PMT 18

COMINCO EUROPE EXPLORATION
PARYS MOUNTAIN PROJECT

REPORT ON THE COMINCO (UK) LTD
1981 STAGE VIII EXPLORATION PROGRAMME

October 1981

Richard Herrington
Ian D McCartney

The hole was terminated after drilling 130 ft of barren, black, partly pyritic shales.

Drill Hole A49

Co-ordinates (Cominco grid)	:	9225N 6270E
Correct dip	:	)
True bearing	:	)vertical
Depth	:	825.75'
Core size	:	T6H 0'-5.0', NQ 5.0' - 825.75' (TNW short sections)

Log Summary (feet)

0 - 5.0	Overburden
5.00 - 290.7	Variable cherty rhyolitic tuffs, in part chloritised
290.70 - 292.45	Chloritised rhylotic tuffs with shale bands
292.45 - 485.5	Variable rhyolitic tuffs and ash flow tuffs
485.50 - 491.0	Rhyolitic ash flow tuff with shales bands
491.00 - 659.0	Rhyolitic ash flow tuff
659.00 - 714.75	Basic/intermediate volcanics
714.75 - 825.75	Black shales

A-49 was drilled to test the down dip extension of the A43 Chapel Zone massive sulphide intersection. The target was approximately 250-300 feet down dip of A43 at an elevation of approximately 100 ft b.s.l. A49 drilled a variable sequence of rhyolitic volcanics dominated by ash flow tuffs. The sequence is generally less cherty beyond 292.45' and shows strong chloritic alteration in part.

A50 was drilled as a joint test of the strike continuity of the A43-H3 Chapel Zone sulphides and also as a second test of the near surface vein breccia, hosting Cu Pb Zn sulphides in A37. The hole was targeted to intersect the mid-point of a line between the A43 and H3 intersections at a depth of 200 ft b.s.l., at the same time it would obtain a second cut of the A37 vein zone perpendicular to the previous test.

From surface to 354.0 ft A50 drilled a fairly uniform sequence of rhyolitic ash flow tuffs. At the anticipated target depth to the A37 vein breccia mineralisation, a fairly barren quartz cemented breccia vein was intersected, but carried only traces of Cu Pb Zn sulphides, highest values 66.0-66.5' (0.5') of 60 ppm Cu 1780 ppm Pb 2680 ppm Zn.

From 354.0 ft to 532.4 ft A-50 drilled a variable sequence of rhyolitic tuffs. From 532.4' to 539.4' A-50 drilled a very variable unit comprising dominantly acid tuffs containing rhyolitic tuff, rhyolite flow and basic volcanic fragments. This is interpreted as the target stratigraphy for the A43 - H3 sulphide zone. In A50 the zone was barren of sulphides save accessory pyrite. From 539.4' to 555.0' A50 intersected an intermediate/basic volcanic unit of similar composition and texture to that seen below the sulphide zone in A43. Below this A50 drilled another variable sequence of rhyolitic ash and ash flow tuffs, becoming highly altered beyond 538'.

From 660.2' to 662.8' A-50 intersected a slumped shale unit containing rounded "bluestone" clasts up to 2 inches across the highest grade section 0.5' (661.0 - 661.5') grading 0.38% Cu, 1.86% Pb, 4.01% Zn, 27 g/t Ag, 0.11 g/t Au. This mineralisation lies directly at the southern rhyolite/Ordovician sediment contact and the "bluestone" fragments resemble the massive polymetallic sulphides seen in the "Engine Zone/Southern Contact Zone", and is interpreted as being equivalent to this

mineralisation. Directly below this from 662.8' to 667.7' ft A50 drilled an altered shale unit with carbonate and silica segregations which carry stringer pyrite/chalcopyrite mineralisation. This 4.9 ft assayed 0.78% Cu, 0.19% Pb, 0.37% Zn, 5 g/t Ag, 0.1 g/t Au.

Below 667.7 ft A-50 drilled barren black shales and was terminated at 815.54'.

b) North and East of Morfa Du

Four drill holes were located in the north-west corner of the property along the flanks of the northern rhyolite/Ordovician sediment contact(Parys Farm Area). Previous drilling in the Morfa Du area had outlined a steeply plunging zone of polymetallic Cu Pb Zn sulphide mineralisation which had been drilled to 1000' b.s.l. This "Engine Zone" was open down plunge some distance to the north before it was postulated that the zone would wrap around on to the south limb of the main Parys Mountain syncline and strike approximately east-north-east. Likewise the "White Rock Zone" of quartz rock hosted Cu Pb Zn mineralisation was similarly open to the north before it was also postulated that it would swing around on to the north limb of the main Parys Mountain syncline.

The four holes were located in order to test the main Parys Mountain structure at the western end, close to the inferred closure of the syncline and also close to where the Morfa Du structure links up with the main Parys Mountain structure. The holes were engineered to test both the north and south rhyolite to Ordovician sediment contacts, by drilling the holes from the overturned northern limb of the main structure.

Drill Hole A-48

Co-ordinates (Cominco grid)	:	10530N 6775E
Correct dip	:	)
True bearing	:	) vertical
Depth	:	1843.9 ft
Core size	:	HQ 0'-361.5' NQ 361.5' - 1179.25', BQ 1179.25' - 1843.9'

Log Summary

0 - 4.80	Overburden
4.8 - 625.10	Black shales with minor basic volcanics
625.1 - 1151.60	Rhyolitic ash flow tuff with minor ash tuffs and rhyolite flows.
1151.6 - 1178.80	Intermediate/basic volcanics
1178.8 - 1492.20	Cherty rhyolitic ash and ash flows tuff
1492.2 - 1507.90	Chloritised tuffs with quartz sericite segregations
1507.9 - 1514.30	Heterolithic breccia
1514.3 - 1516.50	Massive Cu Pb Zn sulphides
1516.5 - 1518.75	Altered tuff with shale bands. Disseminated Cu Pb Zn sulphides
1529.5 - 1548.20	Silicified shale
1548.2 - 1765.00	Grey tuffitic shale
1765.0 - 1843.90	Black shale

A-48 and A-51 were designed as a pair of holes to test the main rhyolite to Ordovician sediment contacts close to the inferred closure of the Parys Mountain synform along section 6775E. They were designed to test for down plunge - along strike extensions to the "Engine Zone" and "White Rock Zone". At a point where the Morfa Du structure would begin to wrap around onto the main Parys Mountain structure. The holes were engineered to give

between 800ft and 1200ft dip separation on the northern overturned Ordovician sediment to rhyolite contact and a 500ft dip separation on the southern contact.

A48 was the shorter of the two holes drilled farthest up dip from the inferred synform closure and had target depths of 250ft b.s.l. and 1200ft b.s.l. for the north and south contacts respectively.

A48 drilled 625.1ft of barren black shales which contained minor basic to intermediate volcanic units. At 625.1ft A48 intersected the north shale to rhyolite contact. The contact was conformable but possibly slightly sheared and was barren of any sulphides or development of quartz rock. From 625.1ft to 1151.6ft A48 drilled a sequence of rhyolitic ash flow tuffs becoming more altered beyond 1078ft. This unit locally carries patchy Cu Pb Zn sulphide mineralisation.

The best mineralised zones within, this unit are: 1091.4' - 1093.7' (2.3') grading 0.11% Cu, 0.93% Pb, 1.72% Zn, 79 g/t Ag, 0.2 g/t Au and 1149.7' - 1153.0' (3.3') grading 0.26% Cu, 1.15% Pb, 2.05% Zn, 74 g/t Ag, 0.35 g/t Au. The former comprises Cu Pb Zn sulphide disseminations in a rhyolitic ash flow tuff and the latter comprises a zone of disseminated Fe Cu Pb Zn sulphides in a fine chloritic lapilli tuff containing a 0.5 inch massive sulphide band.

Between 1151.6ft and 1178.8ft the hole drilled an intermediate to basic volcanic unit with distinctive quartz filled ovoids.

Beyond 1178.8ft A-48 drilled another series of variable rhyolite ash flow tuffs. From 1492.2ft to 1507.9ft A48 drilled a series of heavily altered tuffs characterised by heavy chloritisaton and sericitisaion and abundant quartz segregations. Between 1507.9ft and 1529.5ft the target stratigraphy was intersected. This sequence lies at the base of the rhyolitic volcanics on the southern contact with the Ordovician shale/tuffite sequence.

The target stratigraphy was significantly mineralised and comprised three main units: i) the upper section 1507.9ft to 1514.3ft comprised a Heterolithic Breccia of poorly sorted cherty tuff, ash flow tuff and chloritic fragments in a chloritic argillite matrix with occasional large "bluestone" sulphide fragments; ii) the middle section from 1514.3ft to 1516.5ft comprised Massive to Semi-Massive Polymetallic Cu Pb Zn Sulphides with accessory quartz and minor chloritic bands; iii) the lower section from 1516.5ft to 1518.75ft comprised shale fragment breccia with an Altered Rhyolitic Tuff with Shale Fragments with a matrix containing disseminated Cu Pb Zn sulphides. Below the main zone of mineralisation from 1518.75ft to 1529.5ft A48 drilled a massive chlorite rock zone, the upper section to 1521.0ft significantly mineralised with Cu Pb Zn sulphide disseminations and laminae.

The significant zone of mineralisation extends from 1511.3ft to 1521.0ft (9.7') and grades at 0.88% Cu, 2.59% Pb, 5.02% Zn, 51 g/t Ag, 0.45 g/t Au. Core angles around the zone vary from 50° to 70° to core axis.

From 1529.5ft to 1548.2ft, A48 intersected barren silicified grey shales before passing into light grey tuffitic shales, comprising fine grey homogenous mudstones with a high epiclastic volcanic component. These grade into black shales at 1765ft and the hole was terminated in barren black shales at 1843.9ft.

Drill Hole A51(A51a wedged section)

Co-ordinates (Cominco grid)	:	11130N 6775E
Correct dip	:	88°
True direction	:	165°
Depth	:	1900.25 (2062.75)
Core size	:	HQ 0' - 603.75', NQ 603.75' - 1256.75 BQ 1256.75' - 1900.25 (2062.75)

Log Summary (feet)

0 - 16.1	Overburden
16.1 - 708.25	Black Shales with Mona breccia component
708.25 - 1270.2	Grey black shales with minor basic/intermediate volcanics
1270.2 - 1275.6	Silicified shales
1275.6 - 1304.75	Cherty rhyolitic tuff
1304.75 - 1412.0	Quartz rock
1412.0 - 1428.75	Altered rhyolitic ash flow tuff
1428.75 - 1605.8	Quartz rock with rhyolitic and shale fragments
1605.8 - 1609.8	Altered shale with minor tuff horizons
1609.8 - 1660.0	Variable rhyolitic tuffs with minor shale bands
1660.00 - 1692.2	Intermediate/basic volcanic white
1692.20 - 1768.8	Variable rhyolitic tuffs with minor intermediate/basic volcanics
1768.80 - 1770.2	Heterolithic breccia
1770.20 - 1783.25	Mineralised altered tuffs with shale - disseminated to massive Cu Pb Zn sulphides
1783.25 - 1793.0	Chloritised shale
1793.00 - 1900.25	Tuffite and tuffitic shales. Quartz stringer veins beyond 1843.9, Cu Pb Zn sulphides

A51 was drilled to the north of A48 to test the down dip extensions of the north and south Ordovician sediment to rhyolite contact closer to the inferred synform closure. The target depths for the two contacts where at 900-1000 feet below sea level and 1300 - 1400 feet below sea level for the north and south contacts respectively and 800' down dip and 500' down dip of the A48 intersections respectively. The test of the north contact would also test the down plunge potential of the White Rock Zone quartz rock hosted mineralisation.

From surface to 708.25ft A51 drilled a sequence of Ordovician shales with Mona derived breccia units. The Breccia contains clasts of the Pre-Cambrian Amlwch beds which outcrop to the north of Parys Mountain. From 708 ft the shales became uniformly grey-black with minor basic volcanics and continued as a fairly monotonous sequence until 1270ft. From 1270ft to 1276ft the shales were highly silicified with cross cutting quartz stringers carrying Fe Cu Pb Zn sulphides and minor stratiform sulphide mineralisation. Within this zone the interval from 1273.7ft to 1275.6ft (1.9') grades 1.53% Cu, 0.68% Pb, 1.37% Zn, 21 g/t Ag, 0.2 g/t Au. From 1276ft to 1305ft A51 drilled a minor rhyolitic ash tuff unit before drilling a substantial quartz rock unit between 1305ft and 1606ft.

The quartz rock unit comprised a) from 1304.75ft to 1412.0ft Quartz Breccia, b) 1412.0ft to 1428.75' Altered Rhyolitic Ash Flow Tuff, and c) from 1428.75ft to 1605.8ft Quartz Breccia with Rhyolitic and Silificied Shale Fragments. Units a) and c) were significantly mineralised with Fe Cu Pb Zn sulphides; unit a) showing significantly better grades than unit c). Unit a) graded 0.18% Cu, 0.73% Pb, 1.75% Zn, 49 g/t Ag, 0.3 g/t Au over 107.25ft, with a high grade section from 1392.25ft to 1412.0ft (19.75') grading 0.35% Cu, 2.18% Pb, 5.3% Zn, 145 g/t Ag, 0.75 g/t Au. Unit c) was

mineralised but generally of low grades, highest grade sections from 1436.0ft to 1500.8ft (64.8') at 0.24% Cu, 0.73% Pb, 1.55% Zn, 15 g/t Ag, 0.25g/tAu and from 1535.8ft to 1555.8ft (20') at 0.11% Cu, 1.06% Pb, 1.91% Zn, 14 g/t Ag and 0.2 g/t Au. Unit b) was unmineralised.

The sulphides were present in 3 forms within the quartz rock (i) Primary fine grained Fe Cu Pb Zn sulphide laminations within quartz in banded fragments (ii) "Primary" disseminated Fe Cu Pb Zn sulphides in the fragment matrix and (iii) Cross cutting quartz and carbonate veins hosting Fe Cu Pb Zn sulphides.

At the structural base of the quartz rock an altered tuff/shale band hosted disseminated to massive Fe Cu Pb Zn sulphide rock ("bluestone"), from 1605.8ft to 1609.8ft (4.0') grading 0.2% Cu, 1.7% Pb, 3.22% Zn, 18 g/t Ag, 0.1 g/t Au. Beyond this A51 drilled variable but generally cherty rhyolitic tuffs with two basic to intermediate volcanic units, the upper unit very similar to A-48 1151.6ft to 1178.8ft. This upper unit in A51 has a minor mineralised zone direcetly above it 1659.0ft to 1660.0ft (1.0') grading 0.33% Cu, 1.28% Pb, 2.99% Zn, 18 g/t Ag, 0.1 g/t Au hosted in an altered rhyolitic tuff.

The target stratigraphy for the south rhyolite to Ordovician sediment contact was drilled in A51 from 1768.8ft to 1783.25ft and the package comprised (i) 1768.8ft to 1770.2ft Heterolithic Breccia containing variable fragments including small Cu Pb Zn sulphide fragments (ii) 1770.2ft to 1783ft Altered Rhyolitic Tuffs with Minor Shales carrying disseminated to massive Fe Cu Pb Zn sulphides as fissure infills and primary bands and laminations. The significant zone 1770.2ft to 1755.8ft (5.6') grading at 1.05% Cu, 1.38% Pb, 2.81% Zn, 17 g/t Ag, 0.15 g/t Au.

Below 1783ft A51 drilled a sequence of chloritised shales and tuffite. The tuffite was characterised by core-parallel sulphide bearing quartz veins of a maximum 2 to 3 inches in width. One such vein extended from 1847ft to 1890ft (43') and graded 0.28% Cu, 2.64% Pb, 4.72% Zn, 12 g/t Ag 0.1 g/t Au. The sulphides were evidently late stage, strongly idioblastic, and dominated by honey coloured massive sphalerite and coarse cubic galena. A-51 was terminated due to drilling problems at 1900.25ft.

It was decided to wedge A-51 due to the presence of high-grade quartz-sulphide veins in the tuffite unit below 1847ft and a wedge was set at 1499ft. The wedged section A51a is summarised as follows:

1499.0 - 1608.4	Quartz rock with rhyolite/shale fragments
1608.4 - 1610.5	Altered shale with minor tuff horizons
1610.5 - 1659.3	Variable rhyolitic tuffs with shale bands
1659.3 - 1692.3	Intermediate/basic volcanic unit
1692.3 - 1766.2	Variable rhyolitic tuffs with minor intermediate/ basic volcanics
1766.2 - 1768.2	Heterolithic breccia
1768.2 - 1784.5	Mineralised altered tuff and shale
1784.5 - 1825.2	Chloritised tuffitic shale
1825.2 - 1957.1	Tuffite and tuffitic shales, quartz stringers beyond 1847.3, some Cu Pb Zn sulphides
1857.1 - 2062.75	Grey black shales with minor tuffite bands

These units are directly comparable to those cored in A-51. Mineralisation style was identical in A51a but significant variation in grade and thickness occured. These comparisons are shown below:

A51	A51a
1605.8 - 1609.8 (4.0)	1606.15 - 1609.1 (2.95)
0.2% Cu, 1.7% Pb	0.12% Cu, 1.14% Pb
3.22 % Zn, 18 g/t Ag	2.33% Zn, 17 g/t Ag
0.1 g/t Au	0.1 g/t Au
1770.2 - 1775.8 (5.6)	1770.85 - 1779.85 (9.0)
1.05% Cu, 1.38% Pb	0.19% Cu, 0.42% Pb
2.81% Zn, 17 g/t Ag	1.02% Zn, 4.5 g/t Ag
0.15 g/t Au	0.1 g/t Au
1846.75 - 1890.0 (43.25)	1847.3 - 1957.1 (109.8)
0.28% Cu, 2.64% Pb	Zone weakly mineralised only
4.72% Zn, 12 g/t Ag	
0.1 g/t Au	

The south contact mineralisation is of much lower grade in A51a. The A51, 51a south contact mineralisation is interpreted as fringe mineralisation and this is subject to rapid fluctuations in mineralisation grade and thickness. The footwall stringer zone also was very poorly mineralised in A51a, quartz veins were present but weakly mineralised.

Beyond 1957.1ft A51a drilled grey to black, barren shales and was terminated at 2062.75ft.

Drill Hole A-52

Co-ordinates (Cominco grid)	: 10560N 7715E
Correct dip	: 87°
True direction	: 344°
Depth	: 1780.8'
Core size	: T6H 0' - 9.4', HQ 9.4' -657.8', NQ 657.8' - 1224.9', BQ 657.8' - 1780.8'

Log Summary (feet)

0 - 739.5	Grey-black shales with minor basic volcanics
739.5 - 765.8	Variable rhyolitic tuffs with minor rhyolite flow
765.8 - 1030.5	Cherty ash tuff sequence
1030.5 - 1428.6	Variable rhyolitic ash and ash flow tuffs
1428.6 - 1434.7	Mineralised chlorite-carbonate rock
1434.7 - 1449.1	Rhyolitic ash tuff
1449.1 - 1459.1	Heterolithic breccia
1459.1 - 1484.2	Mineralised altered tuffs-massive to semi-massive Fe Cu Pb Zn sulphide rock
1484.2 - 1506.0	Chlorite zone with silica stringers
1506.0 - 1661.3	Tuffite
1661.3 - 1716.0	Shale
1716.0 - 1752.3	Shale with tuffite
1752.3 - 1780.8	Shale

A-52 and A-53 were designed as a pair of holes similar to A-48/A-51 at a position 1000ft along strike to the east on the A48/51 section along a line 7715E. The targets depths were the same as tested in A-48 and A-51. A53 was actually drilled as a 77° angled hole to facilitate drill site access.

A-52 drilled 740ft of grey black shales containing minor basic to intermediate volcanics with a sharp contact at 740ft between the shales and the main rhyolitic volcanic sequence. From 740ft to 1429ft A-52 drilled a variable rhyolitic volcanic sequence of dominantly volcaniclastics with minor rhyolite flow units. This sequence was essentially barren of mineralisation except for minor pyrite disseminations.

Between 1429ft and 1449ft A-52 drilled a highly altered volcaniclastic sequence comprising tuffs with strong chlorite/carbonate alternation. This zone contained chalcopyrite and pyrite stringer mineralisation, the best zone between 1428.6ft and 1434.7ft (6.1') grading 2.48% Cu with negligible Pb and Zn.

Between 1449ft and 1484ft A-52 drilled the target lithologies, and the zone was significantly mineralised. Host lithologies are: from 1449.1ft to 1459.1ft Heterolithic Breccia with minor chalcopyrite disseminations in the matrix; from 1459.1ft to 1464.2ft a barren Ash Tuff; and from 1464.2ft to 1484.2ft a zone of Massive to Semi-Massive Polymetallic Sulphide Mineralisation. This lower unit comprised an upper chloritic siliceous zone (1464.2ft - 1470.8ft) with disseminations and laminated massive bands of "bluestone" Cu Pb Zn sulphides and a lower zone (1470.8ft - 1484.2ft) of massive to semi-massive highly pyritic siliceous sulphide rock. Sulphide mineralogy is pyrite, honey brown sphalerite, chalcopyrite and galena in that order of abundance. Galena is present in only minor quantities, sphalerite and chalcopyrite are present as coarse 'recrystallised' grains and interstitial blebs respectively. The significant zone assays as follows:

either:

1464.6' - 1484.2' (19.6') - 2.28% Cu, 0.37% Pb
4.77% Zn, 16 g/t Ag
0.3 g/t Au

or:

1470.8' - 1484.2' (13.1) - 3.00% Cu, 0.12% Pb
5.76% Zn, 21 g/t Ag
0.35 g/t Au

From 1484.2ft to 1508ft A-52 drilled a package of altered interbedded volcaniclastics and sediments, heavily chloritised with some minor quartz-pyrite-chalcopyrite stringer veins. From 1508ft to 1661ft A-52 drilled a grey homogeneous tuffite unit hosting quartz stringer veins with chalcopyrite mineralisation oriented between 45° and 90° to core axis. The best section 1568.1ft - 1571.9ft (3.8') grading 3.48% Cu.

Below 1661.3ft A52 drilled barren black shales and was terminated at 1780.3ft.

Drill Hole A53

Co-ordinates (Cominco grid)	: 11545N 7260E
Correct dip	: 77°
True Direction	: 152°
Depth	: 2076.25'
Core size	: T6H 0' - 145.8';HQ 145.8' - 537.8'
	NQ 537.8' - 1015.3';TNW 1015.3' - 1189.1'
	TBW 1189.1' - 1383.5';BQ 1383.5' - 2076.25'

Log Summary (feet)

0	- 81.0	Mona complex
81.0	- 820.0	Grey black shales with Mona breccia component and minor intermediate volcanic units
820.0	- 1392.0	Grey-black shales
1392.0	- 1441.7	Cherty rhyolitic and rhyolitic ash tuffs
1441.7	- 1836.75	Variable rhyolitic ash and ash flow tuffs partly altered
1836.75	- 1837.1	Heterolithic breccia
1837.1	- 1843.3	Quartz rock with minor shale
1843..3	- 1856.9	Mineralised altered tuffs - massive to semi-massive Fe Cu Pb Zn sulphides with chert and magnetite bands
1856.9	- 1860	Rhyolitic ash tuff
1860	- 1973.3	Tuffite with shales
1973.3	- 2076.25	Black shales

A-53 was targeted as a down dip test of the north and south rhyolite to shale contacts as intersected in A-52. A-53 was drilled as an angled hole to facilitate easy drill site positioning repectively giving 1000ft and 500ft down dip tests of the north and south rhyolite to shale contacts from A-52.

From surface to 81ft A-53 drilled Mona complex rocks and clast supported Mona breccia - both units of the distinctive Amlwch bed greenschists, together with intermediate to basic igneous units. From 81ft to 820ft A-53 drilled a sequence of shales with Mona derived breccia and grit bands together with more basic to intermediate volcanic horizons. Beyond 820ft A-53 passed into fairly uniform black shales, typical of the Ordivician sequence. At 1392ft a sharp, unmineralised Ordovician shale - rhyolite contact was intersected. From 1392ft to 1837ft A-53 drilled a variable sequence of rhyolite volcanics, dominantly ash flow tuffs, ash tuffs and cherty tuffs, barren of significant mineralisation. No quartz rock was cored in A-53.

From 1836.75ft to 1856.9ft A-53 intersected the southern volcanic-sediment contact sequence which hosted significant South Contact Zone stratiform sulphide mineralisation. The Heterolithic Breccia unit (1836.75' - 1837.1') was faintly mineralised with disseminations of chalcopyrite. 1837.1ft to 1843.3ft comprised a banded Quartz Rock unit with "travertine" sulphide bands, very similar to the "White Rock" banded sulphide/quartz lithologies. The unit here is sparesly mineralised. The main mineralised package from 1843.3ft to 1856.9ft comprised several Semi-Massive to Massive Sulphide horizons with interbands of sulphide bearing chloritic cherts and monomineralic magnetite. Banded textures are apparently primary in origin.

Assays for this zone are summarised as followed:

1844.4ft - 1859.9ft (15.5') 3.93% Cu: 0.95% Pb: 2.92% Zn: 28 g/t Ag: 0.1 g/t Au.

Sulphides were dominantly coarse idioblastic sphalerite, pyrite and chalcopyrite (in order of abundance) and were of similar style to the A-52 intersection.

Below the mineralised package A-53 drilled a fine ash tuff unit from 1856.9ft to 1860.0ft, apparently siliceous with possible argillite component. From 1860ft to 1973ft A-53 drilled light grey homogenous tuffite passing into tuffaceous shale at 1970ft. The upper part of the unit hosted a quartz stockwork vein system with chloritisation of the tuffite. The unit was mineralised from 1901ft to 1948ft in various zones, the best 1901.2ft to 1908.95ft (7.75ft) grading 2.57% Cu, 0.28% Pb, 0.79% Zn, 13 g/t Ag, 0.1 g/t Au.

Beyond 1973ft A-53 drilled fairly barren black shales and was terminated at 2076ft.

3.2 METALLURGICAL TESTING

Between the periods of January 1980 and December 1981 mineralised core samples from Parys Mountain were submitted to the Cominco Kimberley concentrator complex at Sullivan Mine, British Columbia, Canada for metallurgical tests.

Three test programmes were run on 5 samples of split core, these samples comprising as follows :

Phase 1 Test Sample

No 1 Mineralised Quartz Breccia from DDC C-4 sent to Kimberley January 1980

Phase 2 Test Sample

No 2 Composite Sample Estimated at roughly 35% high grade massive sulphide rock from ENGINE SHAFT dump (Engine Zone mineralisation) and 65% WHITE ROCK No 2 SHAFT dump material sent to Kimberley November 1980. (Quartz Breccia type mineralisation).

Phase 3 Test Sample

No 3 A41 Mineralisation 11.4 kg sample representative sample from A-41 (1418 ft to 1441.75ft)

No 4 A-52, A-53 Mineralisation 9.0 kg sample
Composed of 8.8lbs from A-53
1844.4ft - 1859.9ft and 11.2lbs from A-52
1464.6ft - 1484.2ft each part of sample is representative of overall grade and textural variation in each intersection

No 5 Composite sample - 11.4kg sample
Representative of No 3 and No 4 mineralisation composite

Samples No 3 to 5 were sent to Kimberley August 1981

Testwork - Phase 1

In 1980 preliminary testwork was started on a sample of mineralised quartz breccia from borehole C4 below the White Rock zone. The sample, grading Cu 0.9%, Pb 7.0% and Zn 12.9%, is not considered to be representative of the other zones.

Results showed :

1 It was refractory requiring an 80 - 85% - 200 mesh grind for sulphide liberation.

2 Satisfactory flotation of sulphides from gangue.

3 Differential flotation showed that although concentrates could be made the recovery of each metal to its own concentrate was poor.

4 Precious metal recoveries were poor - 65% for silver and 53% for gold. It was suspected that the gold was associated with pyrite. Subsequently pyrite concentrates were made which reported 26% of the gold but cyanidation and roasting tests failed to recover this gold satisfactorily.

Testwork - Phase 2

A bulk sample, grading Cu 1%, Pb 4.4% and Zn 8.2%, was taken from surface dumps at the Engine and White Rock No 2 shaft. Again it is considered to be representative of only the White Rock zone mineralisation.

Testwork showed that 37% of the gold and 21% of the silver reported to the pyrite concentrate. Overall precious metal recoveries were slightly better than for Sample 1.

Testwork - Phase 3

Laboratory testing of three additional samples was commenced on 6 August 1981. These samples, taken from the drill cores, were an attempt to give representative samples of the mineralisation. No 3 sample was an 11.4kg sample from A41, No 4 sample was 9.0kg from A52 and A53, and the No 5 composite represented A41, A52 and A53.

The metallurgical testwork showed that the No 3 and Composite No 5 samples are highly refractory and flotation is characterised by poor Cu-Pb and Pb-Zn selectivity. However, overall base metal recoveries are good and zinc concentrate grades very good. Precious metal recoveries are poor with silver being somewhat better that gold.

The No 4 sample was too low in lead to give a lead concentrate but copper and zinc recoveries were good.

It must be stressed that these tests are very limited in their scope due to the use of only small amounts of split core. The testing of bulk samples is necessary for accurate tests of metal recoveries.

A more detailed breakdown of the limited test work is shown in the Appendix to this report.

4 CONCLUSIONS

The 1981 drilling programme at the north western end of the property has extended the zone of known significant Cu-Pb-Zn (Ag, Au) sulphide mineralisation within the Morfa Du "Engine Zone" to a depth of 1300ft below sea level.

It has also been shown that the quartz breccia hosted mineralisation occurs to at least 1300ft below sea level down plunge to the north of the Morfa Du "White Rock Zone".

The potential of the thin high grade polymetallic sulphide mineralisation of the "Chapel Zone", previously indicated in H-3 and A-43 has been decreased by the 1981 drilling.

The preliminary metallurgical testwork has indicated possible base and precious metal recoveries from the mineralised material, however the limited nature of the tests, based on small amounts of split drill core, does not allow for any realistic prediction of bulk behaviour.

LIST OF ATTACHMENTS

18	Surface Geology Plan	1" = 200'
20	Drill Section A47, A43, A49	1" = 100'
22	Drill Section A48, A51, A50	1" = 100'
24	Drill Section A52, A53	1" = 100'

Diamond Drill Log Key (legend)

Diamond Drill Logs A47 to A53

Submitted by : Richard Herrington

R J Herrington

pp R Herrington

I D McCartney

Approved by : B.B. Young

B B Young

PHASE I TEST
COMINCO LIMITED
SULLIVAN CONCENTRATOR

TD SECTION 257
PROGRESS REPORT NO 1

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

ABSTRACT:

In January 1980, a sample of copper, lead, zinc mineralisation from the Parys Mountain prospect was submitted by B B Young, Geologist, Cominco Europe, for preliminary flotation tests.

SUMMARY & CONCLUSIONS:

1] Head Assays

Ozs/T		Assays %			
Au	Ag	Cu	Pb	Zn	Fe
0.04	2.03	0.97	7.0	12.9	6.3

2] Parys Mountain mineralisation is very refractory requiring an extra find grind.

3] The procedure consisted of grinding the mineralisation without any reagents. Following the grind, sulphur dioxide gas was added to the pulp to lower the pH to 6.0 and the pulp conditioned for 5 minutes. The acid pH depressed both the lead and zinc minerals allowing flotation of the copper minerals with amyl xanthate and frother.

At the completion of the copper rougher float the pulp was made alkaline with lime and conditioned with zinc sulphate and sodium cyanide, which permitted the flotation of the lead minerals and depression of the zinc minerals. Following the lead rougher float copper sulphate was added and the zinc floated. Xanthate and frother were required for flotation of the lead and zinco minerals. All concentrates were reground prior to cleaning.

From the batch flotation test results the following predicted metallurgy was calculated:

		Oz/T		Assays %			
Product	%Wgt	Au	Ag	Cu	Pb	Zn	Fe
Copper Conc	3.28	0.21	12.0	21.0	12.5	10.5	22.0
Lead Conc	8.11	0.07	7.0	1.2	61.3	13.0	4.0
Zinc Conc	19.11	0.04	2.0	0.6	3.5	56.3	4.5
Tailing	69.50	0.026	0.99	0.10	1.37	1.01	6.3
Calculated Feed	100.00	0.039	2.0	0.97	7.0	12.9	6.3

/ . .

	DISTRIBUTION %					
	Au	Ag	Cu	Pb	Zn	Fe
Copper Conc	17.7	19.4	71.0	5.9	2.7	11.5
Lead Conc	14.6	27.9	10.0	71.0	8.2	5.1
Zinc Conc	20.5	18.8	11.9	9.6	83.6	13.6
Tailing	47.2	33.9	7.1	13.5	5.5	69.8
Calc Feed	100.0	100.0	100.0	100.0	100.0	100.0

The above metallurgy must be considered as very approximate. Locked cycle tests would have to be run to determine the probable mill metallurgy.

Recoveries for gold and silver are very low. These recoveries may be even lower in locked cycle tests. There are indications that the gold may be associated with the pyrite.

OBJECT:

To run selection flotation tests on a sample of Parys Mountain mineralisation.

DETAILS OF INVESTIGATION:

The sample of mineralisation was received on November 21, 1979, consisted of seven separate bags weighing in total 37.85 kilograms. The samples were taken from drill hole C.4 Morfa Du area.

SAMPLE DESCRIPTION		
SAMPLE NO	FOOTAGE IN HOLE	WEIGHT OF SAMPLE IN KILOGRAMS
10601	426' - 436'	4.02
10602	436' - 445' 9"	5.02
10603	493' - 507'	5.80
10604	507' - 520' 9"	6.59
10605	445' 9" - 464'	5.84
10606	464' - 474'	4.29
10607	474' - 484'	6.29

Sample Description

The samples were stage crushed to minus 10 mesh, riffled in half, with one half being saved as a reserve. The second half was combined, a head sample riffled out and the remainder riffled into nine equal portions of 2 kilograms each. All samples were stored in a deep freeze until required for testing.

Head Assays

Oz/T		Assay %			
Au	Ag	Cu	Pb	Zn	Fe
0.04	2.03	0.97	7.0	12.9	6.3

TD SECTION 257
PROGRESS REPORT NO 1

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Testing Procedure

The primary grind was done in a 12 x 16 inch laboratory rod mill using a rod charge of 12 kilograms, the rods varying in size from 5/8 to 1 inch.

The regrind was done in a 12 x 15 inch laboratory ball mill using a ball charge of 4 kilograms, the balls varied in size from ½ to 1 inch. A Galigher Agitair flotation machine was used for flotation, a 2000 gram cell for roughing and a 500 gram cell for cleaning.

Test Series 1: Combined copper-lead rougher float

In this series of two tests a combined copper-lead flotation was made at an alkaline pH, the copper-lead rougher concentrate was cleaned and recleaned, a copper-lead separation was made employing potassium dichromate and sulphur dioxide gas to depress the lead.

Test 1: Preliminary test, grind on zinc rougher tailing 54.1% minus 200 mesh.

		Assay %				Distribution %			
Product	%Wgt	Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
Cu Conc	2.80	15.6	21.3	16.4	14.7	45.1	8.0	3.4	6.9
Pb Conc	5.84	0.82	60.1	9.6	5.6	5.0	46.9	4.1	5.5
Cu-Pb reclnr tlg	2.85	2.6	28.4	22.0	10.6	7.6	10.8	4.6	5.1
Cu-Pb clnr tlg	2.70	1.3	1.53	26.6	10.5	3.6	5.5	5.3	4.7
Zn reclnr conc	10.79	0.86	2.1	55.8	3.8	9.6	3.0	44.5	6.8
Zn reclnr tlg	0.50	1.2	5.1	28.2	11.3	0.6	0.3	1.1	0.9
Zn clnr tlg	8.59	1.3	5.3	34.6	9.0	11.5	6.1	21.9	12.9
Zn rghr tlg	65.93	0.25	2.2	3.1	5.2	17.0	19.4	15.1	57.1
Calc Feed	100.00	0.97	7.5	13.5	6.0	100.0	100.0	100.0	100.0

Assay Sizing-Analysis of Zn Rougher Tailing

		Assay %			Distribution %		
Mesh Size	%Wgt	Pb	Zn	Fe	Pb	Zn	Fe
+100	12.67	2.5	5.6	3.6	15.6	23.8	8.5
-100 +150	23.98	3.4	5.6	5.6	40.1	45.1	25.1
-150 +200	19.23	2.0	2.2	4.3	18.9	14.2	15.5
-200 +325	12.63	1.1	1.0	4.3	6.8	4.2	10.2
-325	31.49	1.2	1.2	6.9	18.6	12.7	40.7
Total	100.00	2.0	3.0	5.3	100.0	100.0	100.0

This screen analysis shows that the major losses of lead and zinc are in the coarse sizes which indicates that finer grinding should lower the losses.

TD SECTION 257
PROGRESS REPORT NO 1

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Reagents, lbs/ton

	COPPER LEAD						ZINC				
	Grind	Cond	Rghr	Cln	Recl	Sep	Cond	Rghr	Cln	Recl	Total
$ZnSO_4$ H_2O	1.0										1.0
NaCN	0.1										0.1
CaO	0.5			0.1	0.1		1.5		0.15	0.15	2.5
Amyl xanthate		0.035									0.035
M.I.B.C.			0.018	0.005		0.005					0.028
$K_2Cr_2O_7$						1.0					1.0
$CuSO_4$							1.0				1.0
Isop xanthate							0.085				0.085
D.F. 1012								0.017			0.017
SO_2						0.5					0.5
pH's		7.5	7.5	10.7	11.2	6.0	10.2	10.2	11.0	11.0	
Times (Mins)	28	5	20	8	5	10	2	15	6	6	

The Cu-Pb separation was run at a temperature of 45°C.

Test 2: Finer grind, grind on zinc rougher tailing 83.7% minus 200 mesh

		ASSAY %				Oz/T	
Product	%Wgt	Cu	Pb	Zn	Fe	Au	Ag
Cu cl conc	3.07	14.7	14.3	21.7	16.1	0.21	11.99
Cu cl tlg	1.73	7.2	21.6	28.3	10.5	0.14	8.28
Pb conc	7.62	0.51	54.9	9.3	8.9	0.07	6.63
Cu-Pb recl tlg	4.30	1.7	17.8	25.7	13.3	0.09	4.47
Cu-Pb clnr tlg	3.91	0.99	9.9	30.1	10.8	0.07	3.23
Zn reclnr conc	14.00	0.59	2.1	55.1	4.5	0.03	1.81
Zn reclnr tlg	1.44	0.74	5.2	19.4	15.0	0.08	2.72
Zn clnr tlg	5.44	0.53	4.0	15.8	15.6	0.08	2.37
Zn rghr tlg	58.49	0.076	0.79	0.54	4.3	0.017	0.48
Calculated Feed	100.00	0.89		13.3	6.6	0.039	2.04

	Distribution %					
	Cu	Pb	Zn	Fe	Au	Ag
Cu cl conc	50.4	6.1	5.0	7.5	15.4	18.1
Cu cl tlg	14.0	5.2	3.7	2.8	5.1	7.0
Pb conc	4.4	58.1	5.3	10.3	12.8	24.9
Cu-Pb recl tlg	8.2	10.6	8.3	8.8	10.3	9.4
Cu-Pb clnr tlg	4.4	5.4	8.8	6.4	7.7	6.2
Zn reclnr conc	9.3	4.1	57.9	9.6	10.3	12.4
Zn reclnr tlg	1.2	1.1	2.1	3.3	2.6	1.9
Zn clnr tlg	3.2	3.0	6.5	12.9	10.3	6.3
Zn rghr tlg	4.9	6.4	2.4	38.4	25.6	13.8
Calculated Feed	100.0	100.0	100.0	100.0	100.0	100.0

TD SECTION 257
PROGRESS REPORT NO 1

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Assay Sizing-Analysis of Zinc Rougher Tailing

Mesh Size	%Wgt	ASSAY %				DISTRIBUTION %			
		Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
+150	1.86	0.096	0.70	0.84	3.3	2.4	1.6	3.0	1.4
-150 +200	14.42	0.056	0.70	0.61	2.8	9.6	12.7	16.7	9.6
-200 +325	25.84	0.036	0.51	0.43	3.0	10.9	16.6	21.0	18.6
-325	57.88	0.110	0.95	0.54	5.1	77.1	69.1	59.3	70.4
TOTAL	100.00	0.08	0.80	0.53	4.2	100.0	100.0	100.0	100.0

Reagents, lbs/ton

	COPPER-LEAD					SEPARATION		ZINC				
	Grind	Cond	Rghr	Clnr	Reclnr	Rghr	Clr	Cond	Rghr	Clr	Recl	TOTAL
$ZnSO_4.H_2O$	1.0											1.0
NaCN	0.1											0.1
CaO	0.5			0.1	0.1			1.5		0.15	0.15	2.5
Amyl-xanthate		0.05	0.15									0.065
M.I.B.C.			0.018	0.005		0.005						0.028
$K_2Cr_2O_7$						1.0						1.0
$CuSO_4$								1.0				1.0
Isop-xanthate								0.125				0.125
D.F. 1012									0.01			0.01
SO_2						0.5	0.3					0.08
pH's		7.7	7.6	10.9	11.0	5.9	5.8	10.8	10.8	11.0	11.2	
Time (mins)	50	5	20	8	6	6	5	2	15	6	5	

The Cu-Pb separation was run at a temperature of 45°C.
The finer grind has improved the recoveries of the lead and zinc.

Test Series 2: Separate copper and lead rougher floats.

In this series of four tests a separate copper float was made at an acid pH, using sulphur dioxide to depress the lead. The copper lead and zinc rougher concentrates were reground before cleaning.

TD SECTION 257
PROGRESS REPORT NO 1

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Test 1: Grind on zinc rougher tailing 91.0% minus 200 mesh

		ASSAY %				DISTRIBUTION %			
Product	%Wgt	Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
Cu clnr conc	2.13	21.3	12.4	10.6	21.8	51.3	3.5	1.7	6.8
Cu cln tlg	2.67	6.2	12.4	16.9	21.0	18.8	4.4	3.5	8.2
Pb reclnr conc	7.04	1.2	61.3	12.8	4.2	9.5	57.2	6.9	4.3
Pb reclnr tlg	2.53	0.98	21.7	30.4	11.8	2.8	7.3	5.9	4.4
Ob clnr tlg	4.51	0.50	19.9	19.1	20.6	2.6	11.9	6.6	13.6
Zn reclnr conc	11.64	0.55	3.5	56.5	4.5	7.2	5.4	50.2	7.7
Zn reclnr tlg	2.58	0.40	4.6	34.7	15.5	1.1	1.5	6.8	5.9
Zn clnr tlg	6.94	0.29	2.5	21.7	18.8	2.3	2.3	11.5	19.2
Zn rghr tlg	59.96	0.065	0.82	1.5	3.4	4.4	6.5	6.9	29.9
Calculated Feed	100.00	0.89	7.5	13.1	6.8	100.0	100.0	100.0	100.0

Sizing-Analysis of Zinc Rougher Tailing

Mesh Size	+200	-200 +325	-325
% Wgt.	9.0	25.6	65.4

Reagents, lbs/ton

		COPPER			LEAD				ZINC				
	Grind	Cond	Rghr	Clnr	Cond	Rghr	Clnr	Recl	Cond	Rghr	Cl	Recl	TOTAL
SO_2		3.4		0.3									3.7
$ZnSO_4$ H_2O					1.0		0.1	0.1					1.2
$NaCN^4$					0.1		0.01	0.01					0.12
CaO					2.0		0.3	0.2					9.15
Amyl-xanthate			0.04	0.01	0.025	0.02	0.02		6.3		0.2	0.15	0.105
M.I.B.C.			0.027	0.018		0.009	0.009						0.063
$CuSO_4$									1.0		0.1		1.1
Isop-xanthate									0.1				0.1
D.F. 1012										0.01	0.003		0.013
pH's		6.0	6.0	5.0	5.9	5.9	10.5	11.0	10.1	10.1	10.8	11.4	
Times (mins)	60	5	15	10	5	15		8	2	15		9	

Regrind

The total copper rougher concentrate was reground for 12 minutes, the plus 400 mesh fraction of the lead rougher concentrate for 15 minutes and the plus 400 mesh fraction of the zinc rougher concentrate for 24 minutes.

The zinc rougher tailings are high in this test as insufficient xanthate was used.

Test 2:

In this test amyl xanthate was increased to the copper rougher float and extra isopropyl xanthate was stage added to the zinc rougher float.

		ASSAY %				DISTRIBUTION %			
Product	%Wgt	Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
Cu clnr conc	4.33	14.0	25.8	10.0	18.9	64.0	15.3	3.3	12.1
Cu clnr tlg	4.37	2.4	31.2	17.6	14.1	11.1	18.7	5.8	9.1
Pb reclnr conc	5.07	0.93	55.1	15.6	5.0	5.0	38.4	6.0	3.8
Pb reclnr tlg	2.49	1.2	20.9	33.8	9.7	3.2	7.1	6.4	3.6
Pb clnr tlg	3.53	0.76	9.8	23.8	17.3	2.8	4.7	6.3	9.0
Zn reclnr conc	11.44	0.60	2.8	58.5	3.3	7.3	4.4	50.7	5.6
Zn reclnr tlg	2.39	0.52	8.9	34.1	12.3	1.3	2.9	6.2	4.4
Zn clnr tlg	9.15	0.31	3.2	20.2	15.5	2.9	4.0	14.0	21.0
Zn rghr tlg	57.23	0.04	0.57	0.31	3.7	2.4	4.5	1.3	31.4
Calculated Feed	100.00	0.95	7.3	13.2	6.7	100.0	100.0	100.0	100.00

Reagents, lbs/ton

		COPPER			LEAD				ZINC				
	Grind	Cond	Rghr	Clnr	Cond	Rghr	Clnr	Recl	Cond	Rghr	Clnr	Recl	TOTAL
SO_2		2.3		0.1									2.4
$ZnSO_4$ H_2O					1.0		0.1	0.1					1.2
$NaCN^4$					0.1		0.01	0.01					0.12
CaO					2.0		0.25	0.15	3.4		0.3	0.3	6.4
Amyl-							0.009						
xanthate		0.04	0.02	0.015	0.025	0.01							0.135
M.I.B.C.			0.027	0.009		0.018							0.063
$CuSO_4$									1.0		0.2		1.2
Isop-													0.145
xanthate									0.075	0.06	0.01		0.01
D.F. 1012										0.01			
pH's		6.0	6.3	5.2	6.3	5.5	10.5	10.9	10.3	10.2	10.8	11.2	
Times (mins)	60	5	15	10	5	15	10	8	2	15	10	8	

Regrind was similar to test number one above.

The increase in xanthate to the copper float has resulted in an unacceptable amount of lead floating with the copper. The stage addition of extra xanthate to the zinc rougher has lowered the zinc in the zinc rougher tailing from 1.5% to 0.31%.

Test 3:

The xanthate was reduced to the copper float and amyl xanthate replaced isopropyl xanthate to the zinc float.

		ASSAY %				Oz/T	
Product	%Wgt	Cu	Pb	Zn	Fe	Au	Ag
Cu cl conc	2.72	17.3	24.4	12.0	16.5	0.14	14.65
Cu cl tlg	3.22	5.8	33.9	15.9	12.4	0.11	8.50
Pb recl conc	7.28	1.03	52.0	16.2	6.5	0.10	6.46
Pb recl tlg	2.08	1.14	20.3	31.2	11.2	0.08	4.33
Pb cl tlg	3.17	0.75	8.8	24.9	15.4	0.06	2.96
Zn recl conc	12.98	0.64	2.8	58.0	3.3	0.03	2.04
Zn recl tlg	2.18	0.56	5.8	33.3	11.5	0.07	2.62
Zn cl tlg	6.44	0.31	3.2	17.3	13.4	0.06	1.72
Zn rghr tlg	59.93	0.05	0.66	0.29	5.5	0.023	0.43
Calculated Feed	100.00	0.93	7.3	13.0	6.9	0.043	2.02

	DISTRIBUTION %					
Product	Cu	Pb	Zn	Fe	Au	Ag
Cu cl conc	50.9	9.1	2.5	6.5	9.3	19.7
Cu cl tlg	20.2	14.9	3.9	5.8	9.3	13.6
Pb recl conc	8.1	52.6	9.1	6.9	16.3	23.3
Pb recl tlg	2.6	5.8	5.0	3.4	4.6	4.5
Pb cl tlg	2.6	3.8	6.1	7.1	4.6	4.7
Zn recl conc	8.9	4.9	57.9	6.2	9.3	13.1
Zn recl tlg	1.3	1.7	5.6	3.7	4.7	2.8
Zn cl tlg	2.2	2.8	8.6	12.5	9.3	5.5
Zn rghr tlg	1.3	5.4	1.3	47.9	32.6	12.8
Calculated Fed	100.0	100.0	100.0	100.0	100.0	100.0

TD SECTION 257
PROGRESS REPORT NO 1

PARYS MOUNTAIN MINERALISATON
WALES, GREAT BRITAIN

Reagents, lbs/ton

		COPPER			LEAD				ZINC				
	Grind	Cond	Rghr	Clnr	Cond	Rghr	Clnr	Recl	Cond	Rghr	Clnr	Recl	TOTAL
SO_2		2.3		0.1									2.4
$ZNSO_4$ H_2O					1.0		0.1	0.1					1.2
$NaCN^4$					0.1		0.01	0.01					0.12
CaO					2.2		0.25	0.15	1.3		0.3	0.2	4.4
Amyl xanthate			0.04	0.015	0.035	0.01	0.025		0.075	0.02	0.015		0.235
N.I.B.C.			0.027	0.018		0.018	0.009						0.072
$CuSO_4$									1.0		0.2		1.2
D.F.^{4}1012										0.014	0.003		0.017
pH's		6.0	6.0	5.0	7.3	7.3	10.8	11.0	10.4	10.4	11.0	11.4	
Times (mins)	60		15	10	5	15	12	8	2	15	10	9	

Regrind as in test number one. The addition of xanthate to the copper rougher float instead of the copper conditioner has improved the copper to lead ratio in the copper float. Replacing the isopropyl xanthate with amyl xanthate to the zinc does not appear to be detrimental to the zinc metallurgy.

Test 4:

Increase the sulphur dioxide to the copper conditioner to maintain a pH of 6.0 during conditioning.

		ASSAY %				DISTRIBUTION %			
Product	%Wgt	Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
Cu cl conc	1.97	22.2	11.8	12.8	19.3	45.9	3.2	2.0	6.2
Cu cl tlg	2.80	8.3	18.2	24.7	12.6	24.4	7.0	5.4	5.7
Pb recl conc	6.83	0.62	62.5	11.6	4.6	7.1	58.5	6.2	5.1
Pb recl tlg	2.06	1.1	29.0	26.7	9.4	2.4	8.2	4.3	3.1
Pb cl tlg	2.50	1.0	13.0	29.1	11.7	2.6	4.4	5.7	4.7
Zn recl conc	14.05	0.78	3.9	56.4	3.0	11.6	7.5	61.8	6.8
Zn recl tlg	2.60	0.46	7.5	13.4	14.2	1.3	2.7	2.6	6.0
Zn cl tlg	8.64	0.28	3.7	15.6	15.4	2.5	4.4	10.5	21.6
Zn rghr tlg	58.55	0.036	0.51	0.33	4.3	2.2	4.1	1.5	40.8
Calculated Feed	100.00	0.95	7.3	12.8	6.2	100.0	100.0	100.0	100.0

TD SECTION 257
PROGRESS REPORT NO 1

PARYS MOUNTAIN MINERALISATON
WALES, GREAT BRITAIN

		COPPER			LEAD				ZINC				
	Grind	Cond	Rghr	Clnr	Cond	Rghr	Clnr	Recl	Cond	Rghr	Clnr	Recl	TOTAL
SO_2		2.6											2.9
$ZnSO_4$ H_2O				0.3	1.0		0.1	0.1					1.2
$NaCN^4$					0.1		0.001	0.01					0.12
CaO					3.0		0.15	0.15	1.5		0.4	0.2	5.4
Amyl-xanthate			0.025	0.01	0.035		0.025		0.075	0.045	0.025		0.24
M.I.B.C.			0.027	0.018		0.018	0.009						0.072
$CuSO_4$									1.0		0.3		1.3
D.F.^{1012}										0.014			0.014
pH's		6.0	6.0	5.5	7.3	7.3	10.3	10.9	10.5	10.5	10.9	11.3	

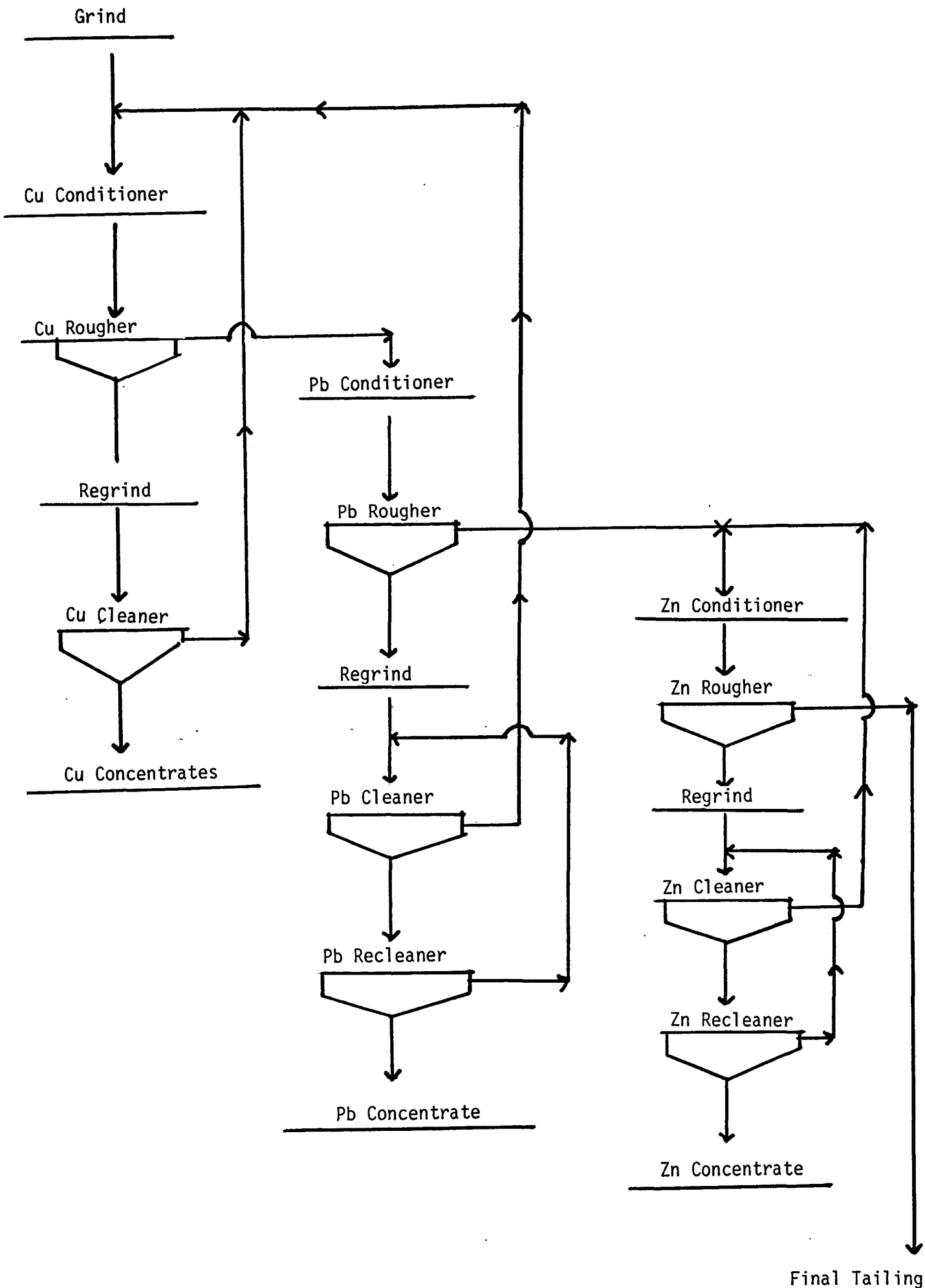
The increased sulphur dioxide to the copper conditioner with a lower xanthate addition has resulted in a better copper to lead selectivity and improved metallurgy.

Possible Mill Metallurgy

		ASSAY %				Oz/T	
Product	%Wgt	Cu	Pb	Zn	Fe	Au	Ag
Cu conc	3.28	21.0	12.5	10.5	22.0	0.21	12.0
Pb conc	8.11	1.2	61.3	13.0	4.0	0.07	7.0
Zn conc	19.11	0.6	3.5	56.5	4.5	0.04	2.0
Tailing	69.50	0.10	1.37	1.01	6.3	0.026	0.99
Calculated Feed	100.00	0.97	7.0	12.9	6.3	0.039	2.0
		DISTRIBUTION %					
		Cu	Pb	Zn	Fe	Au	Ag
Cu conc		71.0	5.9	2.7	11.5	17.7	19.4
Pb conc		10.0	71.0	8.2	5.1	14.6	27.9
Zn conc		11.9	9.6	83.6	13.6	20.5	18.8
Tailing		7.1	13.5	5.5	69.8	47.2	33.9
Calculated Feed		100.0	100.0	100.0	100.0	100.0	100.0

/ . .

PROPOSED PARYS MOUNTAIN FLOWSHEET



TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

ABSTRACT:

In previous testwork reported n February 8, 1980, significantly high losses of Au and Ag values were noted in the zinc rougher tailing. It was reported that the gold may possibly be associated with the pyrite fraction of the tailing. Subsequently testwork was undertaken in an effort to concentrate the precious metals in a pyrite concentrate and determine the amenability of the contained gold and silver to extraction by cyanidation.

SUMMARY AND CONCLUSIONS

1] The recovery of Au and Ag to the pyrite concentrate was good, as shown in the following table:

	Product	% Wgt	ASSAY Oz/T Au	ASSAY Oz/T Ag	Distribution % Au	Distribution % Ag
Cu	Rghr Conc.	6.23	0.20	11.2	32.0	34.7
Pb	Rghr Conc.	13.92	0.06	5.2	21.5	36.0
Zn	Rghr Conc.	19.46	0.033	1.9	16.4	18.4
Fe	Rghr Conc.	10.34	0.10	1.7	26.3	8.7
Tailing		50.05	0.039	0.09	3.8	2.2
Feed		100.00	0.039	2.01	100.0	100.0

2] The recovery of Au and Ag from the pyrite concentrate was negligable by direct cyanidation of the concentrate.

3] The recovery of Au and Ag was not improved by roasting of the pyrite concentrate prior to cyanidation.

It is recommended that detailed investigations be undertaken of methods to extract the Au and Ag values from the pryite concentrate.

OBJECT:

To determine if the gold and silver in the zinc rougher tailing of Parys Mountain mineralisation can be recovered by flotation of pyrite followed by cyanidation of the pyrite concentrate.

DETAILS OF INVESTIGATION:

The sample of mineralisation tested was taken from drill hole C4 Morfa Du Area and was described in TD Section 257, Progress Report No 1 issued on February 8, 1980.

Head Assays	Oz/T Au	Oz/T Ag	Assays % Cu	Assays % Pb	Assays % Zn	Assays % Fe
	0.04	2.03	0.97	7.0	12.9	6.3

TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

TESTING PROCEDURE

The primary grind was done in a 12 x 16 inch laboratory rod mill using a rod charge of 12 kilograms, the rods varying in size from 5/8 to 1 inch. A 2000 gram Galigher Agitair flotation cell was used for flotation. In tests 1 and 2, 2 kilograms of feed was used, in test 3, 3.16 kilograms of feed was used.

The cyanidation tests were run using the laboratory mechanical tumbler with 2 quart glass sealers.

Test 1

1] Distribution of Gold and Silver

		Assay Oz/Ton		Distribution %	
	% Wgt	Au	Ag	Au	Ag
Combined Cu, Pb, Zn, Rghr Conc.	38.91	0.068	4.28	66.5	82.0
Fe Conc.	9.01	0.11	2.50	24.8	11.1
Tailing	52.08	0.006	0.27	8.7	6.9
Calculated Feed	100.00	0.04	2.03	100.0	100.0

2] Distribution of Iron Flotation

		Assay %			Oz/Ton		DISTRIBUTION %				
Product	% Wgt	Pb	Zn	Fe	Au	Ag	Pb	Zn	Fe	Au	Ag
Fe Conc	14.75	3.7	2.3	26.2	0.11	2.5	68.9	70.0	71.6	76.1	61.6
Fe Tailing	85.25	0.29	0.17	1.8	0.006	0.27	31.1	30.0	28.4	23.9	38.4
Zn Rghr Tailing	100.00	0.79	0.48	5.4	0.021	0.60	100.00	100.00	100.0	100.0	100.0

Reagent Consumption lbs/ton

SO_2 2.5; $ZnSO_4$ 1.0; NaCn 0.1; CaO 3.7; Amyl xanthate 0.3; M.I.B.C. 0.045; $CuSO_4$ 1.0; Dowfroth 1012 0.017; Aero Promote 404 0.75.

	GRIND	Cu Rghr	Pb Rghr	Zn Rghr	Fe Rghr
Retention time (Minutes)	60	15	18	18	18
pH's	7.3	6.2	7.0	10.5	6.5

TD SECTION 257
PROGRESS SECTION NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Sizing Analysis of Zinc Rougher Tailing

Mesh Size	+200	-200 +325	-325
% Wgt	9.0	25.6	65.4

Cyanidation of Iron Concentrate

A sample of iron concentrate of 133 grams was bulked with 266 grams of water. Total NaCn and CaO additions were 6.0 and 5.8 lbs/ton, retention time was 24 hours. Total of 237 c.c. of solution was recovered for assay.

Cyanidation Assays

	Au	Ag	
Cyanidation Solution	0.025	0.135	MGMS/Sample
Cyanidation Tailing	0.117	2.5	Oz/Ton

1] Distribution of Gold and Silver

Product	% Wgt	ASSAY % Au	ASSAY % Ag	Distribution % Au	Distribution % Ag
Combined Cu, Pb, Zn, Rghr Conc.	39.00	0.071	4.53	69.5	87.1
Fe Conc.	8.81	0.12	2.2	26.5	9.6
Tailing	52.19	0.003	0.13	4.0	3.3
Calculated Feed	100.00	0.04	2.03	100.0	100.0

2] Distribution of Iron Flotation

Product	% Wgt	ASSAY % Pb	ASSAY % Zn	ASSAY % Fe	Oz/Ton Au	Oz/Ton Ag	DISTRIBUTION % Pb	DISTRIBUTION % Zn	DISTRIBUTION % Fe	DISTRIBUTION % Au	DISTRIBUTION % Ag
Fe Conc.	14.44	2.7	2.5	24.1	0.12	2.2	61.1	72.5	64.9	87.1	74.1
Fe Tailing	85.56	0.29	0.16	2.2	0.003	0.13	38.9	27.5	35.1	12.9	25.9
Zn Rghr Tailing	100.00	0.64	0.50	5.4	0.02	0.43	100.0	100.0	100.0	100.0	100.0

Reageant Consumption lbs/ton

SO_2 2.5; $ZnSO_4$ 1.0; NaCn 0.1; CaO 4.3; Amyl xanthate 0.46; M.I.B.C. 0.045; $CuSO_4$ 1.0; Dowfroth 1012 0.034; Aerofloat 25 Promotion 0.06.

	GRIND	Cu Rghr	Pb Rghr	Zn Rghr	Fe Rghr
Retention Time (Mins)	94	15	15	18	15
pH's	7.3	6.0	6.7	10.3	5.8

Cyanidation of Iron Concentrate

A sample of iron concentrate weighing 125 grams was roasted at approximately 800°C for one hour, the sample was robbled every 10 minutes. The sample was given a wash with 4 litres of water, pH of wash solution was 6.8. The weight of the roasted sample was 116 grams, it was bulked with 232 grams of water, total NaCN and CaO additions were 8.0 and 4.0 lbs/ton, retention time was 48 hours. A total of 194 c.c. of solution was recovered for assay. The sample of roasted iron concentrate was mulled through 200 mesh prior to cyanidation.

Roasting of the iron concentrate caused a problem in assay procedure giving inconclusive results.

Test 3

Distribution of Gold and Silver

		Assay Oz/T		Distribution %	
Product	% Wgt	Au	Ag	Au	Ag
Cu Rghr Conc.	6.23	0.20	11.2	32.0	34.7
Pb Rghr Conc.	13.92	0.06	5.2	21.5	36.0
Zn Rghr Conc.	19.46	0.033	1.9	16.4	18.4
Fe Rghr Conc.	10.34	0.10	1.7	26.3	8.7
Fe Tailing	50.05	0.003	0.09	3.8	2.2
Calculated Feed	100.00	0.039	2.01	100.0	100.0
Calculated Zn Rghr Tailing	60.39	0.02	0.37	30.1	10.9

Reagent Consumption, lbs/ton

SO_2 4.5; $ZnSO_4$ 1.0; CaO 4.68; Amyl xanthate 0.39; M.I.B.C. 0.023; $CuSO_4$ 1.0; Dowfroth 1012 0.015; Aerofloat 25 promoter 0.04.

	GRIND	Cu Rghr	Pb Rghr	Zn Rghr	Fe Rghr
Retention Times (Minutes)	94	15	18	18	18
pH's	7.3	6.2	6.6	10.3	5.8

Cyanidation of Iron Concentrate

A sample of iron concentrate weighing 233 grams was prepared for cyanidation using the same procedure as described in test number 2. The weight of roasted sample was 193 grams and was bulked with 386 grams of water, total NaCN and CaO additions were 6.0 and 5.0 lbs/ton, retention time was 48 hours. A sample of 290 c.c. of solution was used for assay.

Cyanidation Assays

	Au	Ag	
Cyanidation Solution	0.03	1.12	Mgs/sample
Cyanidation Tailing	0.11	0.82	Oz/Ton

PHASE II TEST
COMINCO LIMITED
SULLIVAN CONCENTRATOR - KIMBERLEY B.C.

TD SECTION 257
PROGRESS REPORT NO 3

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

ABSTRACT:

On November 13, 1980, a sample of mineralisation was received at the Sullivan Concentrator, identified as "Parys Mountain Bulk Sample".

The weight of the sample was 372 kilograms. Composite head analysis of the sample was:

% Cu	% Pb	% Zn	% Fe	Oz/Ton Au	Oz/Ton Ag
0.99	4.35	8.20	0.02	0.02	3.67

It was proposed in conjunction with B B Young, Cominco Europe Exploration, Brussels, to produce, by means of repeated batch tests, approximately 20 kg of the pyrite concentrates for metallurgical testing at the Trail Mineral Treatment Research Centre. Testwork was completed by March 9, 1981, and approximately 17.5 kgs of pyrite concentrates were shipped to Trail.

SUMMARY AND CONCLUSIONS

The overall metallurgical distribution of products from the batch test was:

Product	Wgt (Gms)	Wgt %	Assay % Cu	Pb	Zn	Fe	Distribution % Au	Ag
Feed	87,000	100.00	0.99	4.35	8.20	11.36	0.02	3.67
Cu conc.	5,307	6.1	8.8	5.0	6.5	29.6	0.27	14.8
Pb conc.	6,177	7.1	3.0	31.4	13.7	13.9	0.04	17.8
Zn conc.	11,745	13.5	1.2	4.1	46.6	6.9	0.02	4.2
Fe conc.	17,574	20.2	0.28	4.7	2.2	29.4	0.04	3.8
Tailing	46,197	53.1	0.04	0.59	0.18	3.2	0.007	0.31

	DISTRIBUTION % Cu	Pb	Zn	Fe	Au	Ag
Feed	100.0	100.0	100.0	100.0	100.0	100.0
Cu conc.	54.3	7.0	4.8	15.9	19.9	24.6
Pb conc.	21.5	51.3	11.9	8.7	13.0	34.5
Zn conc.	16.4	12.7	76.7	8.2	12.5	15.5
Fe conc.	5.7	21.8	5.4	52.3	37.5	20.9
Tailing	2.1	7.2	1.2	14.9	17.1	4.5

The copper, lead and zinc concentrates were packaged in plastic, and stored in the laboratory freezer for future consideration.

TD SECTION 257
PROGRESS REPORT NO 3

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

On request from B B Young, concentrates from previous testwork (Progress Report No 2 - September 8, 1980) were assayed to determine a comparable metallurgical balance.

		ASSAYS %				Oz/Ton	
Product	%Wgt	Cu	Pb	Zn	Fe	Au	Ag
Feed	100.00	0.95	7.4	13.2	6.5	0.039	2.01
Cu conc.	6.23	11.2	17.4	13.9	19.4	0.20	11.2
Pb conc.	13.92	0.98	38.9	19.8	8.2	0.06	5.2
Zn conc.	19.46	0.44	2.6	47.8	5.1	0.033	1.9
Fe conc.	10.34	0.17	2.2	2.4	21.0	0.10	1.7
Tailing	50.05	0.016	0.15	0.15	1.9	0.003	0.09
		Distribution %					
		Cu	Pb	Zn	Fe	Au	Ag
Feed		100.0	100.0	100.0	100.0	100.0	100.0
Cu conc.		73.8	14.7	6.5	18.7	32.0	34.7
Pb conc.		14.4	73.5	20.8	17.6	21.5	36.0
Zn conc.		9.1	6.9	70.2	15.3	16.4	18.4
Fe conc.		1.9	3.1	1.9	33.6	26.3	8.7
Tailing		0.8	1.8	0.6	14.8	3.8	2.2

A significantly lower analysis for Au in the bulk sample was noted.

OBJECT

To obtain 15 to 20 kilograms of iron concentrates from a sample of Parys Mountain mineralisation.

SUMMARY

Approximately 17.5 kilograms of dry iron concentrates were accumulated which assayed:

%				Oz/T	
Cu	Pb	Zn	Fe	Au	Ag
0.28	4.7	2.2	29.4	0.04	3.8

DETAILS:

All 29 samples were ground and floated under the same conditions. After grinding a 3,000 gram sample for 90 minutes in an open ended Cominco design rod mill, all conditioning and flotation was done in a standard Agitair laboratory machine using a 2,000 gram cell with an agitator speed of 1,950 rpm.

For copper conditioning the pH was lowered to 6.0 using SO_2 as a regulator, 0.033 lbs/ton amyl xanthate and 0.018 lbs/ton M.I.B.C. were added and conditioned for five minutes. The 15 minute copper rougher float used an additional 0.013 lb/ton amyl xanthate and 0.006 lbs/ton M.I.B.C.

Lime was used to adjust the pH to 6.8 for lead conditioning. The following reagents were added and conditioned for five minutes.

amyl xanthate	0.033	lbs/ton
sodium cyanide	0.10	lbs/ton
zinc sulphate	0.66	lbs/ton
M.I.B.C.	0.018	lbs/ton

Lead roughing was completed in 15 minutes using 0.017 lbs/ton amyl xanthate, 0.012 lbs/ton M.I.B.C.

Lime was again used to bring the pH of the pulp to 10.5. The following reagents were conditioned for five minutes.

amyl xanthate	0.05	lbs/ton
copper sulphate	1.0	lbs/ton
Dowfroth 1012	0.01	lbs/ton

Zinc roughing required an additional 0.027 lbs/ton amyl xanthate and 0.005 lbs/ton Dowfroth 1012. Flotation time was 15 minutes.

Sulphuric acid was used to lower the pH to 6.0 for iron conditioning, 0.20 lbs/ton amyl xanthate and 0.044 lbs/ton Aerofloat 25 were then conditioned for five minutes. Iron roughing time as 15 minutes using 0.10 lbs/ton amyl xanthate, 0.029 lbs.ton Aerofloat 25 and 0.007 lbs/ton Dowfroth 1012.

To obtain head assay samples of the accumulated concentrates each flotation concentrate filter press cake was core sampled and composite samples made. The bulk concentrates were stored in a deep freeze.

Results of the 29 tests are summarized in the following table. Dry product weight was obtained assuming a 10% moisture content.

PHASE III TEST
COMINCO LIMITED
SULLIVAN CONCENTRATOR

EXTRACTS FROM
TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

ABSTRACT:

On August 6, 1981, three samples of Parys Mountain mineralisation were received, labelled as:

N° 3 Type 1	(11.4 kg)
N° 4 Type 2	(9.0 kg)
N° 5 Composite	(11.4 kg)

Samples assayed as follows:

	Oz/T		ASSAYS %			
	Au	Ag	Cu	Pb	Zn	Fe
Type 1	0.067	3.8	2.0	4.6	9.0	5.9
Type 2	0.02	0.56	3.3	0.6	3.8	20.3
Composite	0.027	2.0	2.1	3.7	.78	9.8

Investigative open circuit lab flotation tests were conducted on all three samples, to produce Cu, Pb and Zn concentrates at optimum grades and recoveries, and to observe the disposition of Au and Ag. Additional techniques employed included multi-stage Cu-Pb separation, both on Cu concentrates and on Cu-Pb bulk concentrates, and dezincing of lead concentrates.

SUMMARY:

Samples 3 and 5 are highly refractory and flotation is characterized by poor Cu-Pb and Pb-Zn selectivity. Overall base metal recoveries, however, are good and zinc concentrate grades are very good. Gold recovery is poor in both samples but silver recovery is somewhat better. Best overall results were achieved by performing a Cu-Pb separation (5 or more stages) on a Cu-Pb bulk concentrate. Best concentrate grades were: 21% Cu in Cu con; 42% Pb in Pb conc; and 58% Zn in Zn conc. Combined recoveries were +90% with 60% individual recoveries. Type 2 mineralisation yielded a 27% Cu conc; and a 52% Zn conc; but feed Pb was too low to yield a concentrate. Cu and Zn combined recoveries were +90%.

All samples benefited from regrinding the +400 mesh fractions of rougher concentrates. Both NaCN and Zn SO_4 proved beneficial in improving selectivity. It should be noted that deemed metallurgy cannot be reliably predicted on the basis of these data. Further testwork should be performed to improve Cu-Pb and Pb-Zn selectivity, followed by locked cycle tests on representative samples.

EXTRACTS FROM
TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

OBJECT:

To run selective flotation tests on samples of Parys Mountain mineralisation.

DETAILS OF INVESTIGATION:

Three samples of Parys Mountain mineralisation were received on August 6, 1981, averaging 31.8 kilograms.

Sample Description

Sample No 3, Type 1 mineralisation which was taken from hole A-41 ER, weighing 11.4 kilograms.

Sample No 4, Type 2, composite sample mineralisation weighing 9 kilograms.

Sample No 5, Overall Representative, a composite which was taken as a representative sample of all zones to simulate the situation where selective mining would be impossible, and the mill feed would be a combined mine feed. Weight of this sample, 11.4 kilograms.

Sample Preparation

The samples were stage crushed to minus 10 mesh, head sample riffled out and the remainder of each sample was riffled into equal portions of 2 kilograms for testing. All samples were stored in a deep freeze until required for testing.

Head Assays

	Oz/T		Assays %			
	Au	Ag	Cu	Pb	Zn	Fe
Sample No 3 Type 1	0.067	3.8	2.0	4.6	9.0	5.9
Sample No 4 Type 2	0.02	0.56	3.3	0.6	3.8	20.3
Sample No 5 - Overall Composite	0.027	2.0	2.1	3.7	7.8	9.8

Testing Procedure

The primary grind was done in a 12 x 16 inch laboratory rod mill using a rod charge of 13 kilograms, the rods varying in size from 5/8 to 1 inch. The regrind was done in a 12 x 15 inch laboratory ball mill using a ball charge of 4 kilograms, the balls varied in size from 1/2 inch to 1 inch. The flotation procedure used was the same as reported in Progress Report No 1, except as noted.

EXTRACTS FROM
TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Test Series 1: Sample No 3 Type 1

Test 1

Grind on zinc rougher tailing 98.0% minus 200 mesh.

		Oz/T		Assays %			
Product	% Wgt	Au	Ag	Cu	Pb	Zn	Fe
Cu clnr conc.	8.08	0.28	34.1	19.7	17.6	11.2	18.0
Cu clnr tlg.	2.83	0.21	8.8	2.5	20.8	15.6	8.0
Pb reclnr conc.	5.27	0.28	8.4	3.4	30.4	33.0	4.8
Pb reclnr tlg.	4.09	0.52	5.7	1.5	8.5	47.0	4.6
Pb clnr tlg.	3.61	0.08	3.3	0.5	2.8	41.5	3.9
Zn clnr conc.	3.87	0.05	2.2	0.6	1.0	57.2	2.1
Zn clnr tlg.	2.75	0.03	1.3	0.17	0.7	4.2	6.3
Zn rghr tlg.	69.50	0.025	0.57	0.06	0.36	0.32	5.5
Calculated Feed	100.00	0.088	4.32	1.99	4.37	9.05	6.3
		DISTRIBUTION %					
		Au	Ag	Cu	Pb	Zn	Fe
Cu clnr conc.		25.8	63.8	80.0	32.5	10.0	22.9
Cu clnr tlg.		6.8	5.8	3.6	13.5	4.9	3.6
Pb reclnr conc.		16.8	10.3	9.0	36.7	19.2	4.0
Pb reclnr tlg.		24.3	5.4	3.1	7.9	21.2	3.0
Pb clnr tlg.		3.3	2.7	0.9	2.3	16.5	2.2
Zn clnr conc.		2.2	2.0	1.1	0.9	24.5	1.3
Zn clnr tlg.		0.9	0.8	0.3	0.4	1.2	2.7
Zn rghr tlg.		19.9	9.2	2.0	5.8	2.5	60.3
Calculated Feed		100.0	100.0	100.0	100.0	100.0	100.0

Sizing-Analysis of Zinc Rougher Tailing

Mesh Size	+200	-200 +325	-325
% Wgt	2.0	1.9	96.1

EXTRACTS FROM
TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Reagents, lbs/ton

	Time	pH	SO_2	Amyl Xan	MIBC	NaCN	$ZnSO_4$	CaO	Dowfroth 1012	$CuSO_4$
Grind	40					0.1	1.0			
Cu cond	5	6.1	2.1	0.025	0.018					
Cu rghr	15	5.8		0.01						
Cu clnr	6	5.4	0.6							
Pb cond	5	5.8		0.015	0.018	0.05	0.5			
Pb rghr	15	6.8		0.005	0.009					
Pb clnr	6	10.5		0.005	0.009	0.01	0.1	0.1		
Pb reclnr	4	10.8				0.01	0.1	0.18		
Zn cond	5	10.8		0.05				5.0	0.02	1.5
Zn rhgr	15	10.5		0.025	0.027				0.005	
Zn clnr	5	11.5						0.1		
TOTAL			2.7	0.135	0.081	0.17	1.7	5.38	0.025	1.5

Results of this test show poor copper-lead and lead-zinc selectivity. Metal losses in the tailings are low with the exception of gold loss.

Test 2

Grind on zinc rougher tialing 90.8% mihus 200 mesh. In this test the copper float was aerated while adding SO_2 for 1 minute, condition without aeration for 3 minutes, xanthate added and conditioned for 1 minutes.

		ASSAY %				DISTRIBUTION %			
Product	% Wgt	Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
Cu clnr con.	7.56	18.8	18.4	14.5	16.4	72.5	32.7	12.5	19.8
Cu clnr tlg.	2.71	8.3	14.9	22.7	10.5	11.4	9.5	7.0	4.6
Pb reclnr conc.	4.20	2.7	40.2	25.4	4.4	5.7	39.7	12.2	3.0
Pb reclnr tlg.	0.74	2.4	5.7	39.0	5.7	0.9	1.0	3.3	0.7
Pb clnr tlg.	1.84	1.6	8.2	31.0	7.2	1.5	3.5	6.5	2.1
Zn reclnr conc.	7.79	1.0	3.0	55.3	3.2	4.0	5.5	49.1	4.0
Zn reclnr tlg.	1.85	0.8	3.0	24.4	9.7	0.8	1.3	5.1	2.8
Zn clnr tlg.	4.02	0.4	1.4	5.6	8.6	0.8	1.3	2.6	5.5
Zn rghr tlg.	69.29	0.069	0.34	0.21	5.2	2.4	5.5	1.7	57.7
Calculated Feed	100.00	1.97	4.26	8.77	6.3	100.0	100.0	100.0	100.0

EXTRACTS FROM
TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Reagents, lbs/ton

	Time	pH	SO_2	Amyl Xan	MIBC	NaCN	$ZnSO_4$	CaO	Dowfroth 1012	$CuSO_4$
Grind	50									
Cu cond	5	6.0	0.5	0.025						
Cu rghr	15	6.2			0.027					
Cu clnr	10	5.0	0.1		0.009					
Pb cond	5	8.0		0.015		0.1	1.0	0.5		
Pb rghr	15	8.0								
Pb cnr	12	10.0			0.009	0.01	0.1	0.15		
Pb reclnr	7	10.7				0.01	0.1	0.15		
Zn cond	2	10.0		0.05				1.7		1.0
Zn rghr	15	10.0		0.01					0.05	
Zn clnr	11	10.6		0.015				0.3	0.01	
Zn reclnr	6	10.9						0.2		
TOTAL			0.6	0.115	0.045	0.12	1.2	3.0	0.06	1.0

Sizing-Analysis of Zinc Rougher Tailing

Mesh Size	+150	-150 +200	-200 +325	-325
% Wgt	2.4	6.8	18.0	72.8

Regrind

The plus 400 mesh fraction of the copper rougher concentrate was reground for 8 minutes, lead rougher concentrate for 9 minutes and zinc rougher concentrate for 18 minutes.

The copper-lead selectivity is still poor, but a slight improvement is shown in the lead-zinc selectivity.

Test 3

In this test sodium cyanide and zinc sulphate were added to the grind. Grind on zinc rougher tailing 94.9% minus 200 mesh.

EXTRACTS FROM
TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Product	% Wgt	Assay %				Distribution %			
		Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
Cu reclnr conc.	6.12	20.0	22.2	9.7	17.8	62.9	31.4	6.8	17.3
Cu reclnr tlg.	2.51	7.8	34.7	19.7	8.4	10.0	20.2	5.7	3.3
Cu clnr tlg.	3.15	8.2	16.2	19.9	11.3	13.3	11.8	7.2	5.6
Pb reclnr conc.	1.93	2.4	37.8	26.4	5.4	2.4	16.9	5.8	1.6
Pb reclnr tlg.	2.01	2.4	16.2	38.0	7.1	2.5	7.5	8.7	2.3
Pb clnr tlg.	1.50	1.2	4.3	27.0	8.2	0.9	1.5	4.6	2.0
Zn reclnr conc.	6.94	1.1	2.0	58.2	2.6	3.9	3.2	46.1	2.9
Zn reclnr tlg.	1.33	1.0	2.6	29.5	8.5	0.7	0.8	4.5	1.8
Zn clnr tlg.	5.35	0.5	1.4	14.6	7.2	1.4	1.7	8.9	6.1
Zn rghr tlg.	69.16	0.056	0.31	0.22	5.2	2.0	5.0	1.7	57.1
Calculated Feed	100.00	1.94	4.32	8.76	6.3	100.0	100.0	100.0	100.0

Because of the high lead content in the copper concentrate a copper lead separation was tried on the copper recleaner concentrate.

Product	% Wgt	Assay %				Distribution %			
		Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
Pb conc	65.59	15.6	30.5	12.6	13.3	51.2	90.1	85.1	49.1
Cu tlg.	34.41	28.3	6.4	4.2	26.3	48.8	9.9	14.9	50.9
Calculated Feed	100.00	20.0	22.2	9.7	17.8	100.0	100.0	100.0	100.0

Five separation steps were made, with the five tailings combined to produce the total copper tailing. The test indicates that increased cyanide to each step or more steps will result in a good copper lead separation.

EXTRACTS FROM
TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Reagents, lbs/ton

	Time	pH	SO_2	Amyl Xan	MIBC	NaCN	$ZnSO_4$	CaO	Dowfroth 1012	$CuSO_4$
Grind	60	6.6				0.1	1.0			
Cu cond	5	5.8	0.6	0.025	0.018					
Cu rghr	15	5.8			0.009					
Cu clnr	10	5.5	0.1	0.01	0.009					
Cu reclnr	6	5.3	0.1							
Pb cond	5	8.7		0.015		0.1	1.0	0.7		
Pb rghr	15	8.7			0.009					
Pb clnr	12	10.8		0.005	0.009	0.01	0.1	0.15		
Pb reclnr	7	11.1				0.01	0.1	0.15		
Zn cond	2	10.2		0.03				1.7		1.0
Zn rghr	15	10.2		0.015					0.035	
Zn clnr	10	11.2						0.4	0.005	
Zn reclnr	6	11.5		0.015				0.2		
Cu-Pb Separation	25	10.2				1.5				
Total			0.8	0.115	0.054	1.72	2.2	3.3	0.04	1.0

Sizing-Assay Analysis on Zinc Rougher Tailing

Mesh Size	+200	-200 +325	-325
% Wgt	5.1	14.3	80.6

Regrind

The plus 400 mesh fraction of the copper rougher concentrates was ground 10 minutes, the lead rougher concentrate for 6½ minutes and the zinc rougher concentrate for 18 minutes.

Test 4

In this test the copper lead separation was increased to 7 steps and the cyanide consumption was increased.

Grind on zinc rougher tailing 88.1% minus 200 mesh.

EXTRACTS FROM
TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Sizing-Analysis of Zinc Rougher Tailing

Mesh Size	+150	-150 +200	-200 +325	-325
% Wgt	1.6	6.9	21.6	69.9

Reagents, lbs/ton

	Time	pH	SO_2	Amyl Xan	MIBC	NaCN	$ZnSO_4$	CaO	DF 1012	CuSO4
Grind	60	6.9				0.1	1.0			
Cu cond	5	5.9	0.8	0.035	0.018					
Cu rghr	15	6.0			0.018					
Cu clnr	12	5.4	0.1		0.009					
Cu reclnr	10	6.0								
Zn cond	2	10.7		0.01				2.8		1.0
Zn rghr	15	10.7		0.015					0.025	
Zn clnr	7	11.1						0.25		
Zn reclnr	5	11.2						0.2		
Total			0.9	0.06	0.045	0.1	1.0	3.25	0.025	1.0

The metallurgy of this test was fairly good.

Test Series 3: Sample No 5, Overall Composite

Test 1

Grind on zinc rougher tailing 98.9% minus 200 mesh.

		Oz/T		Assay %			
	% Wgt	Au	Ag	Cu	Pb	Zn	Fe
Cu clnr conc.	6.55	0.06	11.8	21.0	13.0	6.8	23.5
Cu clnr tlg.	6.44	0.11	5.2	5.4	9.9	12.1	24.6
Pb reclnr conc.	2.50	0.05	6.6	2.5	37.5	25.4	7.0
Pb reclnr tlg.	2.93	0.05	4.4	2.2	16.3	31.6	11.5
Pb clnr tlg.	3.95	0.05	2.7	1.4	5.2	22.7	18.0
Zn reclnr conc.	4.54	0.03	1.6	0.93	1.15	57.7	3.3
Zn reclnr tlg.	0.91	0.04	3.3	1.47	6.0	22.7	12.2
Zn clnr tlg.	4.23	0.04	2.0	0.86	3.3	14.8	12.4
Zn rghr tlg.	67.95	0.01	0.24	0.86	0.28	0.16	8.1
Calculated Feed	100.00	0.026	1.86	2.05	3.56	7.26	10.6

/ . .

EXTRACTS FROM
TD SECTION 257
PROGRESS REPORT NO 2

PARYS MOUNTAIN MINERALISATION
WALES, GREAT BRITAIN

Reagents, lbs/ton

	Time	pH	CaO	Amyl Xan	MIBC	NaCN	$ZnSO_4$	DF 1012	$CuSO_4$
Grind	60								
Cu-Pb cond	3	8.9	0.5	0.025	0.018	0.1	1.0		
Cu-Pb rghr	17	8.9		0.015					
Cu-Pb clnr	10	10.8	0.2	0.010		0.01	0.1		
Cu-Pb reclnr	10	11.1	0.15			0.01	0.1		
1st Cu-Pb sep	10	10.8				0.5			
2nd Cu-Pb sep	7	10.6				0.5			
3rd Cu-Pb sep	7	10.5				0.25			
4th Cu-Pb sep	5	10.4				0.25			
5th Cu-Pb sep	5	10.4				0.25			
6th Cu-Pb sep	5	10.3				0.25			
Dezincer rghr	5	11.8	3.0	0.07	0.009				2.0
Dezincer clnr	3	11.9							
Zn cond	2	11.8	1.5	0.035					1.0
Zn rghr	15	10.3		0.01				0.03	
Zn clnr	10	11.1	0.3	0.01				0.01	
Zn reclnr	5	11.3	0.25						
Total			5.90	0.175	0.027	2.12	1.2	0.04	3.0

Regrind

The plus 400 mesh fraction of the copper-lead rougher concentrate was ground for 11 minutes and the zinc rougher concentrate for 10 minutes.

Sizing-Analysis on Zinc Rougher Tailing

Mesh	+200	-200 +325	-325
% Wgt	2.1	13.9	84.0