NORTHERN TERRITORY GOLD MINES N.L.

EXPLORATION LICENCE  7155

JESSOPS

FOURTH ANNUAL REPORT - FOR YEAR ENDING 14/12/94

REPORT NUMBER:  NTGM / 7155 / 1

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               AJ Hosking and Associates Pty Ltd
               Darwin

               January 1995
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SUMMARY

The licence was granted to Mainline Gold Mines N.L. on 5/12/90 for a period of six (6) years and now is held by Territory Goldfields N.L.

The licence area contains low-grade metasediments and metavolcanics of Palaeoproterozoic age which have been folded strongly. The area has potential for gold mineralisation, particularly of the large-tonnage, low-grade type in quartz stockworks or complex vein systems. While no specific gold occurrences or old workings are known within the licence area, the Jessops tin(-gold) workings lie to the immediate south.

Further research, data compilation and geophysical interpretation comprised the main exploration activities in the fourth year of tenure. Most data data were processed digitally per a Geographic Information System. Open-file records of Commonwealth and Territory government agencies were the main sources of data. A considerable amount of historical, geological and exploration data was processed.

The activities in the fourth year have demonstrated that subsequent exploration for gold should be focussed upon structural targets and proceed in conjunction with exploration as the contiguous ELs 7674 and 8170.
INTRODUCTION

Exploration Licence (EL) 7155 of four graticular blocks (one minute by one minute) was granted to Mainline Gold Mines N.L. by the Northern Territory Department of Mines and Energy (NTDME) on 5/12/90 for a period of 6 years.

Title to the area passed subsequently to the ownership of Northern Territory Gold Mines N.L. (NTGM) after intermediate periods of ownership by G.R. Orridge (per a transfer in mid-1992) and R.M. Biddlecombe (per a transfer in late-1993). The title was transferred by NTGM to Territory Goldfields N.L. (TG) on 21/12/94 together with all other ELs which were held previously by NTGM within its McKinlay River project area.

The licence area was one of 11 comprising the former McKinlay River project area of NTGM. The main administrative details of the licences are provided in Table 1 below.

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<th>EL no,</th>
<th>No. of blocks</th>
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Transfers of title to NTGM for ELs 7155 and 7674 from the prior holder, Robert Biddlecombe were approved by NTDME on 29/10/93. Statutory, areal reductions also have occurred as follows:

- **EL 7155**
  - 15 blocks originally; first reduction 5/12/92 with 8 blocks retained; second reduction 17/1/94 with 4 blocks retained

- **EL 7674**
  - 34 blocks originally; first reduction 15/7/94 with 17 blocks retained

The total number of blocks in the project area is 246 of which EL 7155 comprises less than two per cent.

The initial expectation of NTGM was that a very substantial field program in the project area would have been completed in the 1994 dry season, including a substantial component for EL 7155. However, unforeseen problems with the public float of NTGM's parent company, Australian Gold Mines No Liability (AGM) on the Australian Stock Exchange caused major delays and difficulties in funding the proposed exploration program. Consequently, only research, administration, data management activities and geophysical interpretation have occurred in Year 4. Considerable time, effort and expenditure has been devoted to digitising relevant technical data and establishing a Geographic Information System (GIS) for ongoing storage, processing, interpretation and presentation of such data per Ekos Research (NT) Pty Limited of Darwin. Details of the GIS are contained in the First Annual Report by NTGM for EL 8069. Imaging of geophysical data was undertaken for NTGM by Allender Exploration of Unley, South Australia.

The main exploration target of the company is large-tonnage, low-grade, open-pittable gold mineralisation similar to that which occurs in major deposits at Union Reefs and Mount Todd. The potential for high grade gold deposits amenable to underground mining, and for base-metal deposits also exists. Small tin, manganese (-iron) and lead (-zinc) deposits occur in the general area.

This report contains details of the research, data management and geophysical interpretation which have occurred in Year 4.

No sacred/significant sites are registered or recorded with the Aboriginal Areas Protection Authority.
LOCATION AND ACCESS

The location of EL 8170 is shown in Figure 1.

The licence area lies approximately 140 km southeast of Darwin. At its closest position (southeast edge), the licence area is approximately 4 km to the north of Mount Masson.

Vehicle access to the area is gained most conveniently from either the south or the north via the Stuart Highway and thence via the good, unsealed road adjacent to the old Darwin - Birdum railway line and thence via the good, unsealed Burrundie Siding - Mount Wells - Mount Harris road.

The licence area is reached by a track which leads north from Jessops Tin Mine.

SURFACE TENURE

The licence area lies wholly within Ban Ban Springs Perpetual Pastoral Lease 1111 (NT Portions 695 and 1344). This property supports beef raising.

PHYSIOGRAPHY

The principal physiographic and cultural features of the licence area are shown in Figure 2. An aerial photograph of the area constitutes Figure 3. The licence area occurs in the catchment of the McKinlay and Mary River as shown by McGowan (1989). Drainage is mainly to the north via "Douglas Creek East".

A major physiographic study of the region bordered by the Alligator and East Alligator rivers was undertaken by CSIRO in the period 1965 - 1969. This study covered the licence area. Several authors, notably Williams (1969), Story (1969) and Williams and others (1969), contributed papers to a major publication which is the principal source of physiographic data in this report. Additional data have been obtained from the Vegetation Map of the NT
published by the Conservation Commission of the NT ((Wilson and others, (1991)). The distributions of soil and vegetation types are shown in Figures 4 and 5.

Two major land units are recognised by Williams and others (1969). These are the dissected foothills and alluvial floodplains. The former unit is present in the licence area and is characterised by, low hills and rubble-covered rises formed by metasedimentary rocks with intervening alluvial flats. Strike ridges also are present. Woodland and/or stunted woodland (Box and Bloodwood) occur on the hills and rises with a grassland under-story, with grassland on the flats. Soils vary from leached, skeletal types to yellow, loamy types on the elevated areas to alkaline types on the flats.

The licence area has a monsoonal climate with an average annual rainfall in the order of 1500 mm, with most rain falling in the summer months. No waterbores are known to exist within the licence area.

REGIONAL GEOLOGY

The licence area lies within the Pine Creek Inlier (or Geosyncline). This major tectono-sedimentary unit contains pelitic and psammitic sediments with minor volcanics of Palaeoproterozoic age which developed in a basinal setting on granitic basement of Late Archaean age. The sedimentary pile subsequently was deformed and metamorphosed (mostly to greenschist facies) by the Top End Orogeny which lasted for approximately 180 Ma (1870 - 1690 Ma). Pre-orogenic sills of mafic intrusives and syn- to post - orogenic granitoids intrude the metasedimentary and metavolcanic rocks. Most granitoids were emplaced in the waning stages of the tectonism.

A voluminous literature has developed for the Inlier over more than 50 years commencing with studies by the Aerial, Geological and Geophysical Survey of Northern Australia (AGGSNA) of mine areas and their surrounds with subsequent regional studies by the Bureau of Mineral Resources, Geology and Geophysics (BMR), now the Australian Geological Survey Organisation (AGSO), and the Northern Territory Geological Survey (NTGS). A considerable boost to the geological studies and to exploration followed the discovery of uranium at Rum Jungle in 1948. However, it is beyond the scope of this report

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to review this literature and only key publications have been referenced, notably those of Walpole (1968), Ferguson (1980), Stuart-Smith and others (1986), Needham and others (1988), Stuart-Smith and others (1993) and Nicholson and others (1994) which are particularly relevant to the licence area and its near surrounds. Geological maps at 1:63,360, 1:100 000 and 1:250 000 scales with accompanying reports produced by Commonwealth and NT government agencies are major components of this extensive database. A vast amount of data has accumulated from base-metal, gold and uranium exploration programs.

Studies dealing with specific features of sedimentation, tectonism, magmatism and metallogenesis also have been features of the developing literature.


In this report, the regional geology and stratigraphic framework proposed by Nicholson and others (1994) are adopted (see Figures 6 and 7). These authors have advocated a three-fold, lithostratigraphic subdivision rather than the four-fold subdivision advocated by earlier BMR authors and applied widely in recent years. The significance of rim faults around major granitic bodies also is highlighted by Nicholson and others (1994). Such faults also were postulated by authors reporting on airborne geophysical surveys of the McKinlay River area in the 1960s eg. Goodeve (1966).

The region contains mainly metasediments and metavolcanics of the Frances Creek Group namely Mundowie Sandstone, Koolpin Formation, Gerowie Tuff and Mount Bonnie Formation is ascending stratigraphic order. BMR authors place the Mundowie Sandstone with the overlying Wildman Siltstone in the Mount Partridge Group stratigraphically below the South Alligator Group, The latter group contains the Koolpin Formation, Gerowie Tuff and Mount Bonnie Formation in the earlier interpretation.

The Frances Creek Group is dominated by carbonaceous and commonly sulphidic shale with interbedded turbidites and varying amounts of chert, iron formation, tuff, carbonate rocks and non-carbonaceous shale of apparent pelagic origin, according to Ormsby and others (1994). Stratigraphic boundaries between the units of the group are determined by the relative abundances of the very distinctive chemical and volcanogenic sediments. Both
crystal and vitric tuffs are known. The overlying Finniss River Group is a flysch sequence of greywacke, siltstone and shale. The units have undergone low-grade metamorphism (greenschist facies). Hornfelsing due to contact metamorphism associated with the components of the Cullen Bathylith, is a prominent feature of the regional geology up to several kilometres from the margins of intrusive granitoids.

The metasediments and metavolcanics have undergone at least two phases of folding. The first phase produced tight to isoclinal, upright folds about NNW - SSE axes while a second, gentler phase produced broad, open folds about east-west axes.

Both strike-slip and cross faulting have affected units of the Frances Creek Group to significant degrees.

LOCAL GEOLOGY

The geology of the licence area is shown in Figure 8 and has been summarised in previous Annual Reports by Orridge (1992, 1993b, 1994a) - all on Closed File in NTDME).

KNOWN MINERALISATION

Details of the tin(-gold) and lead(-zinc-silver) mineralisation which occurs in close proximity to the licence area are provided by Orridge (1992, 1993a, 1993b, 1994a) and are not discussed further in this report. Newton (1977) has described the geology of the Big Julie Tin Mine which is the closest old working to the licence area.

Mine Data Sheets for the mineral deposits which occur close to the licence area are provided in Appendix 1.
PREVIOUS GEOLOGICAL STUDIES AND EXPLORATION ACTIVITIES

The central part of the Pine Creek Inlier has been the focus of many geological studies by Commonwealth and Territory government agencies and of substantial mineral exploration in recent years. The latter activities have occurred mainly in the 1980s and early 1990s and have been concentrated upon geochemical sampling (stream sediment and soil principally), being directed towards the search for one or more of gold, base-metals and uranium. Gold exploration has been the most recent. Small-scale production of tin has occurred from small mines near the licence area in past years, notably from Mount Wells.

Significant aspects of the past government work are:

- work by the Aerial, Geological and Geophysical Survey of the Northern Australia (ASSNQA) at the McKinlay Gold Mine: Hossfeld (1940)


- 1:63 360 scale geological and geophysical mapping by the BMR in the 1950s and 1960s: eg Goodeve (1966)

- detailed geophysical mapping as an aid to tin exploration and mining in the Mount Masson - Mount Harris region to the immediate south of the northern, east-west half of the present licence area: Tipper and Finney (1966)

- detailed assessment of the Mary River (Gubberah Gosan) lead-zinc deposit approximately 9 km east of the Mount Harris Tinfield: Darby (1985)

- 1:100 000 scale geological mapping by the BMR in the 1980s: Stuart-Smith and others (1986)

- detailed geological and metallogenic studies by the BMR of the Cullen Mineral Field: Stuart Smith and others (1993)

- metallogenic mapping by the NTGS of the Pine Creek 1:250 000 mapsheet area: Ahmad and others (1994)
Geological and geophysical plans provided in this report are based on BMR publications as listed above eg Figures 8 and 9.

Detailed mineral exploration has been undertaken by many title holders, both of Exploration Licences and of Mineral Claims and Mining Leases. Only exploration on past Exploration Licences has been summarised as available technical data for past claims and leases are very incomplete. Included in the past exploration activities have been large, airborne, magnetic-radiometric surveys, principally designed as aids to uranium exploration but with much relevance to base metal and gold exploration as well. However, the bulk of the airborne geophysical data relates to ground to the immediate north and west of the licence area where black-soil plains are extensive.

The highlights of previous exploration activities within and near the licence area have been provided by Orridge (1992, 1993a 1993b, 1994a) and are not discussed further in this report. The results of 1:100 000 - scale geological mapping by the BMR have been used as the starting point by most previous explorers for large amounts of stream-sediment, soil and rock geochemistry, followed by limited drilling in some cases. While low-order geochemical anomalies have been quite commonplace in the past, none has led to intensive drill testing.

The multi-client, high resolution, airborne geophysical survey flown by Aerodata in 1988 (with additions in 1991 and 1992) unfortunately does not cover the licence area.

The principal findings of past mineral exploration programs within and/or close to the licence area are:

- a close association of tin and gold has been demonstrated in quartz and quartz-haematite (ex-sulphide) veins which invariably are related to faulting or shearing

- the Koolpin Formation and to a lesser extent, the Zamu Dolerite, have received much exploration for syngenetic, stratiform-stratabound and epigenetic, discordant (structurally controlled) types of Au mineralisation respectively, mostly for bulk-tonnage, low-grade deposits
- numerous past explorers can claim technical success in that one or more of BLEG, silt and pan-concentrate types of stream-sediment and/or soil samples has/have detected subeconomical Au mineralisation (and economic success in the case of Touhys South)

- past experience suggests that the levels of 5 ppb Au for stream-sediment samples and 50 ppb Au for soil samples are appropriate thresholds in the region; higher than average background levels of Au in stream-sediment, soil and rock samples were encountered frequently by past explorers but did not lead to economic success

- tin mineralisation invariably is fine-grained eg Mount Harris Tin Field (gold often was present in tin concentrates during earlier mining), Jessops Tin Mine, Rosemary Tin Mine

- tourmaline is a common accessory in the tin(-gold) mineralisation

- higher gold values in the ferruginous cappings of quartz-sulphide veins and sulphidic metasediments point to a considerable degree of surficial enrichment during oxidation and weathering

- lead and arsenic have been established as pathfinders (arsenopyrite occurs commonly with pyrite in the sulphidic metasediments)

- sulphidic-carbonaceous units are common throughout the Frances Creek group, with the greatest concentrations being in the Mundogie Sandstone and Koolpin Formation

**EXPLORATION CRITERIA**

The criteria observed by NTGM in its exploration of its McKinlay River project area are:

- particular attention to subareas of non-outcrop given that past exploration activities had a strong geochemical focus (stream-sediment, soil and rock sampling) upon subareas of good outcrop, with largely discouraging results
- re-evaluation of all known mineral deposits and occurrences, with a particular emphasis on zinc in some localities (as well as on gold)

- delineation of structurally complex subareas using available detailed aeromagnetic data, satellite imagery and aerial photography, with particular emphasis on faults, shears and anticlinal axial zones

- evaluation of the mineral prospectivity generally of the contact metamorphic aureole of the Cullen Bathylith (evidence possibly favours metal dispersion rather than concentration of metals?)

- detailed sampling of the ferruginous cappings of sulphidic and carbonaceous rock units in the Koolpin Formation specifically and in the Frances Creek Group generally

- detailed sampling of tourmalinised rocks of present

- specific assessment of the potential of the Zamu Dolerite to host quartz-stockwork gold mineralisation

The principal aim of the Year 5 program will be to locate drilling targets in appropriate structural settings via a combination of the interpretation of airborne geophysical data, detailed soil and rock sampling, detailed geological mapping and ground magnetometry.

WORK COMPLETED IN YEAR 4 OF TENURE

The following activities were undertaken in Year 4:
- acquisition and digitising of colour aerial photography for the McKinlay River project area, which includes the licence area

- research of available geological and exploration-related data, mostly available in the open-file records of NTDME, in connection with compilation of the prospectus for Australian Gold Mines NL (AGM), the parent company of NTGM; this work was carried out by Dr. G.R. Orridge of Geonorth Pty. Ltd., Darwin and submitted as the Independent Geologist’s Report for the prospectus ((Orridge (1994)). The prospectus, which was issued in April
1994, subsequently was withdrawn in June 1994

- title management by principals and agents of NTGM based in Perth, Melbourne and Darwin

- establishment of a Geographic Information System (GIS) with subsidiary databases to manage all data generated by NTGM for its NT titles; this work was carried out by Mr. R. Fernandez of Ekos Research (NT) Pty. Limited

- assessment of options to obtain existing geophysical data (principally the aeromagnetic type) and satellite imagery in digital format to allow image processing

- purchase of digital aeromagnetic and aeroradiometric data for the Pine Creek 1:250 000 mapsheet area and imaging of same by Allender Exploration of Unley, South Australia; the reconnaissance survey which generated the data was flown by the BMR in 1974 - 1976 with a line spacing of 1500 m, with east-west lines and at an altitude of 150 m above ground level ((Gerula (1979; Figures 9 - 11)).

- digitising and imaging by Allender Exploration of hard-copy data for the Mount Masson detailed aeromagnetic survey of the BMR which was flown in 1965 with a line spacing of one-tenth of a mile, with east-west lines and at an altitude of 350 feet above ground level; this survey, which was flown in 1965, was designed to aid tin exploration in the area and was a flow-on to a reconnaissance aeromagnetic survey of the Ban Ban 1:63 360 mapsheet area flown in 1963 by the BMR ((Goodeve (1966); Tipper and Finney (1966); Figures 12 - 15)).

Copies of original BMR contour maps of total magnetic intensity are presented in Figures 12 and 13 while images and plans generated by Allender Exploration comprise Figures 9 - 11 and 14 - 15. Figure is an image of total-count radiometric data for the Pine Creek 1:250 000 mapsheet area. Slight aberrations in the plotting of EL boundaries exist in Figures 14 and 15.

This processing and imaging of the BMR aeromagnetic and aeroradiometric data were undertaken in an endeavour to aid target delineation, given that past geochemical sampling has tended to generate many low-order anomalies in the Mount Masson region which have not been indicative of the presence of

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potentially significant gold mineralisation. Considerable difficulties have been
experienced by previous workers in ranking their geochemical anomalies and
the geophysical images have been generated to allow the focus in the future to
be directed towards the search of coincident geochemical and structural
anomalies within the McKinlay River project area generally.

This work has included an extension of the research activities with work by AJ
Hosking of AJ Hosking and Associates Pty. Ltd.

As a consequence of the failure of the public float of AGM, alternative sources
of funding for NTGM’s exploration program in the NT were sought prior to the
transfer of titles in the McKinlay River project area to Territory Goldfields N.L.

EXPENDITURE STATEMENT FOR YEAR 4 OF TENURE

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Total: $11,247

Three geological consultants were utilised for varying periods in connection with
preparation of the Prospectus for AGM, title administration and advice re
programs and budgets for the title.
PROPOSED EXPLORATION PROGRAM AND BUDGET FOR YEAR 5 OF TENURE

Given the generally disappointing nature of the results of past exploration activities within and/or immediately adjacent to the licence area, the exploration philosophy and program for Year 5 will be based upon the following key aspects:

- completion of a structural interpretation of the area using colour aerial photographs plus images prepared from digital Thematic Mapper and aeromagnetic data
- rock-chip, soil and ground magnetic traverses across prospects delineated by the structural interpretation with auger and/or RAB drilling as necessary to sample beneath black soil
- detailed geological mapping of the prospects (subject to outcrop limitations)

Most emphasis will be placed upon:

- assessment of the prospectivity of soil-covered subareas
- delineation of faults, shear zones and folds (particularly the surface traces of anticlinal hingelines)
- delineation of magnetic units within the Koolpin Formation and of any major discontinuities or aberrations associated with them
- assessments of sulphidic-carbonaceous and tourmalinised rocks as potential hosts to mineralisation

The program will be carried out in conjunction with work on contiguous titles.
Expenditure is envisaged as follows:

Geology - detailed mapping, supervision, data interpretation $2000
Geophysics - computer imaging of TM and aeromagnetic data, ground magnetic traversing 2000
Geochemistry - soil and rock-chip sampling (traverses), assaying 2500
Gridding
Information Management (per GIS) 500
Title Management 500

Overheads (10%) - Darwin and Perth offices 750

Say $8250

Say $8300

REFERENCES


McGowan, R.J., 1989: The hydrogeology of the Pine Creek mining region. Power and Water Authority, Explanatory Notes for 1:250 000 scale map.


APPENDIX 1

NTGS MINE DATA SHEETS

Localities in close proximity to EL 7155

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**MINERAL DEPOSIT DATA SHEET**

### METALLOGENIC MAP DATA
- **Deposit/Prospect name:** Unnamed
- **Commodities - Major/Minor:** Pb / Zn
- **Locality - 1:250 000 sheet:** PINE CREEK SD52-8
- **Locality - 1:100 000 sheet:** McKinlay River 5271
- **Universal Grid Reference:** HL071 311
- **Length (m):**
  - **Width (m):**
  - **Depth (m):**
  - **Strike bearing:** Dip:
  - **Plunge:**

### GEOLOGICAL SETTING
- **Major tectonic unit(s):** Pine Creek Geosyncline
- **Group:** Mount Parridge Group
- **Formation:** Wildman Silstone
- **Member:**
- **Sub-unit:**
  - **Age:** E. Prot.
  - **Age:**
  - **Age:**

### LITHOLOGY AND METAMORPHISM
- **Host rock:**
- **Subsidiary host rock:**
- **Wall rock:**
- **Subsidiary wall rock:**
- **Age of metamorphism:** 1800 Ma
- **Type:** Regional
- **Facies:** Greenschist
- **Age relative to mineralisation:**
  - **Age relative to mineralisation:** Pre

### STRUCTURE
- **Type:** Bedding
- **Strike:** 340
- **Dip:** Dip: 60NE
- **Plunge:**
- **Macroscopic ore textures:**
- **Weathering effect(s):**
- **Depth of weathering (m):**

### MINERALISATION
- **Principal primary ore mineral:**
- **Other primary ore mineral(s):**
- **Principal secondary ore mineral:**
- **Other secondary ore mineral(s):**
- **Principal gangue mineral:**
- **Other gangue mineral(s):**
- **Grain size:** (of primary ore mineral)
- **Age of mineralisation:**

### WALLROCK ALTERATION
- **Type:**
- **Location relative to ore**
- **Age relative to ore**

### EXPLORATION AND MINING
- **Exploration methods:**
- **Mining methods:**
- **Open-cut workings - Depth (m):**
- **Length (m):**
- **Width (m):**

### PAST PRODUCTION
- **Period**
- **Ore (t):**
- **Grade (%):**
- **Concentrate (t):**
- **Contained metal (t):**

### ORE RESERVES
- **Status:**
- **Tonnes:**
- **Grade:**
- **Cut-off grade**

### REFERENCES
- **Production and reserves**
- **Exploration and general**
  - Smart-Smith et al., 1986 (Map)

### REMARKS
- Prospect was not inspected.
## MINERAL DEPOSIT DATA SHEET

### METALLOGENIC MAP DATA
- **Deposit/Prospect name:** Unnamed
- **Commodities - Major/Minor:** Pb
- **Locality - 1:250 000 sheet:** PINE CREEK SD52-8
- **Universal Grid Reference:** HL 025 255
- **Length (m):** 40
- **Width (m):** 1
- **Strike bearing:** 315
- **Depth (m):** >3
- **Deposit number:** 71
- **Compiled by:** P.F.
- **Date entered:** 29/03/89
- **Status:** Mineral occurrence
- **Size:** Occurrence only
- **Shape:** Vein
- **Mode of origin:** Hydrothermal

### GEOLOGICAL SETTING
- **Major tectonic unit(s):** Pine Creek Geosyncline
- **Group:** South Alligator Group
- **Formation:** Getowie Tuff
- **Member:** Sub-unit:
  - **Age:** E. Prot.
  - **Age:** E. Prot.
  - **Age:**

### LITHOLOGY AND METAMORPHISM
- **Host rock:** Gossanous tuff-breccia
- **Subsidiary host rock:** Chert
- **Wall rock:** Chert
- **Subsidiary wall rock:** Cordierite hornfels
- **Age of metamorphism:** 1800 Ma
- **Type:** Regional/Contact
- **Facies:** Gnsch./Hb.Hfs

### STRUCTURE
- **Type:** Shear zone
  - **Strike:** 315
  - **Dip:** 90
  - **Plunge:**
- **Type:** Bedding
  - **Strike:** 340
  - **Dip:** 55 E
  - **Plunge:**
- **Age relative to mineralisation:** Syn
- **Age relative to mineralisation:** Pre

### MINERALISATION
- **Principal primary ore mineral:** Galena
- **Other primary ore mineral(s):** Pyrite
- **Principal secondary ore mineral:** Cerussite
- **Other secondary ore mineral(s):** Quartz
- **Principal gangue mineral:** Hematite
- **Other gangue mineral(s):**
- **Macrosopic ore texture:** Disseminated
- **Weathering effect(s):** Supergene
- **Depth of weathering (m):** 20
- **Grain size:** Medium
  - **(of primary ore mineral):**
- **Age of mineralisation:** E. Prot.

### WALLROCK ALTERATION
- **Type:** Silicification
- **Location relative to ore:** Footwall & Hangingwall
- **Age relative to ore:** Syn

### EXPLORATION AND MINING
- **Exploration methods:** Costeaging
- **Mining methods:** Small pits.
- **Open-cut workings - Depth (m):** 1.5
- **Length (m):** 10
- **Width (m):** 2

### PAST PRODUCTION
- **Period:** 15
- **Ore (t):**
- **Grade (%):** High grade
- **Concentrate (t):** Silver-lead ore
- **Contained metal (t):**

### ORE RESERVES
- **Status:**
- **Tonnes:**
- **Grade:**
- **Cut-off grade:**

### REFERENCES
- **Production and reserves:** J. Crago pers comm. 1988
- **Exploration and general:** Ferenczi, 1990b (GS90/15)

### REMARKS
# Mineral Deposit Data Sheet

## Metallogenic Map Data

<table>
<thead>
<tr>
<th>Deposit/Prospect name</th>
<th>Commodities - Major/Minor</th>
<th>Locality - 1:250,000 sheet</th>
<th>Locality - 1:100,000 sheet</th>
<th>Universal Grid Reference</th>
<th>Length (m)</th>
<th>Width (m)</th>
<th>Depth (m)</th>
<th>Strike bearing</th>
<th>Dip</th>
<th>Plunge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jessops</td>
<td>Sn</td>
<td>PINE CREEK SD52-8</td>
<td>McKinley River 5271</td>
<td>HL 052 260</td>
<td>360</td>
<td>0.6-6</td>
<td></td>
<td>350</td>
<td>60W</td>
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</tr>
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## Geological Setting

<table>
<thead>
<tr>
<th>Major tectonic unit(s)</th>
<th>Group</th>
<th>Formation</th>
<th>Sub-unit</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pine Creek Geosyncline</td>
<td>Mount Partridge Group</td>
<td>Wildman Silstone</td>
<td>E. Prot</td>
<td></td>
</tr>
</tbody>
</table>

## Lithology and Metamorphism

<table>
<thead>
<tr>
<th>Host rock</th>
<th>Subsidiary host rock</th>
<th>Wall rock</th>
<th>Subsidiary wall rock</th>
<th>Age of metamorphism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hematite quartz breccia</td>
<td></td>
<td>Silstone</td>
<td></td>
<td>1800Ma</td>
</tr>
</tbody>
</table>

## Structure

<table>
<thead>
<tr>
<th>Type</th>
<th>Strike</th>
<th>Dip</th>
<th>Plunge</th>
<th>Age relative to mineralisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shear</td>
<td>350</td>
<td>60W</td>
<td></td>
<td>Pre</td>
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</tbody>
</table>

## Mineralisation

<table>
<thead>
<tr>
<th>Principal primary ore mineral</th>
<th>Other primary ore mineral(s)</th>
<th>Principal secondary ore mineral</th>
<th>Other secondary ore mineral(s)</th>
<th>Principal gangue mineral</th>
<th>Other gangue mineral(s)</th>
<th>Grainsize</th>
<th>Age of mineralisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassiterite</td>
<td>Pyrite, Arsenopyrite</td>
<td>Hematite</td>
<td>Limonite, Goethite</td>
<td>Hematite, Limonite</td>
<td>Quartz</td>
<td>Fine</td>
<td>E. Prot</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Macroscopic ore textures</th>
<th>Weathering effect(s)</th>
<th>Depth of weathering (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vein fill &amp; disseminations in sulphides</td>
<td>Oxidation</td>
<td>50</td>
</tr>
</tbody>
</table>

## Wallrock Alteration

<table>
<thead>
<tr>
<th>Type</th>
<th>Location relative to ore</th>
<th>Age relative to ore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sericitic</td>
<td>Proximal</td>
<td>Syn</td>
</tr>
<tr>
<td>Hematitisation</td>
<td>In ore</td>
<td>Post</td>
</tr>
</tbody>
</table>

## Exploration and Mining

<table>
<thead>
<tr>
<th>Exploration methods</th>
<th>Mining methods</th>
<th>Open-cut workings - Depth (m)</th>
<th>Length (m)</th>
<th>Width (m)</th>
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</thead>
<tbody>
<tr>
<td>Geol, mapping, Costeaming, Drilling</td>
<td>Open cut &amp; Underground</td>
<td>15</td>
<td>200</td>
<td>4</td>
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## Past Production

<table>
<thead>
<tr>
<th>Period</th>
<th>Ore (t)</th>
<th>Grade (%)</th>
<th>Concentrate (t)</th>
<th>Contained metal (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1957-72</td>
<td>1.0% Sn</td>
<td>193</td>
<td></td>
<td></td>
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</table>

## Ore Reserves

<table>
<thead>
<tr>
<th>Status</th>
<th>Tonnes</th>
<th>Grade</th>
<th>Cut-off grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible</td>
<td>10,000</td>
<td>1.0% Sn</td>
<td></td>
</tr>
</tbody>
</table>

## References

- Production and reserves: United Uranium NL, 1963 (CR 63/11)
- Vanderplank, 1964 (GS 64/5)
- Hays, 1960 (BMR Rec 1960/2)
- Exploration and general: Hays, 1958 (BMR Rec 1958/2)
- Blasket & Dunkin (1951)
- Baker (1960)

## Remarks

Mineralised zone represent oxidised part of massive sulphide vein. Minor gold (about 1 ppm) is present in the ore. Cassiterite is very fine and is disseminated in the sulphides.
### MINERAL DEPOSIT DATA SHEET

#### METALLOGENIC MAP DATA
- **Deposit/Prospect name:** Billycan
- **Commodities - Major/Minor:** Sn
- **Locality - 1:250 000 sheet:** PINE CREEK SD52-8
- **1:100 000 sheet:** McKinlay River 5271
- **Universal Grid Reference:** HL 055 255
- **Length (m):** Width (m): Depth (m):
- **Strike bearing:** 350 **Dip:** 60W **Plunge:**

#### GEOLOGICAL SETTING
- **Major tectonic unit(s):** Pine Creek Geosyncline
- **Group:** Mount Partridge Group
- **Formation:** Wildman Siltstone
- **Member:**

#### LITHOLOGY AND METAMORPHISM
- **Host rock:** Hematite quartz breccia
- **Subsidiary host rock:**
- **Wall rock:** Siltstone
- **Subsidiary wall rock:**
- **Age of metamorphism:** 1800Ma
- **Type:** Regional/Contact
- **Facies:** Gnsch./Alb.Ep.

#### STRUCTURE
- **Type:** Shear
- **Strike:** 350 **Dip:** 60W **Plunge:**

#### MINERALISATION
- **Principal primary ore mineral:** Cassiterite
- **Other primary ore mineral(s):** Pyrite, Arsenopyrite
- **Principal secondary ore mineral:** Hematite
- **Other secondary ore mineral(s):** Limonite, Goethite
- **Principal gangue mineral:** Hematite, Limonite
- **Other gangue mineral(s):** Quartz
- **Macroscopic ore textures:** Vein fill & disseminations in sulphides
- **Weathering effect(s):** Oxidation
- **Depth of weathering (m):** 50

#### WALLROCK ALTERATION
- **Type:**
  - Sericitic
  - Hematitisation
- **Location relative to ore:**
  - Proximal
  - In ore
- **Age relative to ore:**
  - Syn
  - Post

#### EXPLORATION AND MINING
- **Exploration methods:** Geol. mapping, Costeasing, Drilling
- **Mining methods:**
- **Open-cut workings - Depth (m):** Length (m): Width (m):

#### PAST PRODUCTION
- **Period:**
- **Ore (t):** Grade (%)
- **Concentrate (t):** Contained metal (t)

#### ORE RESERVES
- **Status:**
- **Tonnes:** Grade
- **Cut-off grade:**

#### REFERENCES
- **Production and reserves:** United Uranium NL, 1963 (CR 63/11)
- **Exploration and general:**
  - Hays, 1960 (BMR Rec. 1960/2)
  - Hays, 1958 (BMR Rec. 1958/2)

#### REMARKS
- Mineralised zone represent oxidised part of massive sulphide vein. Minor gold (about 1 ppm) is present in the ore. Cassiterite is very fine and is disseminate in the sulphides.
## MINERAL DEPOSIT DATA SHEET

### METALLOGENIC MAP DATA

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Deposit name</td>
<td>Mount Masson</td>
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<tr>
<td>Commodity - Major/Minor</td>
<td>Sn</td>
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<tr>
<td>Locality</td>
<td>PINE CREEK, McKinley River</td>
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<td>Grid Reference</td>
<td>HL 055 245, 5271</td>
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<tr>
<td>Strike bearing</td>
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<tr>
<td>Dip</td>
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<tr>
<td>Plunge</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td>Abandoned mine</td>
</tr>
<tr>
<td>Size</td>
<td>Small</td>
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<tr>
<td>Shape</td>
<td>Vein</td>
</tr>
<tr>
<td>Mode of origin</td>
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### GEOLOGICAL SETTING

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major tectonic unit</td>
<td>Pine Creek Geosyncline</td>
</tr>
<tr>
<td>Group</td>
<td>Mount Partridge Group</td>
</tr>
<tr>
<td>Formation</td>
<td>Wildman Siltstone</td>
</tr>
<tr>
<td>Member</td>
<td></td>
</tr>
<tr>
<td>Sub-unit</td>
<td>E. Prot.</td>
</tr>
<tr>
<td>Age</td>
<td>E. Prot.</td>
</tr>
<tr>
<td>Age</td>
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### LITHOLOGY AND METAMORPHISM

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td>Host rock</td>
<td>Hematite quartz breccia</td>
</tr>
<tr>
<td>Subsidiary host rock</td>
<td></td>
</tr>
<tr>
<td>Wall rock</td>
<td>Siltstone</td>
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<tr>
<td>Subsidiary wall rock</td>
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<tr>
<td>Age of metamorphism</td>
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</tr>
<tr>
<td>Type:</td>
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<tr>
<td>Facies:</td>
<td>Gnei/Alb Ep.</td>
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### STRUCTURE

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Type:</td>
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</tr>
<tr>
<td>Strike:</td>
<td>350</td>
</tr>
<tr>
<td>Dip:</td>
<td>60W</td>
</tr>
<tr>
<td>Plunge:</td>
<td></td>
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### MINERALISATION

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal primary ore mineral</td>
<td>Cassiterite</td>
</tr>
<tr>
<td>Other primary ore mineral(s)</td>
<td>Pyrite, Arsenopyrite</td>
</tr>
<tr>
<td>Principal secondary ore mineral</td>
<td>Hematite</td>
</tr>
<tr>
<td>Other secondary ore mineral(s)</td>
<td>Limonite, Goethite</td>
</tr>
<tr>
<td>Principal gangue mineral</td>
<td>Hematite, Limonite</td>
</tr>
<tr>
<td>Other gangue mineral(s)</td>
<td>Quartz</td>
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<tr>
<td>Grain size:</td>
<td>Fine (of primary ore mineral)</td>
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<tr>
<td>Age of mineralisation</td>
<td>E. Prot.</td>
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### WALLROCK ALTERATION

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Sericitic</td>
</tr>
<tr>
<td>Location relative to ore</td>
<td>Proximal</td>
</tr>
<tr>
<td>Age relative to ore</td>
<td>Syn</td>
</tr>
<tr>
<td>Age relative to ore</td>
<td>Post</td>
</tr>
</tbody>
</table>

### EXPLORATION AND MINING

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration methods</td>
<td>Geol. mapping, Costeaming, Drilling</td>
</tr>
<tr>
<td>Mining methods</td>
<td>Underground</td>
</tr>
<tr>
<td>Open-cut workings - Depth (m): Length (m): Width (m):</td>
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</tr>
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### PAST PRODUCTION

<table>
<thead>
<tr>
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<th>Details</th>
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<tbody>
<tr>
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<td>1942-68</td>
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<tr>
<td>Grade (%)</td>
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<tr>
<td>Concentrate (t)</td>
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<tr>
<td>Contained metal (t)</td>
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### ORE RESERVES

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
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<tr>
<td>Tonnees</td>
<td>5400</td>
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<tr>
<td>Grade</td>
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</tr>
<tr>
<td>Cut-off grade</td>
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### REFERENCES

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production and reserves</td>
<td>Hays, 1960 (BMR Rec. 1960/2)</td>
</tr>
<tr>
<td>Exploration and general</td>
<td></td>
</tr>
</tbody>
</table>

### REMARKS

Mineralised zone represents oxidised part of massive sulphide vein. Minor gold (about 1 ppm) is present in the ore. Cassiterite is very fine and is disseminated in the sulphides.
## METALLOGENIC MAP DATA

- **Deposit/Prospect name:** Big Drum
- **Commodities - Major/Minor:** Sn
- **Locality - 1:250 000 sheet:** PINE CREEK SD52-8
- **1:100 000 sheet:** McKinlay River 5271
- **Universal Grid Reference:** HL 057 239
- **Length (m):** Width (m): Depth (m): Strike bearing: 340 Dip: 90 Plunge:
- **Deposit number:** 75
- **Compiled by:** M.A.
- **Date entered:** 27/8/90
- **Status:** Abandoned mine
- **Size:** Occurrence only
- **Shape:** Vein
- **Mode of origin:** Hydrothermal

## GEOLOGICAL SETTING

- **Major tectonic unit(s):** Pine Creek Geosyncline
- **Group:** Mount Partridge Group
- **Formation:** Wildman Siltstone
- **Member:** Sub-unit:
- **Age:** E. Prot.
- **Age:** E. Prot.
- **Age:**

## LITHOLOGY AND METAMORPHISM

- **Host rock:** Hematite quartz breccia
- **Subsidiary host rock:**
- **Wall rock:** Siltstone
- **Subsidiary wall rock:**
- **Age of metamorphism:** 1800Ma
- **Type:** Regional/Contact
- **Facies:** Gnsch./Alb.Ep.

## STRUCTURE

- **Type:** Shear
  - **Strike:** 350
  - **Dip:** 60W
  - **Plunge:**
- **Age relative to mineralisation:** Pre
- **Age relative to mineralisation:**

## MINERALISATION

- **Principal primary ore mineral:** Cassiterite
- **Other primary ore mineral(s):** Pyrite, Arsenopyrite
- **Principal secondary ore mineral:** Hematite
- **Other secondary ore mineral(s):** Limonite, Goethite
- **Principal gangue mineral:** Hematite, Limonite
- **Other gangue mineral(s):** Quartz
- **Grain size:** Fine
  - (of primary ore mineral)
- **Age of mineralisation:** E. Prot.
- **Macroscopic ore textures:** Vein fill & disseminations in sulphides
- **Weathering effect(s):** Oxidation
- **Depth of weathering (m):** 50

## WALLROCK ALTERATION

- **Type:** Sericitic
  - **Location relative to ore:** Proximal
  - **Age relative to ore:** Syn
  - **Hematitisation:** In ore
  - **Post**

## EXPLORATION AND MINING

- **Exploration methods:** Geol., mapping, costeaming
- **Mining methods:** Underground
- **Open-cut workings - Depth (m):**
- **Length (m):**
- **Width (m):**

## PAST PRODUCTION

- **Period:** 1962
- **Ore (t):** 220
- **Grade (%):**
- **Concentrate (t):**
- **Contained metal (t):** 220kg

## ORE RESERVES

- **Status:**
- **Tonnes:**
- **Grade:**
- **Cut-off grade:**

## REFERENCES

- **Production and reserves:** Hays, 1960 (BMR Rec. 1960/2)
- **Exploration and general:**

## REMARKS

Mineralised zone represent oxidised part of massive sulphide vein. Minor gold (about 1 ppm) is present in the ore. Cassiterite is very fine and is disseminate in the sulphides.
## MINERAL DEPOSIT DATA SHEET

**METALLGENIC MAP DATA**
- **Deposit/Prospect name:** Big Julie
- **Commodities - Major/Minor:** Sn
- **Locality - 1:250 000 sheet:** PINE CREEK
  - **1:100 000 sheet:** McKinlay River
- **Universal Grid Reference:** HL 057 238
- **Length (m):** 65
- **Width (m):** 0.5
- **Strike bearing:** 340
- **Dip:** Depth (m):
- **Deposit number:** 76
- **Compiled by:** M.A
- **Date entered:** 27/8/90
- **Status:** Abandoned mine
- **Size:** Occurrence only
- **Shape:** Vein
- **Mode of origin:** Hydrothermal

**GEOLOGICAL SETTING**
- **Major tectonic unit(s):** Pine Creek Geosyncline
- **Group:** Mount Partridge Group
- **Formation:** Moundgile Sandstone
- **Member:**
- **Sub-unit:**
- **Age:** E. Prot.

**LITHOLOGY AND METAMORPHISM**
- **Host rock:** Hematite quartz breccia
- **Subsidiary host rock:**
- **Wall rock:** Siltstone
- **Subsidiary wall rock:**
- **Age of metamorphism:** 1800Ma
- **Type:** Regional/Contact
- **Facies:** Gneiss./Alb.Ep.

**STRUCTURE**
- **Type:** Shear
- **Strike:** 350
- **Dip:** 60W
- **Plunge:**
- **Age relative to mineralisation:** Pre

**MINERALISATION**
- **Principal primary ore mineral:** Cassiterite
- **Other primary ore mineral(s):** Pyrite, Arsenopyrite, Hematite
- **Principal secondary ore mineral:** Limonite
- **Other secondary ore mineral(s):** Hematite, Goethite
- **Principal gangue mineral:** Quartz
- **Other gangue mineral(s):**
- **Macroscopic ore textures:** Vein fill & disseminations in sulphides
- **Weathering effect(s):** Oxidation
- **Depth of weathering (m):** 50
- **Grain size:** Fine (of primary ore mineral)
- **Age of mineralisation:** E. Prot.

**WALLROCK ALTERATION**
- **Type:** Sericitic, Hematitisation
- **Location relative to ore:** Proximal
- **Age relative to ore:** Syn
- **Post**

**EXPLORATION AND MINING**
- **Exploration methods:** Geol. mapping, costeaming, drilling
- **Mining methods:** Open cut
- **Open-cut workings - Depth (m):** 3
- **Length (m):** 30
- **Width (m):** 4

**PAST PRODUCTION**
- **Period:** 1970-80
- **Ore (t):** 493
- **Grade (%):** 4.17
- **Concentrate (t):**
- **Contained metal (t):**

**ORE RESERVES**
- **Status:**
- **Tonnes:**
- **Grade:**
- **Cut-off grade:**

**REFERENCES**
- **Production and reserves**
  - **Exploration and general:** Newton, 1977b (GS 77/5)

**REMARKS**
- Mineralised zone represent oxidised part of massive sulphide vein. Minor gold (about 1 ppm) is present in the ore. Cassiterite is very fine and is disseminate in the sulphides.
**MINERAL DEPOSIT DATA SHEET**

<table>
<thead>
<tr>
<th>METALLOGENIC MAP DATA</th>
<th>Deposit number: 77</th>
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</thead>
<tbody>
<tr>
<td>Deposit/Prospect name: Nelson 1</td>
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</tr>
<tr>
<td>Commodities - Major/Minor: Sn /</td>
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<tr>
<td>Locality - 1:250 000 sheet: PINE CREEK SD52-8</td>
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<tr>
<td>- 1:100 000 sheet: McKinlay River 5271</td>
<td></td>
</tr>
<tr>
<td>Universal Grid Reference: HL 120 278</td>
<td></td>
</tr>
<tr>
<td>Strike bearing: 45</td>
<td></td>
</tr>
<tr>
<td>Depth (m): Plunge:</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>GEOLOGICAL SETTING</th>
<th>Sub-unit:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major tectonic unit(s): Pine Creek Geosyncline</td>
<td></td>
</tr>
<tr>
<td>Group: Mount Partridge Group</td>
<td></td>
</tr>
<tr>
<td>Formation: Mundoglie Sandstone</td>
<td></td>
</tr>
<tr>
<td>Member:</td>
<td></td>
</tr>
<tr>
<td>Age: E. Prot.</td>
<td></td>
</tr>
<tr>
<td>Age: E. Prot.</td>
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<table>
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<tr>
<th>LITHOLOGY AND METAMORPHISM</th>
<th>Type: Regional/Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host rock: Hematite quartz breccia</td>
<td></td>
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<tr>
<td>Subsidiary host rock:</td>
<td></td>
</tr>
<tr>
<td>Wall rock: Silstone</td>
<td></td>
</tr>
<tr>
<td>Subsidiary wall rock:</td>
<td></td>
</tr>
<tr>
<td>Age of metamorphism: 1800Ma</td>
<td></td>
</tr>
<tr>
<td>Type: Strike:</td>
<td></td>
</tr>
<tr>
<td>Dip: Plunge:</td>
<td></td>
</tr>
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<table>
<thead>
<tr>
<th>MINERALISATION</th>
<th>Age relative to mineralisation: Grain size: Fine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal primary ore mineral: Cassiterite</td>
<td></td>
</tr>
<tr>
<td>Other primary ore mineral(s): Pyrite, Arsenopyrite</td>
<td></td>
</tr>
<tr>
<td>Principal secondary ore mineral: Hematite</td>
<td></td>
</tr>
<tr>
<td>Other secondary ore mineral(s): Limonite, Goethite</td>
<td></td>
</tr>
<tr>
<td>Principal gangue mineral: Hematite, Limonite</td>
<td></td>
</tr>
<tr>
<td>Other gangue mineral(s): Quartz</td>
<td></td>
</tr>
<tr>
<td>Macroscopic ore textures: Vein fill</td>
<td></td>
</tr>
<tr>
<td>Weathering effect(s): Oxidation</td>
<td></td>
</tr>
<tr>
<td>Depth of weathering (m): 50</td>
<td></td>
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<table>
<thead>
<tr>
<th>WALLROCK ALTERATION</th>
<th>Location relative to ore Age relative to ore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPLORATION AND MINING</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration methods: Geol. mapping, Costeering</td>
<td></td>
</tr>
<tr>
<td>Mining methods: Small pits</td>
<td></td>
</tr>
<tr>
<td>Open-cut workings - Depth (m):</td>
<td></td>
</tr>
<tr>
<td>Length (m):</td>
<td></td>
</tr>
<tr>
<td>Width (m):</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>PAST PRODUCTION</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Period:</td>
<td></td>
</tr>
<tr>
<td>Ore (t): Grade (%) Concentrate (t) Contained metal (t)</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>ORE RESERVES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Status:</td>
<td></td>
</tr>
<tr>
<td>Tonnes Grade Cut-off grade</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REFERENCES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Production and reserves:</td>
<td></td>
</tr>
<tr>
<td>Exploration and general: Hays, 1966 (BMR Rec. 1960/2)</td>
<td></td>
</tr>
<tr>
<td>: Crohn, 1968 (BMR Bull. 82)</td>
<td></td>
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</tbody>
</table>

<p>| REMARKS | Few grab samples assayed upto 1.53% Sn. Traces of gold are also present. |</p>
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<thead>
<tr>
<th>METALLOGENIC MAP DATA</th>
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<tr>
<td>Deposit/Prospect name:</td>
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<td>Commodities - Major/Minor:</td>
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<tr>
<td>Locality - 1:250 000 sheet:</td>
</tr>
<tr>
<td>- 1:100 000 sheet:</td>
</tr>
<tr>
<td>Universal Grid Reference:</td>
</tr>
<tr>
<td>Length (m):</td>
</tr>
<tr>
<td>Width (m):</td>
</tr>
<tr>
<td>Strike bearing:</td>
</tr>
<tr>
<td>Dip:</td>
</tr>
<tr>
<td>Plunge:</td>
</tr>
<tr>
<td>Deposit number:</td>
</tr>
<tr>
<td>Compiled by:</td>
</tr>
<tr>
<td>Date entered:</td>
</tr>
<tr>
<td>Status:</td>
</tr>
<tr>
<td>Size:</td>
</tr>
<tr>
<td>Shape:</td>
</tr>
<tr>
<td>Mode of origin:</td>
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<table>
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<th>GEOLOGICAL SETTING</th>
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<tr>
<td>Major tectonic units:</td>
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<td>Group:</td>
</tr>
<tr>
<td>Formation:</td>
</tr>
<tr>
<td>Member:</td>
</tr>
<tr>
<td>Sub-unit:</td>
</tr>
<tr>
<td>Age:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LITHOLOGY AND METAMORPHISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host rock:</td>
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<tr>
<td>Subsidiary host rock:</td>
</tr>
<tr>
<td>Wall rock:</td>
</tr>
<tr>
<td>Subsidiary wall rock:</td>
</tr>
<tr>
<td>Age of metamorphism:</td>
</tr>
<tr>
<td>Type:</td>
</tr>
<tr>
<td>Facies:</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>STRUCTURE</th>
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</thead>
<tbody>
<tr>
<td>Type:</td>
</tr>
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<td>Strike:</td>
</tr>
<tr>
<td>Dip:</td>
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<tr>
<td>Plunge:</td>
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<tr>
<td>Type:</td>
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<tr>
<td>Strike:</td>
</tr>
<tr>
<td>Dip:</td>
</tr>
<tr>
<td>Plunge:</td>
</tr>
<tr>
<td>Age relative to mineralisation:</td>
</tr>
<tr>
<td>Age relative to mineralisation:</td>
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</table>

<table>
<thead>
<tr>
<th>MINERALISATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal primary ore mineral:</td>
</tr>
<tr>
<td>Other primary ore mineral(s):</td>
</tr>
<tr>
<td>Principal secondary ore mineral:</td>
</tr>
<tr>
<td>Other secondary ore mineral(s):</td>
</tr>
<tr>
<td>Principal gangue mineral:</td>
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<tr>
<td>Other gangue mineral(s):</td>
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<tr>
<td>Grain size:</td>
</tr>
<tr>
<td>(of primary ore mineral)</td>
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<td>Age of mineralisation:</td>
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<table>
<thead>
<tr>
<th>WALLROCK ALTERATION</th>
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</thead>
<tbody>
<tr>
<td>Type:</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Location relative to ore:</td>
</tr>
<tr>
<td>Age relative to ore:</td>
</tr>
<tr>
<td>in ore:</td>
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<table>
<thead>
<tr>
<th>EXPLORATION AND MINING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration methods:</td>
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<tr>
<td>Mining methods:</td>
</tr>
<tr>
<td>Open-cut workings - Depth (m):</td>
</tr>
<tr>
<td>Length (m):</td>
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<td>Width (m):</td>
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<table>
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<th>PAST PRODUCTION</th>
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<tbody>
<tr>
<td>Period</td>
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<tr>
<td>-------</td>
</tr>
<tr>
<td>1957-76</td>
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<thead>
<tr>
<th>ORE RESERVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
</tr>
<tr>
<td>--------</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production and reserves</td>
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<tr>
<td>McQueen, 1956 (BMR Rec. 1956/133)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Includes Buffalo, Charlie and Bessie leases. The Buffalo lease has produced some 4 tonnes of hand sorted ore. Mineralisation style is probably similar to the Jessops lode i.e., disseminated in massive sulphides. Traces of gold are present.</td>
</tr>
</tbody>
</table>
## METALLOGENIC MAP DATA
- **Deposit/Prospect name:** Nelson 2
- **Commodities - Major/Minor:** Sn
- **Locality - 1:250 000 sheet:** PINE CREEK SD52-8
- **Locality - 1:100 000 sheet:** McKinlay River 5271
- **Universal Grid Reference:** HL 114 264
- **Length (m):** 1500
- **Width (m):** 0.5
- **Depth (m):**
- **Strike bearing:** 45
- **Dip:** Plunge
- **Deposit number:** 79
- **Compiled by:** M.A
- **Date entered:** 27/8/90
- **Status:** Abandoned mine
- **Size:** Occurrence only
- **Shape:** Vein
- **Mode of origin:** Hydrothermal

## GEOLOGICAL SETTING
- **Major tectonic unit(s):** Pine Creek Geosyncline
- **Group:** Mount Partridge Group
- **Formation:** Mundogie Sandstone
- **Member:**
- **Sub-unit:** E. Prot.
- **Age:**
- **Type:** Regional/Contact
- **Facies:** Gnsch./Alb.Ep.

## LITHOLOGY AND METAMORPHISM
- **Host rock:** Hematite quartz breccia
- **Subsidiary host rock:**
- **Wall rock:** Siltstone
- **Subsidiary wall rock:**
- **Age of metamorphism:** 1800Ma

## STRUCTURE
- **Type:** Strike: Dip: Plunge:
- **Age relative to mineralisation:**

## MINERALISATION
- **Principal primary ore mineral:** Cassiterite
- **Other primary ore mineral(s):** Pyrite, Arsenopyrite
- **Principal secondary ore mineral:** Hematite
- **Other secondary ore mineral(s):** Limonite, Goethite
- **Principal gangue mineral:** Hematite, Limonite
- **Other gangue mineral(s):** Quartz
- **Macromorphose textures:** Vein fill
- **Weathering effect(s):** Oxidation
- **Depth of weathering (m):** 50
- **Grain size:** Fine (of primary ore mineral)
- **Age of mineralisation:** E. Prot.

## WALLROCK ALTERATION
- **Type:** Sericite
- **Hematitisation**
- **Location relative to ore:**
- **Age relative to ore:**
  - Proximal
  - In ore
  - Pyn
  - Post

## EXPLORATION AND MINING
- **Exploration methods:** Prospecting pits
- **Mining methods:** Small pits
- **Open-cut workings - Depth (m):**
- **Length (m):**
- **Width (m):**

## PAST PRODUCTION
- **Period**
- **Ore (t):**
- **Grade (%):**
- **Concentrate (t):**
- **Contained metal (t):**

## ORE RESERVES
- **Status**
- **Tonnes**
- **Grade**
- **Cut-off grade**

## REFERENCES
- **Production and reserves:**
- **Exploration and general**
  - Hays,1960(BMR Rec.1960/2)
  - Cronh,1968(BMR Bull. 82)

## REMARKS
Lodes are discontinuous ove a total strike length of 1500m. Traces of gold are also present.
### MINERAL DEPOSIT DATA SHEET

**METALLOGENIC MAP DATA**
- **Deposit/Prospect name:** Unnamed
- **Commodities - Major/Minor:** Sn /
- **Locality - 1:250 000 sheet:** PINE CREEK SD52-8
- **Locality - 1:100 000 sheet:** McKinlay River 5271
- **Universal Grid Reference:** HL 125 268
- **Length (m):** 45
- **Width (m):** 45
- **Depth (m):** 52
- **Strike bearing:** 45
- **Dip:** 45
- **Plunge:** 52
- **Deposit number:** 80
- **Compiled by:** M.A
- **Date entered:** 27/8/90
- **Status:** Prospect
- **Size:** Occurrence only
- **Shape:** Vein
- **Mode of origin:** Hydrothermal

**GEOLOGICAL SETTING**
- **Major tectonic unit(s):** Pine Creek Geosyncline
- **Group:** Mount Parridge Group
- **Formation:** Mundogie Sandstone
- **Member:** 
- **Sub-unit:** 
- **Age:** E. Prot.
- **Age:** E. Prot.
- **Age:** 

**LITHOLOGY AND METAMORPHISM**
- **Host rock:** Hematite quartz breccia
- **Subsidiary host rock:** 
- **Wall rock:** Siltstone
- **Subsidiary wall rock:** 
- **Age of metamorphism:** 1800 Ma
- **Type:** Regional/Contact
- **Facies:** Gnsch./Alb.Ep.

**STRUCTURE**
- **Type:** Strike
- **Dip:** Strike
- **Plunge:** Dip
- **Age relative to mineralisation:** 
- **Age relative to mineralisation:** 

**MINERALISATION**
- **Principal primary ore mineral:** Cassiterite
- **Other primary ore mineral(s):** Pyrite, Arsenopyrite
- **Principal secondary ore mineral:** Hematite
- **Other secondary ore mineral(s):** Limonite, Goethite
- **Principal gangue mineral:** Hematite, Limonite
- **Other gangue mineral(s):** Quartz
- **Macroscopic ore textures:** Vein fill
- **Weathering effect(s):** Oxidation
- **Depth of weathering (m):** 50
- **Grain size:** Fine
  (of primary ore mineral)
- **Age of mineralisation:** E. Prot.

**WALLROCK ALTERATION**

<table>
<thead>
<tr>
<th>Type</th>
<th>Location relative to ore</th>
<th>Age relative to ore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sericite</td>
<td>Proximal</td>
<td>Pyn</td>
</tr>
<tr>
<td>Hematitisation</td>
<td>In ore</td>
<td>Post</td>
</tr>
</tbody>
</table>

**EXPLORATION AND MINING**
- **Exploration methods:** Prospecting pits
- **Mining methods:** 
- **Open-cut workings - Depth (m):** 
- **Length (m):** 
- **Width (m):** 

**PAST PRODUCTION**
- **Period**
- **Ore (t):** 
- **Grade (%):** 
- **Concentrate (t):** 
- **Contained metal (t):** 

**ORE RESERVES**
- **Status**
- **Tonnes**
- **Grade**
- **Cut-off grade**

**REFERENCES**
- **Production and reserves:** 
- **Exploration and general:** Hays, 1960 (BMR Rec. 1960/2)

**REMARKS**
- Small veins, erratic assays.
Prepared by:
Ekos Research (NT) for:

Northern Territory Gold Mines NL

Figure 1
Location
Generalised geology of the central Pine Creek Geosyncline by P.M. Nicholson and others.

FIGURE 6
GENERAL GEOLOGY
# Central Pine Creek Geosyncline stratigraphy

**by P.M. Nicholson and others**

<table>
<thead>
<tr>
<th>AGE</th>
<th>STRATIGRAPHIC UNIT</th>
<th>ESTIMATED THICKNESS (metres)</th>
<th>LITHOLOGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>JURASSIC - CRETAUCEOUS</td>
<td>Penrhyn Bicuvolat sandstone sandstone, siltstone</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Daly River Group</td>
<td>15-150</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tolmer Group</td>
<td>200-500</td>
<td>conglomerate, basalt, sandstone</td>
</tr>
<tr>
<td></td>
<td>Katherine River Group</td>
<td>1430</td>
<td>siltstone, conglomerate, dolomite</td>
</tr>
<tr>
<td></td>
<td>Edith River Group</td>
<td>2150</td>
<td>siltstone, basalt, andesite</td>
</tr>
<tr>
<td></td>
<td>El Sherana Group</td>
<td>1200</td>
<td>siltstone, sandstone, conglomerate</td>
</tr>
<tr>
<td></td>
<td>This paper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cambrian-Ondwichian</td>
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<td></td>
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</tr>
<tr>
<td>Adeladiachian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpentarian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Paleozoic</td>
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<tr>
<td>Carboniferous</td>
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<td></td>
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<td>Permian</td>
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<td></td>
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<td>Triassic</td>
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<tr>
<td>Cenozoic</td>
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<td></td>
</tr>
</tbody>
</table>

**FIGURE 7**

**STRATIGRAPHY**
REFERENCE

Csa Silt, sand, clay and gravel: alluvium and flood plain deposits
Csa Silt, clayey silt: levee deposits
Cs Quartz sand, outwash and channel deposits

Cz Lithosols, gradational red soils and yellow earth type soils shown ... where these soils occur over known rock units
Cza Winnowed sand, silt, clay, partially derived from Czs
Czs Quartz sand, ferruginous and clayey sand: fan deposits
Czt Delibal Isaacite and concreronitry ironstone
Cgg Higher level gravels and gravelly lithosols
Cgt Sandstone, and metametment fragments, sand: talus and scree deposits

Ko Dark brown limyotic coarse to pebbly quartz sandstone, and massive friable white quartz sandstone and conglomerate

Pnk Ripple-marked and cross-bedded, very coarse to pebbly quartz sandstone. Purple clayey coarse to pebbly quartz sandstone. Quartz pebble conglomerate, boulder conglomerate, medium purple quartz sandstone, flinty greywacke and markstone at base

Pgg Coarse porphyritic granite
Pgp Coarse even-grained to porphyritic granite
Pgp Undivided granite
Pgr Fine even-grained grey leuconorite granite
Pgni Coarse porphyritic pink and green granite

Ptz Massive quartz dolerite, amphibolite

Pfs Brown, grey and red sandy siltstone, siltstone, phyllite, slate and quartz - andalusite - muscovite-biotite-chlorite hornfels. Fine to coarse greywacke, minor volcanolithic pebble conglomerate. \( \ldots \) denotes rare highly altered felsic volcanics

Peo Siltstone and slate with minor laminated black chert bands, lenses and nodules, massive medium to coarse feldspathic greywacke, minor banded iron formation, argillite, crystal tuff and fulfucicous chert
Pgo Grey and brown siltstone and phyllite, andalusite - garnet - biotite-muscovite - quartz hornfels,pink, green, grey and brown argillite, glassy black spotted vitro tuff, crystal tuff and fulfucicous chert
Pek Brown felsicous siltstone, shale and phyllite commonly carbonaceous and containing chert bands, lenses and nodules, massive ironstone, carbonaceous claystone, grey graphitic chlorite-muscovite-quartz hornfels; minor lenses of laminated, massive or brecciated silicified dolomite, impure dolomite, dolomitic marble and tremolite hornfels. Rare sandy siltstone endlimonitic quartz sandstone at base

Ppw Undivided
Ppw Brown sandy siltstone, phyllite, slate and shale, fine to coarse feldspathic sandstone and quartzite, very fine brown quartz sandstone, grey medium quartzite and rare dolomirc

Ppr Hematitic red, brown and grey siltstone, red and cream banded siltstone, siliceous phylite, white claystone, ironstone and very minor grey to brown quartzite, chlorite-muscovite-carbonaceous hornfels
Ppm Coarse to pebbly feldspathic quartz sandstone, quartzite and arkose, minor pebble conglomerate. Graded bedding, cross-bedding and scour structures in places, brown, cream, mauve, red shale, siltstone, sandy siltstone and phyllite, quartz- muscovite hornfels, muscovite-biotite-chlorite- quartz hornfels, biotite-andalusite-quartz- muscovite hornfels, chlorite-muscovite-carbonaceous hornfels; minor fine to medium pyritic grey quartzite

\( \ldots \) Denotes major pelitic lens

FIGURE 8a REFERENCE