AE 67

Bonsall Fluorspar

C O N T E N T S

INTRODUCTION

On November 4th 1971 Heads of Agreement were signed between The Clay Cross Company, through its wholly owned subsidiary Clay Cross (Land & Minerals) Limited, and Exsud Limited, a wholly-owned subsidiary of South American Consolidated Enterprises S.A., whereby the benefits of a Licence dated July 13th 1971 between Horrox Investments Limited and Clay Cross to explore for minerals in an area of approximately 190 acres on Bonsall Hill, near Matlock in Derbyshire, were assigned to Exsud Limited. The Licence Period was from August 1st 1971 to October 31st 1972.

An Option Agreement to purchase the freehold of the mineral area from Horrox Investments Limited was assigned to Exsud Limited at the same time. The Option Period began when boring started under the Licence and ended fifteen months later.

Exsud's exploration programme in the Licence Area started on November 10th 1971, boring started on November 23rd, and the Programme finished at the end of September 1972.

A Grant for financial assistance under the Minerals Exploration Scheme of the Department of Trade and Industry for this exploration programme was awarded on December 16th 1971 under reference MMEI/AE61.67.

1st October 1972.

SRRH/MC. S.R.R. HOOD.

SUMMARY AND CONCLUSIONS

(i) In Phase I of Exsud Ltd.'s exploration for fluorspar deposits on Mr. Horrox's free holdings on Bonsall Hill, seven vertical boreholes were drilled and the caves, caverns, and old mine workings on and adjacent to the option area were examined. These investigations did not lead to the discovery of large stratiform orebodies containing fluorspar nor did they reveal the existence of large unexploited fluorspar mineralised "flats" associated with the veins and fault structures. Nevertheless, in order to fully explore the possibility of a substantial vein or fault breccia associated with the Great Rake structure and containing fluorspar, further diamond drilling was recommended as Phase II of the exploration programme.

(ii) In Phase II, three inclined holes sited to the south of the Great Rake and angled to intersect the structure along its strike below the lower basalt lavas were drilled. Two of these holes intersected the Great Rake, the other had to be abandoned 80 feet from the estimated point of intersection with the structure. Where intersected by the boreholes, the mineralisation was seen to be mainly calcite and silica, and this mineral association was also seen in the hole which had to be abandoned. It would seem that mineralisation associated with the Great Rake structure changes from fluorspar and lead at the western outcrop, to calcite and silica in depth, and eastwards as the structure plunges under the lower lavas. From local geological and mining experience in Derbyshire, a change in mineral association from fluorspar to calcite and silica indicates that fluorspar is unlikely to reappear in any significant quantity.

(iii) Small fluorspar mining operations, similar to the one currently operated by Mr. Marshall, may well continue for many years washing spar from remnants of ore remaining in the faults and vein structures.

FURTHER EXPLORATION BY EXSUD IN THE BONSALL HILL OPTION AREA IS NOT WARRANTED AS THE EVIDENCE OBTAINED INDICATES THAT THERE ARE NO FLUORSPAR OREBODIES EITHER AS STRATIFIED REPLACEMENT OR VEIN DEPOSITS LARGE ENOUGH TO SUPPORT A MINING OPERATION THE SIZE OF WHICH WOULD BE ECONOMICALLY VIABLE FOR OUR COMPANY.

EXPLORATION REPORT

HORROX/CLAY CROSS OPTION,

BONSALL, DERBYSHIRE

EXPLORATION PHASE I

EXSUD LIMITED

HORROX/CLAY CROSS PROJECT

PHASE I.

Contents

OBJECTIVE.

The objective in Phase I of the Bonsall exploration programme was to prove the existence and extent of stratiform replacement deposits of fluorspar ore similar to the one found under Masson Hill and the escarpment north of the Masson Cavern. The replacement ore bodies were expected to lie in the dolomitised upper and middle limestone beds overlying the upper basalt lava and between the upper and lower basalt lava flows. The possible existence of fluorspar mineralised replacement "flats" associated with the Great Rake, Moletrap Vein, Coalpit Rake and Cumberland/ Speedwell Fault, the principal structures on Bonsall Hill, was also to be investigated by drilling a series of vertical boreholes from the surface and down into the lower basalt lava.

Concurrent with the drilling programme, the caves, caverns, old mine workings surface geology and other surface excavations were to be examined, mapped and assayed where feasible to collate all evidence which might lead to the discovery of substantial (cumulatively amounting to about 1 million tons) ore bodies containing fluorspar.

1. GEOLOGICAL BACKGROUND.

The Horrox/Clay Cross Option Area covers part of an anticlinal structure within limestones and basalts of the Carboniferous Limestone Series.

The geological succession within the Option Area is as follows :-

Upper Limestone	40m
Upper Basalt	15m
Middle Limestone	35m
Lower Basalt	40-100m
Lower Limestone	100m approx. base not known

Over the Option Area the Upper and Middle Limestones are partially dolomitised.

The basalts are conformable with the limestones but there are local inconformities within the Upper Limestone horizon.

The mineralisation in the Option Area is mainly fluorspar and calcite with subordinate amounts of barytes and galena, and is most strongly developed along three fault veins; the Great Rake, the Moletrap Vein and Cumberland/Speedwell Fault.

The following stages are suggested in the genesis of the Bonsall mineralised deposit :-

(i) Folding and faulting occurred prior to the main periods of mineralisation.

(ii) Secondary dolomitisation affected the Middle and Upper Limestones over much of the Option Area. This metasomatic process caused a decrease in volume of the limestones giving rise to void space.

iii) Mineralised fluids migrated upwards along faults, fractures, and in cavities crystallising fluorspar, calcite, barytes and galena. The dolomites were also replaced by these minerals, particularly along a horizon between the Upper and Lower Basalts and more locally immediately above the Lower Basalt.

SUMMARY

(a) Geological studies of the surface, caves and old mine workings started at the beginning of November 1971.

(b) Air Flush diamond drilling (core diameter approx. 73 mm.) started on November 23rd 1971, and finished on January 4th 1972. In this time 7 holes were drilled from the surface to the lower basalt lava. A total of 341.10 metres of borehole drilling was completed in this phase of the Exploration Programme.

(c) None of the boreholes encountered a stratiform replacement orebody containing fluorspar, nor was there evidence of any mineralised "flats" associated with the major geological structures in the prospect area.

(d) Any fluorspar mineralisation found occurred as thin veinlets or fracture and cavity encrustations within the dolomitised limestones. These fluorspar veinlets and fluorspar encrustations could not as such be mined economically, and collectively do not appear to form a stockwork or fluorspar dissemination within the limestones and dolomites to justify a large open-pit or quarry type operation.

(e) Examination of the geological structures within the Option Area indicate that the Great Rake offers the best target for further exploration. If fluorspar mineralisation, as seen at the Low Mine as vein infilling, persists in depth and along the strike, about half-a-million tons of fluorspar ore might be discovered. Exploration for this orebody is recommended as Phase II of this programme.

(f) Further investigation and exploration of claims outside Mr. Horrox's Option Area on Bonsall Hill is not warranted as none of the adjacent claims would appear to contain enough reserves to support the size of mining operation envisaged by Exsud Limited.

2. VEIN, FAULT SYSTEMS, AND REPLACEMENT ORE BODIES ON BONSALL HILL.

A. Within the Prospect Area.

(i) Great Rake.

The Great Rake is an E-W fault of moderate displacement and is the most persistent structure within the Option Area. It is the only known structure to continue in depth below the Lower Basalt where it supports a vein about 3 metres wide, exposed in surface workings west of Low Mine (abandoned). The fault can be followed over a distance of about 2,000 metres and it carries fluorspar, calcite, and some lead mineralisation along the entire strike length. Mineralisation is variable and within the basalts is greatly reduced or absent.

The vein was worked from the Low Mine below the Lower Basalt for galena and fluorspar to a depth of about 250 ft. The old workings are reported to have bottomed on clay wayboard or toadstone, possibly the discordant dolerite which is exposed to the west of the Option Area. The shaft and old underground workings have been filled with mill tailings and the old mine workings cannot be examined.

Above the Lower Basalt to the south of the main vein structure, fluorspar mineralisation can be seen in the area being worked by Mr. Marshall. Here there has been some patchy replacement as well as veins and cavity and fracture encrustations. At this locality this horizon of mineralisation is apparently not developed to the north of the Great Rake, probably due to fault displacement. Further to the east the intensity of the vein mineralisation decreases but it is assumed to continue through the workings from the Masson Cavern which may also be associated with a replacement horizon.

(ii) Coalpit Rake.

The Coalpit Rake, which runs E-W across the Option Area within the dolomitised Middle Limestone, is seen to the east of Ember Farm as a series of narrow veins which, on a small scale, have been worked from the surface of fluorspar.

More extensive underground workings from the Devonshire Cavern follow an easterly dipping mineralised horizon 2-3 metres thick for a length of 200 metres. Mineralisation takes the form of two or three sets of intersecting vertical East-West striking veins. These veins rarely penetrate the roof of the main mineralised horizon.

The workings are calculated to lie about 30 metres above the Lower Basalt.

There is no evidence of faulting along the Coalpit Rake.

(iii) Moletrap Vein.

The Moletrap Vein is a mineralised E-W fault within the dolomitised Middle Limestones. The fault has a maximum throw of 40 ft.

The Moletrap Vein is an almost vertical structure and has been largely worked out (as the Wapping Mine) along its strike length of 200 metres, and to a height of about 10 metres above the floor which appears to follow the top of the Lower Basalt. The vein width varies from 2 to 10 metres (averaging about 6 metres) and the walls are substantially free of vein material.

At the Western end of the mine, cross cuts have intersected a series of lead-fluorspar veins running parallel to the main structure. Two of these veins have been substantially exploited. One, to the south of the Moletrap Vein, is near vertical, averages 3 metres wide, and has been worked to a height of about 20 ft. The other vein to the north is thinner, averaging 2 metres, dips at 80° SW, and has been worked to a height of about 15 ft. above the floor, which is on or close to the Lower Basalt. A range of workings running NE from this vein are in cavitous, mineralised dolomites.

A separate series of workings, substantially collapsed and in unstable ground, run in a northerly direction above the Wapping Mine and other old workings and link the Moletrap Vein to the Cumberland Cavern. The chambers, along which access is possible, run for the most part along two horizons of southerly-dipping dolomites which show variable degrees of fluorite replacement. Mineralisation elsewhere is sparse and is seen as thin veins or coatings of calcite and fluorspar on fracture surfaces.

(iv) The Speedwell Cavern and Hopping Pipe Mine.

The Speedwell/Cumberland Fault is seen in the Speedwell Cavern as a 2-3 metre wide mineralised vein along 100 metres of strike running NW-SE. The vein dips at 70° to the SW. The fault is normal, having a maximum throw of 50 ft. to the SW.

To the NE of the fault, particularly in one horizon, there has been extensive ore replacement about 5-10 metres thick. This horizon has been substantially worked for lead and later for fluorspar in the Speedwell Cavern and Hopping Pipe Mines where the degree of replacement has been most complete. The mineralised replacement horizon, which probably lies about 100 ft. above the Lower Basalt, is overlaid by gently dipping massive dolomites which show limited mineralisation usually restricted to encrustations along bedding and joint surfaces. Subsequent collapse of huge dolomite blocks from the roof of the old workings initiated by separation along clay partings, has left the caves and the surface above in a very precarious state.

To the SW of the fault, replacement is very limited and is seen over a few metres only.

It is assumed that mineralisation occurred after faulting and that only the dolomites on the NE side of the fault in the Speedwell Cavern were amenable to mineral replacement.

B. Outside the Prospect Area.

(i) The Dolphin, Coates, Pitchmastic Area.

Four parallel mineralised veins (recently worked out) within the dolomitised Upper Limestone lie on Coates' and Dolphin's property to the south of and outside the Option Area. The veins strike NW-SE approximately parallel to the Bonsall Fault with some veins formed along subsidiary faults. The widest vein of 4-5 metres is located on Dolphin's property.

(ii) The Deepwood Mining Property.

A number of shallow trenches and pits have been excavated by the Deepwood Mining Co. in the Upper and Lower Limestones close to, but outside, the Option Area.

(a) Trenches in the Upper Limestone. A total of 14 trenches have been excavated in the Upper Limestone on the site of known old workings close to the top of the Upper Basalt. The trenches have intersected a series of friable fluorite veins running approximately parallel to and on the NE side of the Bonsall fault. In addition to the veins, the widest of which is 3 ft., the trenches have sometimes exposed patches of friable fluorite below the subsoil. The biggest trench, close to the Pitchmastic Quarry soil tip, shows three main veins, the widest of which is 2 ft., exposed in the face of the trench.

(b) Excavations in the Lower Limestone. Two excavations have been made in the Lower Limestone below the Lower Basalt east of Bonsall. One of these shows moderate encrustations and cavity fillings of fluorspar on silicified Limestone. The other shows only sparse mineralisation.

(iii) Masson Hill Area.

This area, which is to the North of the Great Rake, includes a number of old mine workings such as the Masson Mine and Black Ox Mine which is served by High Loft, Beckman, and Crichman Shafts. It has been intermittently worked for fluorspar since 1910. It is owned part by a Mrs. Pearson (Netherwater Spar Co.), part by Laporte Industries Ltd., and a very small part by Mr. Horrox which is included in the option.

The area is of considerable interest geologically despite the fact that it is largely outside the Option Area, because it is here that the stratiform replacement ore zones were first noted and investigated.

The replacement zones follow the contact between the Lower Basalt Lava and the Middle Limestone, and vary in thickness from 1½ to 6 metres. From examination of old workings and plans, the replacement has been found to be very erratic and discontinuous. The old workings, which follow the calcite-fluorspar mineralisation, trend to the North West for about 800 metres, commencing at the eastern end of the Great Rake and ending at the Masson open pit.

The workings are all interconnected and show that the replacement zones do not extend very far down dip; the maximum width of zones examined was approximately 20 metres.

The mineralisation consisted of fluorspar and calcite with traces of galena and baryte.

Several vertical structures trending North West are to be seen.

4. POTENTIAL OF MAJOR STRUCTURES IN PROSPECT AREA.

(i) Great Rake.

Any ore potential in the Great Rake structure lies in the section within the Lower Limestones below the Lower Basalt lava to the east of Low Mine. Elsewhere within the Great Rake the ore has probably been worked out by earlier mining operations.

On this basis, order of magnitude calculations suggest a maximum of 500,000 metric tons assuming a total vein width of 4 metres, a strike length of 500 metres and a depth of 100 metres.

Inclined drilling would be necessary to prove the vein width and vertical extent.

(ii) Coalpit Rake.

The Coalpit Rake does not appear to offer any potential in itself. The extent of mineralisation is inadequate and is unlikely to persist below the Lower Basalt.

(iii) Moletrap Vein.

Most of the Moletrap Vein where it occurs in the middle limestone between the upper and lower basalt lavas has been substantially worked out by the Wapping mining operations. Residual ore in this zone could only amount to about 50,000 tons.

It is possible that the vein persists in depth below the lower basalt lava which in the mine area is calculated to be about 40 metres thick. Below the lava the strike length within the prospect area could be about 300 metres; assuming a vein width of 4 metres, the ore potential is about 3,500 tons per metre of depth. However, these lower workings would be below the level of the River Derwent.

(iv) The Cumberland Cavern/Speedwell Fault and the associated manto development.

The mineralised vein associated with the Cumberland/Speedwell Fault has been seen in the Cumberland Cavern over a strike length of only 100 metres and lies directly under housing along the Upperwood Road outside the Option Area. It has limited vertical extent although it may persist in depth, possibly below the Lower Basalt. These factors rule against any potential from the mineralised fault although the Geological Survey 6-inch sheet shows a possible extension of the vein NW into the Option Area for 250 metres beyond the limit at which access was possible from the Cumberland Cavern. Were this so, the mineralised fault would still only hold possibilities if it persisted in depth below the Lower Basalt.

The ore replacement, seen on the NE side of the Cumberland/ Speedwell Fault, was not intersected in drill hole No.2 to the north of the known workings on this horizon, neither was it found in drill holes 4 or 5 at greater depth on the SW side of the fault. This suggests that even though some mineralisation has been found associated with this horizon elsewhere in the Option Area (as at Devonshire Mine and, probably, Masson Mine) massive replacement is not persistent.

5. CONCLUSIONS.

Diamond drilling has failed to prove the existence of stratiform replacement deposits of fluorspar within the Option Area on Bonsall Hill similar to the one to the north on nearby Masson Hill. It has been equally disappointing to find that there does not appear to be any fluorspar-mineralised "flats" associated with the Great Rake, Moletrap Vein, Coalpit Rake and the Cumberland/Speedwell fault system, the major geological structures on Bonsall Hill.

Fluorspar mineralisation, as seen in the borehole cores, occurred as thin veinlets (1/8" to 1/4" wide) or cavity encrustations, all too small to be mined individually. Collectively these veinlets and cavity encrustations could not be worked economically by open pit or quarry type operations.

Examination of the major structures in caves, caverns, underground and surface workings shows that the Great Rake offers the best target for further exploration. If the wide vein, as seen in the limestones below the lower basalt lava at the Low Mine, persists in depth and continues its eastward strike under the lava, some half-a-million tons of fluorspar ore might be discovered and proved. A further series of boreholes, drilled from south of the Great Rake and inclined to intersect the structure at various depths along the strike, is therefore recommended. This operation would form Phase II of the Exploration Programme and, if successful, might justify the exploration of the Moletrap structure in depth.

Other fluorspar deposits outside the Option Area, with the exception perhaps of Masson Hill deposit, are of no significance. The trenches excavated by the Deepwood Mining Co. in the Upper Limestones to the west of the Option Area have found veins of fluorspar in the old mine workings. However it is not expected that any appreciable reserves of ore can be established in this area because the upper basalt lava is only a few feet below the surface and will, as elsewhere, cut off the mineralisation.

At Masson Hill the deposit, owned by Laporte Industries Ltd., is not likely to be further exploited by open cast or quarry type operation because the quarry face will break out onto the escarpment overlooking Matlock and Matlock Bath and draw considerable criticism from Local Authorities and other Amenities Societies. Underground mining requiring roof support methods will be expensive and at present commodity prices the operation would not be economically viable.

APPENDIX

List of Documents accompanying this Report :

1 BONSALL AREA MAP Filed.

1a Diamond Drill Hole Log Sheets for holes 1 to 7

2. Diamond Drill Assay Sheets for holes 1 to 7

3. East-West Sections on Great Rake Filed

EXPLORATION REPORT

HORROX/CLAY CROSS OPTION,

BONSALL, DERBYSHIRE

EXPLORATION PHASE II

EXSUD LIMITED

HORROX - CLAY CROSS PROJECT.

PHASE 2 - DIAMOND DRILLING ON THE GREAT RAKE

OBJECT.

The object of phase 2 was to examine by diamond drilling the possibility that fluorite existed in depth in commercial quantities on the Great Rake in the limestone formation beneath the Matlock Lower Lava and in the same limestone formation, where it is exposed in the western end of the Great Rake lying within the property under consideration.

SUMMARY.

1. The geology of the area is described in relation to the diamond drilling programme which forms the subject of this report.

2. Three inclined boreholes were drilled with the object of intersecting the Rake from the south at depths of 100 to 150 metres at its western end, in the centre beath the Lower Lava and at the eastern end where it lies both beneath the Lower Lava and part of the succeeding formation represented by the Matlock Dolomite.

3. None of these boreholes proved more than trace amounts of fluorite on intersection with the Rake. Calcite and to a lesser extent chert were the dominant minerals. The borehole at the eastern end was abandoned in chert and calcite before it reached the estimated intersection, the rods having become stuck to such an extent that continuation of the boring was considered to be impracticable.

4. There is evidence that fluorite was present in variable but small amounts in cavitous and possibly cavernous ground immediately beneath the Lower Matlock Lava to the south of the Rake, but none of the boreholes intercepted this horizon in the Rake itself.

5. The most westerly of the three boreholes shows that lava was present beyond the Limestone outcrop shown on the I.G.S. maps. Of the two possible explanations for the repetition of the lava outcrop, it seems that the presence of a north-south fault is the most acceptable. Such an explanation is consistant with the presence of fluorite in the open-cast workings of A. Marshall and others at the western end of the Rake and also with the collapsed structures in the walls of the Rake to the east of the workings towards the Low Mine.

6. Detailed descriptions of the borehole cores are given at the end of this report, together with diagrams and sections summaris: the main results.

7. Samples for chemical analysis were taken from those portions of the boreholes affected by mineralisation, in order to confirm the presence or absence of fluorite, and in the case of the former to make some quantitative evaluation of its purity and of the associatec minerals present. Significant amounts of fluorite were proved only for samples taken from Borehole 8 at the base of the Lower Lava. In addition to their fluorite content these samples were found to be extremely siliceous. The remaining samples sent for analysis were found to contain little more than trace amounts of fluorite or to be of only small thickness.

8. Other minerals found to be present during examination of the cores were Pyrite, Iron Sulphide, FeS_2, mainly associated with the Lava and Ash, and Sphalerite, Zinc Sulphide (ZnS) present in calcite veins low down in the Limestone formation. Remarkably Galena/Lead Sulphide (PbS) was noticeably absent except as a trace in Borehole 8 near its intersection with the Rake.

CONCLUSIONS.

1. There is no evidence that the Great Rake contains fluorite in sufficient thickness, depth and quality to support a large scale mining operation.

2. There is evidence both from the boreholes and also from opencast working that fluorite is present in variable thickness and quality in the limestone formation immediately underlying the Matlock Lower Lava, i.e. at the top of the Hoptonwood Limestone. At greater depth the borings indicated that the Rake contained mainly chert and calcite with only thin veins of fluorite.

1. GEOLOGY.

1.1. The geology of the area in relation to the fluorite deposit is described by K.C. Dunham, 1952 "Fluorspar" Special Report Mineral Resources No.4 and by E.G. Smith, G.H. Rhys and R.A. Eden, "Geology of the Country Around Chesterfield, Matlock and Mansfield" in the Memoir of the Geological Survey for the new series one-inch geological sheet No.112. More recently Ford and Ineson, 1971 described the fluorspar potential of the area in a paper to Section B of the Institute of Mining and Metallurgy.

1.2. Reference has been made to the possible origin and nature of the deposit in the Exsud Limited reports covering Phase 1 of the present project but since these concern mainly the fluorite occurrences between the two lava flows, the Matlock Upper Lava and the Matlock Lower Lava, it is necessary to consider in more detail the stratigraphically deeper and less well documented occurrences beneath the Matlock Lower Lava. The essential difference between the limestones above and below the lava is that the higher limestones in the Masson Hill - Bonsall Area had been extensively dolomitized whereas there was no evidence in the borehole cores forming the subject of this report that the Hoptonwood Limestone had been similarly affected. There was some evidence that cavernous conditions existed below the lava as well as above, so that the dolomitization may not be the only agency responsible for the caves above the lava and in fact their trends suggest normal solution as the main agency. Dolomitization alone leads to collapsed rather than cavernous structures. Further north in the Peak District, where there is less dolomitization and the fluorite deposits are in more or less solid strata fractured only by tear faulting, there is better continuity of the mineral structures than in the Matlock Area. It is therefore probable that the cavernous conditions occurred later than the fluorite mineralization, but together with the faulting may well have played an important part in their dissection and redisposition.

1.3 There is evidence that dolomitization occurred at almost all horizons of the Carboniferous Limestone in the area but fluorite mineralization appears to be confined to the higher beds and to be influenced more by the impervious cap rocks, represented by the lavas, than by cavernous conditions. It is nevertheless difficult to explain how it is that the fluoritization was more prevalent immediately above and below the Matlock Lower Lava than at the base of the two lava horizons.

1.4. There was no evidence of fluorite at depths provided by the intersection of the boreholes in the Great Rake, but there was massive calcite with chert-lined walls which suggest some connection with the fluorite mineralization nearer the surface which has a similar association with silica in the wall rock. This evidence is in accordance with the published memoir, but while it suspected that the fluorite is at depth in the Low Mine, did not take into consideration the fact that the Matlock Lower Lava was downfaulted and that this mineralization was in fact not so far beneath the lava as suggested - "extending some hundreds of feet below the Matlock Lower Lava". (Smith, Rhys and Eden 1967 - Page 44 Great Rake).

2. DRILLING.

2.1. The Phase 2 drilling covered a wide stratigraphical range since it included the lower dolomitic beds of the Matlock Limestones, the complete thickness of the Lower Lava and the Hoptonwood Limestones beneath and also the top of the Griff Grange beds of S2 age. Only two of the three boreholes intersected the Great Rake, DDH 8 at 108.90 metres and DDH 11 at 180.00 metres, as measured from the collar of the hole. The third borehole, DDH 10, failed to intersect the Rake although it showed an almost continuous series of broken and calcified beds from beneath the Lower Lava to 172.65 metres, where the rods became stuck and the hole had to be abandoned. The calcite which was sometimes coarsely crystalline and in considerable thickness was accompanied by clay, limestone breccia and chert veinlets as well as silicified limestone. There may well have been a continuous series of minor slips resulting in the formation of the calcite but there was no evidence of major disturbance. The Matlock Lower Lava showed no major fractures but there was considerable calcite veining and occasional slickenside markings were recorded in the cores from the lava. Of the two boreholes which intersected the Rake, DDH 8 proved the presence of thin fluorite veins in sparry limestone which was mainly calcite. There was much clay, iron oxide staining, pyrite and traces of galena. Some of the limestone was ashy in character. DDH 11 intercepted the Rake proving calcite with silicified and chert-lined walls, but no evidence of fluorite. Pyrite was present and there was sphalerite disseminated with calcite in thin veins just beyond the Rake on the north side. No barytes was noted in the boreholes although it is recorded further to the west near Bonsall on the Geological Survey six-inch maps.

2.2. The boreholes provided one complete section (Borehole 10) of the Matlock Lower Lava and two part-sections. An interesting horizon is recorded which included limestone fragments and fragments of lava different in appearance from the lava enclosing them. The limestone fragments included lithologically different types in close proximity and they may have been of "Agglomerate" origin. Towards the base of the formation an occasional marmorised fragment was found and some obvious sections of large pieces possibly +100 mm. or more and of boulder size. The basal beds of the lava were ashy in character and in the case of DDH 8 were interbedded with thin limestone with a repetition of thin lavas and ash just above the top of the Hoptonwood Limestone. It was this horizon in DDH 8 which contained the most substantial development of fluorite, but even so it was very considerably silicified, as noted by Ford and Ineson, page B205. DDH 8 also showed fluorite veins with limestone and calcite in the Hoptonwood limestone immediately below the Lower Lava and although these were apparently unaffected by silicification they were insignificant in thickness.

2.3. The lava with limestone fragments formed a useful horizon in that it enabled the three borehole sections to be correlated with more conviction. This was particularly necessary in the case of DDH 11 where it was important to establish a repetition of the lava outcrop in the neighbourhood of the Low Mine as evidence for a north-south fault. Ford (page B204) shows two faults in the area intersecting each other and both intersecting the Great Rake. It seems likely that both these faults actually cut the Rake and are not cut off by it. There is no evidence from the boreholes to show whether the Great Rake is younger or older than the fluorite of the area. The silicification at surface in the Rake, where fluorite occurs at depth associated with calcite as proved by the boreholes, supports a zonal deposition rather than a different age for the mineralization.

2.4. All three boreholes showed loss of core, an indication of cavitous conditions in the horizon beneath the Matlock Lower Lava -

e.g. DDH 8 From 64.00 to 67.00 m. Cavity 1.93 metres
Mineralised limestone with fluorite in cavities
in base of Lower Lava.

DDH 10 From 125.90 to 129.06 m. Cavity 3.16 metres. Mineralised limestone with calcite and fluorite veins with clay and silicified limestone, 8 metres below base of Lower Lava.

DDH 11 From 32.7 to 34.9 m. Cavity 2.2 metres. In brecciated limestone and chert with thin calcite and fluorite veins 8.4 metres below base of Lower Lava.

At this horizon there is evidence of ground water movement since it was in each case the level at which drilling water disappeared underground, thus representing a favourable horizon for solution. In DDH 11 the Lower Lava was substantially decayed but was sufficiently cohesive to show many of the features present in the undecayed material. The main effect of the decay was clay at the surface, and a generally dark brown and iron stained appearance at greater depth.

3. SAMPLING AND ANALYSIS.

3.1. Samples were taken from longitudinally split cores at all horizons where there was evidence of fluorite mineralization and in some cases e.g. the calcite vein at the intersection of DDH 11 with the Great Rake, where fluorite might be expected to be present in small amounts.

3.2. Samples for DDH 8 were taken near the base of the Lower Lava on the first appearance of calcite and fluorite stringers. One sample was taken higher up in the lava itself.

Sample No.	From M	To M	CaF2 %	SiO2 %	Rock Type
222	10.80	10.95	0.12	-	Veined Lava
223	60.90	61.19	0.03	-	Ash
224	61.19	61.89	0.15	52.35	Ashy limestone
225	61.89	62.50	2.44	-	Mineralized Limestone
226	62.50	63.30	6.33	-	Fluorite traces in ashy mineralized limestone.
227	63.30	64.00	10.95	20.75	Fluorite traces in mineralized limestone.
228	64.00	67.00	33.02	63.15	Mineralized Limestone
229	67.00	68.60	5.12	44.55	" "

The results support the contention by Ford and others that the fluorite mineralization at the top of the Hoptonwood Limestone and below the Lower Lava is accompanied by silicification. A thin lava flow occurred below this horizon, but the mineralization was recorded in the limestone deposit between this and the main flow which then continued without interruption to the base of the Matlock Limestone. Further thin fluorite veins occurred below this horizon of the lower flow which was correspondingly nearer the Great Rake. This sequence was complicated by bands of ashy limestone and clay. The thin fluorite veins were associated with calcite veins in normal limestone.

Sample No.	From M	To M	CaF2 %	SiO2 %	Rock Type
253	89.70	89.90	7.3		Calcite vein.
230	100.84	101.30	30.12		Calcite and Clay.
231	101.30	102.35	11.38	7.10	Calcite vein.
233	102.35	103.88	10.88	20.30	Spar and Clay.

The Great Rake intersection was thought to be at 108.90 m. based on the presence of brecciated limestone, calcite veins and brown, green and black clay. Normal light grey limestone of Hoptonwood type was encountered at 115.80 metres and continued to the base of the boring at 138.05 metres.

Whether or not the repetition of the ashy sequence of limestone and lava is evidence of the Rake itself splitting is a matter of conjecture but neither DDH 10 nor DDH 11 indicate that the Lower Lava was broken up into thin units at its base. The lava encountered by DDH 11 was clearly derived from the main Lower Lava flow and was thicker than any of the lower ashy units proved by DDH 8.

3.3. DDH 10 was sampled at the base of the Matlock Lower Lava where traces of fluorite were proved both during examination of the cores and by subsequent analysis Again it is conjecture as to whether this has spread from the Rake as veins or is present for some other reason which is not known.

Sample No.	From M	To M	CaF2 %	Rock Type
236	117.56	118.00	0.1	Veins in limestone, pyritic.
237	119.00	120.00	4.3	Veins in limestone, siliceous.
238	120.00	120.25	2.5	" " " "
239	123.00	125.00	1.5	" " " "
254	155.00	155.50	0.3	Purple staining in calcite vein

Base of Lava at 116.75 m. Cavity at 125.90 to 129.06 metres.

Below the horizon of the cavity there was much brecciated limestone clay filled cavities, silica veins and chert cemented breccia, a sequence which continued to the base of the borehole where it was abandoned at 172.65 m.

3.4. DDH 11 contained stray lava fragments in a clay matrix in which calcite and fluorite veins were present. These formed part of the weathered and decayed lava encountered in this borehole. The main samples for DDH 11 were taken from the base of the decayed lava in cavitous ground, thin veins with fluorite in the Hoptonwood Limestone and a massive calcite vein in which there was no fluorite visible.

Sample No.	From M	To M	CaF2 %	Rock Type
249	6.50	7.25	0.1	Decayed lava fragments
250	31.70	34.90	4.6	Veins in cavitous limestone with
(Cavity	32.7 to	34.9 m.)		calcite and fluorite
251	58.25	58.45)	0.5	Blue fluorite veins with calcite
252	58.45	59.80)	0.7	in light grey limestone.
240	181.30	182.00	0.1	Calcite with chert.
241	182.00	183.00	0.1	Calcite.
242	183.00	183.70	0.1	"
243	183.75	185.00	0.1	"
244	185.00	186.00	0.1	"
245	186.00	187.00	0.1	"
246	187.00	188.00	0.1	"
247	188.00	189.00	0.1	"
248	189.00	189.80	< 0.1	"

The main calcite vein ended with chert and calcite at 189.70 m. Thereafter the boring continued in calcite veined limestone with thin pyrite veins, calcite and sphalerite at 202.20 to 202.70 m. There was a continuous sequence of fine grained, grey and occasionally sparry limestone and calcite mudstone believed to represent the Griffe Grange Limestone from 205.95 to 236.40 m. There were further traces of sphalerite with calcite at 212 m.

4. CONCLUSIONS.

4.1. The main conclusion can only be that there is no evidence provided by the boreholes that fluorite is present in depth in any substantial amount in that part of the Great Rake covered by this survey. Calcite is shown to be the dominant mineral, and even where there is fluorite it is likely to be affected by silicification.

The boreholes proved that the horizon in which fluorite had tended to accumulate was at the base of the Matlock Lower Lava but that the mineralization was not in great depth.

4.2. Four general types of mineralization are recognisable in the borehole cores :-

(1) Replacement of the thin, possibly ashy, limestones immediately beneath the Matlock Lower Lava. Cavernous ground was recorded by all three boreholes at this horizon. The caverns or cavities may be either later or earlier than the mineralization, but in any event it seems likely that silicification took place at a later stage than the mineralization, hence the silicification of mineralized surfaces recorded in all boreholes.

(2) Direct deposition in the Great Rake itself. The borehole evidence for this type can be referred only to the massive crystalline calcite, 6 metres in thickness recorded by DDH 11, bounded by the silicified walls of the Rake.

(3) Fine and coarsely veined massive limestones with thin veins of calcite and fluorite. Mainly calcite at depth with traces of sphalerite and pyrite. The calcite veinlets appear in some cases to have been affected by silicification or to have been edged with chert-like formations of silica.

The cores show different sets of calcite veins intersecting, thus representing different stages of calcitization.

(4) Re-cementing of brecciated limestone mainly by calcite

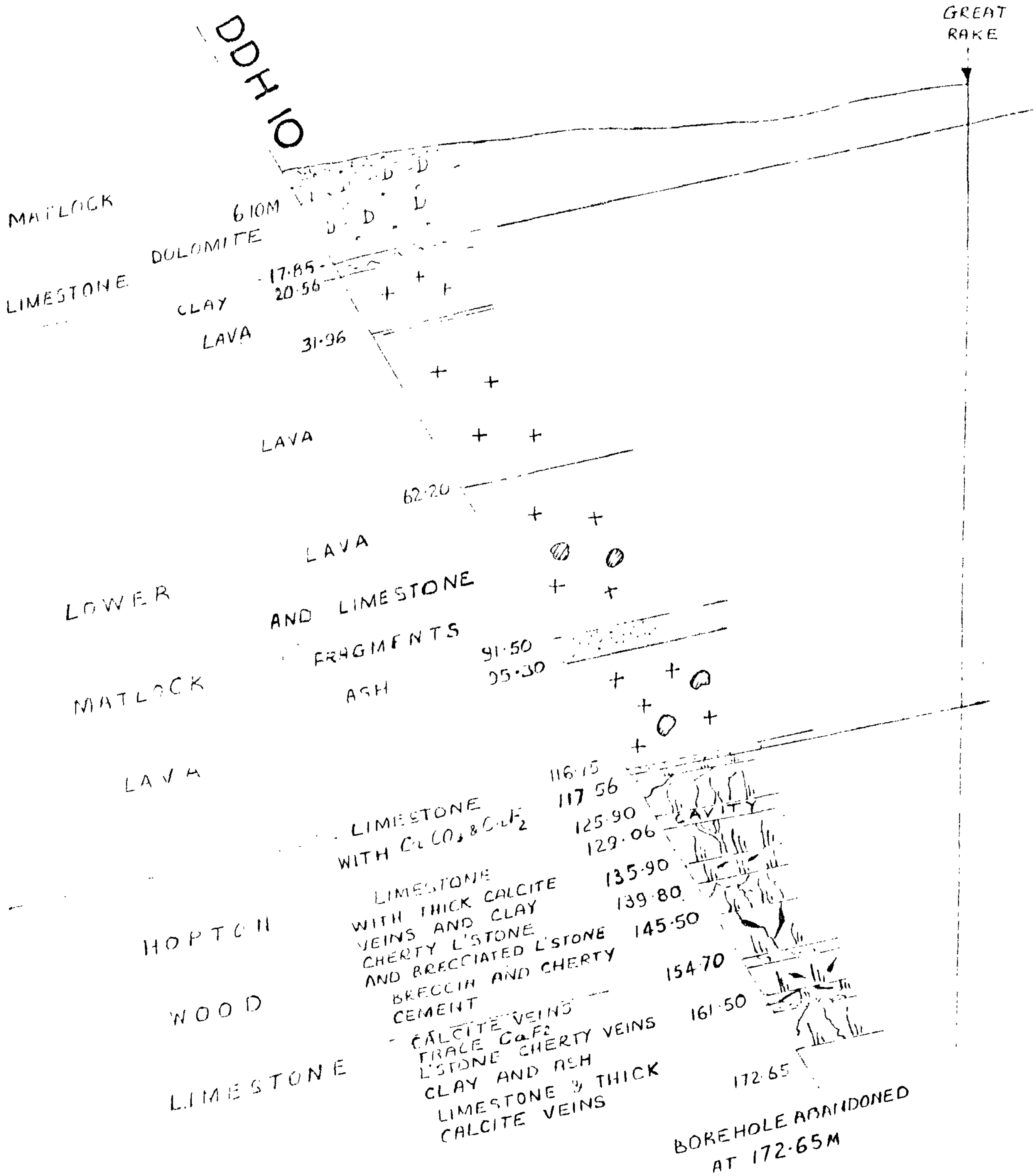
4.3. No evidence was provided by the boreholes of the intermediate stages of mineralization in the Great Rake between the exposed horizon of the Hoptonwood Limestone near the Low Mine, and the massive calcite filling the Rake at 150 metres below the surface. The Rake had however diminished in width to about 5 metres at this depth; it is this intermediate portion of the vein which will continue to require investigation, if even the present day type of working is to carry on.

4.4. There is no evidence that even a small mining operation under the Lower Lava would be successful although neither of the two boreholes DDH 8 and DDH 10 intercepted the Rake at a favourable horizon in this respect, since the base of the lava was encountered at some distance from the Rake.

4.5. It is not the intention of this report to disprove the validity of present operations on the Horrox property, but it is to emphasise that there are no proved reserves of sufficient magnitude to support a large scale mining operation, say of the order of 0.5 to 1 million tons of treatable ore. Further small scale operations might well be extended at the south end of the Rake to examine the cross faulting which is shown to be present in the area of the Low Mine.

4.6. With regard to quality, the silicification to which attention is drawn in this report and by Ford and others, may be confined to the margins of the Rake and to cross faults since DDH 11 showed that the calcite filling at depth, within the Rake itself, was free from silica and that only the wall rock was silicified. Furthermore massive fluorspar which appears to be low in silica was seen to be present in parts of the opencast workings near the Low Mine.

TIONS ON GREAT RAKE DDH 8 10 AND 11



EXSUD LIMITED,

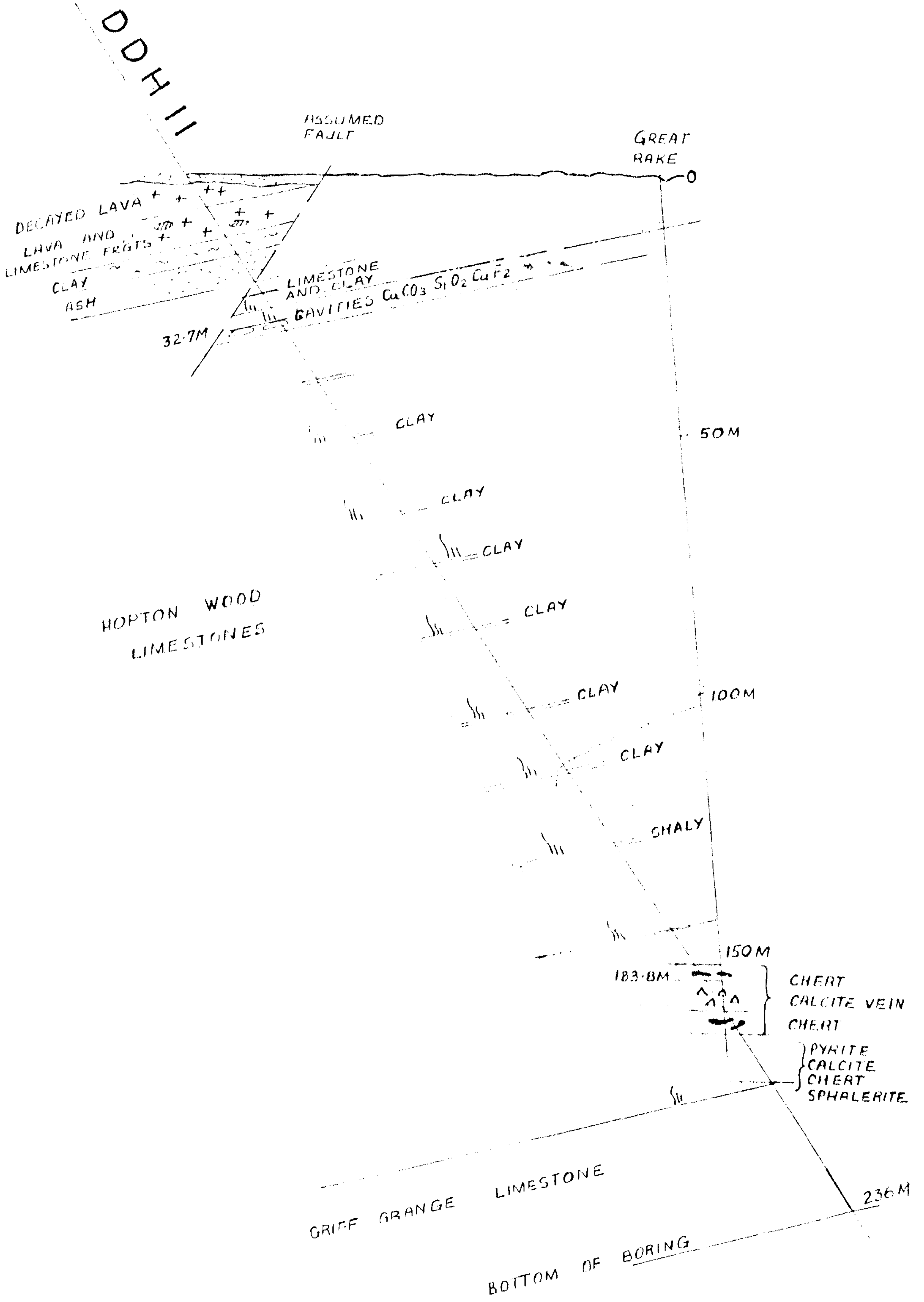
PFD JULY 1972

APPENDIX

List of Documents accompanying this Report :-

1. Diamond Drill Hole Log Sheets for holes 8, 10 and 11.
2. Diamond Drill Assay Sheets for holes 8, 10 and 11.
3. Borehole Section Location and Stratigraphy. Filed
4. North-South Sections through boreholes and the Great Rake.
5. East-West Sections on Great Rake. Filed

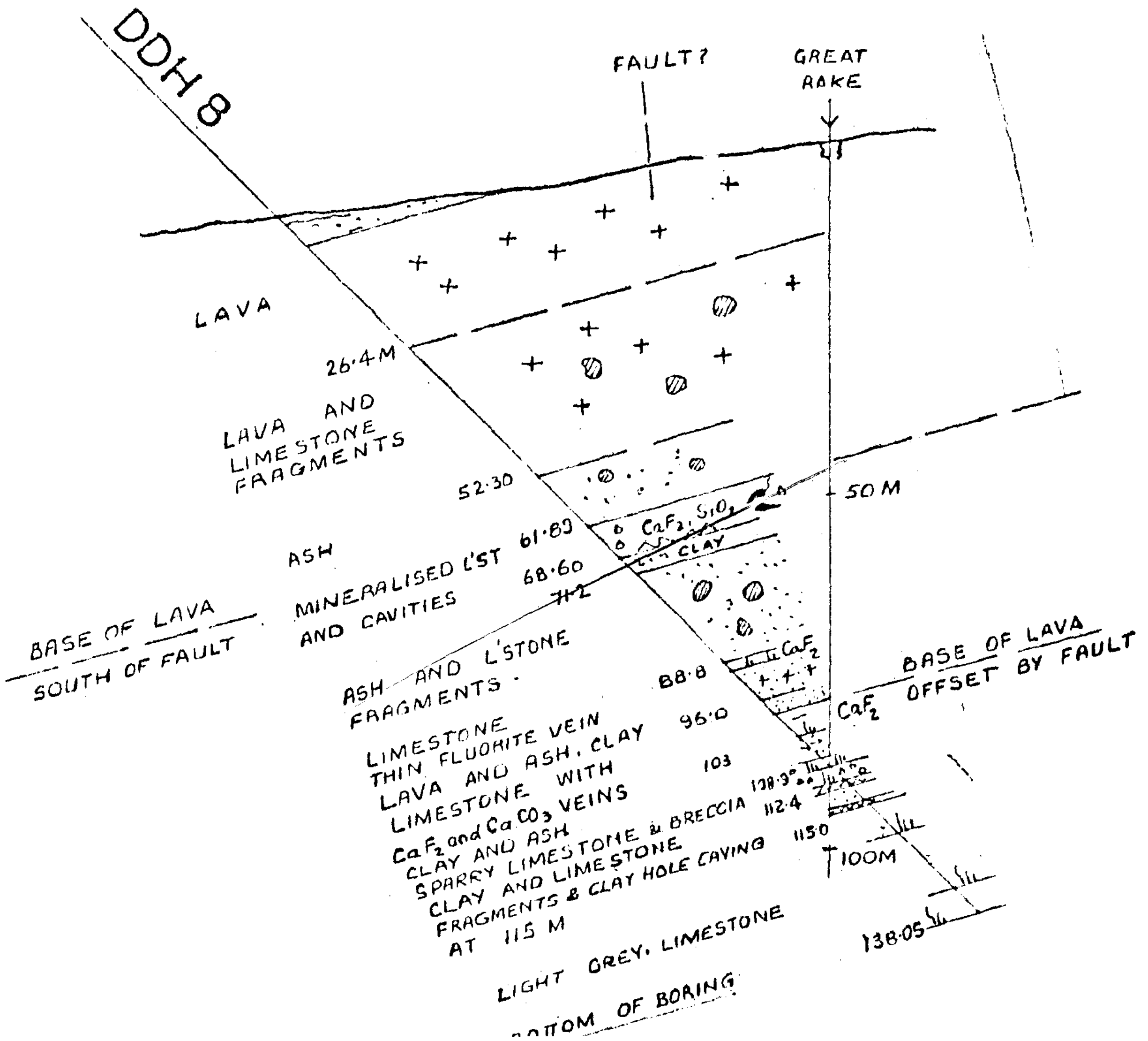
Enc 4(II) EXSUD LTD. HORROX-C



SCALE 1 / 1000

-CLAY CROSS PROJECT

NORTH - SOUT



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DIAMOND DRILL HOLE LOG

PROJECT: Horrox/Clay Cross Option

Hole No. : H 1
Co-ordinate : 4288E 3582N
Collar Elevation: 268 m. (829 ft.)
Inclination : Vertical
Total Depth : 31.10 m.
Date Started : 23.11.71
Date Finished : 24.11.71

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE
2.7/8"	0	0.90	0.90	0	OVERBURDEN Cream coloured clay. Pebbles of dolomite.
	0.90	25.50	24.70	99	DOLOMITE Honey brown-cream coloured dolomite, weakly limey in places. Characteristic 'sugary' texture of dolomite. 5-10% of volume of rock comprises small (1-2 mm) cavities suggesting later replacement of limestone by dolomite. Two sets of fractures: vertical and 30-45°. Fracturing intense 5.80 - 7.00 m. Vertical fractures frequently contain thin (1-2 mm) filaments of calcite, siderite and fluorspar in places. Rock is generally hard and competent, with little fracturing 7.00 - 17.40 m.
	25.60	26.20	0.60	90	CLAY Soft, brown ferruginous clay. Probably weathered basalt.
	26.20	31.10	4.90	99	BASALT Dark green-grey fine grained volcanic rock. Vesicular, vesicules calcite filled. Strong calcite veining 30 - 45°. Rock strongly weathered, chloritic 26.20 - 27.20 m.
	31.10				END OF HOLE.

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DIAMOND DRILL HOLE LOG

PROJECT: Horrox/Clay Cross Option

Hole No. : H 2
Co-ordinates : 4290 E, 3581 N.
Collar Elevation: 237 m. (724 ft.)
Inclination : Vertical
Total Depth : 32.30 m.
Date Started : 25.11.71.
Date Finished : 26.11.71.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE
.7/8"	0	1.20	1.20	0	OVERBURDEN Buff coloured clay.
	1.20	25.90	24.70	99	DOLOMITE Massive, colour variable from medium grey to honey coloured. Cavitous in places, up to 10% of rock small cavities 1 - 20 mm. in size. Calcite veining 5 - 10 mm. thick vertical or 70°, 15.10 - 17.20 m. Weak mineral-isation, mostly calcite as cavity and veinlet filling, but with traces of fluorite, both purple and colourless varieties, 17.20 - 25.90 m. Small irregular patches of jasper or hematite.
	25.90	27.40	1.50	99	LIMESTONE Dark grey, fine grained compact rock, partly crystalline. Strong development of marcasite 27.30 - 27.40 m., partially oxidized to hematite.
	27.40	32.30	4.90	99	BASALT Dark grey-green finely crystalline volcanic rock. Vesicular, calcite filled vesicules. Weak random calcite veining. Strongly altered, chloritic, light green in colour 26.20 - 29.30 m. Up to 15% pyrite partially oxidized to hematite in altered section.
	32.30				END OF HOLE

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DIAMOND DRILL HOLE LOG

PROJECT: Horrox/Clay Cross Option

Hole No. : H 3
Co-ordinates : 4286 E, 3581 N.
Collar Elevation : 283 m. (862 ft.)
Inclination : Vertical
Total Depth : 29.60 M.
Date Started : 26.11.71.
Date Finished : 27.11.71.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE
2.7/8"	0	0.30	0.30	0	OVERBURDEN
	0.30	27.00	26.70	99	DOLOMITE Honey brown coloured dolomite. Texture uneven, 'sugary' in places, elsewhere very fine grained, massive with probable later cementing of grains with dolomite. Very weakly limey, occasional secondary calcite crystals in rock which give a weakly limey reaction with N/10 H cl. Fracturing vertical $> 75^{o}$. Fractures calcite filled 0.30 - 5.00 m., leached with traces of fluorspar 17.40 - 18.60 m. Strong fracturing with oxidation 23.10 - 24.00 m. Occasional thin stringers of jasper 15.20 - 26.80 m.
	26.70	28.00	1.30	60	CLAY Brown ferruginous clay. Relict vesicular basalt.
	28.00	29.60	1.60	95	BASALT Vesicular basalt, calcite filled vesicules. Strongly altered, pale grey-green chloritic rock, soft 28.00 - 28.50 m. Minor alteration - dark green-purple rock, chlorite rims round vesicules 28.50 - 29.60 m. Calcite veins 1.5 mm thick 60^{o} - 70^{o} throughout.
	29.60				END OF HOLE

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DIAMOND DRILL HOLE LOG

PROJECT: Horrox/Clay Cross Option

Hole No. : H 4
Co-ordinates : 42865E 35785N
Collar Elevation: 245 m. (747 ft.)
Inclination : Vertical
Date Started : 28.11.71
Date Finished : 3.12.71
Total Depth : 68.90 m.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE
2.7/8"	0	0.30	0.30	0	OVERBURDEN
	0.30	15.20	14.90	99	DOLOMITE Buff-grey coloured dolomite. Strongly fractured 0.30 - 3.00m. 12.80 - 15.20m. Hard, concretionary 3.00 - 11.30 m. Cavitous, oxidised 11.30 - 15.20 m.
	15.20	16.20	1.00	0	LOST CORE
	16.20	16.75	0.55	70	BRECCIA Angular fragments of dark grey dolomite. Matrix of cream coloured dolomite and colourless fluorite. Strong development of limonite.
	16.75	30.00	13.25	95	BASALT Dark green-grey even textured rock, medium-fine grained. Weakly chloritised in general. Rock is probably a lava but no evidence of vesicules common in the Lower Basalt.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE
2.7/8"	30.00	42.40	12.40	99	DOLOMITE Buff-honey coloured dolomite, weakly limey. Cavitous. Intermittent vertical fracturing.
	42.40	42.70	0.30	90	SHALE BAND Light-grey shale band, partially oxidized with iron oxide staining. Evidence of movement on this Shale Band.
	42.70	65.70	23.00	99	DOLOMITE Rock as above shale band. Fracturing with thin coating of fluorite and probably siderite 61.00 - 65.70 m.
	65.70	68.90	3.20	60	BASALT Dark greygreen vesicular lava. Strongly altered to brown limonitic clay 65.70 - 67.00 m. Fracturing 40 - 45°. Random thin calcite veining.
	68.90				END OF HOLE.

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DIAMOND DRILL HOLE LOG

PROJECT : Horrox/Clay Cross Option

Hole No. : H 5
Co-ordinates : 4291 E, 3576 N.
Collar Elevation : 225 m. (688 ft.)
Inclination : Vertical
Total Depth : 82.20 m.
Date Started : 4.11.71.
Date Finished : 20.12.71.

Core Size	From M	To M	Int M	Rec. %	ROCK TYPE
2⅞"	0	0.90	0.90	0	OVERBURDEN
	0.90	6.65	5.75	99	DOLOMITE. Dark Grey, compact, finely crystalline, limey. Random calcite veining 1-5mm. (two generations). Light, rear vertical fracturing.
	6.65	6.90	0.25	99	SHALE BAND Pale, grey clay; weak, shaley parting. Limonitic.
	6.90	20.50	23.60	99	DOLOMITE Honey coloured, crystalline, weakly cavitous <1%. Hard, compact for the most part becoming more light grey with depth. Weak calcite veining.
	20.50	24.50	4.00	99	DOLOMITE Grey-buff, concretionary. Rounded chert fragments, light grey, up to 100mm.
	24.50	29.30	4.80	99	BRECCIA Angular fragments of dolomite up to 150mm. Cement dominantly light brown dolomite but 10-15% calcite including a large vein at 25.00 to 25.15m. Extensive later veining 27.00 to 27.50m. parallel to core paragenesis suggested. 1 Fluorite 2 Dolomite 3 Calcite Traces FeS PbS

Core Size	From M	To M	Int M	Rec. %	ROCK TYPE
$2\frac{7}{8}$"	29.30	33.20	3.90	0	Core lost, probably weathered basalt.
	33.20	41.00	7.80	99	Dolerite (basalt). Medium-fine grained basic rock, dark green in colour, compact, even grained, occasional thin random calcite veins. Rock altered, light grey and soft 39.70 to 40.50m. 40.50 to 41.00m.soft clay like material, buff and light grey, up to 10% pyrite.
	41.00	52.40	11.40	99	Dolomite. Finely crystalline, dark grey brown in colour. 10% cavitous with occasional random calcite veins. Concretionary texture in places.
	52.40	53.80	1.40	99	BRECCIA. Angular fragments of dolomite 5-100mm. in a matrix of cream coloured dolomite. 10% later, white, coarsely crystalline calcite in matrix. Possible CaF2. Traces of Fe silicates (Jasper).
	53.80	56.40	2.60	99	DOLOMITE. Ditto 41.00 to 52.40m.
	56.40	62.30	5.90	99	DOLOMITE Light, creamy coloured, compact, 15% small 1-2cm. cavities. Unfractured, little calcite veining.
	62.30	66.60	4.30	99	DOLOMITE Pale brown, medium crystalline, weakly limey, unfractured voids about 5% with thin, vertical 1-2mm. calcite veins of two generations. Occasional galena and fluorite.
	66.60	69.60	3.00	99	DOLOMITE Similar to the above but creamy coloured. Galena well developed at 69.60m 80° fractures at 69.30m.
	69.60	73.90	4.30	99	DOLOMITE Pale brown, unfractured, voids 2½%. Random thin calcite veining. Occasional styolites and traces of red ferrosilicates.
	73.90	78.80	4.90	99	DOLOMITE Creamy, finely crystalline with 5% voids in the upper part, but below honeycombed with baryte and fluorite mineralisation in the cavities. Extensive calcite recrystallisation. Galena mineralisation at 75.40m. Sharp boundary between dolomitised and unaltered limestone. Brecciation at 77.60m. Pyrite mineralisation at the base.

Core Size	From M	To M	Int M	Rec %	ROCK TYPE
$2\frac{7}{8}$"	78.80	81.70	2.90	99	BASALT Weathered to a soft, green chloritic clay in the upper part but becoming firmer with depth. Vesicles, ½cm., filled with calcite. Occasional small flecks of pyrite.
	81.70	82.20	0.50	99	BASALT Green-brown, hard, vesicular.

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DIAMOND DRILL HOLE LOG

PROJECT: Horrox/Clay Cross Option

Hole No. : H 6
Co-ordinate : 42888E 35862N
Collar Elevation: 338m (1026 ft.)
Inclination : Vertical
Total Depth : 32.6m
Date Started : 4th January 1972
Date Finished : 7th January 1972

Core Size	From M	To M	Int M	Rec. %	ROCK TYPE
2⅞"	0	0.9	0.9	0	Overburden.
	0.9	4.9	4.0	60%	DOLOMITE. Brown, cavitous, fractures near vertical; fracture surfaces lined with a thin layer of fluorspar. Larger cavities or vugs occasionally lined with fluorspar. Core broken. Very weakly limey.
	4.9	24.3	19.4	99%	DOLOMITE. Brown, rather sparsely cavitous, generally unfractured, thin often near vertical but sometimes random fluorspar veinlets. Occasional voids and partings covered with a thin layer of fluorspar. Thickest fluorite veins 1 cm. Some thin calcite veinlets. Occasional sections of about 1m. of dolomite darker brown and sometimes more cavitous.
	24.3	28.8	4.5	99%	DOLOMITE. Rather darker brown, generally slightly less hard, sparsely cavitous, largely unfractured. Some thin often near vertical fluorspar and calcite veinlets in which, when composite, fluorspar tends to margin calcite. Fluorspar visible in larger cavities or vugs. Bottom 50cm. weakly limey, grey and with flecks of pyrite.
	28.8	29.3	0.5	99%	Dark Brown. Pyritic volcanic ash (?). Calcite filled voids.
	29.3	32.6	3.3	99%	BASALT. Weathered to a soft, green, chloritic clay in the upper part but becoming darker, harder, and unweathered downwards. Occasional vesicles filled with calcite. Thin random calcite veins.

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DIAMOND DRILL HOLE LOG

PROJECT : Horrox/Clay Cross Option

Hole No. : H 7
Co-ordinates : 42883 E, 35837 N.
Collar Elevation : 272 m. (836 ft.)
Inclination : Vertical
Total Depth : 64.40 m.
Date Started : 21.12.71.
Date Finished : 4.1.72.

Core Size	From M	To M	Int M	Rec %	ROCK TYPE
2⅞"	0	0.30	0.30	0	Brown Topsoil.
	0.30	3.85	3.55	90	DOLOMITE Brown, broken, weakly cavitous, fracture surfaces often near vertical and sometimes lined with 1-2mm. fluorite. Fragments of green-brown clay at 2.45m.
	3.85	4.05	0.30	0	CAVITY
	3.85	7.30	3.45	95	Similar to the section above the cavity but becoming less broken. Sporadic, near vertical ½cm. fluorite-calcite veins with traces of less frequent galena.
	7.30	8.55	1.25	99	DOLOMITE Grey-brown with infrequent thin, near vertical calcite veins.
	8.85	19.20	10.35	99	DOLOMITE Brown, weakly limey, sparsely cavitous with infrequent fluorite lining the voids. Vertical fracturing from 10.05 to 10.10m. with near vertical veining 3cm. wide. Fluorite margins of up to 1cm. margin calcite. Elsewhere sporadic, thinner (½cm.) near vertical veins of calcite with subordinate fluorite and galena. Massive calcite veining with subordinate fluorite 16.40-16.70m.
	19.20	22.20	3.00	99	DOLOMITE. Pale brown, unfractured, concretionary.

Core Size	From M	To M	Int M	Rec %	ROCK TYPE
$2\frac{7}{8}$"	22.20	35.00	12.80	99	DOLOMITE Brown, fractured vertically 22.30-25.30m. Fracture surfaces covered by a thin layer of fluorite. Occasional thin, near vertical calcite and fluorite veinlets elsewhere. Sparsely cavitous. Small fluorite crystals sometimes line the voids.
	35.00	35.60	0.60	0	CAVITY
	35.60	36.30	0.70	50	CLAY Brown, limonitic.
	36.30	36.80	0.50	99	CLAY Green, chloritic, weathered basalt.
	36.80	64.40	27.60	99	BASALT Dark, fine grained, occasional near vertical calcite veins. Calcite sometimes coarsely crystalline. Vesicular in parts. Vesicles filled with calcite. Generally chloritic.

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Diamond Drilling Hole Log

Project: Horrox/Clay Cross Option

Hole No. H 8
Coordinate : 42866, 35855
Collar Elevation: 320.7m. (1,050 ft.)
Inclination : 46° at N15°30'W
Total Depth : 138.05m.
Date Started: 21.4.72.
Date Finished: 5.5.72.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE & DESCRIPTION
	0.0	1.52	1.52	-	Top Soil.
HT apprx 3 in.	1.52	5.28	3.76	100	Weathered brown vesicular lava, with occasional patches of calcite-filled vesicles.
	5.28	6.10	0.82	100	Greyish green lava with calcite-filled vesicles and occasional thin calcite veins.
TNX apprx. 2.3/8 in.	6.10	10.80	4.70	100	Greyish green lava with dark speckles and thin white calcite veins, some edged with dark green, greenish white clay and calcite partings. There are slickensides present with dark green and red iron oxide surfaces.
S	10.80	10.95	0.15	100	Greyish green lava with calcite and fluorite stringers 5 to 10 mm. thick.
	10.95	15.10	4.15	100	Greyish green lava with dark speckles.
	15.10	21.80	6.70	100	Greyish green lava with white calcite veins and white speckled patches of calcite.
	21.80	26.40	4.60	100	Patches of sparry calcite and hematite veining in greenish grey lava.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE & DESCRIPTION
TNX	26.40	28.80	2.80	100	Pinkish grey lava with greenish fragments and blotches with occasional patches of calcite changing gradually back to greenish grey lava at 28.80m. The lava contains limestone fragments up to 40mm.; the limestone is varied in type. One fragment at 28.5 m. was black bioclastic limestone and another light grey oolite at 27.8m. There is a 70mm. thick calcite vein at 28.80m.
	28.80	49.50	20.70	100	Greenish lava with many limestone fragments and fragments of lava included. There are calcite and brown clay partings at 32m. and 33m., and numerous calcite veinlets with finely disseminated pyrite. There are sheer fractures with slickensides. Yellow clay 100mm. thick at 49.50m. The limestone fragments range from 1 to 100mm. and some are coated with hematite.
	49.50	52.30	2.80	100	Greenish lava with limestone and lava fragments, numerous calcite veins. The limestone is generally unaltered, one possibly marmorised fragment at 51m.
NQ approx. 1.7/8in.	52.30	60.30	8.00	100	Green ashy lava with limestone inclusions and light coloured ashy bands. Disseminated pyrite. Marmorised limestone fragment at 60m. (Box 15 starts at 59.50m.)
	60.30	60.90	0.60	100	Soft greenish ash.
S	60.90	61.05	0.15	100	Greyish brown limestone. ? Boulder.
S	61.05	61.10	0.05	100	Ashy clay.
S	61.10	61.19	0.09	100	Ashy limestone with stringer of fibrous gypsum in brown and green clay.
S	61.19	61.59	0.40	100	Ashy limestone and clay.
S	61.59	61.89	0.30	100	Limestone and calcite veins with green and brown clay. Siliceous.
S	61.89	62.50	0.61	100	Mineralised limestone, black with clay infilling.
S	62.50	63.30	0.80	100	Ashy mineralised limestone and clay.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE & DESCRIPTION
NQ	S 63.30	64.00	0.70	100	Mineralised limestone with fluorite. (End of Box 15).
	S 64.00	67.00	3.00	35.6	Mineralised limestone with fluorite (1.07m. recovered only) in cavities.
	S 67.00	68.60	1.60	100	Limestone with fine calcite and fluorite veins. Very siliceous.
	68.60	70.15	1.55	100	Orange, green and yellow clay.
	70.15	70.40	0.25	100	Grey clay with sparry inclusions. Pyritic.
	70.40	71.20	0.80	100	Grey clay.
	71.20	72.10	0.90	100	Calcareous tuff with calcite veins.
	72.10	72.63	0.53	100	Calcite veins in grey calcareous tuff.
	72.63	75.00	2.37	100	Ashy limestone with pyrite and blue-grey shaly partings.
	75.00	79.00	4.00	100	Volcanic ash with limestone fragments and inclusions. Some marmorised with pyrite surrounding the fragments.
	79.00	83.51	4.51	100	Volcanic ash with limestone fragments and white calcite veins 5-10mm thick.
	83.51	88.80	5.29	100	Ashy limestone with greenish chlorite and calcite veins. Fragments of light grey and dark grey limestone, some containing indistinct fossils.
	88.80	89.70	0.90	100	Pseudo-brecciated grey limestone with black carbonaceous inclusions at 88.98m. There are patches of disseminated pyrite and occasional calcite veins.
	S 89.70	89.90	0.20	100	Grey limestone with calcite and fluorite vein 25mm wide mainly calcite with two thin bands of fluorite within the calcite.
	89.90	90.08	0.18	100	Grey limestone with thin calcite veins.
	90.08	90.36	0.28	100	Ashy limestone.

Core Size		From M	To M	Int. M	Rec. %	ROCK TYPE & DESCRIPTION
NQ		90.36	90.74	0.38	100	Ash and brown clay with limestone pellets 3 to 10mm diam.
		90.74	96.00	5.26	100	Greenish grey lava with numerous calcite veins.
		96.00	98.00	2.00	100	Greenish volcanic ash with enclosed limestone fragments and thin calcite and pyrite veins and inclusions. Gypsum parting 5mm thick at base.
		98.00	98.18	0.18	100	Orange yellow clay with greenish spots of chlorite and pyrite inclusions.
		98.18	100.84	2.66	100	Limestone with calcite veins.
	S	100.84	101.30	0.46	100	Limestone with fluorite, calcite and yellow clay.
	S	101.30	102.35	1.05	100	Sparry limestone with calcite and fluorite veins.
	S	102.35	103.88	1.53	100	Greenish and yellow clay with sparry limestone. Mainly calcite but some fluorite and traces of galena.
		103.88	107.50	3.62	100	Greenish and yellow clay with ash and limestone fragments. Some sparry nodules. Pyritic.
		107.50	108.90	1.40	100	Dark grey sparry limestone with pyrite and calcite veins and greenish to brown, orange and dark red clay in partings.
		108.90	111.70	2.80	100	Brecciated limestone with iron oxide, carbonaceous and calcite veins.
		111.70	111.85	0.15	100	Brown clay.
		111.85	112.28	0.43	100	Light grey limestone with calcite veins and carbonaceous black partings.
		112.28	112.40	0.12	100	Brown, green and black clay with limestone fragments.
		112.40	115.00	2.60	100	Light grey limestone with occasional thin calcite veins.
		115.00	115.80	0.80	5o	Brown green and black clay with dark ashy limestone.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE & DESCRIPTION
NQ	115.80	133.40	17.60	100	Light grey limestone with occasional thin calcite veins and dark carbonaceous partings.
	133.40	134.50	1.10	53	Broken and jointed light grey limestone. (Recovered 0.53m.)
	134.50	138.05	3.55	100	Light grey limestone mottled with dark limestone spots.

(Bottom of boring 452 ft. 2inches = 138.05m.)

S = Sample taken.

EXSUD LIMITED

Diamond Drill Hole Log

Project : Horrox/Clay Cross

Hole No. : H 10
Coordinates : E 42888:N 35854
Collar Elevation : 305m. O.D.
Inclination : 59° Due N.
Total Depth : 172.65m.
Date Started : 10th May 1972
Date Finished : 25th May 1972.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE AND DESCRIPTION
HT	0.0	3.05	3.05	-	Top soil.
	3.05	6.10	3.05	100	Light brown dolomite with occasional sparry joints. Sandy texture with feintly vesicular patches.
NQ	6.10	17.75	11.65	100	Light brown dolomite.
	17.75	17.85	0.10	100	Black dolomite with white septate coral.
	17.85	20.56	2.71	80	Light green clay.
	20.56	21.50	0.94	100	Dark greenish grey lava with white calcite veins and calcite filled vesicles.
	21.50	22.00	0.50	100	Dark red and green ashy lava.
	22.00	30.70	8.70	100	Dark greenish grey lava with numerous calcite filled vesicles and white calcite veins.
	30.70	30.80	0.10	100	Reddish brown and yellow parting with calcite and pyrite.
	30.80	31.90	1.10	100	Dark greenish grey lava with thin white calcite veins. Mottled with darker green patches of white calcite vesicles.
	31.90	31.96	0.06	100	Dark red ashy clay parting.

Core Size	From M	To M	Int M	Rec. %	ROCK TYPE AND DESCRIPTION
NQ	31.96	39.70	7.74	100	Dark greenish grey lava with occasional white calcite veins. Mottled with darker green and patches of white calcite filled vesicles.
	39.70	40.95	1.25	100	Dark greenish grey lava with reddish clay partings and reddish clay filled joints. Slickenside markings on green and red brown clay at 40.95m.
	40.95	44.14	3.19	100	Dark grey lava with white calcite veins and purplish grey shaly partings. Calcite less abundant.
	44.14	56.00	11.86	100	Dark green grey and ashy lava with dark chloritic partings. Only traces of calcite.
	56.00	57.80	1.80	100	Dark greenish grey lava, less chlorite.
	57.80	62.20	4.40	100	Dark greenish grey lava with calcite veins and calcite filled sparry cavities.
	62.20	63.80	1.60	100	Dark red and green soft lava with calcite filled vesicles and fragments of included limestone.
	63.80	85.36	21.56	100	Red and green lava with calcite filled vesicles and fragments of fine grained dark grey and grey limestone up to 30 mm. diameter. There are also included lava fragments.
	85.36	91.50	6.14	100	Pale green lava with limestone and lava fragments. Lava boulder at 90.84m.
	91.50	95.30	3.80	100	Dark brown ashy lava, patches of lava with dark green spots. Calcite veins, 5 mm. thick, at 92.27 m. and 3 mm. at 93.17 m.
	95.30	109.50	14.20	100	Dark green lava with darker green spots. Several sets of inter-penetrating calcite veins. The thicker veins,1 to 2 mm., appear to cut the finer, ½ to 1 mm.

Core Size	From M	To M	Int M	Rec. %	ROCK TYPE AND DESCRIPTION
NQ	109.50	110.90	1.40	100	Dark greenish lava with limestone fragments and pyrite and calcite veins.
	110.90	112.33	1.43	100	Ashy lava with lava and occasional limestone fragments. Brown clay and lava parting at 112.33 m.
	112.33	116.75	4.42	100	Dark green lava and calcite veins. Some sparry, changes to soft ash at 116.75 m.
	116.75	117.56	0.81	100	Ash with disseminated pyrite and thin rusty partings at base.
Sample	117.56	119.70	2.14	100	Light grey limestone, unaltered but with occasional calcite veins. A little pyrite. (Sample 117.56 to 118.00 m.)
Sample	119.70	125.90	6.20	100	Thin fluorite and calcite stringers in calcified limestone with irregular dark silicified veins. (Sample 119.00 to 120.00, 120.00 to 120.25 m. and 123.00 to 125.00 m.)
	125.90	129.06	3.16	-	Cavity.
	129.06	135.90	6.84	100	Limestone and thick calcite veins. Clay filled cavities.
	135.90	139.80	3.90	100	Brecciated and partly silicified limestone (cherty).
	139.80	145.50	5.70	100	Brecciated limestone with calcite veins and rusty clay stained partings.
	145.50	150.00	4.50	100	Brecciated limestone with sparry calcite.
	150.00	154.70	4.70	100	Brecciated limestone with sparry calcite and clay and calcite lined cavities. Silica veins and cherty cement.
Sample	154.70	155.50	0.80	100	Limestone with calcite veins. Purple fluorite staining in calcite vein. (Sample 155.00 to 155.50 m.)
	155.50	161.50	6.00	100	Coarsely crystalline calcite in veins and cavities in brecciated light grey limestone. Some chert veinlets and rusty iron stained joints.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE AND DESCRIPTION
NQ	161.50	163.42	1.92	100	Calcite lined cavities in light grey limestone with occasional fine cherty veins.
	163.42	164.50	1.08	100	Grey clay and ashy limestone with pyrite. Calcite veins.
	164.50	172.65	8.15	100	Limestone with coarse calcite veins up to 10 mm. in width, fine cherty veins.

NOTE: Borehole was abandoned at 172.65 m. due to rods sticking in cavernous and cherty ground.

EXSUD LIMITED

Diamond Drill Hole Log

Project: Horrox/Clay Cross

Hole No. : H 11
Coordinates : E.42843 : N.35847
Collar Elevation : 305 m.
Inclination : 58° at 10° W of N.
Total Depth : 236.4 m.
Date Started : 2.6.72.
Date Finished : 19.6.72.

Core Size		From M	To M	Int. M	Rec. %	ROCK TYPE AND DESCRIPTION
HT 3 ins. (76mm. diam.)		0.0	1.83	1.83	0	Top soil
		1.83	2.80	0.97	100	Brown sandy clay and black limestone fragments.
		2.80	4.60	1.80	"	Decayed lava with limestone fragments in hard brown clay.
		4.60	5.00	0.40	"	Hard greenish brown clay with a thin fibrous calcite vein.
		5.00	5.60	0.60	"	Decayed lava and brown sandy clay.
	S	5.60	7.20	1.60	"	Brown decayed lava with black speckles and calcite veins
	S	7.20	7.25	0.05	"	Sparry limestone and lava fragments with calcite and pale blue fluorite. (Samples at 6.50 and 7.25 m.)
		7.25	14.10	6.85	"	Brown decayed lava with black speckles and numerous calcite veins and inclusions; occasional limestone fragments.
		14.10	16.00	1.90	"	Grey and brown sandy clay with calcareous fragments.
		16.00	16.50	0.50	"	Orange clay.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE AND DESCRIPTION
HT 3 ins. (76mm.) diam.	16.50	16.80	0.30	100	Purple and grey-brown clay.
	16.80	24.30	7.50	81	Orange and brown clay with calcareous patches. Decayed lava ?
	24.30	25.60	1.30	100	Grey fine-grained limestone.
	25.60	26.60	1.00	80	Orange yellow and green clay.
	26.60	26.90	0.30	100	Light grey fine grain limestone, rusty and clay-stained.
	26.90	27.10	0.20	100	Orange grey and brown calcareous clay.
	27.10	27.90	0.80	100	Light grey brecciated limestone.
	27.90	29.00	1.10	36	Orange yellow clay; 0.40 m. recovered.
NQ Approx.	29.00	31.70	2.70	40	Silicified limestone chert and clay; 1.10 m. recovered
1.7/8 in. (50mm.) S	31.70	34.90	3.20	39	Cavitous brecciated limestone and chert. Thin calcite and fluorite stringers. (Cavity 32.7 m. to 34.9 m.)
	34.90	58.25	23.35	100	Light-grey to grey limestone with occasional calcite veins and sparry vugs. Shiny black bituminous inclusions with calcite at 45.60 m. to 46.00 m.
S	58.25	58.45	0.20	100	Diagonal iron stained sparry joint with blue fluorite stringers
S	58.45	59.80	1.35	100	Light grey limestone with traces of fluorite with calcite.
	59.80	62.00	2.20	100	Light grey limestone.
	62.00	62.20	0.20	100	Hard grey shaly limestone.
	62.20	70.56	8.36	100	Light grey limestone with occasional thin calcite veins.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE AND DESCRIPTION
NQ Approx. 1.7/8 in. (50mm.)	70.56	71.00	0.44	100	Light grey limestone with numerous calcite veins, and small cavities.
	71.00	83.00	12.00	100	Fine grained light-grey limestone with occasional thin calcite veins. Coarse-grained porous at 74.30 to 74.50 m.
	83.00	83.40	0.40	"	Sparry cavities in light grey limestone.
	83.40	87.70	4.30	"	Light grey limestone, occasional sparry cavities.
	87.70	87.90	0.20	"	Clay.
	87.90	101.50	13.60	"	Jointed and broken light grey limestone. Prominent stylolites and thin calcite veins.
	101.50	102.06	0.56	"	Dark grey shaly clay.
	102.06	102.30	0.24	"	Orange clay.
	102.30	103.00	0.70	"	Light grey limestone with occasional sparry patches and carbonaceous partings.
	103.00	104.20	1.20	"	Jointed and broken limestone with clay.
	104.20	121.00	16.80	"	Light grey limestone occasional sparry patches. Prominent stylolites, getting darker and finer grained.
	121.00	121.02	0.02	"	Yellowish brown clay.
	121.02	125.05	4.03	"	Grey fine-grained limestone with dark patches and carbonaceous inclusions and partings. Thick brachiopod shell fragment at 122.60 m.
	125.05	134.00	8.95	"	Grey fine-grained limestone with coarsely crystalline calcite at 125.10, 126.10, 126.50, 127.10, 129.70, 131.55, 133.00 and 133.88 m.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE AND DESCRIPTION
NQ Approx. 1.7/8 in. (50 mm.)	134.00	151.57	17.57	100	Grey fine-grained limestone with patches of pseudo-breccia and shaly inclusions and thick calcite veins at 139.30, 140.30, 142.18 and 144.90 m. becoming cavitous with calcite lined vugs and carbonaceous inclusions.
	151.57	151.77	0.20	"	Shaly limestone.
	151.77	163.30	11.53	"	Grey limestone with calcite veins. Diagonal iron-stained joints. Black carbonaceous inclusions.
	163.30	170.75	7.45	"	Grey limestone with more frequent calcite veins.
	170.75	170.81	0.06	"	Yellow grey clay.
	170.81	180.00	9.19	"	Calcite veins in grey limestone. Septate corals 30 mm. diameter at 179.40 - 179.70 m.
	180.00	181.30	1.30	"	Cherty limestone breccia with calcite veins.
S	181.30	183.80	2.50	"	Calcite with chert inclusions.
S	183.80	189.70	5.90	"	Calcite vein.
	189.70	190.30	0.60	"	Limestone with cherty fragments.
	190.30	190.80	0.50	"	Calcite.
	190.80	202.10	11.30	"	Calcite veined limestone. Pyrite veins at 194.36 m.
	202.10	202.70	0.60	"	Calcite vein with sphalerite and pyrite 202.20 to 202.70 m.
	202.70	203.60	0.90	"	Limestone with thin veins of calcite and pyrite.

Core Size	From M	To M	Int. M	Rec. %	ROCK TYPE AND DESCRIPTION
NQ Approx. 1.7/8 in. (50 mm.)	203.60	203.90	0.30	"	Calcite vein.
	203.90	205.95	2.05	100	Fine-grained limestone with pyrite and chert at interface with joints and thin calcite veins.
	205.95	236.40	30.45	"	Grey fine-grained sparry limestone and calcite mudstone, with patches of calcite. Some of the limestones are slightly oolitic in texture and vary in colour from buff to grey and dark grey. The bedding planes are black and carbonaceous, but clay free. Very few fossils seen. Syringopora coral was noted at 221.80 m. and 223.62 m. There are traces of sphalerite with calcite at 212 m.

(Bottom of boring 775 ft. 5 in. = 236.4 m.)

S = Samples taken.

EXPLORATION PHASE I

EXSUD (MINING) LTD

DIAMOND DRILLING SUMMARY

HORROX/CLAY CROSS OPTION

LOCATION BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log Rock*	From	To	Sampling No.	From	To	Est**	Assays % CaF_2	$BaSO_4$		
H 1	4288 3582	23.11.71	24.11.71	31.10	O/B	0	0.60	75	0	1.5		0.35			
					MID DOL.	0.60	25.60	76	1.5	3.0		0.55			
					LOWER BAS.	25.60	31.10	77	3.0	4.1		0.31			
								78	4.1	4.9		0.76			
								79	4.9	5.9		0.29			
								80	5.9	6.9		1.42			
								81	6.9	7.9		0.62			
								82	7.9	9.0		0.28			
								83	9.0	10.0		0.40			
								84	10.0	11.1		0.40			
								85	11.1	12.2		0.38			
								86	12.2	13.2		0.28			
								87	13.2	14.3		0.17			
								88	14.3	15.4		0.11			
								89	15.4	16.4		0.13			
								90	16.4	17.5		0.14			
								91	17.5	18.6		0.07			
								92	18.6	19.6		0.05			
								93	19.6	20.6		0.09			
								94	20.6	21.6		0.20			
								95	21.6	23.6		2.44			
								134	23.6	24.6		2.92			
								135	24.6	25.6		0.31			

All measurements are in metres

*		
Upper Dolomite		Dolomite
Upper Basalt		Basalt
Middle Dolomite		Dolomite, Limestone in places
Lower Basalt		Basalt

**L = 0 - 20% Ca F2

M = 20 - 40% " "

H = >40% " "

Char = Character Sample, Ca F2 not clearly identified but suspect

EXPLORATION PHASE I

EXSUD (MINING) LTD

DIAMOND DRILLING SUMMARY — HORROX/CLAY CROSS OPTION — LOCATION BONSALL HILL

le ber	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log			Sampling				Assays %			
					Rock*	From	To	No.	From	To	Est**	CaF_2	$BaSO_4$		
H 2	4290 3581	25.11.71	26.11.71	M 32.3	O/B	M 0	M 0.30	203	M 6.20	M 7.20	)				
					MID DOL.	0.30	27.20	204	7.20	8.20	)				
					LOWER BAS.	27.20	32.30	205	8.20	9.20	)				
								206	9.20	10.20	) C				
								207	10.20	11.20	) O				
								208	11.20	12.20	) M P	0.19			
								209	12.20	13.20	) O S				
								210	13.20	14.20	) I T E				
								211	14.20	15.20	)				
								212	15.20	16.30	)				
								138	16.30	17.30	)				
								139	17.30	18.30	)				
								140	18.30	19.30	)				
								141	19.30	20.30	) C				
								142	20.30	21.30	) O M	0.60			
								143	21.30	22.30	) P O				
								144	22.30	23.30	) S I				
								145	23.30	24.30	) T E				
								146	24.30	25.30	)				
								147	25.30	26.30	)				

All measurements are in metres.

*		
Upper Dolomite		Dolomite
Upper Basalt		Basalt
Middle Dolomite		Dolomite, Limestone in places
Lower Basalt		Basalt

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M = 20 - 40% " "

H = > 40% " "

Char = Character Sample, Ca F2 not clearly identified but suspect

EXPLORATION PHASE I

EXSUD (MINING) LTD

HORROX/CLAY CROSS OPTION

LOCATION BONSALL HILL

DIAMOND DRILLING SUMMARY

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log: Rock*	Geological Log: From	Geological Log: To	Sampling: No.	Sampling: From	Sampling: To	Sampling: Est**	Assays %: CaF_2	Assays %: $BaSO_4$		
H 3	[illegible] 3581	26.11.71	27.11.71	M 29.60	O/B	M 0	M 0.30		M	M					
					MID DOL.	0.30	27.00	220	7.00	8.00	)				
					LOWER BAS.	27.00	29.60	316	8.00	9.00	)				
								317	9.00	10.00	)				
								318	10.00	11.00	)				
								319	11.00	12.00	)				
								320	12.00	13.00	)				
								321	13.00	14.00	)	0.27			
								322	14.00	15.00	) COMPOSITE				
								323	15.00	16.00	)				
								324	16.00	17.00	)				
								325	17.00	18.00	)				
								326	18.00	19.00	)				
								327	19.00	20.00	)				
								328	20.00	21.00	)				

All measurements are in metres.

*		
Upper Dolomite		Dolomite
Upper Basalt		Basalt
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Lower Basalt		Basalt

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M = 20 - 40% " "

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EXPLORATION PHASE I

EXSUD (MINING) LTD

DIAMOND DRILLING SUMMARY

HORROX/CLAY CROSS OPTION

LOCATION BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log: Rock*	From	To	Sampling: No.	From	To	Est**	Assays %: CaF_2	$BaSO_4$		
				M		M	M		M	M					
H 4	4269 3578	28.11.71	3.12.71	68.90	O/B	0	0.30	333	0.30	1.25	)				
					UPPER DOL.	0.30	16.75	334	1.25	2.25	)				
					UPPER BAS.	16.75	30.00	335	2.25	3.25	)				
					MIDDLE DOL.	30.00	65.70	336	3.25	4.25	)				
					LOWER BAS.	65.70	68.90	337	4.25	5.25	)				
								338	5.25	6.25	)				
								339	6.25	7.25	)				
								340	7.25	8.25	) COMPOSITE	0.16			
								341	8.25	9.25	)				
								342	9.25	10.25	)				
								343	10.25	11.25	)				
								344	11.25	12.25	)				
								345	12.25	13.25	)				
								346	13.25	14.25	)				
								148	14.25	15.25	)				
								156	59.80	60.80					
								155	60.80	61.80	)				
								154	61.80	62.80	)				
								153	62.80	63.80	)				
								152	63.80	64.80	) COMPOSITE				
								151	64.80	65.80	)	9.70			
								52	14.25	15.25	)				
								53	15.25	16.25	)				

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Char = Character Sample, Ca F2 not clearly identified but suspect

EXPLORATION PHASE I

EXSUD (MINING) LTD

HORROX/CLAY CROSS OPTION

DIAMOND DRILLING SUMMARY

LOCATION BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log: Rock*	Geological Log: From	Geological Log: To	Sampling: No.	Sampling: From	Sampling: To	Sampling: Est**	Assays %: CaF_2	Assays %: $BaSO_4$		
				M		M	M		M	M					
H 4	4269 3578	28.11.71	3.12.71	68.90	O/B	0	0.30	333	0.30	1.25	)				
					UPPER DOL.	0.30	16.75	334	1.25	2.25	)				
					UPPER BAS.	16.75	30.00	335	2.25	3.25	)				
					MIDDLE DOL.	30.00	65.70	336	3.25	4.25	)				
					LOWER BAS.	65.70	68.90	337	4.25	5.25	)				
								338	5.25	6.25	)				
								339	6.25	7.25	)				
								340	7.25	8.25	) COMPOSITE	0.16			
								341	8.25	9.25	)				
								342	9.25	10.25	)				
								343	10.25	11.25	)				
								344	11.25	12.25	)				
								345	12.25	13.25	)				
								346	13.25	14.25	)				
								148	14.25	15.25	)				
								156	59.80	60.80					
								155	60.80	61.80	)				
								154	61.80	62.80	)				
								153	62.80	63.80	)				
								152	63.80	64.80	) COMPOSITE				
								151	64.80	65.80	)	9.70			
								52	14.25	15.25	)				
								53	15.25	16.25	)				

All measurements are in metres.

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**L = 0 - 20% Ca F2

M = 20 - 40% " "

H = > 40% " "

Char = Character Sample, Ca F2 not clearly identified but suspect

EXPLORATION PHASE I

EXSUD (MINING) LTD

DIAMOND DRILLING SUMMARY — HORROX/CLAY CROSS OPTION — LOCATION BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log: Rock*	From	To	Sampling: No.	From	To	Est**	Assays %: CaF_2	$BaSO_4$		
H 5	4291 3576	4.12.71	20.12.71	M 82.80	O/B	M 0	M 0.90	353	M 0.90	M 2.30					
					UPPER DOL.	0.90	29.30	354	2.30	3.30					
					UPPER BAS.	29.30	41.10	355	3.30	4.30					
					MIDDLE DOL.	41.10	78.80	356	4.30	5.30					
					LOWER BAS.	78.80	82.20	357	5.30	6.30					
								358	6.30	7.30					
								359	7.30	8.30					
								360	8.30	9.30					
								361	9.30	10.30					
								362	10.30	11.30					
								363	11.30	12.30					
								364	12.30	13.30					
								365	13.30	14.30					
								366	14.30	15.30					
								367	15.30	16.30					
								368	16.30	17.30					
								369	17.30	18.30					
								370	18.30	19.30					
								371	19.30	20.30					
								372	20.30	21.30					
								373	21.30	22.30					
								374	22.30	23.30					
								375	23.30	24.20					

All measurements are in metres

* Upper Dolomite		Dolomite
Upper Basalt		Basalt
Middle Dolomite		Dolomite, Limestone in places
Lower Basalt		Basalt

**L = 0 - 20% Ca F2

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EXPLORATION PHASE [illegible]

EXSUD (MINING) LTD

DIAMOND DRILLING SUMMARY

HORROX/CLAY CROSS OPTION

LOCATION. BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log: Rock*	From	To	Sampling: No.	From M	To M	Est**	Assays %: CaF_2	$BaSO_4$		
H 5	CONTINUED				CONTINUED			2002	24.20	25.20					
								2003	25.20	26.20					
								2004	26.20	27.20					
								2005	27.20	28.20					
								2006	28.20	29.20					
								377	41.10	42.40					
								383	42.40	43.40					
								384	43.40	44.40					
								385	44.40	45.40					
								386	45.40	46.40					
								387	46.40	47.40					
								388	47.40	48.40					
								389	48.40	49.40					
								390	49.40	50.40					
								391	50.40	51.40					
								392	51.40	52.40					
								58	52.40	54.00					
								393	54.00	55.00					
								394	55.00	56.00					
								395	56.00	57.00					
								396	57.00	58.00					
								397	58.00	59.00					
								398	59.00	60.00					

*		
Upper Dolomite		Dolomite
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Lower Basalt		Basalt

**L = 0 - 20% Ca F2

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Char = Character Sample, Ca F2 not clearly identified but suspect

EYSUD (MINING) LTD

DIAMOND DRILLING SUMMARY — HORROX/CLAY CROSS OPTION — LOCATION BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log			Sampling				Assays %			
					Rock*	From	To	No.	From	To	Est**	CaF_2	$BaSO_4$		
H 5	CONTINUED				CONTINUED			399	60.00	61.00					
								400	61.00	62.00					
								401	62.00	63.00					
								402	63.00	64.00					
								403	64.00	65.00					
								404	65.00	66.00					
								405	66.00	67.00					
								406	67.00	68.00					
								407	68.00	69.00					
								408	69.00	70.00					
								409	70.00	71.00					
								410	71.00	72.00					
								411	72.00	73.00					
								412	73.00	73.80					
								59	73.80	74.80					
								60	74.80	75.80					
								61	75.80	76.80					
								62	76.80	77.80					
								63	77.80	78.80					
					A composite sample was prepared from all the samples							taken			
					in this hole and the assay results showed -						0.69%	CaF2			

*		
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Lower Basalt		Basalt

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EXSUD (MINING) LTD

DIAMOND DRILLING SUMMARY

HORROX/CLAY CROSS OPTION

LOCATION BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log			Sampling				Assays %			
					Rock*	From	To	No.	From	To	Est**	CaF_2	$BaSO_4$		
				M		M	M		M	M					
H 6	428675 358621	4.1.72	7.1.72	32.60	O/B	0	0.90	438	0.90	3.30	)				
					MIDDLE DOL.	0.90	29.30	439	3.30	4.30	)				
					LOWER BAS.	29.30	32.60	440	4.30	5.30	)				
								441	5.30	6.30	)				
								442	6.30	7.30	)				
								443	7.30	8.30	)				
								444	8.30	9.30	)				
								445	9.30	10.30	) E				
								446	10.30	11.30	) T				
								447	11.30	12.30	) I				
								448	12.30	13.30	) S				
								449	13.30	14.30	) O				
								450	14.30	15.30	) P				
								451	15.30	16.30	) M	3.15			
								452	16.30	17.30	) O				
								453	17.30	18.30	) C				
								454	18.30	19.30	)				
								455	19.30	20.30	)				
								456	20.30	21.30	)				
								457	21.30	22.30	)				
								458	22.30	23.30	)				
								459	23.30	24.30	)				
								460	24.30	25.30	)				

All measurements are in metres.

*		
Upper Dolomite		Dolomite
Upper Basalt		Basalt
Middle Dolomite		Dolomite, Limestone in places
Lower Basalt		Basalt

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Char = Character Sample, Ca F2 not clearly identified but suspect

[illegible]

EXSUD (MINING) LTD

HORROX/CLAY CROSS OPTION

DIAMOND DRILLING SUMMARY

LOCATION BONSALL HILL

Hole Number	Co-ord inates	Date Started	Date Finished	Final Depth	Geological Log: Rock*	Geological Log: From	Geological Log: To	Sampling: No.	Sampling: From	Sampling: To	Sampling: Est**	Assays %: CaF_2	Assays %: $BaSO_4$		
									M	M					
H 6	CONTINUED				CONTINUED			461	25.30	26.30	) See composite result on Page1				
								462	26.30	27.30	)				
								463	27.30	28.30	)				
								464	28.30	28.70	)				

*		
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H = > 40% " "

Char = Character Sample, Ca F2 not clearly identified but suspect

EXSUD (MINING) LTD

DIAMOND DRILLING SUMMARY — HORROX/CLAY CROSS OPTION — LOCATION BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log: Rock*	Geological Log: From	Geological Log: To	Sampling: No.	Sampling: From	Sampling: To	Sampling: Est**	Assays %: CaF_2	Assays %: $BaSO_4$		
				M		M	M		M	M					
H 7	426635 358366	21.12.71	4.1.72	64.40	O/B	0	0.30	417	11.30	12.30	) COMPOSITE				
					MIDDLE DOL.	0.30	35.60	418	12.30	13.30	)				
					LOWER BAS.	35.60	64.40	419	13.30	14.30	)	1.97			
								420	14.30	15.30	)				
								421	15.30	16.30	)				
								67	32.00	33.00	) COMPOSITE				
								66	33.00	34.00	)	1.49			
								65	34.00	35.00	)				

All measurements are in metres.

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Upper Dolomite		Dolomite
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Lower Basalt		Basalt

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H = > 40% " "

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EXPLORATION PHASE II

EXSUD (MINING) LTD

DIAMOND DRILLING SUMMARY   MORROX/CLAY CROSS OPTION   LOCATION BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log			Sampling				Assays %			
					Rock*	From	To	No.	From	To	Est**	CaF_2	$BaSO_4$	SiO_2	$CaCO_3$
H.8	42866 35855	21.4.72	5.5.72	M 138.05				222	10.80	10.95		0.12	-	-	-
								223	60.90	61.19		0.03	-	-	-
								224	61.19	61.89		0.15	-	52.35	-
								225	61.89	62.50		2.44	-	-	-
								226	62.50	63.30		6.33	-	-	-
								227	63.30	64.00		10.95	-	20.75	-
								228	64.00	67.00		33.02	-	63.15	-
								229	67.00	68.60		5.12	-	44.55	-
								230	100.84	101.30		30.12	-	-	-
								231	101.30	102.35		11.38	-	7.10	-
								233	102.35	103.88		10.88	-	20.30	-
								253	89.70	89.90		7.3	-	5.85	82.72

*		
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EXPLORATION PHASE II

EXSUD (MINING) LTD

DIAMOND DRILLING SUMMARY

HORROX/CLAY CROSS OPTION

LOCATION BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log: Rock*	From	To	Sampling: No.	From	To	Est**	Assays %: CaF_2	$BaSO_4$	SiO_2	$CaCO_3$
H.10	42088 35854	10.5.72	25.5.72	M 172.65				236	117.55	118.00		<0.1	-	-	87.32
								237	119.00	120.00		4.3	-	-	79.36
								238	120.00	120.25		2.5	-	-	84.42
								239	123.00	125.00		1.5	-	-	79.54
								254	155.00	155.50		0.3	-	14.55	82.34

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EXPLORATION PHASE II

EXSUD (MINING) LTD

DIAMOND DRILLING SUMMARY — HORROX/CLAY CROSS OPTION — LOCATION: BONSALL HILL

Hole Number	Co-ordinates	Date Started	Date Finished	Final Depth	Geological Log: Rock*	From	To	Sampling: No.	From	To	Est**	Assays %: CaF_2	$BaSO_4$	SiO_2	$CaCO_3$
H.11	42843 35847	2.6.72	19.6.72	M. 236.4				240	181.30	182.00		0.1	-	14.15	82.92
								241	182.00	183.00		0.1	-	35.20	62.72
								242	183.00	183.70		0.1	-	14.40	82.44
								243	183.75	185.00		0.1	-	1.35	96.90
								244	185.00	186.00		0.1	-	0.60	97.40
								245	186.00	187.00		0.1	-	1.10	96.74
								246	187.00	188.00		0.1	-	0.60	97.50
								247	188.00	189.00		0.1	-	7.10	90.44
								248	189.00	189.80		<0.1	-	8.20	87.04
								249	6.50	7.25		0.1	-	23.95	47.72
								250	31.70	34.90		4.6	-	35.30	56.92
								251	58.25	58.45		0.5	-	0.60	96.48
								252	58.45	59.80		0.7	-	2.40	95.02

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Lower Basalt		Basalt

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1:2500 EXSUD DDH Location HEIRA AE 67.
Matlock Bath Approx 1970-72.

HORROX EXPLORATION

WEST

SECTION ALONG GREAT RAKE

EAST

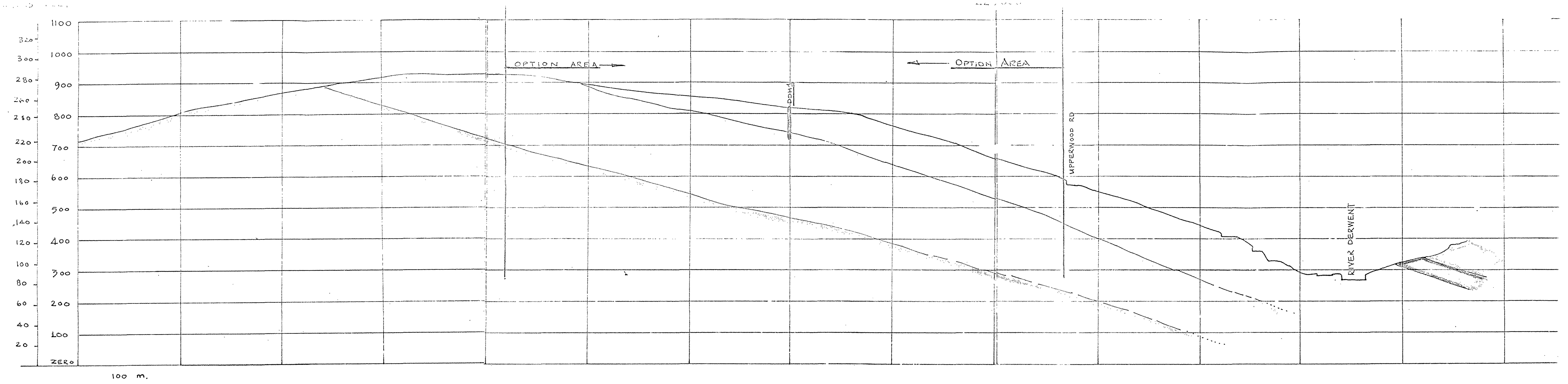
ENC No. 5 (II)

UPPER LST	☐
UPPER LAVA	☐
MIDDLE LST	☐
LOWER LAVA	☐
LOWER LST	☐

ALL SECTIONS EAST WEST

SCALE 1:2500 BOTH HORIZ. & VERT.

INTERSECTION OF BOREHOLES 11 AND 8 IN GREAT RAKE

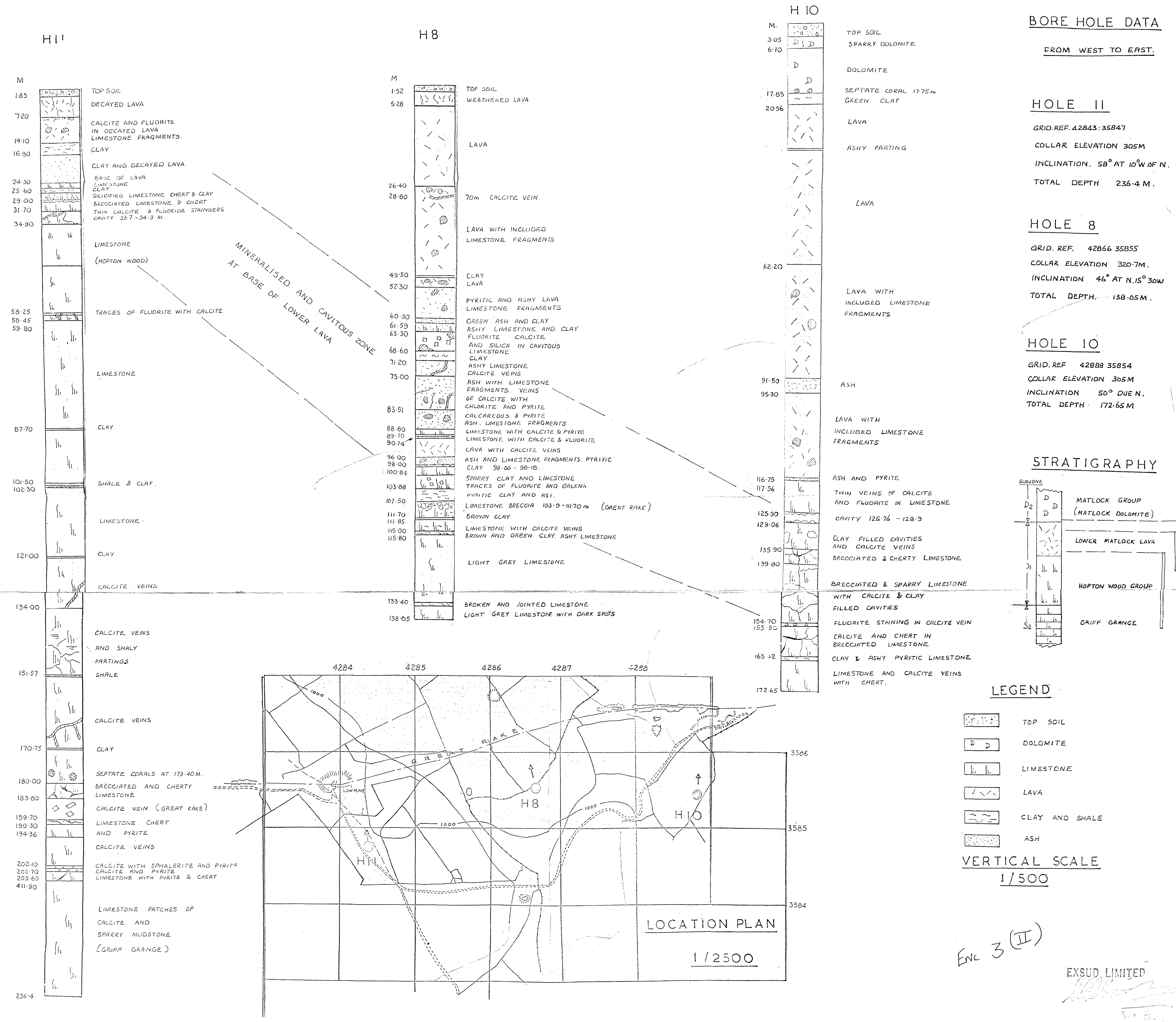


WEST

SECTION 3 (N35820) On D.D. Hole No1.

..LL SECTIONS EAST WEST

EXSUD LIMITED HORROX - GLAY CROSS PROJECT BOREHOLES 8, 10 AND 11



METRES FEET
429000
1100
1000
900
800
700
600
500
400
300
200
100
ZERO
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
OPTION AREA
DDH3
FAULT
OPTION AREA
DDH2
UPPERWOOD ROAD
RIVER DERWENT
100 m.

WEST

WEST

SECTION 5 (N 35784) ON D.D. HOLE No 4

SECTION 6 (N35760) ON D.D.HOLE No 5

HORROX EXPLORATION

SECTION 1 (N 35862) ON D.D. HOLE N.º 6

ENC 3 (I)

UPPER LST	
UPPER LAVA	
MIDDLE LST	
LOWER LAVA	

SECTIONS EAST WEST

ALE 1:2500 BOTH HORIZ. & VERT.

SECTION 2 (N35836) ON D.D. HOLE Nº 7

ATTACHMENT No. 1.

HORROX-CLAY CROSS OPTION

SCALE 1:2500

BONSALL HILL AREA