PARTIAL RELINQUISHMENT REPORT
for
EL-25406  FOG BAY

&

FINAL REPORT
for
EL-26420  FOG BAY EAST

Year Ending 9th of April 2009

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SUMMARY

Hapsburg Exploration Pty Ltd was granted EL-25406 (Fog Bay) on the 10th of April 2007, for a period of six years. EL-25406 (Fog Bay) tenement consisted of 25 sub-blocks and covers an area of 77 km$^2$. On the second anniversary of grant (10th April 2009), EL-25406 was reduced by about half, to 13 sub-blocks covering about 40 km$^2$. This report represents the Partial Relinquishment Report for the 12 sub-blocks released.

On the 23rd of April 2008, Hapsburg was granted EL-26420 (Fog Bay East) consisting of 7 sub-blocks totalling about 17 km$^2$. The sub-blocks of EL-26420 occur along the north and east side of EL-25406. EL-26420 was relinquished in entirety in mid 2009 and this report represents the Final Report for this exploration licence.

These two tenements are located on the north side of the mouth of the Finniss River, about 60 km south-west of Darwin. These tenements are bordered by 5 Mile Beach on the west, Wagait Aboriginal Reserve on the south, the residential areas of Dundee Beach and Fog Bay Road on the north and north-east. The eastern boundary used to be bordered by tenements held by Uranex NL, but these have since been relinquished.

The Fog Bay tenements are located in the northern part of the Litchfield Province, which is described as a medium to high grade metamorphic terrane comprising metasedimentary and igneous rocks of Archean(?) to Lower Proterozoic age. This basement block (or province) lies on the west side of the Pine Creek Orogen and extends for several hundred kilometres in a north-south direction, and is up to 60 km wide. The Litchfield Province is also cut by (and in part bound by) several major faults which appear to be part of the Halls Creek Mobile Zone fault system. The Litchfield Province contains a centrally located syn-orogenic granitoid of presumed Lower Proterozoic age. This granitoid is enveloped by a suite of recrystallised carbonate rocks, calc-silicate rocks, amphibolite, biotite quartzofeldspathic gneiss, graphitic schist/gneiss, quartzite, sideritic iron formation and ultramafic rocks. This suite of rocks forms the Sweets Unit of the Welltree Metamorphics, and corresponds with pronounced aeromagnetic and radiometric anomalies. This unit has been correlated (by some) with the Cahill Formation of the East Alligator Rivers Uranium Field (the Cahill Formation is host to the Jabiluka, Koongarra, Nabarlek and Ranger Uranium Province).

Within Hapsburg’s tenements, the main rock exposure is a linear outcrop of mildly metamorphosed ferruginous, and pebbly sandstone which is correlated with the Depot Creek Sandstone that forms the Tolmer Plateau. Cretaceous age lateritic sandstone (Bathurst Island Formation) covers the northern and eastern parts of the tenements to a depth of up to 60m.

A geology map of the Fog Bay area (by Idemitsu) shows possible Burrell Creek Formation occurring to the east of the Depot Creek Sandstone (presumably underlying the laterite cover seen on EL-26420). Then further to the east is a north to north-east trending unconformity that separates the Burrell Creek Formation from the Port Patterson sequence. To the west of the Depot Creek Formation, the basement rock is interpreted to be the Wagait Granite (however Idemitsu had no drilling in this area).

The area to the west of the Depot Creek Formation is covered by the Quaternary age sand dunes and is very difficult to access. The sub-blocks of EL-25406 which covered this sand dune area were relinquished. No significant magnetic anomalies are present in this relinquished area.
The NTGS geology of the area shows Wagait Granite occurring on both sides (E & W) of the Depot Creek Sandstone in the south part of Hapsburg’s tenement. This is based on two NTGS stratigraphic drill holes in the south part of Hapsburg’s tenement. In contrast, the NTGS shows the Depot Creek Sandstone in the northern part of Hapsburg’s tenement to be bracketed by Palaeoproterozoic gneissic rocks. This is based on four NTGS stratigraphic drill holes within or adjacent to the northern part of Hapsburg’s tenement.

**Review of Historic Exploration**

Only minor surface work has been done directly on Hapsburg’s tenements (EL-25406 & 26420). However, significant exploration for uranium and base metals was done about 15 to 25 km to the east of Hapsburg’s tenements; without success.

The Fog Bay area has seen past exploration for a diverse range of commodities. In the 1960s Placer Limited explored for mineral sands in the beach deposits, without success. Others (including BHP) have explored for base metals (Pb & Zn) in the Proterozoic basement rocks, especially to the east of Hapsburg’s tenements. This work showed only weak Pb-Zn values in fault structures largely cutting carbonate units. Various companies such as Greenbushes have explored pegmatite bodies for tin and tantalum, with several small operators having exploited small deposits.

To the east of Hapsburg’s Fog Bay tenements, there has been substantial uranium exploration conducted by Esso Australia Limited, AOG Minerals Limited in joint venture with Union Oil Development Corporation, and the Urangesellschaft - Idemitsu Joint Venture. Virtually all airborne radiometric anomalies were investigated without any significant uranium responses being found. Much effort was expended on evaluating the stratigraphy in this area, in an effort to show it to be equivalent to the Cahill Formation of the East Alligator Rivers Uranium Field. Despite the apparent success of proving stratigraphic equivalence, the surface surveys and drilling still failed to locate any uranium.

Hapsburg’s exploration target for this area is an unconformity type uranium deposit (vein type) within a unit thought to be analogous to the Cahill Formation of the East Alligator region. It is suggested that vein pitchblende mineralisation could occur within graphitic micro-gneiss units of the Fog Bay Metamorphics, showing Mg metasomatism and chlorite alteration and related to intrusives.

**Exploration by Hapsburg in 2007**

A government regional geophysical survey had previously been flown in a north-south direction generally parallel to stratigraphy. This limits the full magnetic response, so Hapsburg commissioned a new aeromagnetic survey to be flown with east-west flight lines, 100m spaced lines and a sensor height of 50m. Universal Tracking Systems (UTS) of Perth was awarded the contract, and the survey of 2,210 line kilometres was flown in late December 2007 (Fig 6). This resulted in the selection of four areas (A to D) for follow-up ground magnetic surveys and geological reconnaissance.

**Exploration by Hapsburg in 2008**

No physical exploration was conducted on the relinquished sub-blocks of EL-25406 or EL-26420 during the 2008 field season.
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INTRODUCTION

Hapsburg Exploration Pty Ltd was granted EL-25406 (Fog Bay) on the 12th of April 2007, for a period of six years. The Fog Bay EL originally consisted of 25 sub-blocks (77 km²), but was reduced to 13 sub-blocks on the 10th of April 2009 (40 km²). On the 23rd of April 2008, Hapsburg was granted EL-26420 (Fog Bay East) consisting of 7 sub-blocks totalling about 17 km². EL-26420 was relinquished in total in mid 2009.

Location

The two tenements are located about 60 km south-west of Darwin and are accessed by the Fog Bay road via the Sturt Highway (a travel distance of about 150 km). The tenements are bordered by 5 Mile Beach on the west, from Stingray Head at the north-west corner to the mouth of the Finniss River at the southwest corner (Figs 1 & 2). The Wagait Aboriginal Reserve forms the southern boundary while the residential areas of Dundee Beach and Fog Bay Rd border to the north and north-east, and ELs held by Uranex NL form the east boundary.

Topography & Vegetation

The Fog Bay tenement contains a variety of physiographic terranes:
A north – south trending ridge occurs through the middle part of the tenement. This ridge is made up of the Middle Proterozoic Depot Creek Sandstone. The highest point is recorded as 47 metres. Paludal and estuarine plains (black soil plains and swamp) occur in the central and southern part of the tenement (associated with the Finniss River). Lateritic soil cover occurs over the northern part of the tenement. Beaches and sand dune ridges along the coastline make up the western edge of the tenement. Tidal mudflats and mangroves fringe the coastline and Finniss River.

TENEMENT INFORMATION

The following are the descriptions of the two Exploration Licences: EL-25406 & 26420.

EL-25406 Fog Bay (Original Grant – 10th April, 2007)

1:1,000,000 Map Series SD52 - Darwin
Block Sub-Blocks
774 L (1).
Total Sub-blocks = 25

EL-25406 Fog Bay (Area retained after first reduction – 10th April 2009) (See Fig 3)

1:1,000,000 Map Series SD52 - Darwin
Block Sub-Blocks
701 N, S, T, X, Y (5).
773 C, D, H, J, K, N, O, P (8)
Total Sub-blocks = 13

EL-26420 Fog Bay East (Original Grant – 23rd April 2008) (See Fig 3)

1:1,000,000 Map Series SD52 - Darwin
Block Sub-Blocks
701 O, P, U (3).
702 Q, V (2)
774 A, F (2)
Total Sub-blocks = 7
PAST EXPLORATION

Since 1970, several companies have investigated the area surrounding ELs-25406 & 26420. The following is a summary by Dave Bennett (2008) of the historic activity as detailed in a report by Jim McGregor-Dawson (2007).

BHP (EL-71, 1972-76)
BHP explored an area of 350 sq km just to the southeast of Hapsburg’s boundary. Target was Daly River type base-metal mineralisation, and Cainozoic uranium mineralisation. Methodology used was ground magnetics, IP/resistivity, rock and soil sampling, auger drilling and 8 cored holes. Similarities were made with the geology Alligator Rivers Uranium Province.
Aeromagnetics and radiometrics were flown over the Finniss River swamp, together with ground traverses and auger drilling. This was in an attempt to locate 2 BMR airborne radiometric anomalies. No anomalous U$_3$O$_8$ was intersected, but P$_2$O$_5$ to 2.5% was located in basal ?Cambrian sediments.

Esso Australia (EL-877, 1973)
Esso’s tenement covered an area of 250 sq.km to the east of Hapsburg’s current EL. Exploration was mainly auger drilling beneath Cainozoic cover to determine bedrock stratigraphy and geochemistry. Lithologies are mainly quartz-mica-schist and minor shale, mudstone and amphibolite. No mineralisation was located.

AOG & Union Oil (5 EL’s, 1978-80)
Auger drilling located weak base metal and uranium mineralisation (to 70ppm) in gneissic granite near the contact with metasediments over an area of 2500m by 200m. Elevated values were interpreted to be due to secondary enrichment at the watertable.

Other exploration centred on evaluation of the Finniss River Plains radiometric anomaly and drilling intersected marble and granulite. Weakly anomalous U$_3$O$_8$ assays ranged from 10-70ppm, with radiometric counts to 210 cps.

AOG recommended further work on the Finniss Plains U anomaly, but in any event the area was relinquished.

Idemitsu & Urangesellschaft Joint Venture (10EL’s, 1978-86)
This JV held tenements to the east and north of present ELs-25406 & 26420. Focus of activity was the “Lookin Project” which is approximately 15 km distant from the present eastern boundary of EL-25406.

Lookin Project

The exploration premise was that greenschist to amphibolite rank gneisses in the Lookin area are similar in chemistry and geological setting to the Lower Cahill Formation of the East Alligator River Uranium Field.

The area under consideration lies to the east of Tom Turner’s Fault, which separates Port Patterson gneisses to the west from the Lookin gneisses. Muddy sand and silts with basal intercalated calcareous and carbonaceous sediments were deposited in a shallow marine intertidal environment. Syngenetic uranium was concentrated
in black shales. The sediments have been metamorphosed to medium and high-grade amphibolites and granulites. Folding is NW-trending isoclinal with steep westerly pitch.

The Dumbell Prospect covers part of the Tom Turners Fault System (an extension of the Hall’s Creek Mobile Zone Fault System). Lithologies are meta-carbonates, amphibolites, microgneiss, biotite-sillimanite-quartz-feldspar gneiss and intrusive granitoids.

By comparison, the Port Patterson gneisses to the west of Tom Turner Fault (and on Hapsburg’s ELs-25406 & 26420) are described as coarse grained, lower to upper amphibolite facies gneiss and amphibolite. The sequence, from bottom up, is:
- coarse grained feldspathic gneiss;
- a slightly magnetic (after pyrrhotite) amphibolite unit with thin carbonate bands;
- graphite – pyrite – biotite-pelitic gneiss grading to:
- coarse feldspathic biotite gneiss.

The pyrrhotite rich units show up well as curvilinear belts on magnetic maps. A circular airborne magnetic anomaly on the Port Patterson tenement was drilled and found to be an ultramafic pipe composed of peridotite, pyroxenite and norite.

After 4 years exploration the final analysis of the area is that it is underlain by a Palaeoproterozoic metasedimentary sequence of quartz-feldspar-biotite gneiss and amphibolites correlated to the upper Cahill Formation of the East Alligator River Province. No significant areas of chloritisation and uranium mineralisation were encountered. Prospective target horizons were not outlined and if present, would be at too great a depth to warrant further exploration.

**Eupene Exploration Enterprises (1985-94)**
This group held several EL’s in the Fog Bay, Port Patterson, Bynoe Harbour areas for base and precious metal exploration and shell grit. Exploration was limited to sampling pisolitic gravels for base metals and testing targets with shallow auger drilling.

**Australian Coal and Gold Holdings (1981-89)**
Several tenements were held in the Dundee Downs area 15 km north-northeast of Hapsburg’s area. Target minerals were gold, base metals and uranium. Exploration consisted of ground magnetics and radiometrics, auger, RAB and diamond drilling and gamma logging. Anomalous base metal assays interpreted to relate to faults and intrusives.
PAST TARGET CONCEPTS

The Fog Bay area has seen past exploration for a diverse range of commodities. In the 1960s Placer Limited explored for mineral sands in the beach deposits, without success. Others (including BHP) have explored for base metals (Pb & Zn) in the Proterozoic basement rocks, especially to the east of Hapsburg’s Fog Bay tenement. This work showed only weak Pb-Zn values in fault structures largely cutting carbonate units. Various companies such as Greenbushes have explored pegmatite bodies for tin and tantalum, with several small operators exploiting small deposits.

To the east of Hapsburg’s Fog Bay tenement, there has been substantial uranium exploration conducted by Esso Australia Limited, AOG Minerals Limited in joint venture with Union Oil Development Corporation, and the Urangesellschaft - Idemitsu Joint Venture. Virtually all airborne radiometric anomalies were investigated without any significant uranium responses being found. Much effort was expended on evaluating the stratigraphy in this area, and showing it to be essentially equivalent to the Cahill Formation of the East Alligator Rivers Uranium Field. Despite the apparent success of this work, the surface surveys and drill holes still failed to locate any uranium.

Later exploration by Eupene and others focussed on gold, base and ferro metals, as well as peat and shell grit deposits. This work was quite limited, and failed to show any anomalous metals or deposits of peat or shell grit.

Gold deposits are noted in the Litchfield Province (Ahmad et al 1999) but they are not significant producers. It is assumed that gold deposits do not form in the high metamorphic grades in the Pine Creek Orogen. The granites in the Litchfield Province are more likely to be S type granites that can host pegmatites with tin and tantalum (Ahmad et al 1993).

HAPSBURG’S EXPLORATION TARGET CONCEPT

Hapsburg’s exploration target for this area is an unconformity type uranium deposit (vein type) within a unit thought to be analogous to the Cahill Formation of the East Alligator region. It is suggested that vein pitchblende mineralisation could occur within graphitic micro-gneiss units of the Fog Bay Metamorphics, showing Mg metasomatism and chlorite alteration and related to intrusives.

This concept is based on the drilling and stratigraphic interpretation in the Litchfield Block to the northeast of ELs-25406 & 26420 that confirmed the presence of a Palaeoproterozoic calc-silicate sequence in the lower Fog Bay Metamorphics which could be analogous to the calc-silicate gneisses and schists of the Lower Cahill Formation in the Alligator Rivers Region. It is known that major $U_3O_8$ and Au mineralisation is hosted in the Lower Cahill Formation.
REGIONAL GEOLOGY

Geological descriptions have been garnered from reports by Idemitsu Uranium Exploration Australia and Eupene Exploration Enterprises.

The Fog Bay tenements (ELs-25406 & 26420) is located in the northern part of the Litchfield Block, which is described as a medium to high grade metamorphic terrane comprising metasedimentary and igneous rocks of Archean (?) to Lower Proterozoic age. This basement block (or province) lies on the west side of the Pine Creek Geosyncline and extends for several hundred kilometres in a north-south direction, and is up to 60 km wide. It extends from the Cox Peninsular (just west of Darwin) in the north to Daly River in the south, where it is covered by Middle Proterozoic sediments of the Victoria River Basin. The western margins of the Litchfield Block are covered by Permian sediments of the Bonaparte Basin, while the eastern edge is unconformably overlain by the Lower Proterozoic Burrell Creek Formation (of the Finnis River Group), and is characterised by extensive intrusion of Carpentarian granites. The Litchfield Block is also cut by (and in part bound by) several major faults which appear to be part of the Halls Creek Mobile Zone fault system (Fig 5).

The Litchfield Block contains a centrally located syn-orogenic granitoid of presumed Lower Proterozoic age. This granitoid is enveloped by a suite of recrystallised carbonate rocks, calc-silicate rocks, amphibolite, biotite quartzofeldspathic gneiss, graphitic schist/gneiss, quartzite, sideritic iron formation and ultramafic rocks. This suite of rocks forms the Sweets Unit of the Welltree Metamorphics, and corresponds with pronounced aeromagnetic and radiometric anomalies. This unit has been correlated (by some) with the Cahill Formation of the East Alligator Rivers Uranium Field (the Cahill Formation is host to the Jabiluka, Koongarra, Naborlek and Ranger Uranium Province).

It is suggested that the Sweets Unit rocks are the earliest sediments of the Lower Proterozoic stratigraphy. Eupene notes that where intersected by diamond drill holes, it (the Sweets Unit?) is separated from feldspathic gneiss of the Welltree Metamorphics and syn-orogenic granitoids by moderate angle (60° to 70°) west dipping breccia zones and silicified faults. The Sweets Unit is isoclinally folded about north-south axes, and is further complicated by faulting and cross folding on east-west axes which produce reversals of plunges in the isoclinal folds.
LOCAL GEOLOGY

The local geology of the Fog Bay area is best described from the work by Idemitsu on their Port Patterson and Port Patterson II tenements (EL-3167 & 3149). These tenements lie immediately east and north-east of Hapsburg’s Fog Bay tenements (EL-25406 & 26420). Idemitsu based their geology on several drill holes and costeans on their tenements. No historic exploration drilling is known on Hapsburg’s Fog Bay tenement; however, there are six NTGS stratigraphic drill holes.

Idemitsu denoted the gneissic rocks in the area as the Port Patterson sequence and estimated a Lower Proterozoic age. These rocks are occurring mainly to the west of the Tom Turner’s Fault. They are described as a series of coarse grained, upper to lower amphibolite facies felspathic biotite gneisses, amphibolites and pelitic gneiss. The correlation of these rocks with other units in the Pine Creek Geosyncline was not clearly established.

The lower most units were described as coarse grained granitized felspathic gneisses and trondhjemitic gneisses. These are overlain by an amphibolite unit which contains rare carbonate bands and is sporadically magnetic (pyrrhotitic). This is in turn overlain by a more consistently magnetic (pyrrhotitic) unit of graphite-pyrite-biotite-pelitic gneiss which grades upward into a coarser felspathic biotite gneiss.

It is presumed that the pyrrohtitic pelitic gneisses are the cause of the curvilinear magnetic belts in the Port Patterson area (eg: Arc and N-S trends), although the amphibolites were also considered as possible causes of the magnetic trends.

Idemitsu also described the younger sequences in the area. They described the regional gravity data as showing a N-S trending, moderately high gravity ridge; based on information from the Reynolds River area further to the south. This was interpreted as a denser rock, possibly a mafic sill or lopolith underlying the Port Patterson sequence. They estimated a depth to the centre of this planar body of about 2 – 3 km, and they thought it to be an intrusive body of possible Carpentarian age.

A strong circular magnetic anomaly on the Patterson tenement was drilled and found to be a pipe-like ultramafic body of mica-peridotite, norite and pyroxenite intruded into the Port Patterson sequence (known as the Bullseye Area). This is mildly metamorphosed and thought to be of Proterozoic age. In late 1986, Stockdale Prospecting Limited inspected this material for possible diamond pipe affinities. However their work concluded it was a chromite bearing amphibole harzburgite, and therefore of no interest to Stockdale.

In the area of Hapsburg’s Fog Bay tenement (EL-25406), Idemitsu noted a linear outcrop of mildly metamorphosed ferruginous sandstone and pebbly sandstone to the south-west and west of their Patterson tenements (on Hapsburg’s Fog Bay tenement). The age was unknown but Idemitsu correlated it with the Depot Creek Sandstone which forms the Tolmer Plateau. The weak magnetic responses in this area appear to confirm a general NNW – SSE structural trend.

Throughout their tenement, Idemitsu noted a thin cover of Cretaceous sandstone (Bathurst Island Formation) that covers most of the Port Patterson sequence to a depth of up to 60m. This cover also occurs over part of Hapsburg’s Fog Bay tenements. Idemitsu’s regional geology map of the Fog Bay area shows possible Burrell Creek Formation occurring to the east of the Depot Creek Sandstone. Then further to the east is a north to north-east trending unconformity that separates the Burrell Creek Formation from the Port Patterson sequence. To the west of the Depot Creek Formation, the basement rock is interpreted to be the Wagait Granite however, Idemitsu had no drilling in this area. Eupene Enterprises noted the basement rocks consisted of undifferentiated Palaeoproterozoic gneiss, schists and migmatites (in the north of Hapsburg’s tenement), and Wagait Granite in the south part of
the tenement (based on NTGS drill holes). Eupene described the Depot Creek Sandstone as an elongate ridge which forms a tight syncline and believed it to be fault bound on both the east and west sides. They also noted cobbles of acid volcanics in conglomerate units during mapping.

The NTGS geology of the area shows Wagait Granite occurring on both sides (E & W) of the Depot Creek Sandstone in the south part of Hapsburg’s tenement. This is based on two NTGS stratigraphic drill holes. In the northern part of Hapsburg’s tenement the Depot Creek Sandstone is bracketed by Palaeoproterozoic gneissic rocks. This is based on four NTGS stratigraphic drill holes within or adjacent to the northern part of Hapsburg’s tenement.

FIELD INVESTIGATIONS AND RESULTS

April 2007 – April 2008 Period

No fieldwork was undertaken in 2007 due to access limitations. However, a site visit was made to Finniss River Station to meet the pastoralist and explain the company’s activities, and to prepare for the aerial magnetic survey.

Aeromagnetic Survey

A government regional geophysical survey had previously been flown in a north-south direction generally parallel to stratigraphy. This limits the full magnetic response so it was decided to re-fly the area with east-west flight lines. Universal Tracking Systems (UTS) of Perth were awarded the contract, which was planned for September. Technical and mechanical problems delayed the survey until late December 2007. Climatic conditions at that time were monsoonal with electrical storms and daily rainfall. This led to the loss of two days survey time.

Parameters of the survey were:

- Traverse Spacing : 100m
- Traverse Direction : 090-270
- Tie Line Spacing : 1,000m
- Tie Line Direction : 000-180m
- Sensor Height : 50m
- Total Line Kilometres : 2,210 km

A verification montage map was provided containing total magnetic intensity (TMI) and derivative-enhanced TMI. This data was contoured, and first derivative TMI contours overlain on geology. No magnetic anomalies were found on the relinquished parts of ELs-25406 & 26420.

April 2008 – April 2009 Period

During the 2008 field season, reconnaissance work was carried out on the retained area of EL-25406. Whereas the lack of any significant target anomalies on the subsequent relinquished sub-blocks of EL-25406 and all of EL-26420, meant that no work was done on these areas.
REFERENCES

Ahmad, M et al 1:250,000 Metallogenic Map Series . Pine Creek SD52-8 Explanatory Notes. NT Geological Survey, 1993


Bennett, Dave Joint Venture Report to Monaro Mining NL on Exploration of EL-25406 Fog Bay & EL-26420 Fog Bay East Hapsburg Exploration P/L internal report, Dec 2008

Hickey, S. H. 1:100,000 Geological Map Series, Explanatory Notes Fog Bay 4972, NT Geological Survey 1985

Figure 1.
EL25406 Tenement boundary

EL26420 Tenement boundary

Topo Image from 100K Sheet 4972

Figure 2.
EL25406 Tenement boundary
EL25406 area to be relinquished
EL26420 Tenement boundary
EL26420 area to be relinquished

CURRENT EL TENEMENT MAP

Figure 3.
Figure 4.
Figure 5.

HAPSBURG EXPLORATION PTY LTD

FOG BAY PROJECT
EL25406, EL26420

GEOLOGY AND TENEMENT MAP

Drawn: Jim McG-D / MontanaGIS
Date: 12sep09
Figure 6.

EL25406 Tenement boundary
EL25406 area to be relinquished
EL26420 Tenement boundary
EL26420 area to be relinquished