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SULFIDE TEST HEAP METALLURGICAL REPORT
BROHM MINING CORPORATION
MAY 1994

Prepared by
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1.0 INTRODUCTION

A sulfide ore heap leach test (STH) was conducted at Brohm Mining Corporation to determine the economic and environmental feasibility of heap leaching sulfide ore. The 46,430 ton heap, crushed to 96.5% minus 1/4 inch, was put under leach on September 26, 1992 at the Gilt Edge Mine. Minus 1/4 inch limestone fines were added to the ore at a 159 pound per ton dry weight ratio. The ore was treated with 2 pound per ton quicklime and agglomerated to a moisture content of 9.8% with 0.1 pound per ton DrewFloc 2440 (a cationic polymer) and 1 pound per ton sodium cyanide barren solution. Both the crushed ore and the ore/limestone mix were assayed for total gold and silver content. Other analyses included determination of total and cyanide soluble copper, sulfur speciation, acid potential peroxide and neutralizing potential.

One pound per ton sodium cyanide (NaCN) leach solution was applied at a rate of 0.005 gpm per sq ft. Breakthrough of solution was attained after 30 hours and solution equilibrium (amount ON = amount OFF) was reached after 3 days. Various parameters including gold, silver, copper and NaCN concentrations and pH were monitored daily on both the influent and effluent solutions. The total gallons per day for each solution was measured with a flow meter and the average gallons per minute calculated. Gold and silver extraction percentages were tracked on a daily basis. NaCN consumption was also calculated daily.

The effluent solution leachate (CELL #5) was collected weekly with various parameters monitored. The influent (ON-SOL) was collected bi-weekly and monitored for the same constituents as the leachate although it was a conglomerate of all the heap effluents from the leach pad.

Static and kinetic testwork was performed on the sulfide test heap material as well as other sulfide ore having various limestone addition amounts. The objective of the testwork was to determine if addition of limestone before or after heap leach cyanidation treatment was effective for mitigation of acid production.

The sulfide test heap was drilled after fourteen months on leach to obtain solid drill hole "tail" samples to compare with the original "head" samples. A final gold and silver extraction percentage was calculated using the solid samples. The "tail" samples were also assayed for total and cyanide soluble copper, sulfur speciation, acid potential peroxide and neutralizing potential.

2.0 SUMMARY AND CONCLUSIONS

2.1 GOLD EXTRACTION

The sulfide test heap achieved gold extraction values which were as good or better than expected. After 441 days on leach the sulfide test heap showed a gold extraction percentage based on the calculated head of 50.5% ± 1.4%. This compares to 54.0% extraction based on the fire assay head and tail residue and 46.9% extraction based on the solution assays and fire head. The predicted gold extraction percentage for the same time frame was 49.2%. Total gold extraction after a two year leach period was predicted to reach 55.0%. Three regression analysis models done on an adjusted actual curve extrapolated gold extraction values to 57.4%, 62.2% and 62.2% after a two year period.

2.2 RATE OF EXTRACTION

Of the 50.5% gold extraction achieved in 441 days based on total contained ounces from the calculated head, the first 10% was recovered in 20 days. 25% was recovered by Day 65 and 40% was recovered on Day 254.

Column testwork conducted on Brohm sulfide ore at various crush sizes (Brohm & Degerstrom Tests) indicate that the rate of gold extraction is proportional to the crush size of the ore. Brohm testwork has also shown that the rate of extraction is highly dependent on the pretreatment of the ore with cyanide solution (i.e. agglomeration with barren solution).

2.3 pH

The pH of the sulfide test heap effluent stayed in the 7-9 range throughout the test which was considerably lower than the planned 10-11 range. The cause was due to an insufficient amount of lime and/or limestone fines. An adequate pH range (10-11) needs to be maintained in order to minimize cyanide consumption.

2.4 CYANIDE CONSUMPTION

A total of 106,478 pounds of NaCN was consumed by the sulfide test heap in 441 days equating to 2.5 lb NaCN/ton ore. The cyanide consumption was directly proportional to the pH values, and therefore erroneously high due to the pH of the heap being low (pH = 7-9 range).

Copper also was a cyanide consumer, estimated to have consumed about 1 lb NaCN/ton ore. Although the copper appeared to leach out in the first 70-90 days with values in excess of 900 mg/l, the copper concentration in the heap effluent remained in the 600-800 mg/l range throughout the test, tying up cyanide molecules. Although the sulfide test heap ore exhibited a relatively high copper content, there is no evidence of elevated copper values in the larger sulfide deposit. (Cite Literature)

Thiocyanate also contributed to some cyanide consumption seeming to attain a steady state at 100-200 mg/l before climbing to above 300 mg/l in the last 20 weeks of the test.

2.5 CYANIDE CONCENTRATION

One lb NaCN/ton solution was maintained throughout the test. This concentration seemed to give the best gold extraction results from previous testwork data and was deemed appropriate at the onset of the test.

2.6 LIMESTONE AND LIME ADDITION

Neut Pot : Acid Pot.

Minus 1/4 inch limestone fines were added to the ore on a 159 pound per ton dry weight basis to maintain a 3:1 NP/AP ratio. This equates to a 3:1 NP/AP ratio based on Acid Potential by Peroxide.

Quicklime (CaO) was added to the ore at 2 lb CaO/ton ore for pH control. A pH range of 10-11 was targeted but the pH stayed below 9 throughout the test period which caused excess cyanide consumption. More study is needed to determine the optimal ratio of CaO and limestone to maintain an elevated pH.

2.7 HEAP STABILITY AND AGGLOMERATION

The sulfide test heap ore agglomerated well with DrewFloc 2440 and barren solution. The agglomerated ore resulted in a fluffy pile which demonstrated excellent flow characteristics.

Heap stability became a problem from the beginning. The side slopes washed out immediately following snow melt and were therefore removed from leach during the first month of the leach cycle. The test heap experienced small scale washouts (<500 tons) periodically throughout the test but became most evident during the spring rains. In fact, leaching was discontinued for a few days during May 1993 to avoid complete side slope failure. The side slopes were put under leach in July 1993 after the rainy season had passed and were sucessfully leached without much more side slope failure. Minus 1/4 inch material does not appear to be a good candidate for larger scale leaching due to the instability of the heap.

2.8 CRUSH SIZE

The final crushed product averaged 96.5% minus 1/4 inch (cubical) with minus 200 mesh averaging 11%.

A sieve analysis showed the majority of the material to be plus 14 mesh and exhibit a light gray color. These fractions averaged 54% gold extraction. The ore between 14 mesh and 200 mesh was dark gray in color and appeared to contain the bulk of the sulfides. These size fractions averaged 53% gold extraction. The minus 200 mesh material, tan in color, obtained 72% gold extraction. The calculated head from the size fraction analysis (0.567 opt Au) was

? vs attained

fairly close to the calculated head from the test heap (0.551 opt Au).

Various crush sizes of ore were run in column tests which showed an inverse relationship between size and final gold extraction values.

2.9 SILVER AND COPPER LEACHABILITY

After 441 days on leach the sulfide test heap showed a cumulative silver extraction percentage based on solution assay data of 54.3%. This compares to 75.8% extraction based on the fire assay of the head and tail residue and 69.1% extraction based on the calculated silver head.

As calculated from the solid head and tail samples, 65% of the cyanide soluble copper was extracted in 441 days on leach while 52% of the total copper was extracted. Copper appeared to leach out of the sulfide test heap ore in the first 70-90 days with values in excess of 900 mg/l before coming to an equilibrium with the influent solution in the 600-800 mg/l range.

2.10 NEUTRALIZATION

Drilled material was collected from the test heap after the leach cycle was completed and loaded in a lab column for neutralization. Wad cyanide initially assayed 849 mg/l and dropped to <2 mg/l (compliance values) after about 3 Ton Solution per Ton Ore (TS/TO) was applied. Historically the TS/TO ratio at the Gilt Edge Mine has been less than 2 TS/TO, although lower initial wad cyanide values were treated.

Two splits of ore were analyzed using a compliance procedure bottle roll after <2 mg/l wad cyanide was achieved in the effluent solution. The compliance value of <0.5 mg/l wad cyanide was attained and the other parameters also passed compliance limits.

The pH of the effluent started out at 7.4 and rose to 8.1 by the end of the Neutralization Solution application. The Neutralization Solution pH was 7.8.

Most of the assay results comparing the neutralization solution and final column effluent were very close except for higher copper and zinc values in the neutralization solution.

2.11 LEACHATE CHEMISTRY

Most of the data from the leachate analyses stayed fairly consistent throughout a sixty-four week period. The "ON" solution showed very similar trends to the leachate data. The "ON" solution consisted of a mixture of the effluents from ALL the heaps and therefore the sulfide test heap was influenced by the same. Many of the total and dissolved metals had minute concentrations. Variances in the concentrations could simply be due to analytical discrepancies.

2.12 STATIC ABA TESTWORK

The sulfide test heap ore before limestone addition averaged total sulfur of 4.63% most of it being sulfide sulfur at 4.45%. Sulfate sulfur averaged 0.19%. A composite of sulfide ore after limestone addition used for column testing showed total sulfur at 4.27%, sulfide sulfur at 4.13% and sulfate sulfur at 0.14%. Acid potential by Peroxide (APP) showed an AP of -29.3 T $CaCO_3$/KT material for the sulfide ore before limestone addition while the sulfide ore after limestone addition averaged an AP of -29.0 T $CaCO_3$/KT. The neutralizing potential (NP) for the material before limestone addition averaged 4.1 T $CaCO_3$/KT giving a net neutralizing potential (NNP) of -25.2 T $CaCO_3$/KT. This NNP value was used for calculating the 3:1 NP/AP ratio for limestone addition requirements. The Static ABA tests were originally meant to be a "yes" or "no" procedure only, not a predictive procedure for amounts. Yes, this ore is acid producing.

2.13 KINETIC TESTWORK

Kinetic testwork was performed at McClelland Laboratories and is outlined in the Gilt Edge Mine Acid Rock Drainage Mitigation Plan (Section 3.7) prepared by Steffen Robertson and Kirsten (SRK), June 1993. As in the humidity cell testing of the limestone amended samples (3.7.3), the STH effluent pH remained above 7.0 for the entire leach period. The sulfate level remained fairly constant in the STH effluent (CELL #5) samples as opposed to the STH humidity cell (HC-7) test which produced sulfate levels of 860 mg/l during the initial week of testing and decreased to 24 mg/l by week 31. This could be attributed to the humidity cell "ON" solution being fresh each time and the "ON" solution of the test heap being a recirculating conglomerate of ALL the heap solutions building in constituent concentrations over a period of time. The unamended head sample produced acid rapidly in the humidity cell test (HC-1) but the testwork showed that adding as little as 60 lb limestone/ton ore mitigated acid generating conditions during a 34 week test period. The sulfide test heap results also show that acid generating conditions did not develop during the leach and neutralization cycles.

2.14 ICP DATA

ICP results for the head and tail samples did not appear to change significantly for most elements. Although every effort was made to obtain representative head and tail samples, their elemental makeup was subject to inherent differences.

3.0 METHODS AND MATERIALS

3.1 ORE DESCRIPTION

The sulfide test heap ore was a blend of Quartz Trachyte and Trachyte Porphry.

3.1.1 Sample Collection

The sulfide test heap ore was collected from two different sulfide stockpiles in proportions representative of the proposed sixteen million ton sulfide project. 10-15% of the test heap ore was collected from Sulfide Ore Stockpile 1, located near the leach pad, and believed to be mostly representative of the Sunday Pit sulfide, i.e. Quartz Trachyte. 85-90% of the test heap ore was collected from Sulfide Ore Stockpile 2, located in the Sunday Pit, and believed to be mainly representative of the Dakota Maid sulfide, i.e. Trachyte Porphry.

3.1.2 Mineralogical Evaluation

Head and Tail samples were submitted to an independent consultant for polished thin section analysis. The head sample came from the SP3 subsample referred to in Section 3.4.3. The tail sample came from a series of drilled samples collected for Lab Column neutralization (Section 3.6). The principal rock type was identified as porphyritic trachyte or latite. Microprobe analysis was performed on the polished thin sections to identify pyrite inclusions and an unidentified leach product that was believed to be blinding off the gold particles.

3.2 CRUSHING

The ore was crushed in three stages using jaw, cone and Barmac crushers with a 95% minus 1/4 inch product targeted. The operating hours for the Brohm Crusher and the wet tons crushed and the operating hours for the Barmac Crusher, the average rpm and the average plus 1/4 inch cubical product was logged daily.

3.2.1 Primary Crush

The ore was primary crushed at a target rate of 250-300 tons per hour through a Model 4248 RT single toggle Allis Chalmers Jaw Crusher with a double Seco Screen Deck, the top deck having 2-3/4 inch holes and the bottom having 1 inch holes. An undetermined amount of water was added to the ore in the jaw crusher for dust control. The jawed product went to a cone crusher for the secondary crush.

3.2.2 Secondary Crush

The secondary crusher was a 2-arm 600 Allis Chalmers Hydrocone Cone Crusher with a 10 inch bowl and a target crush size of less than 10% plus one inch. Water was added to the material prior to and after the crush for dust control. Quicklime was added to the crushed product at a rate of 2 pound per ton. The product was

stacked in a reclaim stockpile on top of a 36 inch reclaim tunnel with belt scale which fed a 81 foot conveyor leading to the screen decks.

3.2.3 Tertiary Crush

The tertiary crush was provided by a 9600 portable Barmac diesel powered crusher. Materials and labor on steel wear and replacement parts for the Barmac averaged $0.24-$0.26 per ton. A tunnel conveyor system fed a 6 X 16TD quad 1/4 inch screening plant comprised of two 1/4 inch X 1 inch screen cloths and two 3/16 inch X 1-1/2 inch screen cloths. Both screen cloths had a long slot cross flow and were made of 12 gauge standard steel. Materials and labor for screen wear averaged $0.06-$0.08 per ton.

The plus 1/4 inch material went to the Barmac crusher where water was added for dust control. The Barmac product went back to the screening plant where the minus 1/4 inch material fell to an underscreen stacker which fed a 36 inch X 82 foot Barmac C.C. conveyor leading to a 30 inch X 80 foot stacker. The stacker feed was placed in a stockpile.

Power consumption for the Barmac crusher and screen deck apparatus averaged 261 KW/hr.

3.3 STACKING

Ore from the Barmac stacker feed stockpile was trucked to a pug mill/stacking conveyor system proximinal to the heap leach pad where it was stacked at a target rate of 300-500 tons per hour. The pug mill/stacking conveyor system's power consumption averaged 245 KW/hr.

3.3.1 Hopper Feed

Ore from the Barmac stacker feed stockpile was trucked to the hopper stockpile. The hopper stockpile material was fed to the hopper with a 966E front end loader. Average tonnage per bucket load and the number of bucket loads of material were tracked on a daily basis and tonnage to the heap calculated. Limestone fines were added to an additional hopper at approximately 150 lb limestone per ton ore with the limestone feed belt calibrated daily. The limestone fines mixed with the ore on the belt which fed the pug mill. The tonnage being placed on the heap was also determined on a daily basis by measuring the belt movement in feet per minute and weighing the wet tonnage on a segment of the belt. The moisture content of the ore and limestone fines were determined daily and the ton material moving on the belt per hour calculated. The operating hours for the pug circuit was tracked daily.

3.3.2 Pug Mill

The ore/limestone mix was agglomerated in a trap/feeder pugmill

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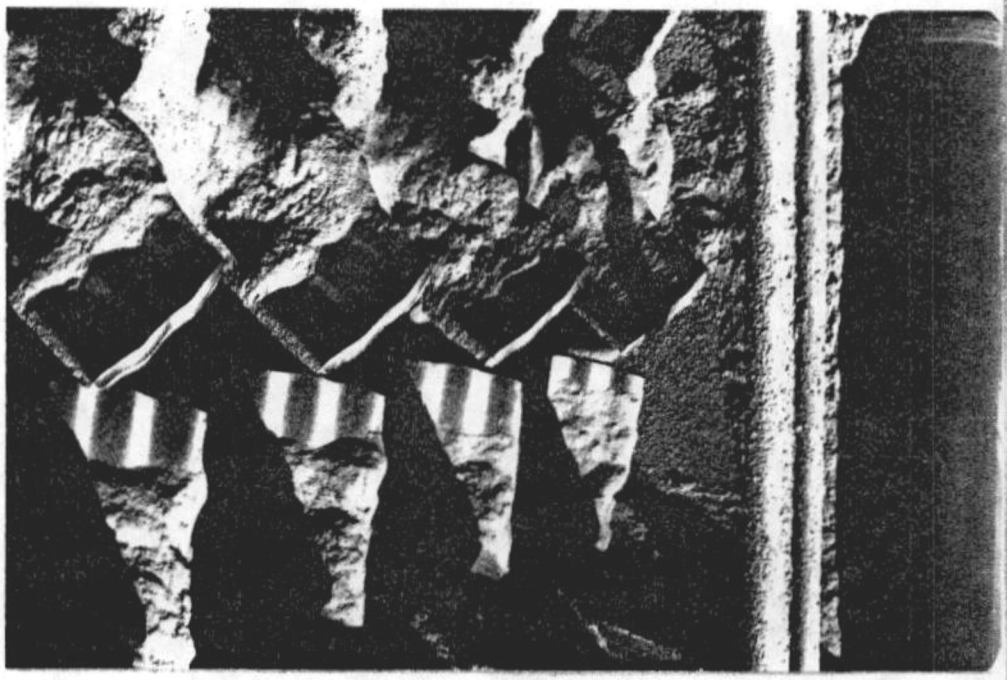

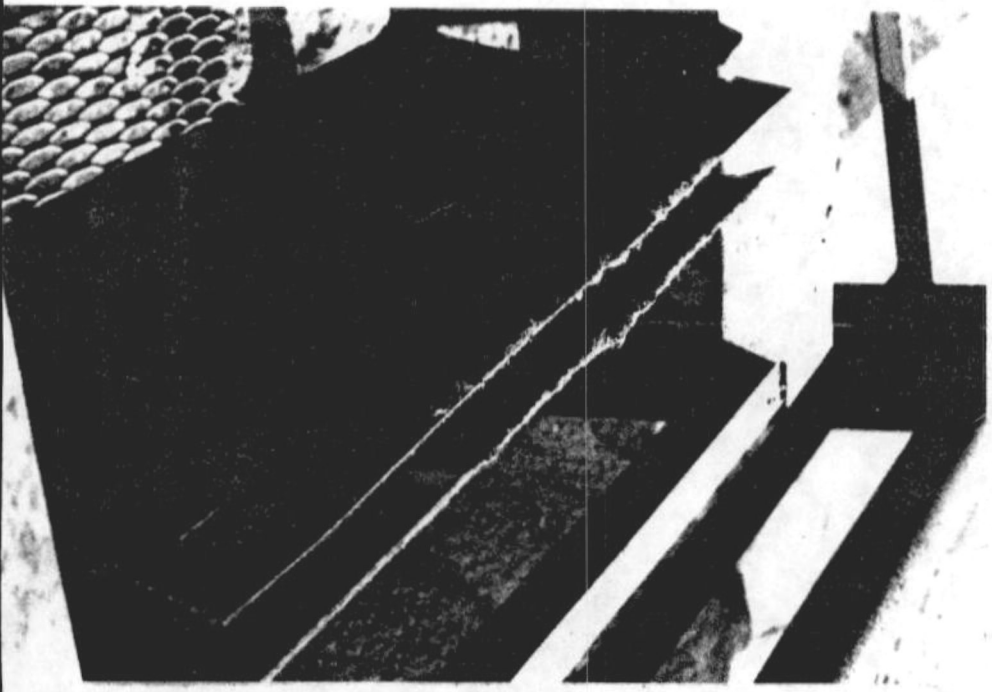

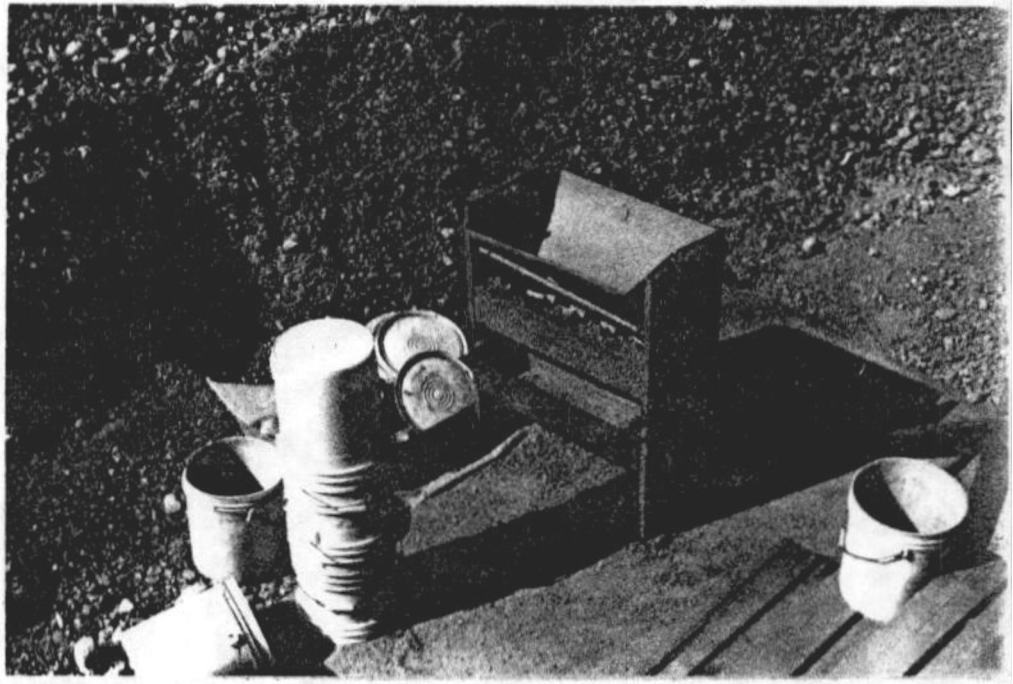

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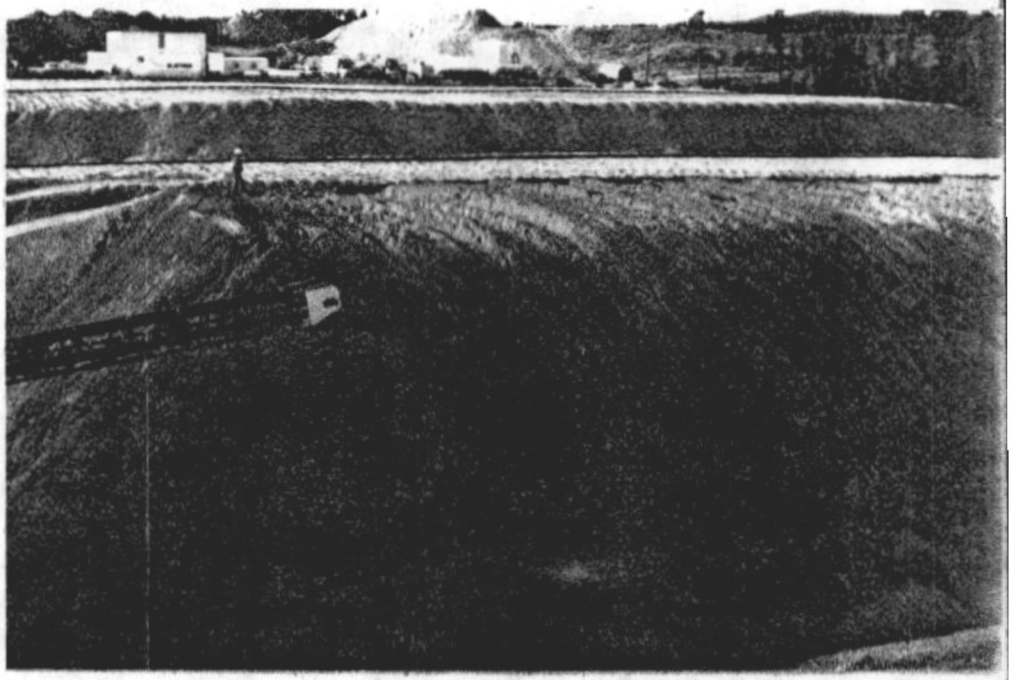

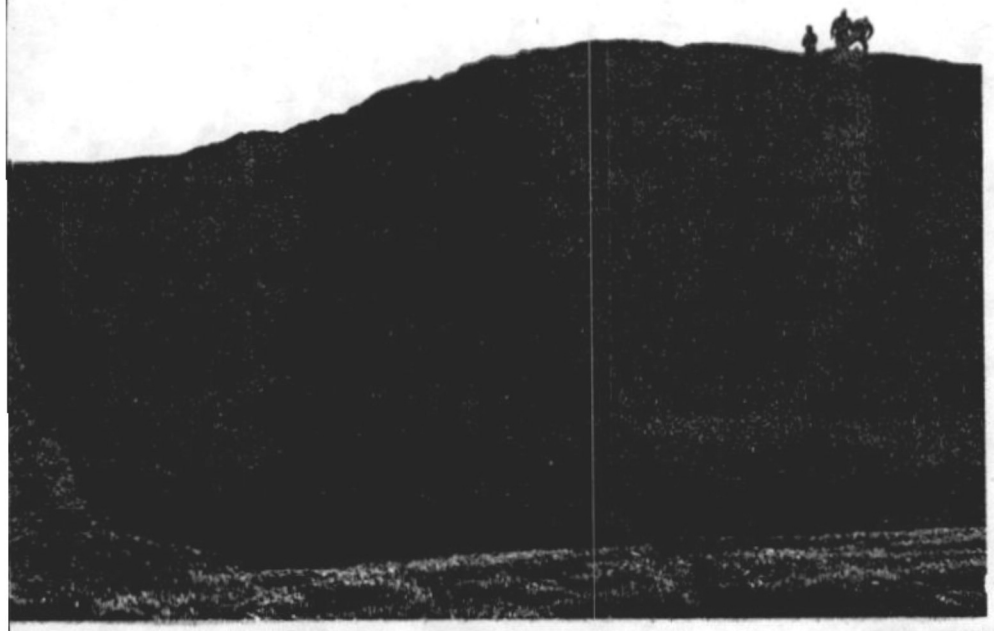

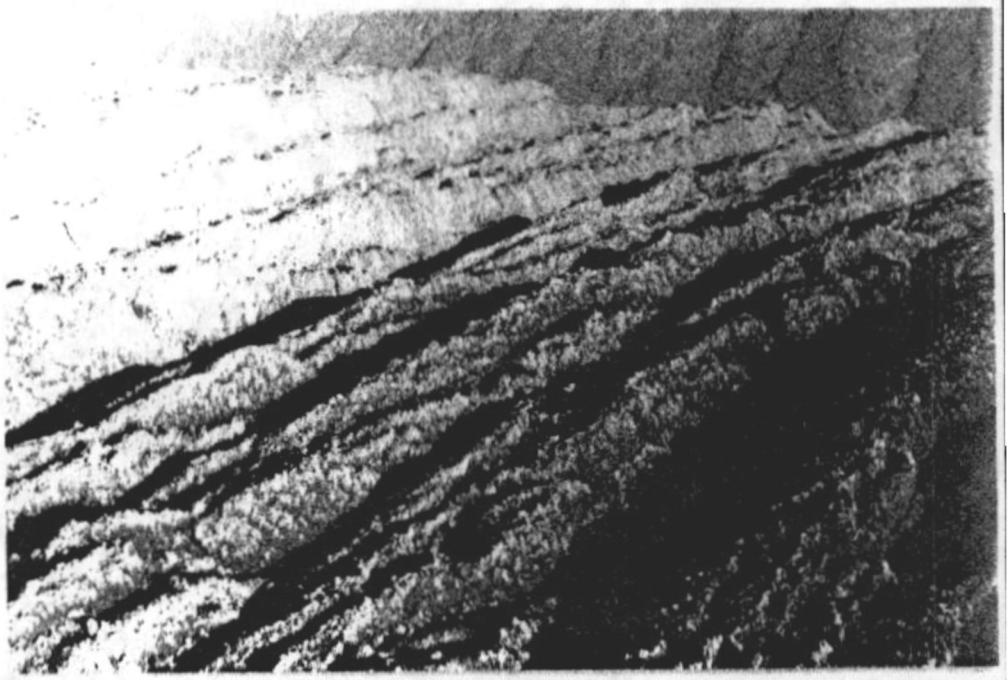

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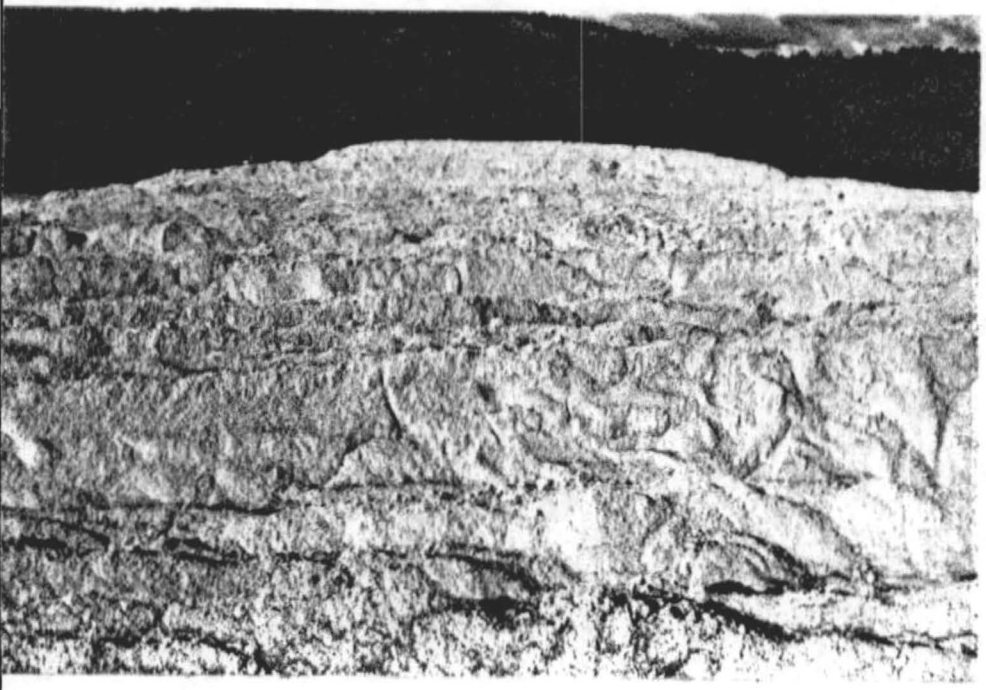

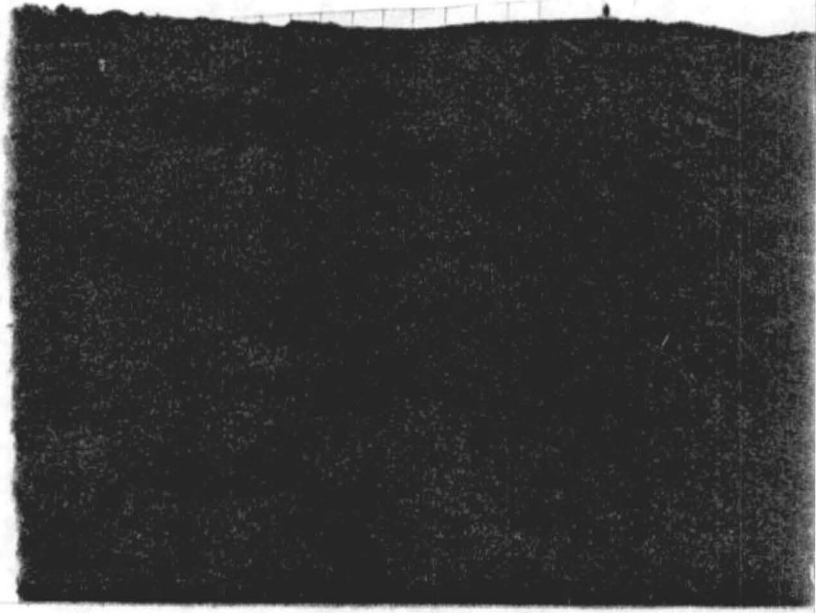

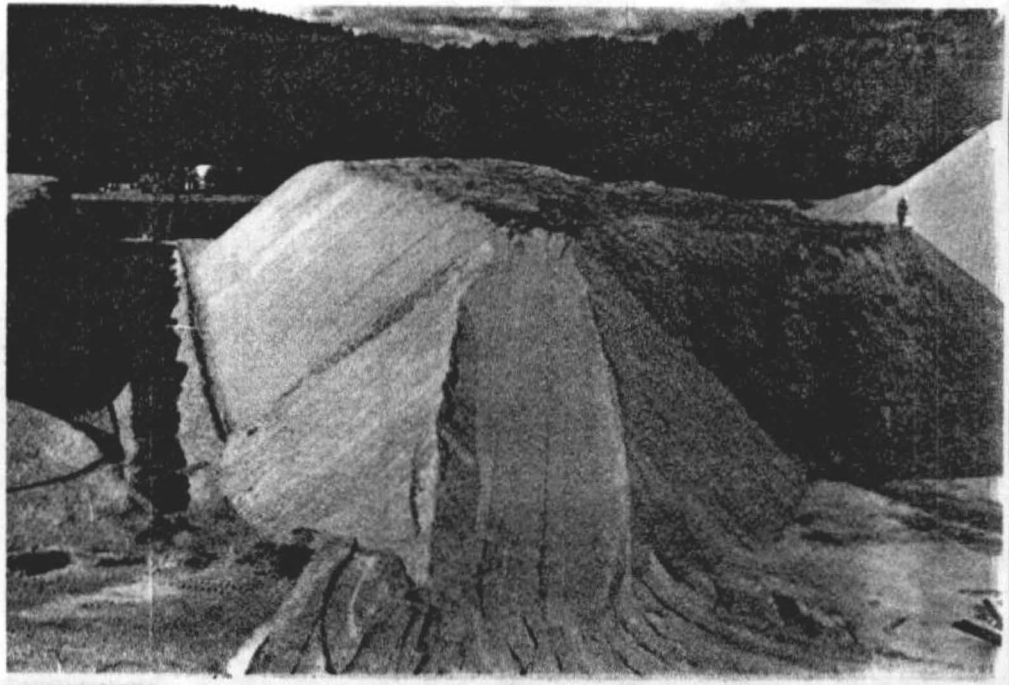

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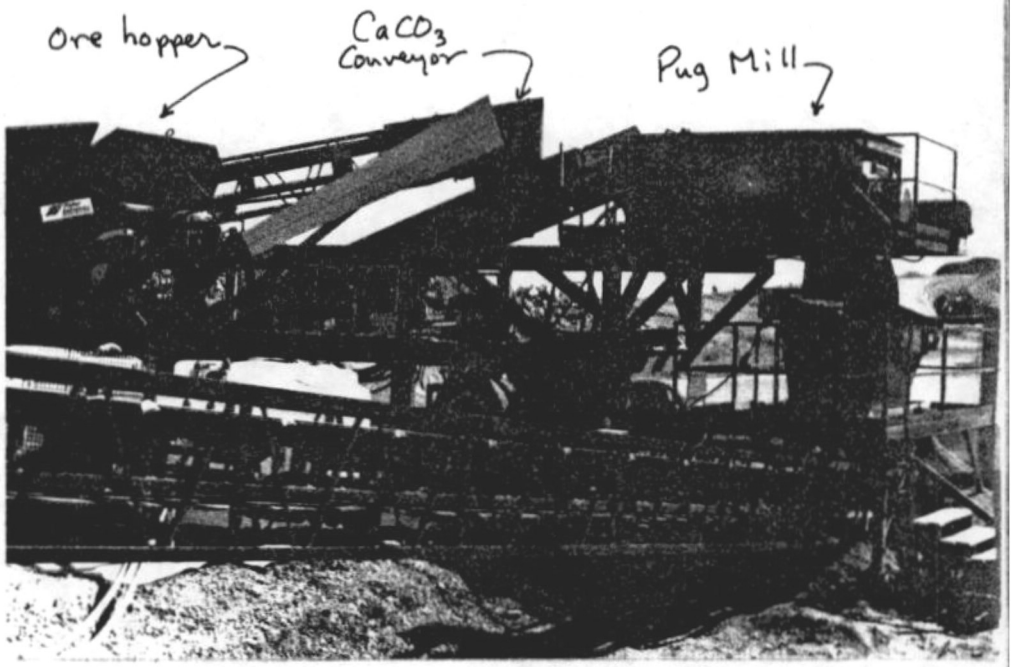

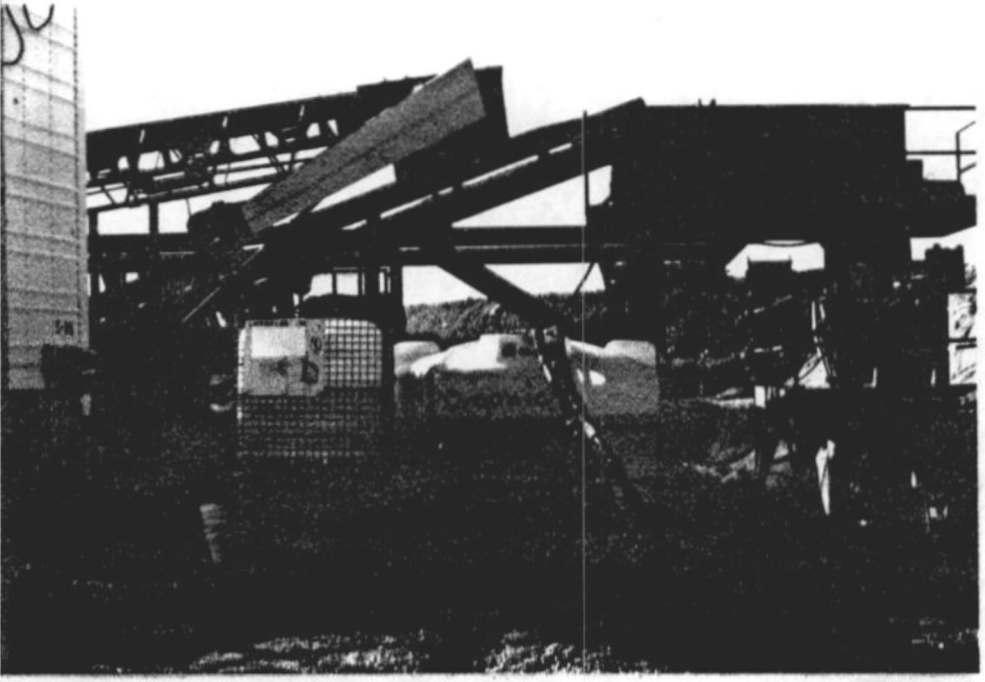

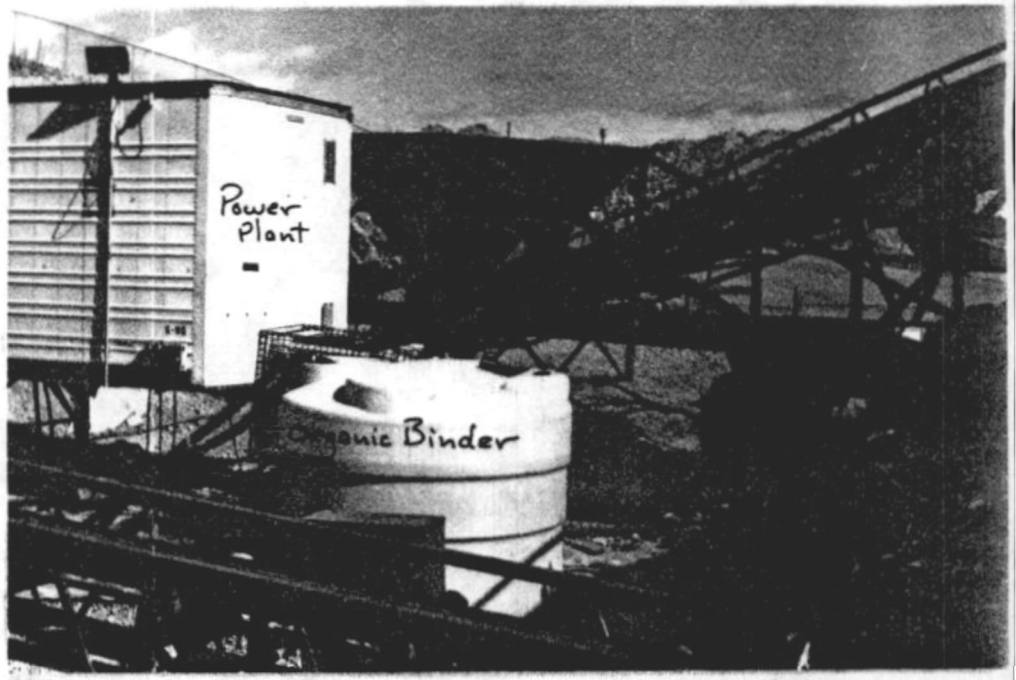

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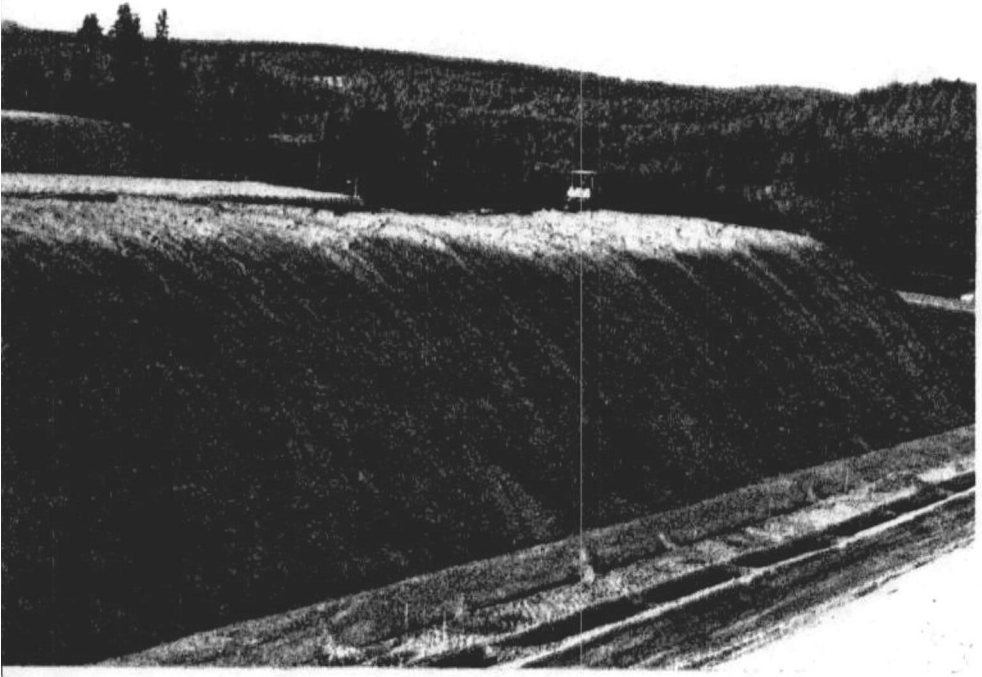
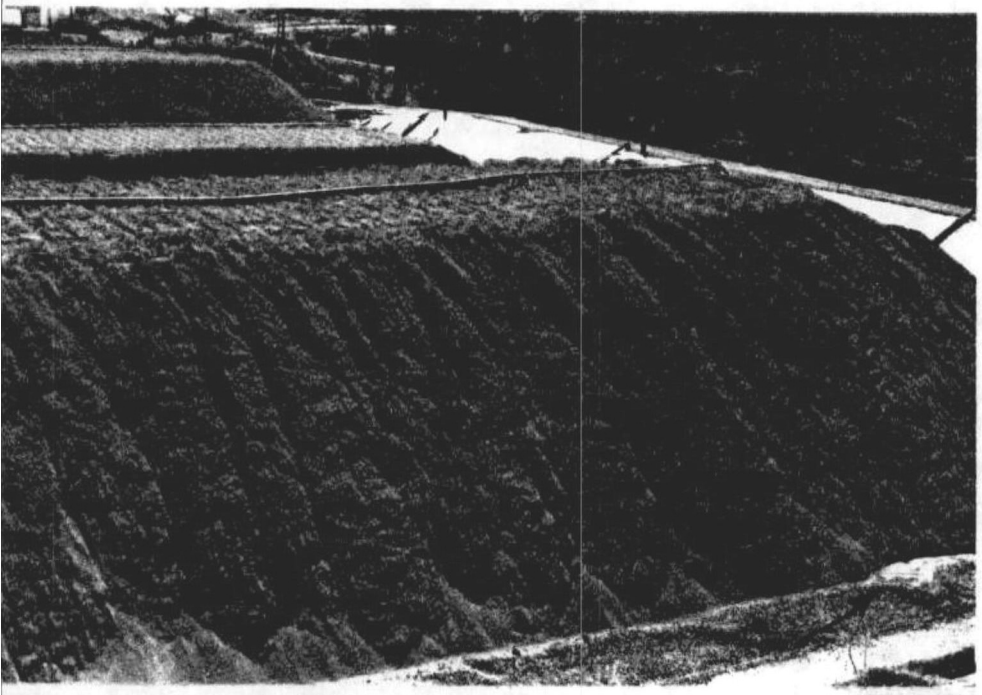
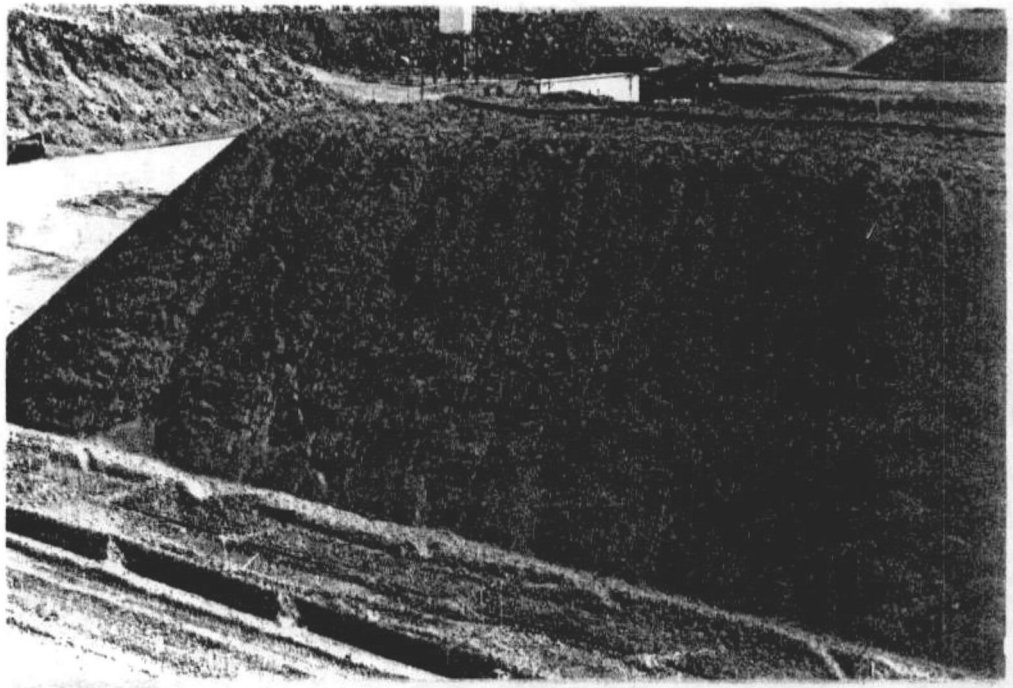






with 1 lb per ton NaCN barren solution and 0.1 lb per ton DrewFloc 2440, a cationic polymer, to a targeted moisture content of 10%. The DrewFloc dispersal rate in ml/min and the amount of barren solution used (gpm) was measured daily. The agglomerated product fed the conveyor system.

3.3.3 Conveyor System

The conveyor system consisted of one 36 inch X 225 foot transfer conveyor and four 30 inch X 85 foot mobile conveyor belt units leading to a radial stacker with tracks. The 30 inch X 130 foot stacker luffed continuously, except in the corners, and it was withdrawn in 2 foot increments. The ore was piled at a target rate of 300-500 ton per hour.

3.3.4 Heap

The heap was stacked to 33 feet at a side slope angle of repose of 38°-39°. Upon completion, a D4 dozer made a single pass over the heap to fill in the valleys. The average dry ore/limestone mix bulk density was found to be 91.8 lb/ft^3. An initial survey was done on the heap and the total contained dry tons of ore/limestone mix calculated. The final estimated dry ton ore/limestone mix figure was based on an average between the surveyed value and the amount calculated from the ton per hour belt calibration as described in Section 3.3.1. These two values were thought to have provided the most accurate tonnages. A 6 inch HDPE header was placed along the centerline of the heap's top and emitter lines, on 32 inch spacings, were fed from it. The half inch drip lines with 2 gph emitters, spaced every 32 inches, were buried 18 inches into the heap. Drip lines on the side slopes of the heap had 1 gph emitters. One foot trenches holding 6 inch perforated pipe were placed on either side of the heap to avoid solution infiltration from the other heaps.

3.4 SAMPLING

Samples were collected on a daily basis from three separate sampling points (SP) for various parameter analyses and storage for subsequent testwork. The heap was drilled after 441 days on leach and solid "tail" residue collected.

3.4.1 SP1

Sample point 1 was located at the Brohm Autosampler after the secondary crusher. It consisted of a minus 10% plus one inch product. The sampler cross cut the belt every 15 minutes and composited a 500 lb sample daily. A split of this sample was assayed for size distribution, moisture content, pH, gold and silver (total by fire assay method and cyanide extractable by hot NaCN shake method), cyanide soluble copper and total copper by acid digestion, sulfur speciation by gravimetric procedures, acid potential peroxide and neutralizing potential. Subsamples were composited and archived for subsequent column testwork on recovery

vs crush size.

3.4.2 SP2

Sample point 2 was located at the Barmac stacker feed stockpile which consisted of the minus 1/4 inch Barmac product without limestone addition. Every hour 25 random scoopfuls were obtained from the stockpile and placed in a 55 gal barrel. Two barrels were filled per day. Along with field sampling to determine any oversize ore using a 1/4 inch sieve, a 1000 gram subsample (dry) was processed daily through a Rotap to ascertain the individual amounts for +4 mesh, +14 mesh, +28 mesh, +48 mesh, +100 mesh, +200 mesh and -200 mesh. Wet screen analyses were processed in the same manner to compare with the dry screen data. The daily barrel samples were composited and stored for future testwork.

3.4.3 SP3

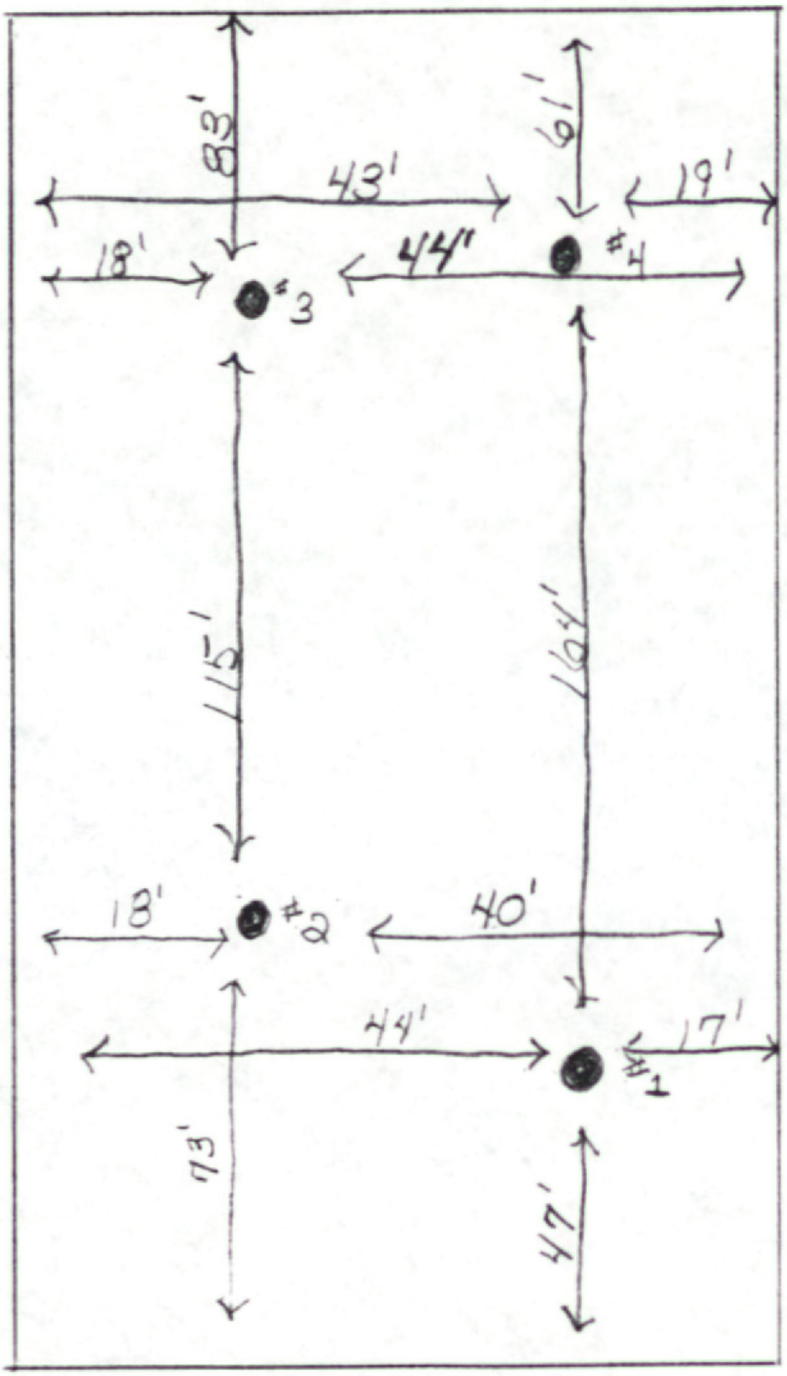
Sample point 3 was located after the pug mill and consisted of the agglomerated product after limestone addition. The sample was obtained from an automated sampler which cut the sample stream every hour. Approximately 200 pounds of sample was collected daily and sample splits were assayed for moisture content, pH, gold and silver (total by fire assay method and cyanide extractable by hot NaCN shake method), cyanide soluble copper, acid potential peroxide and neutralizing potential. Subsamples were composited and parallel test columns were run for comparison with the test heap. A split of the subsample composite was used for a "head" sample with size fraction Au and Ag assays run along with various other environmental and mineralogical testwork.

3.4.4 SOLID TAIL SAMPLE - Figure 3.4.4-1.

3.5 LEACH

The sulfide test heap was leached at 0.005 gpm/ft^2 which corresponded to 80 gpm. At the start of leaching the test heap was hooked up to the neutralization circuit in order to utilize the "ON" solution and "OFF" solution flow meters. When an equilibrium was established, the test heap continued leach on the leach circuit with a flow meter only measuring the "ON" solution. The "ON" solution flow (gpm) and psi were monitored every two hours and a solution totalization was taken every 12 hours. The totalization figure was used for calculation purposes except when the flow meter broke. Then psi was used to calculate average gpm. Daily precipitation levels were recorded and from known data figures it was estimated that one inch precipitation correlated to 50,000 gallons on Cell #5 where the test heap was located. Therefore the appropriate ratio of gallons were added to the effluent total gallons over a two day period (since it takes aproximately two days for the solution going into the heap to come out the bottom) to take into account the additional gallons from precipitation. In addition to gpm and psi, Au (opt), NaCN (lb/ton) and pH were monitored every two hours throughout the duration of the test. Solution samples were composited every two hours over a 24 hour

Cell 5 holes 0-27'



3.4.4-1.
Figure ~~3.6.4.~~

Haul Road

East

period for the "ON" and effluent solutions and assayed daily. The solutions were assayed for Au (opt), Ag (opt) and Cu (ppm) by flame Atomic Absorption Spectroscopy, pH and NaCN (lb/ton) by silver nitrate titration.

3.6 NEUTRALIZATION

Approximately 300 lb of sample was collected by drilling the test heap. About 150 lb of sample was placed in an 8 inch diameter by 5 ft column and rinsed with actual neutralization solution from the Brohm processing facilities. The sample effluent was monitored daily for pH and wad cyanide concentration using the Picric Acid Method of determination. When the sample effluent reached 2 ppm wad cyanide, the column ore was unloaded and a split was sent to an outside lab for analyses by a bottle roll procedure used for off-load criteria. The neutralization solution and final column effluent were analyzed for various parameters. A second split was analyzed by the bottle roll procedure for comparison purposes.

3.7 ENVIRONMENTAL MONITORING

The following tests were conducted on the sulfide test heap to monitor environmental aspects of the test.

The sulfide test heap leachate effluent was collected weekly and analyzed for an array of parameters by an outside lab. The "ON" solution was collected bi-weekly and analyzed for the same parameters as the effluent samples. It must be noted that the "ON" solution, however, was a mixture of ALL the effluent solutions from the leach pad with the gold removed. The sulfide test heap circuit was therefore not closed to the influence of the other heaps.

Static ABA testwork was conducted on head and tail samples from the sulfide test heap. Leco furnace sulfide percentages were used to calculate a modified ABA while acid potential by peroxide was used to determine, at the onset of the test, the amount of limestone addition necessary to equal a 3:1 ratio.

Kinetic testwork was done at McClelland Laboratories in an attempt to determe the correct amount of limestone addition to prevent acid generation after the leach cycle.

A 32 element ICP analysis was performed on the head and tail samples to try to quantify metal mobility during the leach cycle.

3.7.1 Leachate

The effluent solution leachate (CELL #5) was collected weekly and the influent (ON-SOL) collected bi-weekly with the field pH, field conductivity and field temperature recorded. Samples were submitted to an outside lab for analyses on various parameters including conductivity, hardness, pH, total dissolved solids (TDS), total suspended solids, (TSS), alkalinity - bicarbonate and carbonate, chloride (Cl), total cyanide, weak acid dissociable

(wad) cyanide, free cyanide, thiocyanate (SCN), sulfate (SO_4), and nitrogen as ammonia (NH_3), nitrate (NO_3), and nitrite (NO_2). Metals were monitored weekly and included total and dissolved aluminum (Al), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), iron (Fe), lead (Pb), manganese (Mn), selenium (Se) and zinc (Zn). Total mercury (Hg) and dissolved calcium (Ca), magnesium (Mg), potassium (K) and sodium (Na) were also monitored.

Sixty-four weekly leachate samples were submitted for the above analyses. The first ten metals samples were preserved with nitric acid according to EPA protocol. The acid was destroying the cyanide-metal complexes in the process water samples and precipitating some of the metals as seen especially in the copper analyses. Samples from weeks eleven through thirteen were analyzed both preserved and unpreserved for comparison purposes and the remainder of the samples were collected unpreserved.

3.7.2 Static ABA

The daily composite samples (SP1 and SP3) were analyzed for Neutralizing Potential and AP by Acidity Potential by Peroxide method. The daily values were averaged by ore weight percent to come up with a final determination for each. NP and AP analyses were run on each of the four solid drill hole "tail" samples and their results mathematically averaged. Subsamples of the "head" sample from the parallel test column A (Section 3.4.3) was submitted for an ABA using a Leco furnace for sulfur determinations. A composite of the four solid drill hole "tail" samples was submitted for the same analyses. NNP (Net Neutralizing Potential) was calculated using the AP by Peroxide and NP results, ABA (Acid Base Accounting) was calculated using the total sulfur by Leco results and a modified ABA was calculated using the sulfide sulfur results.

3.7.3 Kinetic ABA

Kinetic testwork (humidity cell) was performed at McClelland Laboratories and is outlined in the Gilt Edge Mine Acid Rock Drainage Mitigation Plan (Section 3.7) prepared by Steffen Robertson and Kirsten (SRK), June 1993.

3.7.4 ICP

A "head" sample was submitted for a 32 element ICP analyses and Selenium by digestion with an AA finish. The solid drill hole "tail" composite referred to in Section 3.7.2 was submitted for the same suite of ICP analyses.

4.0 RESULTS AND DISCUSSION

4.1 CONDITION SUMMARY & SURVEY DATA

Table 4.1-1. Sulfide Test Heap Summary.

Dry Tons Ore/Limestone Mix	46430
Calculated Dry Tons Ore	43003
Calculated Dry Tons Limestone	3427
$CaCO_3$ Added (lb/Ton Ore)	159
CaO Added (lb/Ton Ore)	2
DrewFloc 2440 (lb/Ton Ore)	0.1
% Moisture in Agglomerated Mix	9.8%
NaCN in Agglomeration (lb/Ton Soln)	0.89
Oz Au Added in Agglomeration	16.989
Oz Ag Added in Agglomeration	18.079
CRUSH SIZE:	
% + 1/4"	3.5%
% -200 mesh	11%
HEAP HEIGHT:	
Initial (Ft)	31.3
Final (Ft)	31.3
Bulk Density (lb/Ft^3)	91.8
INITIAL SURVEY VOLUME:	
Cubic Feet	955199
Square Feet	15930
FINAL SURVEY VOLUME:	
Cubic Feet	908480
Square Feet	15873

Table 4.1-1 shows a summary of the sulfide test heap conditions. The dry tons ore/limestone mix was derived from an average of the initial survey tons (955199 ft^3 x 91.8 lb/ft^3/2000 lb/ton) and the reported belt calibrated tons from the SP3 Loading Data Sheet (Appendix I).

$$46430 = (43844 + 49016)/2$$

The dry tons of ore and limestone were calculated from the dry tons ore/limestone mix and the ore/limestone ratio of 159 lb limestone/ton ore. It is worth noting that the calculated dry tons of ore (43,003) compares very favorably with the final dry ore value derived (42,700) for the Blattner and Fisher billing.

Table 4.1-2 shows the initial survey data. Figure 4.1-1 shows the final survey map and data. The final survey volume reflects shrinkage and the slumping or instability of the heap.

4.2 GOLD EXTRACTION

TABLE 4.1-2. Sulfide Test Heap Initial Survey Data.

Cell 5
Sulfide Test Heap

The survey of the agglomerated sulfide material put on cell 5 took place as follows:

Toe & Crest	-	9/22/92
Final Toe	-	9/25/92
Final Crest	-	9/26/92
Ramp	-	9/26/92

The final crest and ramp surveys were taken after smoothing but before leaching was begun.

The area of the crest : 15,930.3 sq. ft.
The area of the toe : 46,705.7 sq. ft.

The height of the stacked material: 30.4 ft. using 263 samples
The average angle of repose: 36.8 degrees using the same 263 sample points.
The height ranged from a maximum of 32.0 ft. to a minimum of 29.0 ft.

Further breakdown shows:	Height feet	Minimum	Maximum	Angle of Repose (degrees)	Number of Samples
For the East side :	30.5	29.9	30.7	38.9	26
For the Northeast corner :	30.3	30.0	30.5	38.2	9
For the Southeast corner :	30.8	30.5	31.4	39.2	10
For the South side :	30.8	29.9	31.4	35.3	59
For the Southwest corner :	30.7	30.4	31.0	32.1	13
For the Northwest corner :	29.7	29.6	29.7	36.3	12
For the West side :	30.6	29.7	31.0	38.0	47
For the North side :	29.9	29.0	30.7	36.8	87
For the Centerline :	31.25	30.7	32.0		4

The volume of the material on the cell is:

(15930.3 + 46705.7) * 30.5 / 2

955,199 cu. ft.

@ a density of 91.8 pounds per cu. ft.

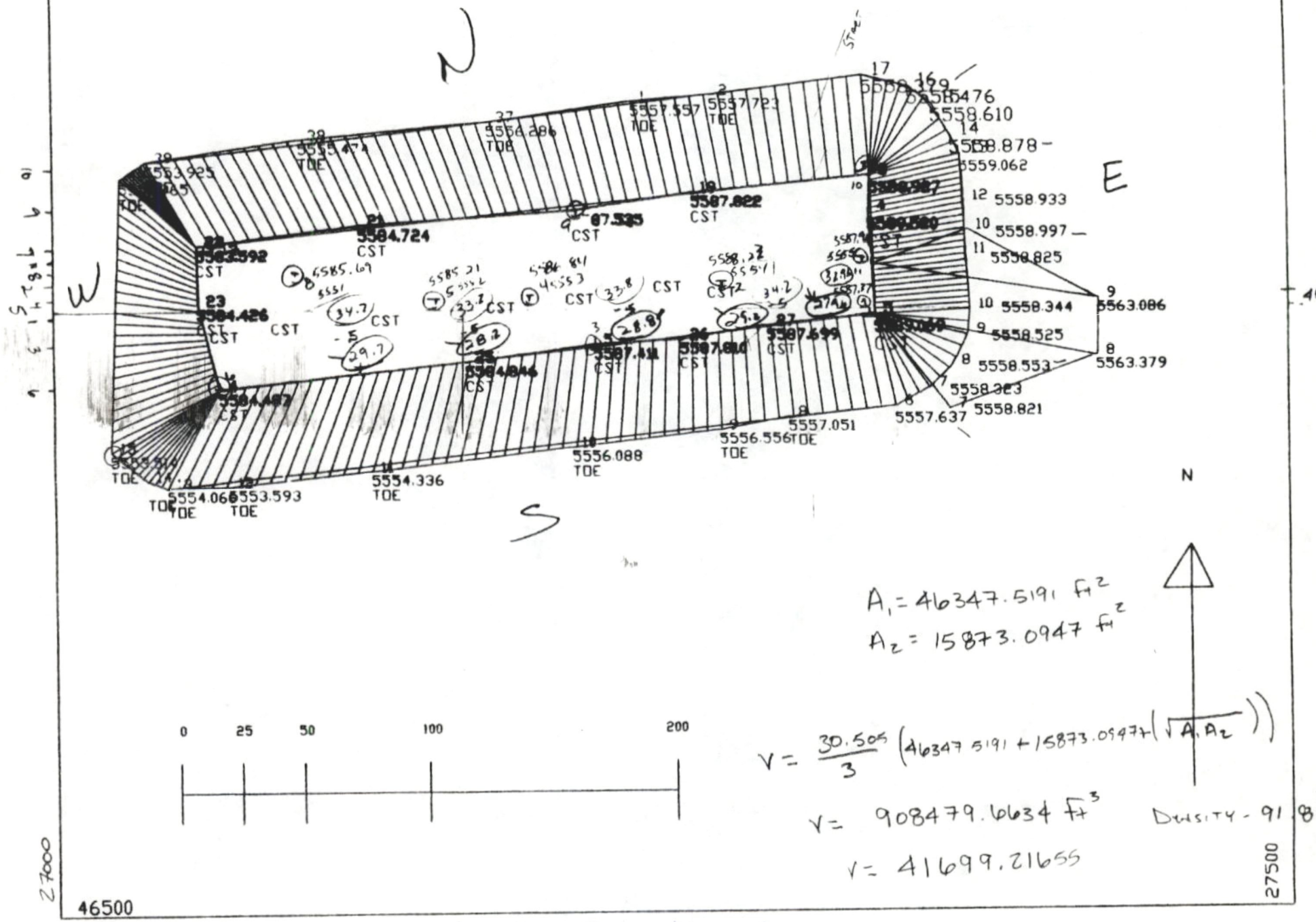
87,687,268 pounds

or 43,844 tons

AREAS of Slopes

The southeast corner:	1,306.1 sq. ft.
The southwest corner:	781.5 sq. ft.
The northwest corner:	324.2 sq. ft.
The northeast corner:	1.320.2 sq. ft.
The north side :	14,365.8 sq. ft.
The south side :	15,175.9 sq. ft.
The east side :	2,859.2 sq. ft.
The west side :	4,373.5 sq. ft.
Total area :	40,506.4 sq. ft.

Area covered by ramp : 1,307.5 sq. ft.



$A_1 = 46347.5191\ ft^2$

$A_2 = 15873.0947\ ft^2$

$V = \frac{30.505}{3}\left(46347.5191 + 15873.09477 + \left(\sqrt{A_1 A_2}\right)\right)$

$V = 908479.6634\ ft^3$

$V = 41699.21655$

Density - 91.8 #/ft

Figure 4.1-1. Sulfide Test Heap Final Survey Map.

SULFIDE TEST HEAP GOLD EXTRACTION CURVE ACTUAL, ADJUSTED ACTUAL & PREDICTED

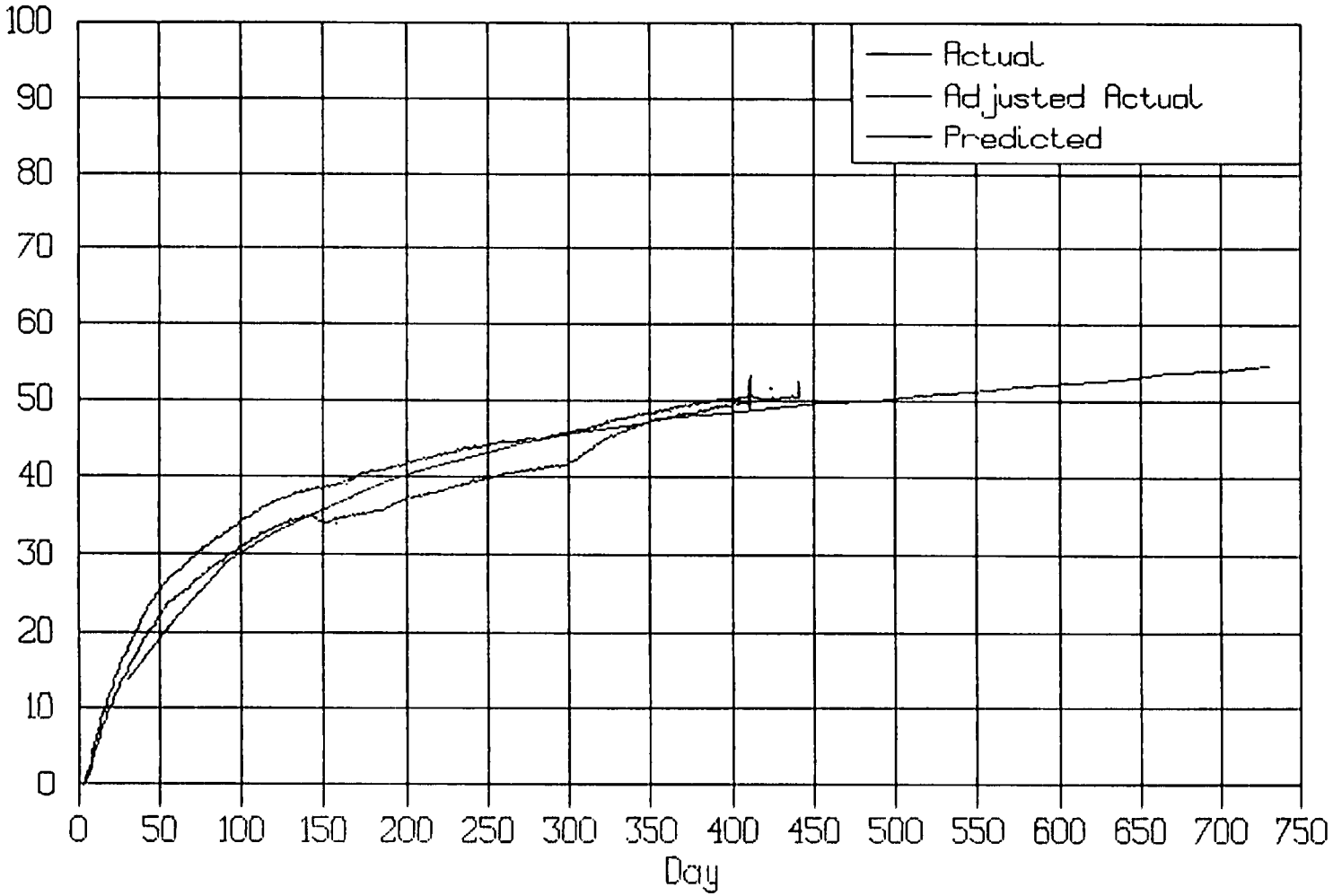


Figure 4.2.1–1. Sulfide Test Heap Gold Extraction Curve Comparisons.

Three gold extraction curves were developed for the sulfide test heap. They were a theoretical predicted curve, the actual extraction curve derived from daily assay data and an adjusted actual curve for regression analysis purposes.

The gold extraction was calculated in three ways on a total contained ounce basis from the head/tail assays, solution assays and the calculated head.

Gold extraction rates were not only observed from the adjusted actual extraction curve, but also from data produced from column tests of sulfide test heap ore run at various crush sizes. It became apparent from the column tests that agglomerating with barren solution had a profound effect in extracting the gold with a flush at the beginning of the cycle.

Three different regression analysis models were used to generate extrapolated curves from the adjusted actual curve.

4.2.1 Gold Extraction Curves

Three gold extraction curves were developed. A theoretical predicted gold extraction curve was developed prior to the commencement of the Sulfide Test Heap for tracking purposes throughout the test. The actual curve was derived from daily solution assays and the contained ounces from the calculated head. An adjusted actual gold extraction curve was formulated in an attempt to smooth out the areas of deviation in the actual curve for regression analysis purposes. The three curves are compared in Figure 4.2.1-1.

4.2.1.1 Predicted Curve

The theoretical predicted gold extraction curve was developed from a combination of column testwork done at Degerstrom Labs, indicating an attainable 55% total gold extraction in a two year period, and actual gold extraction curve data from previous Gilt Edge Mine heaps and column testwork.

4.2.1.2 Actual Curve

The actual gold extraction curve was derived by dividing the calculated daily net cumulative gold ounces by the total contained gold ounces derived from the calculated head.

The actual gold extraction curve has two distinct areas of deviation from the curve slope. One occurs at about Day 150 and the other occurs at about Day 300 as illustrated in Figure 4.2.1-1.

The first area of deviation occured when "preg building" was implemented in the processing stage. Gold content was allowed to concentrate in the process solution by not recovering it in the Merrill-Crowe Plant. During this period the "ON" solution gold

grade actually assayed higher than the effluent solution grade coming off the heap. Because of this gold concentration gradient, the heap appeared to lose some gold extraction percentage. When the preg building ceased, the gold extraction rate rose sharply until an apparent equilibrium was again maintained (i.e. the slope resumed as it had before the preg building influence interval).

The second area of deviation occured when the unleached side slopes were put under leach, Day 297-305. Due to the instability of the ore on the oversaturated sides during winter/spring 1992-1993, the side slopes were left off leach until July 1993. A steepened incline in the extraction slope occured when the sides were put under leach.

4.2.1.3 Adjusted Actual Curve

An adjusted gold extraction curve was formulated in an attempt to smooth out the areas of deviation in the actual curve for regression analysis purposes.

During the preg building phase the percent gold extraction dropped off and then rose sharply. Since during this 25 day period, (Day 141-165), the data did not contribute to the overall extraction percentage, those days were simply deleted from the data base for the adjusted actual curve (Table 4.2.1.3-1).

When the side slopes were put under leach it is estimated that the gold extraction gained an additional 3.3% (Table 4.2.1.3-2). Since these slopes should have been on leach since the heap's conception, the additional extraction percentage was moved from Day 301-343 to Day 4-46. This better reflects the gold extraction for all of the test material from the beginning of the leach cycle rather than the unleached portions of ore being treated as a separate test (i.e. as though fresh ore was added in July 1993).

Table 4.2.1.3-1. Preg Building Influence Interval.

Au Extraction Database		
Day	Cum % Au Extraction	Description
139	34.903	
140	34.937	
141	34.959	PB
142	34.965	*
143	34.967	*
144	34.880	*
145	34.747	*
146	34.607	*
147	34.460	*
148	34.331	*
149	34.229	*
150	34.134	*
151	34.062	*
152	34.044	*
153	34.134	*
154	34.284	*
155	34.396	*
156	34.515	*
157	34.567	*
158	34.599	*
159	34.665	*
160	34.708	*
161	34.783	*
162	34.841	*
163	34.892	*
164	34.929	*
165	34.952	*
166	34.978	
167	35.037	
168	35.077	
169	35.126	

PB = Preg Building * =Preg Building Influence

Table 4.2.1.3-2 Percent Au Extraction Determination from Side Slope Contribution.

Day	Actual Percent Cum Extraction	~~Cum~~ Percent Extration per 12 days	Description
12	5.8	5.8	
24	12.4	6.6	
36	17.2	4.8	
48	21.3	4.1	
60	24.3	3.0	
72	26.5	2.2	
84	28.6	2.1	
96	30.3	1.7	
108	32.0	1.7	
120	33.5	1.5	
132	34.5	1.0	
144	34.9	0.4	*
156	34.5	-0.4	*
168	35.1	0.6	*
180	35.6	0.5	*
192	36.4	0.8	*
204	37.4	1.0	*
216	37.9	0.5	@
228	38.7	0.8	@
240	39.4	0.7	@
252	39.9	0.5	@
264	40.5	0.6	@
276	41.0	0.5	@
288	41.5	0.5	@
300	41.8	0.3	@

	Actual Percent	Cum Extration	
312	43.6	1.8	-0.5
324	45.2	1.6	-0.5
336	46.2	1.0	-0.5
348	47.1	0.9	-0.5
360	47.8	0.7	#
372	48.3	0.5	#
384	48.7	0.4	#
396	49.3	0.6	#
408	49.7	0.4	#
420	50.1	0.4	#
432	50.3	0.2	#

PB = Preg Building SS = Side Slopes (under leach)
* = Preg Building Influence # = After SS Influence
@ = After PB Influence and Before SS Influence

Since *, @ and # time intervals all averaged +0.5% Au extraction/12 days, I assumed that the actual % extraction for each 12 day period during the side slope extraction period should be 0.5%. Therefore, I subtracted 0.5% from the actual extraction to determine what % should be attributed to the side slope recovery.

4.2.2 Gold Extraction Determinations

Gold extraction percentages were calculated using three methods as shown in Table 4.2.2-1. Classic fire assay techniques were used to determine the head (Loading Data - Appendix I) and tail grades of the solid samples. Gold grade in the effluent was assayed daily and the cumulative net solution ounces calculated from the assay and the tons of solution. These results are recorded in the daily log data (Appendix II).

Also shown in Table 4.2.2-1 is the variance of gold extraction percentages between the survey tonnage and the calibrated belt tonnage. The percent extraction based on the calculated head (#3) is believed to be the most valid because the tail assays had excellent reproducibility (Table 4.2.2-2) and any error inherent to the solution assay data would cancel in the equation. Therefore the reported extraction is 50.5% ± 1.4%. This 50.5% gold extraction in 441 days was used to calculate the actual curve. This corresponds to a predicted value of 49.2% in the same time frame.

Table 4.2.2-1. Gold Extraction Sulfide Test Heap.

	SURVEY TONNAGE	BELT TONNAGE	AVERAGE TONNAGE
Tons	43844	49016	46430
Head Au (opt) w/ Agglom	0.0597	0.0597	0.0597
Contained Au oz (Head)	2617.487	2926.255	2771.871
Au oz from Agglomeration	16.989	16.989	16.989
Corrected Au oz (Head)	2600.498	2909.266	2754.882
Cum Net Soln oz from Leach	1290.700	1290.700	1290.700
Tail Au (opt)	0.0273	0.0273	0.0273
Contained Au oz (Tail)	1196.941	1338.137	1267.539
Calc Head Au (opt)	0.0567	0.0536	0.0551
Contained Au oz (Calc Head)	2487.641	2628.837	2558.239
% Ext Soln Basis 1)	49.6	44.4	46.9
% Ext Head/Tail Basis 2)	54.0	54.0	54.0
% Ext Calc Head Basis 3)	51.9	49.1	50.5

1) Cum Net Soln oz/Corr Au oz (Head)
2) (Corr Au oz (Head) - Contained Tail oz)/Corr Au oz (Head)
3) Cum Net Soln oz/(Cum Net Soln oz + Contained Tail oz)

Table 4.2.2-2. Assay Results and Comparison Sulfide Test Heap.

	Gold Oz/Ton		Contained Oz	
Head Grade 1)	0.0593		2754.882	
Calculated Head 2)	0.0551		2558.239	
Deviation	0.0042			
Precision Percent		92.9		
Tail Grade 3)	0.0273		1267.539	
Drill Hole 1	0.0284			
Drill Hole 2	0.0284			
Drill Hole 3	0.0253			
Drill Hole 4	0.0272			
Deviation	0.0020			
Precision Percent		92.7		
Head Grade SP1 Ore	0.0643		2765.093	
Deviation (SP3/SP1)			10.211	
Precision Percent				99.6

1) Calculated from Corrected Au Oz (Head)
2) Calculated from Contained Tail Oz and Cum Net Soln Oz
3) Average of 4 Drill Holes w/ each Drill Hole sample assayed 10X

4.2.3 Gold Extraction Rate

Representative ore samples from the Sulfide Test Heap material were crushed to various sizes and leached in 10 inch diameter by 5 foot columns for comparison with the minus 1/4 inch material. It became immediately obvious that agglomerating the ore with barren solution (as in the minus 1/4 inch columns) was a crutial step in extracting the gold more efficiently. ~~Table 4.2.3-1 shows the comparison between the non-agglomerated crush size ore and the agglomerated (pre-treated) ore.~~ See Section 4.9 for more discussion.

4.2.4 Regression Analysis

Regression analysis was performed on an adjusted actual curve as described in section 4.2.1.3 using 3 different models. The data extrapolated to gold extraction values of 57.4%, 62.2% and 62.2% after a two year leach period.

4.2.4.1 Regression Analysis Models

The adjusted curve was used for the regression analysis models since the smoothed out version lent itself to the linear regression analysis better than the actual curve. Model 1 used data points from Day 10-416 and extrapolated to 57.4% gold extraction at the end of a two year leach cycle. Model 2 used data points from Day 120-416 and extrapolated to 62.2% gold extraction at the end of two years. Model 3 used data points from Day 162-416 and extrapolated to 62.2% gold extraction in the same time frame as Models 1 and 2.

4.2.4.2 Model 1 - Arithmetic Gold Extraction Axis; Log Day Axis

$$y = (m * \log(x)) + b$$

When the actual and adjusted gold extraction curves are plotted on an arithmetic y-axis and log x-axis the curve becomes fairly linear (Figure 4.2.4.2-1). Therefore, I assumed that a meaningful linear regression analysis could be performed on the data points. I chose the adjusted curve since the deviations were smoothed out as explained in Section 4.2.1.3. Points (Days) 10-416 were chosen for the regression analysis since these data points gave the ~~most~~ best linear fit.

Table 4.2.4.2-1 shows the regression output with a coefficient of determination (r^2) of 0.997 and a standard error of y estimate of 0.5758. This model estimates the Sulfide Test Heap gold extraction to reach 57.4% $\pm$ 0.6% at the end of a two year leach time. The Model 1 curve is extrapolated in Figure 4.2.4-1.

4.2.4.3 Model 2 - Log of Decreasing Tail Grade

$$y = 10^{(mx + b)}$$

In this model the gold ounces extracted were calculated from the adjusted curve cumulative percent gold extraction. The extracted

gold ounces were subtracted from the total gold ounces contained giving the gold ounces left in the heap. The ounces left were divided by the total tons to give the heap's tail grade in ounces per ton. Since the log of the decreasing tail grade gave a semi-linear plot from Day 120-416 (Figure 4.2.4.3-1), these data points were used for the linear regression analysis.

Table 4.2.4.3-1 shows the regression output with a coefficient of determination (r^2) of 0.994. This model estimates the Sulfide Test Heap gold extraction to be 62.2% ± 0.2% at the end of two years on leach. The Model 2 curve is extrapolated in Figure 4.2.4-1.

4.2.4.4 Model 3 - Least Squares Curve Fit
y = A+B*X+C/X

For Model 3, a software program named Curve Fit was used to analyze the data points. The program performs a least squares curve fit on x, y data. Curves for 25 equations are fitted. Equation coefficients, Correlation Coefficient, and Best Fit are computed. For any of the 25 equations, predictions for y can be calculated. Since the program will accept only 255 data points, Day 162-416 were used from the adjusted actual curve.

Equation 4, a combined linear and reciprocal equation was chosen by Curve Fit as the Best Fit with a correlation coefficient of 0.996. The regression output is shown in Table 4.2.4.4-1. This model predicts the Sulfide Test Heap gold extraction to reach 62.2% at the end of a two year leach period. This correlates with Model 2. The Model 3 curve is extrapolated in Figure 4.2.4-1.

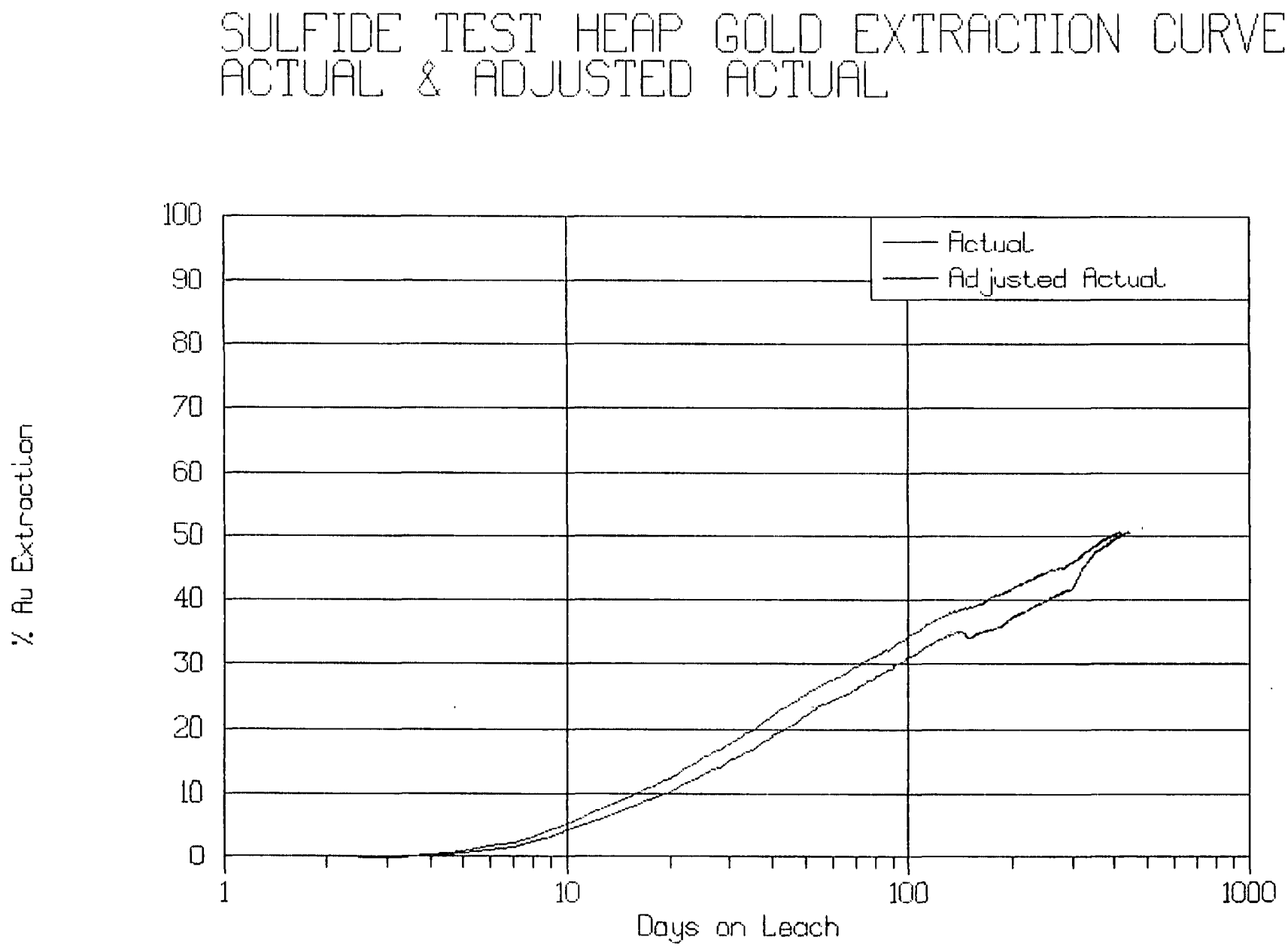


Figure 4.2.4.2–1. Sulfide Test Heap Gold Curve with log x–axis.

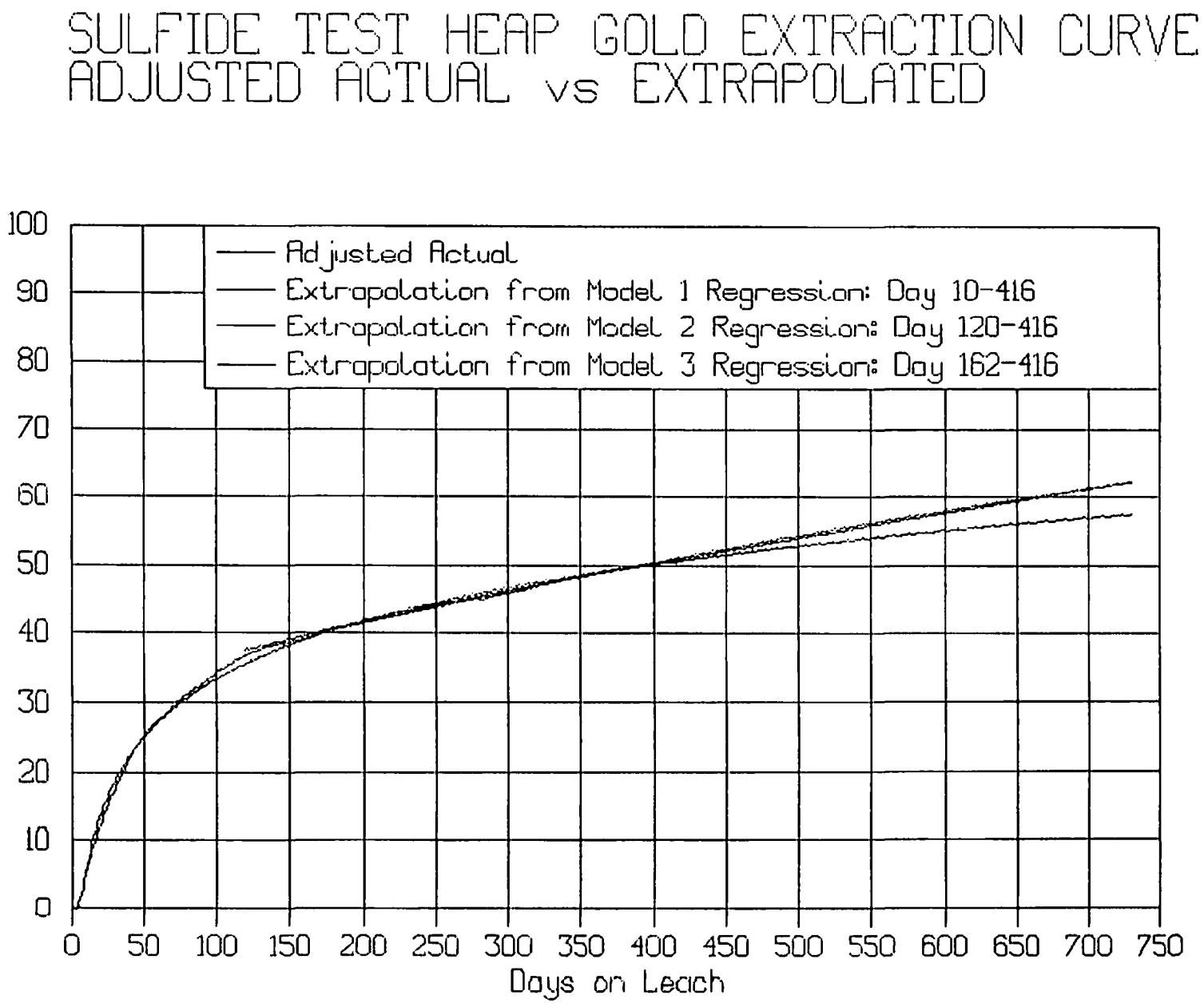


Figure 4.2.4-1. Sulfide Test Heap Gold Extrapolated Curve Comparisons.

Table 4.2.4.2-1 Regression Analysis Data - Model 1.

Arithmetic Gold Extraction Axis; Log Day Axis
Adjusted Sulfide Test Heap Percent Gold Extraction Curve
Day 10-416

Regression Output

Constant		-22.2739
Std Err of Y Est		0.5758
r^2 (Adj, Raw)	0.9965728	0.9965812
No. of Observations		407
Degrees of Freedom		405
Coefficient(s)		27.82534
Std. Err of Coef.		0.0809826

Equation: y = (m* log(x)) + b
m = 27.82534
b = -22.2739
x = Day
y = % Au Extraction

		Adjusted Actual y Values
If x = 50;	Then y = 25.0	25.3
If x = 100;	Then y = 33.4	34.2
If x = 150;	Then y = 38.3	38.6
If x = 200;	Then y = 41.8	41.7
If x = 250;	Then y = 44.4	44.3
If x = 300;	Then y = 46.7	45.9
If x = 350;	Then y = 48.5	48.3
If x = 400;	Then y = 50.1	50.2
If x = 450;	Then y = 51.6	
If x = 500;	Then y = 52.8	
If x = 550;	Then y = 54.0	
If x = 600;	Then y = 55.0	
If x = 650;	Then y = 56.0	
If x = 700;	Then y = 56.9	
If x = 730;	Then y = 57.4	

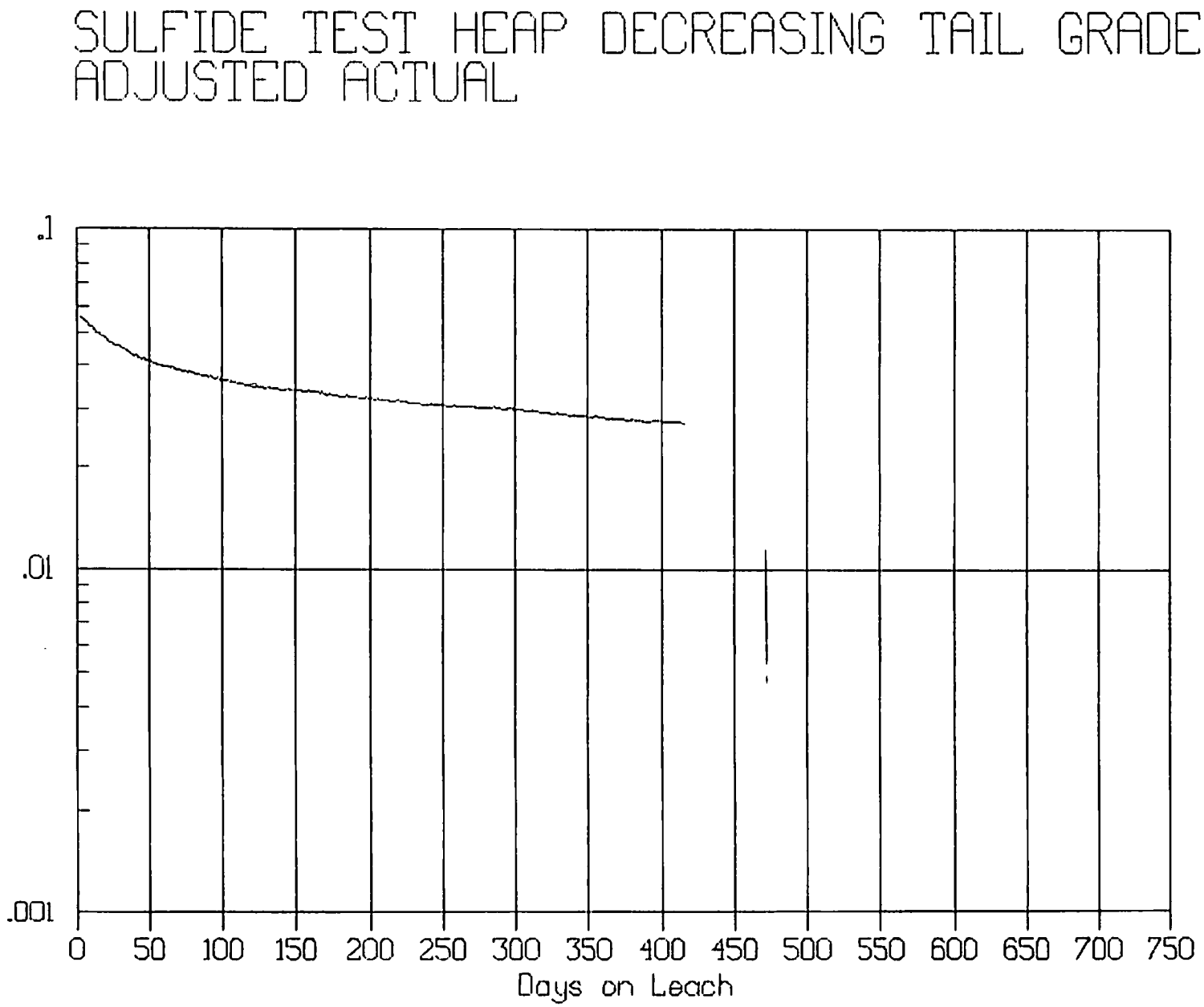


Figure 4.2.4.3–1. Sulfide Test Heap Leach Curve with Log of Decreasing Tail.

Table 4.2.4.3-1 Regression Analysis Data - Model 2.

Log of Decreasing Tail Grade
Adjusted Sulfide Test Heap Percent Gold Extraction Curve
Day 120-416

Regression Output:

Constant		-1.42039
Std Err of Y Est		0.0023
r^2 (Adj, Raw)	0.9944612	0.9944799
No. of Observations		297
Degrees of Freedom		295
Coefficient(s)		-0.000357
Std Err of Coef.		0.0000015

Equation: y = 10^(mx + b)
m = -0.000357
b = -1.42039
x = Day
y = % Au Extraction

		Adjusted Actual y Value
If x = 150;	Then y = 39.1	38.6
If x = 200;	Then y = 41.5	41.7
If x = 250;	Then y = 43.9	44.3
If x = 300;	Then y = 46.1	45.9
If x = 350;	Then y = 48.3	48.3
If x = 400;	Then y = 50.4	50.2
If x = 450;	Then y = 52.4	
If x = 500	Then y = 54.3	
If x = 550;	Then y = 56.1	
If x = 600;	Then y = 57.9	
If x = 650;	Then y = 59.6	
If x = 700;	Then y = 61.2	
If x = 730;	Then y = 62.2	

Table 4.2.4.4-1 Regression Analysis Data - Model 3.

Least Squares Curve Fit Adjusted Sulfide Test Heap Percent Gold Extraction Curve Day 162-416		
Regression Output:		
r^2		0.9956
Equation: y = A+B*X+C/X A = 38.15 B = 0.03419 C = -651.9 x = Day y = % Au Extraction		
		Adjusted Actual y Value
If X = 150;	Then y = 38.9	38.6
If X = 200;	Then y = 41.7	41.7
If X = 250;	Then y = 44.1	44.3
If X = 300;	Then y = 46.2	45.9
If X = 350;	Then y = 48.3	48.3
If X = 400;	Then y = 50.2	50.2
If X = 450;	Then y = 52.1	
If X = 500;	Then y = 53.9	
If X = 550;	Then y = 55.8	
If X = 600;	Then y = 57.6	
If X = 650;	Then y = 59.4	
If X = 700;	Then y = 61.2	
If X = 730;	Then y = 62.2	

4.3 MINERALOGICAL EVALUATION

4.3.1 Polished Thin Sections

Polished thin sections were prepared and analyzed by Dr. Theodore P. Paster, a Ph.D. Petrographer from the Denver area. The principal rock type was reported to be a porphyritic trachyte or latite. The rock alteration seen was goethite development, probably from sulfide weathering, and 15% clay alteration of

feldspar along cleavage and/or cryptoperthite exsolution structure planes. The ≤ 1u gold particles were closely associated with the clay in 10-20u alteration patches in the feldspar. The cavities in the tail sample were lined with a fine-grained unidentified secondary mineral not found in the head sample. It was further reported that gold was not particularly associated with any other phase although it may have been overlooked as inclusions in the pyrite due to the small size. The unidentified leach product was thought to possibly be gypsum but regardless of it's identity, "undoubtedly impedes fluid flow to the point where gold leaching stops". The report including photomicrographs, can be found in Appendix III.

4.3.2 Microprobe

Upon recommendation by Dr. Paster, the polished thin sections were submitted to The University of Calgary's Geology Department for microprobe evaluations to identify the pyrite inclusions and the unidentified leach product. The unidentified leach product was not identified due to the minute amount and the limitations of the microprobe. The inclusion in the pyrite was identified as molybdenite. The results of the microprobe work are included in Appendix III.

4.4 pH

The pH of the sulfide test heap was lower than the planned 10-11 range throughout the test as shown in Figure 4.4-1. It stayed in the high 7 to low 8 range for most of the first 120 days before climbing to the mid to high 8 range. The pH fell back to the low 8 range for about 90 days starting at Day 300 before recovering back to the high 8 range at about Day 420. The decline in pH during this time period was due to the side slopes being put on leach.

4.5 CYANIDE CONSUMPTION

A total of 106,478 pounds of NaCN was consumed by the sulfide test heap in 441 days equating to 2.5 lb NaCN/ton ore, shown in Figure 4.5-1. The cyanide consumption was directly proportional to the pH values. When the pH values were relatively low (Day 0-120; Day 300-420) the NaCN consumption slope steepened. When the pH maintained values in the mid to high 8 range, the NaCN consumption slope became less steep.

Copper also was a cyanide consumer, having consumed about 1 lb NaCN/ton ore as calculated below.

.039% Cu x 46430 Tons = 36215 lb Cu x 52% Recovery = 18832 lb Cu
18832 lb Cu x (3 mol CN:1 mol Cu) x .77 (NaCN:Cu) = 43502 NaCN
43502 lb NaCN Consump/43003 Ton Ore = 1.0 lb NaCN/ton ore.

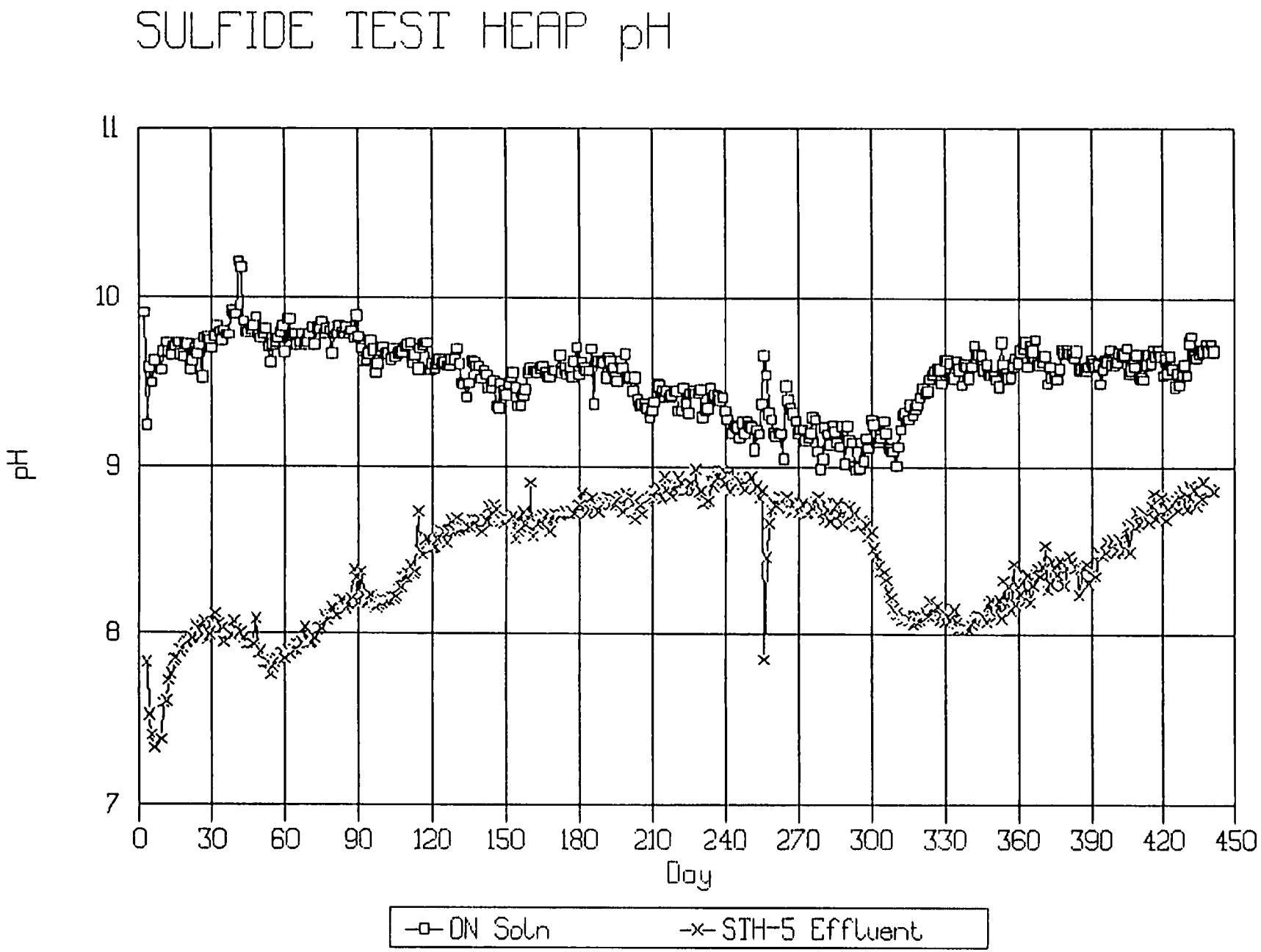


Figure 4.3-1. Sulfide Test Heap Daily pH. "ON" Solution vs STH Effluent.

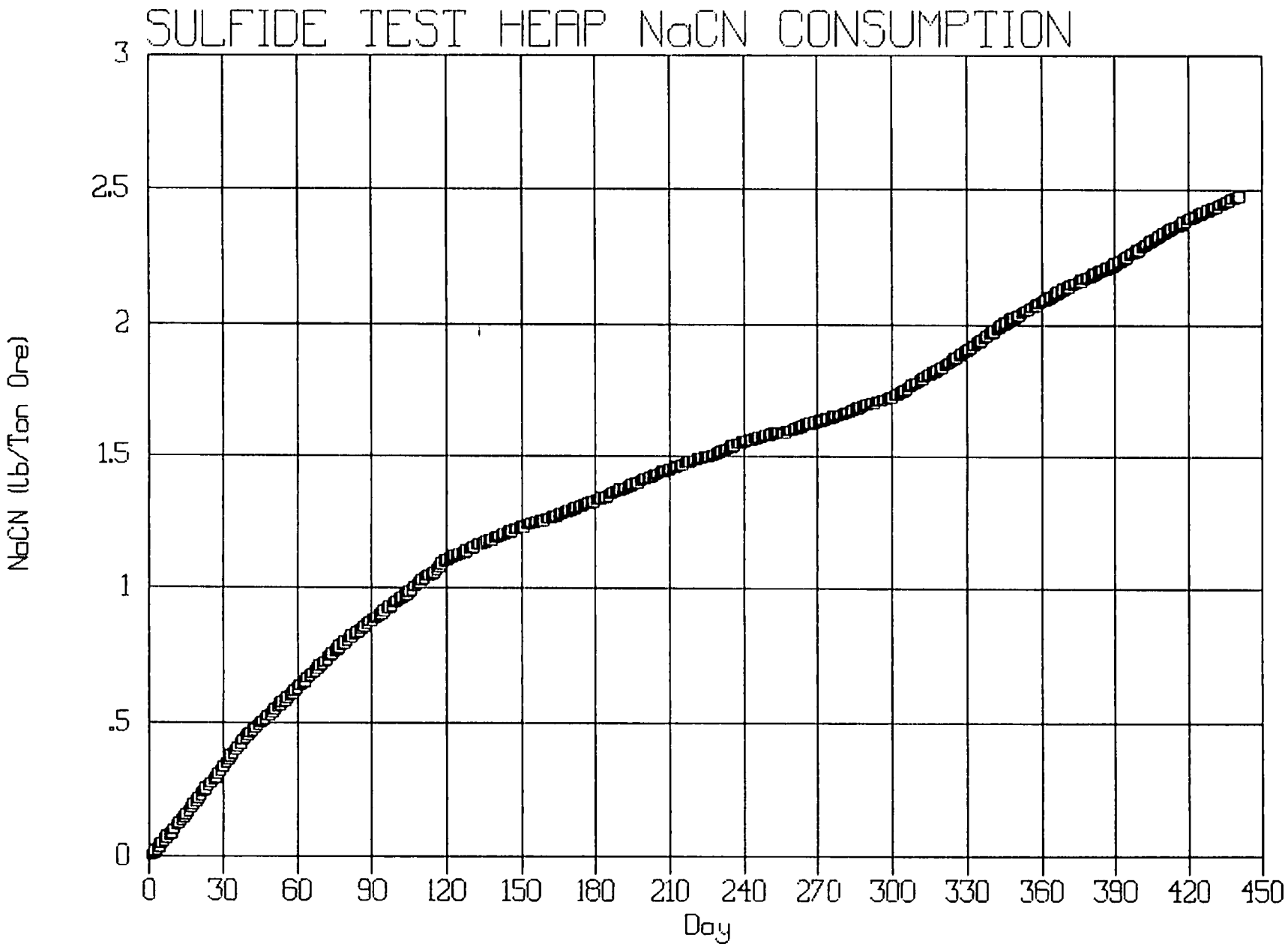


Figure 4.4-1. Sulfide Test Heap Cumulative NaCN Consumption (lb NaCN/Ton Ore).

Since most of the copper is relatively soluble, a fresh water rinse prior to the leach cycle would most likely alleviate the problem. However, due to water balance issues, a fresh water rinse may not be a feasible option.

Thiocyanate also contributed to some cyanide consumption seeming to come to an equilibrium at 100-200 mg/l before climbing to above 300 mg/l in the last 20 weeks of the test.

4.6 CYANIDE CONCENTRATION

Bottle roll testwork done at Degerstrom Labs (1991) indicated that gold extraction was suppressed at 0.5 lb/ton NaCN (37.5%) but not significantly elevated above 1.0 lb/ton NaCN (1 lb/ton = 78.0%; 2 lb/ton = 81.2%; 4 lb/ton = 77.5%). Therefore a 1.0 lb/ton NaCN concentration was chosen for subsequent column testwork and the sulfide test heap.

4.7 LIMESTONE AND LIME ADDITION

Minus 1/4 inch limestone fines were added to the ore on a 159 pound per ton dry weight basis to maintain a 3:1 NP/AP ratio based on acid potential peroxide. (See Appendix II - Loading Stats for SP1.) A 3:1 NP/AP ratio was based on a rule of thumb excess neutralizing potential. Acid potential peroxide data were used based on the assumption that these results were more indicative of the actual sulfide weathering over time rather than complete weathering of the sulfide content as reported in the modified ABA.

Quicklime (CaO) was added to the ore at 2 lb CaO/ton ore for pH control. A pH range of 10-11 was targeted but the pH stayed below 9 throughout the test period.

4.8 HEAP STABILITY AND AGGLOMERATION

Cement, lime and water, and various high molecular weight polymers were tested for agglomeration purposes. Due to an indication of retarded gold extraction with increased pH, we shyed away from elevated amounts of lime and cement. DrewFloc 2440, a cationic polymer, gave the best results from the polymer testing and was therefore chosen for the Sulfide Test Heap agglomerate aid. Table 4.8-1 shows the comparison results from Strength and Stability Agglomeration Tests.

Table 4.8-1. Strength and Stability Agglomeration Test Results.

Agglomerate	Dosage lb/ton	% Fines (-8 mesh) Loss
Lime-1	2.0	22.6
Lime-Dupl	2.0	20.5
Cement	2.5	16.7
Cement	5.0	9.8
Cement	7.5	8.6
Cement	10.0	6.2
Cement	20.0	3.7
DrewFloc 2440	0.05	17.9
DrewFloc 2440-1	0.10	18.3
DrewFloc 2440-Dupl	0.10	15.8
DrewFloc 2440	0.20	25.9

4.9 CRUSH SIZE

Table 4.9-1 shows the average percent size fraction data for SP1 (before Barmac Crusher) and SP2 (after Barmac Crusher) samples. SP2 was screened both wet and dry. The final crushed product averaged, by a calculated daily average, 96.5% minus 1/4 inch (cubical) with minus 200 mesh averaging 11% (wet screen). Table 4.9-2 tabulates screen and assay data from the Sulfide Test Heap head and tail samples. The screened head sample shows 14% minus 200 mesh while the tail sample has 15.5% minus 200 mesh.

Table 4.9-1. Sulfide Test Heap Size Fraction Data.

SP1*		SP2*		
Size	% Retained	Size	Dry Screen % Retained	Wet Screen % Retained
1-1/2"	0.6	4 mesh	23.4	23.9
1"	3.4	14 mesh	46.0	43.0
3/4"	9.8	28 mesh	9.6	7.0
1/2"	22.4	48 mesh	8.0	6.3
1/4"	22.3	100 mesh	6.1	4.9
-1/4"	41.5	200 mesh	3.3	3.7
		-200 mesh	3.6	11.2

* Note: These are daily averages, not weighted averages.

Table 4.9-2. Sulfide Test Heap Size Fraction Analyses.

Head				
Size	% Retained	Au (opt)	Au Oz	Apperance
+4 mesh	15.45	0.0313	0.0048	Lt Gray
+8 mesh	28.63	0.0233	0.0067	Lt Gray
+14 mesh	15.35	0.0277	0.0043	Lt Gray
+28 mesh	9.35	0.0483	0.0045	Dk Gray
+48 mesh	7.52	0.1780	0.0134	Dk Gray
+100 mesh	5.89	0.1330	0.0078	Dk Gray
+200 mesh	3.86	0.1300	0.0050	Dk Gray
-200 mesh	13.95	0.0730	0.0102	Tan
Calc Head		0.0567		
Tail				
Size	% Retained	Au (opt)	Au Oz	% Au Ext
+4 mesh	13.26	0.0123	0.0016	66.3
+8 mesh	26.40	0.0123	0.0032	51.3
+14 mesh	15.56	0.0153	0.0024	44.0
+28 mesh	10.80	0.0263	0.0028	37.1
+48 mesh	7.75	0.0457	0.0035	73.5
+100 mesh	6.45	0.0620	0.0040	49.0
+200 mesh	4.29	0.0567	0.0024	51.5
-200 mesh	15.49	0.0187	0.0029	71.6
		0.0230		59.5

The minus 200 mesh material in the head and tail samples appeared as a tan color and leached the second to best of any size fraction obtaining 72% gold extraction. The majority of the material, over 55%, in both the head and tail samples was plus 14 mesh and had a light gray color. This material leached reasonably well with an average of 54% gold extraction. The balance of the ore was between 14 mesh and 200 mesh and was dark gray in color. It appeared that the bulk of the sulfides were in these size fractions. Although the plus 48 mesh showed the highest gold extraction of any of the size fractions at 73.5%, the overall gold extraction for these dark gray size fractions was 53%, just slightly lower than the bigger size fraction average. The three plus 14 mesh size fractions had somewhat of a constant tail which behaved historically like the oxide ore. The calculated head from the size fraction analyses (.0567 opt Au) was fairly consistent with the calculated head form the test heap (.0551 opt Au).

Numerous columns were run with various crush sizes to compare gold extraction data. The results are tabulated in Table 4.9-3. The Brohm -1/4" * was an average of two column tests containing 2 lb/T CaO and 150 lb/T limestone that were agglomerated with barren solution and allowed to sit in barrels for about two months before leaching. These column tests were run in 8 inch diameter by 5 foot columns. The other Brohm columns were not agglomerated and had 150

lb/T limestone added in addition to the CaO. These column tests were run in 10 inch diameter by 5 foot columns.

The Degerstrom column tests were all agglomerated with water and the various CaO amounts. No additional limestone was added. Four inch diameter by 5 foot columns were used for the -1/4" and -1/2" tests. Six inch diameter by 8 foot columns were used for the one inch material.

It is quite obvious that agglomerating with barren solution speeds up the initial rate of gold dissolution steepening the gold extraction curve. The rate of reaction also appears to be enhanced, in the Degerstrom -1/4" and -1/2" column tests, for the 10 lb/T CaO vs the 4 lb/T CaO addition. The Brohm and Degerstrom -1/2" (2-4 lb/T CaO) column tests initially compare quite favorably but the Degerstrom columns have higher final extraction percentages. This may be an indication that agglomeration aids in overall gold extraction. In fact, the Degerstrom columns all have better final extraction percentages except for the one inch material which has very close extractions for both the Degerstrom 2 and the Brohm 4. Although leach conditions and ore differed between the Degerstrom and Brohm columns, both labs showed the same inverse relationship between crush size and final gold extraction values.

Table 4.9-3. Column Crush Size Comparison. Calc Head Basis

Column ID	10 Days (w/ 240)	20 Days (480)	30 Days (720)	40 Days (960)	50 Days (1200)
-1/4" Brohm *	32.70	39.82	44.78	47.97 (49.8)	50.24
-1/4" Degstrm 2	14.16	44.89	54.82	57.53	59.51
-1/4" Degstrm 10	23.13	47.30	53.41	55.83	57.27
-3/8" Brohm 4	~~20.39~~ 32.90	~~27.66~~ 44.62	~~30.99~~ 49.99	~~32.23~~ 52.99	~~32.76~~ 52.85
-1/2" Brohm 2	~~18.22~~ 30.31	~~25.12~~ 41.79	~~28.48~~ 47.37	~~29.94~~ 49.81	~~30.79~~ 51.22
-1/2" Brohm 4	~~17.91~~ 29.39	~~24.61~~ 40.38	~~28.02~~ 45.97	~~29.55~~ 48.47	~~30.23~~ 49.59
-1/2" Degstrm 2	16.10	30.23	37.72	40.94	42.81
-1/2" Degstrm 10	26.64	39.58	45.26	48.35	50.80
1" Brohm 4	~~17.01~~ 28.47 (28.5)	~~23.18~~ 38.80	~~26.25~~ 43.93	~~27.39~~ 45.84	~~28.12~~ 47.06
1" Degstrm 2	17.99	23.30	25.84	27.58	28.83
1" Degstrm 10	12.51	16.66	19.24	21.18	22.81

The numbers after the name identification for the column ID refers to the amount of CaO used for pH control.

4.10 SILVER AND COPPER LEACHABILITY

4.10.1 Silver Extraction

Cumulative silver extraction was calculated daily from the sulfide test heap effluent assays. After 441 days on leach the sulfide test heap showed a cumulative percent extraction based on total contained ounces and daily solution assays of 54.3%. (Figure 4.10.1-1.) The sulfide test heap reached a silver extraction percentage of 75.8 % after 441 days on leach based on the fire assay results from the solid tail residue and 69.1% extraction based on the calculated silver head. Tables 4.10.1-1 and 4.10.1-2 summarize extraction and assay data. The 54.3% extraction based on the assay head and solution assays seems to be the most credible since the SP3 and SP1 head ounces are most in agreement and AA silver assays are quite reliable at the concentrations being tested. The tail fire assays reproduced very poorly and therefore make any extractions based on the tail assays questionable.

Table 4.10.1-1. Silver Extraction Sulfide Test Heap.

	AVERAGE TONNAGE
Tons	46430
Head Ag (opt) w/ Agglom	0.2097
Contained Ag oz (Head)	9736.371
Ag oz from Agglomeration	18.079
Corrected Ag oz (Head)	9718.292
Cum Net Soln oz from Leach	5274.244
Tail Ag (opt)	0.0507
Contained Ag oz (Tail)	2354.001
Calc Head Ag (opt)	0.1643
% Ext Soln Basis 1)	54.3
% Ext Head/Tail Basis 2)	75.8
% Ext Calc Head Basis 3)	69.1

1) Cum Net Soln oz/Corr Ag oz (Head)
2) (Corr Ag oz (Head) - Contained Tail oz)/Corr Ag oz (Head)
3) Cum Net Soln oz/(Cum Net Soln oz + Contained Tail oz)

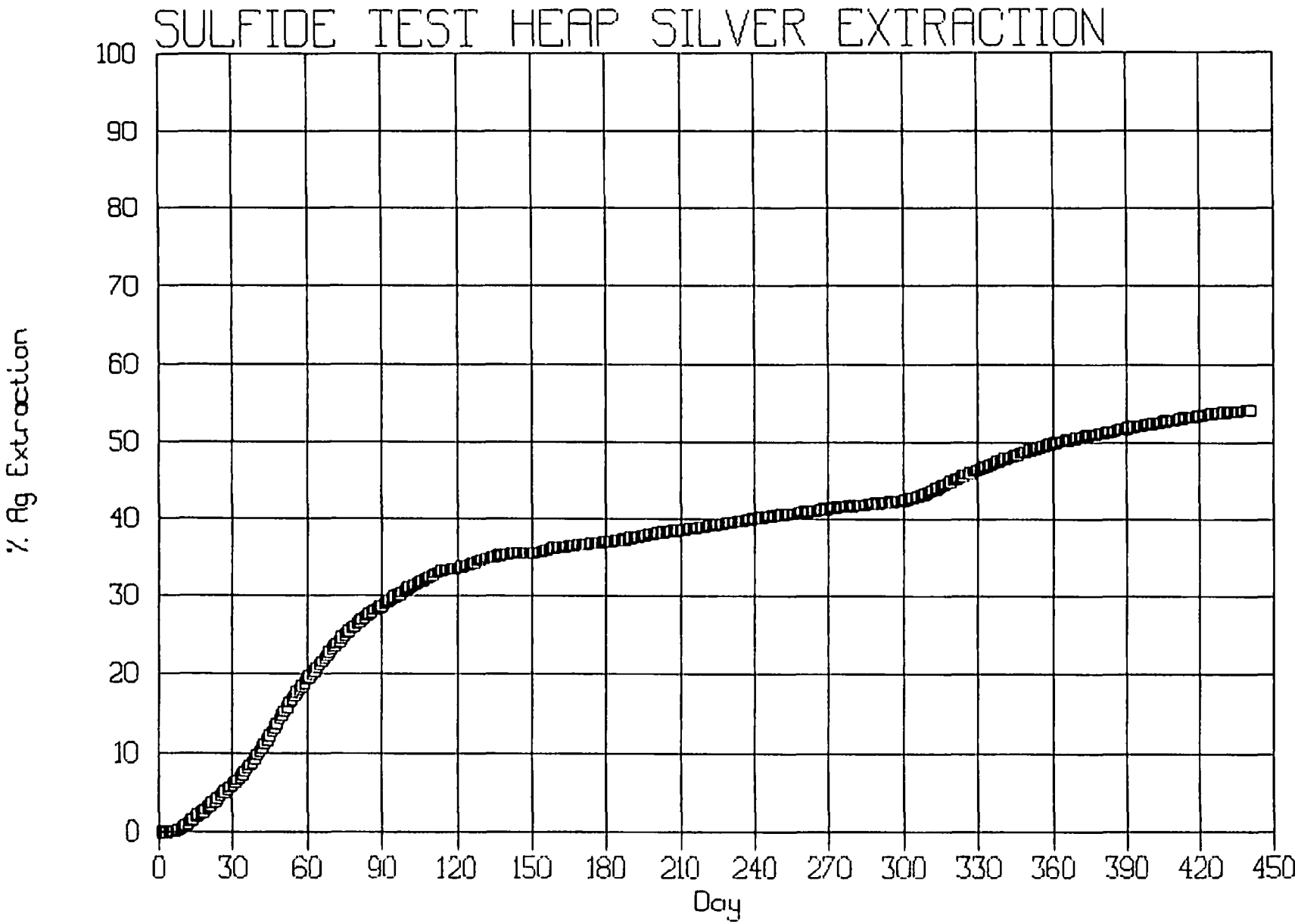


Figure 4/0.1-1. Sulfide Test Heap Silver Extraction Based on Net Solution Oz/ Total Contained Oz from Fire Assay Head of Ore/Limestone Mix.

Table 4.10.1-2. Assay Results and Comparison Sulfide Test Heap.

	Silver Oz/Ton		Contained Oz	
Head Grade 1)	0.2097		9718.292	
Calculated Head 2)	0.1643		7628.245	
Deviation	0.0454			
Precision Percent		78.4		
Tail Grade 3)	0.0507		2354.001	
Drill Hole 1	0.0116			
Drill Hole 2	0.0496			
Drill Hole 3	0.0567			
Drill Hole 4	0.0848			
Deviation	0.0391			
Precision Percent		22.9		
Head Grade SP1 Ore	0.2148		9237.044	
Deviation (SP3/SP1)			481.248	
Precision Percent				95.0

1) Calculated from Corrected Ag Oz (Head)
2) Calculated from Contained Tail Oz and Cum Net Soln Oz
3) Average of 4 Drill Holes w/ each Drill Hole sample assayed 10X

4.10.2 Copper Extraction

Copper extraction was simply calculated from the head and tail solid samples as shown in Table 4.10.2-1.

Table 4.10.2-1. Copper Extraction Sulfide Test Heap.

	Total Copper (mg/l)	CN Extractable Copper (mg/l)
Head	390	358
Tail	188	127
Percent Extraction	51.8%	64.5%

Figure 4.10.2-1 shows the daily extraction of copper in mg/l. It appears that the copper is basically extracted in the first 70-90 days and comes to an equilibrium with the "ON" solution.

It is worth noting at this point that although the sulfide test heap ore has elevated copper values, it has been thought that this is merely a transitional phase in the orebody and not indicative of the larger sulfide deposit. There is no evidence of these elevated copper values in previous sulfide testwork.

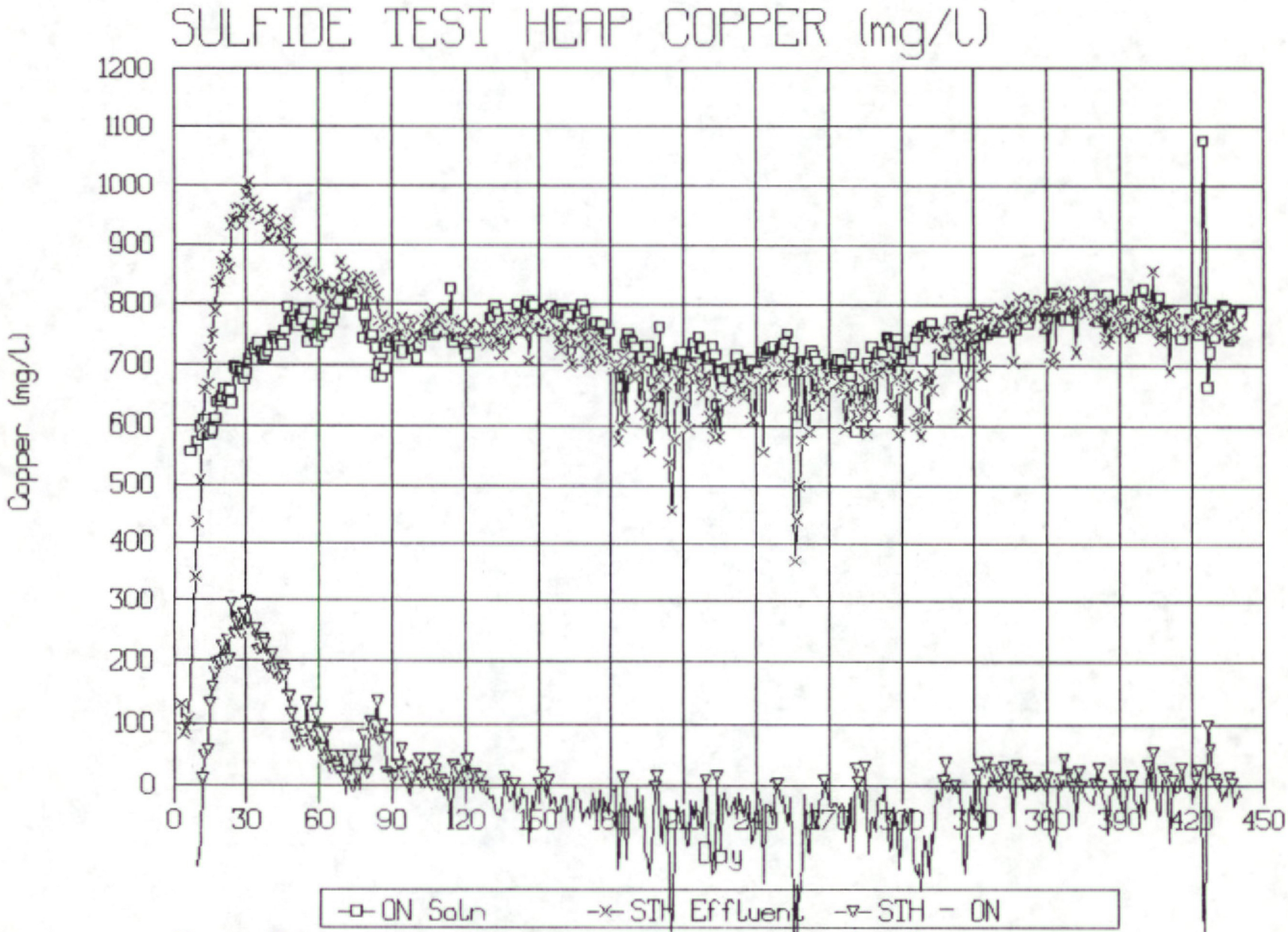


Figure 4.9.2-1. Sulfide Test Heap Daily Copper Values (mg/l). "ON" Solution vs STH Effluent and their Differences.

4.11 NEUTRALIZATION

The STH material neutralization data is summarized in Tables 4.11-1 through 4.11-4. Compliance wad cyanide effluent values (<2 mg/l) were achieved but only after about 3 Ton Solution per Ton Ore (TS/TO). The historical TS/TO at the Gilt Edge Mine has been less than 2 TS/TO. The neutralized ore was bottle rolled using the same procedure as for off-load criteria. The first split had a wide variance between the pH 4.2 and pH 12 solutions. The mg/kg dry weight must meet off-load criteria limits of <0.5 mg/l wad cyanide. Since the sample only passed for the pH 12 bottle roll, another split was submitted for comparison purposes. Both the pH 12 bottle roll samples from Split #1 and Split #2, were comparible in their values. The pH 4.2 bottle roll results did not compare favorably but the Split #2 results more closely followed the pH 12 bottle roll data. SCN assays were run on the second split bottle rolls and showed quite different results between the high and low pH solutions. Table 4.11-3 shows the solution assay results for the Neutralization solution (used to wash the column material), the final effluent of the netralized STH ore and a drain sample taken three days after the final effluent sample was taken. The effluent sample had 12428 ml of solution while the drain sample had only 1639 ml of sample.

Table 4.11-1. Sulfide Test Heap Neutralization Results.

Hour	Cumulative TS/TO	Wad Cyanide (mg/l)	pH
8	.04	756	7.55
12	.06	625	7.72
16	.08	470	7.61
20	.11	375	7.62
24	.13	303	7.78
28	.16	224	7.97
32	.19	176	7.96
36	.21	183	7.97
40	.23	156	7.97
44	.25	137	7.94
48	.30	113	7.98
56	.35	96	8.01
64	.40	78	7.99
72	.47	54	8.12
84	.55	39	8.07
96	.71	29	8.07
120	.86	16	8.10
144	1.01	11	8.06
168	1.17	7.2	8.05
192	1.33	5.9	8.06
216	1.48	4.9	8.06
240	1.64	4.0	8.08
264	1.90	4.1	8.16
288	1.96	4.4	8.16
312	2.12	4.1	8.07
336	2.28	3.6	8.13
360	2.45	2.6	8.14
384	2.61	2.2	8.11
408	2.78	2.0	8.13
432	2.96	1.4	8.16
456	3.10	1.2	8.14
480	3.11	1.6	7.92

Table 4.11-2. Neutralization Bottle Roll Results in Mg/Kg Dry Wt.

	Split #1	Split #1	Split #2	Split #2
mg/l	pH = 4.2	pH = 12	pH = 4.2	pH = 12
Total CN	1.92	1.17	0.215	0.984
Wad CN	1.77	.050	0.186	0.028
SCN	-	-	0.172	5.34

Table 4.11-3. Neutralization Bottle Roll Results in Mg/Kg Wet Wt.

mg/l	Split #1	Split #2
pH	8.28	8.32
Cl	15.0	10.5
N as NH_3	17.9	17.2
N as NO_3	1.91	1.32
N as NO_2	0.592	0.335
SO_4	179	212
As (dissolved)	0.057	0.032
Cd (dissolved)	<0.001	<0.001
Cu (dissolved)	0.611	<0.460
Fe (dissolved)	-	<0.050
Se (dissolved)	<0.005	<0.005
Ag (dissolved)	0.012	0.011
Zn (dissolved)	<0.050	<0.050

Table 4.11-4. Neutralization and Column Effluent Solution Comparisons.

Assay Parameter	Neutralization Solution	Final Column Effluent
Conductivity	4070	4220
Hardness	1119	1025
pH	7.75	8.00
TDS	2919	2965
TSS	<10.0	<10.0
Alkalinity	214	220
Bicarbonate	261	268
Carbonate	0.00	0.00
Chloride	160	155
Cyanide Total	0.793	2.29
Cyanide Wad	0.470	1.88
Cyanide Free	0.300	1.86
SCN	15.9	18.5
N as NH_3	79.6	108
N as NO_3	32.2	32.7
N as NO_2	8.75	8.23
Sulfate	1557	1700
Aluminum Diss	<0.050	<0.050
Aluminum Total	<0.050	<0.050
Arsenic Diss	0.006	0.024
Arsenic Total	0.012	0.026
Cadmium Diss	0.001	<0.001
Cadmium Total	0.002	0.001
Calcium Diss	368	397
Chromium Diss	0.005	0.006
Chromium Total	0.005	0.006
Copper Diss	7.64	2.35
Copper Total	8.94	2.50
Iron Diss	<0.050	<0.050
Iron Total	<0.050	1.39
Lead Diss	<0.001	<0.001

Assay Parameter	Neutralization Solution	Final Column Effluent
Lead Total	<0.001	<0.001
Magnesium Diss	8.55	8.08
Manganese Diss	<0.050	<0.050
Manganese Tot	<0.050	<0.050
Mercury Total	0.0015	0.0006
Potassium Diss	25.9	29.2
Selenium Diss	0.036	0.047
Selenium Total	0.039	0.048
Sodium Diss	483	496
Zinc Diss	2.14	0.055
Zinc Total	4.53	0.075
Anion Sum	44.10	47.05
Cation Sum	45.15	48.78
Balance	1.18	1.80

4.12 LEACHATE DATA

Most of the data from the leachate analyses, documented in Appendix IV and illustrated in Figures 4.12-1 through 4.12-8, stayed fairly consistent throughout a sixty-four week period. The conductivity ranged from 5410-7040 umhos/cm. Hardness ranged from 1956-2746 mg/l $CaCO_3$. The pH started out at 7.2 and rose to 8.9 throughout the test. The pH dropped below 8 from day 318-353 due to the side slopes being put under leach. TDS ranged from 3385-6005 mg/l and TSS was generally <10 mg/l. The alkalinity mostly stayed in a bicarbonate system and chlorides were generally in the 200-400 mg/l range. Cyanide concentrations were generally around 1000 mg/l. Thiocyanate seemed to come to a steady state in the 100-200 mg/l range before showing an upward trend from Days 200-250 and climbing to above 300 mg/l the last twenty weeks of the test. The nitrogen compound concentrations remained typical of the mine process solution. Sulfates ranged from 831-1662 mg/l although usually assayed around 1200-1500 mg/l. Many of the total and dissolved metals had minute amounts and therefore any variances seen may have been unduly influenced by analytical error. Total and dissolved aluminum ranged from <0.05-+1 mg/l. Arsenic stayed in the <0.02-0.3 mg/l range. Cadmium was generally in the 0.01-0.03 mg/l range. Chromium and lead were almost exclusively non-detectable while copper remained in the 600-800 mg/l range. Iron was generally in the 0.2-0.5 mg/l range although assayed as low as <0.001 mg/l and as high as +2 mg/l, the higher concentrations mainly occured during Days 125-225. Manganese seemed to leach out quickly with values of +1 mg/l but, by week 13 was consistently

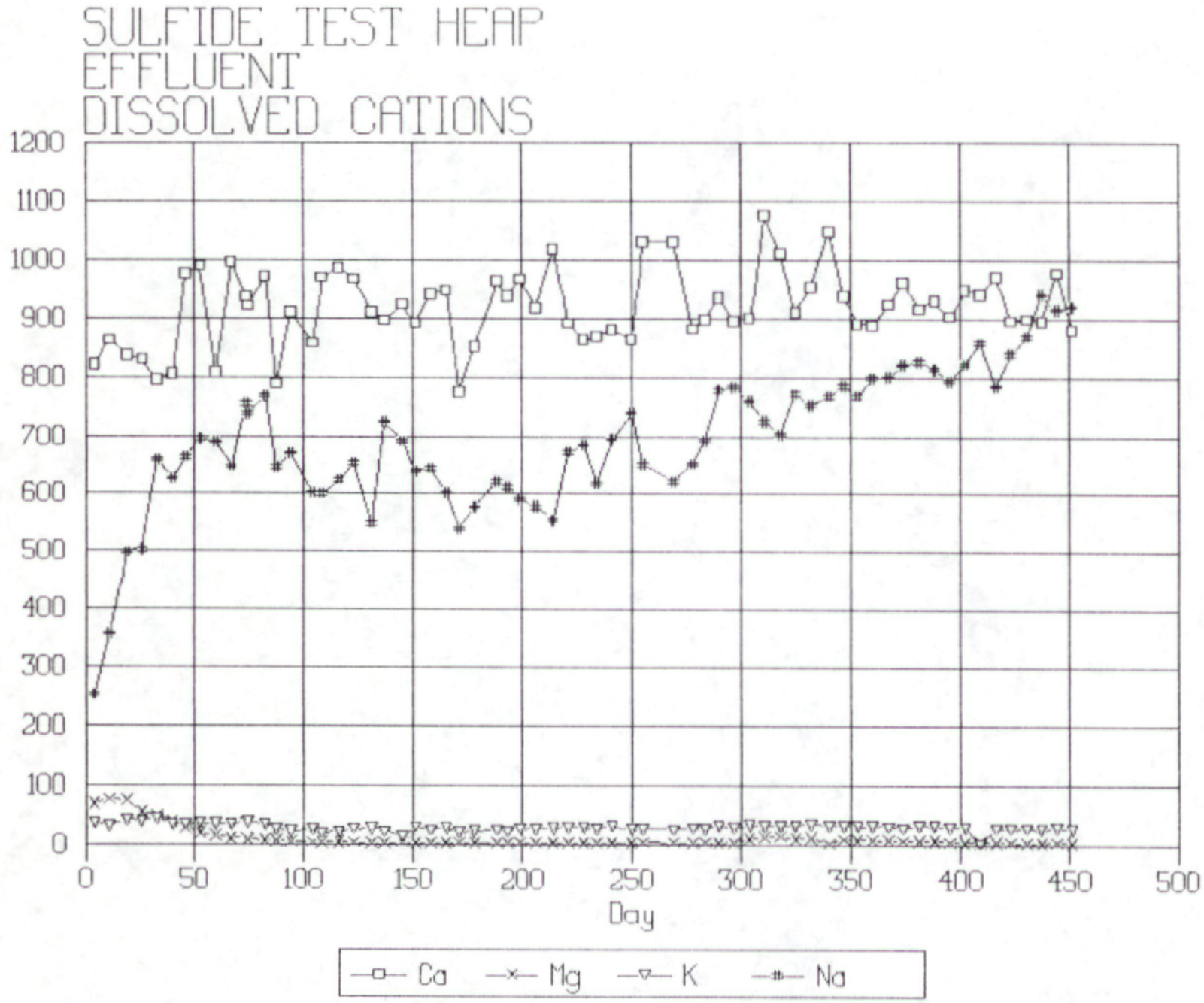

SULFIDE TEST HEAP
EFFLUENT
DISSOLVED CATIONS
mg/L
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0
50
100
150
200
250
300
350
400
450
500
Day
Ca
Mg
K
Na

Figure 4.12-1.

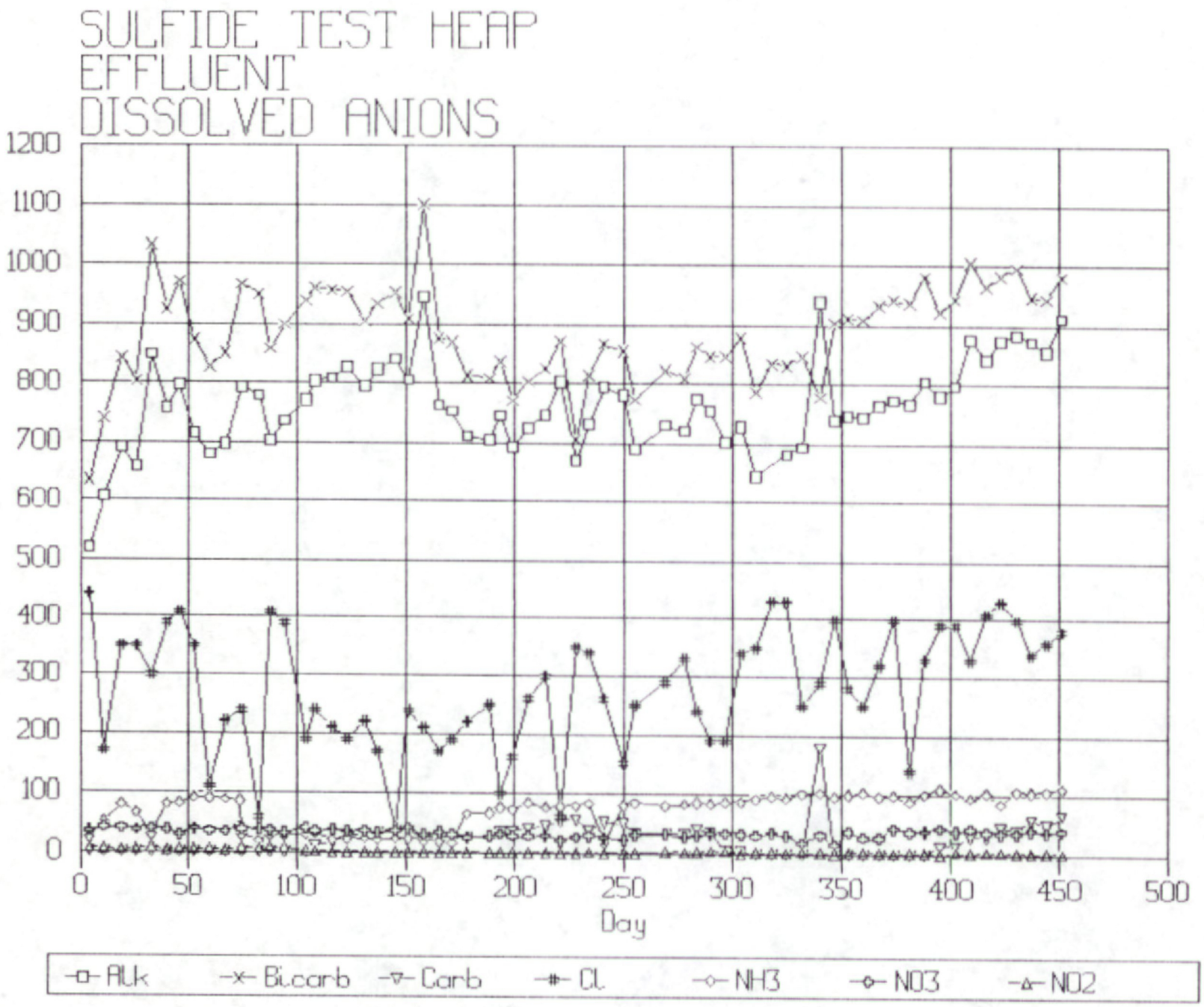

SULFIDE TEST HEAP
EFFLUENT
DISSOLVED ANIONS
(mg/L)
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0
50
100
150
200
250
300
350
400
450
500
Day
Alk
Bicarb
Carb
Cl
NH3
NO3
NO2

Figure 4.12-2.

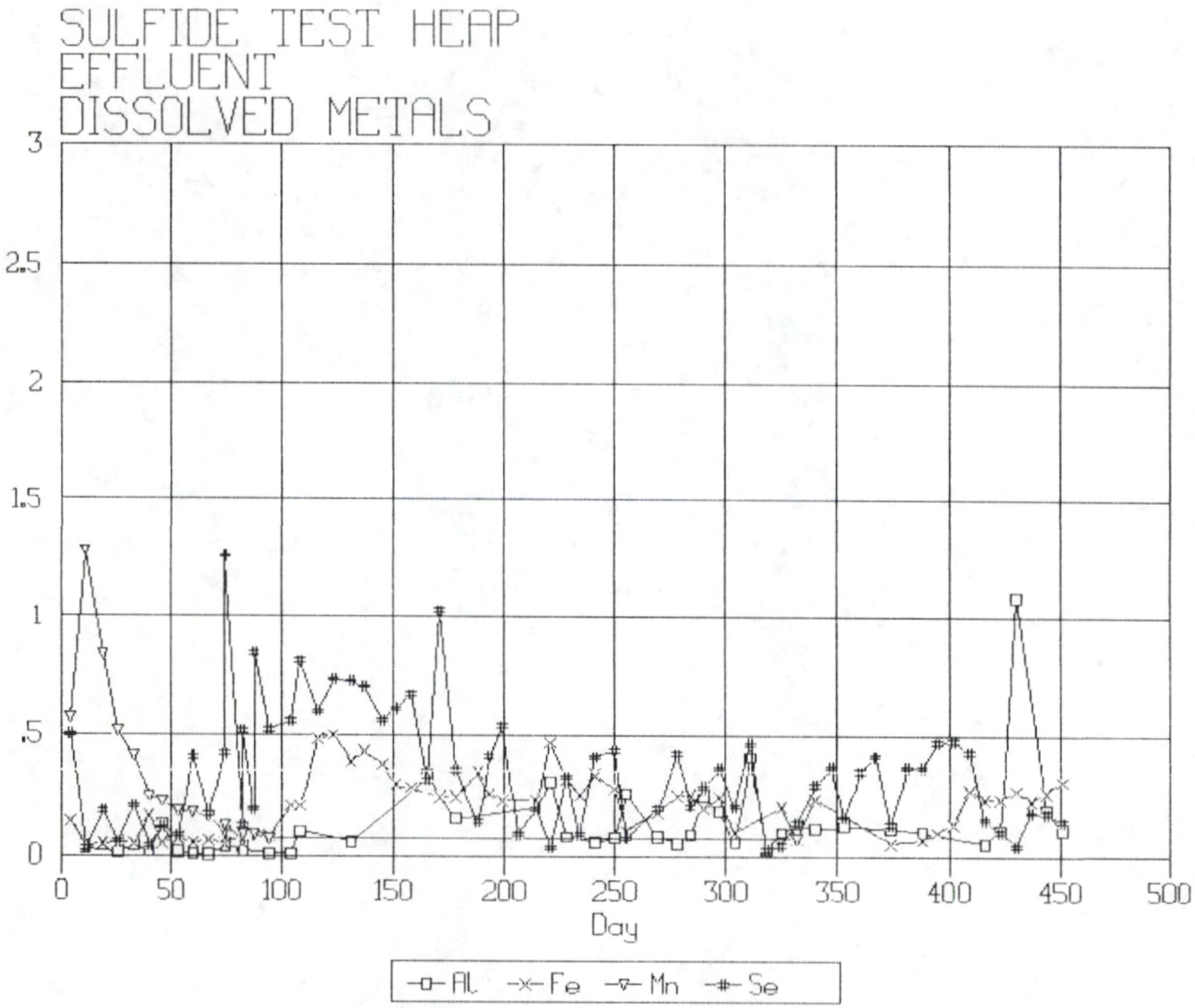

SULFIDE TEST HEAP
EFFLUENT
DISSOLVED METALS
(mg/L)
3
2.5
2
1.5
1
.5
0
0
50
100
150
200
250
300
350
400
450
500
Day
Al
Fe
Mn
Se

Figure 4.12-3.

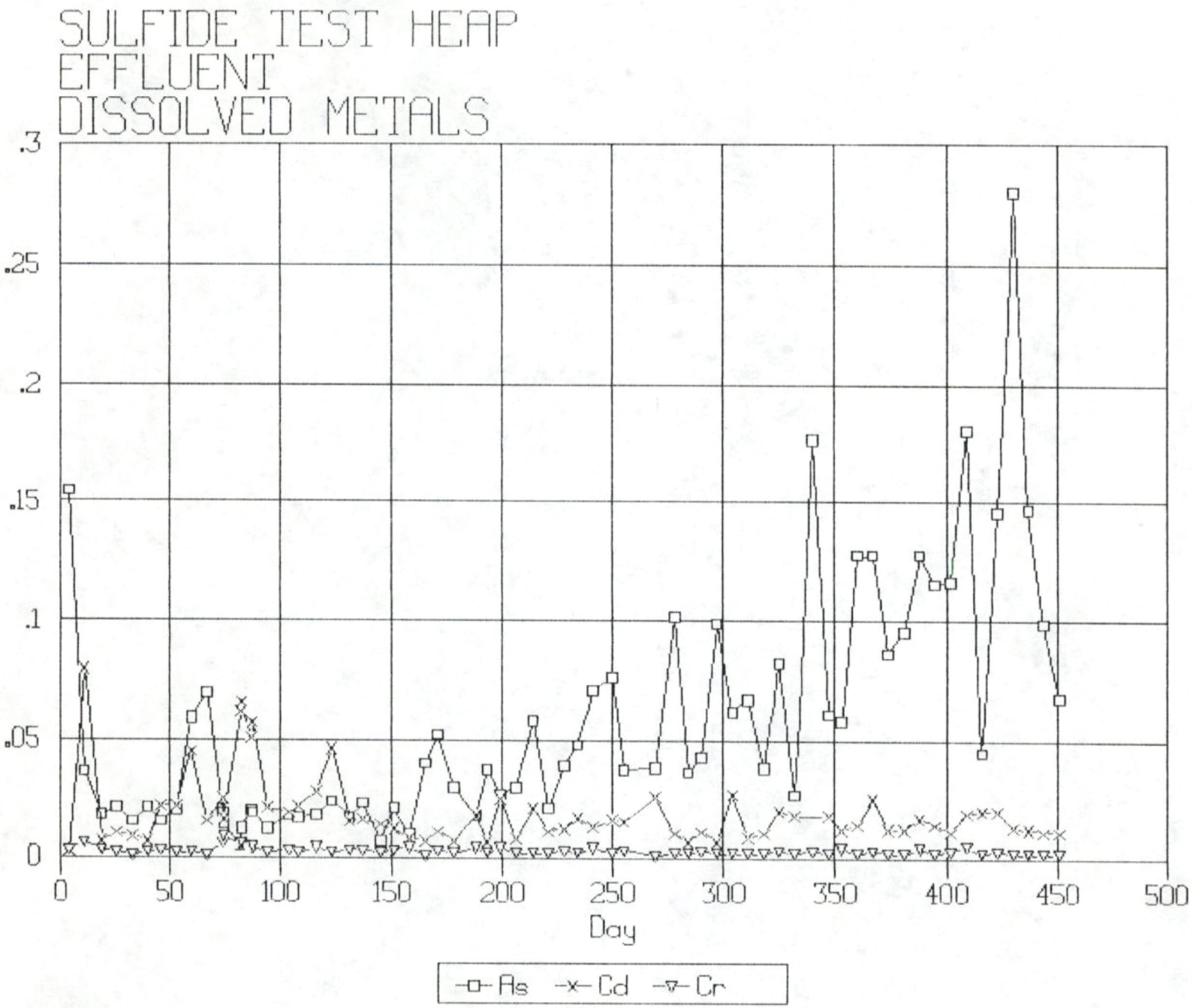

SULFIDE TEST HEAP
EFFLUENT
DISSOLVED METALS
.3
.25
.2
.15
.1
.05
0
(mg/L)
0
50
100
150
200
250
300
350
400
450
500
Day
As
Cd
Cr

Figure 4.12-4.

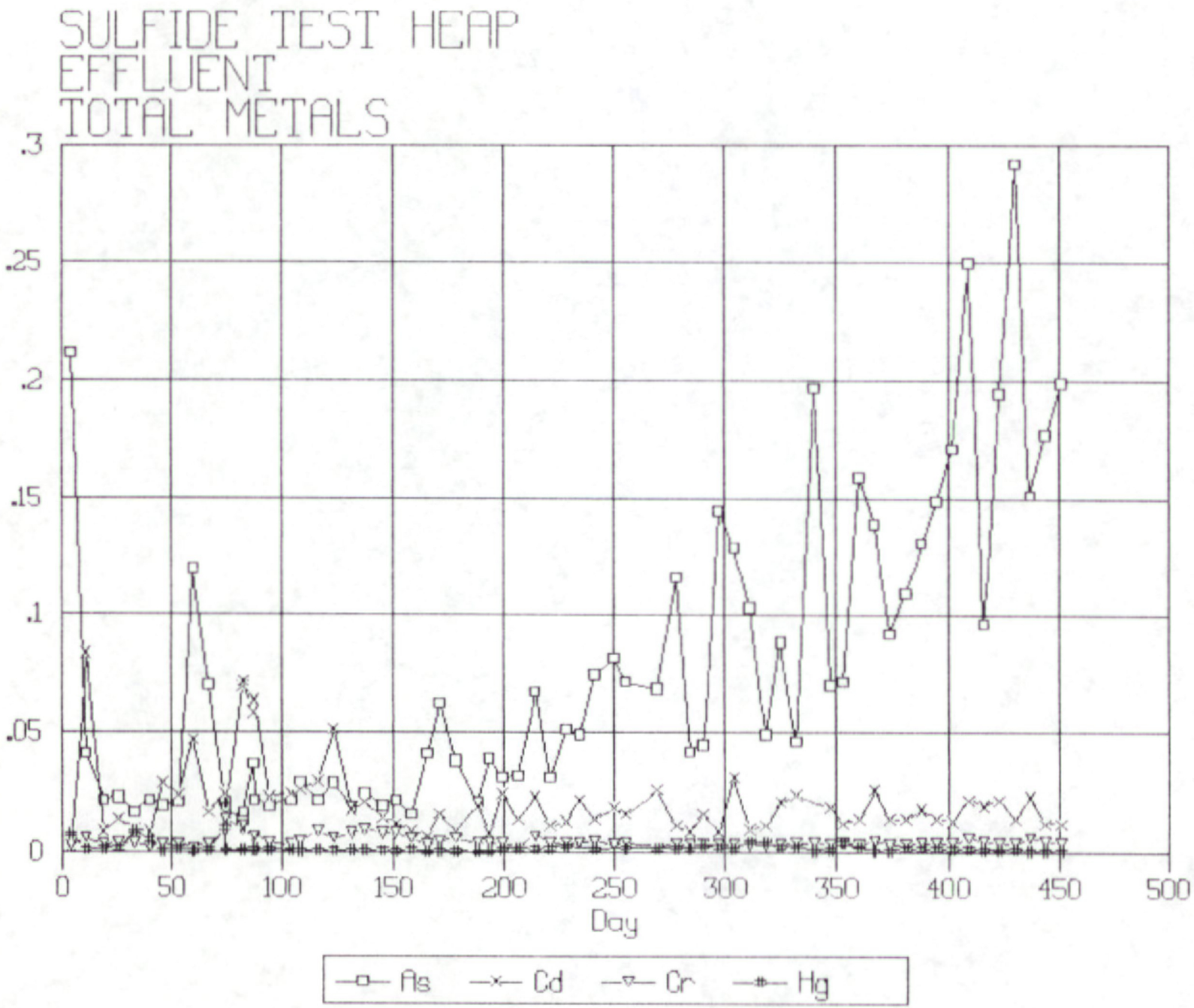

SULFIDE TEST HEAP
EFFLUENT
TOTAL METALS
(mg/L)
.3
.25
.2
.15
.1
.05
0
0
50
100
150
200
250
300
350
400
450
500
Day
As
Cd
Cr
Hg

Figure 4.12-5.

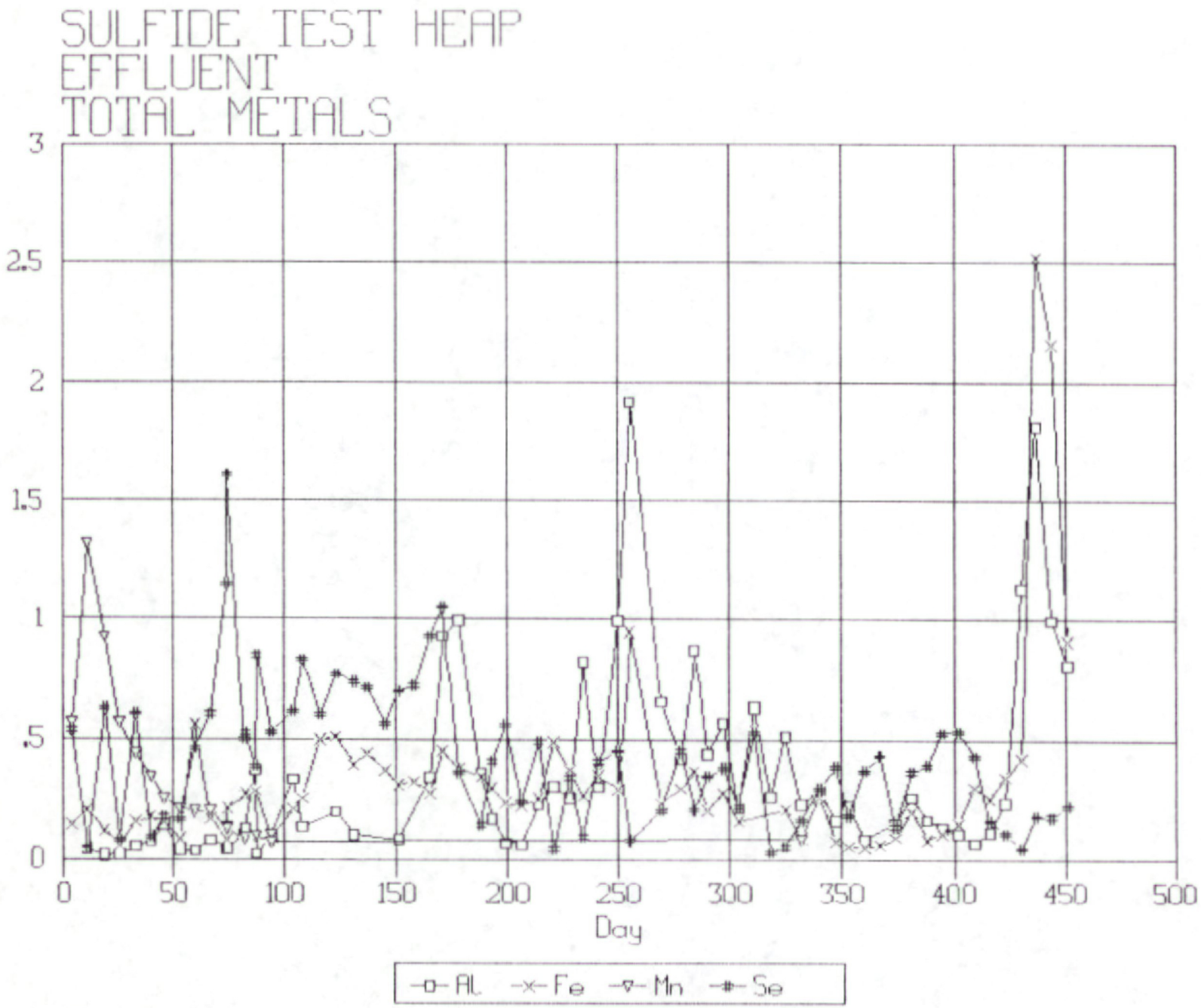

SULFIDE TEST HEAP
EFFLUENT
TOTAL METALS
(mg/L)
3
2.5
2
1.5
1
.5
0
0
50
100
150
200
250
300
350
400
450
500
Day
AL
Fe
Mn
Se

Figure 4.12-6.

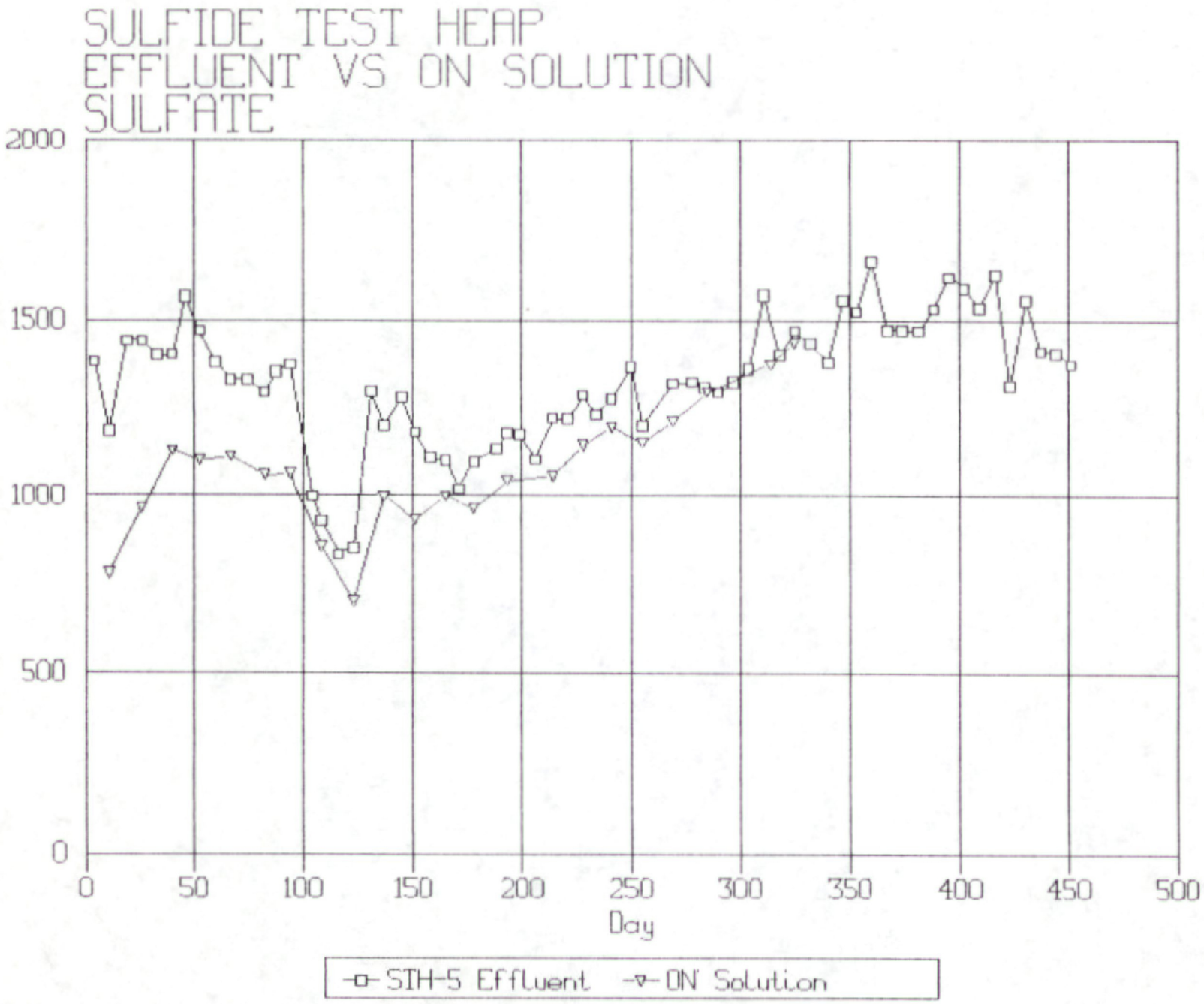

SULFIDE TEST HEAP
EFFLUENT VS ON SOLUTION
SULFATE
2000
1500
1000
500
0
SO4 (mg/L)
0
50
100
150
200
250
300
350
400
450
500
Day
SIH-5 Effluent
ON Solution

Figure 4.12-7.

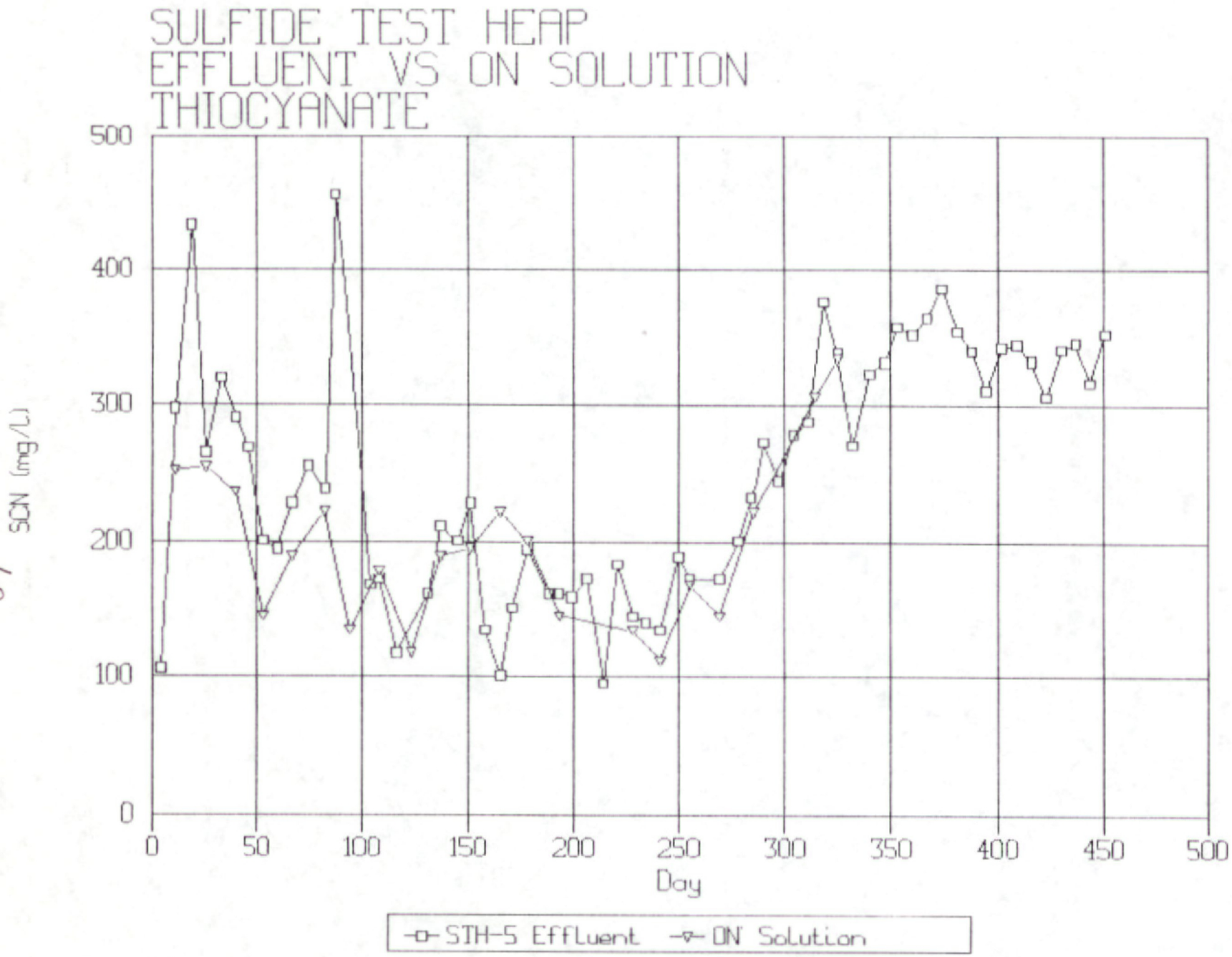

SULFIDE TEST HEAP
EFFLUENT VS ON SOLUTION
THIOCYANATE
SCN (mg/L)
500
400
300
200
100
0
0
50
100
150
200
250
300
350
400
450
500
Day
STH-5 Effluent
ON Solution

Figure 4.12-8.

<0.05 mg/l. Mercury peaked in week 10 at 0.01 mg/l although could be considered a negligible constituent in the ore. Zinc ranged from <1-68 mg/l but was usually in the 10-30 mg/l range. Selenium ranged from <0.03-+1 mg/l with no consistency in the data possibly due to analytical inconsistencies. The cations ranged as follows: calcium - 777-1076 mg/l; potassium - 14-40 mg/l; sodium - 253-941 mg/l although was usually in the 600-900 mg/l range showing an upward trend throughout the leach period; and magnesium appeared very pH dependent with pH >8 = around 10 mg/l, pH 7.8-8.0 = 10-15 mg/l, and pH <7.8 = 20-80 mg/l. Lime and limestone contribute to the calcium concentrations and sodium cyanide to the sodium concentrations.

The "ON" Solution data is documented in Appendix IV and shows very similar trends to the leachate data.

It must be noted here that the "ON" solution came from a mixture of the effluents from ALL the heaps and therefore the sulfide test heap was influenced by the same.

4.13 STATIC ABA TESTWORK

The sulfide test heap ore before limestone addition averaged total sulfur of 4.63% most of it being sulfide sulfur at 4.45%. Sulfate sulfur averaged 0.19%. A composite of sulfide ore after limestone addition used for column testing showed total sulfur at 4.27%, sulfide sulfur at 4.13% and sulfate sulfur at 0.14%. Table 4.13-1 shows a comparison of sulfur speciation using both Leco Furnace and gravimetric methods. The Leco and gravimetric Sulfur analyses compare favorably especially on the sulfide analyses. The results are within 10% on total sulfur and within 3% on sulfide sulfur values.

Table 4.13-1. Sulfur Speciation Comparison: Leco Furnace vs Gravimetric Procedures.

Sample ID	% Sulfur Leco			% Sulfur Gravimetric		
	Total	$S^{=}$	SO_4	Total	$S^{=}$	SO_4
SP1090392	5.04	4.19	0.97	4.57	4.33	0.24
SP1092292	5.62	4.75	1.09	4.93	4.64	0.30
SP1-Average	-	-	-	4.63	4.45	0.19
Tail-1	-	-	-	4.18	4.04	0.14
Tail-2	-	-	-	4.50	4.34	0.15
Tail-3	-	-	-	4.56	4.39	0.17
Tail-4	-	-	-	4.85	4.69	0.16
Tail-Average	-	-	-	4.52	4.37	0.16
STH-COLB2-Head	4.27	-	0.14	4.63	4.42	0.21
STH-COLB2-Tail	4.47	-	0.19	4.67	4.49	0.18
HC-7 Tail	4.57	4.25	0.15	-	-	-
STH SP3 Head	4.65	4.47	0.25	4.56	4.33	0.22
STH Tail	4.65	4.51	0.17	-	-	-

Acid Base Accounting (ABA) was derived by various means. Acid potential by Peroxide (APP) showed an AP of -29.3 T $CaCO_3$/KT material for the sulfide ore before limestone addition while the sulfide ore after limestone addition averaged an AP of -29.0 T $CaCO_3$/KT. The neutralizing potential (NP) for the material before limestone addition averaged 4.1 T $CaCO_3$/KT giving a net neutralizing potential (NNP) of -25.2 T $CaCO_3$/KT. This NNP value was used for calculating the 3:1 NP/AP ratio for limestone addition requirements. ABA's were also calculated using total sulfur values and sulfide sulfur values. Table 4.13-2 shows Acid Base Accounting comparisons using various methods of determination. One set of NP's (Neutralizing Potential) were done at the Brohm lab. The other NP's were done at outside labs. The two values compare favorably. The APP's (peroxide) were done at the Brohm lab and the AP's were calculated from Leco Sulfur results. The NNP's from the ABA's and modified ABA;s are fairly close but differ considerably from the NNP (peroxide) values.

Table 4.13-2. Acid Base Accounting Methods Comparison.

Sample ID	NP	Peroxide		NP	Total S ABA		Sulfide S Mod ABA	
		AP	NNP		AP	NNP	AP	NNP
SP1090392	4	-27.5	-23.7	2	-158	-156	-131	-129
SP1092292	0	-28.7	-28.3	0	-184	-184	-148	-148
SP1 Head-Avg	4	-29.3	-25.2	-	-	-	-	-
SP3 Head-Avg	68	-29.0	38.8	-	-	-	-	-
STH SP3 Head	74	-39.1	35.0	74	-145	-71	-140	-66
STH-COLB2-Head	73	-42.2	31.0	84	-133	-49	-132	-48
STH-COLB2-Tail	77	-53.9	23.7	82	-140	-58	-138	-56
HC-7 Tail	-	-	-	70	-143	-73	-133	-63
STH Tail-1	71	-53.5	17.3	-	-	-	-	-
STH Tail-2	64	-63.1	0.9	-	-	-	-	-
STH Tail-3	72	-70.3	1.3	-	-	-	-	-
STH Tail-4	64	-69.4	-5.6	-	-	-	-	-
STH Tail-Avg	68	-64.1	3.5	-	-	-	-	-
STH Tail-Comp	-	-	-	67	-145	-78	-141	-74

* Note: All values reported in T $CaCO_3$/KT material.

The acid potential by peroxide method is a less harsh oxidizing procedure than the acid digestion for total sulfide content. Therefore less of the sulfide is oxidized or weathered. The modified ABA calculation assumes that all the sulfide species will produce acid from weathering. This may be a false assumption and overstate the acid potential as only certain sulfide species may weather or oxidize over time. Also the static testwork is done on pulverized material which has much more surface area avilable for oxidizing the sulfide. And finally, the Static ABA tests were

originally meant to be a "yes" or "no" procedure only, not a predictive procedure for amounts.

4.~~13~~14 KINETIC TESTWORK

Kinetic testwork was performed at McClelland Laboratories and is outlined in the Gilt Edge Mine Acid Rock Drainage Mitigation Plan (Section 3.7) prepared by Steffen Robertson and Kirsten (SRK), June 1993. As in the humidity cell testing of the limestone amended samples (3.7.3), the STH effluent pH remained above 7.0 for the entire leach period. The sulfate level remained fairly constant in the STH effluent (CELL #5) samples as opposed to the STH humidity cell (HC-7) test which produced sulfate levels of 860 mg/l during the initial week of testing and decreased to 24 mg/l by week 31. This could be attributed to the humidity cell "ON" solution being fresh each time and the "ON" solution of the test heap being a conglomerate of ALL the heap solutions building in constituent concentrations over a period of time. The unamended head sample produced acid rapidly in the humidity cell test (HC-1) but the testwork showed that adding as little as 60 lb limestone/ton ore mitigated acid generating conditions during a 34 week test period. The sulfide test heap results also show that acid generating conditions did not develop during the leach and neutralization cycles.

4.~~14~~15 ICP DATA

Table 4.14-1 shows the results of a 32 element ICP scan and Selenium analysis done on the STH head and tail samples. Although every effort was made to obtain representative head and tail samples their elemental makeup was subject to inherent differences. Therefore, when interpreting data, care must be exercised as these values may not be significantly different. Again it must be noted that the tail sample was influenced by the "ON" solution which was a conglomerate of ALL the heaps' effluents.

(A) OFF
(B) OFF after 5.5 pH with Lime

Table 4.14-1. ICP Analysis Comparison of the Sulfide Test Heap Head and Tail Samples.

ICP Analyses - Total Metals	Head	Tail
Ag (mg/l)	7.6	2.8
Al %	1.16	0.45
As (mg/l)	212	224
Ba (mg/l)	90	40
Be (mg/l)	<0.5	<0.5
Bi (mg/l)	72	66
Ca %	2.98	2.98
Cd (mg/l)	<0.5	0.5
Co (mg/l)	12	15
Cr (mg/l)	53	44
Cu (mg/l)	396	238
Fe %	4.62	5.18
Ga (mg/l)	20	10
Hg (mg/l)	1	<1
K %	0.55	0.19
La (mg/l)	60	70
Mg %	0.13	0.08
Mn (mg/l)	50	40
Mo (mg/l)	34	27
Na %	0.06	0.04
Ni (mg/l)	10	11
P (mg/l)	280	330
Pb (mg/l)	232	230
Sb (mg/l)	4	4
Sc (mg/l)	2	1
Sr (mg/l)	164	75
Ti %	0.01	<0.01
Tl (mg/l)	<10	<10
U (mg/l)	<10	<10
V (mg/l)	24	13
W (mg/l)	60	50
Zn (mg/l)	58	74
Se (mg/l)	0.6	1.2

APPENDIX I

DAILY HEAP DATA DURING LOADING

SP1 - BROHM SAMPLER

Sample ID	STH-SP1082792	STH-SP1083192	STH-SP1090192	STH-SP1090292	STH-SP1090392	STH-SP1090492
Date	08/27/92	08/31/92	09/01/92	09/02/92	09/03/92	09/04/92
Tons Crushed	2949	5283	2105	3533	3251	3376
% Moisture	3.8%	4.1%	4.0%	3.4%	3.0%	3.6%
Dry Tons	2837	5066	2021	3413	3153	3254
pH	10.7	5.8	10.2	11.7	8.1	9.3
FA - Au (opt)	.069	.056	.059	.064	.062	.065
FA - Au (oz)	195.749	283.718	119.227	218.424	195.515	211.540
FA - Ag (opt)	.31	.22	.21	.15	.25	.26
FA - Ag (oz)	879.45	1,114.61	424.37	511.93	788.37	846.16
AA - Au (opt)	.042	.032	.036	.034	.036	.035
AA - Au (oz)	119.151	162.125	72.749	116.038	113.525	113.906
AA - Ag (opt)	.288	.208	.175	.100	.198	.230
AA - Ag (oz)	817.04	1,053.81	353.64	341.29	624.39	748.53
Total Cu (ppm)	494	356	350	337	324	498
CN Sol Cu (ppm)	401	305	293	281	294	499
% CN Sol Cu	81.2%	85.7%	83.6%	83.3%	90.9%	100.1%
% Total Sulfur	4.81	4.95	4.64	2.46	4.57	5.44
% SO4	.98	.81	.58	.23	.71	.67
% Sulfide	4.48	4.68	4.45	2.38	4.33	5.22
APP (T CaCO3/KT)	-37.3	-40.9	-15.8	-25.0	-27.5	-27.8
ANP (T CaCO3/KT)	4.4	4.2	3.3	5.0	3.8	4.4
Net APP (T CaCO3/KT)	-32.9	-36.7	-12.4	-20.0	-23.7	-23.4
SP2 - -1/4" STOCKPILE						
Brohm Oper. Hrs		12.0	7.2	14.4	9.3	11.0
Barmac Oper. Hrs	*	10.5	14.0	18.5	15.5	19.0
Barmac Avg rpm	*	1900	1900	1900	1900	1900
% +1/4" (Cubical)	*	*	*	*	*	2.5%
% -200 mesh	*	12%	10%	8%	9%	11%

* Not Applicable
(09/25/92)

SP1 - BROHM SAMPLER

Sample ID	STH-SP1090892	STH-SP1090992	STH-SP1091092	STH-SP1091192	STH-SP1091292	STH-SP1091392
Date	09/08/92	09/09/92	09/10/92	09/11/92	09/12/92	09/13/92
Tons Crushed	3348	3921	1128	1601	1671	0
% Moisture	4.1%	3.6%	2.9%	3.7%	3.4%	*
Dry Tons	3211	3780	1095	1542	1614	0
pH	9.1	9.2	8.7	7.9	10.8	*
FA - Au (opt)	.071	.055	.057	.056	.059	*
FA - Au (oz)	227.962	207.891	62.431	86.339	95.237	.000
FA - Ag (opt)	.27	.28	.24	.10	.13	*
FA - Ag (oz)	866.90	1,058.36	262.87	154.10	209.84	.00
AA - Au (opt)	.034	.034	.033	.026	.031	*
AA - Au (oz)	109.165	128.515	36.145	40.086	50.040	.000
AA - Ag (opt)	.205	.206	.179	.152	.169	*
AA - Ag (oz)	658.20	778.65	196.06	234.35	272.80	.00
Total Cu (ppm)	468	420	404	406	427	*
CN Sol Cu (ppm)	437	382	366	350	362	*
% CN Sol Cu	93.4%	90.8%	90.6%	86.1%	84.8%	*
% Total Sulfur	5.50	5.32	5.10	4.43	5.05	*
% SO4	.54	.55	.57	.51	.52	*
% Sulfide	5.32	5.14	4.91	4.26	4.88	*
APP (T CaCO3/KT)	-30.0	-32.6	-30.1	-29.5	-35.0	*
ANP (T CaCO3/KT)	1.6	3.8	.8	5.1	4.2	*
Net APP (T CaCO3/KT)	-28.4	-28.8	-29.3	-24.3	-30.8	*
SP2 - -1/4" STOCKPILE						
Brohm Oper. Hrs	12.6	10.7	4.2	3.0	2.9	.0
Barmac Oper. Hrs	19.7	18.0	7.0	11.5	13.5	12.5
Barmac Avg rpm	1900	1900	1900	1900	1900	1900
% +1/4" (Cubical)	3.4%	2.5%	5.2%	4.1%	4.1%	3.7%
% -200 mesh	13%	12%	11%	11%	11%	12%

* Not Applicable
(09/25/92)

SP1 - BROHM SAMPLER

Sample ID	STH-SP1091492	STH-SP1091592	STH-SP1091692	STH-SP1091792	STH-SP1091892	STH-SP1091992
Date	09/14/92	09/15/92	09/16/92	09/17/92	09/18/92	09/19/92
Tons Crushed	6387	3917	3766	2718	3663	0
% Moisture	3.6%	3.7%	3.7%	3.3%	3.3%	*
Dry Tons	6157	3772	3627	2628	3542	0
pH	12.1	6.6	8.2	10.5	9.3	*
FA - Au (opt)	.070	.064	.064	.078	.068	*
FA - Au (oz)	430.995	241.413	232.106	205.008	240.864	.000
FA - Ag (opt)	.07	.31	.22	.20	.23	*
FA - Ag (oz)	430.99	1,169.34	797.86	525.66	814.67	.00
AA - Au (opt)	.041	.032	.038	.040	.040	*
AA - Au (oz)	252.440	120.706	137.813	105.132	141.685	.000
AA - Ag (opt)	.066	.160	.175	.184	.189	*
AA - Ag (oz)	406.37	603.53	634.67	483.61	669.46	.00
Total Cu (ppm)	439	405	410	412	356	*
CN Sol Cu (ppm)	288	348	363	369	305	*
% CN Sol Cu	65.6%	85.9%	88.6%	89.7%	85.7%	*
% Total Sulfur	3.00	5.08	5.07	4.92	5.41	*
% SO4	.04	.58	.43	.53	.80	*
% Sulfide	2.98	4.88	4.93	4.74	5.15	*
APP (T CaCO3/KT)	-21.5	-29.2	-27.2	-27.8	34.5	*
ANP (T CaCO3/KT)	6.7	1.8	1.8	5.3	6.5	*
Net APP (T CaCO3/KT)	-14.8	-28.1	-25.4	-22.4	27.9	*
SP2 - -1/4" STOCKPILE						
Brohm Oper. Hrs	16.0	13.1	13.0	9.5	6.9	*
Barmac Oper. Hrs	15.0	19.0	19.5	15.5	20.0	3.0
Barmac Avg rpm	1900	1900	1900	1900	1900	1900
% +1/4" (Cubical)	3.0%	3.0%	4.0%	5.0%	5.0%	3.0%
% -200 mesh	9%	10%	10%	10%	11%	10%

* Not Applicable
(09/25/92)

- ...3F0 - BROHM SAMPLER

Sample ID	STH-SP1092192	STH-SP1092292	STH-SP1092392	Total or Wt Avg to Date
Date	09/21/92	09/22/92	09/23/92	
Tons Crushed	3060	2648	0	58325
% Moisture	3.2%	1.4%	*	3.5%
Dry Tons	2962	2611	0	56286
pH	11.6	7.6	*	*
FA - Au (opt)	.055	.077	*	.064
FA - Au (oz)	162.914	201.041	.000	3,618.376
FA - Ag (opt)	.16	.46	*	.22
FA - Ag (oz)	473.93	1,201.03	.00	12,530.54
AA - Au (opt)	.035	.051	*	.037
AA - Au (oz)	103.673	133.157	.000	2,056.050
AA - Ag (opt)	.167	.239	*	.178
AA - Ag (oz)	494.67	624.01	.00	9,995.05
Total Cu (ppm)	383	544	*	412
CN Sol Cu (ppm)	323	432	*	350
% CN Sol Cu	84.2%	79.4%	*	85.1%
% Total Sulfur	4.33	4.93	*	4.63%
% SO4	.58	.89	*	.56%
% Sulfide	4.14	4.64	*	4.45%
APP (T CaCO3/KT)	-25.0	-28.7	*	-29.3
ANP (T CaCO3/KT)	6.6	.4	*	4.1
Net APP (T CaCO3/KT)	-18.4	-28.3	*	-25.2
SP2 - -1/4" STOCKPILE				
Brohm Oper. Hrs	6.5	5.5	*	157.6
Barmac Oper. Hrs	19.5	20.5	20.5	318.2
Barmac Avg rpm	1900	1900	1900	1900
% +1/4" (Cubical)	3.0%	4.0%	4.0%	3.5%
% -200 mesh	11%	11%	10%	11%

* Not Applicable
(09/25/92)

900 MILL/STACKER CIRCUIT

SP3 - FISHER SAMPLER

Sample ID	STH-SP3083192	STH-SP3090192	STH-SP3090292	STH-SP3090392	STH-SP3090492
Date	08/31/92	09/01/92	09/02/92	09/03/92	09/04/92
	(Calculated from Cone Area)				
Total Wet Tons To Pad (Total Dry Tons to Pad + Moisture)	87	550	2465 (3015)	2720	2795
% Moisture (in heap)	7.9%	7.8%	9.7%	9.2%	9.8%
	(Calculated from Wet Tons to Pad - Moisture)				
Total Dry Tons To Pad (Dry Tons Ore + Dry Tons CaCO3)	80	507	2226	2469	2521
CaCO3 (TPH - Dry) (9/9-Calib.)	31.8	31.8	31.8	31.8	31.8
	(Calc from Dry Tons to Pad)				
Dry Tons CaCO3 To Pad (TPH*Oper. Hrs)	6	36	192	180	192
CaCO3 (lb/Ton - Dry) (Calc from TPH)	152	152	152	152	152
Dry Tons CaCO3 To Pad (lb/Ton*Ton Ore)	6	36	154	174	177
Dry Tons Ore (Ton/hr) (9/9-Calib.)	403	403	403	403	385
	(Calc from Dry Tons Ore/TPH)				
Oper. Hrs (9/3-Actual)	.18	1.17	5.05	5.68	6.05
	(Total Dry Tons - Dry Tons CaCO3)				
Dry Tons Ore To Pad (TPH*Oper. Hrs)	74	471	2034 (2530)	2289	2329
Bucket Loads (101 lb/cu ft)	10 (966-E)	64 (966-E)	278 (966-E)	287 (966-E)	277 (980-C)
Dry Tons Ore To Pad (Calc from Buckets)	75	480	2085	2153	2271
DrewFloc (ml/min)	270	270	270	270	270
DrewFloc (lb/Ton)	.1	.1	.1	.1	.1
ON Soln (GPM)	120	120	120	120	120
ON (ton/day)	5.5	35.1	151.4	170.4	181.5
ON NaCN (lb/T)	.93	.87	.87	.88	.90
NaCN (lb/day)	5.2	30.5	131.7	150.0	163.4
ON Au (oz/day)	.033	.175	.757	.852	.726
ON Ag (oz/day)	.033	.246	.908	1.022	1.089

(10/05/92)

SP3 - FISHER SAMPLER

Sample ID	STH-SP3090892	STH-SP3090992	STH-SP3091092	STH-SP3091192
Date	09/08/92	09/09/92	09/10/92	09/11/92
Total Wet Tons To Pad (Total Dry Tons to Pad + Moisture)	2542	1730	3452	3345
% Moisture (in heap)	9.8%	9.9%	9.4%	10.1%
Total Dry Tons To Pad (Dry Tons Ore + Dry Tons CaCO3)	2293	1559	3128	3008
CaCO3 (TPH - Dry) (9/9-Calib.)	31.8	35.4	31.0	30.3
Dry Tons CaCO3 To Pad (TPH*Oper. Hrs)	184	146	225	215
CaCO3 (lb/Ton - Dry) (Calc from TPH)	152	207	155	154
Dry Tons CaCO3 To Pad (lb/Ton*Ton Ore)	160	146	225	215
Dry Tons Ore (Ton/hr) (9/9-Calib.)	365	342	399	393
Oper. Hrs (9/3-Actual)	5.78	4.13	7.27	7.10
Dry Tons Ore To Pad (TPH*Oper. Hrs)	2110	1412	2902	2792
Bucket Loads (101 lb/cu ft)	259 (980-C)	183 (980-C)	352 (980-C)	307 (980-C)
Dry Tons Ore To Pad (Calc from Buckets)	2124	1501	2886	2517
DrewFloc (ml/min)	270	270	270	275
DrewFloc (lb/Ton)	.1	.1	.1	.1
ON Soln (GPM)	115	115	120	120
ON (ton/day)	173.4	123.9	218.1	213.0
ON NaCN (lb/T)	.92	.85	.90	.90
NaCN (lb/day)	159.5	105.3	196.3	191.7
ON Au (oz/day)	1.040	.620	.872	1.065
ON Ag (oz/day)	.867	.743	1.091	1.278

(10/05/92)

BUB MILL CIRCUIT - ORE TO POP

9P3 - FISHER SAMPLER

Sample ID	STH-SP3091492	STH-SP3091592	STH-SP3091692	STH-SP3091792	STH-SP3091892	STH-SP3092092
Date	09/14/92	09/15/92	09/16/92	09/17/92	09/18/92	09/20/92
Total Wet Tons To Pad (Total Dry Tons to Pad + Moisture)	3085	3976	4716	3757	3642	1819
% Moisture (in heap)	10.3%	9.5%	10.1%	10.7%	10.3%	10.0%
Total Dry Tons To Pad (Dry Tons Ore + Dry Tons CaCO3)	2767	3598	4240	3355	3267	1637
CaCO3 (TPH - Dry) (9/9-Calib.)	36.4	34.2	26.6	26.9	27.6	30.0
Dry Tons CaCO3 To Pad (TPH*Oper. Hrs)	271	304	255	208	219	113
CaCO3 (lb/Ton - Dry) (Calc from TPH)	185	194	128	129	144	149
Dry Tons CaCO3 To Pad (lb/Ton*Ton Ore)	231	320	255	203	220	113
Dry Tons Ore (Ton/hr) (9/9-Calib.)	335	371	416	406	383	403
Oper. Hrs (9/3-Actual)	7.45	8.88	9.58	7.75	7.95	3.78
Dry Tons Ore To Pad (TPH*Oper. Hrs)	2496	3294	3985	3147	3047	1523
Bucket Loads (101 lb/cu ft)	324 (980-C)	409 (980-C)	457 (980-C)	351 (980-C)	368 (980-C)	182 (980-C)
Dry Tons Ore To Pad (Calc from Buckets)	2657	3354	3747	2878	3018	1492
DrewFloc (ml/min)	270	270	284	294	290	275
DrewFloc (lb/Ton)	.1	.1	.1	.1	.1	.1
ON Soln (GPM)	120	125	125	120	120	120
ON (ton/day)	223.5	266.4	287.4	232.5	238.5	113.4
ON NaCN (lb/T)	.87	.90	.87	.82	.90	.94
NaCN (lb/day)	194.4	239.8	250.0	190.7	214.7	106.6
ON Au (oz/day)	1.341	1.332	1.437	1.163	1.193	.680
ON Ag (oz/day)	1.341	1.598	1.724	1.395	1.193	.454

(10/05/92)

SP3 - FISHER SAMPLER

Sample ID	STH-SP3092192	STH-SP3092292	STH-SP3092492	STH-SP3092592	
Date	09/21/92	09/22/92	09/24/92	09/25/92	Total or Wt Avg to Date
Total Wet Tons To Pad (Total Dry Tons to Pad + Moisture)	3179	3532	3651	3311	54355
% Moisture (in heap)	10.0%	8.8%	9.1%	10.6%	9.8%
Total Dry Tons To Pad (Dry Tons Ore + Dry Tons CaCO3)	2861	3221	3319	2960	49016
CaCO3 (TPH - Dry) (9/9-Calib.)	31.1	32.8	32.8	29.4	31.3
Dry Tons CaCO3 To Pad (TPH*Oper. Hrs)	199	226	236	208	3617
CaCO3 (lb/Ton - Dry) (Calc from TPH)	150	151	148	151	159
Dry Tons CaCO3 To Pad (lb/Ton*Ton Ore)	200	226	228	208	3496
Dry Tons Ore (Ton/hr) (9/9-Calib.)	416	434	428	389	394
Oper. Hrs (9/3-Actual)	6.40	6.90	7.20	7.07	115.37
Dry Tons Ore To Pad (TPH*Oper. Hrs)	2662	2995	3083	2752	45400
Bucket Loads (101 lb/cu ft)	304 (980-C)	335 (980-C)	375 (980-C)	329 (980-C)	5451
Dry Tons Ore To Pad (Calc from Buckets)	2493	2747	3075	2698	44251
DrewFloc (ml/min)	300	310	310	305	281
DrewFloc (lb/Ton)	.1	.1	.1	.1	.1
ON Soln (GPM)	120	120	120	120	120
ON (ton/day)	192.0	207.0	216.0	212.1	3,461.1
ON NaCN (lb/T)	.91	.88	.89	.89	.89
NaCN (lb/day)	174.7	182.2	192.2	188.8	3,067.6
ON Au (oz/day)	.960	1.242	.864	.636	16.989
ON Ag (oz/day)	.768	.828	.864	.636	18.079

(10/05/92)

PUG MILL/STACKER CIRCUIT

SP3 - FISHER SAMPLER

Sample ID	STH-SP3083192	STH-SP3090192	STH-SP3090292	STH-SP3090392	STH-SP3090492
Date	08/31/92	09/01/92	09/02/92	09/03/92	09/04/92
pH	8.0	7.4	7.7	8.2	7.7
FA - Au (opt)	.056	.070	.071	.055	.060
FA - Au (oz)	4.487	35.497	158.039	135.816	151.280
FA - Ag (opt)	.29	.27	.30	.14	.23
FA - Ag (oz)	23.24	136.92	667.77	345.71	579.91
AA - Au (opt)	.036	.036	.036	.039	.036
AA - Au (oz)	2.885	18.256	80.132	96.306	90.768
AA - Ag (opt)	.227	.213	.202	.135	.192
AA - Ag (oz)	18.19	108.01	449.63	333.37	484.35
CN Sol Cu (ppm)	319	365	330	302	334
APP (T CaCO3/KT)	-28.3	-29.2	-34.7	-23.1	-35.4
ANP (T CaCO3/KT)	5.9	60.8	69.8	93.4	82.8
Net APP (T CaCO3/KT)	-22.4	31.6	35.1	70.3	47.4

(10/05/92)

PUG MILL CIRCUIT - ORE TO PAD

SP3 - FISHER SAMPLER

Sample ID	STH-SP3090892	STH-SP3090992	STH-SP3091092	STH-SP3091192
Date	09/08/92	09/09/92	09/10/92	09/11/92
pH	7.7	7.7	7.6	7.6
FA - Au (opt)	.056	.054	.061	.058
FA - Au (oz)	128.420	84.168	190.781	174.438
FA - Ag (opt)	.29	.23	.25	.16
FA - Ag (oz)	665.03	358.49	781.89	481.21
AA - Au (opt)	.034	.028	.032	.029
AA - Au (oz)	77.969	43.643	100.082	87.219
AA - Ag (opt)	.197	.192	.195	.191
AA - Ag (oz)	451.76	299.26	609.87	574.44
CN Sol Cu (ppm)	379	419	426	402
APP (T CaCO3/KT)	-33.5	-31.0	-31.2	-28.0
ANP (T CaCO3/KT)	89.3	84.4	67.0	69.9
Net APP (T CaCO3/KT)	55.8	53.3	35.8	41.8

(10/05/92)

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	03/01	03/02	03/03	03/04	03/05	03/06	03/07	03/08	03/09	03/10	03/11	03/12
Day	157	158	159	160	161	162	163	164	165	166	167	168
ON SOLUTION:												
Total Gal	115200	115200	115200	115200	115200	115200	115200	115200	115200	113760	115200	115200
gpm	80	80	80	80	80	80	80	80	80	79	80	80
Tons	480	480	480	480	480	480	480	480	480	474	480	480
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.012	.009	.009	.008	.007	.008	.008	.009	.007	.007	.008	.008
Au (oz)	5.520	4.464	4.416	4.032	3.552	3.840	3.984	4.080	3.504	3.318	3.840	3.840
Ag (opt)	.012	.011	.011	.010	.010	.010	.010	.010	.009	.009	.010	.011
Ag (oz)	5.760	5.472	5.040	4.800	4.560	4.704	4.896	4.704	4.464	4.408	4.608	5.232
Cu (ppm)	791	766	788	782	784	765	734	740	778	788	799	790
NaCN (lb/T)	.96	.90	1.01	.99	.95	.93	.98	.94	.99	1.02	1.05	1.00
NaCN (lb)	460.8	432.0	484.8	475.2	456.0	446.4	470.4	451.2	475.2	483.5	504.0	480.0
pH	9.42	9.45	9.55	9.57	9.56	9.56	9.55	9.58	9.59	9.55	9.53	9.53
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	90.0	83.4	82.9	81.7	97.5	97.5	88.5	90.9	88.3	88.7	86.4	95.2
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	115200	115200	115200	115200	115200	115200	115200	115200	115200	115200	113760	115200
gpm	80	80	80	80	80	80	80	80	80	80	79	80
Tons	480	480	480	480	480	480	480	480	480	480	474	480
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.014	.013	.013	.012	.012	.011	.011	.010	.010	.009	.010	.010
Au (oz)	6.480	6.336	6.144	5.520	5.952	5.040	5.136	4.944	4.656	4.176	4.835	4.848
Ag (opt)	.029	.025	.024	.021	.022	.020	.019	.019	.019	.020	.019	.019
Ag (oz)	13.776	12.000	11.280	9.984	10.320	9.792	9.216	8.880	9.120	9.360	9.053	9.264
Cu (ppm)	763	744	723	768	765	739	697	700	737	762	765	739
NaCN (lb/T)	.68	.70	.74	.73	.68	.70	.63	.65	.66	.64	.65	.73
NaCN (lb)	326.4	336.0	355.2	350.4	326.4	336.0	302.4	312.0	316.8	307.2	308.1	350.4
pH	8.73	8.66	8.70	8.91	8.59	8.67	8.66	8.68	8.71	8.70	8.72	8.62
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	111.9	110.4	111.8	105.6	120.5	120.0	121.7	118.7	115.2	113.9	113.5	118.8
DO	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	125	77	134	149	120	144	158	134	168	175	154	144
Cumulative lb	53666	53743	53877	54026	54146	54290	54448	54583	54751	54926	55080	55224
(lb/Ton Ore)	.003	.002	.003	.003	.003	.003	.004	.003	.004	.004	.004	.003
Cum lb/Ton Ore	1.248	1.250	1.253	1.256	1.259	1.262	1.266	1.269	1.273	1.277	1.281	1.284
Net Au (oz)	1.344	.816	1.680	1.104	1.920	1.488	1.296	.960	.576	.672	1.517	1.008
Net Ag (oz)	7.872	6.240	5.808	4.944	5.520	5.232	4.512	3.984	4.416	4.896	4.645	4.656
Cum Net Au (oz)	884.310	885.126	886.806	887.910	889.830	891.318	892.614	893.574	894.150	894.822	896.338	897.346
Cum Net Ag (oz)	3505.097	3511.337	3517.145	3522.089	3527.609	3532.841	3537.353	3541.337	3545.753	3550.649	3555.294	3559.950

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	03/13	03/14	03/15	03/16	03/17	03/18	03/19	03/20	03/21	03/22	03/23	03/24
Day	169	170	171	172	173	174	175	176	177	178	179	180
ON SOLUTION:												
Total Gal	112320	115200	107490	104530	106920	108000	107230	113320	104530	112550	110520	112050
gpm	78	80	75	73	74	75	74	79	73	78	77	78
Tons	468	480	448	436	446	450	447	472	436	469	461	467
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.008	.008	.009	.008	.008	.008	.008	.007	.008	.007	.008	.009
Au (oz)	3.650	3.984	3.941	3.397	3.609	3.600	3.574	3.305	3.354	3.330	3.546	4.062
Ag (opt)	.010	.011	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010
Ag (oz)	4.867	5.280	4.479	4.443	4.366	4.365	4.557	4.627	4.312	4.502	4.467	4.856
Cu (ppm)	752	752	739	769	772	735	768	739	752	755	697	712
NaCN (lb/T)	.98	1.02	1.08	1.08	1.06	.92	1.01	.96	1.01	1.05	.94	.96
NaCN (lb)	458.6	489.6	483.7	470.4	472.2	414.0	451.3	453.3	439.9	492.4	432.9	448.2
pH	9.56	9.56	-	9.65	9.55	9.57	9.54	9.57	9.53	9.62	9.70	9.54
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	93.0	90.5	-	86.3	87.7	59.2	87.4	82.0	74.3	77.4	86.9	87.3
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	115200	112320	115200	107490	104530	113745	114894	119144	125911	113620	123681	122800
gpm	80	78	80	75	73	79	80	83	87	79	86	85
Tons	480	468	480	448	436	474	479	496	525	473	515	512
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.011	.010	.010	.010	.010	.010	.010	.010	.009	.008	.009	.011
Au (oz)	5.088	4.727	4.560	4.344	4.530	4.739	4.644	4.815	4.827	3.693	4.638	5.373
Ag (opt)	.019	.018	.017	.018	.018	.017	.017	.017	.018	.016	.016	.016
Ag (oz)	9.216	8.424	8.112	7.972	7.796	8.010	8.090	8.489	9.181	7.717	8.194	8.136
Cu (ppm)	744	715	696	728	746	714	728	704	721	714	706	692
NaCN (lb/T)	.70	.68	.70	.70	.69	.63	.61	.59	.58	.60	.60	.60
NaCN (lb)	336.0	318.2	336.0	313.5	300.5	298.6	292.0	292.9	304.3	284.0	309.2	307.0
pH	8.70	8.72	-	8.71	8.72	8.74	8.72	8.73	8.74	8.72	8.76	8.77
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	117.2	116.9	-	119.2	118.1	108.2	116.9	121.7	116.0	112.5	112.5	112.5
DO	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	140	154	170	170	174	122	158	149	156	183	126	147
Cumulative lb	55364	55518	55688	55858	56032	56154	56312	56461	56617	56800	56926	57073
(lb/Ton Ore)	.003	.004	.004	.004	.004	.003	.004	.003	.004	.004	.003	.003
Cum lb/Ton Ore	1.287	1.291	1.295	1.299	1.303	1.306	1.309	1.313	1.317	1.321	1.324	1.327
Net Au (oz)	1.248	1.076	.576	.403	1.132	1.131	1.044	1.241	1.521	.339	1.308	1.827
Net Ag (oz)	3.984	3.557	2.832	3.493	3.354	3.644	3.725	3.932	4.554	3.405	3.692	3.669
Cum Net Au (oz)	898.594	899.671	900.247	900.650	901.782	902.913	903.957	905.198	906.719	907.058	908.367	910.193
Cum Net Ag (oz)	3563.934	3567.491	3570.323	3573.816	3577.170	3580.813	3584.539	3588.470	3593.024	3596.429	3600.121	3603.790

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	03/25	03/26	03/27	03/28	03/29	03/30	03/31	04/01	04/02	04/03	04/04	04/05
Day	181	182	183	184	185	186	187	188	189	190	191	192
ON SOLUTION:												
Total Gal	105520	114010	113740	105960	111690	112560	106620	109110	106470	100570	103920	102860
gpm	73	79	79	74	78	78	74	76	74	70	72	71
Tons	440	475	474	442	465	469	444	455	444	419	433	429
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.004	.005	.004
Au (opt)	.009	.008	.008	.008	.009	.009	.010	.005	.005	.003	.003	.006
Au (oz)	3.825	3.658	3.649	3.664	4.095	4.033	4.443	2.091	1.996	1.425	1.256	2.357
Ag (opt)	.011	.011	.010	.011	.011	.011	.012	.001	.001	.000	.001	.001
Ag (oz)	4.704	5.178	4.881	4.768	5.212	5.253	5.109	.500	.311	.168	.260	.300
Cu (ppm)	696	714	663	697	734	751	739	738	728	697	701	713
NaCN (lb/T)	.97	.98	.92	1.06	1.10	.95	1.07	1.01	.98	.99	.93	1.00
NaCN (lb)	426.5	465.5	436.0	468.0	511.9	445.6	475.3	459.2	434.8	414.9	402.7	428.6
pH	9.61	9.58	9.56	9.56	9.69	9.37	9.62	9.62	9.62	9.61	9.52	9.64
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	74.5	86.3	88.2	82.6	85.0	73.8	80.6	78.3	80.1	80.4	83.7	73.7
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	124500	114696	148065	138707	110375	111690	112560	106620	109110	106470	100570	103920
gpm	86	80	103	96	77	78	78	74	76	74	70	72
Tons	519	478	617	578	460	465	469	444	455	444	419	433
gpm/sq ft	.005	.005	.006	.006	.005	.005	.005	.005	.005	.005	.004	.005
Au (opt)	.011	.010	.008	.008	.011	.009	.012	.011	.010	.012	.010	.012
Au (oz)	5.499	4.827	4.997	4.739	5.059	4.142	5.394	4.842	4.410	5.102	4.190	4.980
Ag (opt)	.016	.017	.014	.015	.017	.015	.018	.018	.018	.018	.018	.016
Ag (oz)	8.300	8.172	8.699	8.669	8.002	7.074	8.254	7.997	8.047	8.030	7.668	7.058
Cu (ppm)	703	694	573	598	711	611	702	706	689	677	692	630
NaCN (lb/T)	.58	.62	.53	.57	.66	.58	.62	.60	.60	.60	.60	.61
NaCN (lb)	300.9	296.3	327.0	329.4	303.5	269.9	290.8	266.6	272.8	266.2	251.4	264.1
pH	8.85	8.72	8.72	8.75	8.82	8.75	8.77	8.74	8.77	8.79	8.82	8.82
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	108.2	110.5	113.2	116.5	117.9	105.2	104.7	101.2	99.6	100.7	100.6	102.5
DO	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	130	139	107	164	242	155	209	186	169	163	139	167
Cumulative lb	57203	57342	57448	57613	57855	58010	58218	58405	58573	58737	58875	59043
(lb/Ton Ore)	.003	.003	.002	.004	.006	.004	.005	.004	.004	.004	.003	.004
Cum lb/Ton Ore	1.330	1.333	1.336	1.340	1.345	1.349	1.354	1.358	1.362	1.366	1.369	1.373
Net Au (oz)	1.437	1.002	1.339	1.090	1.394	.047	1.360	.400	2.319	3.105	2.766	3.724
Net Ag (oz)	3.445	3.468	3.521	3.788	3.234	1.862	3.002	2.888	7.547	7.719	7.501	6.798
Cum Net Au (oz)	911.630	912.632	913.971	915.061	916.456	916.502	917.862	918.262	920.581	923.686	926.452	930.176
Cum Net Ag (oz)	3607.234	3610.702	3614.223	3618.010	3621.244	3623.106	3626.107	3628.995	3636.542	3644.261	3651.762	3658.560

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	04/06	04/07	04/08	04/09	04/10	04/11	04/12	04/13	04/14	04/15	04/16	04/17
Day	193	194	195	196	197	198	199	200	201	202	203	204
ON SOLUTION:												
Total Gal	105240	110880	110880	110880	110880	108000	110880	110880	110880	110880	110880	110880
gpm	73	77	77	77	77	75	77	77	77	77	77	77
Tons	439	462	462	462	462	450	462	462	462	462	462	462
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.003	.002	.003	.003	.003	.003	.004	.002	.003	.003	.004	.002
Au (oz)	1.184	1.109	1.340	1.247	1.478	1.530	1.987	1.109	1.571	1.294	1.756	.970
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.000	.001	.001	.001	.001
Ag (oz)	.263	.231	.277	.323	.416	.270	.323	.185	.231	.231	.462	.277
Cu (ppm)	729	730	706	672	649	657	764	701	697	711	710	698
NaCN (lb/T)	1.03	1.01	.92	.90	1.07	1.02	1.09	1.01	.95	.96	1.14	1.00
NaCN (lb)	451.7	466.6	425.0	415.8	494.3	459.0	503.6	466.6	438.9	443.5	526.7	462.0
pH	9.62	9.57	9.52	9.50	9.62	9.58	9.66	9.52	9.53	9.44	9.52	9.39
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	76.0	80.0	-	-	-	-	76.2	77.3	80.1	81.3	-	-
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	102860	105240	110880	129630	129630	129630	126750	110880	115880	115880	110880	114880
gpm	71	73	77	90	90	90	88	77	80	80	77	80
Tons	429	439	462	540	540	540	528	462	483	483	462	479
gpm/sq ft	.004	.005	.005	.006	.006	.006	.006	.005	.005	.005	.005	.005
Au (opt)	.010	.010	.008	.008	.008	.008	.008	.007	.008	.006	.006	.006
Au (oz)	4.457	4.560	3.742	4.159	4.483	4.429	4.383	3.326	3.670	2.897	2.680	2.728
Ag (opt)	.018	.014	.014	.012	.013	.012	.011	.010	.009	.010	.010	.008
Ag (oz)	7.586	6.183	6.468	6.482	6.968	6.373	5.651	4.759	4.442	4.635	4.620	4.021
Cu (ppm)	694	619	606	555	610	649	674	687	604	663	666	538
NaCN (lb/T)	.61	.54	.51	.46	.52	.61	.62	.60	.55	.59	.65	.59
NaCN (lb)	261.4	236.8	235.6	248.5	280.9	329.5	327.4	277.2	265.6	284.9	300.3	282.4
pH	8.78	8.81	8.77	8.80	8.83	8.74	8.85	8.82	8.83	8.79	8.69	8.75
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	95.9	102.3	-	-	-	-	103.1	92.6	101.0	103.3	-	-
DO	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	215	231	177	135	165	132	226	201	154	143	244	166
Cumulative lb	59257	59488	59665	59800	59965	60096	60323	60524	60678	60821	61065	61232
(lb/Ton Ore)	.005	.005	.004	.003	.004	.003	.005	.005	.004	.003	.006	.004
Cum lb/Ton Ore	1.378	1.383	1.387	1.391	1.394	1.397	1.403	1.407	1.411	1.414	1.420	1.424
Net Au (oz)	2.100	3.376	2.633	2.819	3.236	2.951	2.853	1.340	2.561	1.326	1.386	.973
Net Ag (oz)	7.286	5.920	6.237	6.204	6.644	5.958	5.381	4.435	4.257	4.404	4.389	3.559
Cum Net Au (oz)	932.276	935.652	938.285	941.105	944.340	947.291	950.144	951.484	954.045	955.371	956.757	957.730
Cum Net Ag (oz)	3665.846	3671.766	3678.003	3684.207	3690.851	3696.809	3702.190	3706.625	3710.882	3715.286	3719.675	3723.234

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	04/18	04/19	04/20	04/21	04/22	04/23	04/24	04/25	04/26	04/27	04/28	04/29
Day	205	206	207	208	209	210	211	212	213	214	215	216
ON SOLUTION:												
Total Gal	110880	113760	110880	110880	108000	110880	110880	110880	106560	106560	102680	120170
gpm	77	79	77	77	75	77	77	77	74	74	71	83
Tons	462	474	462	462	450	462	462	462	444	444	428	501
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.004	.005
Au (opt)	.004	.004	.004	.004	.003	.003	.005	.006	.004	.004	.006	.004
Au (oz)	1.663	1.896	1.940	2.033	1.350	1.432	2.218	2.726	1.732	1.598	2.738	2.203
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.002	.001
Ag (oz)	.231	.427	.277	.277	.315	.416	.370	.554	.311	.400	.642	.350
Cu (ppm)	691	708	718	719	705	702	688	699	732	719	746	726
NaCN (lb/T)	1.00	1.03	1.01	.95	.91	.94	1.01	1.03	1.00	1.10	.99	1.02
NaCN (lb)	462.0	488.2	466.6	438.9	409.5	434.3	466.6	475.9	444.0	488.4	423.6	510.7
pH	9.35	9.37	9.36	9.34	9.29	9.33	9.38	9.49	9.47	9.44	9.40	9.44
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	-	79.6	-	-	-	-	-	-	81.4	-	86.3	-
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	131380	114380	113760	110880	110880	110500	113380	110880	115880	111560	106560	102680
gpm	91	79	79	77	77	77	79	77	80	77	74	71
Tons	547	477	474	462	462	460	472	462	483	465	444	428
gpm/sq ft	.006	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.004
Au (opt)	.004	.005	.007	.005	.006	.007	.007	.007	.007	.007	.007	.008
Au (oz)	1.971	2.574	3.318	2.495	2.726	3.085	3.260	3.188	3.380	3.114	3.019	3.252
Ag (opt)	.007	.010	.011	.010	.011	.011	.010	.010	.010	.011	.011	.011
Ag (oz)	3.832	4.813	5.024	4.805	4.943	5.203	4.771	4.620	4.877	5.067	4.751	4.578
Cu (ppm)	454	576	685	676	648	646	598	594	675	674	692	679
NaCN (lb/T)	.54	.56	.65	.65	.71	.62	.60	.65	.67	.71	.61	.67
NaCN (lb)	295.6	266.9	308.1	300.3	328.0	285.5	283.5	300.3	323.5	330.0	270.8	286.6
pH	8.77	8.72	8.80	8.81	8.82	8.83	8.86	8.86	8.88	8.81	8.95	8.87
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	-	100.7	-	-	-	-	-	-	105.9	-	95.2	-
DO	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	195	180	166	111	124	151	166	152	114	218	137	190
Cumulative lb	61427	61607	61773	61884	62008	62159	62325	62478	62592	62809	62946	63136
(lb/Ton Ore)	.005	.004	.004	.003	.003	.004	.004	.004	.003	.005	.003	.004
Cum lb/Ton Ore	1.428	1.433	1.436	1.439	1.442	1.445	1.449	1.453	1.456	1.461	1.464	1.468
Net Au (oz)	1.001	.910	1.422	.554	.693	1.735	1.827	.970	.654	1.383	1.421	.513
Net Ag (oz)	3.555	4.582	4.598	4.528	4.666	4.888	4.356	4.250	4.322	4.756	4.351	3.936
Cum Net Au (oz)	958.730	959.641	961.063	961.617	962.310	964.045	965.872	966.843	967.497	968.879	970.300	970.814
Cum Net Ag (oz)	3726.789	3731.371	3735.969	3740.497	3745.163	3750.051	3754.406	3758.657	3762.979	3767.735	3772.086	3776.022

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	04/30	05/01	05/02	05/03	05/04	05/05	05/06	05/07	05/08	05/09	05/10	05/11
Day	217	218	219	220	221	222	223	224	225	226	227	228
ON SOLUTION:												
Total Gal	108770	111330	109210	109490	112820	113380	107950	112150	105380	118180	102880	116830
gpm	76	77	76	76	78	79	75	78	73	82	71	81
Tons	453	464	455	456	470	472	450	467	439	492	429	487
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.004	.005
Au (opt)	.003	.004	.003	.004	.005	.004	.007	.005	.003	.004	.005	.003
Au (oz)	1.360	1.856	1.229	1.688	2.256	1.748	3.328	2.477	1.405	1.871	2.015	1.509
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.363	.278	.410	.456	.376	.283	.270	.374	.220	.345	.343	.389
Cu (ppm)	727	672	692	712	729	716	633	689	676	662	692	689
NaCN (lb/T)	1.03	.92	.90	1.02	1.00	.92	1.04	.89	.80	.95	.98	.97
NaCN (lb)	466.8	426.8	409.5	465.3	470.1	434.6	467.8	415.9	351.3	467.8	420.1	472.2
pH	9.40	9.42	9.44	9.44	9.33	9.33	9.46	9.36	9.32	9.43	9.44	9.43
emf	-	-	74.5	-	64.9	-	-	-	-	-	-	79.6
EFFLUENT:												
Total Gal	120170	108770	111330	109210	109490	112820	119880	141950	140150	141880	154180	106380
gpm	83	76	77	76	76	78	83	99	97	99	107	74
Tons	501	453	464	455	456	470	500	591	584	591	642	443
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.006	.006	.006	.007	.005
Au (opt)	.007	.006	.007	.007	.006	.006	.006	.008	.006	.008	.007	.007
Au (oz)	3.705	2.810	3.340	3.003	2.920	2.679	3.147	4.850	3.621	4.552	4.561	3.058
Ag (opt)	.011	.010	.011	.010	.010	.009	.009	.014	.009	.010	.011	.011
Ag (oz)	5.308	4.668	5.103	4.414	4.380	4.090	4.695	7.985	5.431	6.148	6.810	4.743
Cu (ppm)	664	651	682	610	613	582	578	649	582	652	648	642
NaCN (lb/T)	.64	.62	.68	.62	.66	.62	.64	.55	.52	.63	.60	.58
NaCN (lb)	320.5	281.0	315.4	282.1	301.1	291.5	319.7	325.3	303.7	372.4	385.5	257.1
pH	8.83	8.83	8.88	8.90	8.94	8.91	8.86	8.87	8.87	8.91	8.86	8.99
emf	-	-	96.2	-	96.3	-	-	-	-	-	-	97.1
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	186	111	127	164	179	115	142	112	-21	82	163	170
Cumulative lb	63322	63433	63561	63725	63903	64018	64161	64273	64252	64334	64497	64668
(lb/Ton Ore)	.004	.003	.003	.004	.004	.003	.003	.003	.000	.002	.004	.004
Cum lb/Ton Ore	1.472	1.475	1.478	1.482	1.486	1.489	1.492	1.494	1.494	1.496	1.500	1.504
Net Au (oz)	1.502	1.450	1.484	1.775	1.232	.423	1.399	1.522	1.144	3.147	2.690	1.044
Net Ag (oz)	4.957	4.305	4.824	4.004	3.923	3.714	4.412	7.715	5.057	5.929	6.465	4.400
Cum Net Au (oz)	972.316	973.766	975.251	977.025	978.257	978.680	980.079	981.601	982.745	985.892	988.581	989.625
Cum Net Ag (oz)	3780.979	3785.284	3790.109	3794.113	3798.037	3801.750	3806.162	3813.877	3818.934	3824.862	3831.327	3835.727

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	05/12	05/13	05/14	05/15	05/16	05/17	05/18	05/19	05/20	05/21	05/22	05/23
Day	229	230	231	232	233	234	235	236	237	238	239	240
ON SOLUTION:												
Total Gal	119740	113150	113450	112510	108380	116740	113810	113860	118700	109330	116900	110880
gpm	83	79	79	78	75	81	79	79	82	76	81	77
Tons	499	471	473	469	452	486	474	474	495	456	487	462
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.003	.003	.005	.006	.005	.004	.004	.003	.004	.003	.004	.004
Au (oz)	1.347	1.367	2.316	2.813	2.393	2.140	1.802	1.613	1.830	1.458	1.900	1.709
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.449	.330	.378	.328	.271	.389	.427	.474	.445	.319	.292	.370
Cu (ppm)	692	675	714	684	698	695	682	703	704	690	683	687
NaCN (lb/T)	1.03	1.08	1.00	1.03	1.04	.99	1.02	1.01	.97	.93	1.02	.94
NaCN (lb)	513.9	509.2	472.7	482.9	469.6	481.6	483.7	479.2	479.7	423.7	496.8	434.3
pH	9.43	9.45	9.29	9.33	9.34	9.46	9.40	9.42	9.41	9.39	9.40	9.33
emf	-	-	-	-	-	75.1	-	-	-	-	-	-
EFFLUENT:												
Total Gal	116830	119740	113150	113450	112510	108380	118240	115310	113860	118700	109330	129400
gpm	81	83	79	79	78	75	82	80	79	82	76	90
Tons	487	499	471	473	469	452	493	480	474	495	456	539
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.006
Au (opt)	.007	.007	.008	.007	.007	.007	.006	.006	.007	.007	.006	.007
Au (oz)	3.456	3.443	3.677	3.451	3.188	3.206	3.055	3.075	3.179	3.363	2.870	3.774
Ag (opt)	.011	.011	.011	.011	.010	.010	.010	.010	.010	.009	.009	.010
Ag (oz)	5.257	5.239	4.950	4.963	4.782	4.471	4.927	4.757	4.744	4.451	4.191	5.500
Cu (ppm)	641	655	657	656	673	659	644	665	671	607	612	680
NaCN (lb/T)	.62	.62	.61	.62	.62	.63	.61	.61	.57	.59	.58	.65
NaCN (lb)	301.8	309.3	287.6	293.1	290.7	293.5	300.5	293.1	270.4	291.8	264.2	350.5
pH	8.85	8.86	8.79	8.80	8.80	8.92	8.89	8.92	8.95	8.98	8.98	8.91
emf	-	-	-	-	-	90.0	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	205	222	180	192	176	181	191	209	188	159	146	85
Cumulative lb	64872	65094	65273	65466	65642	65823	66013	66222	66410	66569	66716	66801
(lb/Ton Ore)	.005	.005	.004	.004	.004	.004	.004	.005	.004	.004	.003	.002
Cum lb/Ton Ore	1.508	1.514	1.518	1.522	1.526	1.530	1.535	1.540	1.544	1.548	1.551	1.553
Net Au (oz)	1.947	2.095	2.310	1.135	.375	.813	.914	1.273	1.566	1.533	1.412	1.875
Net Ag (oz)	4.868	4.790	4.620	4.585	4.454	4.200	4.538	4.330	4.270	4.006	3.872	5.207
Cum Net Au (oz)	991.572	993.668	995.978	997.112	997.487	998.300	999.215	1000.488	1002.053	1003.586	1004.999	1006.873
Cum Net Ag (oz)	3840.595	3845.385	3850.005	3854.590	3859.044	3863.244	3867.781	3872.111	3876.381	3880.387	3884.259	3889.466

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	05/24	05/25	05/26	05/27	05/28	05/29	05/30	05/31	06/01	06/02	06/03	06/04
Day	241	242	243	244	245	246	247	248	249	250	251	252
ON SOLUTION:												
Total Gal	110880	119190	111265	111265	110650	117110	112320	119520	110600	111010	114220	115510
gpm	77	83	77	77	77	81	78	83	77	77	79	80
Tons	462	497	464	464	461	488	468	498	461	463	476	481
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.005	.004	.004	.004	.004	.003	.004	.006	.004	.004	.003	.005
Au (oz)	2.171	1.738	1.762	1.762	1.614	1.464	1.732	3.187	1.797	1.804	1.380	2.214
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.277	.248	.278	.278	.323	.293	.374	.349	.277	.324	.286	.385
Cu (ppm)	715	719	717	723	726	730	692	689	724	724	735	751
NaCN (lb/T)	.92	.96	.91	.95	.91	.83	.92	.89	.89	.89	.87	.80
NaCN (lb)	425.0	476.8	421.9	440.4	419.5	405.0	430.6	443.2	410.1	411.7	414.0	385.0
pH	9.28	9.19	9.20	9.24	9.23	9.17	9.26	9.20	9.26	9.24	9.23	9.10
emf	85.9	-	-	-	-	-	-	-	92.5	-	-	-
EFFLUENT:												
Total Gal	126880	113880	120690	111265	111265	111150	117110	124320	131520	115100	117760	117220
gpm	88	79	84	77	77	77	81	86	91	80	82	81
Tons	529	475	503	464	464	463	488	518	548	480	491	488
gpm/sq ft	.006	.005	.005	.005	.005	.005	.005	.005	.006	.005	.005	.005
Au (opt)	.006	.006	.005	.006	.007	.007	.007	.007	.007	.006	.005	.006
Au (oz)	3.278	2.894	2.364	2.596	3.060	3.149	3.416	3.574	3.562	2.686	2.601	2.784
Ag (opt)	.010	.010	.008	.010	.010	.010	.010	.010	.009	.009	.010	.010
Ag (oz)	5.128	4.603	3.973	4.404	4.543	4.585	4.928	5.232	5.151	4.364	4.661	4.689
Cu (ppm)	674	677	554	685	690	692	664	695	693	695	707	694
NaCN (lb/T)	.66	.68	.58	.65	.67	.67	.66	.68	.65	.63	.61	.64
NaCN (lb)	348.9	322.7	291.7	301.3	310.6	310.3	322.1	352.2	356.2	302.1	299.3	312.6
pH	8.96	8.86	8.95	8.94	8.91	8.92	8.90	8.87	8.95	8.93	8.95	8.88
emf	91.9	-	-	-	-	-	-	-	94.7	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	102	185	121	130	109	83	78	87	108	112	101	85
Cumulative lb	66904	67089	67209	67339	67448	67531	67610	67697	67805	67917	68018	68103
(lb/Ton Ore)	.002	.004	.003	.003	.003	.002	.002	.002	.003	.003	.002	.002
Cum lb/Ton Ore	1.556	1.560	1.563	1.566	1.568	1.570	1.572	1.574	1.577	1.579	1.582	1.584
Net Au (oz)	1.568	.723	.625	.834	1.298	1.536	1.952	1.843	.375	.888	.797	1.404
Net Ag (oz)	4.758	4.325	3.724	4.126	4.265	4.262	4.636	4.857	4.803	4.088	4.338	4.403
Cum Net Au (oz)	1008.441	1009.164	1009.790	1010.624	1011.922	1013.458	1015.410	1017.252	1017.627	1018.516	1019.312	1020.716
Cum Net Ag (oz)	3894.225	3898.550	3902.274	3906.400	3910.666	3914.928	3919.563	3924.421	3929.223	3933.311	3937.649	3942.052

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	06/05	06/06	06/07	06/08	06/09	06/10	06/11	06/12	06/13	06/14	06/15	06/16
Day	253	254	255	256	257	258	259	260	261	262	263	264
ON SOLUTION:												
Total Gal	113630	122693	32340	0	73920	110880	110880	110880	110880	110880	110880	110880
gpm	79	85	22	0	51	77	77	77	77	77	77	77
Tons	473	511	135	0	308	462	462	462	462	462	462	462
gpm/sq ft	.005	.005	.001	.000	.003	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.004	.003	.005	.003	.004	.004	.004	.004	.005	.006	.004	.005
Au (oz)	1.704	1.585	.606	.000	1.109	1.802	2.033	1.756	2.402	2.726	1.940	2.079
Ag (opt)	.001	.001	.001	.002	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.426	.511	.094	.000	.308	.323	.370	.370	.370	.277	.370	.370
Cu (ppm)	714	727	691	604	690	704	706	702	703	720	716	706
NaCN (lb/T)	.92	.94	.97	.95	1.06	.92	.88	.83	.86	.84	.88	.82
NaCN (lb)	435.6	480.5	130.7	.0	326.5	425.0	406.6	383.5	397.3	388.1	406.6	378.8
pH	9.22	9.19	9.37	9.65	9.54	9.31	9.28	9.20	9.18	9.19	9.19	9.05
emf	-	-	66.7	-	-	-	-	-	-	80.2	-	-
EFFLUENT:												
Total Gal	116260	113630	120340	167443	43250	73920	110880	110880	110880	110880	110880	110880
gpm	81	79	84	116	30	51	77	77	77	77	77	77
Tons	484	473	501	698	180	308	462	462	462	462	462	462
gpm/sq ft	.005	.005	.005	.007	.002	.003	.005	.005	.005	.005	.005	.005
Au (opt)	.007	.006	.007	.006	.009	.008	.007	.008	.006	.006	.005	.005
Au (oz)	3.246	2.983	3.259	3.837	1.640	2.310	3.095	3.881	2.726	2.587	2.495	2.495
Ag (opt)	.010	.010	.010	.009	.014	.011	.009	.010	.009	.008	.010	.010
Ag (oz)	4.747	4.687	4.814	6.558	2.541	3.419	4.019	4.666	3.973	3.881	4.666	4.435
Cu (ppm)	684	694	631	369	440	498	575	691	590	588	689	648
NaCN (lb/T)	.62	.64	.57	.44	.48	.50	.50	.60	.54	.53	.65	.60
NaCN (lb)	300.3	303.0	285.8	307.0	86.5	154.0	231.0	277.2	249.5	244.9	300.3	277.2
pH	8.89	8.82	8.86	7.85	8.47	8.67	8.75	8.79	8.77	8.83	8.82	8.81
emf	-	-	100.5	-	-	-	-	-	-	102.5	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	133	195	-176	-87	172	194	129	134	152	88	129	379
Cumulative lb	68236	68430	68254	68168	68340	68534	68664	68798	68950	69038	69167	69546
(lb/Ton Ore)	.003	.005	-.004	-.002	.004	.005	.003	.003	.004	.002	.003	.009
Cum lb/Ton Ore	1.587	1.591	1.587	1.585	1.589	1.594	1.597	1.600	1.603	1.605	1.608	1.617
Net Au (oz)	1.032	1.278	1.674	3.231	1.640	1.201	1.294	1.848	.970	.185	-.231	.554
Net Ag (oz)	4.362	4.261	4.302	6.464	2.541	3.111	3.696	4.297	3.604	3.511	4.389	4.066
Cum Net Au (oz)	1021.748	1023.026	1024.700	1027.931	1029.571	1030.772	1032.066	1033.914	1034.884	1035.069	1034.838	1035.392
Cum Net Ag (oz)	3946.414	3950.675	3954.978	3961.442	3963.982	3967.093	3970.789	3975.086	3978.689	3982.201	3986.590	3990.655

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	06/17	06/18	06/19	06/20	06/21	06/22	06/23	06/24	06/25	06/26	06/27	06/28
Day	265	266	267	268	269	270	271	272	273	274	275	276
ON SOLUTION:												
Total Gal	110880	110880	110880	110880	110880	110880	110880	110880	110880	110880	110880	110880
gpm	77	77	77	77	77	77	77	77	77	77	77	77
Tons	462	462	462	462	462	462	462	462	462	462	462	462
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.003	.004	.003	.007	.006	.006	.005	.004	.004	.002	.003	.004
Au (oz)	1.525	1.756	1.432	3.095	2.680	2.633	2.079	2.033	1.756	1.063	1.525	2.033
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.416	.370	.323	.323	.370	.370	.323	.323	.416	.416	.370	.323
Cu (ppm)	658	659	656	685	698	698	695	701	708	706	688	689
NaCN (lb/T)	1.00	.90	.90	.99	.87	.85	.89	.84	.90	.92	.92	.96
NaCN (lb)	462.0	415.8	415.8	457.4	401.9	392.7	411.2	388.1	415.8	425.0	425.0	443.5
pH	9.47	9.39	9.34	9.31	9.27	9.20	9.22	9.22	9.16	9.17	9.20	9.29
emf	-	-	-	-	-	94.8	-	-	-	-	-	80.2
EFFLUENT:												
Total Gal	124380	152630	142380	126630	123380	110880	110880	112880	112380	110880	110880	110880
gpm	86	106	99	88	86	77	77	78	78	77	77	77
Tons	518	636	593	528	514	462	462	470	468	462	462	462
gpm/sq ft	.005	.007	.006	.006	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.006	.006	.006	.006	.006	.007	.006	.007	.006	.007	.006	.006
Au (oz)	3.161	4.007	3.678	3.271	3.136	3.003	2.818	3.198	2.716	3.049	2.772	2.957
Ag (opt)	.010	.010	.010	.010	.009	.009	.009	.009	.009	.009	.009	.008
Ag (oz)	4.923	6.105	5.695	5.065	4.627	4.297	4.250	4.280	4.214	4.158	3.973	3.650
Cu (ppm)	634	635	642	665	684	669	661	664	671	670	676	655
NaCN (lb/T)	.63	.60	.65	.63	.60	.66	.64	.57	.64	.62	.65	.61
NaCN (lb)	326.5	381.6	385.6	332.4	308.5	304.9	295.7	268.1	299.7	286.4	300.3	281.8
pH	8.83	8.76	8.74	8.75	8.75	8.74	8.78	8.79	8.72	8.74	8.76	8.76
emf	-	-	-	-	-	104.2	-	-	-	-	-	108.5
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	80	30	83	149	97	97	143	88	129	125	143	203
Cumulative lb	69626	69657	69740	69889	69986	70083	70226	70314	70444	70569	70712	70915
(lb/Ton Ore)	.002	.001	.002	.003	.002	.002	.003	.002	.003	.003	.003	.005
Cum lb/Ton Ore	1.619	1.620	1.622	1.625	1.627	1.630	1.633	1.635	1.638	1.641	1.644	1.649
Net Au (oz)	1.082	2.482	1.923	1.839	.041	.323	.185	1.119	.683	1.294	1.709	1.432
Net Ag (oz)	4.554	5.689	5.326	4.742	4.303	3.927	3.881	3.957	3.891	3.742	3.557	3.280
Cum Net Au (oz)	1036.475	1038.957	1040.879	1042.718	1042.759	1043.082	1043.267	1044.386	1045.069	1046.363	1048.072	1049.505
Cum Net Ag (oz)	3995.209	4000.898	4006.224	4010.966	4015.269	4019.196	4023.077	4027.034	4030.924	4034.667	4038.224	4041.504

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	06/29	06/30	07/01	07/02	07/03	07/04	07/05	07/06	07/07	07/08	07/09	07/10
Day	277	278	279	280	281	282	283	284	285	286	287	288
ON SOLUTION:												
Total Gal	110880	110880	110880	110880	110880	110880	110880	110880	110880	110880	110880	112320
gpm	77	77	77	77	77	77	77	77	77	77	77	78
Tons	462	462	462	462	462	462	462	462	462	462	462	468
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.004	.005	.004	.006	.005	.005	.006	.006	.005	.006	.007	.007
Au (oz)	1.987	2.218	1.802	2.772	2.171	2.495	2.864	2.772	2.402	2.633	3.095	3.089
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.277	.277	.231	.323	.231	.370	.277	.277	.323	.508	.370	.562
Cu (ppm)	684	682	718	590	625	633	661	645	702	691	730	695
NaCN (lb/T)	.91	.88	.91	1.03	.97	.94	.98	1.00	1.05	.97	.94	1.10
NaCN (lb)	420.4	406.6	420.4	475.9	448.1	434.3	452.8	462.0	485.1	448.1	434.3	514.8
pH	9.28	9.09	8.99	9.05	9.23	9.19	9.13	9.24	9.21	9.14	9.12	9.24
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	110880	110880	111380	110880	112380	111880	110880	111380	112380	125880	123380	110880
gpm	77	77	77	77	78	78	77	77	78	87	86	77
Tons	462	462	464	462	468	466	462	464	468	525	514	462
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.006	.006	.007	.008	.008	.007	.008	.008	.008	.007	.007	.007
Au (oz)	2.633	2.818	3.017	3.650	3.699	3.356	3.650	3.481	3.699	3.409	3.804	3.234
Ag (opt)	.007	.008	.008	.008	.008	.008	.008	.008	.008	.007	.007	.008
Ag (oz)	3.234	3.881	3.713	3.742	3.793	3.776	3.788	3.666	3.793	3.619	3.547	3.650
Cu (ppm)	594	650	662	606	618	631	622	618	676	587	634	678
NaCN (lb/T)	.52	.62	.71	.65	.63	.62	.65	.61	.62	.65	.64	.60
NaCN (lb)	240.2	286.4	329.5	300.3	295.0	289.0	300.3	283.1	290.3	340.9	329.0	277.2
pH	8.80	8.83	8.76	8.74	8.69	8.75	8.68	8.79	8.76	8.78	8.72	8.67
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	134	77	120	181	159	134	170	172	144	119	157	237
Cumulative lb	71049	71126	71246	71427	71586	71720	71890	72061	72206	72325	72482	72719
(lb/Ton Ore)	.003	.002	.003	.004	.004	.003	.004	.004	.003	.003	.004	.006
Cum lb/Ton Ore	1.652	1.654	1.657	1.661	1.665	1.668	1.672	1.676	1.679	1.682	1.685	1.691
Net Au (oz)	.601	.832	.799	1.848	.927	1.185	1.155	.616	.927	1.007	1.171	.139
Net Ag (oz)	2.911	3.604	3.435	3.511	3.469	3.545	3.419	3.389	3.516	3.296	3.039	3.280
Cum Net Au (oz)	1050.105	1050.937	1051.736	1053.584	1054.511	1055.696	1056.851	1057.467	1058.394	1059.401	1060.572	1060.711
Cum Net Ag (oz)	4044.415	4048.018	4051.454	4054.965	4058.435	4061.980	4065.398	4068.787	4072.303	4075.599	4078.638	4081.918

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	07/11	07/12	07/13	07/14	07/15	07/16	07/17	07/18	07/19	07/20	07/21	07/22
Day	289	290	291	292	293	294	295	296	297	298	299	300
ON SOLUTION:												
Total Gal	112320	112320	112320	112320	112320	112320	112320	112320	112320	115200	118080	120960
gpm	78	78	78	78	78	78	78	78	78	80	82	84
Tons	468	468	468	468	468	468	468	468	468	480	492	504
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.006	.006	.006	.006	.005	.004	.005	.004	.004	.005	.007	.005
Au (oz)	2.761	2.902	2.668	2.995	2.246	1.872	2.106	1.919	2.059	2.256	3.247	2.671
Ag (opt)	.002	.001	.002	.002	.002	.002	.002	.001	.001	.001	.003	.001
Ag (oz)	.702	.608	.983	.936	.796	.749	.796	.608	.328	.336	1.230	.554
Cu (ppm)	713	719	717	703	746	742	732	745	745	728	712	710
NaCN (lb/T)	.94	.99	.93	.90	.87	.96	.95	1.03	.90	.98	.88	.93
NaCN (lb)	439.9	463.3	435.2	421.2	407.2	449.3	444.6	482.0	421.2	470.4	433.0	468.7
pH	9.02	9.24	9.15	9.14	9.01	8.98	9.00	9.14	9.04	9.17	9.11	9.28
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	112821	116320	115320	116320	116320	117320	121320	118820	117320	114320	115200	148080
gpm	78	81	80	81	81	81	84	83	81	79	80	103
Tons	470	485	481	485	485	489	506	495	489	476	480	617
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.006
Au (opt)	.007	.005	.006	.006	.006	.006	.006	.006	.007	.007	.008	.009
Au (oz)	3.291	2.569	2.883	3.102	2.860	2.884	2.932	3.169	3.177	3.144	3.696	5.615
Ag (opt)	.007	.008	.008	.008	.008	.009	.008	.008	.008	.009	.009	.012
Ag (oz)	3.432	3.829	3.892	3.926	4.023	4.204	3.993	4.010	4.057	4.096	4.512	7.219
Cu (ppm)	617	688	699	693	701	701	632	635	708	679	585	658
NaCN (lb/T)	.59	.62	.67	.66	.67	.65	.63	.67	.68	.64	.58	.60
NaCN (lb)	277.4	300.5	321.9	319.9	324.7	317.7	318.5	331.7	332.4	304.9	278.4	370.2
pH	8.77	8.76	8.76	8.74	8.73	8.65	8.66	8.68	8.67	8.66	8.59	8.62
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	139	141	115	96	89	131	113	150	116	192	63	98
Cumulative lb	72859	73000	73115	73212	73301	73432	73545	73695	73811	74003	74066	74163
(lb/Ton Ore)	.003	.003	.003	.002	.002	.003	.003	.003	.003	.004	.001	.002
Cum lb/Ton Ore	1.694	1.697	1.700	1.702	1.704	1.707	1.710	1.714	1.716	1.721	1.722	1.724
Net Au (oz)	.202	-.192	-.019	.434	-.136	.638	1.060	1.063	1.259	1.085	1.440	2.368
Net Ag (oz)	2.870	3.127	3.284	2.943	3.087	3.408	3.245	3.215	3.449	3.769	4.176	5.989
Cum Net Au (oz)	1060.912	1060.720	1060.701	1061.136	1061.000	1061.638	1062.697	1063.760	1065.019	1066.103	1067.543	1069.911
Cum Net Ag (oz)	4084.788	4087.915	4091.198	4094.141	4097.228	4100.636	4103.881	4107.096	4110.545	4114.313	4118.489	4124.478

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	07/23	07/24	07/25	07/26	07/27	07/28	07/29	07/30	07/31	08/01	08/02	08/03
Day	301	302	303	304	305	306	307	308	309	310	311	312
ON SOLUTION:												
Total Gal	123840	126720	129600	132480	135360	135360	135360	135360	135360	135360	135360	135360
gpm	86	88	90	92	94	94	94	94	94	94	94	94
Tons	516	528	540	552	564	564	564	564	564	564	564	564
gpm/sq ft	.005	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.005	.004	.005	.008	.006	.005	.005	.006	.005	.005	.006	.004
Au (oz)	2.322	1.954	2.430	4.140	3.328	2.538	2.707	3.328	2.876	3.046	3.497	2.369
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.310	.264	.324	.607	.338	.395	.508	.451	.508	.508	.451	.282
Cu (ppm)	720	719	707	730	746	756	759	766	767	763	770	754
NaCN (lb/T)	1.05	1.01	1.02	.97	.95	1.10	1.06	1.02	1.03	.91	1.00	.95
NaCN (lb)	541.8	533.3	550.8	535.4	535.8	620.4	597.8	575.3	580.9	513.2	564.0	535.8
pH	9.25	9.14	9.14	9.17	9.27	9.20	9.11	9.09	9.09	9.01	9.12	9.22
emf	-	-	-	-	80.9	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	148460	127840	134220	134600	133480	136360	135360	135360	135360	141860	140360	135360
gpm	103	89	93	93	93	95	94	94	94	99	97	94
Tons	619	533	559	561	556	568	564	564	564	591	585	564
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.009	.011	.012	.012	.009	.012	.011	.011	.014	.014	.011	.013
Au (oz)	5.691	5.753	6.599	6.898	5.228	6.704	6.430	6.260	7.840	8.216	6.667	7.388
Ag (opt)	.013	.014	.016	.017	.016	.019	.021	.020	.025	.026	.023	.027
Ag (oz)	7.794	7.511	8.836	9.310	9.066	10.568	11.844	11.336	14.213	15.605	13.685	15.228
Cu (ppm)	669	660	681	668	605	599	624	584	682	676	613	688
NaCN (lb/T)	.60	.61	.60	.60	.57	.55	.51	.50	.52	.55	.52	.54
NaCN (lb)	371.2	324.9	335.6	336.5	317.0	312.5	287.6	282.0	293.3	325.1	304.1	304.6
pH	8.52	8.48	8.42	8.38	8.38	8.33	8.26	8.22	8.16	8.13	8.12	8.09
emf	-	-	-	-	124.1	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	217	198	214	218	223	333	316	282	256	209	259	243
Cumulative lb	74380	74578	74792	75011	75234	75567	75883	76165	76420	76630	76889	77132
(lb/Ton Ore)	.005	.005	.005	.005	.005	.008	.007	.007	.006	.005	.006	.006
Cum lb/Ton Ore	1.729	1.734	1.739	1.744	1.749	1.757	1.764	1.771	1.777	1.782	1.788	1.793
Net Au (oz)	3.020	3.431	4.646	4.468	1.088	3.377	3.892	3.553	4.512	5.340	3.622	3.892
Net Ag (oz)	7.240	7.201	8.572	8.986	8.458	10.230	11.449	10.829	13.762	15.097	13.178	14.777
Cum Net Au (oz)	1072.930	1076.361	1081.007	1085.475	1086.563	1089.940	1093.831	1097.385	1101.897	1107.236	1110.858	1114.749
Cum Net Ag (oz)	4131.718	4138.919	4147.491	4156.477	4164.935	4175.165	4186.614	4197.443	4211.205	4226.302	4239.479	4254.256

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	08/04	08/05	08/06	08/07	08/08	08/09	08/10	08/11	08/12	08/13	08/14	08/15
Day	313	314	315	316	317	318	319	320	321	322	323	324
ON SOLUTION:												
Total Gal	135360	135360	135360	135360	135360	135360	135360	135360	133170	132650	134280	143790
gpm	94	94	94	94	94	94	94	94	92	92	93	100
Tons	564	564	564	564	564	564	564	564	555	553	560	599
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.006	.004	.004	.004	.005	.006	.005	.006	.006	.004	.004	.004
Au (oz)	3.215	2.256	2.312	2.256	2.594	3.553	3.046	3.440	3.052	2.432	2.070	2.097
Ag (opt)	.001	.001	.001	.001	.002	.002	.002	.001	.001	.001	.001	.001
Ag (oz)	.338	.395	.395	.282	1.015	1.015	.846	.790	.721	.608	.671	.779
Cu (ppm)	754	742	755	720	717	756	761	771	762	765	734	731
NaCN (lb/T)	.98	1.03	1.00	1.04	.96	.98	1.02	1.01	1.01	.97	.98	1.05
NaCN (lb)	552.7	580.9	564.0	586.6	541.4	552.7	575.3	569.6	560.4	536.1	548.3	629.1
pH	9.30	9.32	9.28	9.36	9.30	9.34	9.37	9.40	9.46	9.43	9.44	9.51
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	135360	135360	135360	135360	136860	136360	135360	135360	135360	136170	140650	139280
gpm	94	94	94	94	95	95	94	94	94	95	98	97
Tons	564	564	564	564	570	568	564	564	564	567	586	580
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.011	.012	.012	.012	.011	.012	.010	.011	.010	.009	.010	.011
Au (oz)	6.430	6.542	6.712	6.824	6.444	6.648	5.866	5.978	5.866	5.220	5.685	6.442
Ag (opt)	.025	.028	.028	.029	.029	.028	.028	.027	.027	.027	.027	.027
Ag (oz)	14.044	15.792	15.792	16.243	16.252	16.079	15.905	15.341	15.228	15.206	15.765	15.727
Cu (ppm)	658	748	729	732	727	753	756	759	757	763	751	732
NaCN (lb/T)	.52	.50	.60	.55	.54	.53	.54	.60	.59	.52	.52	.58
NaCN (lb)	293.3	282.0	338.4	310.2	307.9	301.1	304.6	338.4	332.8	295.0	304.7	336.6
pH	8.12	8.10	8.09	8.09	8.06	8.08	8.12	8.09	8.11	8.13	8.11	8.20
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	271	243	254	279	240	248	237	237	265	231	212	330
Cumulative lb	77402	77645	77899	78177	78418	78666	78903	79139	79405	79636	79848	80177
(lb/Ton Ore)	.006	.006	.006	.006	.006	.006	.006	.006	.006	.005	.005	.008
Cum lb/Ton Ore	1.800	1.805	1.811	1.818	1.823	1.829	1.835	1.840	1.846	1.852	1.857	1.864
Net Au (oz)	4.061	3.328	4.456	4.512	4.188	4.053	2.312	2.933	2.425	2.168	3.253	4.372
Net Ag (oz)	13.762	15.454	15.397	15.848	15.970	15.064	14.890	14.495	14.438	14.484	15.157	15.056
Cum Net Au (oz)	1118.810	1122.138	1126.593	1131.105	1135.293	1139.346	1141.659	1144.592	1147.017	1149.185	1152.437	1156.809
Cum Net Ag (oz)	4268.017	4283.471	4298.868	4314.717	4330.687	4345.751	4360.640	4375.135	4389.573	4404.058	4419.214	4434.270

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	08/16	08/17	08/18	08/19	08/20	08/21	08/22	08/23	08/24	08/25	08/26	08/27
Day	325	326	327	328	329	330	331	332	333	334	335	336
ON SOLUTION:												
Total Gal	127920	127920	134540	131960	129280	131870	132470	129920	130860	129790	127750	127750
gpm	89	89	93	92	90	92	92	90	91	90	89	89
Tons	533	533	561	550	539	549	552	541	545	541	532	532
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.006	.005	.005	.006	.006	.006	.006	.005	.005	.005	.005	.004
Au (oz)	3.038	2.558	2.915	3.079	3.340	3.132	3.312	2.869	2.454	2.866	2.502	2.342
Ag (opt)	.001	.001	.002	.002	.002	.002	.002	.001	.001	.001	.001	.001
Ag (oz)	.640	.586	.841	.825	1.239	1.209	1.104	.650	.600	.595	.639	.532
Cu (ppm)	766	760	779	786	774	745	731	770	765	750	767	757
NaCN (lb/T)	1.09	1.06	1.06	1.10	1.06	1.10	1.12	1.04	1.07	1.06	1.13	1.13
NaCN (lb)	581.0	565.0	594.2	604.8	571.0	604.4	618.2	563.0	583.4	573.2	601.5	601.5
pH	9.54	9.56	9.57	9.57	9.49	9.63	9.63	9.61	9.52	9.52	9.62	9.57
emf	-	71.1	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	143790	130420	129920	134540	131960	150780	151870	132470	129920	130860	129790	127750
gpm	100	91	90	93	92	105	105	92	90	91	90	89
Tons	599	543	541	561	550	628	633	552	541	545	541	532
gpm/sq ft	.006	.006	.006	.006	.006	.007	.007	.006	.006	.006	.006	.006
Au (opt)	.008	.008	.009	.009	.010	.010	.010	.010	.007	.008	.009	.008
Au (oz)	4.913	4.130	4.601	5.157	5.223	6.408	6.075	5.244	3.898	4.198	4.813	4.365
Ag (opt)	.022	.021	.023	.026	.026	.027	.027	.026	.023	.023	.026	.026
Ag (oz)	12.941	11.629	12.559	14.351	14.351	16.900	16.769	14.241	12.180	12.323	14.007	13.840
Cu (ppm)	612	619	669	760	746	725	763	766	682	697	789	775
NaCN (lb/T)	.50	.48	.52	.55	.57	.58	.59	.53	.54	.50	.55	.58
NaCN (lb)	299.6	260.8	281.5	308.3	313.4	364.4	373.3	292.5	292.3	272.6	297.4	308.7
pH	8.16	8.17	8.17	8.09	8.12	8.08	8.12	8.09	8.15	8.15	8.07	8.04
emf	-	123.5	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	320	283	286	291	207	231	326	271	311	276	293	308
Cumulative lb	80498	80781	81067	81358	81565	81796	82122	82392	82703	82979	83272	83579
(lb/Ton Ore)	.007	.007	.007	.007	.005	.005	.008	.006	.007	.006	.007	.007
Cum lb/Ton Ore	1.872	1.878	1.885	1.892	1.897	1.902	1.909	1.916	1.923	1.929	1.936	1.943
Net Au (oz)	2.816	1.092	2.043	2.242	2.144	3.068	2.943	1.932	1.029	1.745	1.947	1.863
Net Ag (oz)	12.162	10.990	11.973	13.510	13.526	15.661	15.560	13.137	11.530	11.723	13.412	13.201
Cum Net Au (oz)	1159.625	1160.717	1162.760	1165.002	1167.146	1170.215	1173.158	1175.090	1176.118	1177.863	1179.810	1181.673
Cum Net Ag (oz)	4446.432	4457.422	4469.394	4482.904	4496.430	4512.091	4527.651	4540.788	4552.318	4564.041	4577.453	4590.654

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	08/28	08/29	08/30	08/31	09/01	09/02	09/03	09/04	09/05	09/06	09/07	09/08
Day	337	338	339	340	341	342	343	344	345	346	347	348
ON SOLUTION:												
Total Gal	124990	125545	125545	122820	120500	120500	118400	118187	118187	118187	117920	117810
gpm	87	87	87	85	84	84	82	82	82	82	82	82
Tons	521	523	523	512	502	502	493	492	492	492	491	491
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.004	.004	.005	.005	.005	.004	.004	.003	.004	.006	.005	.004
Au (oz)	1.979	2.249	2.668	2.508	2.410	2.159	2.072	1.330	1.724	3.004	2.457	1.914
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.002	.002	.002	.001
Ag (oz)	.573	.575	.628	.614	.703	.552	.592	.689	.837	.739	.737	.491
Cu (ppm)	760	766	776	772	757	786	785	786	775	761	792	779
NaCN (lb/T)	1.05	1.13	1.16	1.10	1.10	1.15	1.09	1.09	1.13	1.10	1.10	1.07
NaCN (lb)	546.8	591.1	606.8	562.9	552.3	577.4	537.7	536.8	556.5	541.7	540.5	525.2
pH	9.48	9.60	9.59	9.52	9.59	9.71	9.66	9.66	9.65	9.57	9.60	9.54
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	128250	125490	125545	127545	124320	120500	122000	119400	118187	138187	133687	118920
gpm	89	87	87	89	86	84	85	83	82	96	93	83
Tons	534	523	523	531	518	502	508	498	492	576	557	496
gpm/sq ft	.006	.005	.005	.006	.005	.005	.005	.005	.005	.006	.006	.005
Au (opt)	.009	.009	.009	.009	.008	.008	.008	.008	.009	.007	.008	.008
Au (oz)	4.916	4.497	4.760	4.570	4.144	3.916	3.813	4.080	4.284	3.858	4.623	3.865
Ag (opt)	.026	.026	.025	.025	.024	.024	.024	.023	.023	.021	.023	.023
Ag (oz)	13.680	13.333	13.130	13.180	12.587	12.100	12.149	11.542	11.523	11.919	12.756	11.198
Cu (ppm)	774	784	769	776	793	789	791	800	769	705	795	812
NaCN (lb/T)	.55	.53	.55	.62	.57	.59	.51	.53	.48	.49	.60	.56
NaCN (lb)	293.9	277.1	287.7	329.5	295.3	296.2	259.3	263.7	236.4	282.1	334.2	277.5
pH	8.05	8.03	8.04	8.03	8.06	8.09	8.11	8.12	8.10	8.11	8.08	8.18
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	270	303	277	268	256	318	274	300	274	207	263	231
Cumulative lb	83849	84152	84430	84697	84953	85272	85546	85846	86120	86328	86591	86822
(lb/Ton Ore)	.006	.007	.006	.006	.006	.007	.006	.007	.006	.005	.006	.005
Cum lb/Ton Ore	1.950	1.957	1.963	1.969	1.975	1.983	1.989	1.996	2.002	2.007	2.013	2.019
Net Au (oz)	2.574	2.518	2.511	1.903	1.636	1.506	1.654	2.008	2.955	2.134	1.619	1.408
Net Ag (oz)	13.148	12.760	12.555	12.552	11.973	11.397	11.597	10.950	10.834	11.081	12.017	10.461
Cum Net Au (oz)	1184.247	1186.765	1189.276	1191.178	1192.815	1194.321	1195.974	1197.982	1200.936	1203.071	1204.690	1206.098
Cum Net Ag (oz)	4603.802	4616.562	4629.116	4641.668	4653.642	4665.039	4676.636	4687.586	4698.420	4709.501	4721.518	4731.980

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	09/09	09/10	09/11	09/12	09/13	09/14	09/15	09/16	09/17	09/18	09/19	09/20
Day	349	350	351	352	353	354	355	356	357	358	359	360
ON SOLUTION:												
Total Gal	118030	117900	116100	121980	123696	113952	108360	112010	112350	107280	110237	110237
gpm	82	82	81	85	86	79	75	78	78	75	77	77
Tons	492	491	484	508	515	475	452	467	468	447	459	459
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.004	.004	.005	.005	.005	.004	.005	.006	.004	.005	.006	.006
Au (oz)	2.066	2.112	2.564	2.541	2.319	1.947	2.393	2.754	2.060	2.101	2.526	2.664
Ag (opt)	.001	.001	.001	.001	.001	.001	.002	.002	.002	.002	.003	.002
Ag (oz)	.492	.639	.581	.661	.670	.665	.813	.933	1.124	.805	1.148	1.011
Cu (ppm)	809	784	771	786	796	796	799	805	799	764	781	793
NaCN (lb/T)	1.06	1.10	1.03	1.09	1.05	1.07	1.06	1.12	1.10	1.12	1.10	1.08
NaCN (lb)	521.3	540.4	498.3	554.0	541.2	508.0	478.6	522.7	514.9	500.6	505.3	496.1
pH	9.54	9.54	9.51	9.47	9.73	9.60	9.55	9.52	9.53	9.59	9.64	9.61
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	117810	118030	117900	116100	121980	124696	114952	108360	112010	115350	109780	130237
gpm	82	82	82	81	85	87	80	75	78	80	76	90
Tons	491	492	491	484	508	520	479	452	467	481	457	543
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.006
Au (opt)	.007	.008	.008	.009	.007	.007	.007	.007	.006	.007	.008	.008
Au (oz)	3.289	3.688	3.930	4.112	3.405	3.637	3.544	3.251	2.987	3.557	3.476	4.124
Ag (opt)	.022	.023	.022	.022	.021	.020	.021	.021	.021	.021	.020	.020
Ag (oz)	10.750	11.065	11.004	10.691	10.572	10.547	10.010	9.256	9.801	9.949	9.286	10.690
Cu (ppm)	803	789	798	777	781	802	790	798	801	805	765	794
NaCN (lb/T)	.60	.55	.59	.56	.54	.60	.60	.60	.59	.65	.63	.58
NaCN (lb)	294.5	270.5	289.8	270.9	274.5	311.7	287.4	270.9	275.4	312.4	288.2	314.7
pH	8.21	8.13	8.11	8.21	8.10	8.33	8.17	8.29	8.15	8.43	8.18	8.29
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	251	251	227	280	229	221	208	247	203	212	191	229
Cumulative lb	87072	87323	87550	87830	88059	88280	88488	88735	88937	89150	89340	89569
(lb/Ton Ore)	.006	.006	.005	.007	.005	.005	.005	.006	.005	.005	.004	.005
Cum lb/Ton Ore	2.025	2.030	2.036	2.042	2.048	2.053	2.058	2.063	2.068	2.073	2.077	2.083
Net Au (oz)	1.374	1.623	1.818	1.548	.864	1.318	1.598	.858	.233	1.497	1.375	1.598
Net Ag (oz)	10.259	10.574	10.365	10.110	9.911	9.877	9.346	8.443	8.867	8.825	8.481	9.542
Cum Net Au (oz)	1207.473	1209.096	1210.913	1212.461	1213.325	1214.643	1216.241	1217.098	1217.332	1218.829	1220.204	1221.802
Cum Net Ag (oz)	4742.239	4752.813	4763.178	4773.288	4783.199	4793.076	4802.422	4810.865	4819.733	4828.558	4837.039	4846.581

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	09/21	09/22	09/23	09/24	09/25	09/26	09/27	09/28	09/29	09/30	10/01	10/02
Day	361	362	363	364	365	366	367	368	369	370	371	372
ON SOLUTION:												
Total Gal	110237	105320	106690	108700	95310	103390	102005	102005	99600	104110	93270	105970
gpm	77	73	74	75	66	72	71	71	69	72	65	74
Tons	459	439	445	453	397	431	425	425	415	434	389	442
gpm/sq ft	.005	.005	.005	.005	.004	.005	.004	.004	.004	.005	.004	.005
Au (opt)	.005	.004	.003	.004	.004	.004	.004	.004	.005	.005	.005	.006
Au (oz)	2.480	1.755	1.511	1.585	1.509	1.852	1.743	1.615	1.909	2.169	2.060	2.561
Ag (opt)	.002	.001	.001	.001	.001	.001	.001	.001	.001	.001	.002	.002
Ag (oz)	.735	.439	.400	.498	.477	.474	.510	.425	.457	.521	.661	.795
Cu (ppm)	794	819	813	805	782	778	799	778	804	805	789	797
NaCN (lb/T)	1.07	1.10	1.20	1.16	1.10	1.17	1.20	1.16	1.10	1.17	1.12	1.09
NaCN (lb)	491.5	482.7	533.5	525.4	436.8	504.0	510.0	493.0	456.5	507.5	435.3	481.3
pH	9.68	9.69	9.73	9.59	9.71	9.68	9.75	9.60	9.60	9.62	9.65	9.49
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	123237	110737	105820	106690	108700	95310	103390	102005	102005	99600	104110	93270
gpm	86	77	73	74	75	66	72	71	71	69	72	65
Tons	513	461	441	445	453	397	431	425	425	415	434	389
gpm/sq ft	.005	.005	.005	.005	.005	.004	.005	.004	.004	.004	.005	.004
Au (opt)	.007	.007	.006	.007	.007	.008	.007	.007	.007	.006	.007	.007
Au (oz)	3.646	3.322	2.469	2.978	3.306	3.058	3.102	2.805	2.975	2.656	2.863	2.798
Ag (opt)	.017	.017	.017	.020	.019	.019	.018	.017	.018	.017	.017	.017
Ag (oz)	8.935	7.705	7.628	8.669	8.379	7.387	7.927	7.225	7.523	7.055	7.505	6.684
Cu (ppm)	715	700	712	799	806	794	822	797	796	804	820	720
NaCN (lb/T)	.52	.53	.56	.57	.61	.63	.59	.60	.58	.64	.54	.64
NaCN (lb)	267.0	244.5	246.9	253.4	276.3	250.2	254.2	255.0	246.5	265.6	234.2	248.7
pH	8.25	8.37	8.21	8.36	8.19	8.30	8.37	8.40	8.35	8.42	8.54	8.27
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	247	236	280	249	187	250	255	247	191	273	187	203
Cumulative lb	89816	90052	90332	90581	90768	91018	91273	91519	91710	91984	92170	92373
(lb/Ton Ore)	.006	.005	.007	.006	.004	.006	.006	.006	.004	.006	.004	.005
Cum lb/Ton Ore	2.088	2.094	2.100	2.106	2.111	2.116	2.122	2.128	2.132	2.139	2.143	2.148
Net Au (oz)	.982	.842	.714	1.467	1.721	1.549	1.249	1.063	1.360	.747	.694	.738
Net Ag (oz)	7.924	6.971	7.189	8.268	7.881	6.910	7.453	6.715	7.098	6.599	6.984	6.024
Cum Net Au (oz)	1222.784	1223.626	1224.339	1225.806	1227.527	1229.076	1230.326	1231.388	1232.748	1233.495	1234.189	1234.928
Cum Net Ag (oz)	4854.505	4861.476	4868.665	4876.933	4884.814	4891.724	4899.177	4905.892	4912.990	4919.588	4926.572	4932.596

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	10/03	10/04	10/05	10/06	10/07	10/08	10/09	10/10	10/11	10/12	10/13	10/14
Day	373	374	375	376	377	378	379	380	381	382	383	384
ON SOLUTION:												
Total Gal	100670	96524	96120	99270	90500	91580	92742	95210	93045	93045	96440	91140
gpm	70	67	67	69	63	64	64	66	65	65	67	63
Tons	419	402	401	414	377	382	386	397	388	388	402	380
gpm/sq ft	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
Au (opt)	.006	.006	.003	.006	.005	.004	.005	.003	.005	.004	.004	.005
Au (oz)	2.391	2.292	1.362	2.399	1.848	1.488	1.778	1.349	1.745	1.512	1.447	1.747
Ag (opt)	.002	.002	.002	.002	.002	.002	.003	.003	.002	.002	.002	.001
Ag (oz)	.755	.804	.841	.786	.716	.801	.966	1.031	.930	.775	.683	.532
Cu (ppm)	808	816	809	810	-	817	778	774	803	805	780	816
NaCN (lb/T)	1.17	1.14	1.12	1.05	1.09	1.18	1.09	1.12	1.17	1.18	1.20	1.17
NaCN (lb)	490.8	458.5	448.6	434.3	411.0	450.3	421.2	444.3	453.6	457.5	482.2	444.3
pH	9.59	9.53	9.54	9.51	9.58	9.69	9.67	9.68	9.67	9.66	9.64	9.68
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	105970	100670	96524	96120	99270	90500	98080	99742	96210	93045	93045	97440
gpm	74	70	67	67	69	63	68	69	67	65	65	68
Tons	442	419	402	401	414	377	409	416	401	388	388	406
gpm/sq ft	.005	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
Au (opt)	.007	.007	.007	.007	.007	.006	.007	.007	.006	.007	.008	.008
Au (oz)	3.002	3.020	2.815	2.763	2.854	2.263	2.902	3.075	2.566	2.714	3.063	3.086
Ag (opt)	.017	.017	.017	.017	.017	.016	.017	.017	.016	.016	.017	.016
Ag (oz)	7.462	6.963	6.837	6.608	6.866	6.146	6.947	6.940	6.454	6.358	6.629	6.374
Cu (ppm)	822	808	803	788	-	793	785	780	803	804	789	746
NaCN (lb/T)	.63	.72	.68	.60	.61	.64	.62	.60	.62	.67	.64	.61
NaCN (lb)	278.2	302.0	273.5	240.3	252.3	241.3	253.4	249.4	248.5	259.8	248.1	247.7
pH	8.31	8.45	8.41	8.37	8.45	8.30	8.30	8.41	8.48	8.44	8.41	8.41
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	189	185	208	182	170	197	172	196	194	209	235	230
Cumulative lb	92562	92747	92955	93137	93307	93504	93676	93871	94065	94275	94509	94739
(lb/Ton Ore)	.004	.004	.005	.004	.004	.005	.004	.005	.005	.005	.005	.005
Cum lb/Ton Ore	2.152	2.157	2.161	2.166	2.170	2.174	2.178	2.183	2.187	2.192	2.198	2.203
Net Au (oz)	.442	.629	.523	1.402	.455	.415	1.413	1.298	1.217	.969	1.551	1.639
Net Ag (oz)	6.667	6.208	6.033	5.767	6.080	5.430	6.146	5.974	5.423	5.428	5.854	5.691
Cum Net Au (oz)	1235.369	1235.998	1236.521	1237.923	1238.378	1238.793	1240.206	1241.504	1242.721	1243.690	1245.241	1246.880
Cum Net Ag (oz)	4939.263	4945.471	4951.504	4957.271	4963.351	4968.781	4974.927	4980.902	4986.324	4991.752	4997.606	5003.297

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	10/15	10/16	10/17	10/18	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26
Day	385	386	387	388	389	390	391	392	393	394	395	396
ON SOLUTION:												
Total Gal	87175	87600	98680	96470	94690	93690	100300	91140	95870	113710	126330	122410
gpm	61	61	69	67	66	65	70	63	67	79	88	85
Tons	363	365	411	402	395	390	418	380	399	474	526	510
gpm/sq ft	.004	.004	.004	.004	.004	.004	.004	.004	.004	.005	.006	.005
Au (opt)	.004	.004	.005	.006	.004	.004	.004	.005	.005	.005	.005	.004
Au (oz)	1.598	1.460	2.138	2.452	1.618	1.483	1.755	1.709	2.037	2.179	2.421	2.244
Ag (opt)	.003	.002	.002	.003	.002	.002	.002	.002	.002	.003	.002	.002
Ag (oz)	.981	.876	.822	1.085	.829	.742	.836	.911	.919	1.232	1.105	1.020
Cu (ppm)	763	769	769	799	802	808	803	774	749	764	802	811
NaCN (lb/T)	1.07	1.14	1.15	1.13	1.20	1.16	1.09	1.15	1.16	1.12	1.12	1.14
NaCN (lb)	388.7	416.1	472.8	454.2	473.5	452.8	455.5	436.7	463.4	530.6	589.5	581.4
pH	9.57	9.58	9.57	9.57	9.59	9.63	9.61	9.59	9.60	9.49	9.58	9.63
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	93640	118675	127100	107680	96970	97690	95690	101300	91140	95870	113710	126330
gpm	65	82	88	75	67	68	66	70	63	67	79	88
Tons	390	494	530	449	404	407	399	422	380	399	474	526
gpm/sq ft	.004	.005	.006	.005	.004	.004	.004	.004	.004	.004	.005	.006
Au (opt)	.007	.007	.008	.007	.007	.007	.008	.006	.007	.007	.006	.006
Au (oz)	2.575	3.362	3.972	3.275	2.788	2.809	3.110	2.575	2.772	2.716	2.701	3.053
Ag (opt)	.016	.017	.016	.016	.016	.016	.015	.015	.016	.014	.013	.013
Ag (oz)	6.087	8.307	8.685	7.134	6.263	6.350	6.100	6.500	5.924	5.752	6.301	6.896
Cu (ppm)	734	747	756	785	781	792	770	760	775	747	781	781
NaCN (lb/T)	.55	.59	.62	.66	.65	.62	.63	.64	.65	.66	.64	.60
NaCN (lb)	214.6	291.7	328.3	296.1	262.6	252.4	251.2	270.1	246.8	263.6	303.2	315.8
pH	8.24	8.40	8.41	8.43	8.31	8.36	8.35	8.35	8.50	8.49	8.48	8.50
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	97	88	177	192	221	202	185	190	200	227	274	270
Cumulative lb	94836	94924	95100	95292	95513	95715	95900	96090	96290	96517	96791	97061
(lb/Ton Ore)	.002	.002	.004	.004	.005	.005	.004	.004	.005	.005	.006	.006
Cum lb/Ton Ore	2.205	2.207	2.211	2.216	2.221	2.226	2.230	2.234	2.239	2.244	2.251	2.257
Net Au (oz)	.828	1.764	2.512	1.137	.336	1.191	1.627	.819	1.063	.679	.521	.632
Net Ag (oz)	5.555	7.327	7.809	6.311	5.177	5.521	5.359	5.664	5.013	4.833	5.070	5.790
Cum Net Au (oz)	1247.708	1249.472	1251.984	1253.121	1253.457	1254.648	1256.275	1257.094	1258.157	1258.836	1259.358	1259.989
Cum Net Ag (oz)	5008.852	5016.179	5023.988	5030.299	5035.477	5040.998	5046.357	5052.021	5057.034	5061.867	5066.937	5072.727

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	10/27	10/28	10/29	10/30	10/31	11/01	11/02	11/03	11/04	11/05	11/06	11/07
Day	397	398	399	400	401	402	403	404	405	406	407	408
ON SOLUTION:												
Total Gal	124340	119600	122260	120200	124780	118320	116000	114500	114500	115700	115700	115200
gpm	86	83	85	83	87	82	81	80	80	80	80	80
Tons	518	498	509	501	520	493	483	477	477	482	482	480
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.005	.005	.004	.003	.004	.004	.004	.004	.004	.004	.004	.004
Au (oz)	2.331	2.243	1.936	1.703	1.924	2.021	1.692	1.861	1.765	1.687	1.784	2.064
Ag (opt)	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
Ag (oz)	1.192	1.146	.968	.851	.780	.838	.725	.811	.716	.723	.723	.912
Cu (ppm)	823	805	826	771	766	800	803	800	812	786	757	765
NaCN (lb/T)	1.10	1.11	1.15	1.14	1.14	1.19	1.12	1.13	1.12	1.10	1.14	1.20
NaCN (lb)	569.9	533.2	585.8	571.0	592.7	586.7	541.3	539.1	534.3	530.3	549.6	576.0
pH	9.62	9.69	9.60	9.60	9.62	9.67	9.65	9.66	9.70	9.55	9.57	9.59
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	122410	124340	123100	125260	120200	124780	118320	116000	114500	114500	119700	118700
gpm	85	86	85	87	83	87	82	81	80	80	83	82
Tons	510	518	513	522	501	520	493	483	477	477	499	495
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.006	.006	.006	.006	.007	.006	.006	.005	.006	.006	.007	.006
Au (oz)	2.907	3.264	2.821	3.132	3.506	3.120	3.007	2.417	2.719	2.767	3.342	2.918
Ag (opt)	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013
Ag (oz)	6.733	6.735	6.719	6.889	6.561	6.707	6.360	6.380	6.154	6.107	6.284	6.430
Cu (ppm)	785	781	790	771	768	800	794	859	790	761	740	782
NaCN (lb/T)	.61	.66	.60	.62	.62	.62	.64	.65	.60	.61	.60	.68
NaCN (lb)	311.1	341.9	307.8	323.6	310.5	322.3	315.5	314.2	286.3	291.0	299.3	336.3
pH	8.56	8.53	8.57	8.50	8.51	8.58	8.55	8.52	8.65	8.50	8.67	8.65
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	228	245	262	260	270	271	227	253	243	231	213	283
Cumulative lb	97289	97534	97797	98057	98327	98599	98826	99079	99322	99553	99766	100049
(lb/Ton Ore)	.005	.006	.006	.006	.006	.006	.005	.006	.006	.005	.005	.007
Cum lb/Ton Ore	2.262	2.268	2.274	2.280	2.286	2.293	2.298	2.304	2.309	2.315	2.320	2.326
Net Au (oz)	.663	.933	.579	1.196	1.803	1.196	.986	.725	.859	1.002	1.654	1.134
Net Ag (oz)	5.712	5.543	5.573	5.921	5.710	5.927	5.522	5.655	5.343	5.391	5.561	5.706
Cum Net Au (oz)	1260.652	1261.585	1262.163	1263.359	1265.162	1266.358	1267.344	1268.069	1268.928	1269.930	1271.584	1272.718
Cum Net Ag (oz)	5078.439	5083.983	5089.556	5095.477	5101.187	5107.114	5112.635	5118.290	5123.634	5129.025	5134.586	5140.292

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	11/08	11/09	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19
Day	409	410	411	412	413	414	415	416	417	418	419	420
ON SOLUTION:												
Total Gal	102050	113390	116640	122410	116710	118030	117435	117435	117590	120040	119500	114710
gpm	71	79	81	85	81	82	82	82	82	83	83	80
Tons	425	472	486	510	486	492	489	489	490	500	498	478
gpm/sq ft	.004	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.005	.004	.004	.003	.004	.004	.004	.001	.002	.000	.000	.001
Au (oz)	1.871	1.890	1.409	1.938	1.848	2.066	.538	.783	.196	.000	.448	.526
Ag (opt)	.002	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.765	.520	.340	.255	.292	.344	.343	.391	.441	.500	.299	.430
Cu (ppm)	790	787	778	779	769	761	743	768	772	779	778	776
NaCN (lb/T)	1.20	1.10	1.18	1.00	1.09	1.10	1.04	1.11	1.18	1.08	1.09	1.10
NaCN (lb)	510.3	519.7	573.5	510.0	530.1	541.0	508.9	543.1	578.2	540.2	542.7	525.8
pH	9.66	9.53	9.52	9.51	9.60	9.66	9.61	9.68	9.65	9.68	9.65	9.54
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	115200	102050	113390	116640	122410	116710	118030	120435	119935	117590	120040	119500
gpm	80	71	79	81	85	81	82	84	83	82	83	83
Tons	480	425	472	486	510	486	492	502	500	490	500	498
gpm/sq ft	.005	.004	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.006	.006	.006	.006	.006	.007	.006	.003	.003	.002	.001	.002
Au (oz)	2.640	2.381	2.599	2.722	3.213	3.161	2.852	1.606	1.349	1.029	.550	.846
Ag (opt)	.013	.012	.011	.012	.012	.012	.011	.011	.011	.010	.010	.010
Ag (oz)	6.000	5.188	5.150	5.735	5.967	5.641	5.606	5.721	5.397	4.998	5.002	4.830
Cu (ppm)	781	786	690	787	770	760	758	772	761	764	770	764
NaCN (lb/T)	.61	.64	.62	.64	.60	.65	.62	.67	.70	.68	.64	.70
NaCN (lb)	292.8	272.1	292.9	311.0	306.0	316.1	304.9	336.2	349.8	333.2	320.1	348.5
pH	8.74	8.67	8.75	8.74	8.72	8.68	8.77	8.85	8.70	8.74	8.83	8.76
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	238	227	262	204	214	236	173	193	245	220	194	195
Cumulative lb	100288	100514	100777	100981	101195	101431	101604	101797	102042	102262	102456	102651
(lb/Ton Ore)	.006	.005	.006	.005	.005	.005	.004	.004	.006	.005	.005	.005
Cum lb/Ton Ore	2.332	2.337	2.343	2.348	2.353	2.359	2.363	2.367	2.373	2.378	2.382	2.387
Net Au (oz)	.576	.510	.709	1.312	1.275	1.313	.787	1.068	.566	.833	.550	.398
Net Ag (oz)	5.088	4.422	4.630	5.395	5.712	5.349	5.262	5.378	5.006	4.557	4.502	4.531
Cum Net Au (oz)	1273.294	1273.804	1274.513	1275.825	1277.100	1278.413	1279.200	1280.268	1280.834	1281.667	1282.217	1282.616
Cum Net Ag (oz)	5145.380	5149.802	5154.432	5159.827	5165.539	5170.889	5176.151	5181.529	5186.535	5191.091	5195.593	5200.124

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

Date	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/01
Day	421	422	423	424	425	426	427	428	429	430	431	432
ON SOLUTION:												
Total Gal	114660	112170	112170	113160	112000	107510	107760	107760	106705	106705	107460	106050
gpm	80	78	78	79	78	75	75	75	74	74	75	74
Tons	478	467	467	472	467	448	449	449	445	445	448	442
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.001	.001	.001	.001	.000	.001	.000	.000	.001	.001	.002	.002
Au (oz)	.526	.421	.467	.472	.187	.403	.180	.000	.356	.311	.851	.795
Ag (opt)	.002	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.764	.561	.467	.424	.280	.358	.269	.314	.445	.356	.269	.265
Cu (ppm)	763	752	798	1076	791	663	720	757	745	771	783	801
NaCN (lb/T)	1.10	1.12	1.08	1.25	.97	.92	1.00	1.13	1.10	1.10	1.12	1.16
NaCN (lb)	525.5	523.5	504.8	589.4	452.7	412.1	449.0	507.4	489.1	489.1	501.5	512.6
pH	9.64	9.55	9.65	9.58	9.47	9.55	9.48	9.54	9.60	9.54	9.73	9.77
emf	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	116710	116160	112170	112170	116160	114500	110010	113760	112260	106705	106705	107460
gpm	81	81	78	78	81	80	76	79	78	74	74	75
Tons	486	484	467	467	484	477	458	474	468	445	445	448
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.002	.002	.001	.001	.000	.002	.002	.002	.001	.002	.002	.003
Au (oz)	.827	1.113	.421	.421	.145	.859	.963	.995	.655	1.067	1.023	1.119
Ag (opt)	.010	.010	.009	.010	.009	.010	.009	.009	.009	.008	.008	.008
Ag (oz)	4.814	4.888	4.393	4.487	4.550	4.628	4.080	4.029	4.257	3.646	3.512	3.672
Cu (ppm)	760	772	778	782	783	766	763	780	767	757	773	775
NaCN (lb/T)	.68	.70	.66	.64	.65	.62	.65	.67	.67	.77	.68	.72
NaCN (lb)	330.7	338.8	308.5	299.1	314.6	295.8	297.9	317.6	313.4	342.3	302.3	322.4
pH	8.69	8.76	8.80	8.79	8.81	8.75	8.84	8.87	8.85	8.76	8.89	8.87
emf	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	187	215	206	275	157	114	131	194	147	187	179	217
Cumulative lb	102838	103053	103259	103533	103690	103804	103936	104130	104276	104463	104642	104859
(lb/Ton Ore)	.004	.005	.005	.006	.004	.003	.003	.005	.003	.004	.004	.005
Cum lb/Ton Ore	2.391	2.396	2.401	2.407	2.411	2.414	2.417	2.421	2.425	2.429	2.433	2.438
Net Au (oz)	.301	.588	.000	-.047	-.326	.672	.559	.816	.655	.711	.711	.269
Net Ag (oz)	4.384	4.124	3.832	4.019	4.125	4.348	3.721	3.760	3.942	3.201	3.157	3.403
Cum Net Au (oz)	1282.917	1283.504	1283.504	1283.458	1283.131	1283.803	1284.363	1285.179	1285.833	1286.545	1287.256	1287.525
Cum Net Ag (oz)	5204.508	5208.632	5212.464	5216.484	5220.609	5224.957	5228.678	5232.438	5236.380	5239.581	5242.738	5246.141

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE

									Drill Samples
Date	12/02	12/03	12/04	12/05	12/06	12/07	12/08	12/09	12/10
Day	433	434	435	436	437	438	439	440	441
ON SOLUTION:									
Total Gal	107250	104700	104120	102880	81000	107330	102490	100150	100150
gpm	74	73	72	71	56	75	71	70	70
Tons	447	436	434	429	338	447	427	417	417
gpm/sq ft	.005	.005	.005	.004	.004	.005	.004	.004	.004
Au (opt)	.001	.001	.000	.003	.001	.001	.000	.002	.001
Au (oz)	.358	.262	.130	1.157	.338	.537	.171	.876	.542
Ag (opt)	.001	.001	.001	.001	.001	.000	.001	.001	.001
Ag (oz)	.313	.349	.304	.300	.203	.000	.256	.250	.292
Cu (ppm)	796	769	742	746	785	782	786	788	787
NaCN (lb/T)	1.09	1.15	1.17	1.21	1.10	1.11	1.16	1.08	1.06
NaCN (lb)	487.1	501.7	507.6	518.7	371.3	496.4	495.4	450.7	442.3
pH	9.65	9.64	9.67	9.69	9.68	9.72	9.68	9.72	9.68
EFFLUENT:									
Total Gal	106050	107250	106700	105120	102880	82500	107330	102490	100150
gpm	74	74	74	73	71	57	75	71	70
Tons	442	447	445	438	429	344	447	427	417
gpm/sq ft	.005	.005	.005	.005	.004	.004	.005	.004	.004
Au (opt)	.002	.003	.001	.003	.001	.003	.001	.002	.002
Au (oz)	.751	1.207	.489	1.183	.557	.928	.537	.726	.626
Ag (opt)	.008	.008	.008	.009	.008	.008	.008	.007	.008
Ag (oz)	3.579	3.396	3.423	3.723	3.472	2.716	3.354	3.160	3.255
Cu (ppm)	777	787	750	756	750	751	767	779	771
NaCN (lb/T)	.67	.74	.73	.74	.67	.70	.68	.65	.68
NaCN (lb)	296.1	330.7	324.5	324.1	287.2	240.6	304.1	277.6	283.8
pH	8.88	8.78	8.81	8.82	8.92	8.88	8.88	8.87	8.86
gal evap or abs									
Tons " " "									
Tons/Ton Ore									
NaCN Consump	156	177	183	231	131	192	218	167	163
Cumulative lb	105015	105192	105376	105607	105738	105930	106148	106315	106478
(lb/Ton Ore)	.004	.004	.004	.005	.003	.004	.005	.004	.004
Cum lb/Ton Ore	2.442	2.446	2.450	2.456	2.459	2.463	2.468	2.472	2.476
Net Au (oz)	.751	.849	.227	1.052	-.600	.591	.000	.555	-.250
Net Ag (oz)	3.579	3.083	3.074	3.419	3.172	2.513	3.354	2.904	3.005
Cum Net Au (oz)	1288.276	1289.125	1289.352	1290.405	1289.805	1290.395	1290.395	1290.950	1290.700
Cum Net Ag (oz)	5249.720	5252.803	5255.877	5259.297	5262.469	5264.982	5268.336	5271.240	5274.244

PUG MILL CIRCUIT - ORE TO PAD

SP3 - FISHER SAMPLER

Sample ID	STH-SP3091492	STH-SP3091592	STH-SP3091692	STH-SP3091792	STH-SP3091892	STH-SP3092092
Date	09/14/92	09/15/92	09/16/92	09/17/92	09/18/92	09/20/92
pH	7.7	7.8	8.0	7.6	7.9	7.9
FA - Au (opt)	.063	.056	.062	.072	.061	.062
FA - Au (oz)	174.317	201.498	262.887	241.558	199.266	101.478
FA - Ag (opt)	.20	.29	.21	.18	.17	.17
FA - Ag (oz)	553.39	1,043.47	890.42	603.90	555.33	278.25
AA - Au (opt)	.033	.031	.030	.033	.030	.032
AA - Au (oz)	91.309	111.543	127.203	110.714	98.000	52.376
AA - Ag (opt)	.173	.178	.162	.166	.140	.175
AA - Ag (oz)	478.68	640.48	686.90	556.93	457.33	286.43
CN Sol Cu (ppm)	348	349	380	372	358	377
APP (T CaCO3/KT)	-28.7	-26.1	-28.6	-31.0	-25.7	-24.4
ANP (T CaCO3/KT)	66.0	85.6	30.1	46.5	67.4	69.3
Net APP (T CaCO3/KT)	37.3	59.5	1.4	15.5	41.7	44.8

(10/05/92)

PUG MILL CIRCUIT - ORE TO PAD

SP3 - FISHER SAMPLER

Sample ID	STH-SP3092192	STH-SP3092292	STH-SP3092492	STH-SP3092592	Total or Wt Avg to Date
Date	09/21/92	09/22/92	09/24/92	09/25/92	
pH	8.2	7.8	7.7	7.8	•
FA - Au (opt)	.058	.059	.050	.054	.060
FA - Au (oz)	165.964	190.034	165.960	159.851	2,925.738
FA - Ag (opt)	.15	.23	.14	.23	.21
FA - Ag (oz)	429.22	740.81	464.69	680.85	10,280.48
AA - Au (opt)	.035	.033	.033	.035	.033
AA - Au (oz)	100.150	106.290	109.534	103.607	1,607.986
AA - Ag (opt)	.161	.151	.134	.161	.169
AA - Ag (oz)	460.69	486.36	444.77	476.59	8,304.05
CN Sol Cu (ppm)	344	329	306	346	358
APP (T CaCO3/KT)	-25.6	-36.5	-22.0	-30.2	-29.0
ANP (T CaCO3/KT)	65.4	82.8	58.5	62.9	67.8
Net APP (T CaCO3/KT)	39.7	46.3	36.6	32.7	38.8

(10/05/92)

APPENDIX II

DAILY LEACH DATA LOG

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	09/26	09/27	09/28	09/29	09/30	10/01	10/02	10/03	10/04	10/05	10/06	10/07
Day	1	2	3	4	5	6	7	8	9	10	11	12
ON SOLUTION:												
Total Gal	38400	115200	139756	144059	138974	145135	132128	135453	135844	132382	147385	128998
gpm	80	80	97	100	97	101	92	94	94	92	102	90
Tons	160	480	582	600	579	605	551	564	566	552	614	537
gpm/sq ft	.005	.005	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.002	.004	.005	.003	.002	.003	.002	.002	.004	.004	.005	.003
Au (oz)	.320	1.920	2.912	1.801	1.158	1.814	1.101	1.129	2.264	2.206	3.071	1.612
Ag (opt)	.002	.001	.001	.001	.001	.001	.001	.002	.001	.002	.001	.001
Ag (oz)	.320	.480	.582	.600	.579	.605	.551	1.129	.566	1.103	.614	.537
Cu (ppm)	-	-	-	-	-	555	-	-	571	597	584	607
NaCN (lb/T)	.85	.85	.90	.77	.79	.86	.84	.84	.82	.91	.94	1.06
NaCN (lb)	136.0	408.0	524.1	462.2	457.5	520.1	462.4	474.1	464.1	501.9	577.3	569.7
pH	-	9.91	9.24	9.58	9.49	9.62	-	-	9.56	9.67	9.72	9.67
mV	-197.8	-199.3	-193.5	-177.0	-174.5	-179.3	-	-	-177.6	-185.3	-188.5	-187.4
emf	-	-	-	-	-	-	-	-	-	-	-	-
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	-	-	-	-	7.6	6.5	-	-	8.3	8.1	8.1	8.4
EFFLUENT:												
Total Gal	0	3100	38000	139756	144059	138974	145135	132128	135453	135844	132382	147385
gpm	0	26	26	97	100	97	101	92	94	94	94	102
Tons	0	13	158	582	600	579	605	551	564	566	552	614
gpm/sq ft	.000	.002	.002	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	-	.018	.018	.017	.018	.021	.029	.037	.041	.042	.043	.040
Au (oz)	.000	.233	2.850	9.899	10.864	12.160	17.416	20.205	22.971	23.773	23.608	24.318
Ag (opt)	-	-	.010	.006	.006	.007	.011	.020	.029	.038	.042	.047
Ag (oz)	.000	.000	1.583	3.494	3.481	4.053	6.652	11.011	16.367	21.509	23.167	28.986
Cu (ppm)	-	-	132	85	92	107	-	-	343	435	507	595
NaCN (lb/T)	-	-	.05	.06	.06	.05	-	-	.14	.21	.00	.00
NaCN (lb)	.0	.0	7.9	34.9	36.0	29.0	.0	.0	79.0	118.9	.0	.0
pH	-	-	7.83	7.52	7.40	7.33	-	-	7.38	7.59	7.60	7.72
mV	-	-	-80.5	-62.1	-55.9	-53.8	-	-	-57.5	-66.2	-67.3	-74.8
emf	-	-	-	-	-	-	-	-	-	-	-	-
DO	-	-	-	-	8.0	6.8	-	-	8.4	8.1	7.5	7.6
gal evap or abs	-35300	-77200	Total =	-112500								
Tons " " "	-147	-322	Total =	-469								
Tons/Ton Ore	-.003	-.007	Total =	-.010								
NaCN Consump	136	400	489	426	429	520	462	395	345	502	577	570
Cumulative lb	136	536	1025	1451	1880	2400	2862	3257	3603	4105	4682	5252
(lb/Ton Ore)	.003	.009	.011	.010	.010	.012	.011	.009	.008	.012	.013	.013
Cum lb/Ton Ore	.003	.012	.024	.034	.044	.056	.067	.076	.084	.095	.109	.122
Net Au (oz)	.000	-.088	.930	6.988	9.064	11.002	15.602	19.103	21.842	21.509	21.402	21.248
Net Ag (oz)	.000	-.320	1.103	2.912	2.881	3.474	6.047	10.460	15.238	20.943	22.064	28.372
Cum Net Au (oz)	.000	-.088	.843	7.830	16.894	27.896	43.498	62.602	84.443	105.952	127.354	148.602
Cum Net Ag (oz)	.000	-.320	.783	3.695	6.576	10.050	16.098	26.558	41.796	62.739	84.803	113.174

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	10/08	10/09	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19
Day	13	14	15	16	17	18	19	20	21	22	23	24
ON SOLUTION:												
Total Gal	127922	130074	122739	124499	124304	121272	120001	129878	131052	130856	132617	133790
gpm	89	90	85	86	86	84	83	90	91	91	92	93
Tons	533	542	511	519	518	505	500	541	546	545	553	557
gpm/sq ft	.006	.006	.005	.005	.005	.005	.005	.006	.006	.006	.006	.006
Au (opt)	.003	.002	.002	.005	.004	.003	.003	.002	.003	.003	.005	.005
Au (oz)	1.599	1.084	1.023	2.594	2.072	1.516	1.500	1.082	1.638	1.636	2.763	2.787
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.533	.542	.511	.519	.518	.505	.500	.541	.546	.545	.553	.557
Cu (ppm)	609	586	590	610	638	640	646	658	644	657	637	696
NaCN (lb/T)	.87	.87	.88	.93	1.00	1.05	1.01	1.01	.87	.88	.93	.95
NaCN (lb)	463.7	471.5	450.0	482.4	517.9	530.6	505.0	546.6	475.1	479.8	513.9	529.6
pH	9.65	9.70	9.70	9.72	9.65	9.64	9.71	9.71	9.57	9.62	9.68	9.66
mV	-184.8	-185.2	-187.6	-188.4	-185.2	-186.0	-189.1	-189.6	-182.1	-184.9	-187.7	-188.0
emf	-	-	-	-	-	-	-	-	-	-	-	-
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	8.3	9.8	9.5	-	7.9	9.6	9.8	8.0	8.3	8.4	7.9	7.7
EFFLUENT:												
Total Gal	128998	127922	130074	122739	124499	124304	121272	120001	129878	131052	130856	132617
gpm	90	89	90	85	86	86	84	83	90	91	91	92
Tons	537	533	542	511	519	518	505	500	541	546	545	553
gpm/sq ft	.006	.006	.006	.005	.005	.005	.005	.005	.006	.006	.006	.006
Au (opt)	.037	.033	.032	.030	.031	.029	.028	.027	.028	.028	.027	.027
Au (oz)	19.672	17.803	17.235	15.394	16.185	14.968	14.351	13.450	15.261	15.235	14.830	14.975
Ag (opt)	.047	.047	.047	.047	.047	.046	.048	.047	.050	.051	.051	.053
Ag (oz)	25.262	24.998	25.473	24.241	24.381	23.721	24.052	23.650	27.220	27.576	27.698	29.397
Cu (ppm)	656	666	720	750	791	835	838	871	860	880	860	934
NaCN (lb/T)	.00	.00	.00	.00	.00	.00	.00	.00	.03	.05	.13	.00
NaCN (lb)	.0	.0	.0	.0	.0	.0	.0	.0	16.2	27.3	70.9	.0
pH	7.76	7.84	7.85	7.90	7.89	7.91	7.93	7.95	7.96	7.97	8.05	8.00
mV	-77.0	-81.7	-84.5	-84.9	-85.5	-86.8	-88.5	-89.9	-90.6	-92.2	-95.8	-92.1
emf	-	-	-	-	-	-	-	-	-	-	-	-
DO	7.6	8.1	7.3	-	7.3	8.7	8.2	6.9	4.6	5.0	5.8	5.9
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	464	472	450	482	518	531	505	530	448	409	514	530
Cumulative lb	5715	6187	6637	7119	7637	8168	8673	9203	9651	10060	10574	11103
(lb/Ton Ore)	.011	.011	.010	.011	.012	.012	.012	.012	.010	.010	.012	.012
Cum lb/Ton Ore	.133	.144	.154	.166	.178	.190	.202	.214	.224	.234	.246	.258
Net Au (oz)	18.060	16.204	16.151	14.371	13.591	12.897	12.835	11.950	14.178	13.597	13.195	12.212
Net Ag (oz)	24.725	24.465	24.931	23.730	23.862	23.203	23.547	23.150	26.679	27.029	27.153	28.844
Cum Net Au (oz)	166.662	182.865	199.016	213.387	226.978	239.874	252.709	264.659	278.837	292.434	305.629	317.841
Cum Net Ag (oz)	137.899	162.364	187.295	211.024	234.887	258.090	281.637	304.787	331.466	358.496	385.649	414.493

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	10/20	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31
Day	25	26	27	28	29	30	31	32	33	34	35	36
ON SOLUTION:												
Total Gal	121076	96431	127531	130367	131248	132323	127922	124988	128803	128250	133720	133710
gpm	84	67	89	91	91	92	89	87	89	89	93	93
Tons	504	402	531	543	547	551	533	521	537	534	557	557
gpm/sq ft	.005	.004	.006	.006	.006	.006	.006	.005	.006	.006	.006	.006
Au (opt)	.003	.004	.003	.002	.002	.005	.003	.004	.004	.005	.002	.000
Au (oz)	1.513	1.607	1.594	1.086	1.094	2.757	1.599	2.083	2.147	2.672	1.114	.000
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.002	.001	.000
Ag (oz)	.504	.402	.531	.543	.547	.551	.533	.521	.537	1.069	.557	.000
Cu (ppm)	692	688	689	676	685	708	716	724	708	732	721	709
NaCN (lb/T)	.93	.93	.99	1.05	1.10	1.02	1.02	1.19	1.09	1.06	1.01	.97
NaCN (lb)	469.2	373.7	526.1	570.4	601.6	562.4	543.7	619.7	585.0	566.4	562.7	540.4
pH	9.71	9.52	9.75	9.76	9.73	9.69	9.76	9.83	9.79	9.74	9.80	9.77
mV	-187.9	-180.5	-192.2	-193.3	-192.0	-190.5	-193.2	-198.4	-193.0	-193.8	-197.7	-196.3
emf	-	-	-	-	-	-	-	-	-	-	-	-
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	7.2	7.0	7.3	7.8	7.6	7.8	-	8.1	8.2	8.5	7.9	7.9
EFFLUENT:												
Total Gal	133790	121076	96431	127531	130367	131248	132323	127922	124988	128803	128250	133720
gpm	95	84	67	89	91	91	92	89	87	89	89	93
Tons	557	504	402	531	543	547	551	533	521	537	534	557
gpm/sq ft	.006	.005	.004	.006	.006	.006	.006	.006	.005	.006	.006	.006
Au (opt)	.026	.026	.025	.023	.022	.021	.023	.022	.021	.021	.022	.021
Au (oz)	14.271	13.016	10.125	12.328	12.113	11.429	12.460	11.939	10.936	11.217	11.649	11.868
Ag (opt)	.055	.055	.057	.057	.057	.059	.056	.060	.061	.064	.064	.067
Ag (oz)	30.382	27.797	22.782	30.182	30.962	32.101	31.096	31.927	31.664	34.186	34.147	37.107
Cu (ppm)	942	956	960	934	956	984	1006	972	974	964	950	943
NaCN (lb/T)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.10	.10
NaCN (lb)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	53.4	55.7
pH	8.02	7.99	8.07	7.96	7.99	8.05	8.12	8.05	8.06	8.03	7.95	7.99
mV	-93.3	-92.2	-92.9	-91.6	-92.3	-95.6	-98.8	-96.1	-95.2	-94.6	-91.2	-93.4
emf	-	-	-	-	-	-	-	-	-	-	-	-
DO	5.2	5.6	5.6	3.8	4.6	6.0	-	6.6	6.2	6.2	4.0	5.5
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	469	374	526	570	602	562	544	620	585	513	507	474
Cumulative lb	11573	11946	12472	13043	13644	14207	14750	15370	15955	16468	16975	17449
(lb/Ton Ore)	.011	.009	.012	.013	.014	.013	.013	.014	.014	.012	.012	.011
Cum lb/Ton Ore	.269	.278	.290	.303	.317	.330	.343	.357	.371	.383	.395	.406
Net Au (oz)	11.484	11.502	8.518	10.734	11.027	10.336	9.704	10.340	8.853	9.070	8.978	10.753
Net Ag (oz)	29.824	27.293	22.380	29.651	30.419	31.554	30.545	31.394	31.143	33.650	33.078	36.550
Cum Net Au (oz)	329.324	340.826	349.345	360.078	371.105	381.441	391.145	401.485	410.339	419.408	428.386	439.139
Cum Net Ag (oz)	444.317	471.610	493.990	523.641	554.060	585.614	616.158	647.553	678.696	712.345	745.423	781.973

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	11/01	11/02	11/03	11/04	11/05	11/06	11/07	11/08	11/09	11/10	11/11	11/12
Day	37	38	39	40	41	42	43	44	45	46	47	48
ON SOLUTION:												
Total Gal	142090	134784	134784	132770	132830	135630	137330	138960	135660	138440	141810	140410
gpm	99	94	94	92	92	94	95	97	94	96	98	98
Tons	592	562	562	553	553	565	572	579	565	577	591	585
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.002	.004	.003	.003	.004	.003	.003	.003	.007	.003	.004	.003
Au (oz)	1.184	2.246	1.685	1.660	2.214	1.695	1.717	1.737	3.957	1.731	2.364	1.755
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.003	.001	.001	.001
Ag (oz)	.592	.562	.562	.553	.553	.565	.572	.579	1.696	.577	.591	.585
Cu (ppm)	715	722	732	747	739	732	740	731	757	795	773	773
NaCN (lb/T)	1.09	1.23	1.16	1.15	1.10	1.17	1.08	1.10	1.08	1.07	1.06	1.09
NaCN (lb)	645.3	690.8	651.5	636.2	608.8	661.2	618.0	636.9	610.5	617.2	626.3	637.7
pH	9.77	9.92	9.90	9.90	10.22	10.18	9.86	9.79	9.79	9.80	9.83	9.88
mV	-196.7	-203.2	-202.0	-199.7	-215.0	-217.8	-198.9	-196.4	-194.5	-195.4	-196.5	-199.7
emf	-	-	-	-	-	-	-	-	-	-38.8	-30.6	-12.6
CaO added (lb)	0	0	0	40	120	80	0	0	0	0	0	0
DO	7.8	8.7	9.2	8.9	8.9	8.9	8.4	8.1	8.2	8.7	8.7	8.6
EFFLUENT:												
Total Gal	133710	142090	134784	134784	132770	132830	135630	137330	138960	135660	138440	141810
gpm	93	99	94	94	92	92	94	95	97	94	96	98
Tons	557	592	562	562	553	553	565	572	579	565	577	591
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.022	.021	.020	.020	.019	.017	.017	.017	.019	.018	.018	.018
Au (oz)	12.201	12.374	11.344	11.288	10.566	9.353	9.720	9.899	11.059	10.231	10.325	10.754
Ag (opt)	.069	.074	.073	.080	.081	.083	.085	.086	.086	.089	.087	.086
Ag (oz)	38.609	43.515	41.165	44.816	44.865	45.771	47.923	48.981	49.678	50.194	50.300	50.874
Cu (ppm)	946	946	912	940	958	918	924	912	921	936	941	919
NaCN (lb/T)	.12	.26	.30	.33	.32	.36	.44	.58	.37	.43	.44	.35
NaCN (lb)	66.9	153.9	168.5	185.3	177.0	199.2	248.7	331.9	214.2	243.1	253.8	206.8
pH	8.00	7.98	8.07	8.02	8.00	8.01	7.97	7.93	7.93	7.93	7.93	8.09
mV	-93.6	-93.9	-98.3	-95.4	-92.3	-97.1	-95.3	-92.7	-91.1	-89.0	-91.3	-96.8
emf	-	-	-	-	-	-	-	-	-	162.2	157.3	145.6
DO	6.3	7.3	8.1	7.8	7.7	6.7	7.5	7.4	7.2	7.7	7.8	8.1
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	491	522	466	459	410	413	286	423	367	363	420	381
Cumulative lb	17940	18462	18928	19388	19797	20210	20496	20918	21286	21649	22069	22450
(lb/Ton Ore)	.011	.012	.011	.011	.010	.010	.007	.010	.009	.008	.010	.009
Cum lb/Ton Ore	.417	.429	.440	.451	.460	.470	.477	.486	.495	.503	.513	.522
Net Au (oz)	12.201	11.190	9.098	9.603	8.907	7.140	8.025	8.183	9.322	6.274	8.595	8.390
Net Ag (oz)	38.609	42.923	40.604	44.254	44.312	45.218	47.357	48.409	49.099	48.498	49.723	50.283
Cum Net Au (oz)	451.340	462.530	471.628	481.231	490.138	497.277	505.302	513.485	522.807	529.081	537.676	546.066
Cum Net Ag (oz)	820.582	863.505	904.109	948.363	992.675	1037.892	1085.250	1133.659	1182.758	1231.256	1280.979	1331.263

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23	11/24
Day	49	50	51	52	53	54	55	56	57	58	59	60
ON SOLUTION:												
Total Gal	138470	138960	139180	135230	128990	134610	133550	136780	139840	128740	134800	136140
gpm	96	97	97	94	90	93	93	95	97	89	94	95
Tons	577	579	580	563	537	561	556	570	583	536	562	567
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.003	.003	.002	.005	.003	.003	.003	.009	.003	.005	.005	.005
Au (oz)	1.731	1.737	1.160	2.817	1.612	1.683	1.669	5.129	1.748	2.682	2.808	2.836
Ag (opt)	.001	.001	.001	.001	.001	.001	.002	.014	.002	.001	.002	.002
Ag (oz)	.577	.579	.580	.563	.537	.561	1.113	7.979	1.165	.536	1.123	1.135
Cu (ppm)	773	765	784	776	790	736	761	769	745	734	750	747
NaCN (lb/T)	1.07	1.15	1.19	1.20	1.16	1.05	1.07	1.05	1.10	1.11	1.11	1.12
NaCN (lb)	617.3	665.9	690.1	676.2	623.5	588.9	595.4	598.4	640.9	595.4	623.5	635.3
pH	9.77	9.75	9.77	9.81	9.70	9.61	9.71	9.73	9.75	9.79	9.83	9.67
mV	-196.3	-196.2	-197.4	-199.3	-192.0	-189.9	-193.2	-194.2	-195.5	-197.6	-195.7	-189.1
emf	-25.4	-37.2	-43.3	-15.3	-22.1	-18.7	56.4	32.5	17.3	-25.8	72.0	80.7
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	-	-	-	8.6	8.3	8.6	8.3	8.7	8.7	8.4	8.7	9.3
EFFLUENT:												
Total Gal	150410	153470	158960	159180	160230	138990	134610	133550	136780	139840	128740	134800
gpm	104	107	110	111	111	97	93	93	95	97	89	94
Tons	627	639	662	663	668	579	561	556	570	583	536	562
gpm/sq ft	.007	.007	.007	.007	.007	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.016	.015	.015	.015	.013	.015	.014	.014	.013	.013	.013	.013
Au (oz)	9.714	9.720	9.803	10.015	8.879	8.455	7.908	7.623	7.580	7.808	7.081	7.414
Ag (opt)	.090	.081	.078	.078	.074	.076	.075	.071	.072	.072	.073	.074
Ag (oz)	56.090	51.796	51.596	51.800	49.070	43.956	42.290	39.620	40.977	41.777	39.051	41.339
Cu (ppm)	889	865	830	859	859	863	871	853	833	824	848	836
NaCN (lb/T)	.41	.45	.41	.41	.41	.40	.35	.48	.47	.42	.38	.45
NaCN (lb)	257.0	287.8	271.6	271.9	273.7	231.7	196.3	267.1	267.9	244.7	203.8	252.8
pH	7.89	7.89	7.84	7.83	7.82	7.76	7.80	7.82	7.85	7.87	7.88	7.85
mV	-90.4	-90.9	-87.9	-86.5	-86.2	-84.4	-85.5	-86.4	-87.9	-89.6	-85.7	-85.5
emf	132.3	105.4	82.5	131.5	115.0	101.8	153.3	151.0	144.4	96.3	152.4	155.2
DO	-	-	-	8.2	8.3	8.7	8.0	7.9	8.4	8.4	8.5	9.0
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	330	394	418	402	392	393	328	331	396	392	371	397
Cumulative lb	22779	23173	23592	23994	24386	24778	25107	25437	25833	26225	26596	26993
(lb/Ton Ore)	.008	.009	.010	.009	.009	.009	.008	.008	.009	.009	.009	.009
Cum lb/Ton Ore	.530	.539	.549	.558	.567	.576	.584	.592	.601	.610	.618	.628
Net Au (oz)	7.959	7.989	8.066	8.855	6.062	6.843	6.226	5.954	2.451	6.060	4.399	4.606
Net Ag (oz)	55.505	51.219	51.017	51.220	48.507	43.418	41.729	38.507	32.998	40.612	38.515	40.215
Cum Net Au (oz)	554.025	562.014	570.079	578.935	584.997	591.840	598.065	604.019	606.470	612.530	616.928	621.534
Cum Net Ag (oz)	1386.768	1437.987	1489.004	1540.224	1588.731	1632.149	1673.878	1712.385	1745.383	1785.995	1824.510	1864.725

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	11/25	11/26	11/27	11/28	11/29	11/30	12/01	12/02	12/03	12/04	12/05	12/06
Day	61	62	63	64	65	66	67	68	69	70	71	72
ON SOLUTION:												
Total Gal	137200	136390	135560	137360	135970	128280	144410	138090	135950	134920	136120	132650
gpm	95	95	94	95	94	89	100	96	94	94	95	92
Tons	572	568	565	572	567	535	602	575	566	562	567	553
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.005	.007	.005	.004	.004	.006	.004	.004	.004	.005	.005	.003
Au (oz)	2.858	3.978	2.824	2.289	2.266	3.207	2.587	2.244	2.436	2.867	2.949	1.603
Ag (opt)	.002	.002	.002	.002	.002	.002	.001	.001	.001	.001	.002	.002
Ag (oz)	1.143	1.137	1.130	1.145	1.133	1.069	.542	.633	.623	.787	.907	1.105
Cu (ppm)	761	751	767	776	788	802	808	824	840	842	800	802
NaCN (lb/T)	1.10	1.16	1.08	1.08	1.15	1.15	1.13	1.20	1.11	1.05	1.06	1.11
NaCN (lb)	628.8	659.2	610.0	618.1	651.5	614.7	679.9	690.5	628.8	590.3	601.2	613.5
pH	9.87	9.87	9.76	9.78	9.71	9.72	9.78	9.71	9.73	9.78	9.82	9.71
mV	-198.6	-197.8	-193.7	-194.8	-192.5	-192.9	-196.3	-193.1	-193.7	-197.7	-199.3	-195.8
emf	35.0	34.7	65.5	43.5	14.7	85.2	89.3	55.1	70.6	72.5	71.3	64.4
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	9.2	9.0	9.0	8.8	8.8	8.3	8.5	8.8	9.1	9.2	9.0	8.9
EFFLUENT:												
Total Gal	136140	137200	136390	135560	137360	135970	128280	144410	138090	135950	134920	136120
gpm	95	95	95	94	95	94	89	100	96	94	94	95
Tons	567	572	568	565	572	567	535	602	575	566	562	567
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.013	.013	.012	.014	.013	.015	.013	.014	.013	.014	.013	.012
Au (oz)	7.147	7.375	6.933	7.625	7.669	8.215	7.002	8.544	7.422	7.930	7.477	7.033
Ag (opt)	.071	.071	.068	.069	.069	.068	.069	.065	.067	.065	.066	.064
Ag (oz)	40.388	40.703	38.871	39.199	39.205	38.695	36.881	39.111	38.435	36.933	36.822	36.412
Cu (ppm)	805	803	837	814	805	836	833	833	873	855	827	848
NaCN (lb/T)	.42	.45	.43	.42	.39	.43	.43	.47	.41	.45	.43	.46
NaCN (lb)	238.2	257.3	244.4	237.2	223.2	243.6	229.8	282.8	235.9	254.9	241.7	260.9
pH	7.89	7.88	7.90	7.90	7.93	7.93	7.94	8.04	7.97	7.94	7.95	7.97
mV	-86.3	-86.3	-87.2	-87.6	-89.3	-89.7	-90.3	-97.1	-92.6	-94.2	-94.5	-95.6
emf	135.0	134.0	146.4	145.1	140.5	144.5	142.4	118.9	122.0	127.9	129.0	126.0
DO	8.9	8.6	8.7	8.2	8.5	8.6	8.0	8.6	8.6	9.0	8.7	8.6
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	372	415	373	395	408	385	397	455	374	349	340	387
Cumulative lb	27364	27779	28152	28547	28955	29340	29737	30191	30565	30914	31254	31641
(lb/Ton Ore)	.009	.010	.009	.009	.009	.009	.009	.011	.009	.008	.008	.009
Cum lb/Ton Ore	.636	.646	.655	.664	.673	.682	.692	.702	.711	.719	.727	.736
Net Au (oz)	4.311	4.516	2.955	4.801	5.380	5.949	3.795	5.957	5.178	5.495	4.610	4.084
Net Ag (oz)	39.254	39.559	37.735	38.070	38.060	37.562	35.812	38.570	37.802	36.310	36.035	35.505
Cum Net Au (oz)	625.845	630.361	633.316	638.118	643.497	649.446	653.241	659.198	664.376	669.871	674.481	678.564
Cum Net Ag (oz)	1903.979	1943.538	1981.273	2019.342	2057.403	2094.964	2130.776	2169.345	2207.148	2243.457	2279.492	2314.997

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	12/07	12/08	12/09	12/10	12/11	12/12	12/13	12/14	12/15	12/16	12/17	12/18
Day	73	74	75	76	77	78	79	80	81	82	83	84
ON SOLUTION:												
Total Gal	140410	134390	135660	133430	134610	135770	134720	133850	133930	134560	133000	134530
gpm	98	93	94	93	93	94	94	93	93	93	92	93
Tons	585	560	565	556	561	566	561	558	558	561	554	561
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.005	.004	.003	.004	.004	.003	.003	.005	.003	.003	.003	.004
Au (oz)	2.633	2.016	1.639	2.335	2.356	1.471	1.909	2.844	1.674	1.514	1.718	1.962
Ag (opt)	.002	.003	.001	.001	.002	.002	.002	.003	.002	.002	.002	.003
Ag (oz)	.936	1.512	.791	.556	1.122	1.131	1.347	1.617	1.283	.953	1.108	1.401
Cu (ppm)	833	828	829	839	743	782	824	739	749	727	681	701
NaCN (lb/T)	1.11	1.15	1.13	1.06	1.13	1.09	1.09	1.09	1.05	1.00	1.04	1.06
NaCN (lb)	649.4	644.0	638.7	589.3	633.8	616.6	611.9	607.9	585.9	560.7	576.3	594.2
pH	9.81	9.81	9.86	9.78	9.81	9.80	9.66	9.82	9.78	9.83	9.79	9.77
mV	-197.3	-198.9	-200.3	-196.3	-197.9	-197.4	-189.6	-197.3	-196.8	-198.3	-197.0	-196.2
emf	71.4	69.2	59.4	71.6	68.7	67.3	74.9	77.1	61.1	78.8	63.7	76.7
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	8.8	9.0	9.0	9.2	9.6	9.8	9.5	9.2	8.8	9.6	9.4	8.4
EFFLUENT:												
Total Gal	132650	140410	134390	135660	133430	134610	135770	134720	133850	133930	134560	133000
gpm	92	98	93	94	93	93	94	94	93	93	93	92
Tons	553	585	560	565	556	561	566	561	558	558	561	554
gpm/sq ft	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.013	.012	.012	.011	.011	.012	.012	.011	.011	.011	.010	.010
Au (oz)	6.964	7.255	6.720	6.161	6.004	6.843	6.506	6.006	5.967	5.971	5.719	5.542
Ag (opt)	.061	.058	.058	.054	.055	.053	.055	.051	.050	.049	.048	.046
Ag (oz)	33.439	34.166	32.310	30.750	30.522	29.895	30.944	28.684	27.885	27.232	26.968	25.381
Cu (ppm)	848	833	839	847	833	824	821	844	842	833	824	817
NaCN (lb/T)	.41	.42	.40	.40	.53	.52	.47	.48	.52	.47	.50	.49
NaCN (lb)	226.6	245.7	224.0	226.1	294.7	291.7	265.9	269.4	290.0	262.3	280.3	271.5
pH	8.02	8.03	8.03	8.10	8.08	8.11	8.15	8.11	8.11	8.20	8.20	8.15
mV	-93.9	-95.1	-96.1	-100.4	-101.8	-103.1	-104.9	-102.9	-103.9	-105.0	-107.4	-104.5
emf	123.7	124.2	120.5	123.2	120.3	118.7	116.7	129.1	120.4	117.8	117.2	126.1
DO	8.6	9.1	8.9	8.9	9.6	9.4	8.9	9.1	8.7	9.5	9.3	9.4
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	404	420	413	295	342	351	342	318	324	280	305	320
Cumulative lb	32045	32465	32877	33172	33514	33865	34207	34525	34849	35129	35434	35753
(lb/Ton Ore)	.009	.010	.010	.007	.008	.008	.008	.007	.008	.007	.007	.007
Cum lb/Ton Ore	.745	.755	.765	.771	.779	.787	.795	.803	.810	.817	.824	.831
Net Au (oz)	5.361	4.622	4.704	4.522	3.669	4.487	5.035	4.098	3.123	4.297	4.205	3.824
Net Ag (oz)	32.333	33.230	30.798	29.958	29.966	28.773	29.813	27.337	26.268	25.949	26.015	24.273
Cum Net Au (oz)	683.926	688.548	693.251	697.773	701.442	705.929	710.964	715.062	718.185	722.482	726.687	730.511
Cum Net Ag (oz)	2347.330	2380.561	2411.359	2441.317	2471.283	2500.056	2529.869	2557.206	2583.474	2609.423	2635.438	2659.710

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	12/19	12/20	12/21	12/22	12/23	12/24	12/25	12/26	12/27	12/28	12/29	12/30
Day	85	86	87	88	89	90	91	92	93	94	95	96
ON SOLUTION:												
Total Gal	133210	132230	134200	139350	123480	136010	129220	132150	140590	136800	131810	132480
gpm	93	92	93	97	86	94	90	92	98	95	92	92
Tons	555	551	559	581	515	567	538	551	586	570	549	552
gpm/sq ft	.006	.006	.006	.006	.005	.006	.006	.006	.006	.006	.006	.006
Au (opt)	.005	.004	.006	.004	.002	.002	.004	.003	.004	.004	.003	.002
Au (oz)	2.664	2.369	3.523	2.032	.926	1.360	1.992	1.817	2.109	2.280	1.703	.994
Ag (opt)	.005	.005	.004	.003	.001	.001	.002	.003	.002	.002	.001	.001
Ag (oz)	2.664	2.975	2.460	1.568	.617	.510	1.131	1.377	1.172	1.140	.659	.607
Cu (ppm)	681	692	727	734	746	742	737	729	720	745	759	772
NaCN (lb/T)	1.00	1.10	1.07	1.17	1.14	1.01	1.00	1.00	1.03	1.05	1.10	1.08
NaCN (lb)	555.0	606.1	598.3	679.3	586.5	572.4	538.4	550.6	603.4	598.5	604.1	596.2
pH	9.82	9.77	9.80	9.75	9.89	9.76	9.69	9.62	9.63	9.66	9.73	9.68
mV	-198.6	-197.6	-	-	-	-	-	-	-	-	-	-
emf	81.0	76.7	54.1	68.4	59.1	65.4	66.2	63.8	65.1	58.1	68.6	68.1
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	8.2	7.7	7.9	7.7	8.0	8.0	8.1	8.0	7.6	8.4	8.6	8.6
EFFLUENT:												
Total Gal	134530	133210	132230	134200	139350	123480	136010	129220	132150	140590	136800	131810
gpm	93	93	92	93	97	86	94	90	92	98	95	92
Tons	561	555	551	559	581	515	567	538	551	586	570	549
gpm/sq ft	.006	.006	.006	.006	.006	.005	.006	.006	.006	.006	.006	.006
Au (opt)	.010	.009	.009	.015	.009	.010	.012	.011	.011	.010	.010	.008
Au (oz)	5.437	4.995	4.959	8.108	5.400	5.042	6.857	6.084	6.112	5.916	5.757	4.504
Ag (opt)	.044	.043	.043	.039	.041	.043	.041	.041	.040	.039	.038	.037
Ag (oz)	24.832	23.922	23.526	21.696	23.748	22.072	23.065	21.967	21.970	22.729	21.489	20.321
Cu (ppm)	773	781	770	748	750	759	757	770	762	778	766	763
NaCN (lb/T)	.49	.47	.47	.52	.47	.51	.53	.46	.53	.49	.46	.50
NaCN (lb)	274.7	260.9	259.0	290.8	272.9	262.4	300.4	247.7	291.8	287.0	262.2	274.6
pH	8.15	8.17	8.21	8.39	8.34	8.18	8.38	8.23	8.18	8.20	8.23	8.18
mV	-105.1	-106.2	-	-	-	-	-	-	-	-	-	-
emf	127.4	126.4	117.8	116.8	116.6	114.5	115.3	113.3	114.4	112.1	115.7	114.8
DO	9.0	8.9	8.9	8.8	8.6	8.2	8.4	8.4	8.1	8.8	8.4	7.8
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	294	347	308	406	324	272	291	259	316	336	330	287
Cumulative lb	36048	36395	36702	37109	37433	37705	37996	38254	38571	38907	39237	39524
(lb/Ton Ore)	.007	.008	.007	.009	.008	.006	.007	.006	.007	.008	.008	.007
Cum lb/Ton Ore	.838	.846	.853	.863	.870	.877	.884	.890	.897	.905	.912	.919
Net Au (oz)	3.475	2.331	2.590	4.585	3.368	4.116	5.497	4.092	4.295	3.808	3.477	2.801
Net Ag (oz)	23.431	21.258	20.551	19.235	22.180	21.455	22.555	20.837	20.593	21.557	20.349	19.662
Cum Net Au (oz)	733.986	736.317	738.907	743.492	746.860	750.976	756.473	760.565	764.860	768.667	772.144	774.945
Cum Net Ag (oz)	2683.141	2704.399	2724.949	2744.185	2766.365	2787.819	2810.374	2831.211	2851.804	2873.362	2893.711	2913.372

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	12/31	01/01	01/02	01/03	01/04	01/05	01/06	01/07	01/08	01/09	01/10	01/11
Day	97	98	99	100	101	102	103	104	105	106	107	108
ON SOLUTION:												
Total Gal	132480	132650	139290	137550	125280	125280	125280	138240	138240	145440	171360	159840
gpm	92	92	97	96	87	87	87	96	96	101	119	111
Tons	552	553	580	573	522	522	522	576	576	606	714	666
gpm/sq ft	.006	.006	.006	.006	.005	.005	.005	.006	.006	.006	.007	.007
Au (opt)	.001	.002	.003	.003	.003	.003	.003	.003	.002	.002	.003	.002
Au (oz)	.773	.884	1.451	1.490	1.357	1.357	1.357	1.440	1.267	1.273	1.999	1.332
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.607	.553	.522	.573	.470	.574	.679	.806	.518	.606	.857	.799
Cu (ppm)	731	723	710	731	759	761	758	763	766	749	753	771
NaCN (lb/T)	1.07	1.07	1.21	1.18	1.16	1.16	1.12	1.17	1.25	1.19	1.23	1.13
NaCN (lb)	590.6	591.4	702.3	676.3	605.5	605.5	584.6	673.9	720.0	721.1	878.2	752.6
pH	9.55	9.60	9.68	9.70	9.66	9.66	9.63	9.69	9.64	9.66	9.67	9.67
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	74.8	71.9	66.2	67.1	30.1	64.8	43.5	66.9	58.2	56.9	64.8	64.0
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	6.9	6.7	7.8	8.4	7.6	7.8	7.9	8.1	7.2	7.9	7.7	7.8
EFFLUENT:												
Total Gal	132480	132480	132650	139290	137550	125280	125280	125280	138240	138240	145440	171360
gpm	92	92	92	97	96	87	87	87	96	96	101	119
Tons	552	552	553	580	573	522	522	522	576	576	606	714
gpm/sq ft	.006	.006	.006	.006	.006	.005	.005	.005	.006	.006	.006	.007
Au (opt)	.009	.011	.009	.008	.008	.008	.009	.008	.009	.008	.009	.008
Au (oz)	5.189	5.851	5.085	4.759	4.528	4.333	4.489	4.333	5.069	4.666	5.151	5.426
Ag (opt)	.039	.038	.037	.035	.033	.033	.034	.034	.032	.031	.031	.028
Ag (oz)	21.307	21.197	20.505	20.313	18.913	17.226	17.591	17.696	18.605	17.626	18.544	19.635
Cu (ppm)	753	745	752	740	774	763	765	775	782	768	792	777
NaCN (lb/T)	.56	.56	.56	.55	.54	.60	.61	.61	.70	.67	.68	.63
NaCN (lb)	309.1	309.1	309.5	319.2	309.5	313.2	318.4	318.4	403.2	385.9	412.1	449.8
pH	8.16	8.17	8.18	8.20	8.19	8.20	8.22	8.21	8.22	8.27	8.28	8.34
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	115.1	112.8	113.9	110.7	101.5	109.7	106.2	108.4	109.7	106.9	109.0	106.4
DO	6.5	7.2	7.9	8.5	7.5	7.3	7.0	8.1	6.9	7.1	7.4	7.4
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	282	282	383	367	292	287	266	271	334	309	428	353
Cumulative lb	39805	40087	40470	40837	41129	41416	41682	41953	42287	42596	43025	43378
(lb/Ton Ore)	.007	.007	.009	.009	.007	.007	.006	.006	.008	.007	.010	.008
Cum lb/Ton Ore	.926	.932	.941	.950	.956	.963	.969	.976	.983	.991	1.001	1.009
Net Au (oz)	4.195	5.078	4.201	3.308	3.038	2.975	3.132	2.975	3.629	3.398	3.878	3.427
Net Ag (oz)	20.700	20.590	19.953	19.791	18.340	16.756	17.017	17.017	17.798	17.107	17.938	18.778
Cum Net Au (oz)	779.140	784.219	788.419	791.728	794.765	797.741	800.873	803.848	807.477	810.875	814.754	818.181
Cum Net Ag (oz)	2934.072	2954.662	2974.615	2994.405	3012.745	3029.502	3046.519	3063.536	3081.334	3098.442	3116.379	3135.157

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	01/12	01/13	01/14	01/15	01/16	01/17	01/18	01/19	01/20	01/21	01/22	01/23
Day	109	110	111	112	113	114	115	116	117	118	119	120
ON SOLUTION:												
Total Gal	145440	152640	152640	132480	103680	103680	110880	118080	118080	125280	118080	118080
gpm	101	106	106	92	72	72	77	82	82	87	82	82
Tons	606	636	636	552	432	432	462	492	492	522	492	492
gpm/sq ft	.006	.007	.007	.006	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.004	.001	.005	.002	.002	.002	.002	.004	.004	.002	.003	.002
Au (oz)	2.121	.445	3.307	.883	.821	.821	.832	1.722	1.820	1.096	1.378	1.132
Ag (opt)	.001	.001	.001	.002	.001	.001	.001	.001	.001	.000	.001	.001
Ag (oz)	.667	.636	.572	.828	.475	.475	.416	.492	.246	.209	.344	.394
Cu (ppm)	770	778	758	760	826	737	747	745	760	753	725	715
NaCN (lb/T)	1.19	1.18	1.12	1.21	1.20	1.20	1.16	1.15	1.06	1.14	1.07	1.05
NaCN (lb)	721.1	750.5	712.3	667.9	518.4	518.4	535.9	565.8	521.5	595.1	526.4	516.6
pH	9.70	9.71	9.72	9.61	9.65	9.57	9.69	9.71	9.72	9.72	9.56	9.60
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	58.2	70.5	59.8	71.2	72.4	67.6	67.3	69.9	76.9	81.6	88.0	89.6
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	8.3	8.6	8.3	7.9	8.1	7.9	8.0	-	-	-	-	-
EFFLUENT:												
Total Gal	159840	145440	152640	152640	132480	103680	103680	110880	118080	118080	125280	118080
gpm	111	101	106	106	92	72	72	77	82	82	87	82
Tons	666	606	636	636	552	432	432	462	492	492	522	492
gpm/sq ft	.007	.006	.007	.007	.006	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.009	.007	.011	.007	.007	.011	.008	.010	.010	.008	.010	.006
Au (oz)	5.728	4.484	7.060	4.579	3.864	4.795	3.370	4.712	4.822	3.887	4.959	3.001
Ag (opt)	.027	.027	.025	.026	.026	.027	.027	.028	.027	.027	.027	.026
Ag (oz)	17.782	16.241	16.027	16.536	14.573	11.837	11.837	12.890	2.173	2.173	2.332	2.116
Cu (ppm)	772	780	759	762	754	751	771	761	769	758	761	740
NaCN (lb/T)	.60	.58	.59	.71	.70	.72	.69	.71	.67	.71	.67	.68
NaCN (lb)	399.6	351.5	375.2	451.6	386.4	311.0	298.1	328.0	54.9	58.2	58.3	55.8
pH	8.34	8.37	8.42	8.37	8.38	8.74	8.50	8.48	8.56	8.58	8.51	8.52
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	116.4	108.1	106.9	105.2	105.9	97.8	100.8	103.8	109.0	115.8	112.9	112.3
DO	7.7	8.2	8.4	7.9	8.4	8.2	8.2	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	370	375	261	282	207	220	208	511	463	537	471	172
Cumulative lb	43747	44123	44383	44665	44872	45093	45300	45811	46275	46811	47282	47454
(lb/Ton Ore)	.009	.009	.006	.007	.005	.005	.005	.012	.011	.012	.011	.004
Cum lb/Ton Ore	1.017	1.026	1.032	1.039	1.043	1.049	1.053	1.065	1.076	1.089	1.100	1.104
Net Au (oz)	4.396	2.363	6.614	1.272	2.981	3.974	2.549	3.881	3.100	2.066	3.863	1.624
Net Ag (oz)	16.983	15.574	15.391	15.964	13.745	11.362	11.362	12.474	1.681	1.927	2.123	1.771
Cum Net Au (oz)	822.576	824.940	831.554	832.826	835.807	839.781	842.330	846.211	849.311	851.377	855.240	856.863
Cum Net Ag (oz)	3152.140	3167.715	3183.106	3199.069	3212.814	3224.176	3235.537	3248.011	3249.692	3251.619	3253.742	3255.513

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	01/24	01/25	01/26	01/27	01/28	01/29	01/30	01/31	02/01	02/02	02/03	02/04
Day	121	122	123	124	125	126	127	128	129	130	131	132
ON SOLUTION:												
Total Gal	118080	118080	118080	118080	118080	118080	118080	118080	118080	118080	118080	117810
gpm	82	82	82	82	82	82	82	82	82	82	82	82
Tons	492	492	492	492	492	492	492	492	492	492	492	491
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.004	.004	.004	.004	.003	.002	.002	.002	.004	.003	.003	.003
Au (oz)	1.771	1.968	1.968	1.771	1.279	1.082	1.082	.836	1.722	1.279	1.279	1.374
Ag (opt)	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Ag (oz)	.492	.443	.344	.344	.295	.344	.443	.443	.689	.541	.443	.589
Cu (ppm)	752	759	738	752	753	764	754	737	776	779	797	789
NaCN (lb/T)	1.08	1.06	1.02	.96	.91	1.00	1.01	1.03	1.03	1.14	1.17	1.01
NaCN (lb)	531.4	521.5	501.8	472.3	447.7	492.0	496.9	506.8	506.8	560.9	575.6	495.8
pH	9.58	9.60	9.63	9.60	9.61	9.59	9.59	9.63	9.63	9.69	9.60	9.49
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	85.0	79.0	71.4	79.9	84.9	89.7	89.1	80.9	50.9	67.7	74.0	82.0
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	118080	118080	118080	118080	118080	118080	118080	118080	118080	118080	118080	118080
gpm	82	82	82	82	82	82	82	82	82	82	82	82
Tons	492	492	492	492	492	492	492	492	492	492	492	492
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.009	.008	.009	.009	.007	.006	.007	.008	.007	.007	.006	.006
Au (oz)	4.526	3.788	4.428	4.280	3.493	2.854	3.247	3.936	3.493	3.296	3.001	2.755
Ag (opt)	.026	.025	.024	.024	.024	.024	.024	.023	.022	.021	.020	.019
Ag (oz)	12.792	12.103	11.562	11.808	11.857	11.857	11.808	11.168	10.578	10.135	9.692	9.496
Cu (ppm)	756	769	747	756	757	766	764	739	732	754	762	759
NaCN (lb/T)	.70	.62	.63	.59	.61	.69	.63	.68	.63	.65	.64	.65
NaCN (lb)	344.4	305.0	310.0	290.3	300.1	339.5	310.0	334.6	310.0	319.8	314.9	319.8
pH	8.53	8.57	8.63	8.61	8.61	8.55	8.61	8.68	8.62	8.70	8.63	8.64
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	110.9	108.2	105.4	105.0	107.6	116.3	115.8	111.7	106.3	102.4	108.4	108.4
DO	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	226	212	212	172	108	182	162	197	187	246	256	201
Cumulative lb	47681	47892	48104	48276	48384	48566	48729	48925	49112	49358	49614	49815
(lb/Ton Ore)	.005	.005	.005	.004	.003	.004	.004	.005	.004	.006	.006	.005
Cum lb/Ton Ore	1.109	1.114	1.119	1.123	1.125	1.129	1.133	1.138	1.142	1.148	1.154	1.158
Net Au (oz)	3.395	2.017	2.460	2.312	1.722	1.574	2.165	2.854	2.657	1.574	1.722	1.476
Net Ag (oz)	12.398	11.611	11.119	11.464	11.513	11.562	11.464	10.726	10.135	9.446	9.151	9.053
Cum Net Au (oz)	860.258	862.275	864.735	867.048	868.770	870.344	872.509	875.363	878.019	879.594	881.316	882.792
Cum Net Ag (oz)	3267.912	3279.523	3290.642	3302.106	3313.619	3325.181	3336.644	3347.370	3357.505	3366.951	3376.103	3385.155

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	02/05	02/06	02/07	02/08	02/09	02/10	02/11	02/12	02/13	02/14	02/15	02/16
Day	133	134	135	136	137	138	139	140	141	142	143	144
ON SOLUTION:												
Total Gal	119940	117980	117070	113260	116630	112940	115890	115240	116390	114310	115200	115200
gpm	83	82	81	79	81	78	80	80	81	79	80	80
Tons	500	492	488	472	486	471	483	480	485	476	480	480
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.004	.003	.003	.004	.004	.002	.005	.006	.007	.009	.012	.015
Au (oz)	1.749	1.524	1.463	1.982	1.944	1.129	2.559	3.073	3.395	4.191	5.952	7.056
Ag (opt)	.002	.002	.002	.002	.002	.002	.005	.007	.008	.010	.016	.022
Ag (oz)	.900	.934	1.024	.991	1.118	.988	2.221	3.409	4.074	4.525	7.872	10.320
Cu (ppm)	771	745	735	764	779	761	768	801	779	763	777	790
NaCN (lb/T)	.90	.88	1.00	.98	.96	.95	.99	.99	1.01	.92	.93	.96
NaCN (lb)	449.8	432.6	487.8	462.5	466.5	447.1	478.0	475.4	489.8	438.2	446.4	460.8
pH	9.48	9.40	9.49	9.62	9.61	9.59	9.59	9.51	9.56	9.54	9.46	9.46
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	96.4	101.3	82.9	90.2	98.8	97.2	85.1	104.9	104.0	103.3	96.5	88.0
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	117810	119940	117980	117070	113260	116630	112940	115890	115240	116390	114310	115200
gpm	82	83	82	81	79	81	78	80	80	81	79	80
Tons	491	500	492	488	472	486	471	483	480	485	476	480
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.006	.007	.006	.006	.006	.007	.006	.007	.008	.007	.009	.008
Au (oz)	2.896	3.248	3.097	3.073	2.832	3.159	2.965	3.428	3.649	3.540	4.239	3.744
Ag (opt)	.019	.019	.018	.018	.018	.018	.017	.018	.018	.017	.019	.017
Ag (oz)	9.278	9.345	8.799	8.780	8.259	8.650	8.094	8.643	8.643	8.438	9.240	7.920
Cu (ppm)	740	720	718	749	758	753	742	772	758	751	759	759
NaCN (lb/T)	.60	.56	.59	.64	.58	.58	.61	.67	.64	.62	.66	.57
NaCN (lb)	294.5	279.9	290.0	312.2	273.7	281.9	287.1	323.5	307.3	300.7	314.4	273.6
pH	8.64	8.65	8.64	8.69	8.67	8.69	8.69	8.61	8.68	8.68	8.76	8.72
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	114.0	113.1	110.9	109.9	117.1	116.6	113.4	121.4	120.6	121.3	119.4	115.2
DO	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	170	143	176	189	185	160	155	168	189	124	173	173
Cumulative lb	49985	50128	50303	50492	50677	50837	50991	51159	51349	51472	51645	51818
(lb/Ton Ore)	.004	.003	.004	.004	.004	.004	.004	.004	.004	.003	.004	.004
Cum lb/Ton Ore	1.162	1.166	1.170	1.174	1.178	1.182	1.186	1.190	1.194	1.197	1.201	1.205
Net Au (oz)	1.522	1.499	1.573	1.610	.849	1.215	1.835	.869	.576	.145	.048	-2.208
Net Ag (oz)	8.688	8.446	7.865	7.756	7.268	7.532	7.106	6.422	5.234	4.365	4.715	.048
Cum Net Au (oz)	884.313	885.813	887.386	888.995	889.845	891.060	892.895	893.764	894.340	894.486	894.534	892.326
Cum Net Ag (oz)	3393.844	3402.290	3410.155	3417.911	3425.178	3432.711	3439.817	3446.239	3451.473	3455.837	3460.553	3460.601

SULFIDE TEST HEAP - CELL #5
LEACH CYCLE DATA

Date	02/17	02/18	02/19	02/20	02/21	02/22	02/23	02/24	02/25	02/26	02/27	02/28
Day	145	146	147	148	149	150	151	152	153	154	155	156
ON SOLUTION:												
Total Gal	115200	115200	115200	115200	115200	115200	115200	115200	115200	115200	115200	115200
gpm	80	80	80	80	80	80	80	80	80	80	80	80
Tons	480	480	480	480	480	480	480	480	480	480	480	480
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.014	.016	.017	.016	.016	.016	.015	.010	.008	.010	.010	.011
Au (oz)	6.864	7.872	7.920	7.680	7.824	7.728	7.152	4.560	4.032	4.944	4.944	5.136
Ag (opt)	.021	.025	.024	.024	.025	.026	.021	.011	.010	.011	.012	.012
Ag (oz)	10.176	11.856	11.664	11.568	12.192	12.288	10.032	5.136	4.944	5.472	5.616	5.904
Cu (ppm)	804	798	799	764	765	780	755	788	779	797	786	783
NaCN (lb/T)	.90	1.06	1.07	.92	.95	1.05	1.05	.99	.97	1.00	1.00	.90
NaCN (lb)	432.0	508.8	513.6	441.6	456.0	504.0	504.0	475.2	465.6	480.0	480.0	432.0
pH	9.50	9.35	9.34	9.49	9.44	9.42	9.48	9.53	9.55	9.46	9.35	9.35
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	78.3	93.9	100.6	99.0	80.8	97.3	56.4	78.5	72.4	94.2	98.0	93.2
CaO added (lb)	0	0	0	0	0	0	0	0	0	0	0	0
DO	-	-	-	-	-	-	-	-	-	-	-	-
EFFLUENT:												
Total Gal	115200	115200	115200	115200	115200	115200	115200	115200	115200	115200	115200	115200
gpm	80	80	80	80	80	80	80	80	80	80	80	80
Tons	480	480	480	480	480	480	480	480	480	480	480	480
gpm/sq ft	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
Au (opt)	.008	.007	.009	.010	.011	.011	.012	.014	.014	.016	.016	.017
Au (oz)	3.648	3.264	4.128	4.608	5.088	5.376	5.904	6.672	6.864	7.872	7.824	7.968
Ag (opt)	.017	.017	.020	.022	.025	.025	.027	.029	.030	.032	.033	.032
Ag (oz)	8.112	8.016	9.600	10.560	11.808	12.192	13.008	13.920	14.496	15.456	15.600	15.120
Cu (ppm)	774	706	779	761	757	769	777	777	770	788	764	768
NaCN (lb/T)	.60	.58	.65	.65	.62	.72	.70	.71	.69	.77	.75	.75
NaCN (lb)	288.0	278.4	312.0	312.0	297.6	345.6	336.0	340.8	331.2	369.6	360.0	360.0
pH	8.77	8.75	8.70	8.68	8.67	8.70	8.69	8.69	8.71	8.58	8.61	8.64
mV	-	-	-	-	-	-	-	-	-	-	-	-
emf	112.1	114.3	118.0	117.2	117.4	116.8	112.2	110.3	107.4	118.6	118.8	122.4
DO	-	-	-	-	-	-	-	-	-	-	-	-
gal evap or abs												
Tons " " "												
Tons/Ton Ore												
NaCN Consump	154	197	202	144	110	168	163	144	96	120	120	106
Cumulative lb	51972	52168	52370	52514	52624	52792	52956	53100	53196	53316	53436	53541
(lb/Ton Ore)	.004	.005	.005	.003	.003	.004	.004	.003	.002	.003	.003	.002
Cum lb/Ton Ore	1.209	1.213	1.218	1.221	1.224	1.228	1.231	1.235	1.237	1.240	1.243	1.245
Net Au (oz)	-3.408	-3.600	-3.744	-3.312	-2.592	-2.448	-1.824	-.480	2.304	3.840	2.880	3.024
Net Ag (oz)	-2.208	-2.160	-2.256	-1.104	.240	.000	.720	3.888	9.360	10.512	10.128	9.504
Cum Net Au (oz)	888.918	885.318	881.574	878.262	875.670	873.222	871.398	870.918	873.222	877.062	879.942	882.966
Cum Net Ag (oz)	3458.393	3456.233	3453.977	3452.873	3453.113	3453.113	3453.833	3457.721	3467.081	3477.593	3487.721	3497.225

APPENDIX III

MINERALOGICAL REPORTS

THEODORE P. PASTER, Ph.D.
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February 19, 1994

Laura L. Damon
Brohm Mining Corporation
P.O. Box 485
Deadwood, SD. 57732

RE: Petrography of One Head and One Tail Heap Leach Test Sample for Brohm Mining Corporation.

RESULTS

Introduction

The Head sample is from a sulfide heap leach test run over the past year. It was agglomerated with 150 lb limestone fines/ton ore. The Tail sample represents the same material after leaching.

Rock Type

The principal rock type appears to be a porphyritic trachyte or latite.

Rock Alteration

The only alterations seen are:

1) Some goethite development in the Head and Tail which is probably from weathering of sulfides in the rock.
2) Approximately 15% clay alteration of feldspar along cleavage and/or along cryptoperthite exsolution structure planes.

Because of the close gold association with clay, it is assumed that gold mineralization is coincident with this minor argillic alteration event. The copper mineralization appears to be a different, more vein-like, event.

Sulfides and Gold

Head:

Pyrite (Py); Approximately 3% cubic porphyroblasts dispersed through rock groundmass. Contains an opaque gray mineral as primary inclusions.
Arsenopyrite (Aspy); Minor amount as porphyroblasts.
Covellite; Minor or trace found embedded in goethite(?) with Py, Aspy and rutile.
Gold; $\leq$ 1u particles principally associated with clay in 10-20u alteration patches in K-spar (Probably cryptoperthite). Gold is not associated with covellite.

Tail:

Pyrite; Same description as in Head.
Chalcopyrite (Cupy); Two particles (trace), 0.1-0.4mm in size, which had been liberated form any associated minerals.
?; Found as 2-42u inclusions in Py. A gray, low-reflectance opaque mineral which may be galena, digenite or bornite. May possibly be a silver mineral but more likely Ag-bearing galena.
Gold; A significant amount of $\leq$ 1.5u Au particles are present associated with the clay alteration in the feldspar phenos but cavities are also lined with a fine-grained unidentified secondary mineral not found in Head sample.

Gold is not particularly associated with any other phase although it may be overlooked, at this size, as inclusions in Py and Cupy.

Leach Product

The unidentified fine-crystalline product found with clay and gold in the Tail which is not found in the Head may or may not be gypsum. It's crystal size is approximately 1 to 3 u which is too fine-grained to obtain most optical properties.

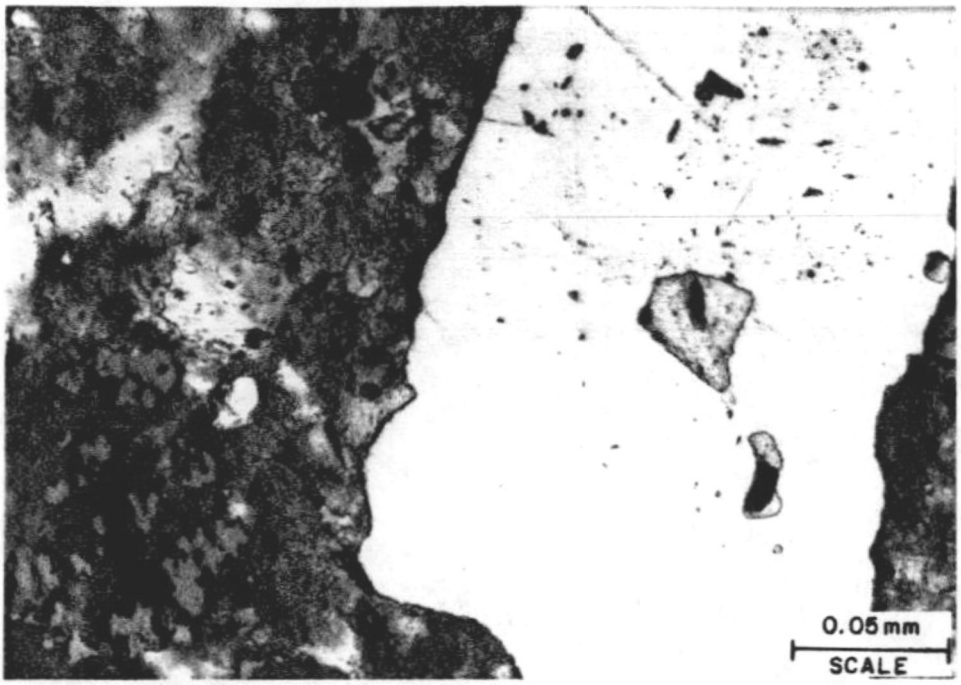
The precipitation of this mineral in the clay alteration crevices where the gold is found undoubtedly impedes fluid flow to the point where gold leaching stops.

Recommendations

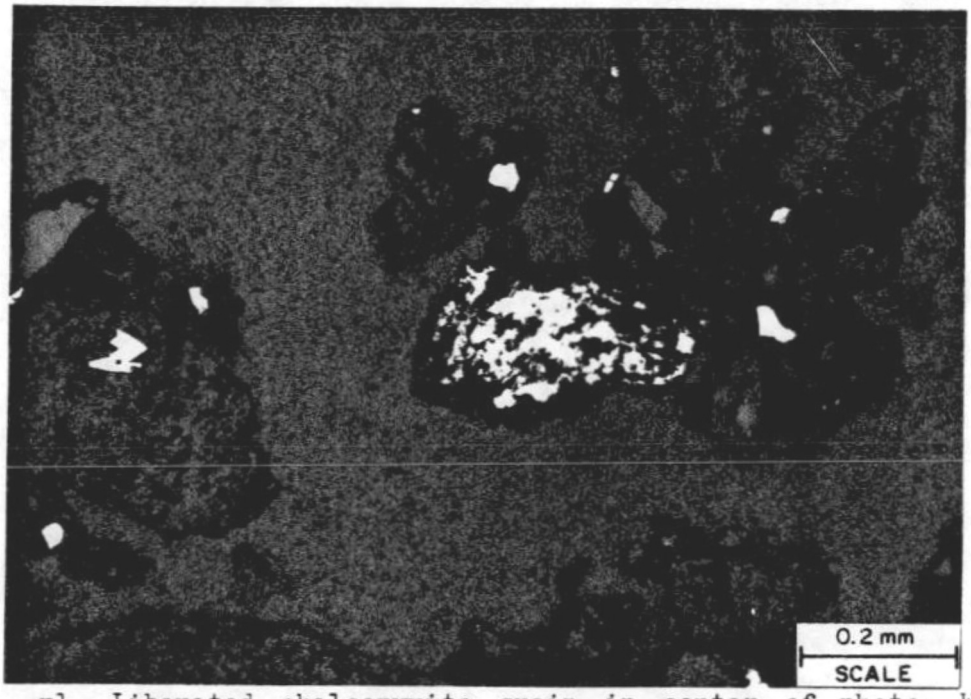
Microprobe identifications of the Py inclusions and the unidentified leach product can and should be performed. The polished thin sections prepared for this investigation would be sufficient for the probe work.

Respectfully submitted:

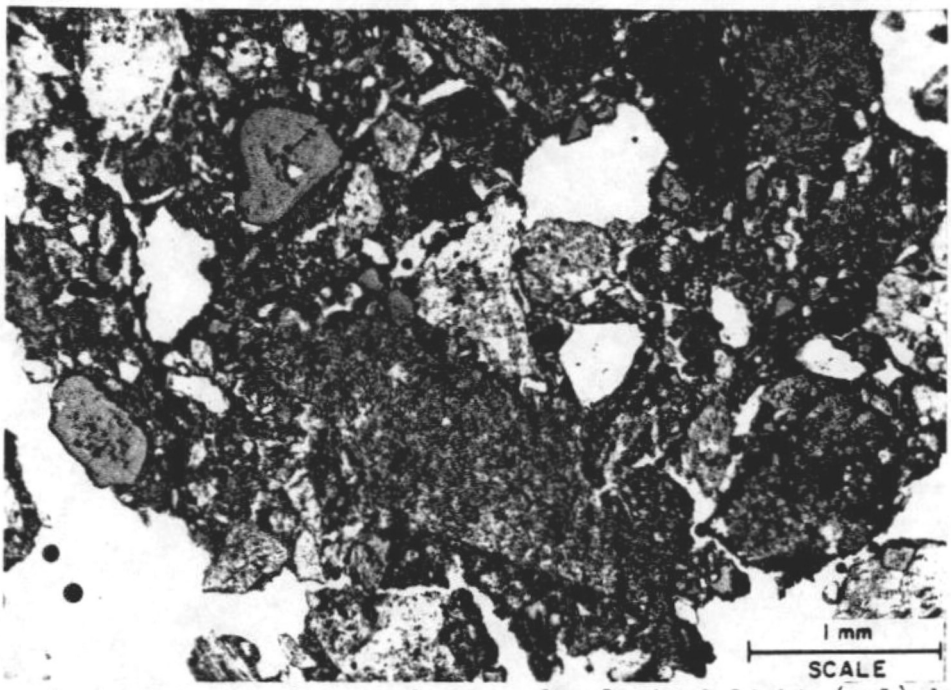
Theodore P. Paster
February 19, 1994



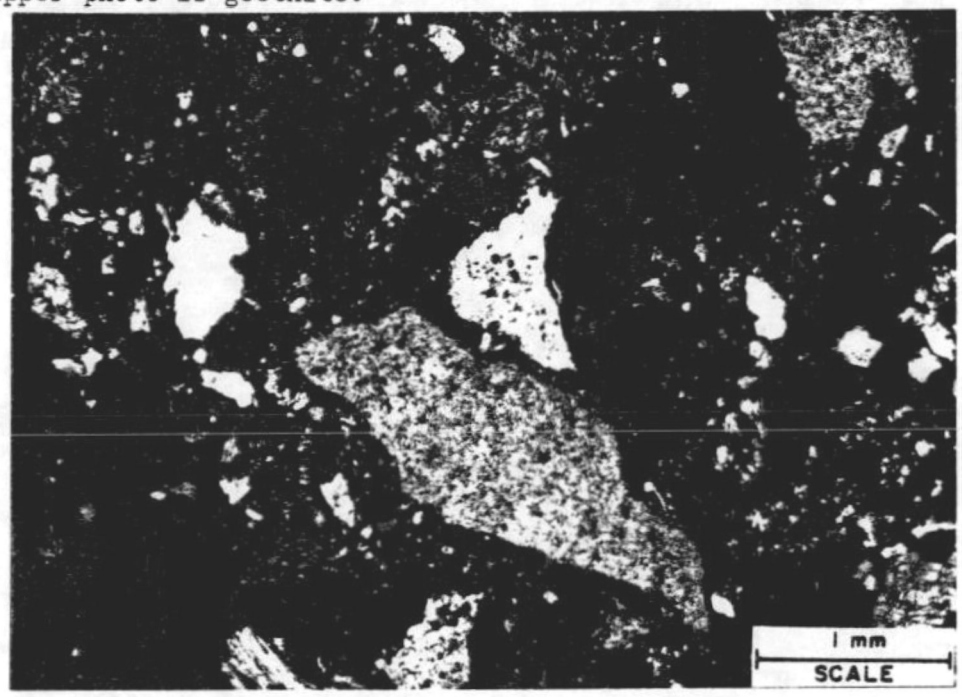
Tail, reflected light (rl) + plane polarized light (pl). Pyrite (Py) crystal in E½ of photo contains 10-42u inclusions of an unidentified gray, isotropic mineral which may be galena, bornite or digenite. Cluster of gray grains in SW corner is rutile.

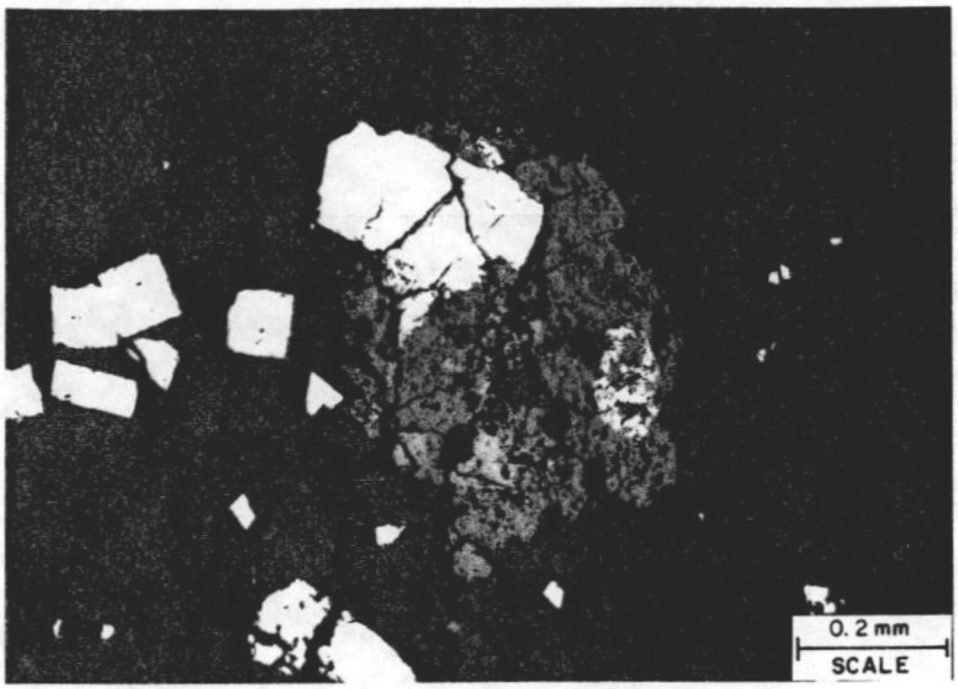


Tail, rl. Liberated chalcopyrite grain in center of photo. White Py crystals are scattered through mineral and agglomerate particles.

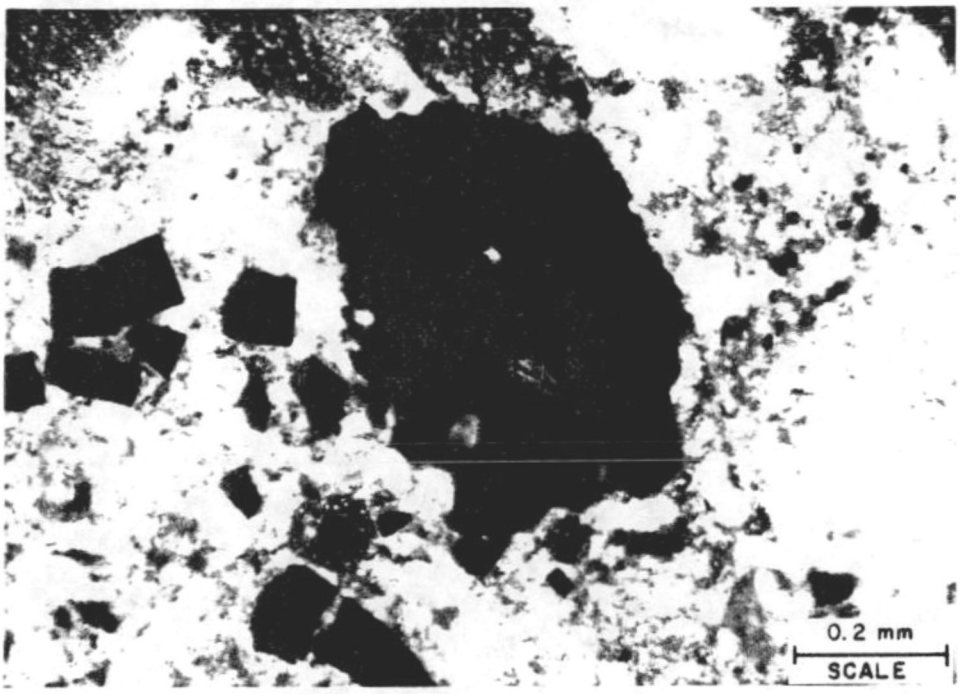


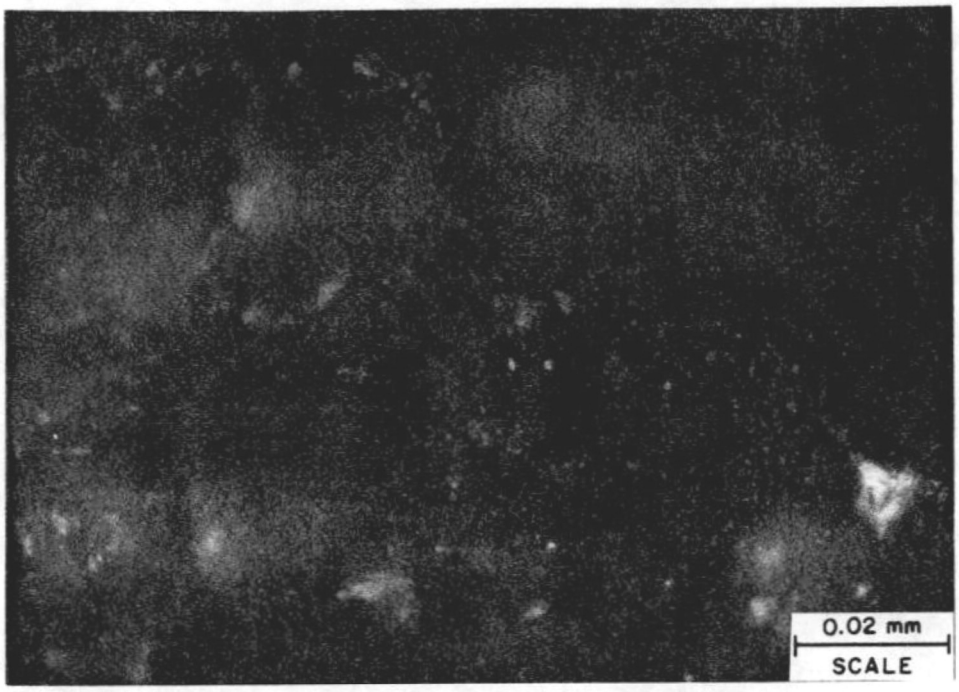
Tail, rl + pl upper photo and crossed polarized light (xpl) bottom photo; Same view in both photos. Note fractures and open cracks in agglomerate at top and lack of any sign of coatings in these cracks which would be the first locations for gypsum or other secondary minerals to precipitate. Pinkish fragments and dust particles in lower photo are limestone. Brass-colored crystals in upper photo are Py crystals. Dark gray aggregate grain near NE corner of upper photo is goethite.



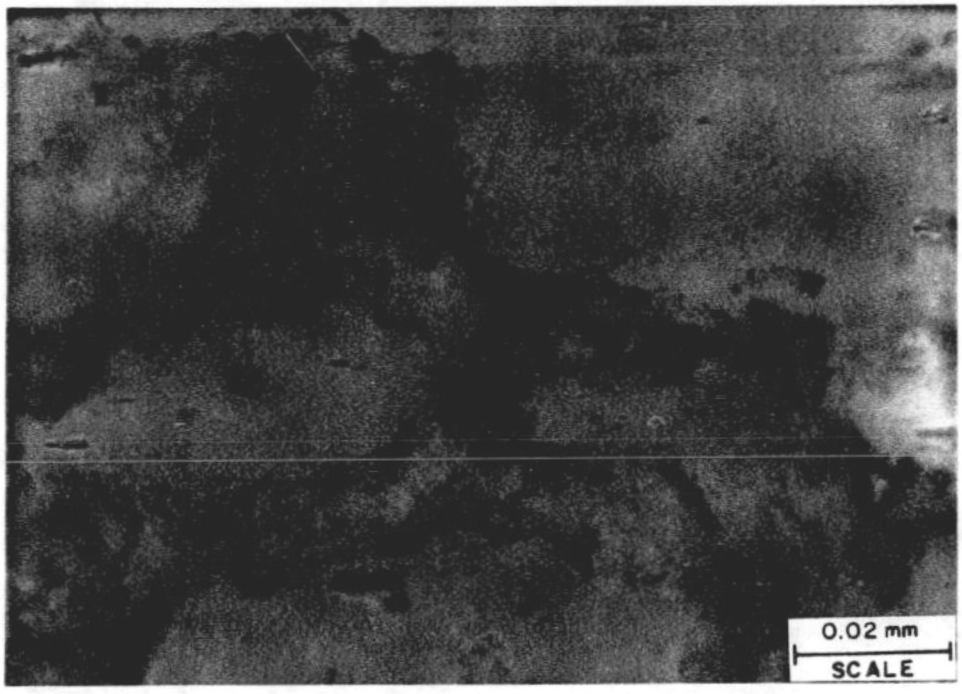


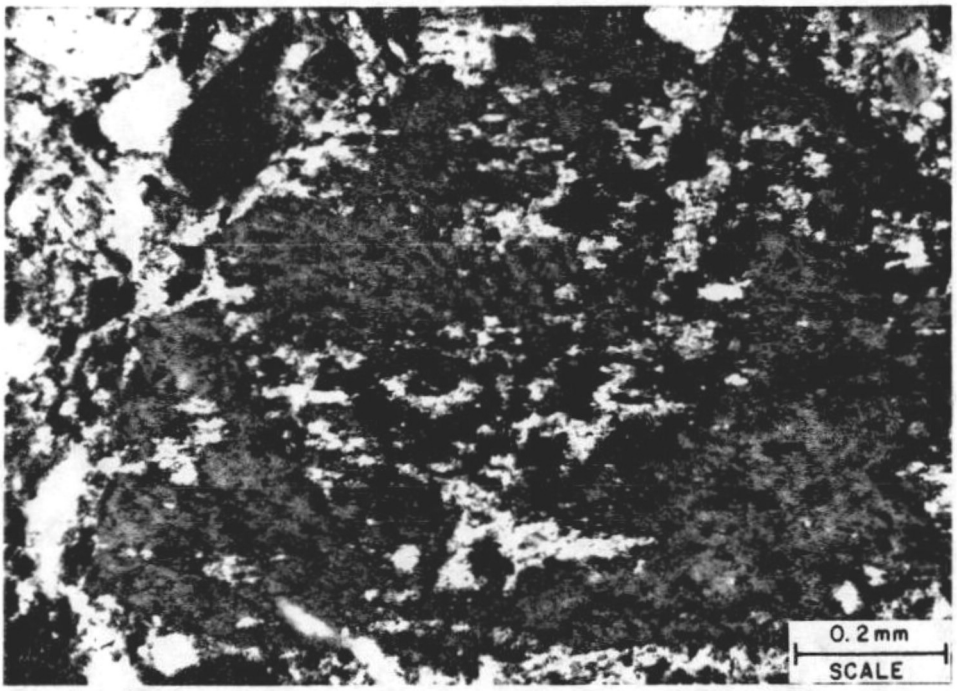
Head, rl upper photo and xpl lower photo; Same view in both photos. Upper photo shows blue covellite and yellow-white Py in gray goethite. Py crystals in surrounding agglomerate. Arsenopyrite is above and below Py crystal in goethite. Gold content in all of these phases is very low.



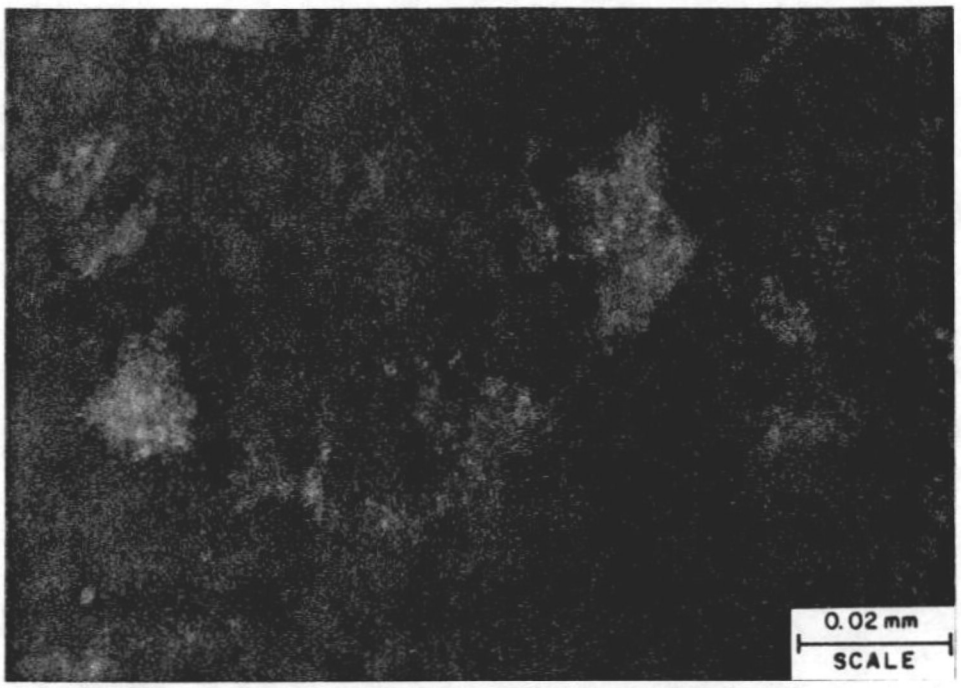


Head, rl upper photo and pl lower photo; Same view in both photos. ≤ 1u gold particles are associated with yellow rutile(?) grains in clay-altered patches in feldspar of upper photo. Clay alteration is shown as brownish discoloration in lower photo.

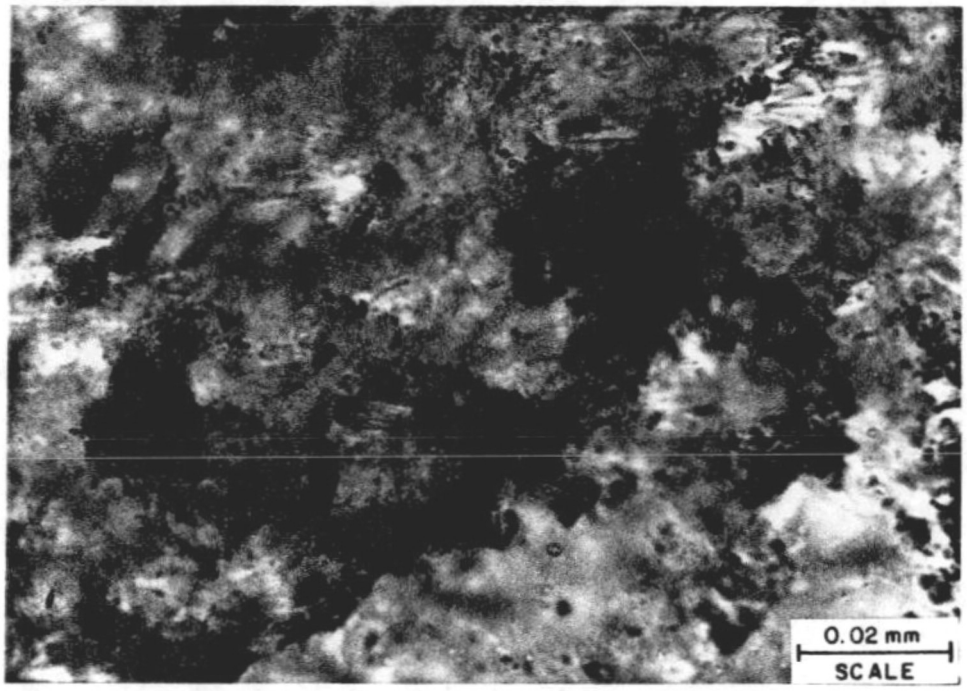


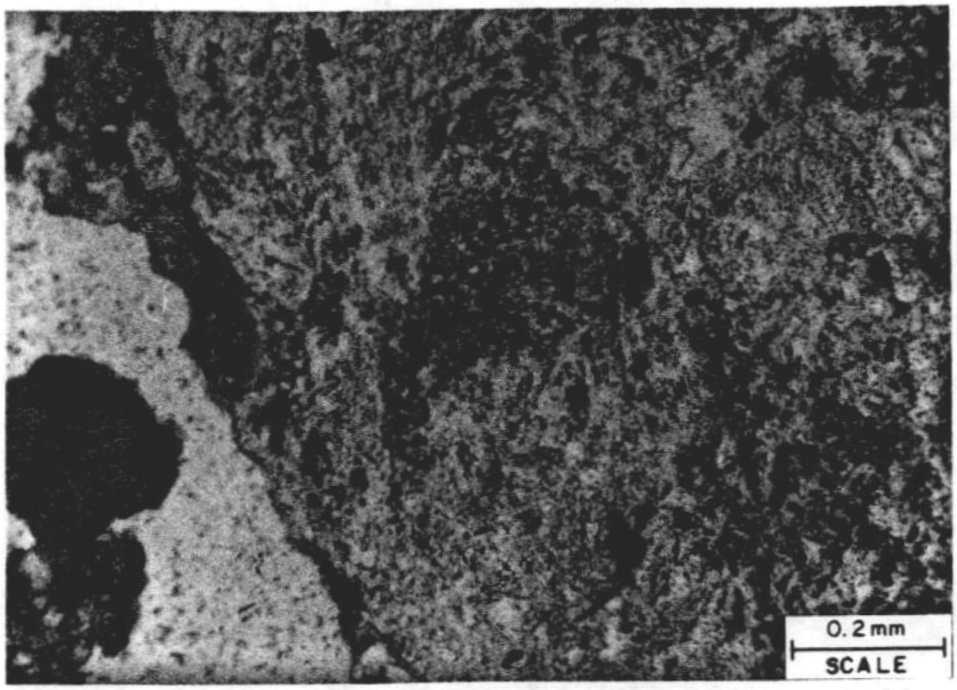


Head, xpl. low power view of photos on previous page which is in the center of this photo. large crystal of feldspar with patches of clay alteration.

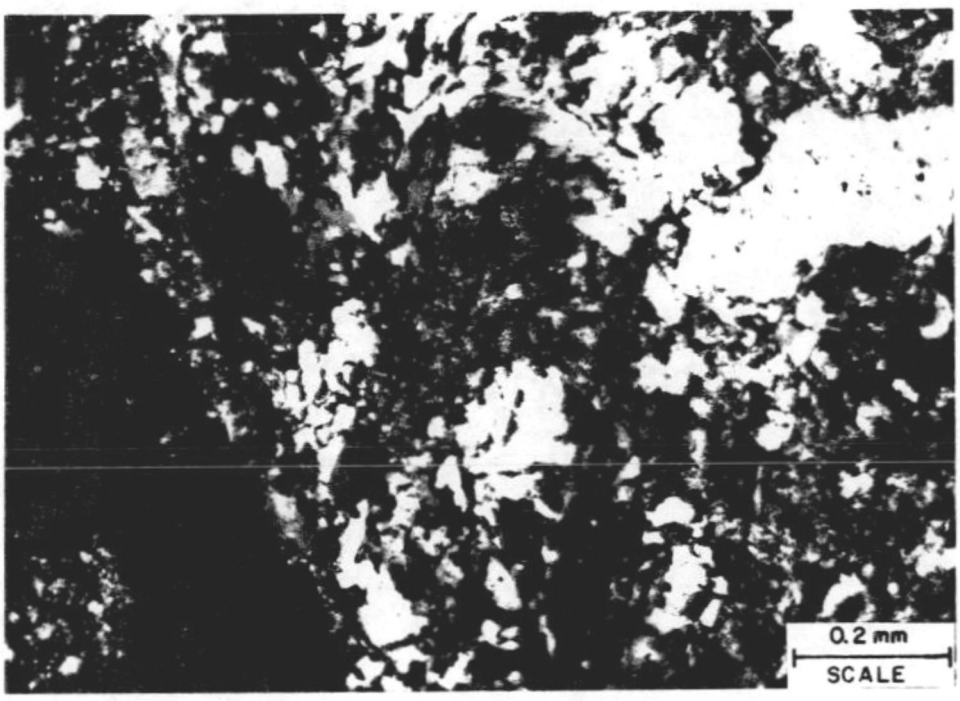


Tail, rl upper photo and pl lower photo; Same view in both photos. Gold is clearly visible in top photo where largest (2u) gold particle is in center of photo. Yellowish unidentified crystals in top photo which occur in about 20u clumps line cavities which still contain clay but less noticable. Same crystals are brown in lower photo. Compare this set of photos with those of Head sample two pages prior to this page.





Tail, pl upper photo and xpl lower photo; Same view in both photos. Volcanic rock particle in which center of photo is low power view of gold-bearing clay/? replaced feldspar area shown on preceding page.



THE UNIVERSITY OF
CALGARY
Faculty of SCIENCE
Department of GEOLOGY and GEOPHYSICS

94/03/24

Ms. Laura Damon
Brohm Mining Corp.
P.O. Box 485
Deadwood, South Dakota
57732
Fax: 605-578-1709
page one of four

Re: Probe analysis

The analyses of the two thin sections sent to the University of Calgary by Dr. Ted Paster follow. A copy will be sent to you by mail as well. Would you like the thin sections returned to you or Dr. Paster?

Our invoicing is done through the University's office of Financial Services, and will follow later. The two sample numbers will be quoted (STH-tail and STH-head) for your reference. As per our external analytical rates, you will charged the three hour minimum of CAN$600, plus any applicable local taxes. (The actual work took just over four hours.)

If the Department can be of any further service, please do not hesitate to contact me. Thank you for considering the University of Calgary for specialized analytical work.

Sincerely,

Jon Greggs

Jon Greggs
Technical Supervisor

2500 University Drive N.W., Calgary, Alberta, Canada T2N 1N4
Telephone (403) 220-5841 FAX (403) 284-0074

THE UNIVERSITY OF CALGARY

2500 University Drive N.W., Calgary, Alberta, Canada T2N 1N4

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Department of GEOLOGY and GEOPHYSICS

Telephone (403) 220-5841
FAX (403) 284-0074

March 24, 1994

Dear Dr. Paster:

I have recently analyzed the two polished thin sections that you sent to Jon Greggs. You raised questions regarding mineralogy in three locations:

Sample STH-Tail

Location #1

In this location you were interested to know the composition of the minerals lining the 20 μm alteration patches. The alteration product in the larger patches is, as I'm sure you expected, sericite/muscovite. The smaller spots appear to be the same sericite/muscovite, although the smallest reasonable spot size to get a quantitative analysis on our probe is about 10 μm. No sulphur peaks were evident, which would indicate gypsum, upon scanning the area.

Location #2

The grey inclusion in the pyrite is molybdenite. Other pyrite grains nearby have K-feldspar inclusions.

Sample STH-Head

Location #3

You wanted to know:
a) if the mineral near the covellite was arsenopyrite
b) if the deep red mineral mixed with rutile was goethite or a silver mineral

a) I could find no arsenopyrite (however, pyrite, covellite, and rutile are present)
b) the deep red mineral is goethite.

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FAX (403) 284-0074

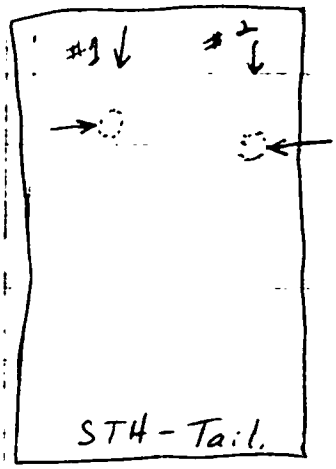
I hope that these results are useful. If you have any questions please call me at (403) 220-7570. If there is any further work that we can do for you, please call Jon Greggs at (403) 220-6509.

Sincerely,

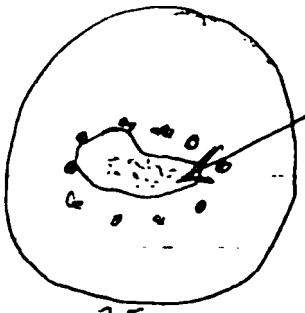
Scott Digel, Ph.D.

3/2/94

Areas for microprobe work.



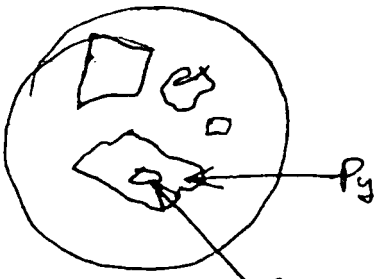
#1)



25x

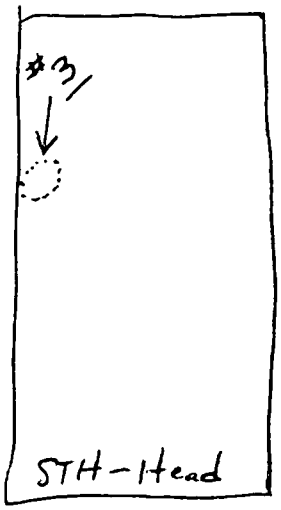
Altered cryptoperthite
Contains ~ 20μ alteration patches lined with ~2μ crystals of unknown mineral.
Gypsum? (See photo)

#2)

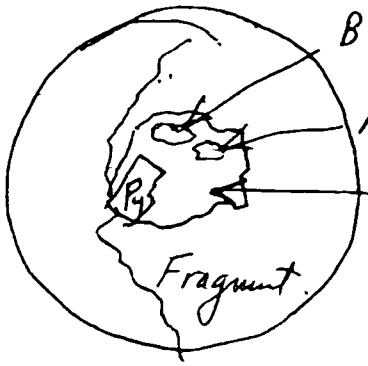


100x

Gray inclusion (~30μ)
What is this gray mineral?



#3)



Blue covellite. (Yes)

Aspy?

Goethite(?) + rutile
Is deep red phase goethite? or a silver mineral.

100x reflected light.

1) – What are xls lining alt. patches in Feldspar? (See Photo)

2) – What is gray mineral phase which occurs as inclusions in Py?

3) – Is deep red phase Goethite or Pyrargyrite?

T. Paster

THEODORE P. PASTER, Ph.D.
Consultant
11425 E. Cimmarron Drive
Englewood, Colorado 80111

APPENDIX ~~VI~~ IV

PROCEDURES

LEACHATE DATA

Q#	COEF A	COEF B	COEF C	R^2	R^2 C	EQUATION
1	0.3317D+02	0.4306D-01	0.0000D+00	0.9930	0.9929	Y=A+B*X
2	0.0000D+00	0.1508D+00	0.0000D+00	0.0000	0.0000	Y=B*X
3	0.2811D-01	-.2101D-04	0.0000D+00	0.9817	0.9816	Y=1/(A+B*X)
4	0.3815D+02	0.3419D-01	-.6519D+03	0.9956	0.9955	Y=A+B*X+C/X
5	0.5683D+02	-.3021D+04	0.0000D+00	0.9594	0.9593	Y=A+B/X
6	0.1647D-01	0.1499D+01	0.0000D+00	0.9805	0.9804	Y=X/(A*X+B)
7	0.6536D+02	-.7547D+04	0.5572D+06	0.9909	0.9909	Y=A+B/X+C/X*X
8	0.3091D+02	0.5975D-01	-.2888D-04	0.9949	0.9949	Y=A+B*X+C*X*X
9	0.2809D+00	-.4011D-03	0.0000D+00	0.0000	0.0000	Y=A*X+B*X*X
10	0.1040D+02	0.2620D+00	0.0000D+00	0.9938	0.9938	Y=A*X^B
11	0.3458D+02	0.1001D+01	0.0000D+00	0.9885	0.9885	Y=A*B^X
12	0.5840D+02	0.6694D-29	0.0000D+00	0.9710	0.9709	Y=B^(1/X)
13	0.3597D+02	0.1426D-03	0.0000D+00	0.9854	0.9854	Y=A*X^(B*X)
14	0.6187D+02	-.1489D+02	0.0000D+00	0.9783	0.9783	Y=A*X^(B/X)
15	0.3458D+02	0.9497D-03	0.0000D+00	0.9885	0.9885	Y=A*e^(B*X)
16	0.5840D+02	-.6718D+02	0.0000D+00	0.9710	0.9709	Y=A*e^(B/X)
17	-.2103D+02	0.1183D+02	0.0000D+00	0.9902	0.9902	Y=A+B*lnX
18	0.5482D-01	-.5821D-02	0.0000D+00	0.9950	0.9950	Y=1/(A+B*lnX)
19	0.1519D+02	0.1000D+01	0.1792D+00	0.9952	0.9952	Y=A*B^X*X^C
20	0.6605D+01	0.6395D+08	0.3308D+00	0.9948	0.9948	Y=A*B^(1/X)*X^C
21	0.5605D+02	0.7157D+03	-.8987D+06	0.9944	0.9944	Y=A*e^(((X-B)^2)/C)
22	0.2857D+02	0.2146D+01	0.2627D+02	0.9951	0.9950	Y=A*e^((lnX-B)^2/C)
24	0.6487D+02	0.3298D+04	0.1792D+00	0.9952	0.9952	Y=A*(X/B)^C*e^(x/b)
25	0.3523D-07	-.5872D+03	0.1871D-01	0.9937	0.9936	Y=1/(A*(X+B)^2+C)

BASED ON THE VALUE OF RC( )--BEST FITTING CURVE WAS NUMBER 4