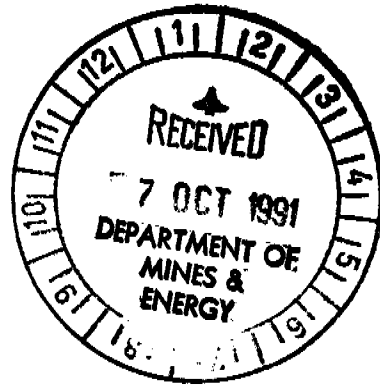


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**RELINQUISHMENT REPORT
FOR YEAR TWO
EL 6400 and EL 6401**

12 July 1990 to 11 July 1991

FOR

BEN HALL

BY

I. K. BUTLER B.App.Sc

OF

EUPENE EXPLORATION ENTERPRISES PTY LTD

CR 91 / 494

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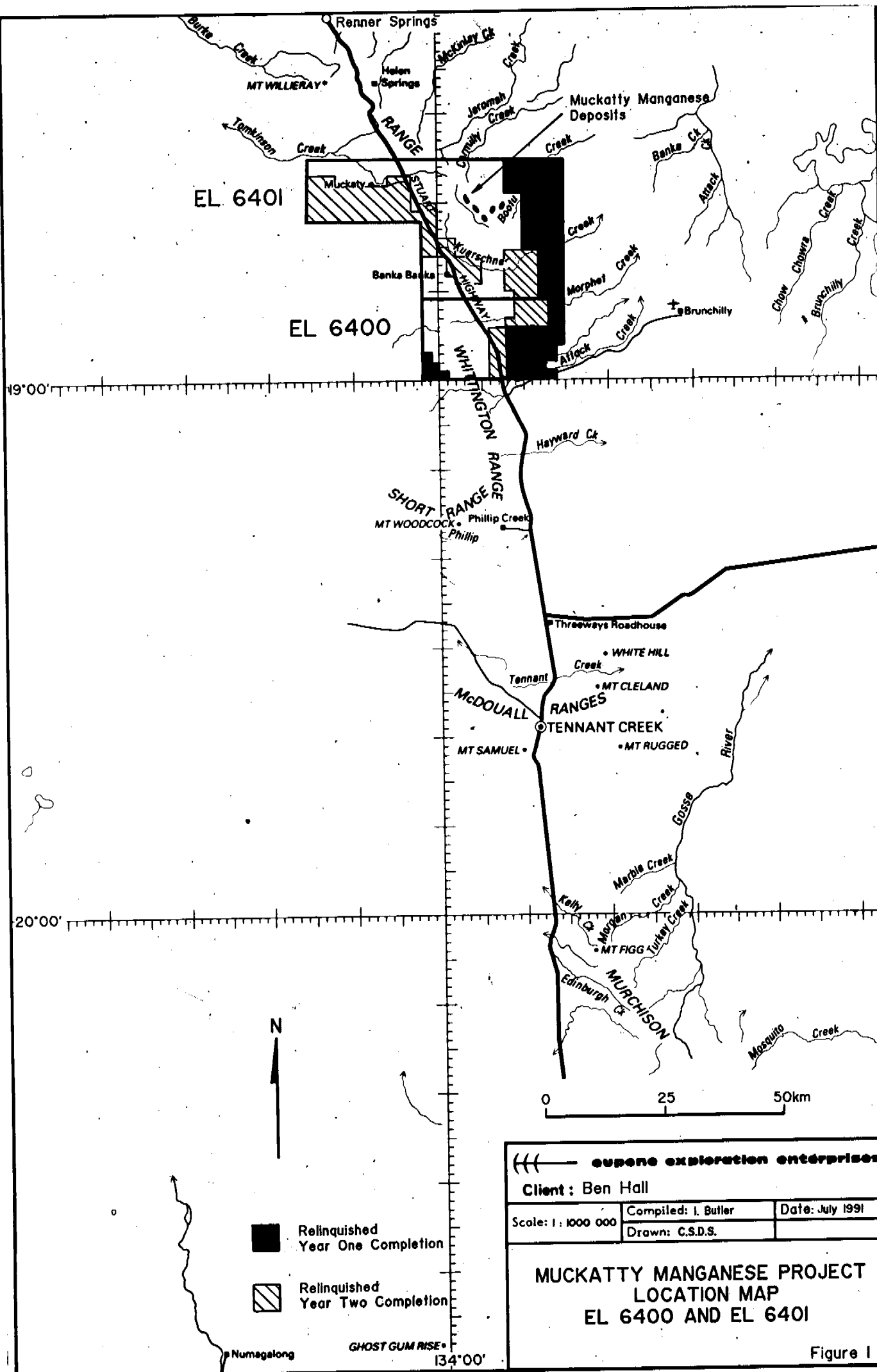
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1. INTRODUCTION

Exploration Licences 6400 and 6401 are located approximately 950 kms south south-east of Darwin on the Muckatty and Banka Banka Pastoral Leases (Figure 1). The exploration licences are accessed by the Stuart Highway and station tracks.

The licences are owned by a private prospector, Mr. Ben Hall.

The Muckatty manganese deposits are located approximately 12 kms northeast of the Banka Banka homestead within EL 6401. The relinquished area has been explored primarily for manganese and to a lesser extent gold and base metals. The aim of this report is to discuss the work conducted within the area relinquished at the completion of Year Two of tenure and present results.



2. TENURE (see Figure 1)

Exploration licences 6400 was granted to Mr. Ben Hall on 12 July, 1989 for a period of six years and originally comprised an area of 477 square kilometres consisting of 148 blocks. At the completion of Year One, 49 blocks were voluntarily relinquished and at the end of Year Two a further 25 blocks were relinquished, leaving a total of 74 blocks (240 square kilometres). EL 6400 is located within the southern portion of the Banka Banka Pastoral Lease.

Exploration Licence 6401 was granted to Mr. Ben Hall on 12 July, 1989 for a period of six years and originally comprised an area of 1,169 square kilometres consisting of 363 blocks. At the completion of Year One, 76 blocks were voluntarily relinquished and at the end of Year Two a further 105 blocks were relinquished leaving a total of 183 blocks (585 square kilometres). EL 6401 is located on both Banka Banka and Muckatty Pastoral Leases.

As of 26th July, 1991 the exploration licences became subject to the terms of a joint venture agreement between Mr. Ben Hall and M.I.M. Exploration Pty Ltd. The agreement is in the form of a staged option over two years with M.I.M. Exploration being the operators.

3. SUMMARY

Exploration Licences 6400 and 6401 were taken up principally to evaluate the economic potential of the Muckatty manganese deposits. In addition surrounding areas have been explored for further manganese mineralisation and for gold and base metals. The Muckatty manganese deposits occur in sediments of the Middle Proterozoic Tomkinson Creek Beds.

The manganese deposits have been known to pastoralists for many years but it was not until the 1950's when manganese dioxide was required for the Rum Jungle uranium treatment plant that any systematic work was carried out. Mining commenced in June, 1955 and by September of that year 400 tons of ore averaging 68% MnO₂ (43% Mn) had been carted. The Bureau of Mineral Resources carried out geological mapping and rock chip sampling before drilling 5 diamond drillholes into the main body of the manganese mineralisation. They concluded that 15,000 tons of ore greater than 60% MnO₂ (38% Mn) were available by shallow open pit extraction, from two of the seven known deposits at Bootu Creek (see Figure 1). Very little work has been done since.

The known manganese lodes occur within a specific stratigraphic interval over at least 20 km strike length.

Exploration activity in the first year of tenure concentrated on reconnaissance stream sediment sampling, geological traversing and rock chip sampling to evaluate the regional potential of the area. Some rock chip sampling was conducted in the vicinity of the Muckatty manganese deposit to confirm grades. No significant anomalies were located within the area relinquished.

Work carried out in the second year of tenure consisted of literature research, seeking a joint venture partner and prospecting in the vicinity of geochemically anomalous streams defined during the Year One programme.

This work has resulted in a joint venture agreement being signed between Ben Hall and M.I.M. Exploration Pty Ltd with M.I.M. Exploration being the operators for year three of tenure. The prospecting has failed to locate any further areas with significant manganese

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mineralisation away from the Muckatty deposits.

4. CONCLUSIONS

- a) There are no base metal or gold geochemical anomalies within the area relinquished at the completion of Year Two.
- b) There are anomalous Mn levels in streams draining the Muckatty manganese deposits on the western limb of the Bootu Creek Syncline.

5. PREVIOUS EXPLORATION

The Muckatty manganese deposits have been known to pastoralists for many years, but no serious attention has been paid to the deposit until manganese dioxide was required for the uranium treatment plant at Rum Jungle during the 1950's.

The deposits were initially evaluated in 1955 by the BMR and the Rio Tinto Finance and Exploration Co.; the results of this work being reported in BMR Record 1955/120 (Jones, 1955). During this programme 18 grab samples were collected from the deposit and assayed for MnO_2 , Fe and SiO_2 . Results for manganese varied between 4.7% and 78.7% MnO_2 and qualitative results for phosphorus were described as below 0.1% (Jones, 1955). Jones concluded there was a strong stratigraphical control of the ore and it was formed by secondary concentration of sedimentary manganese.

Work commenced on the central deposit at a small open cut in June, 1955 by Messrs Doyle and Farlow, the lease holders, and the ore was trucked to the uranium treatment plant at Rum Jungle. This deposit occurs on the western limb of a syncline where the beds dipped between 20° and 30° to the northeast.

From his field investigations Jones (1955) calculated an inferred manganese deposit of 8490 tons/foot down dip (ore at 35% MnO_2). No estimate was made of the total ore reserve due to the lack of subsurface stratigraphic data. He recommended a programme of diamond drilling to determine the extent of the deposit down dip.

In 1956, the BMR completed five diamond drill holes over the top of the main scarp deposit (MacKay, 1956, BMR Record 1956/134). The holes were drilled to determine the extent of the manganese down dip from outcrop. The results showed that the deposit decreases rapidly in size and grade down dip. Drilling also confirmed that the siltstone horizon is the favourable host unit for replacement processes to form manganese ore.

The report outlines that there were reserves of approximately 11 000 tons of good ore ($>60\%$ MnO_2) in the central deposit, with a further 1500 tons available as boulders below the scarp. An extra 500 tons was estimated for the Bootu Creek deposit on the eastern limb of the syncline. It was concluded there was potential for a total of 15,000 tons of

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manganese ore (>60% MnO₂) contained within all of the Muckatty deposits.

According to Mr. J. C. Walton (*pers. comm. 1989*), some airtrack drilling was completed during the 1970's on the deposit. No results were recorded from this work, however the results were said to be disappointing.

6. WORK CARRIED OUT AND RESULTS

Exploration of the area surrounding the Muckatty manganese deposits commenced in 1989 during Year One of tenure for the two licence areas. The work was conducted by Eupene Exploration Enterprises Pty Ltd as consultants to the tenement holder, Mr. Ben Hall.

The work involved three field trips, during which time stream sediment sampling, rock chip sampling and geological mapping of the licences took place. Bulk Cyanide Leach Extractable Gold (BLEG) and -40 mesh sediment samples were collected from all suitable streams (see Enclosures 1 and 2), while rock chip samples were collected from manganese oxide or limonite rich outcrops. The -40 mesh sediment samples were analysed for Au (fire assay, carbon rod finish), As (hydride generation, AAS finish) and Mn, Co, Ni, Cu, Pb and Zn (AAS) (see Appendix I). Levels for all elements with the exception of Mn (235 ppm max.) were background only. Streams draining the Muckatty Mn deposits, particularly on the western limb of the Bootu Creek Syncline were anomalously high in Mn. This programme of work failed to locate any significant manganese mineralisation away from the Muckatty manganese deposits however. No anomalous gold or base metal values were obtained from the stream sediments or rock chip sampling.

Work carried out during Year Two of tenure primarily involved seeking a joint venture partner. In addition, further literature research and prospecting in the vicinity of streams with anomalous manganese detected during the Year One programme was carried out.

The licence holder, Mr. Ben Hall, spent approximately two weeks in the field prospecting the drainage areas of streams with anomalous levels of Mn in their sediments. This work failed to locate any significant quantities of outcropping high grade manganese ore away from the known Muckatty deposits.

7. GEOLOGY

The geology of the licence areas is presented on the Helen Springs 1:250 000 scale geological map sheet (SE53-10), published in 1969 by the Bureau of Mineral Resources (BMR).

The Middle Proterozoic Tomkinson Creek Beds are predominantly sandstone and siltstone units. The stratigraphy of the unit is not well known and the sequence is further complicated by the fact that the beds outcrop in four structurally separate blocks. Two of the blocks are relevant to the geology here; the Whittington Range block which runs along the western half of EL 6400 and the southwest corner of EL 6401, and the Bootu Creek block which makes up the bulk of EL 6401.

The rock types comprise quartz sandstone (with mud casts), pebbly sandstone, glauconitic sandstone, siltstone, calcareous siltstone, siliceous siltstone, dolomite, limestone, chert, minor conglomerate and dolomite breccia.

EL 6400

Within the Whittington Range block, a medium to very fine grained quartz sandstone predominates with an interbedded siltstone unit outcropping along the western portion of the licence. At Churchills Head, a distinctive medium to coarse grained sandstone, pebbly sandstone and conglomerate crops out.

All three lithologies are extensively jointed and faulted, making it difficult to determine the stratigraphic relationship between them. According to Randal and Brown (1969) this block of predominantly sandstone contains the oldest rocks of the Tomkinson Creek Beds on this map sheet, and they also extend south towards Tennant Creek.

Outcrops of manganese or the calcareous siltstone host unit are not recorded on the geology map sheet, and none were identified during the field programmes.

EL 6401

The Whittington Range block extends into the southwest portion of this licence and the medium to very fine grained quartz sandstone unit still predominates. The northern most portion of this block is capped by the Cambrian Helen Springs Volcanics. This unit forms a distinctive dark red-brown flat soil plain backed by the Whittington Range, just north of Banka Banka homestead.

East of the Stuart Highway the Bootu Creek block extends through the centre of the licence, trending in a northwest-southeast direction. The block is dominated by a north-northwest plunging complimentary anticline and syncline structure. The stratigraphy once again is dominated by the medium to very fine grained quartz sandstone with at least two interbeds of siltstone and fine grained sandstone.

Muckatty Manganese Deposit

The Muckatty manganese deposits occur as a replacement horizon in a siltstone unit of the Tomkinson Creek Beds. The ore horizon outcrops as a prominent discontinuous dark steel blue ridge line along both limbs of a north-northwest plunging syncline (Bootu Creek area). The main deposits lie along the western limb at the top of a limestone-siltstone sequence which separates two sandstone units. The boundary between the siltstone and sandstone forms the loci for mineralisation. This surface was possibly a disconformity (Jones, 1955) which may have encouraged the primary sedimentary concentration of manganese. Surficial enrichment occurred during the Miocene and has upgraded the deposits through lateritisation processes.

According to Randal and Brown (1969), three types of manganese ore have been identified from the seven deposits located in the Bootu Creek area; massive ore of good grade ($>60\%$ MnO_2), medium grade sandy ore ($35 - 60\%$ MnO_2), and low grade ore ($<35\%$ MnO_2). The good grade ore occurs in the siltstone and a sharp cut-out occurs between the good and medium grade ores, which reflects the contact between the siltstone and sandstone.

8. REFERENCES

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- Hickey, S.H., 1990 - Annual Report for Year One EL 6400 and EL 6401. 12 July, 1989 to 11 July, 1990. *Unpublished Report for Ben Hall and the NT Department of Mines and Energy.*
- Jones, N.O., 1955 - Geological report on the Muckatty manganese deposit. *Bureau of Mineral Resources, Geology and Geophysics, Record 1955/120* (unpublished).
- Mackay, N.J., 1956 - Report on diamond drilling of Muckatty manganese deposit, Northern Territory. *Bureau of Mineral Resources, Geology and Geophysics, Record 1956/134* (unpublished).
- Randal, M.A. and Brown, M.C., 1969 - Explanatory notes for Helen Springs 1:250 000 scale map sheet, SE 53-10. *Bureau of Mineral Resources, Geology and Geophysics.*

APPENDIX I

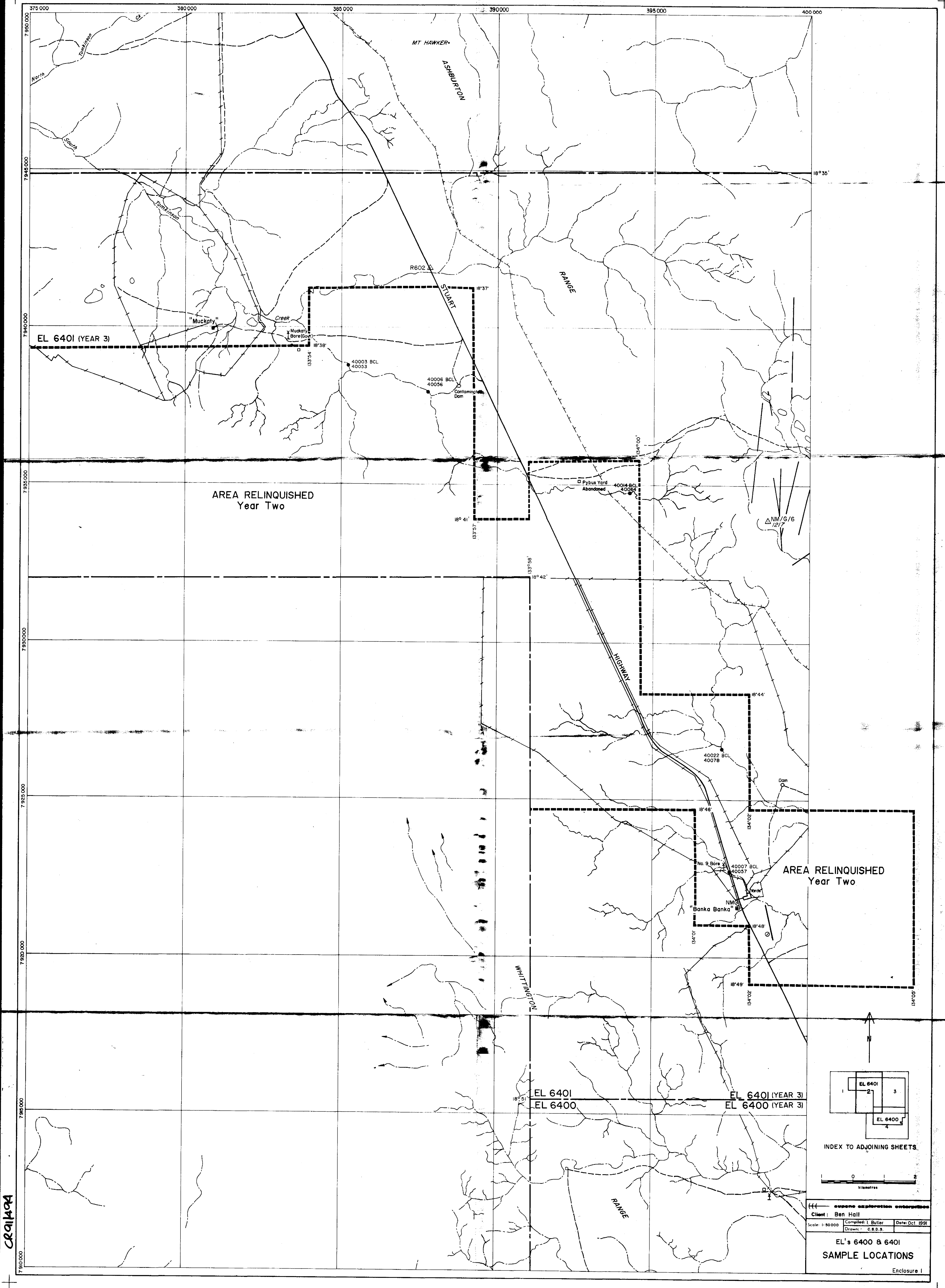
ANALYTICAL RESULTS

-40 MESH ANALYSIS

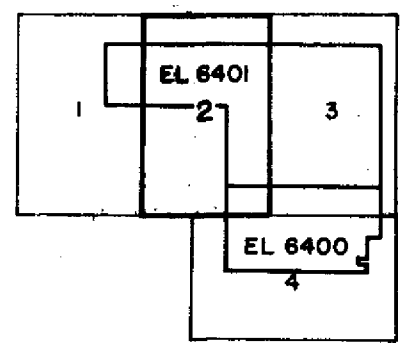
Sample No:	Au	As	Pb	Mn	Co	Ni	Cu	Zn
40053	<0.001	1	5	110	<5	10	5	5
40056	<0.001	1	5	75	<5	15	5	5
40057	<0.001	1	5	75	<5	5	10	5
40004	Sample not received							
40078	<0.001	1	<5	235	10	15	10	20
40079	<0.001	1	<5	40	<5	5	5	5
40080	<0.001	1	5	25	<5	10	5	5
40094	<0.001	<1	5	70	<5	5	10	10
40095	<0.001	1	5	125	5	10	10	15
40171	0.001	1	5	45	<5	10	5	5
40175	<0.001	1	<5	130	5	10	10	10

BCL (BULK CYANIDE LEACH) ANALYSYS

Sample No:	Au (ppb)
40003	0.1
40006	0.2
40007	0.2
40014	0.2
40022	0.4
40023	0.8
40024	0.6
40035	0.2
40036	0.2
40211	0.2
40215	0.3



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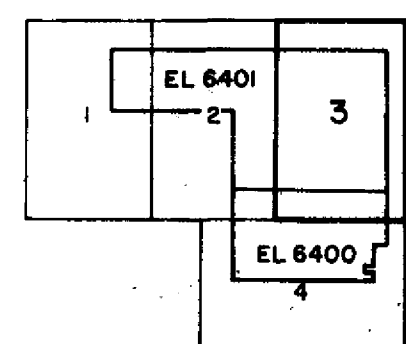
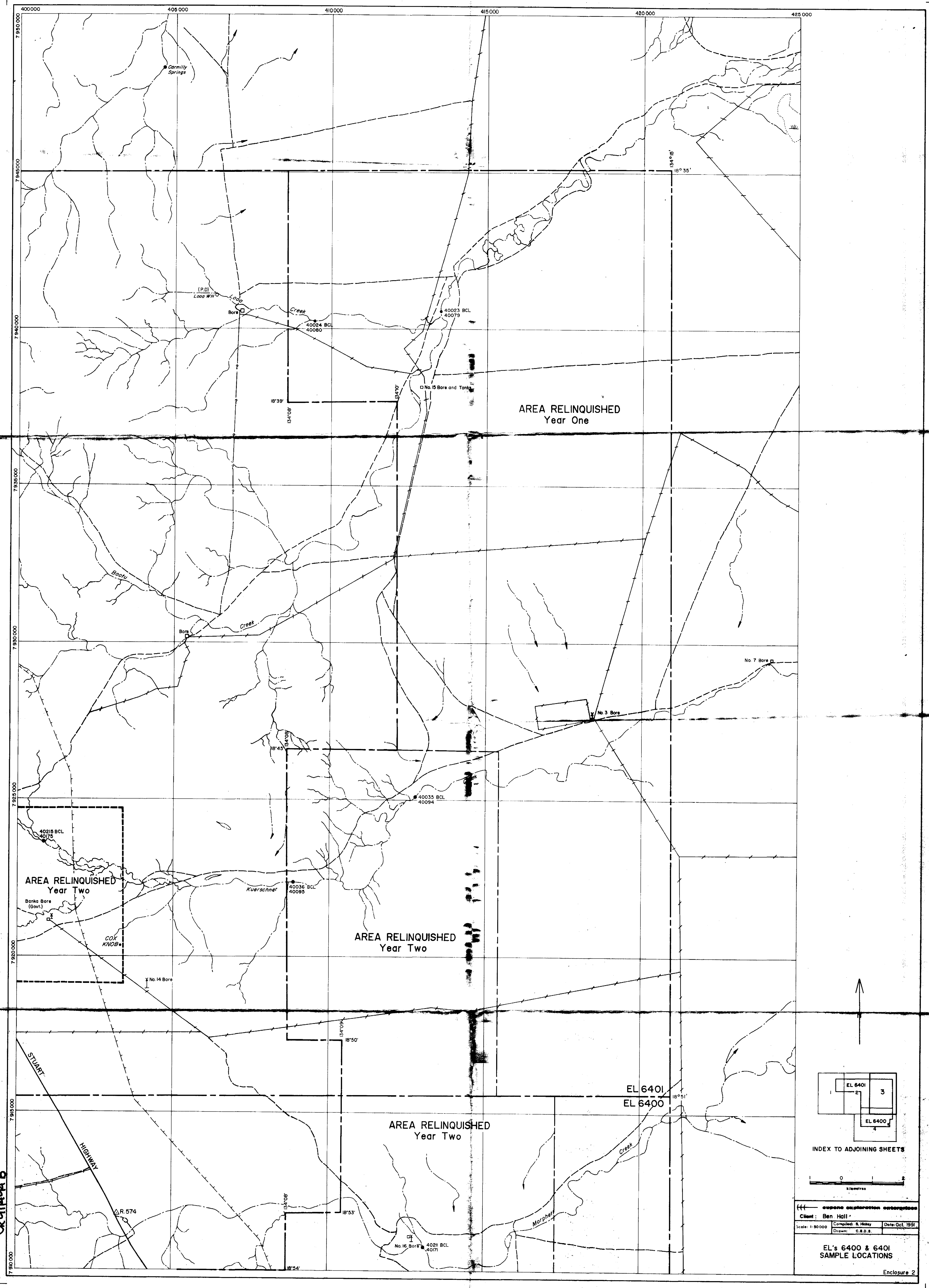
INDEX TO ADJOINING SHEETS



Client: Ben Hall
Compiled: I. Butler
Scale: 1:50000
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Drawn: C.S.D.S.

EL's 6400 B 6401
SAMPLE LOCATIONS

Enclosure 1



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supone exploration enterprises
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Scale: 1:50,000
Compiled: S. Hakey
Date: Oct. 1991
Drawn: C.S.D.S.

EL's 6400 & 6401
SAMPLE LOCATIONS