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EL48/94

See folio 46

**PASMINCO EXPLORATION**  
**WARATAH EL 48/94**  
**ANNUAL AND FINAL REPORT**  
**FOR THE PERIOD ENDING NOVEMBER 1997**

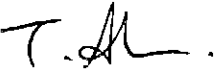
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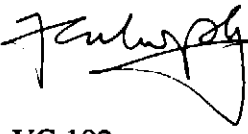
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**Date:** November 1997

**Submitted To:** Regional Exploration Manager, Tasmania

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**1. SUMMARY**

Exploration during the 1996-97 reporting period within Waratah EL 48/94 has consisted of a GIS study to determine the prospectivity of the licence area. The prior exploration data proved to be sparse and few new areas were highlighted.

At the completion of this study, the review recommended relinquishment of all titles in the Luina area. This does not, in itself, diminish the prospectivity of the area for targets other than those sought by Pasmaenco Exploration.

## 2. INTRODUCTION

The Waratah EL 48/94 licence area forms a portion of the Pasmaenco licence areas. It lies north and west of the township of Waratah, with the area around the Mt Bischoff Mine excised out of the title (Fig 1). The licence area covers an area of 87km<sup>2</sup> from the Deep Gully Creek area north east of the Waratah township to Arthur Dam in the south west.

This is the third Annual Report for EL 48/94 and covers the period from December 1996 to November 1997. The exploration work completed involved the capture of all prior exploration onto a GIS and reviewing the prospectivity of the area.

The Mt Bischoff (Sn) and Magnet (Pb-Ag-Zn) Mines lie within or just outside the licence, along with numerous other small Sn and base metal shows (Fig 3). The base metal mineralisation appears to be hosted by Precambrian and Cambrian volcano-sedimentary sequences, with all reported occurrences being vein-style.

Much of the EL area is Crown Land, covered by patches of rain forest and forestry, titree scrub and button grass plains. Access is provided by the Corvina Road, with numerous old logging tracks, old exploration tracks and walking tracks providing further access. Much of the area is only accessible by foot.

### 3. TENURE

Waratah EL 48/94 was issued to Pasminco Australia Limited on December 23 1994. The licence area covers 87km<sup>2</sup>, which excludes a land area of 4km<sup>2</sup> (RL8807), 4ha Crown Reserves (82m/77) and a 9ha Mining Lease (58m/87) (Fig 2).

The land tenure of the area comprises predominantly Crown Land, which includes non-allocated, Deferred Forest Land, and Recommended Area for Protection - the Savage River RAP, Mt Ramsey RAP and Deep Gully RAP. As well as State Forest land and private property, the area also contains part of the Savage River Australian Heritage Area (Fig 2).

#### 4. PREVIOUS EXPLORATION AND MINING

A comprehensive bibliography of reports on previous exploration in the Waratah area is included in Morrison (1995a & b; Appendix 1) which includes a listing of regional data available. Previous exploration conducted in the area is summarised in Table 1.

Earliest work in the Waratah district began with the discovery of tin ore in Tinstone Creek by James Smith in December 1871. Small lodes of antimonial galena, and zinc blende - galena were discovered before tracing the source of the tin to Mt Bischoff. Following the rich discoveries at Broken Hill (New South Wales) in 1882, a silver "boom" commenced and the district was energetically prospected for silver-lead (Nye, 1923). During the following decade discoveries of silver-lead were made at Magnet and Heazlewood, gold at Corinna, tin at Heens Kirk and copper and iron at the Rocky and Savage Rivers. Most of the discoveries were made during the years 1890 and 1891. The lodes were opened up and tested during the nineties, and although the majority produced small quantities of argentiferous galena the results were otherwise disappointing.

The Magnet Mine is thought to have been first discovered in 1877 by W R Bell, but was not investigated until 1890 when Bell was able to relocate his find. The Magnet Silver Mining Co was formed in 1895 and worked the mine with various success until 1933. From 1933 to 1940 the mine was controlled by four separate organisations, none of which found it a successful venture. Production from the mine totaled approximately 630,000t @ 6% Pb, 7% Zn and 394g/t Ag up to 1940 when operation ceased (Cottle, 1951).

Modern exploration in the area commenced in the early 1970's and has been undertaken within several exploration licences since then (Table 1). The work has included extensive stream sediment sampling and geological mapping, a range of geophysical surveys and several drill holes. Numerous Sn and base metal anomalies have been discovered in the area, although much of the mineralisation is thought to be related to contamination from Magnet and Mt Bischoff.

In the Magnet Mine area modern exploration began during 1970 with stream sediment sampling undertaken by Comstaff. All results however were discarded due to cultural contamination. A Sn stream sediment anomaly believed not be sourced from the mine was located in 1972, and significant exploration began in 1975 with the establishment of a grid from Magnet to Mt Bischoff. Mapping, soil sampling, ground magnetics and EM surveys resulted in one diamond drill hole targeted at an EM anomaly (BAB1), and two holes (MAG1, MAG2) drilled to test the southern extension of the Magnet Mine Pb-Ag-Zn vein. BAB1 failed to intersect any evidence of mineralisation, whilst MAG1 and MAG2 intersected moderate patchy mineralisation plus extensive zones of stoping. In 1985 BHP joint venture into EL 5/63 and drilled a short hole (BR1) targeting a 1983 DIGHEM anomaly at Butlers Road. This returned anomalous tin and base metal values. No further activity was undertaken by Comstaff, and much of the area was surrendered from EL 5/63 during 1985.

During the 1980's the Tasmanian Mines Department carried out exploration on the Luina and Wombat Flat exempt areas (Collins, 1983; Brown, 1986). This work included magnetic and DIGHEM surveys and soil geochemistry. The program culminated in the drilling of two holes at Arthur Dam which targeted coincident magnetic and soil geochemical anomalies. The holes intersected sheet-like pyrrhotite-chalcopyrite bearing veins (AD1) and sphalerite-galena quartz stockwork veining (AD2) in Eocambrian andesites and volcanoclastics.

RGC held EL's 12/90 and 15/90 in the area from 1990-1993 primarily focussing on Renison-style tin mineralisation, specifically carbonate replacement tin deposits such as those mined at Mt Bischoff and Luina. The discovery of a new skarn on the Whyte River Grid and anomalous geochemistry remains untested.

**Table 1 Previous Exploration in the Waratah Area**

|           |   |
|-----------|---|
| 1870-1940 | Discovery of tin ore in Tinstone Creek and Mt Bischoff tin deposit. 1877: Magnet Mine discovered, producing approx 630,000t @ 6% Pb, 7% Zn, & 394g/t Ag (1895-1940).<br>1890: Small discoveries of Ag-Pb, Au, Sn, Cu & Fe lodes opened up.  |
| 1963-1989 | EL 5/63, 7AP/AM, Comstaff Pty Ltd (plus BHP Co Ltd).<br>1969+: Stream sediment sampling, reconnaissance mapping, gridding and soil sampling around the eastern margin of Meredith Granite.<br>Early 1970: Extensive stream sediment sampling and geological mapping (Shaw and Everett, 1985a, b; BHP, 1988), regional TURAM EM survey, CRONE EM and magnetic surveys over 3 grids. Drilled BAB1, MAG1 & MAG2.<br>1981: Investigation of Deep Gully Creek anomaly; gridding, soil geochemistry, geological mapping, ground magnetics and aeromagnetics identified anomalous tin.<br>1983: Regional DIGHEM survey identified anomalies in the Deep Gully Creek area (not further investigated). BHP joint-ventured into EL 5/63 in 1985 and drilled BR1.<br>1984: 5 holes drilled through Tertiary cover. |
| 1963-1989 | EL 1/63, Cominco Exploration Pty Ltd.<br>1974 helimag survey, 52m line spacing; 1980-1981 DIGHEM EM and stream sediment geochemistry.   |
| 1983-1985 | Department of Mines, Luina and Wombat Flat Exempt areas.<br>Regional mapping (Brown, 1986), magnetic and DIGHEM anomaly; geological mapping, ground magnetics and UTEM. Drilling intersected background levels of tin and basemetals.   |
| 1988-1990 | EL 46/88, Billiton Australia.<br>Gridding of 1983 Comstaff DIGHEM anomaly; geological mapping, ground magnetics and UTEM. Drilling intersected background levels of tin and basemetal.  |
| 1990-1993 | EL 47/88 Placer Exploration Ltd.<br>Regional stream sediment sampling, rock chip geochemistry (Magnet Mine) and resampling of MAG1, MAG2 and BAB1.  |
| 1991-1992 | EL 21/90, Geopeko.<br>1:25,000 compilation maps of Comstaff stream sediment data. Limited water and rock float sampling.  |

1994

EL 17/93, EL 49/94, MPI Gold Pty Ltd.

Regional stream sediment sampling, rock chip sampling (Magnet Mine)  
and resampling of AD1 and AD2.

## 5. GEOLOGY

### 5.1 Regional Geology

The regional geology of the Waratah area consists of Precambrian to Ordovician rocks of the Dundas Trough. Lithologies which are well described in Brown (1986) include carbonates, intermediate to mafic volcanics and ultramafics. Devonian Meredith Granite forms a shallow ridge extending from outcrop on the Corinna Road to the north east underneath Mt Bischoff mine (Brown, 1984) (Figure 3). The outcropping lithologies are summarised below.

### 5.2 Oonah Formation

A block of Oonah Formation of approximately 17km<sup>2</sup> in size surrounds the Mt Bischoff Mine and extends below basalt to the east. The Proterozoic Oonah Formation is composed of pale grey quartz sandstones, pale grey siltstones, dark grey shales, dolomites and minor mafic lavas and volcanoclastics. A high degree of deformation often allows distinction from younger rocks.

The Oonah Formation has been divided into upper and lower successions on the basis of lithology. The lower sequence is dominated by micaceous quartz sandstones and siltstone with minor interbedded phyllitic mudstones. The upper Oonah Formation has a greater abundance of mudstone and shale with dolomite and occasional intercalated mafic volcanics.

In the Mt Bischoff area the Oonah Formation is comprised of a shale and siltstone succession with thick units of dolomite that correlates to the upper sequence. It is inferred that the Oonah/Crimson Creek Formation contacts in the Mt Bischoff area are faulted, possibly involving significant over thrusting of Precambrian over the Eocambrian sequences.

### 5.3 Crimson Creek Formation

The Crimson Creek Formation occurs to the north and east of the Meredith Granite, and is in part overlain by Tertiary basalt. The formation is comprised largely of basalt lavas, basaltic volcanoclastics and finely bedded siltstone and mudstone. Brown (1986) notes that the Crimson Creek Formation becomes more basaltic to the north of the Meredith Granite. Thin carbonate horizons occur in the Crimson Creek Formation but rarely outcrop.

Contact metamorphism of the Crimson Creek by the Meredith Granite has resulted in a highly magnetic aureole about the granite. It is probable that this magnetic signature will swamp any magnetic anomaly sourced from mineralisation, thus limiting the use of magnetics to an indirect mapping tool.

Ultramafic and mafic rocks have been locally overthrust onto the Crimson Creek Formation.

#### 5.4 Ordovician to Devonian Sediments

A sequence of Ordovician to Devonian sediments overlies the Crimson Creek Formation and associated ultramafic rocks within a small syncline to the north of the Meredith Granite in the Mt Stewart-Heazlewood area. These sediments belong to the conformable Gordon Limestone-Eldon Group sequence, and the Gordaon Limestone at the base of the sequence may have a stratigraphic thickness of up to 500m. It is overlain by the Crotty Sandstone, a white, friable, quartz rich unit up to 400m in thickness, which forms a prominent ridge around the edge of the syncline. Much of the sequence is poorly exposed and covered by alluvium.

#### 5.5 Meredith Granite

The Meredith Granite has been radiometrically dated at 356 Ma, using both K-Ar and Rb-Sr methods (Brown, 1986). Around the north-eastern tip and eastern margin the granite is porphyritic close to the contact and contains feldspar (up to 25mm) and quartz phenocrysts (up to 8mm). The granite becomes increasingly equigranular towards the core, and contains biotite throughout. Zones of greisenisation and concentrations of tourmaline veining are common and conspicuous close to the granite margins. Quartz feldspar porphyry dykes related to the Meredith granite occur at Mt Bischoff and at Deep Gully Creek.

Modeling of the shape of the Meredith Granite (Leaman and Richardson, 1989) demonstrates a shallow ridge extending from outcrop on the Corinna Road to the north east underneath Mt Bischoff mine. An infill of gravity stations by RGC during 1990/91 in this area confirmed this ridge and highlighted the granite topography.

#### 5.6 Tertiary Basalt

An extensive plateau of Tertiary Basalt covers the area east and south of Waratah with erosional outliers elsewhere. Basalt cover may be up to 300m in thickness, comprised of flows ranging from less than 1m to greater than 10m thick. Fluvial and lacustrine sediments occur between basalt flows, ranging from mud to gravel grain size.

Magnetic character and variation in thickness of the basalt severely hinders interpretation of sub-basalt basement magnetic features.

## 5.7 Known Mineralisation

The Waratah-Luina area is well known for large replacement-style Sn deposits (Mt Bischoff and Cleveland), but lesser known for Pb-Zn mineralisation.

The largest base metal orebody discovered and mined to date is Magnet, which lies to the immediate west of EL 48/94. Approximately 630,000t @ 6% Pb, 7% Zn and 394g/t Ag were extracted from the mine between 1895 and 1940. The ore body has a strike length of 90m, a true width averaging 5.5m, and was worked to 365m vertical depth. The orebody is described as occupying a steep west north-west dipping fracture system within an early Cambrian mafic/ultramafic body known as the Magnet dyke, close to its discordant footwall contact with early Cambrian sedimentary rocks.

The ore at Magnet consists of sphalerite and argentiferous galena with lesser amounts of arsenopyrite, pyrite, boulangerite, pyrargyrite, tetrahedrite and chalcopyrite in a gangue of manganosiderite.

Other base metal mineralisation sites are discussed in Nye (1923), however each are small vein style galena dominated accumulation which were worked to a shallow depth only.

The Cleveland Sn-Cu deposit located 6km west of EL 48/94 comprises several stratabound lenses of pyrrhotite-cassiterite-stannite-chalcopyrite mineralisation formed by metasomatic replacement of limestone beds. The limestone is a small part of the Crimson Creek Formation in the area, forming the transitional sequence between mafic volcanics and the overlying turbidite sequence. The tabular lenses are up to 30m in thickness, and are disrupted by a series of sub-parallel reverse faults that were mineralisation conduits.

At Mt Bischoff, massive pyrrhotite has partially replaced a 40-60m thick dolomite bed within a sequence of turbiditic sandstone, siltstone and shale of the Oonah Formation. Quartz-feldspar porphyry dykes intrude this sequence. Other mineralisation styles include topazised porphyry dykes and late stage quartz-carbonate-fluorite veins.

## 6. PROSPECTIVITY REVIEW

### 6.1 Background

Pasminco Exploration undertook a prospectivity assessment of its ground holdings in Western Tasmania during the past 12 months (Murphy 1997). The review employed a GIS (MapInfo) analysis of exploration data which, for the Waratah EL, was sourced from open file data and an existing Pasminco database held in Access. Both data sets required substantial effort to validate and were then combined with the open file compilation. The integration of the various data sets formed the basis for largely geochemically-oriented metallogenic modelling and target area definition. Analysis was performed on Cu, Pb and Zn distributions as these elements provide the most coherent regional coverage. In essence, this identifies existing anomalies and significant gaps in coverage to date on the Tullah tenement. Layers incorporated in the GIS are:

- modified 1:250,000 geology and mineral occurrences (Fig. 3). The geology was coded according to lithotypes eg. DGE = Dundas Group Equivalent, CVC = Central Volcanic Sequence.
- Stream sediment sampling and drainage (Fig. 4)
- Extant grids and access (Fig. 5)
- Soil sampling and grids (Fig. 6)
- Rock chip sampling and drill collars (Fig. 7)

### 6.2 Point Data Analysis

- The stream sediment sample points invariably plot off stream lines (Fig. 4) so catchment analysis was not deemed appropriate. In any case, where there is a high sample density the points approximate to small catchment areas. The data points were standardised and leveled accordingly to the underlying 1:25,000 geology polygon that contains them. Analysis was then made of the lithotype populations (eg. all CVC hosted samples) with statistical analysis performed on the log distributions and z-scores ( $(x - \text{mean}(x)) / \text{st dev}(x)$ ) calculated for each point. The data was subsequently imaged using a search radius of 500m and grid cell size of 50m.
- The soil samples were standardised and leveled according to soil profile (A, B, C and 'unknown') and to major lithotype code of the underlying geology polygon, using the same statistical manipulations as with the stream data. The data was then imaged using a search radius of 100m and a grid cell size of 50m.
- The rock chip data was gridded in the same way as the soil data.

- Each of the 'surface' data sets (stream, soil and rock chip) were imaged for each of the three elements and displayed as percentile RGB images. The images are 'hot to cold' colour coded according to the 99<sup>th</sup>, 98<sup>th</sup>, 95<sup>th</sup>, 90<sup>th</sup>, 80<sup>th</sup>, 60<sup>th</sup> and 40<sup>th</sup> percentile of the z-score distribution.
- The high z-score values for each element were threshold as a composite RGB image to show levels of coincident anomalies. These are colour coded according to: Red=Pb, Green=Cu, Blue=Zn, Yellow=Pb+Cu, Cyan=Zn+Cu, Magenta=Pb+Zn, White=Cu+Pb+Zn.

### 6.3 Multi-element Distributions

Preliminary observations can only be made at this stage, ie. qualitative statements that require quantitative analysis of the nature and robustness of the anomalies. They provide pointers for future work programs. The following observations are drawn from the data:

#### *Stream Sediment Images (Figs. 8, 9, 10, 11)*

- Significant Zn-Pb-Cu anomalies occur along the northern extension of the Arthur River which is thought to be due to extensive contamination for the Magnet Mine area.
- A distinctive anomaly occurs south west of Mt Bischoff in an area of no historical workings. This anomaly is small for Cu, slightly larger for Pb and quite large occurring in two catchments for Zn.
- An area of anomalous Pb stream sediments occurs in the southern extremity of the licence area. The Butlers Road ? grid may cover this area.
- The western sector contains some very small spot highs which from the density of stream sediment sampling may warrant follow up work.

#### *Soil Sampling Images (Figs. 12, 13, 14, 15)*

- The Magnet Mine - Mt Bischoff Grid has not been put onto the Pasmenco GIS data base.
- Although the (?) Butlers Road Grid has been plotted on no data is available.
- There is no data to interpret.

#### *Rock Chip Samples (Figs. 16, 17, 18, 19)*

- There is no data worthy of interpretation.

### 6.4 Metallogenic Modelling

- A strong north east trend occurs north west of the Magnet Mine, but it does not appear to have any workings closely associated with it.
- The north east trend is crossed by numerous north west structures which often have mines/prospects associated with them.

- The Magnet Mine - Mt Bischoff Oonah Trend is not visible on this data.
- Little else can be deducted.
- As a result of the review of the Mt Read Belt outlined above, Pasmaico has decided to relinquish this group of tenements as they are peripheral to its key exploration areas within the belt.

7. **ENVIRONMENTAL DISTURBANCE AND REHABILITATION**

No environmental disturbance was associated with exploration activity and no rehabilitation was required.

**8. EXPENDITURE**

Total expenditure for all work undertaken by Pasminco Exploration within Waratah EL 48/94 for the twelve month period to the end of November 1997 was \$17,166. A detailed expenditure statement is given below.

|                                   |               |
|-----------------------------------|---------------|
| Personnel                         | 3,417         |
| Travel and Accommodation          | 311           |
| Geological Consultants            |               |
| Geochemical Consultants & Assays  |               |
| Geophysical Surveys & Consultants |               |
| Other Consultants                 | 730           |
| Drilling                          |               |
| Stores & Supplies                 | 53-           |
| Vehicles Plant & Equipment        |               |
| Land                              | 500           |
| Computing                         |               |
| Office                            | 10,701        |
| Administration Fee 10%            | 1,560         |
| <b>Total Tenement Expenditure</b> | <b>17,166</b> |

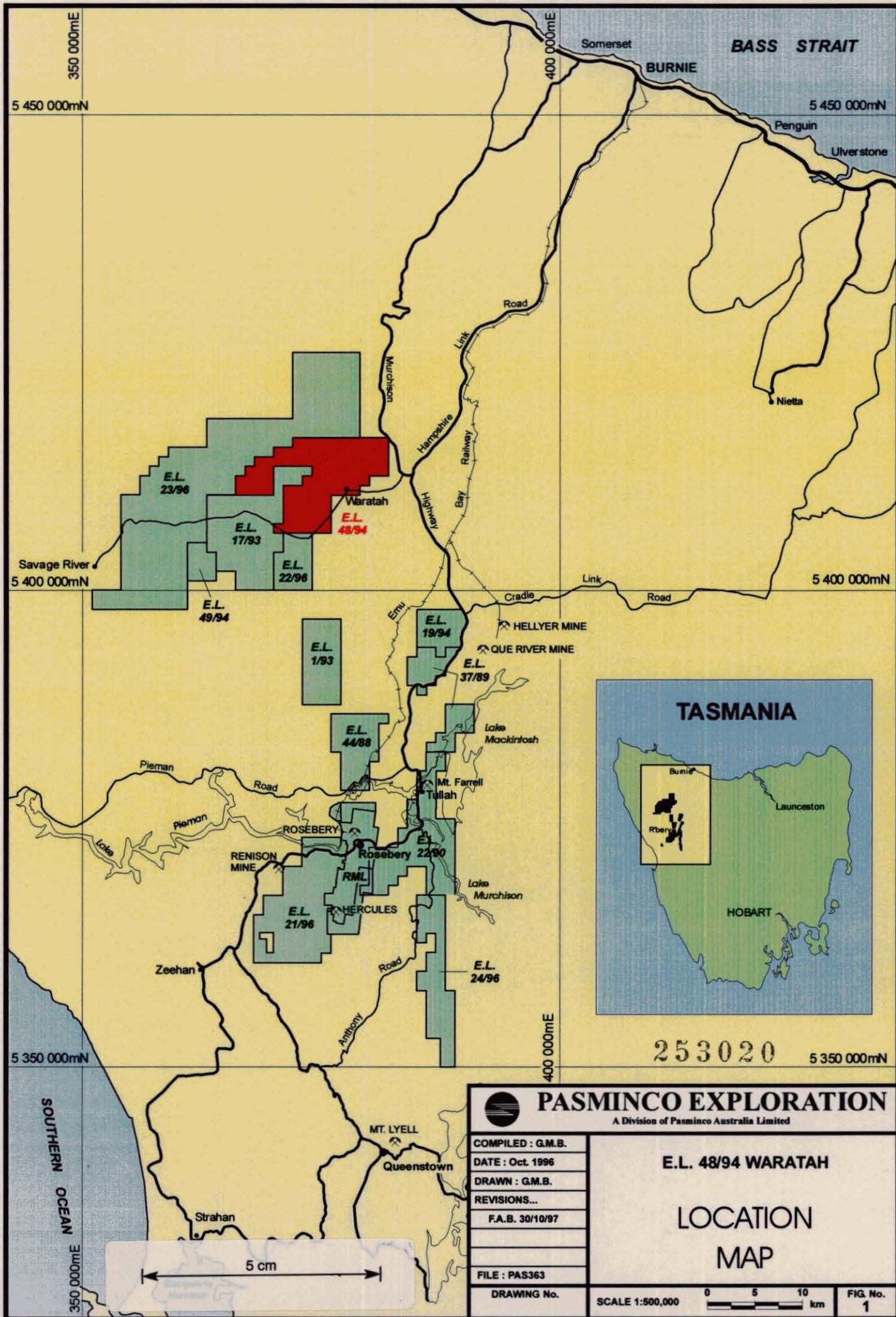
9. **KEYWORDS & LOCALITY**


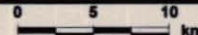
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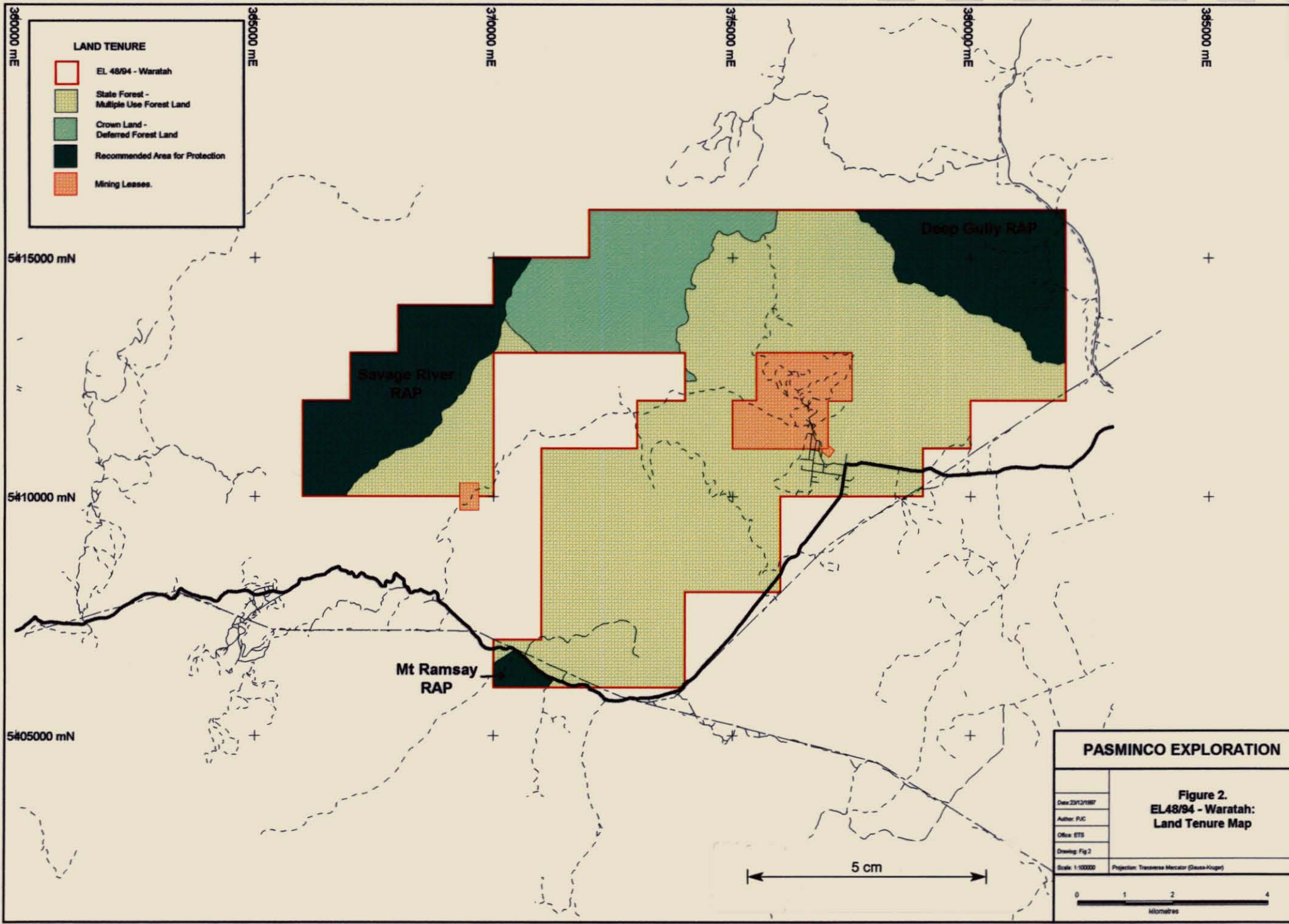
BURNIE SK5503, WARATAH, RUSSELL, DUNDAS

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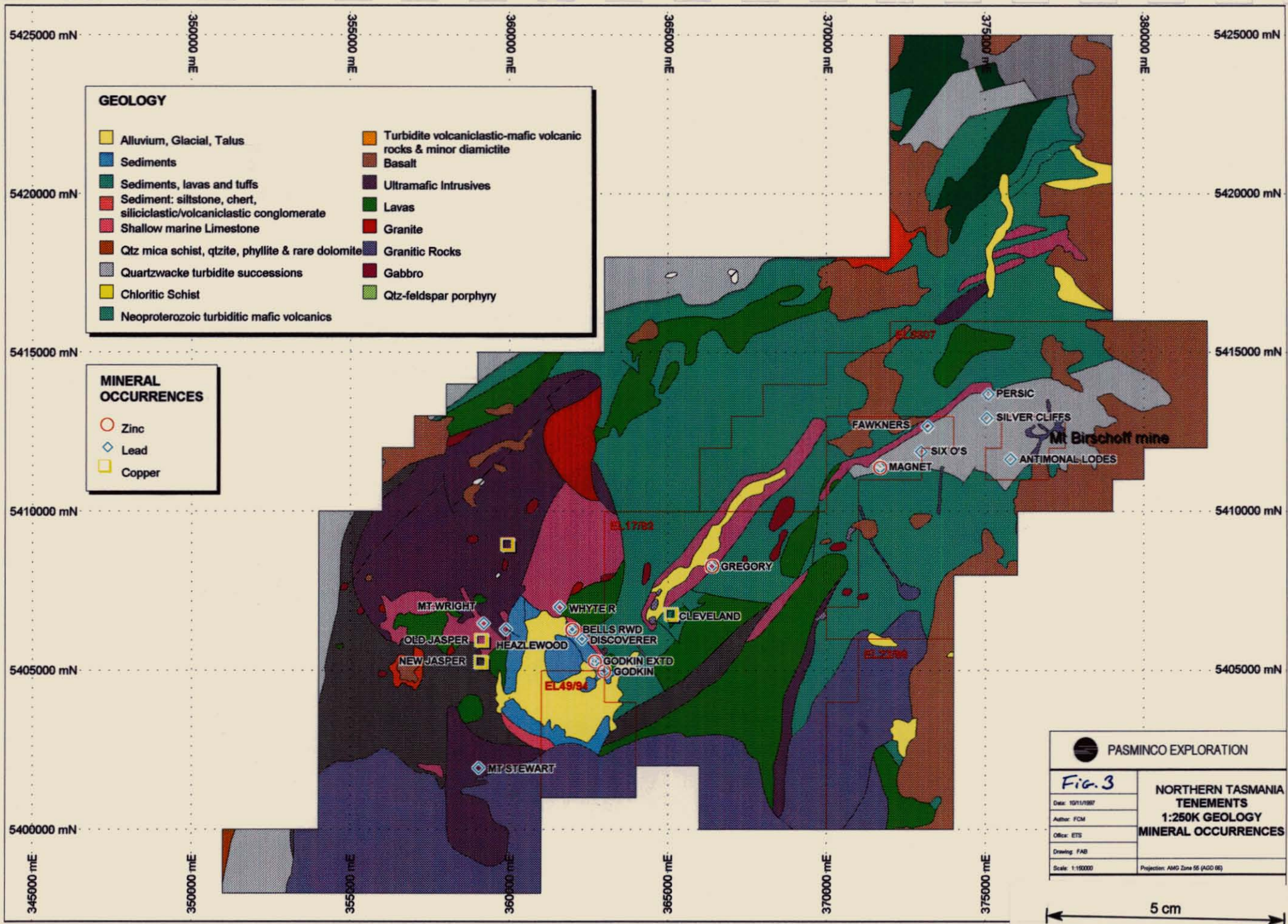
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|  <b>PASMINCO EXPLORATION</b><br><small>A Division of Pasmenco Australia Limited</small> |  |
| COMPILED : G.M.B.<br>DATE : Oct. 1996<br>DRAWN : G.M.B.<br>REVISIONS...<br>F.A.B. 30/10/97   | <b>E.L. 48/94 WARATAH</b><br><br><b>LOCATION<br/>MAP</b>   |
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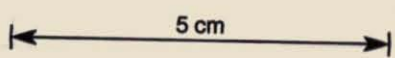
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| <b>PASMINCO EXPLORATION</b>  |  |
| Date: 23/12/1987<br>Author: PJC<br>Office: ETS<br>Drawing: Fig 2<br>Scale: 1:10000<br>Projection: Transverse Mercator (Gauss-Krüger) | <p align="center"><b>Figure 2.</b><br/> <b>EL48/94 - Waratah:</b><br/> <b>Land Tenure Map</b></p> <p align="center">0    1    2    4<br/>         kilometres</p> |

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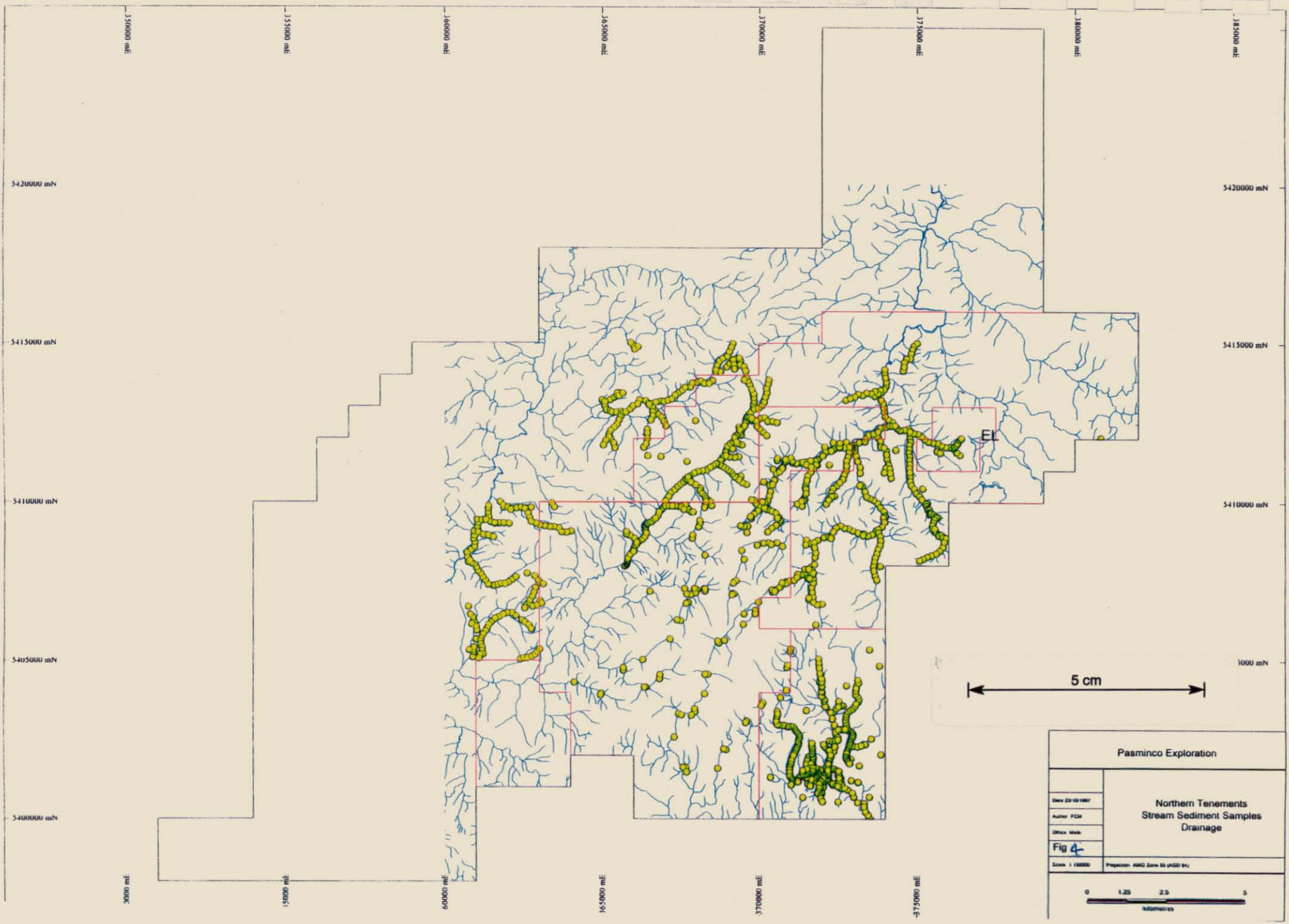
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|                 |   |
|-----------------|---|
|                 |   |
| <b>Fig. 3</b>   |   |
| Date: 10/11/98/ | <b>NORTHERN TASMANIA<br/>TENEMENTS<br/>1:250K GEOLOGY<br/>MINERAL OCCURRENCES</b> |
| Author: FCM     |   |
| Office: ETS     |   |
| Drawing: FAB    |   |
| Scale: 1:150000 | Projection: AMG Zone 55 (AGD 86)  |

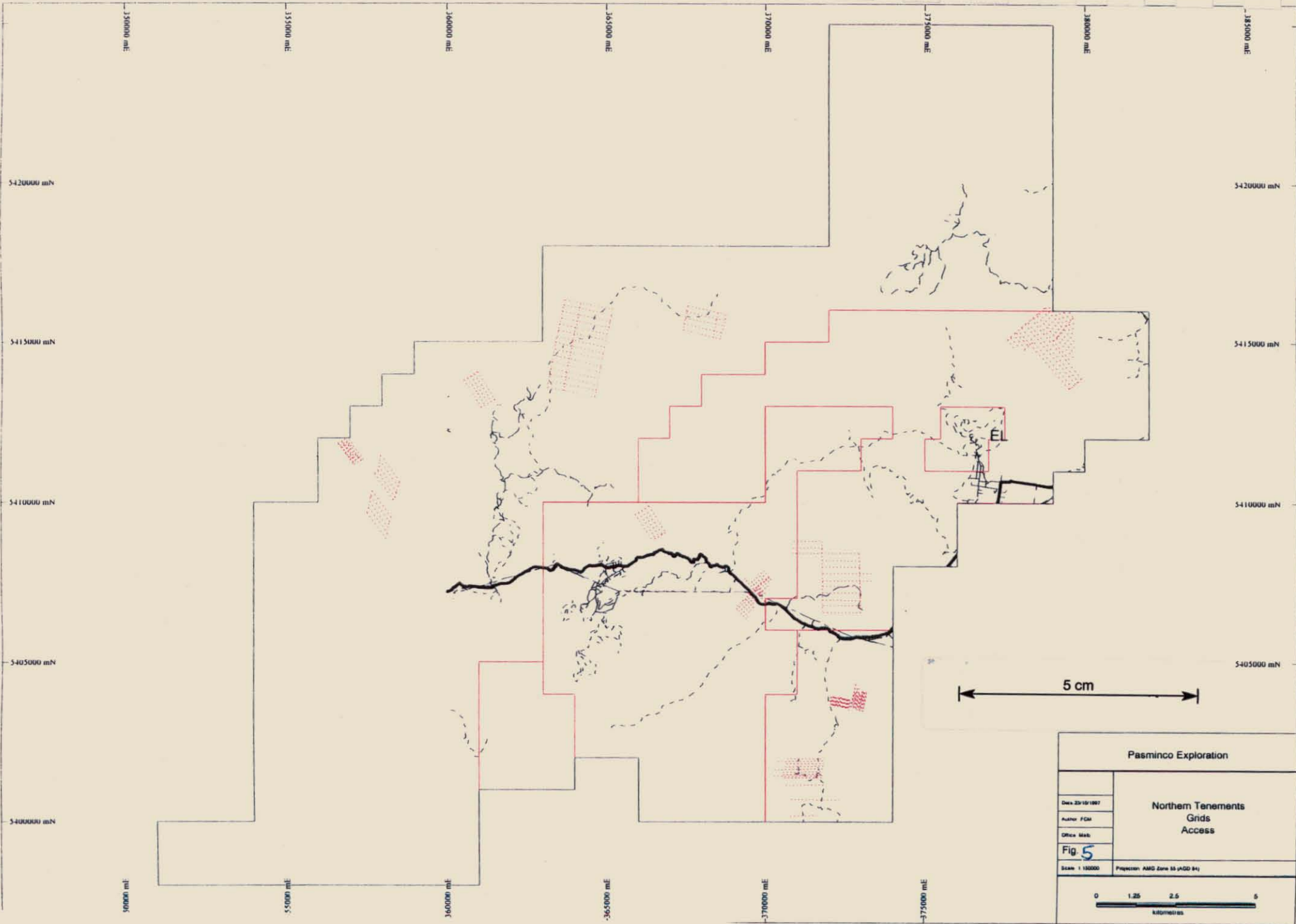


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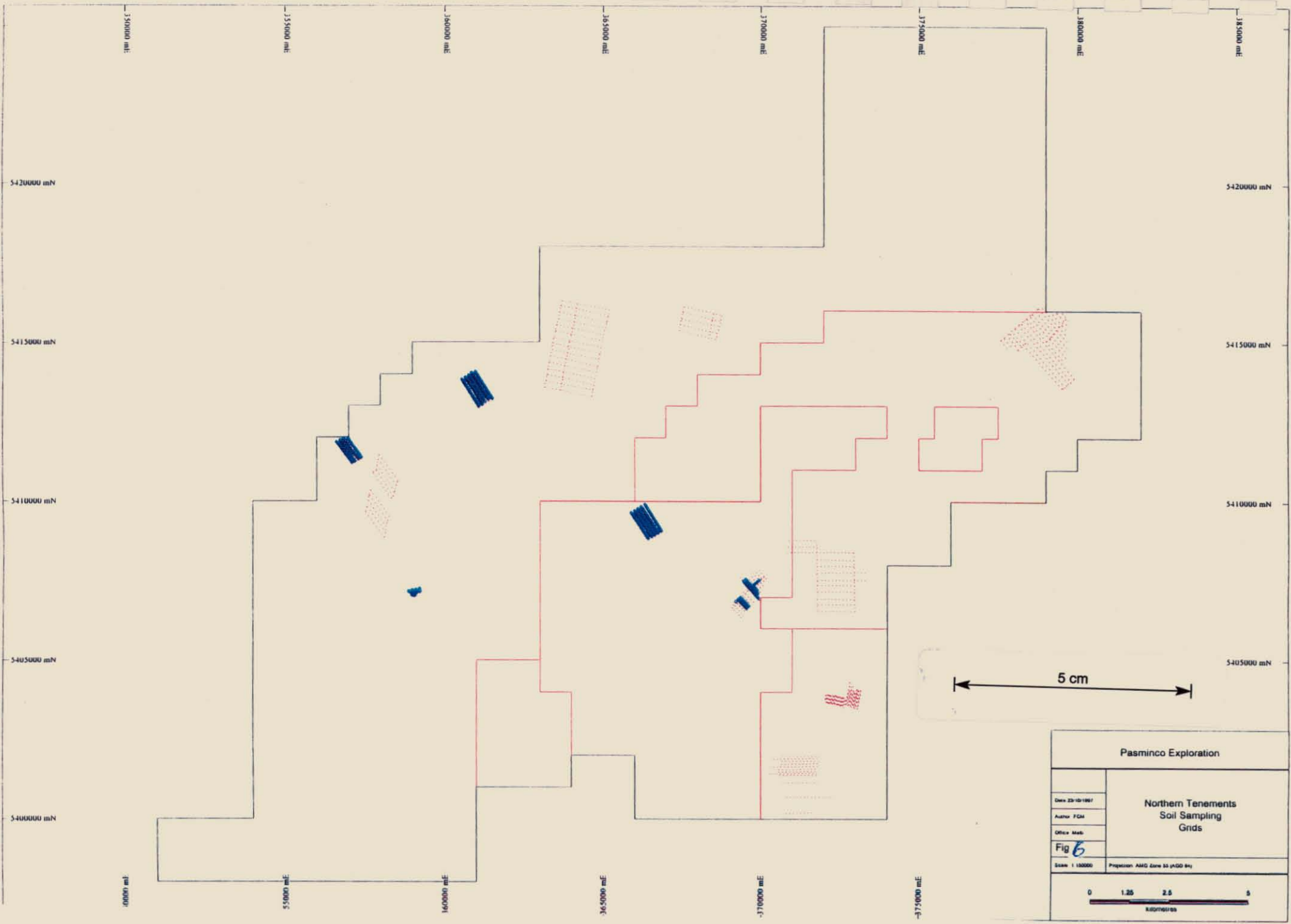
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|---|---|
| Pasminco Exploration  |   |
| <p>Date: 23/10/1987<br/>Author: FGM<br/>Drawn: MAB<br/>Scale: 1:10000</p> | <p><b>Northern Tenements<br/>Stream Sediment Samples<br/>Drainage</b></p> |
| <p>Fig 4</p>  |   |
| <p>Projection: AMG Zone 55 (AGD 84)</p>                                   |   |
| <p>0 1.25 2.5 5<br/>Metres</p>  |   |

253024



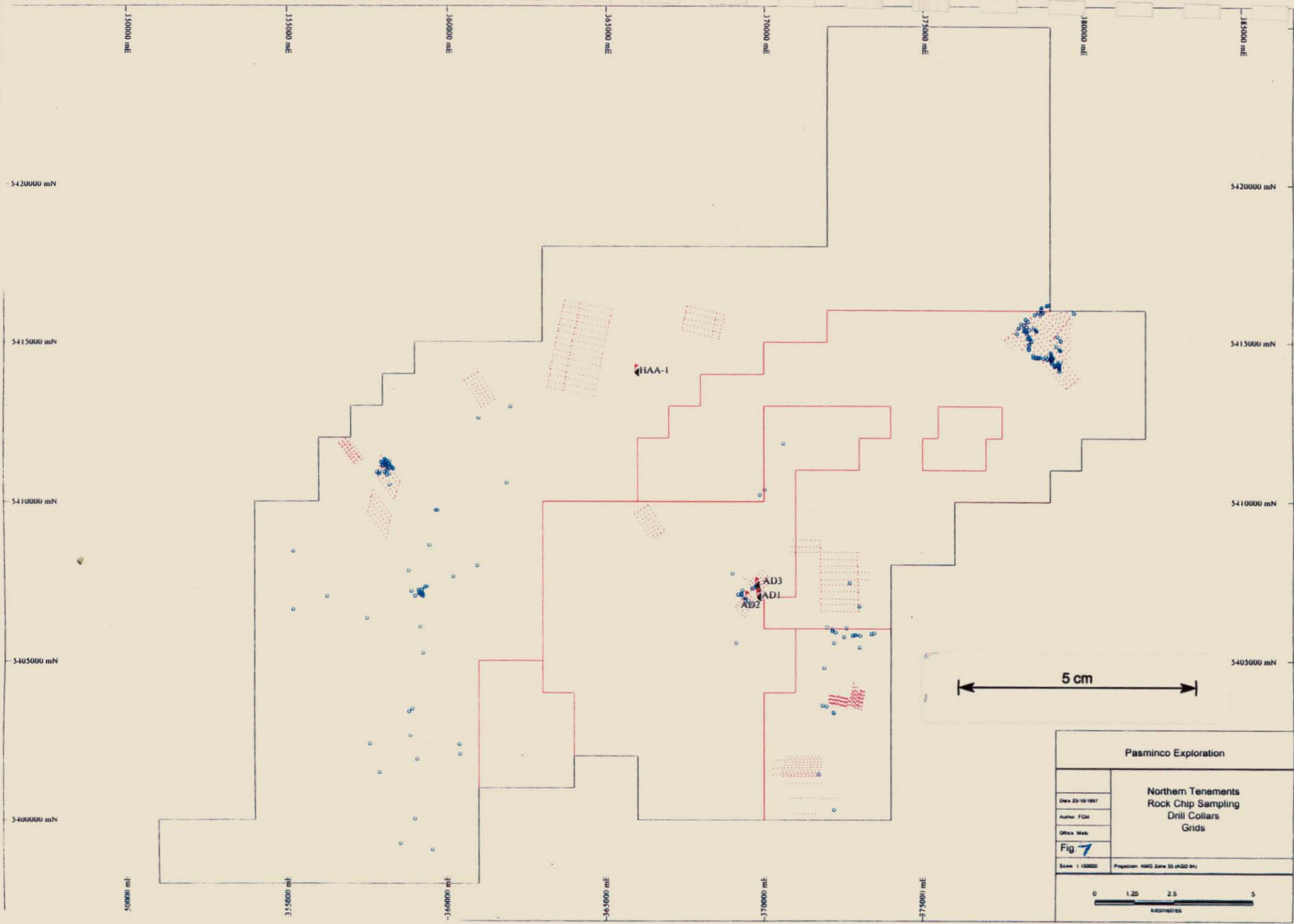
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| Pasmenco Exploration   |                                       |
| Date: 23/10/1997       | Northern Tenements<br>Grids<br>Access |
| Author: FCM            |                                       |
| Office: Mex            |                                       |
| Scale: 1:100000        | Projection: AMG Zone 55 (AGD 84)      |
| 0 1.25 2.5 5<br>Metres |                                       |

253025



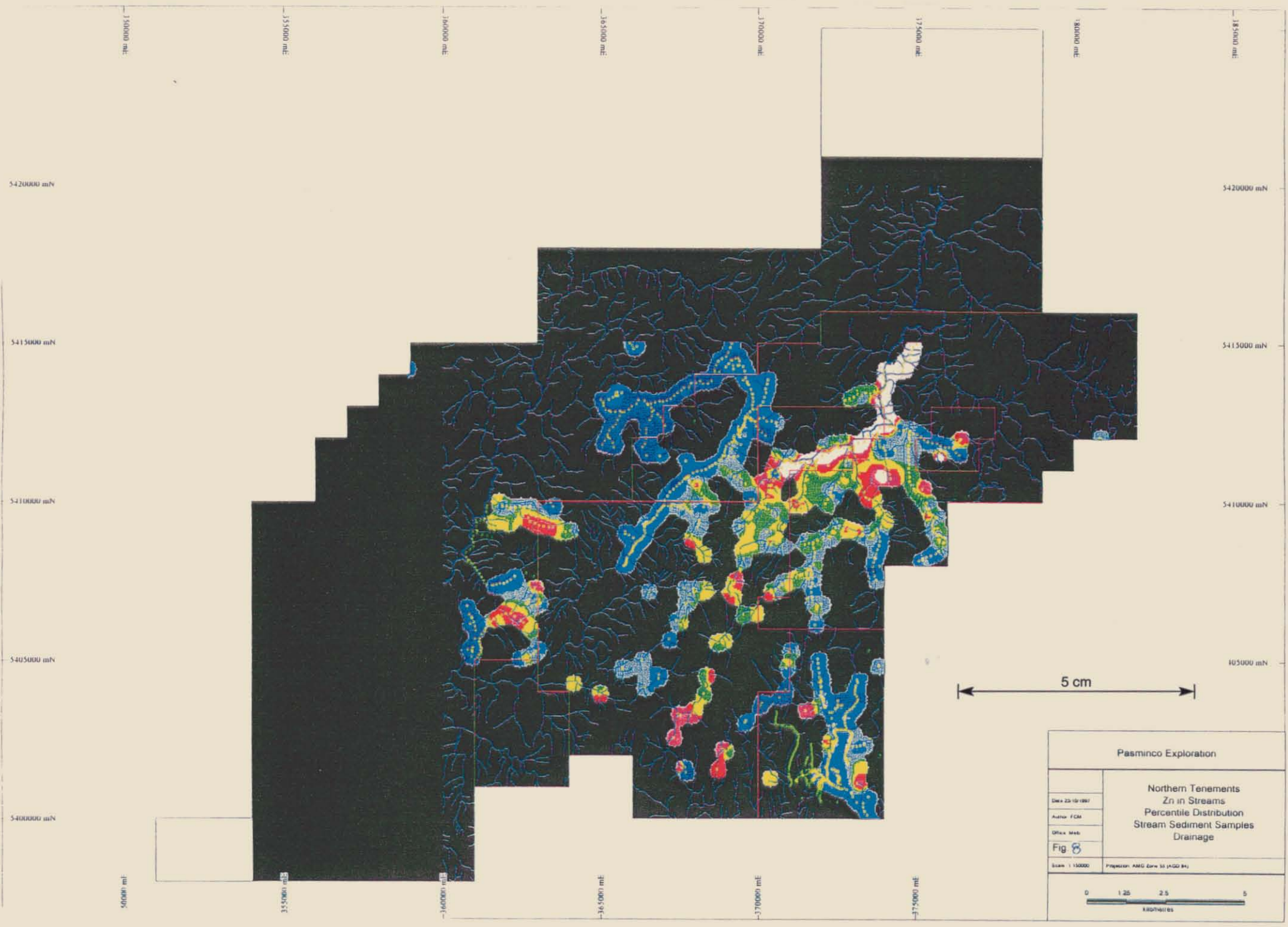
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| Pasminco Exploration   |  |
| Date: 23/10/1987       | Northern Tenements<br>Soil Sampling<br>Grids |
| Author: FGM            |  |
| Office: Perth          |  |
| Fig: 6                 |  |
| Scale: 1:10000         | Projection: AMG Zone 50 (MGS 84)             |
| 0 1.25 2.5 5<br>Metres |  |

253026

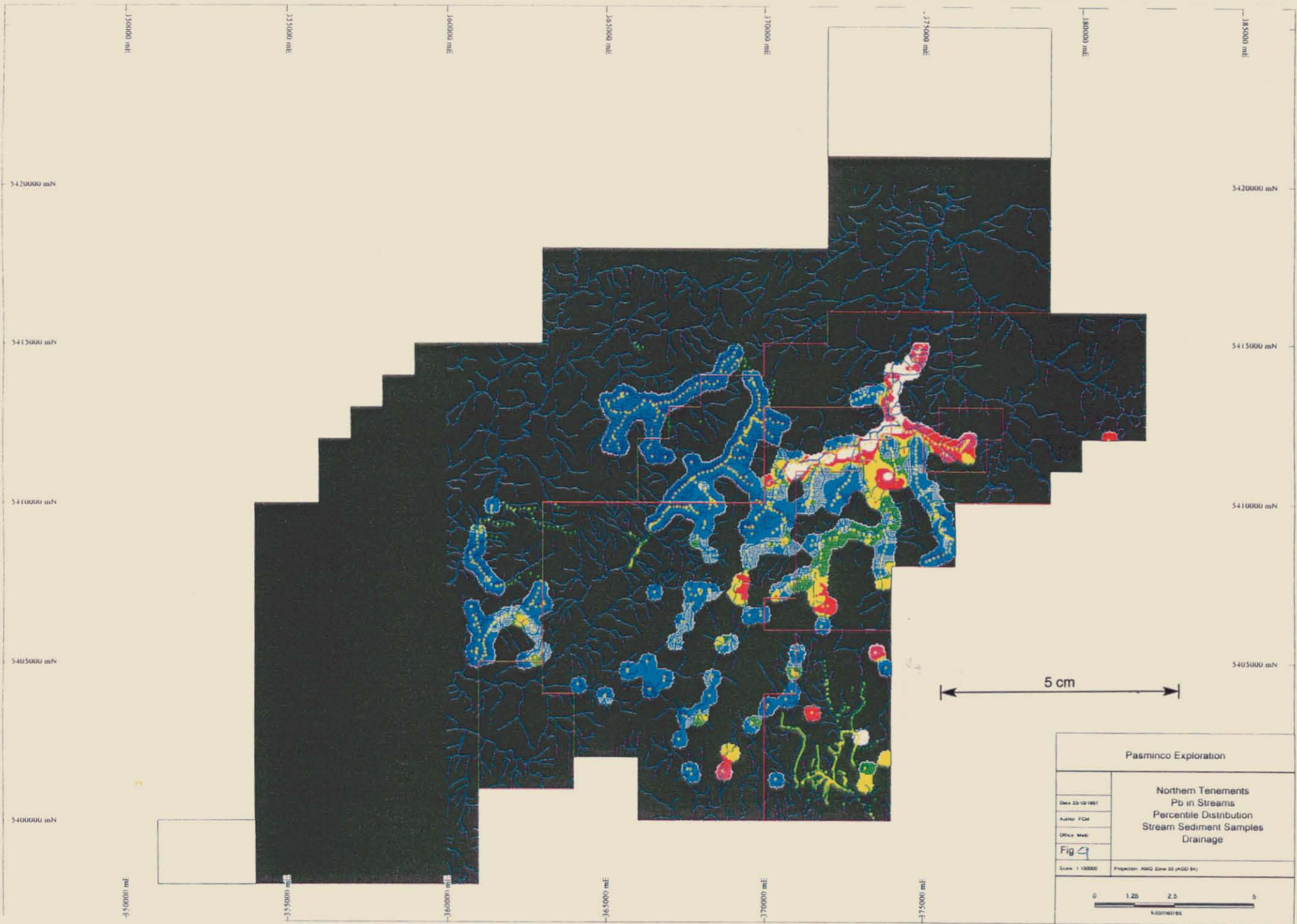


|  |                                 |
|--|---------------------------------|
| Pasmenco Exploration   |                                 |
| Northern Tenements<br>Rock Chip Sampling<br>Drill Collars<br>Grids |                                 |
| Drawn 23/10/1997   |                                 |
| Author FGM   |                                 |
| Office Map   |                                 |
| Fig 7  |                                 |
| Scale 1:150000   | Projection AMG Zone 55 (AGD 84) |
| 0 1.25 2.5 5<br>kilometres   |                                 |

253027

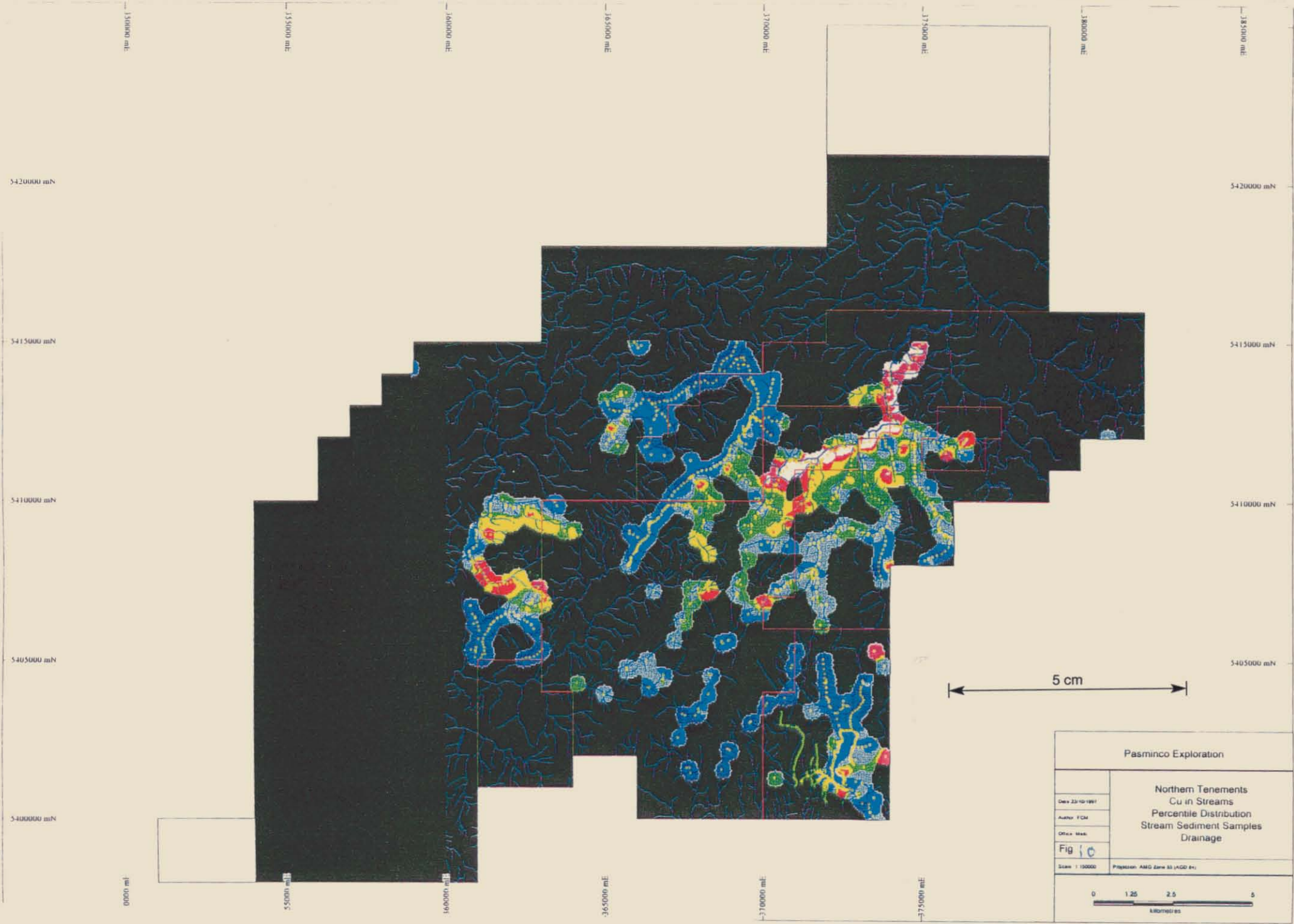


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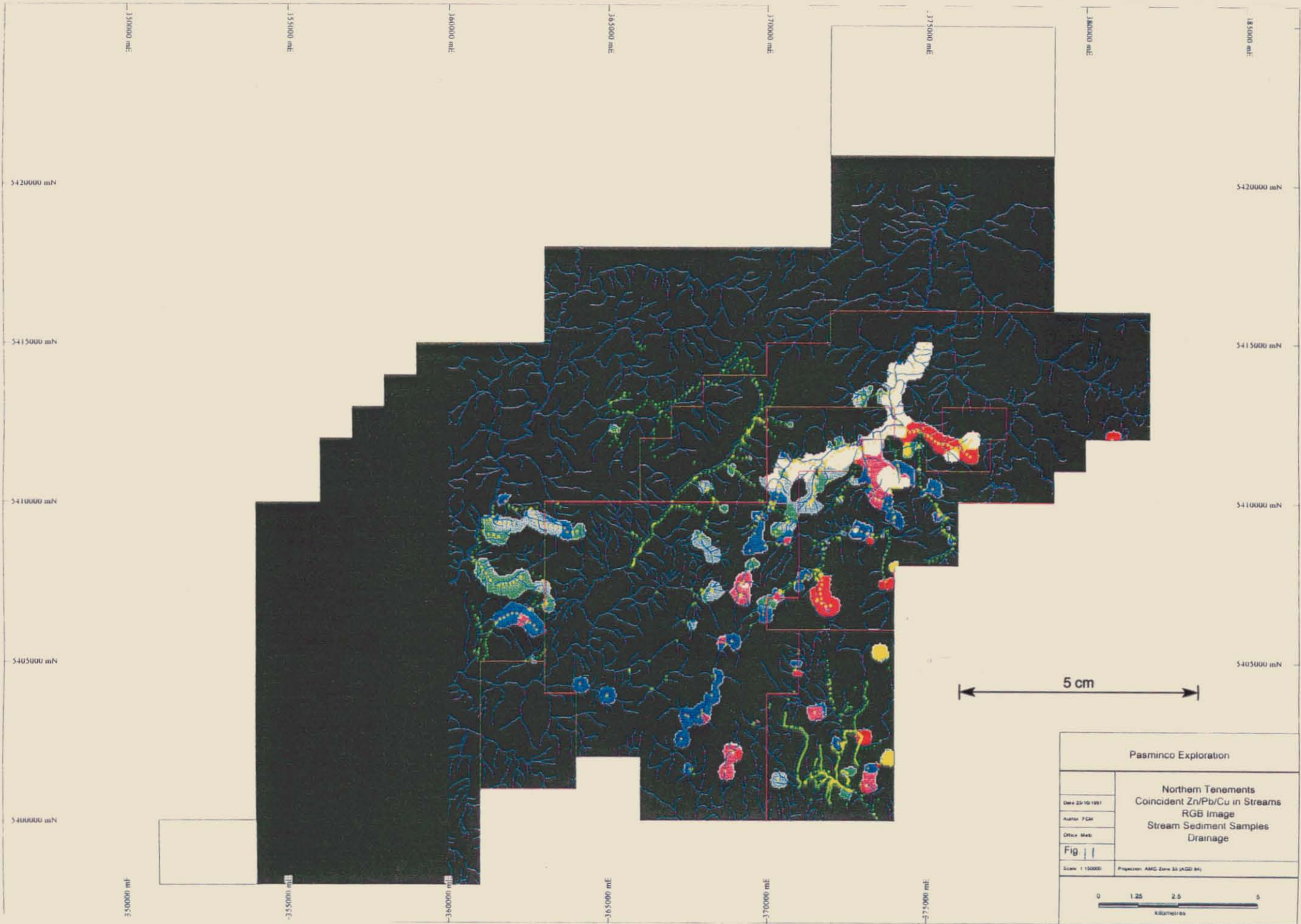


|   |       |
|---|-------|
| Pasmenco Exploration  |       |
| Northern Tenements<br>Pb in Streams<br>Percentile Distribution<br>Stream Sediment Samples<br>Drainage |       |
| Date: 23-10-1991  | Fig 4 |
| Author: FCM   |       |
| Office: Mab   |       |
| Scale: 1:10000  |       |
| Projection: AMG Zone 50 (AGD 84)  |       |
| 0 1.25 2.5 5<br>KILOMETRES  |       |

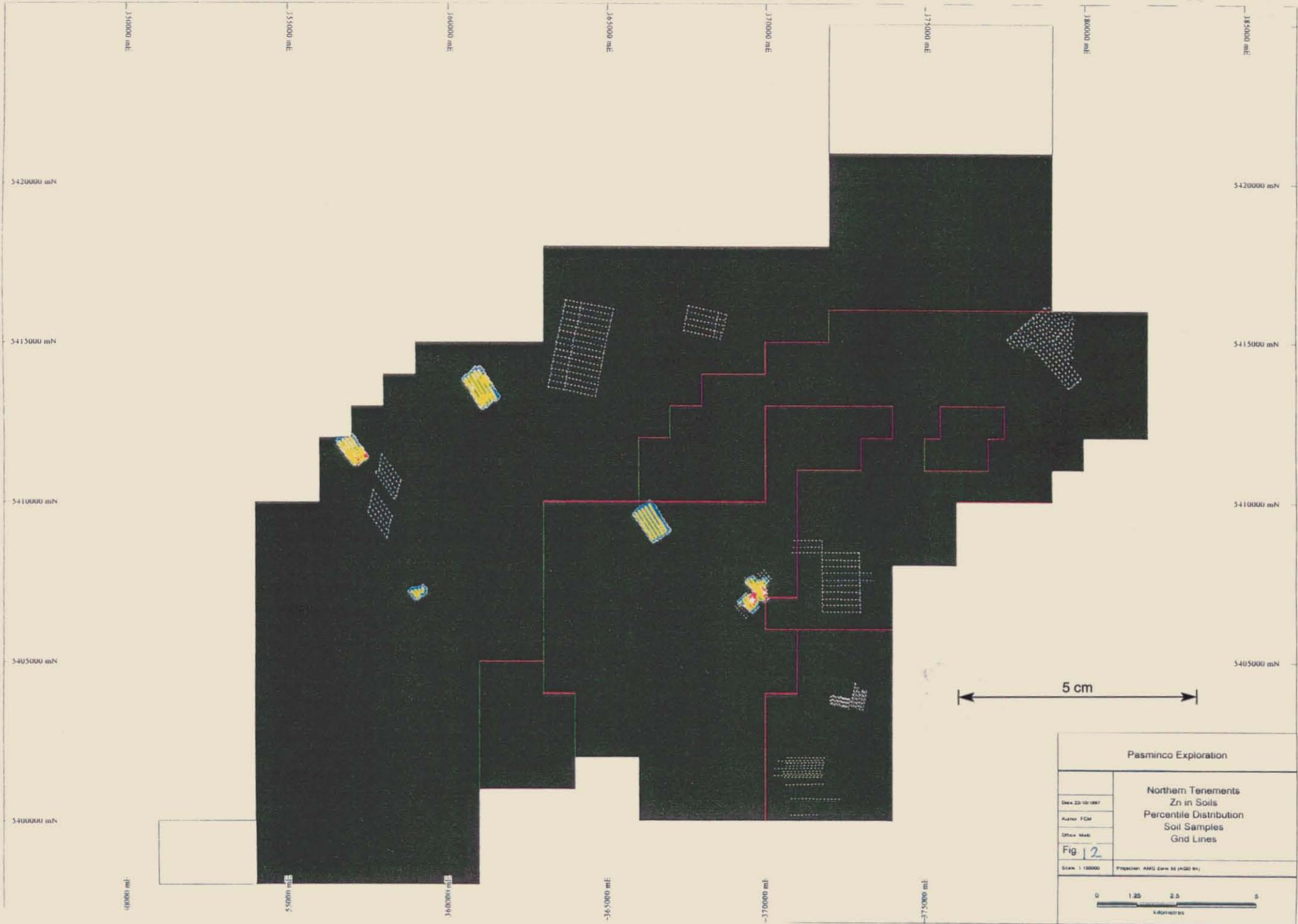
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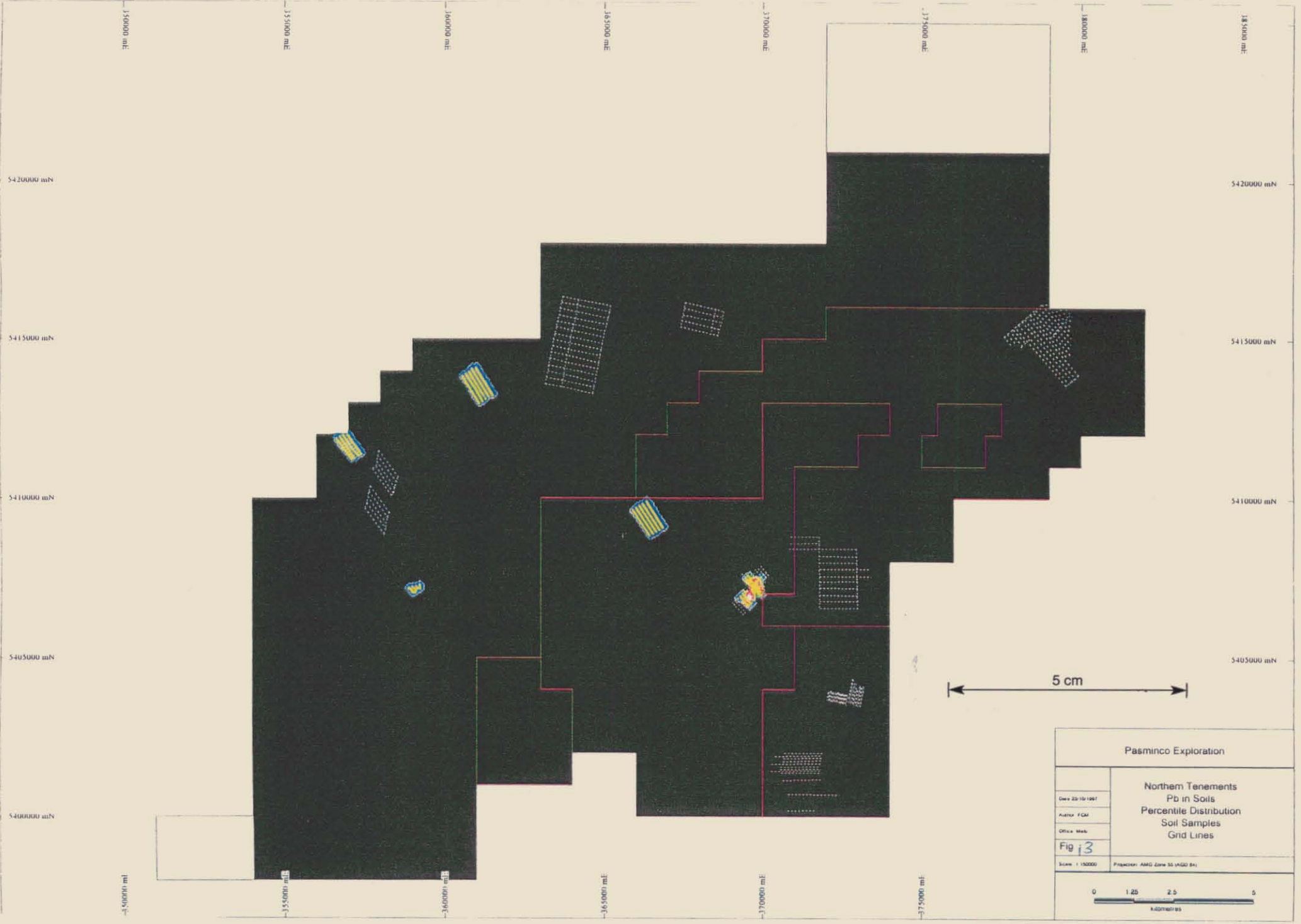
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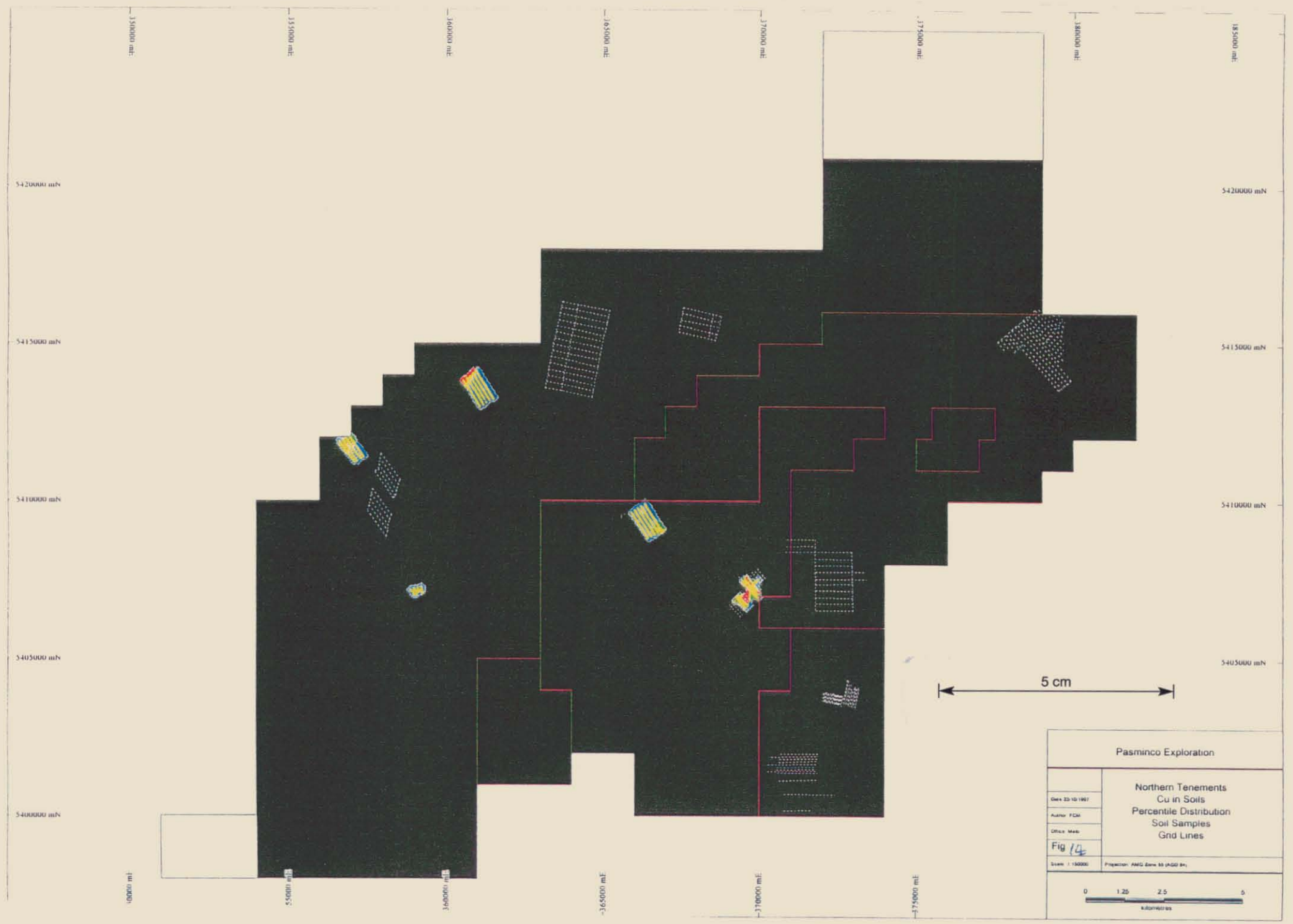
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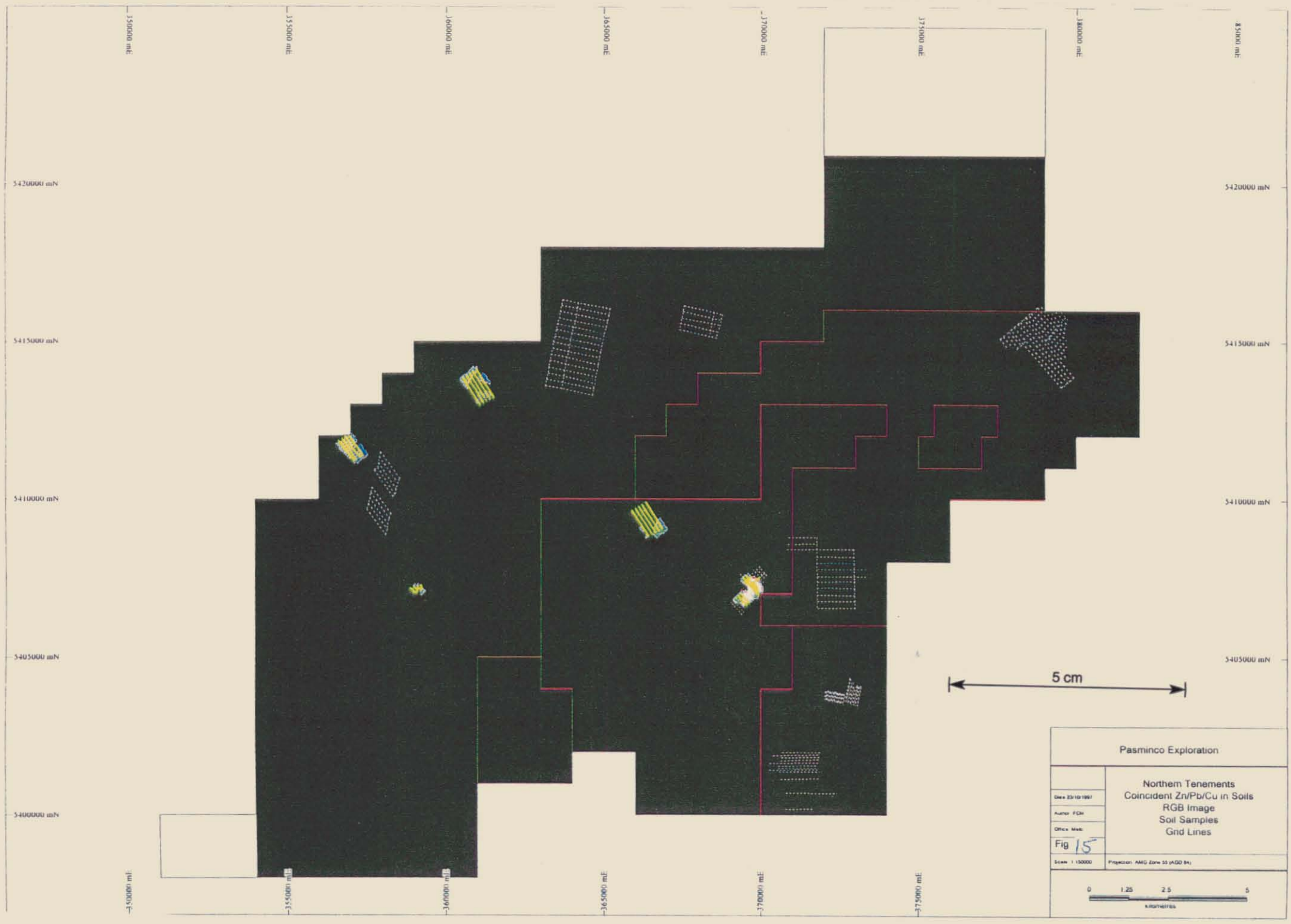
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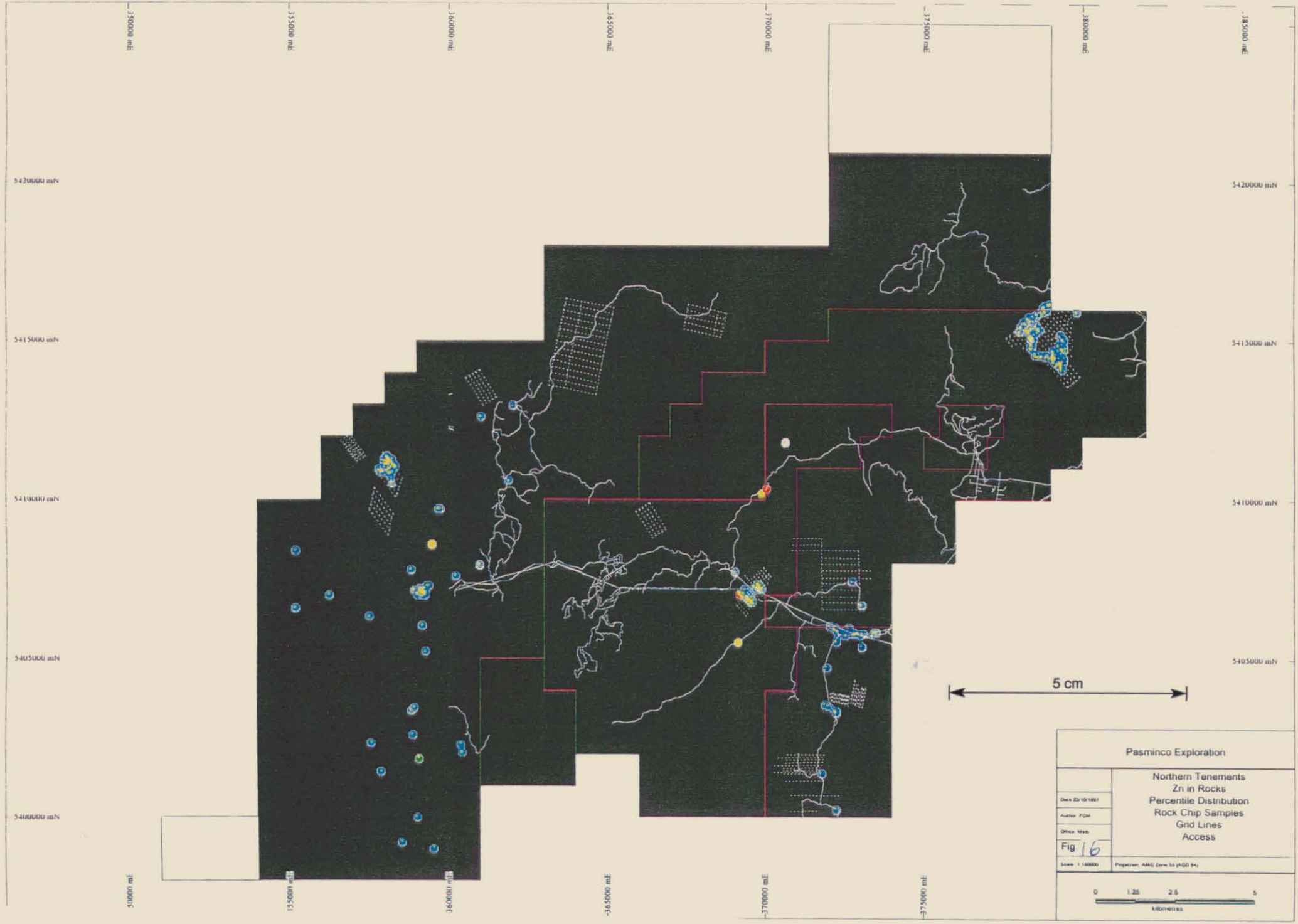
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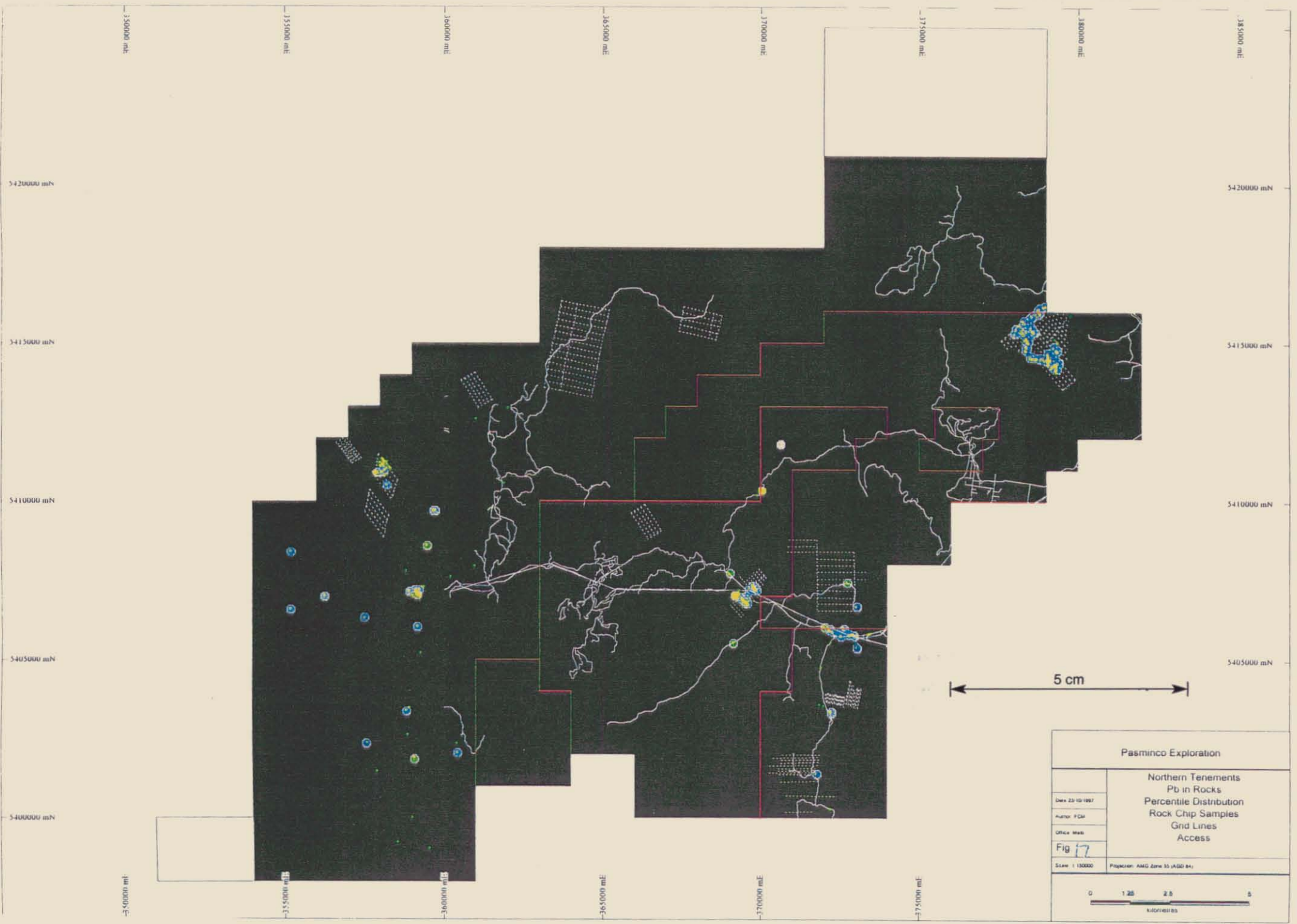
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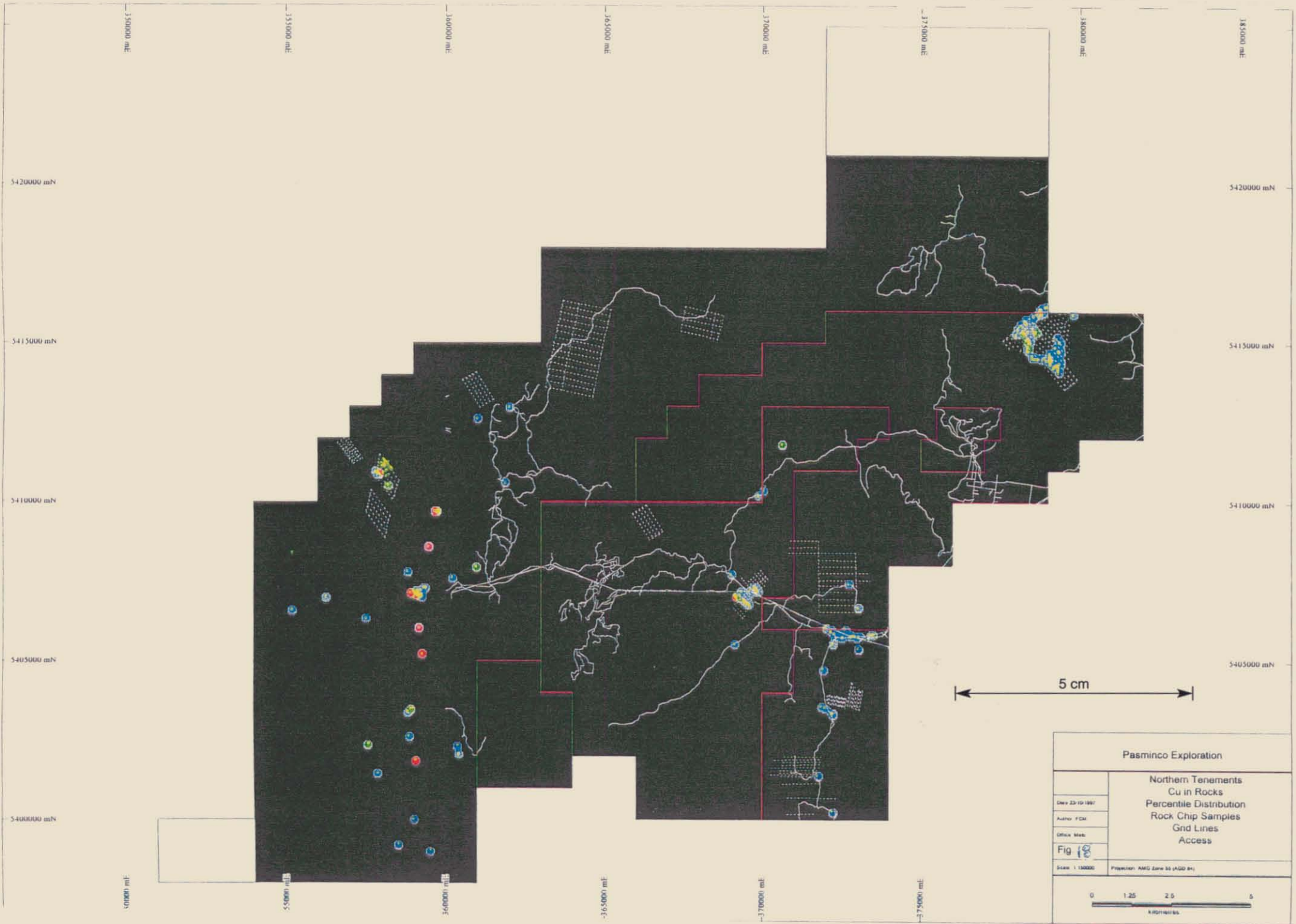
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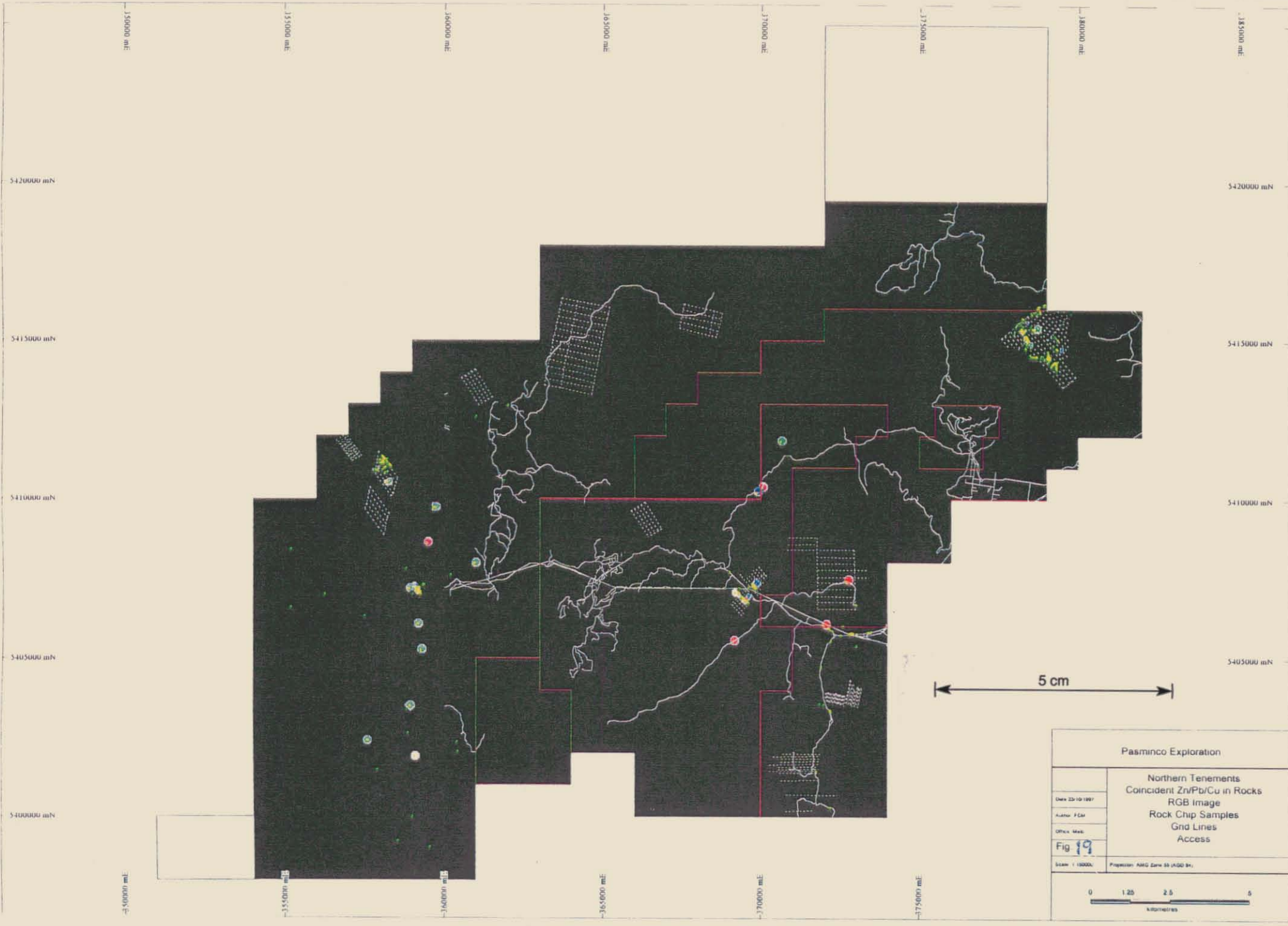
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253038



253039

