

THE PARYS-MONA PROJECT
ANGLESEY, WALES, U. K.

REPORT ON EXPLORATION PROGRAMME

JULY, 1971 - FEBRUARY, 1972

BY

ROBERT BATEY, PH. D.

February, 1972

PARYS MONA PROJECT

List of Maps to accompany report on Exploration

July, 1971 to February, 1972 by R. Batey.

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GENERAL STATEMENT

The Parys Mona area is situated in Anglesey, Wales, U.K. at the north-easterly corner of the island, $1\frac{1}{2}$ miles south of the town of Amlwch (see index map). The region has been known for its mineral occurrences (Cu-Pb-Zn-Ag) since Roman times but its active history really began at the end of the 18th century when the great open pit lodes were discovered and it became the largest copper mine in the world. This active phase lasted until the early 20th century when the mines were eventually abandoned. Since then various exploration programmes have been carried out, particularly after 1960, to find extensions of the old lodes or new lodes altogether. The CIGOL survey (1968-1970) proved some 33,000,000 tons averaging at 0.71% Cu. on the north slope of the mountain.

GEOLOGICAL SETTING

The Parys-Mona sulphide deposits occur associated within felsites which are a complex group of acid-volcanics comprising lavas, fragmentals and tuffs which overlie and underlie dense black mudstones and graphitic shales. The lower shale, mudstone group is said to be of Ordovician age whereas the overlying shale group is of Silurian age from its fossil content. To the north and south of the Parys-Mona area, large areas are covered by Pre-Cambrian schists and gneisses, called the Mona complex (see generalized sections).

The outcrop of the volcanic group consists of two irregular east-west trending belts which are contiguous at their western extremities. The outcrop is bounded on the north, west and south by Ordovician shales. Within the north and south belts, Silurian shales occur and continue eastwards to the limits of the occurrence of the volcanics (see geological map).



HOLYHEAD

AMLWCH

IRISH SEA



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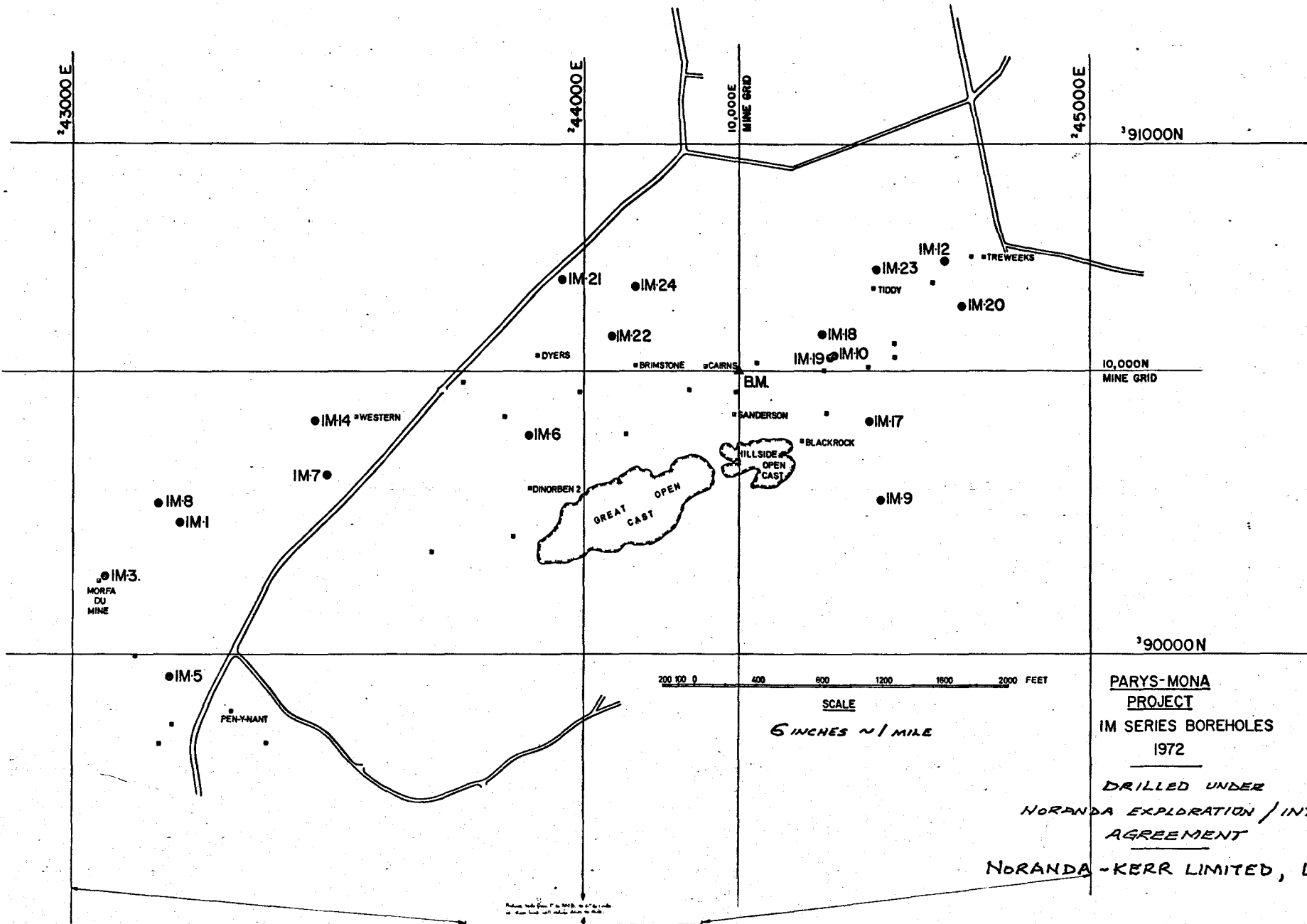
BANGOR

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-  EXPLORED AREA
-  PARYS MOUNTAIN MINES

SCALE: 4 Miles to the Inch



PARYS-MONA PROJECT
IM SERIES BOREHOLES
1972
 DRILLED UNDER
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ROCK TYPES

1) Volcanic Group

This group consists of rhyolitic lavas, acid-fragmentals, and tuffs with intercalations of shale and massive chert. Local chloritization is not uncommon. The whole has been referred to in the past as "felsite". The thickness of this group in the northern "felsite" may be 400-500 feet. The southern "felsite" is generally much thicker.

2) Ordovician Group

This group is made up of dense black shales and mudstones which get greyer and greener north of the mountain. In general there are no macro-fossils and age determination is made on the acrytarch content (micro fossils).

3) Silurian Group

This group is generally dense black and graphitic shales well banded with abundant graptolites (monograptus).

4) Mona Complex

This group consists of gneisses and schists of Pre-Cambrian age often brecciated and disrupted.

MINERALIZATION

The major mineralization is associated with the "felsite" group particularly the Northern Felsite. The ore has been defined in several lode systems as follows: (see generalized section)

1) The Hanging Wall Lodes

These lodes vary in thickness from 3-15 feet and they are generally chalcopryrite-rich associated with quartz breccia and may be discordant to the surrounding rock (Ordovician shales). In earlier days these were important copper producers (1.0% - 2.5% Cu.).

2) Carreg-y-doll Lode

This lode varies greatly in thickness (0-100') and is again chalcopryrite-rich occurring within a massive quartz-breccia zone situated at the contact of the Northern Felsite group and the northerly Ordovician shale group (Grade - 0.50% - 2.0% Cu.).

3) Felsite Lodes

This lode group is much more complex than the previous two and is found within the northern volcanic group. It is usually a chloritic zone associated with minor black shales and a considerable development of chert. It varies in its position within the volcanic group throughout the Parys Mona area and may even split up and become separated by intercalations of volcanic material. This lode is the major zone of mineralization and is present throughout the northern volcanic group. It includes the bluestone groups and those lodes associated with the hanging wall side of the Open Pits as follows:

- a) Chlorite-rich zones with pyrite and chalcopyrite. (widths 100-400') and grade of 0.5% to 2.0% Cu.
- b) "Bluestone" zones with chert, complex massive sulphides (Cu-Pb-Zn-Ag). Width 0-50' and grades of 12% combined Pb-Zn with variable amounts of Cu. and Ag.

These zones merge down-dip with the Carreg-y-doll Lode beyond 1,000 feet to form the mineralized zone intersected in the CIGOL drilling (Northern Zone).

STRUCTURE

The volcanic mass of Parys-Mona is an upthrust area which has been repeatedly thrust-faulted from the north during the Caledonian Orogeny, so that it consists of a series of imbricate plates about 300 feet thick. The Northern Felsite has been particularly affected resulting in a complete dislocation of the ore zones. The whole has then been more steeply tilted at hilltop and further tear faulting has occurred which has disposed the Parys-Mona zone into a series of blocks aligned along the strike of the volcanic group. The blocks are let down progressively to the west (see plan workings, D.D.H. sections, generalized section)

Both east and west ends of the Parys-Mona area are terminated by faults. In the west at Morfa Du the volcanic group disappears beneath overthrust Ordovician shales. To the east the Corwas thrust covers the northern volcanic group at the surface near Henwaith and transgresses to the east to cover the southern felsite group at Pen-y-sarn.

To the north both volcanics and Ordovician shales are covered by the Carmel Head thrust which brings the Mona Complex almost to the Parys-Mona area.

To the south, the volcanic and various shale groups have been thrust over the Mona Complex.

A combination of all these above factors has caused the disposition of the various lodes within the Parys-Mona area and also led to the recognition of well defined ore localities within the area of known mineral interest.

- 1) Morfa Du (bluestone zone)
- 2) Open Pit Area (bluestone area)
- 3) Hanging Wall Lodes and Carreg-y-doll (chalcopyrite area)
- 4) Henwaith and Eastern Zone (bluestone area)
- 5) Southern Felsite Group (mixed sulphides)

These areas were all worked independently and no previous geological hypothesis was proposed to connect all these zones or to relate them to the stratigraphy, particularly the volcanic group. Recent work by Intermine Limited has shown that all the mineral lodes of the Parys-Mona area are in fact related to the volcanism, and are part of the strato-volcanic sequence even though there possibly may be some later remobilization (i.e. the Hanging Wall Lodes).

DRILLING PROGRAMME

The Intermine drilling programme was conceived to test the relationship and disposition of the various ore types found in the open pit area with respect to environment and geological setting.

A) Bluestone deposits within Felsite Lodes

- 1) Morfa Du (D.D.H. #IM-1, #IM-3, #IM-5, #IM-8)
- 2) Open Pit, Bluestone Shaft Area (D.D.H. #IM-6, #IM-10, #IM-17, #IM-18, #IM-19, #IM-12, #IM-20)
- 3) Southern Felsite (D.D.H. #IM-9)
- 4) Coronation Zone (D.D.H. #IM-7, #IM-14)

B) Felsite Lodes and Carreg-y-doll Lodes

- 1) Parys Block (D.D.H. #IM-21, #IM-22, #IM-24)
- 2) Tiddy Beers Block (D.D.H. #IM-23)

*DRILLING PROGRAMME (SUMMARY)

A) BLUESTONE DEPOSITS WITHIN FELSITE LODES

1) MORFA DU AREA

a) D.D.H. #IM-1

(Coordinates 6,380E/9,000N, bearing 160°, declination -70°)

This hole, placed near the White Rock was drilled to 498.5 feet.

A good intersection of mineralized ground was achieved but bluestone ore was poorly developed. Assay results indicated the best zone from 215.0 - 226.5' giving 11.5' at 0.67% Cu., 4.25% Pb., 7.75% Zn., 2.5 ounces Ag., and 0.82 ounces Au.

b) D.D.H. #IM-3

(Coordinates 5,910E/8,640N, bearing 170°, declination -60°)

This hole was placed to test the westerly extension of the Morfa Du zone, and drilled to a depth of 723 feet. Nothing other than barren black shales was intersected.

c) D.D.H. #IM-5

(Coordinates 6,350E/8,000N, bearing 155°, declination -50°)

This borehole was drilled in the Chapel area to 791 feet to test the south of the Methodist Chapel for shales and bluestone. The hole started in rhyolites (to 148') and thence to greenstones and black shales without any mineralization.

d) D.D.H. #IM-8

(Coordinates 6,230E/9,110N, bearing 160°, declination -60°)

This borehole was drilled close to the site of #IM-1 to 900 feet to test the continuity of the bluestone ore picked up in #IM-1. The borehole passed through shale with some rhyolite and finally massive rhyolite without bluestone, indicating that the occurrence of bluestone in the White Rock area already drilled off, had been limited by a shallow thrust.

2) OPEN PIT AREA

a) D.D.H. #IM-6

(Coordinates 8,625E/9,590N, bearing 155°, declination -65°)

This hole was drilled under the Great Open Pit to test the downward extensions of the favourable bluestone ground. This long hole was in felsite most of the way which contained sulphide in low concentrations

* All D.D.H. Section, logs and assay sections, and drill hole location maps attached)

- a) D.D.H. #IM-6 (Cont'd)
(less than 0.30% Cu.) and thence passed into greenstone which although well mineralized with pyrite contained little copper (40' of 0.34% Cu. from 1208'). At the bottom of the greenstone sequence the hole intersected massive chalcopyrite (1385-1396') which assayed at 6.90% Cu., 0.81% Pb., 4.15% Zn., and 39.0 gm./Ton Ag. The hole then passed into shales, probable Mona Gneiss and finally into shales again to a final depth of 1816 feet. This hole indicated the presence of massive sulphides of the bluestone at the base of the Southern Felsite and possibilities of its extension up and down dip as well as along strike.

Note: This is the only hole drilled in this area

- b) D.D.H. #IM-10
(Coordinates 10,575E/10,150N, bearing 160°, declination -65°)
This hole was sited to test the hanging wall contact of the bluestone mineralization near the Hillside Opencast extension eastwards. The hole passed through the Carreg-y-doll Zone initially and then into felsite. Subsequently it passed into chert with weak bluestone, Silurian shales, and finally into felsite to its termination at 1166 feet. The weak bluestone ground assayed at 12 feet of 0.75% Cu., 0.28% Pb., and 0.74% Zn. from 400 feet.
- c) D.D.H. #IM-17
(Coordinates 10,820E/9,740N, bearing 355°, declination -45°)
Following the occurrence of bluestone in #IM-10 and the presence of Silurian (monograptus) strata (to at least 447') it was decided to drill northwards from the Open Pit to intersect the bluestone ground from the south. The hole followed the Silurian shale down-dip to the north to a depth of 796 feet without intersecting bluestone ground thought to lie on the hanging wall of the Silurian shale. The hole increased in declination and may have run parallel to mineralized cherty bluestone ground. The hole was abandoned at a depth of 841 feet in highly sheared ground.
- d) D.D.H. #IM-18
(Coordinates 10,500E/10,280N, bearing 155°, declination -70°)
When #IM-17 was abandoned in favourable ground it was decided to test the potential bluestone ground again from the north side. The hole passed the Carreg-y-doll zone with great difficulty and entered the Golden Venture Zone on the footwall. Caving because of old workings at the top of the hole forced its abandonment at 264 feet.

- e) D.D.H. #IM-19
(Coordinates 10,600E/10,000N, vertical)
This hole was drilled near the site of #IM-10 to achieve more or less the same results as #IM-18. The hole passed the Carreg-y-doll and Golden Venture zones and then passed into tuffaceous rhyolite to 610 feet. From 610-644 feet the hole intersected carbonaceous shales and then passed into the felsite group (rhyolite) to its end at 796 feet. The hole flattened to the south. Bluestone was not intersected.
- f) D.D.H. #IM-12
(Coordinates 11,280E/10,785N, bearing 175°, declination -80°)
This hole was drilled near the Pearl Shaft to intersect the downward extension of the Silurian syncline and also to intersect the Golden Venture Lode area, where bluestone was reported to occur. The hole collared in shales (Ordovician) passed into the Carreg-y-doll and Golden Venture Zones and then into felsite where it remained to the final depth of 816 feet. Minor bluestone type mineralization was intersected. Assays of Carreg-y-doll showed 44 feet of 0.88% Cu. from 327-371 feet, some of which showed weak bluestone type mineralization.
- g) D.D.H. #IM-20
(Coordinates 11,400E/10,485N, bearing 165°, declination -80°)
This hole was drilled to the south of #IM-12 in a further attempt to intersect bluestone ground and the Silurian shales and also the favourable ground for the development of bluestone ore on the hanging wall side. This hole completed the section started in #IM-12. The Silurian syncline with carbonaceous shales and monograptus was intersected. No bluestone was found however, although favourable cherts and cherty rhyolites were present. The hole was stopped at 578 feet.

3) SOUTHERN FELSITE

- a) D.D.H. #IM-9
(Coordinates 10,910E/9,225N, bearing 155°, declination -65°)
This hole was drilled to test the southern contact of the Southern Felsite and thus complete the section started by CIGOL with their drilling of D.D.H. No. 2. The hole started off in weakly pyritized rhyolite and eventually passed into presumed Ordovician shales without bluestone. The transition from Southern Felsite to shale was gradual and faulting is not suspected at this point. The hole was stopped at 500 feet.

4) CORONATION ZONE

a) D.D.H. #IM-7

(Coordinates 7,320E/9,320N, bearing 165°, declination -65°)

This hole was started north of the Coronation Zone in order to intersect possible extensions of the Open Pit in depth and to the west as well as the massive sulphides cut in CIGOL #3. The core was mainly massive rhyolites and tuffs with the chloritic zone of the Felsite Lodes intersected (647-851'). Assays were marginal, giving 15 feet at 1.03% Cu. from 676 feet. No further extensions of favourable ground were intersected to the final depth of 2001 feet.

b) D.D.H. #IM-14

(Coordinates 7,240E/9,665N, bearing 165°, declination -65°)

This hole was drilled approximately 300 feet northwards along the line of #IM-7 to test the Felsite Lodes intersected in that hole. The Felsite Lode Zone was intersected from 785-1116 feet. Again assays were marginal giving 59 feet at 0.47% Cu. from 927 feet. This hole was stopped at 1166 feet.

CONCLUSIONS ON THE DRILLING OF
BLUESTONE GROUND WITHIN FELSITE LODS

- 1) Immediately east and west of the Open Pit the local bluestone ground apparently becomes attenuated either by faulting or the lack of suitable facies and/or geological environment.
- 2) Bluestone ore is associated in part if not wholly with the Felsite Lodes (chloritic zone) within the Northern Felsite.
- 3) Bluestone is a sporadic complex ore facies developed in association with chert at intervals within the Northern Felsite (east to west) as follows:
 - a) Henwaith
 - b) Marquis Shaft Area
 - c) Bluestone Shafts, Hillside Open Cast, Great Open Cast
 - d) CIGOL Holes No. 30, No. 17A (North and down-dip of Parys Mountain)
 - e) Morfa Du

Dimensions of the area in which bluestone is found are approximately 7,000 feet east to west and a down-dip extension of at least 1,500 feet (CIGOL #30)

- 4) The bluestone zones are contained within a transgressive volcanic horizon and may be separated to the west by intercalations of felsite.
- 5) The chloritic Felsite Lodes are present west of the Open Pit (#IM-7 and #IM-14) and represent a continuation of the same Felsite Lodes which outcropped within the Great Open Pit where the bluestone was in association with the massive cherts and its last exposure westwards is the bluestone at Morfa Du.
- 6) The chloritic Felsite Lode group (Golden Venture type) is the principle sulphide horizon and chert/bluestone and Carreg-y-doll zone are facies or modifications of it.
- 7) All rock types and associated lode zones are affected and displaced by two major fault groups.
 - a) Thrust planes trending east-west which have repeatedly overthrust from the north with displacements of 200-300 feet.
 - b) Major tear faults whose direction is north-south and whose general effect is to displace portions of Parys-Mona vertically (100-200') relatively one to another.

The first group have caused repeated lateral separation of the parallel lode systems (i.e. Hanging Wall Lodes, Carreg-y-doll Lode and Felsite Lodes). This has caused abrupt termination in worked lodes throughout the mines in a vertical sense (see working plans and sections).

The second fault group have displacements of over 100 feet in many cases causing abrupt lateral termination of lodes and associated workings, and permitted the division of Parys-Mona into a series of blocks aligned east-west along strike (see plan of workings).

B) FELSITE LODES AND CARREG-Y-DOLL LODES

This drilling was related to the Felsite Lodes since they are the principal sulphide horizon in the area.

1) PARYS BLOCK

- a) D.D.H. #IM-21
(Coordinates 8,825E/10,600N, bearing 165°, declination -80°)
Bluestone ground occurs in CIGOL No. 30 (45.7' of 1.15% Cu., 4.45% Pb., 6.84% Zn., 1.05 oz. Ag.) and this hole was sited to test its up-

- a) D.D.H. #IM-21 (Cont'd)
dip development towards the Open Pit. D.D.H. #IM-21 was carried to 1146 feet without intersecting bluestone ground although the Carreg-y-doll and Golden Venture zones were intersected, both weakly mineralized. It would appear that the hole missed the mineralized zone because of the separation caused by the Great Cross Course fault.
- b) D.D.H. #IM-22
(Coordinates 9,145E/10,250N, bearing 185°, declination -70°)
This hole was sited in the same general area as #IM-22 but farther to the east to test a blank zone in the old workings west of the Great Cross Course. It was also intended to test the up-dip extension of the bluestone ground in CIGOL No. 30. Carreg-y-doll and Felsite Lodes were intersected overlying cherts of the Open Pit type. The Carreg-y-doll zone of mineralization extended from 345-390 feet, 45 feet averaging at 0.78% Cu. The Felsite Lodes group extended from 895-987 feet, 92 feet averaging at 0.71% Cu. Weak bluestone type ore and related black shales occurred at 971-978 feet giving 7 feet at 1.66% Cu., 0.22% Pb., 0.32% Zn. The hole was stopped at a depth of 1316 feet.
- c) D.D.H. #IM-24
(Coordinates 9,290E/10,565N, bearing 170°, declination -70°)
This hole was placed 300 feet north and 100 feet east of #IM-22 in order to test the same intersections in depth as those encountered in #IM-22. As expected small Hanging Wall Lodes were encountered followed by a weak Carreg-y-doll zone. These upper lodes were separated from the main Felsite Lode group by a thick series of rhyolite and tuff. The main Felsite Lode zone extended from 1007-1157 feet. Assay results showed the following:

- | | | | | | | | |
|------|------|----|-----------|------|-------|----|-------|
| i) | 29' | of | 0.67% Cu. | from | 900' | to | 929' |
| ii) | 22' | of | 2.25% Cu. | from | 1028' | to | 1050' |
| iii) | 116' | of | 0.71% Cu. | from | 1028' | to | 1144' |

Thus borehole #IM-24 confirmed the existence of the Felsite Lodes beneath the intersection made in #IM-22 and also up-dip from the intersection of CIGOL #IM-30. This hole was carried to a depth of 1333 feet.

2) TIDDY BEERS BLOCK

a) D.D.H. #IM-23

(Coordinates T0,850E/10,710N, bearing 165°, declination -70°)
This hole was placed 150 feet north of Tiddy's Shaft to intersect the Carreg-y-doll and Felsite Lodes (Golden Venture) between the bore-holes #IM-10 and #IM-12. The hole intersected thin Hanging Wall Lodes which assayed 21 feet at 0.60% Cu. from 326 feet, 20 feet at 0.48% Cu. from 364 feet, 6 feet at 0.76% Cu. from 390 feet, averaging 60 feet of 0.43% Cu. from 336-396 feet. The Carreg-y-doll and Felsite Lode zones were poorly mineralized, assaying at 54 feet of 0.35% Cu. from 466-520 feet. This hole was carried to a depth of 1001 feet.

CONCLUSIONS

The diamond drilling programme initially set out to test for specific extensions of favourable ground in the Open Pit and Morfa Du areas and their extensions. The favourable ground or zone has been termed the Felsite Lode Group. It varies in width (100-400'), grade and disposition from east to west and from surface down-dip to the north. It includes the development of massive sulphides, the chloritic pyrite and chalcopyrite zones, as well as the Carreg-y-doll and related Hanging Wall zones.

LODE SYSTEMS - VARIATIONS ✓

The following is a description of the various lode systems outlining their variations from point to point.

1) East-West Variation *

At Henwaith where the zone has been covered by the Corwas thrust to the east, the Felsite Lodes can be differentiated into two adjacent lodes.

- a) Carreg-y-doll (chalcopyrite in quartz) on hanging wall
- b) Chloritic - bluestone group on footwall (Golden Venture Lode)

The second of these lodes (b) is complex and bounded on its footwall side at this point by the Silurian shales. Westwards a lens of rhyolite (Felsite) is developed on the footwall of the Golden Venture Lode which is split further west into two separate lodes so that the section (north-south) is as follows near the Golden Venture Shaft *

* See Geological Map, Sections, and Map Mine Workings

1) East-West Variation (Cont'd)

Carreg-y-doll (hanging wall) chalcopyrite-rich

Felsite Lodes [Golden Venture (pyrite, with bluestone)
Felsite
Bluestone Lode (Bluestone Shaft Area)

The Carreg-y-doll Lode also undergoes some modification westwards and a series of thin lodes are developed on the hanging wall side and the most well developed of these is referred to as the Charlotte Lode. The sequence (north-south) is thus.

Hanging Wall Lodes (non-productive)
Charlotte Lode
Carreg-y-doll Lode

Felsite Lodes [Golden Venture Lode
Felsite
Bluestone Lode Group

In the region of the Hillside Open Cast (3), the two phases of the Golden Venture Lode converge again but these felsite lodes become separated from the Carreg-y-doll on the northern side of yet another wedge of felsite so that the lode disposition is as follows.

Hanging Wall Lodes
Charlotte Lode
Carreg-y-doll (maximum development)
Felsite

Felsite Lodes [Golden Venture
Great Lodes (Black Rock, Clay Shaft) Bluestone Lodes

Further west at the section of the Great Open Cast the lode systems undergo further modification and the Carreg-y-doll Lode is apparently faulted out. The section (north-south) is as follows.

Hanging Wall Lode Group [Hanging Wall Lodes
Charlotte's Lode
Carreg-y-doll Lode (faulted at surface)
Felsite

Felsite Lodes [Golden Venture Lode Group
Bluestone Lodes (weaker)

1) East-West Variation (Cont'd)

West of the Dinorben Shafts area all lodes are abruptly terminated at surface by faulting except the Felsite Lode which carries on westwards to the area of Chapel, Pen-y-sarn. At this point however, the irregular lodes of White Rock and Morfa Du make their appearance.

To the west beyond Ida and Engine (Morfa Du) Shafts the volcanic outcrops together with their associated lode systems are covered by overthrust Ordovician shales. Their extension west and north is considered normal

2) Variations Down-Dip (See Composite Sections)

The Hanging Wall Lode systems in the region of Gwen's Shaft converge in depth on the Felsite - Ordovician shale contact. The convergence is noted on all the Hanging Wall Lodes (including Charlotte) progressively to the east (see sections and mine workings map).

The Felsite also appears to narrow in depth at all points on the western slopes of Parys-Mona. The Felsite Lode group with its strong chloritization continues beyond in depth converging with the Hanging Wall Lodes and Carreg-y-doll Lodes to form a very wide mineralized zone (up to 400') - see D.D.H.'s 30, 17A, etc.

* THE ORE ZONE AT PARYS-MONA - LIMITS AND GRADE

The ore zone of Parys-Mona is lost by faulting to the east and west but remains open to the north (down-dip) where it was followed by CIGOL drilling. Indications are that the steep dips (60-70°) present on Parys Mountain where the ore zone outcropped may be much flatter at depth, a relatively short distance north of the mountain.

The Corwas thrust covers the Northern Felsite group at Henwaith and covers the Southern Felsite much further east at Pen-y-sarn. There are possibilities (see M6, M8) that the favourable horizon exists beneath the overthrust portion of the Mona complex east and north of Henwaith.

The western end of the Parys-Mona area is faulted off but as the bluestone had re-appeared at Morfa Du there is every possibility of continuance of favourable mineralization to the north and west of Morfa Du.

* See Longitudinal Section and Plan of Workings

It should be noted that in many areas of past drilling where the mineralized zones appear to be absent, the reason can be explained by fault separation and/or holes being terminated before cutting the Felsite Lode horizon. This strongly supports the possibility of the grade being raised appreciably.

STRUCTURE

The study of Parys-Mona has indicated that the Ordovician volcanic group forms a stratified complex lying within a shale sequence which is Silurian above and Ordovician below. The stratified sequence has been repeatedly overthrust from the north (see sections) and the whole area has been traversed by north-south tear faults which have moved adjacent blocks up and down relative to one another. The result has been a complex of ore zone segments repeated and related by faulting in the Northern Felsite group.

The fault systems seen in the Parys-Mona area are thought to continue beyond the immediate outcrops on Parys Mountain. There is every evidence to suggest that the east-west thrust planes continue northwards to the sea and the north-south tear faults are associated with the strato-volcanic complex within the Ordovician group, it is probable that these favourable rocks and associated mineralization continue northwards, eastwards and westwards of the mountain.

RECOMMENDATIONS

The favourable mineral facies within the acid volcanic (Felsite) group is a continuous horizon in which several lode systems are developed. Bluestone (massive sulphides) seems to be the most irregular ore-type, occurring both laterally and vertically within this mineralized facies. There is evidence to suggest that the main mineralized horizon is thickening towards the west and north. The mineralized zone and the Northern Felsite appear to be thinning to the east, however this is probably due in part to the Corwas overthrust. The Southern Felsite continues approximately one mile further to the east. This together with the occurrence of similar mineralized volcanics at the Rhosmynach Mine, two (2) miles further to the east, indicates a continuity eastwards of the mineralized horizon.

The next stage of drilling is proposed in the following localities (see map).

- 1) On the footwall side of the Hanging Wall Lodes where the Carreg-y-doll and Felsite Lodes probably exist (unmined) up-dip from the CIGOL Northern Zone as indicated by

1)	(Cont'd) Intermine holes #IM-22, and #IM-24. All of the CIGOL drilling was carried out below the workings of the Hanging Wall Lodes	
	Four (4) holes at 1,000 feet each	4,000'
2)	North of the CIGOL holes where the wide mineralized zone flattens and continues northwards to the sea. The change at this point from fragmental acid volcanics to black shales and tuffs indicates the possibility of a massive sulphide environment, i.e. (Bluestones)	
	Two (2) holes at 2,500 feet each	5,000'
3)	West of Morfa Du - Favourable black shales and associated sulphides occur at the surface of Morfa Du. They probably represent an upthrust portion of the shale/sulphide facies discovered in the CIGOL drilling to the north. The area to the west and north should be tested for down-dip development of sulphides. A deep penetration I.P. Survey could precede the drilling.	
	Two (2) holes at 1,500 feet each and two (2) holes at 1,000 feet each	5,000'
4)	North and east of Henwaith where the Corwas Thrust brings the Mona Complex on the top of the favourable volcanic group. The Corwas thrust plate does not appear (field studies) to exceed 200-300 feet in thickness.	
	Five (5) holes at 1,000 feet each	5,000'
5)	Due east of CIGOL North Zone	
	Two (2) holes at 1,500 feet each	3,000'
6)	Due west of CIGOL North Zone	
	Two (2) holes at 1,500 feet each	<u>3,000'</u>
	TOTAL FOOTAGE:	<u><u>26,000'</u></u>

BUDGET

Diamond drilling - 26,000' @ \$10.00/ft. (Assuming use of present equipment)	\$260,000.00
Geology - Overhead	\$ 50,000.00
Assaying	\$ 10,000.00
Geophysics (One Month)	\$ 7,000.00
Management	<u>\$ 35,000.00</u>
TOTAL BUDGET:	<u><u>\$362,000.00</u></u>

TIMING

Two (2) drills - 2,000'/machine month (including moves)	6 - 8 Months
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February, 1972
Toronto, Canada

*copied from reports lodged
at Parys Mt. Anglesey*

12-12-72

THE PARYS-MONA PROJECT
ANGLESEY, WALES, U.K.
REPORT ON EXPLORATION PROGRAMME
JULY, 1971 - FEBRUARY, 1972

R. Batey, Ph.D. February, 1972

UNRECORDED

PARYS-MONA PROJECT
ANGLESEY, WALES, U. K.

SUMMARY REPORT

Intermine Limited,
Toronto, Canada

March 1st, 1972

PARYS-MONA PROJECT
ANGLESEY, WALES, U. K.
SUMMARY REPORT

GENERAL STATEMENT

In July, 1971, Intermine Limited initiated a programme of exploration in the Parys-Mona area of Anglesey, Wales in the United Kingdom. The Parys and Mona Mines were formerly the largest copper producer in the world (1750-1850) and at the present time constitutes the largest known reserve of copper in Western Europe. A detailed programme of geology and related studies was carried out simultaneously with diamond drilling between July, 1971 and January, 1972. Approximately \$300,000.00 were spent during this period.

PURPOSE AND SCOPE OF THE PROGRAMME

The purpose and scope of the programme was to test the peripheral sections of the old workings for extension of the original orebodies and perhaps more important to interpret the geology, structure and geological environment of the Parys-Mona area which has been somewhat of an enigma since its known history of mining. Detailed mapping, surface studies and relogging of all previous drilling with special reference to stratigraphy and related mineralization was carried out. The results of these studies enhances the potential appreciably.

RESULTS AND FINDINGS OF CURRENT PROGRAMME

The results and findings of the present programme may be listed as follows:

- 1) There are no near surface ($\pm 200'$) of viable ore that can be exploited in the area studied. The only exception to this is the Morfa Du area where 300 thousand tons of massive sulphides (10% combined Pb-Zn, 0.47% Cu, 1.35 oz. Ag) has been discovered. This is limited by faulting, however extensions appear favourable to the north.
- 2) The downward extension of the ore zone continues indefinitely and does not pinch out as anticipated by the ancients as well as some of the recent investigators. The reason for their termination can be well shown by a series of thrust faults. The studies show that the downward extension of the ores can be extensive and that reserves in the order of several hundreds of millions of tons is not an unlikely figure.

- 3) Studies show that many of the earlier holes were terminated either too soon (stratigraphy) or passed through fault separations, resulting in the misinterpretation of blank areas and/or barren areas.
- 4) In the grade estimates, use of these shallow holes have resulted in the grades not being accurately estimated. It is our opinion that the possibility of raising the disseminated copper ore grade appreciably is good.
- 5) Stratigraphic studies based on all of past re-drilling and re-logging indicate that the possibility of finding major areas of massive sulphides is good. These areas are currently virtually untested, either by reason of no drilling or early termination of holes.
- 6) The area is typically a sedimentary-volcanic basin with associated disseminated and massive sulphide deposits of major proportions. There is every reason to believe that a programme of diamond drilling will discover one or more ore bodies of major dimensions.

A brief summary report with recommendations comprise the initial part of this presentation. A more detailed description of the property is attached. in the latter part of the report.

STRUCTURE

The structure of the Parys-Mona area is complex, however it may be broken into the following basic elements.

- 1) An upthrust (from the north) mass of acid volcanic and related sediments which have been tilted, flexured, and possibly folded and/or overturned.
- 2) A series of east-west gently northerly dipping thrust and bedding plane faults have repeatedly off-set the formations of the northern mass.
- 3) North-south trending tear faults, and possibly normal faults have further complicated the structure.

MINERALIZATION

Associated with the acid volcanism there have been several phases or stages of ore formations (Cu., Pb., Zn., Ag., Au., with abundant pyrite) which except for small diverging lodes (Hanging Wall) are concordant with the formations. The major phase of the ore formation is within the Felsite Lode group which occurs as a facies of

the Northern Felsite (acid-volcanics). Because of the complexity of the mineral or lode systems they have been broken into three major groups for east-of discussion, which are defined as follows (See Generalized Section).

1) Hanging Wall Lodes

Differences in DTI report

Hanging Wall Lodes, which may be discordant are present in the Ordovician shales on the north slope of the Parys Mountain. They are comprised of chalcopryite and pyrite (width - 3-15') and usually occur within a quartz-rich or siliceous horizon. Grades (0.0% - 2.5% Cu.).

1.0% DTI report

2) Carreg-y-doll Lodes

These are concordant lodes comprised of chalcopryite and pyrite (width 5-100'). They are present at the boundary of the Ordovician shales and the northern volcanic (Felsite) group. Sulphides are contained in a very siliceous-quartz rich facies of the volcanics. Grades (0.5% - 2.0% Cu.).

3) Felsite Lodes

Felsite Lodes are concordant and present throughout the entire northern volcanics, and economically are the most important group. They are extremely variable in width and mineralization. The principal sub-groups are:

- a) Chlorite-rich zones with pyrite and chalcopryite (width 100-400') and grades of 0.5% to 2.0% Cu. (Noranda-Timmins type)
- b) "Bluestone" zones with chert, complex massive sulphides (Cu-Pb-Zn-Ag). Widths 0-50'+, and grades of 12% combined Pb-Zn with variable amounts of Cu. (1-1.5%) and Ag (2-3 oz.)

Not in DTI

Not in DTI report

The Felsite Lodes system occur on the footwall side of the Carreg-y-doll Lode on the east side of the mountain. As it progresses to the west, it diverges or splits within the acid volcanics (Felsites) occurring in the Great Open Pits and further to the west and north.

POTENTIAL (TONNAGE AND GRADE)

The occurrence of the acid-volcanic (Felsite) group is extensive on the surface and drilling has indicated a lengthy down-dip extension. The CIGOL drilling in a concentrated area showed approximately 30 million tons of 0.71% copper over an

average width of 270 feet*. Since the major ore mineralization (Cu-Pb-Zn-Ag) is associated with the northern group of acid volcanics there are good possibilities and potential wherever this horizon is traced along strike to the east and west and also down-dip. There is a good possibility of (1) increasing the known reserves many times; (2) raising the grade appreciably; and (3) finding major areas of massive sulphides. We are basically dealing with a sedimentary volcanic basin which has large dimensions. Large potential mineralized areas immediately below the Open Pits are virtually untested.

CONCLUSIONS

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Past drill programmes have indicated down-dip extensions of the mineralized zone from vertical depths of 1,000 to 1,500 feet (CIGOL) or 2,000 feet down-dip. It should be noted that many of the previously drilled holes either passed through fault separations and/or were stopped short. Intermine drilling has traced the CIGOL intersections up-dip within 200 feet (vertically) of the surface in one particular area (#IM-22, and #IM-24). All the major occurrences of ore including bluestones (massive sulphides) are known to be associated with the northern acid volcanic (Felsite) phase. Therefore this horizon should be drilled off in its extensions to the east, west, north and up-dip to the south. The Southern Felsite because of its possible faulted relationship to the Northern Felsite, will require further drilling to ascertain its potential, especially since D.D.H. #IM-6 indicated interesting mineralization at its base, i.e. (11.0' of 6.9% Cu., 0.31% Pb., 4.15% Zn.)

RECOMMENDATIONS

The favourable mineral facies within the acid volcanic (Felsite) group is a continuous horizon in which three lode systems are developed. Bluestone (massive sulphides) seems to be the most irregular ore-type, occurring both laterally and vertically within this mineralized facies. There is evidence to suggest that the main mineralized horizon is thickening towards the west and north. The mineralized zone and the Northern Felsite appear to be thinning to the east, however this is probably due in part to the Corwas overthrust. The Southern Felsite continues approximately one mile further to the east. This together with the occurrence of similar mineralized volcanics at the Rhosmynach Mine, two (2) miles further to the east, indicates a continuity eastwards of the mineralized horizon.

The next stage of drilling is proposed in the following areas numbered on maps as follows: (Note: Note in order of priority)

- 1) On the footwall side of the Hanging Wall Lodes where the Carreg-y-doll and Felsite Lodes probably exist (unmined) up-dip from the CIGOL Northern Zone as indicated by

* This grade is considered low because of early termination of numerous holes

- 1) Intermine holes #IM-22, and #IM-24. All of the CIGOL drilling was carried out down-dip from the workings of the Hanging Wall Lodes.
Four (4) holes at 1,000 feet each 4,000'

 - 2) North of the CIGOL holes where the wide mineralized zone flattens and continues northwards to the sea. The change at this point from fragmental acid volcanics to black shales and tuffs indicates the possibility of a massive sulphide environment, i.e. (Bluestones)
Two (2) holes at 2,500 feet each 5,000'

 - 3) West of Morfa Du - Favourable black shales and associated sulphides occur at the surface of Morfa Du. They probably represent an upthrust portion of the shale/sulphide facies discovered in the CIGOL drilling to the north. The area to the west and north should be tested for down-dip development of sulphides. A deep penetration I.P. Survey could precede the drilling.
Two (2) holes at 1,500 feet each and
two (2) holes at 1,000 feet each 5,000'

 - 4) North and east of Henwaith where the Corwas Thrust brings the Mona Complex on the top of the favourable volcanic group. The Corwas thrust plate does not appear (field studies) to exceed 200-300 feet in thickness.
Five (5) holes at 1,000 feet each 5,000'

 - 5) Due east of CIGOL North Zone
Two (2) holes at 1,500 feet each 3,000'

 - 6) Due west of CIGOL North Zone
Two (2) holes at 1,500 feet each 3,000'
- TOTAL FOOTAGE: 26,000'

BUDGET

Diamond drilling - 26,000' @ \$10.00/ft. (Assuming use of present equipment)	\$260,000.00	
Geology - Overhead	\$ 50,000.00	
Assaying	\$ 10,000.00	
Geophysics (One Month)	\$ 7,000.00	
Management	<u>\$ 35,000.00</u>	
	\$362,000.00	\$362,000.00

BRITISH (U.K.) INCENTIVES

Granted
\$126,000.00 DTI

BUDGET RECOMMENDED

\$236,000.00

TIMING

Two (2) drills - 2,000'/machine month
(Including moves)

6 - 8 Months

February, 1972
Toronto, Canada

PM3

THE PARYS-MONA PROJECT

ANGLESEY, WALES, U. K.

REPORT ON EXPLORATION PROGRAMME

JULY, 1971 - FEBRUARY, 1972

BY

ROBERT BATEY, PH. D.

February, 1972

THE PARYS-MONA PROJECT
ANGLESEY, WALES, U. K.
REPORT ON EXPLORATION PROGRAMME
JULY, 1971 - FEBRUARY, 1972
BY
ROBERT BATEY

GENERAL STATEMENT

The Parys Mona area is situated in Anglesey, Wales, U.K. at the north-easterly corner of the island, 1½ miles south of the town of Amlwch (see index map). The region has been known for its mineral occurrences (Cu-Pb-Zn-Ag) since Roman times but its active history really began at the end of the 18th century when the great open pit lodes were discovered and it became the largest copper mine in the world. This active phase lasted until the early 20th century when the mines were eventually abandoned. Since then various exploration programmes have been carried out, particularly after 1960, to find extensions of the old lodes or new lodes altogether. The CIGOL survey (1968-1970) proved some 33,000,000 tons averaging at 0.71% Cu. on the north slope of the mountain. The probability of increasing this reserve many-fold and increasing the grade appears very likely.

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GEOLOGICAL SETTING

The Parys-Mona sulphide deposits occur associated within felsites which are a complex group of acid-volcanics comprising lavas, fragmentals and tuffs which overlie and underlie dense black mudstones and graphitic shales. The lower shale, mudstone group is said to be of Ordovician age whereas the overlying shale group is of Silurian age from its fossil content. To the north and south of the Parys-Mona area, large areas are covered by Pre-Cambrian schists and gneisses, called the Mona complex (see generalized sections).

The outcrop of the volcanic group consists of two irregular east-west trending belts which are contiguous at their western extremities. The outcrop is bounded on the north, west and south by Ordovician shales. Within the north and south belts, Silurian shales occur and continue eastwards to the limits of the occurrence of the volcanics (see geological map).

ROCK TYPES

1) Volcanic Group

This group consists of rhyolitic lavas, acid-fragmentals, and tuffs with intercalations of shale and massive chert. Local chloritization is not uncommon. The whole has been referred to in the past as "felsite". The thickness of this group in the northern "felsite" may be 400-500 feet. The southern "felsite" is generally much thicker.

2) Ordovician Group

This group is made up of dense black shales and mudstones which get greyer and greener north of the mountain. In general there are no macro-fossils and age determination is made on the acrytarch content (micro fossils).

3) Silurian Group

This group is generally dense black and graphitic shales well banded with abundant graptolites (*monograptus*).

4) Mona Complex

This group consists of gneisses and schists of Pre-Cambrian age often brecciated and disrupted.

MINERALIZATION

The major mineralization is associated with the "felsite" group particularly the Northern Felsite. The ore has been defined in several lode systems as follows: (see generalized section)

1) The Hanging Wall Lodes

These lodes vary in thickness from 3-15 feet and they are generally chalcopyrite-rich associated with quartz breccia and may be discordant to the surrounding rock (Ordovician shales). In earlier days these were important copper producers (1.0% - 2.5% Cu.).

2) Carreg-y-doll Lode

This lode varies greatly in thickness (0-100') and is again chalcopyrite-rich occurring within a massive quartz-breccia zone situated at the contact of the Northern Felsite group and the northerly Ordovician shale group (Grade - 0.70% - 2.0% Cu.).

3) Felsite Lodes

This lode group is much more complex than the previous two and is found within the northern volcanic group. It is usually a chloritic zone associated with minor black shales and a considerable development of chert. It varies in its position within the volcanic group throughout the Parys Mona area and may even split up and become separated by intercalations of volcanic material. This lode is the major zone of mineralization and is present throughout the northern volcanic group. It includes the bluestone groups and those lodes associated with the hanging wall side of the Open Pits as follows:

- a) Chlorite-rich zones with pyrite and chalcopryrite (widths 100-400') and grade of 0.5% to 2.0% Cu.
- b) "Bluestone" zones with chert, complex massive sulphides (Cu-Pb-Zn-Ag). Width 0-50'⁺, and grades of 12% combined Pb-Zn with variable amounts of Cu. (1-1.5%) and Ag. (1-5 oz.) Not
DTI

These zones merge down-dip with the Carreg-y-doll Lode beyond ~~2,000'~~ DTI form the mineralized zone intersected in the CIGOL drilling (Northern Zone). i.e. holes #30 and #34 (the rest were probably terminated too early).

STRUCTURE AND LODE DISTRIBUTION

The volcanic mass of Parys-Mona is an upthrust area which has been repeatedly thrust-faulted from the north during the Caledonian Orogeny, so that it consists of a series of imbricate plates about 300 feet thick. The Northern Felsite has been particularly affected resulting in a complete dislocation of the ore zones. The whole has then been more steeply tilted at hilltop and further tear faulting has occurred which has disposed the Parys-Mona zone into a series of blocks aligned along the strike of the volcanic group. The blocks are let down progressively to the west (see plan workings, D.D.H. sections, generalized section)

Both east and west ends of the Parys-Mona area are terminated by faults. In the west at Morfa Du the volcanic group disappears beneath overthrust Ordovician shales. To the east the Corwas thrust covers the northern volcanic group at the surface near Henwaith and transgresses to the east to cover the southern felsite group at Pen-y-sarn.

To the north both volcanics and Ordovician shales are covered by the Carmel Head thrust which brings the Mona Complex almost to the Parys-Mona area.

To the south, the volcanic and various shale groups have been thrust over the Mona Complex.

A combination of all these above factors has caused the disposition of the various lodes within the Parys-Mona area and also led to the recognition of well defined ore localities within the area of known mineral interest.

- 1) Morfa Du (bluestone zone)
- 2) Open Pit Area (bluestone area)
- 3) Hanging Wall Lodes and Carreg-y-doll (chalcopyrite area)
- 4) Henwaith and Eastern Zone (bluestone area)
- 5) Southern Felsite Group (mixed sulphides)

These areas were all worked independently and no previous geological hypothesis was proposed to connect all these zones or to relate them to the stratigraphy, particularly the volcanic group. Recent work by Intermine Limited has shown that all the mineral lodes of the Parys-Mona area are in fact related to the volcanism, and are part of the strato-volcanic sequence even though there possibly may be some later remobilization (i.e. the Hanging Wall Lodes).

LODE SYSTEMS - VARIATIONS

The following is a description of the various lode systems outlining their variations from point to point.

1) East-West Variation *

At Henwaith where the zone has been covered by the Corwas thrust to the east, the Felsite Lodes can be differentiated into two adjacent lodes.

- a) Carreg-y-doll (chalcopyrite in quartz) on hanging wall
- b) Chloritic - bluestone group on footwall (Golden Venture Lode)

The second of these lodes (b) is complex and bounded on its footwall side at this point by the Silurian shales. Westwards a lens of rhyolite (Felsite) is developed on the footwall of the Golden Venture Lode which is split further west into two separate lodes so that the section (north-south) is as follows near the Golden Venture Shaft *.

* See Geological Map, Sections, and Map Mine Workings

1) East-West Variation (Cont'd)

Carreg-y-doll (hanging wall) chalcopyrite-rich

Felsite Lodes

[Golden Venture (pyrite, with bluestone)
Felsite
Bluestone Lode (Bluestone Shaft Area)

The Carreg-y-doll Lode also undergoes some modification westwards and a series of thin lodes are developed on the hanging wall side and the most well-developed of these is referred to as the Charlotte Lode. The sequence (north-south) is thus.

Hanging Wall Lodes (non-productive)
Charlotte Lode
Carreg-y-doll Lode

Felsite Lodes

[Golden Venture Lode
Felsite
Bluestone Lode Group

In the region of the Hillside Open Cast (3), the two phases of the Golden Venture Lode converge again but these felsite lodes become separated from the Carreg-y-doll on the northern side of yet another wedge of felsite so that the lode disposition is as follows.

Hanging Wall Lodes
Charlotte Lode
Carreg-y-doll (maximum development)
Felsite

Felsite Lodes

[Golden Venture
Great Lodes (Black Rock, Clay Shaft) Bluestone Lode

Further west at the section of the Great Open Cast the lode systems undergo further modification and the Carreg-y-doll Lode is apparently faulted out. The section (north-south) is as follows.

Hanging Wall Lode Group [Hanging Wall Lodes
Charlotte's Lode
Carreg-y-doll Lode (faulted at surface)
Felsite

Felsite Lodes

[Golden Venture Lode Group
Bluestone Lodes (weaker)

1) East-West Variation (Cont'd)

West of the Dinorben Shafts area all the lode systems are abruptly terminated at surface by faulting except the Felsite Lode which carries on westwards to the area of Chapel, Pen-y-sarn. At this point however, the irregular lodes of White Rock and Morfa Du make their appearance.

To the west beyond Ida and Engine (Morfa Du) Shafts the volcanic outcrops together with their associated lode systems are covered by overthrust Ordovician shales. Their extension west and north is considered normal

2) Variations Down-Dip (See Composite Sections)

The Hanging Wall Lode systems in the region of Gwen's Shaft converge in depth on the Felsite - Ordovician shale contact. The convergence is noted on all the Hanging Wall Lodes (including Charlotte) progressively to the east (see sections and mine workings map).

The Felsite also appears to narrow in depth at all points on the western slopes of Parys-Mona. The Felsite Lode group with its strong chloritization continues beyond in depth converging with the Hanging Wall Lodes and Carreg-y-doll Lodes to form a very wide mineralized zone (up to 400') - see D.D.H.'s 30, 17A, etc.

INTERMINE PROGRAMME

The Intermine programme was conceived to test the relationship and disposition of the various ore types found in the Open Pit area with respect to environment and geological setting. The conclusions are as follows:

- 1) Immediately east and west of the Open Pit the local bluestone ground apparently becomes attenuated either by faulting or the lack of suitable facies and/or geological environment. The former is most likely.
- 2) Bluestone ore is associated in part if not wholly with the Felsite Lodes (chloritic zone) within the Northern Felsite.
- 3) Bluestone is a sporadic complex ore facies developed in association with chert at intervals within the Northern Felsite (east to west) as follows:
 - a) Henwaith (initially mined by Romans)
 - b) Marquis Shaft Area

- c) Bluestone Shafts, Hillside Open Cast, Great Open Cast
- d) CIGOL Holes No. 30, No. 17A (North and down-dip of Parys Mountain)
- e) Morfa Du (300,000 tons @ 10% Pb-Zn, 0.47% Cu., 1,35 oz. Ag.)

See drawing in DTI ref.

Dimensions of the area in which bluestone is found are approximately 7,000 feet east to west and down-dip extension of at least 1,500 feet (CIGOL #30). Extensions of this will be multiple

- 4) The bluestone zones are contained within a transgressive volcanic horizon and may be separated to the west by intercalations of felsite. Tonnages of massive sulphides (bluestone) at surface are relatively small (300,000 - 500,000 Tons). This is probably due to faulting, however they could be much larger at depth as the blocks become more stable and the environment more favourable.
- 5) The chloritic Felsite Lodes are present west of the Open Pit (#IM-7 and #IM-14) and represent a continuation of the same Felsite Lodes which outcropped within the Great Open Pit where the bluestone was in association with the massive cherts and its last exposure westwards is the bluestone at Morfa Du.
- 6) The chloritic Felsite Lodes group (Golden Venture type) is the principle sulphide horizon and chert/bluestone and Carreg-y-doll zone are facies or modifications of it.
- 7) All rock types and associated lode zones are affected and displaced by two major fault groups.
 - a) Thrust planes trending east-west which have repeatedly overthrust from the north with displacements of 200-300 feet.
 - b) Major tear faults whose direction is north-south and whose general effect is to displace portions of Parys-Mona vertically (100-200') relatively one to another.

M.D. 1/2/6

The first group have caused repeated lateral separation of the parallel lode systems (i.e. Hanging Wall Lodes, Carreg-y-doll Lode and Felsite Lodes). This has caused abrupt termination in worked lodes throughout the mines in a vertical sense (see working plans and sections). Also many of the drill holes passed through these separations (see sections).

The second fault group have displacements of over 100 feet in many cases causing abrupt lateral termination of lodes and associated workings, and permitted the division of Parys-Mona into a series of blocks aligned east-west along strike (see plan of workings).

- 8) The diamond drilling programme initially set out to test for specific extensions of favourable ground in the Open Pit and Morfa Du areas and their extensions. The favourable ground or zone has been termed the Felsite Lode Group. It varies in width (100-400'), grade and disposition from east to west and from surface down-dip to the north. It includes the development of massive sulphides, the chloritic pyrite and chalcopyrite zones, as well as the Carreg-y-doll and related Hanging Wall zones.

*THE ORE ZONE AT PARYS-MONA - LIMITS AND GRADE

The ore zone of Parys-Mona is obscured at surface by faulting to the east and west but remains open to the north, east, and west (down-dip) where it was followed by CIGOL drilling. Indications are that the steep dips (60-70°) present on Parys Mountain where the ore zone outcropped may be much flatter at depth, a relatively short distance north of the mountain.

The Corwas thrust covers the Northern Felsite group at Henwaith and covers the Southern Felsite much further east at Pen-y-sarn. There are good possibilities that the favourable horizon exists beneath the overthrust portion of the Mona complex east and north of Henwaith. Recent geochemical and geophysical results indicate this.

The western end of the Parys-Mona area is faulted off but as the bluestone had re-appeared at Morfa Du there is every possibility of continuance of favourable mineralization to the north and west of Morfa Du.

It should be noted that in many areas of past drilling where the mineralized zones appear to be absent, the reason can be explained by fault separation and/or holes being terminated before cutting the Felsite Lode horizon. Stratigraphic studies indicate numerous holes (CIGOL and other) terminated after cutting the Hanging Wall Lodes. In some cases they cut the Carreg-y-doll Lodes. As a result the CIGOL grade estimates (0.71% Cu) included intersections which lowered the overall grade. If these holes had been continued through the entire Lode System (3 in all) it is our opinion the grade would be appreciably higher. Also the possibility of intersecting massive sulphide ore, which is always on the footwall side would have been likely.

* See Geological Map, Sections, and Map Mine Workings.

STRUCTURE

The study of Parys-Mona has indicated that the Ordovician volcanic group forms a stratified complex lying within a shale sequence which is Silurian above and Ordovician below. The stratified sequence has been repeatedly overthrust from the north (see sections) and the whole area has been traversed by north-south tear faults which have moved adjacent blocks up and down relative to one another. The result has been a complex of ore zone segments repeated and related by faulting in the Northern Felsite group.

The fault systems seen in the Parys-Mona area are thought to continue beyond the immediate outcrops on Parys Mountain. There is every evidence to suggest that the east-west thrust planes continue northwards to the sea and the north-south tear faults are associated with the strato-volcanic complex within the Ordovician group, it is probable that these favourable rocks and associated mineralization continue northwards, eastwards and westwards of the mountain.

RECOMMENDATIONS

The favourable mineral facies within the acid volcanic (Felsite) group is a continuous horizon in which several lode systems are developed. Bluestone (massive sulphides) seems to be the most irregular ore-type, occurring both laterally and vertically within this mineralized facies. There is evidence to suggest that the main mineralized horizon is thickening towards the west and north. The mineralized zone and the Northern Felsite appear to be thinning to the east, however this is probably due in part to the Corwas overthrust. The Southern Felsite continues approximately one mile further to the east. This together with the occurrence of similar mineralized volcanics at the Rhosmynach Mine, two (2) miles further to the east, indicates a continuity eastwards of the mineralized horizon.

The next stage of drilling is proposed in the following localities (see map).

- 1) On the footwall side of the Hanging Wall Lodes where the Carreg-y-doll and Felsite Lodes probably exist (unmined) up-dip from the CIGOL Northern Zone as indicated by Intermine holes #IM-22, and #IM-24. All of the CIGOL drilling was carried out below the workings of the Hanging Wall Lodes

Four (4) holes at 1,000 feet each 4,000'

2)	North of the CIGOL holes where the wide mineralized zone flattens and continues northwards to the sea. The change at this point from fragmental acid volcanics to black shales and tuffs indicates the possibility of a massive sulphide environment, i.e. (Bluestones)	
	Two (2) holes at 2,500 feet each	5,000'
3)	West of Morfa Du - Favourable black shales and associated sulphides occur at the surface of Morfa Du. They probably represent an upthrust portion of the shale/sulphide facies discovered in the CIGOL drilling to the north. The area to the west and north should be tested for down-dip development of sulphides. A deep penetration I.P. Survey could precede the drilling.	
	Two (2) holes at 1,500 feet each and two (2) holes at 1,000 feet each	5,000'
4)	North and east of Henwaith where the Crowas Thrust brings the Mona Complex on the top of the favourable volcanic group. The Corwas thrust plate does not appear (field studies) to exceed 200-300 feet in thickness.	
	Five (5) holes at 1,000 feet each	5,000'
5)	Due east of CIGOL North Zone	
	Two (2) holes at 1,500 feet each	3,000'
6)	Due west of CIGOL North Zone	
	Two (2) holes at 1,500 feet each	<u>3,000'</u>
	TOTAL FOOTAGE:	<u><u>26,000'</u></u>

BUDGET

Diamond drilling - 26,000' @ \$10.00/ft. (Assuming use of present equipment)	\$260,000.00	
Geology - Overhead	\$ 50,000.00	
Assaying	\$ 10,000.00	
Geophysics (One Month)	\$ 7,000.00	
Management	<u>\$ 35,000.00</u>	
	\$362,000.00	\$362,000.00

BRITISH (U.K.) INCENTIVES

omitted
\$126,000.00 DTI

BUDGET RECOMMENDED

\$236,000.00

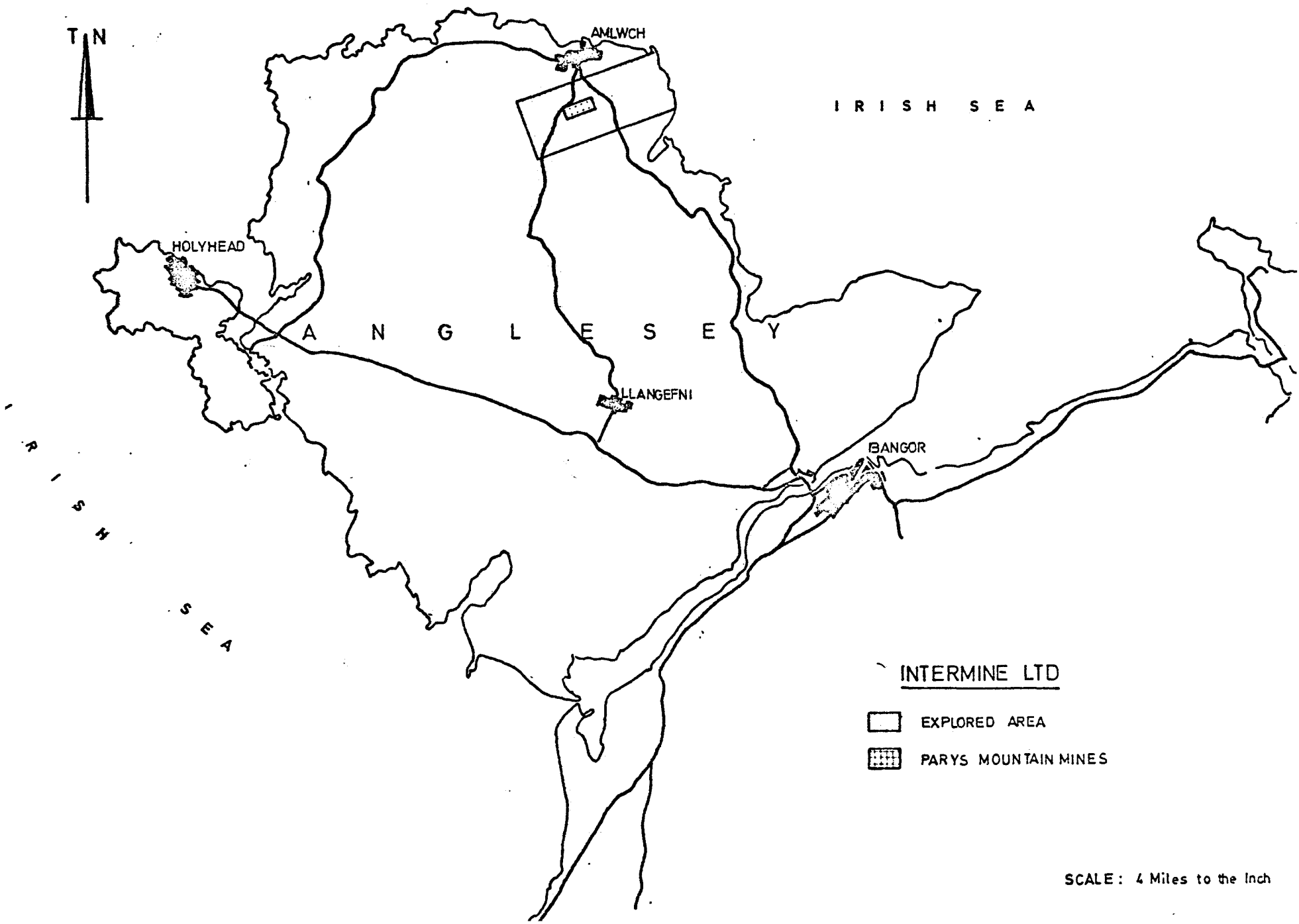
TIMING

Two (2) drills - 2,000'/machine month
(Including moves)

6 - 8 Months

Robert Batey, Ph.D.
Intermine Limited

February, 1972



IRISH SEA

HOLYHEAD

AMLWCH



A N G L E S E Y

LLANGFNI

BANGOR

IRISH SEA

INTERMINE LTD

-  EXPLORED AREA
-  PARYS MOUNTAIN MINES

SCALE: 4 Miles to the Inch