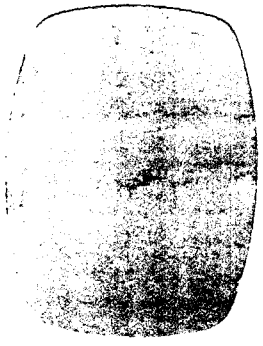
Final Report on AP1301 Arnhem Land.

March 1969.



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FINAL REPORT ON

A.P. 1301, ARNHEM LAND,

NORTHERN TERRITORY, AUSTRALIA

March 1969

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Pty. Limited
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I N D E X

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A INTRODUCTION

1. Surveys

A.P. 1301 in the eastern part of Arnhem Land is covered by nine air photo mosaics as shown on the Arnhem Land Reference Map (I). The drainage basins of this area were stream sampled in 1967. Results are presented on air mosaic overlays (Mosaic No. 1,2,3,4,9,14,19,22).

Several medium to strong stream sediment anomalies on Mosaic 9 (further called "Tungi Area") were followed up by soil sampling, geophysical, and geological surveys in 1967. The western part of Mosaic No. 19 was covered by a combined magnetic electromagnetic and radiometric airborne survey (Adastra Hunting Geophysics Pty. Ltd., 1966). A magnetic survey only was flown over part of Mosaic No. 9.

2. Access

In July 1967 Western Nuclear graded a track to connect the Tungi Area with Bulman - Mainoru. It continues to a bore in a northeastern direction (see HG1). In 1968 there was a fair amount of traffic on this track, and it should be still recognizable and usable during the dry season. Travelling time from Mainoru to Tungi is 11 hours or more.

B STREAM SEDIMENT SAMPLING 1967

1. Procedure

Helicopter-supported ground crews collected samples of active sediment each quarter mile and from each tributory over one mile long. Samples were seived to minus 80 mesh.

The samples were analyzed in Western Nuclear's Laboratory for Cn, Pb, Zn, Ag and in most cases also for Co and Ni. The values for Ag, Co and Ni are smaller than 0.5, 10 and 10 p.p.m. respectively and haye not been plotted.

2. Results

Photo mosaics numbers 1,2,3,19 and 22 cover alluvial flats, swamp areas and are poorly suited to stream sampling. Stream sediments frequently comprise only coarse sand with a high percentage of humic material. The values are low and probably inconclusive.

Mosaics No. 4,9 and 14 cover well developed drainage systems and are well suited to stream sampling. Medium to strong stream anomalies of zinc, lead and copper bound to Archean igneous and metamorphic rocks are found only in the area covered by Mosaic 9.

In Mosaics No. 4 and 14 the geology is similar to Mosaic No. 9. The values are lower here, possibly because the outcrop of the Archean is poorer.

C FOLLOW-UP WORK IN TUNGI AREA

The stream anomalies have been followed up by a short soil sampling programme together with some geophysical work. The soil sample grid lines are shown on map 2.

1. Block S

In the northeastern part of Block S a Pb-Zn soil anomaly accompanied by higher Cu values found. There are hardly any outcrops in the anomalous area reported except a graphitic meta-sandstone.

3.4 line-miles of SP survey delineated a very weak anomaly at

	(relative drop in mV)
Line 32N/39E	22
Line 36N/39E	8
Line 40N/40E	19

5.5 line-miles of magnetometer survey failed to locate any anomalous values.

2. Block S2

Higher Zn values, sometimes accompanied by slightly higher Pb and Cu seem to coincide either with swamp areas or outcrops of granite and gneiss.

3. Block NT

In the centre part of Block NT is a zone of slightly higher Cu, Zn and Pb extending in a northerly direction. It is probably due to variations of the initial content in different strata. Magnetometer readings are very irregular, SP shows a small low at 20S/40W.

4. Block V

The soil anomaly located in Block S seems to continue into the southwestern part of Block V but is weakening.

5. Block U and T

Cu anomalies in Flemming Creek(Fig. 2) and Upper Morley Creek are probably due to enrichment in swamp areas. The values could not be repeated by soil sampling.

6. Copper Creek (Fig. 2)

A definite, although weak, Cu anomaly shows up in the upper part of Copper Creek. Outcropping in this area are yellowish-white sandstones, which are rather clean, but they could possibly carry very small amounts of copper as heavy minerals.

7. Fagan Creek (Fig. 2)

(a) Outcrop in Morley Creek shows a 3 inch thick vein of malachite, chalcopyrite and pyrite with quartz in the Fagan Volcanics. Immediately west and northwest of the showing the purplish-red-brown porphyries are cut by a swarm of inch-thick quartz veins (170° strike), which are often offset along dipping at 80° fractures.

A small soil sampling and geophysical grid was laid out but no further mineralization or encouraging results were noted.

(b) Fagan Creek Pb-Zn anomaly.
Two tributaries of the lower Fagan Creek have anomalous Pb-Zn values (3 to 5 times background).

On the upper end of both tributaries are outcrops of purple micaceous ashstones and red-brown volcanics, in parts containing quartz veins similar to those at the Morley Creek showing.

The source of the anomalous Pb-Zn values has not yet been found.

8. Gold at Tungi

About ½ mile east of Tungi Camp (Fig. 2) is a hill of mica schists, gneisses and basic igneous rocks with large oval shaped feldspars. Around the base of this hill are numerous shallow pits. A soil sample from the bottom of one pit was panned and yielded a few flakes of gold. Several quartz veins and outcrops of granite, schist and gneiss from Archean areas were sampled and panned but failed to produce any heavy minerals except magnetite.

D AIRBORNE SURVEYS

1. Mosaic No. 9 (Fig. 2)

Five NW-SE lines have been flown for magnetic survey.

The enclosed map shows NE-SW striking structures, the most prominent high probably indicating the fault contact between basement (Mirrarrmina complex) and Ritarango Beds.

2. Mosaic No. 19 (Fig. 5) Not applicable to present area.

Fig. 5 is the interpretation of combined magnetic, electromagnetic and radiometric survey.

Adastra Report (Figure 5)

(a) EM- Magnetic survey.

"There are several broad and well-defined conductors which strike approximately E/W in this area. The continuity and strength of these anomalies is probably emphasised at the E/W strike which will give the best E.M. response from concordant conductors.

There are four more conductive groups, D33-36. D33 corresponds fairly closely to the Zamia Creek siltstone, and D34 to the Conway Formation. Both of these rock groups contain dolomitic siltstones. D35 follows the base of the Bath Range Formation. D36 is probably due to an older horizon, but as there are no outcrops in this area we cannot say which one it is.

Conductor D36 is displaced by a continuation of the Zamia Fault F35 and a further three miles east it is cut by what seems to be an extension of the Mount Fleming Fault F36.

What actual materials within the rocks are responsible for the anomalies we do not at present know. They could be carbonaceous shales, or shales which contain some pyrites or even porous sandstones. The conductors are broad and have a moderately low resistivity.

The first study of the anomalies should be carried out where access is easy; the aim should be to find what type of rock is responsible for the anomalies. Resistivity measurements or E.M. measurements should identify the conductor. Geochemical sampling may indicate if the conductors are associated with mineralisation.

East Boundary River System. A large number of small anomalies are found in this area. At present we do not know whether they are due to the overburden which is abundant in this area or to the underlying rocks, which include the Vaughton Siltstones. Until some geological guidance is provided in this area it is difficult to make a selection among the small anomalies.

The boundaries are the Mount Fleming Fault, F36, to the west, and the outcrop of the Bath Range Formation to the south, D37. The outcrop of the Yarrawirrie Formation along a watershed, D38, is the one nonconductive part of the area.

Bath Range Formation. The outcrops of soil or sands which cover the Bath Range Formation are almost all nonconductive, so that the slightly conductive areas stand out clearly. Most of these conductors, which are broad and poor ones, occur in the southeast corner of the survey area. They strike W.N.W. and are parallel to a fault. Anomaly C20 lies on a continuation of this fault. It is possible that these anomalies mark old river channels. If so, they are of no interest in prospecting. Anomalies like C22 are found over outwash material derived from the outcrops of the Bath Range Formation."

(b) Radiometric Survey

"To the south of the boundary R23 the level of radioactivity is higher than elsewhere. The boundary does not have a clear cut correlation with the geology.

R24 is a small group of anomalies of 1½ times background. It occurs over residual soil and is coincident with a NW zone of electromagnetic anomalies. There is little of note in the radioactivity elsewhere."

3. Radiometric Survey by Western Nuclear

Having used airborne scintillometers in a Piper Cub and partly in helicopters Western Nuclear undertook a radiometric reconnaissance survey on their own.

At 13° 05' S, 135° 30' E, a weak anomaly of 3 times background was discovered over Fagan Volcanics and shales. Not all of the radioactive anomalies along fault F35 in the NW corner of mosaic 19 (Fig. 5) could be located. Some measured twice background on the ground on soil flats.

E WORK STATISTICS

Adastra Airborne Geophysics (Line miles)		1,220
Airborne Radiometric Survey (flight hours)		12
Ground Geophysics (line miles)		
	Magnetometer	5.5
	Self Potential	3.4
Geochemical samples		
	Stream sampling	2,709
	Soil sampling	2,216
Road building (miles)		15
Man-months		22

F SUMMARY

Exploration activities in A.P. 1301 from 1965-1968 include airborne EM - MAGNETIC - RADIOMETRIC surveys, geochemical stream sediment sampling, soil sampling and brief geophysical and geological ground work.

Weak to medium geochemical Cn - Pb - Zn stream sediment anomalies have been found associated with the Proterozoic Mirrarrmina Complex, the Fagan Volcanics and the Mattamurta Sandstone. Some have been followed up by soil sampling.

The most interesting anomalies found are the Fagan Creek Pb-Zn anomaly, the Morley Creek Copper showing, the soil anomaly in Block S and possibly the weak Cn - anomaly in the upper "Copper" Creek. None of these geochemical anomalies is supported by obvious geological or geophysical reasons to be very promising. However, access and remoteness did not allow sufficient geological surveys. The variety of rocks in the Mirarrmina Complex is an interesting aspect along with the geochemical anomalies.

PWH/dmn

CR 69 / 76. BLUE MUD BAY / ARNHEM BAY.

GEOLOGICAL EXPLORATION

1 Western Neclear (Australia) Ptyltd.

2. CR69/76 , A.P. 1301 , 1969

3.

4. Locality map missing → is eastern Ar. Land & covered by 9 photo mocics. → ≈ 90 miles NE of Bulman (Western Edge of Mitchell Ranges. → Fagan Creek & Merely creek

↳ This is not Fagan creek on BMR map.

5 1":1000'

6 2

7 v. little map gives Brief geo map of 1 photo but no locality diagram so useless

DRILLING .

NONE

GEOCHEM .

1 "
2 AS ABOVE
3 "
4 "
5 STONE STREAM SEDIMENT .
SOIL
6
7 2 709 stream samples
2216 soil samples.

8. Cu Pb Zn Ag ± Co, ± Ni

9. 2 present 2 missing

10. Weak to medium Cu- Pb- Zn stream sediment anomalies associated with Mirrarrmina Complex, Fagan Volc and The Mattamurta SS.
FOUND GOLD ½ mile east of Tunji Camp.

GEOPHYSICS.

1-4 AS ABOVE.

5 A & S.

6. EM - Magnetic survey
Raidiometric

7.

8. 5 NW-SE lines for mag. survey.
line miles 1,220.

Magnetometer 5.5 miles
Self Potential 3.4 miles

- ~~Two~~

10. 2, 2 missing.

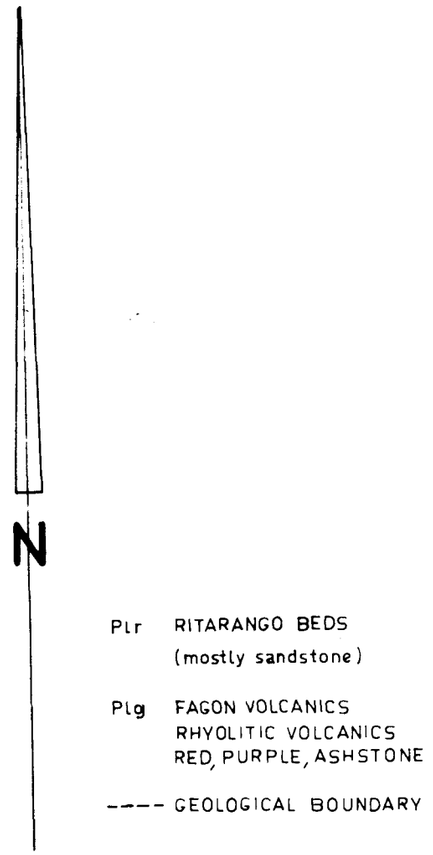
11. weak anomaly (Radio) over Fagan Volcs (3x)

- Possibly EM-Mag.
- 4 good conductors 1) corresponds to Zamia Creek siltstones
2) Conway Fm
3) Base of Bath Range Fm } → Possible carbonaceous shales pyritic paras ss are poss. responsible but don't know
4) One with no outcrop.

NOTE: THIS FAGAN CREEK IS DIFFERENT FROM THE FAGON CREEK ON THE B.M.R MAP (SEE TUNGI AREA MAP)

RESULTS OF WORK DONE DURING JULY 1968, TO FOLLOW UP THE MORLEY CREEK COPPER MINE SHOWING. WHICH WAS FOUND DURING STREAM SAMPLING SURVEY 1967.

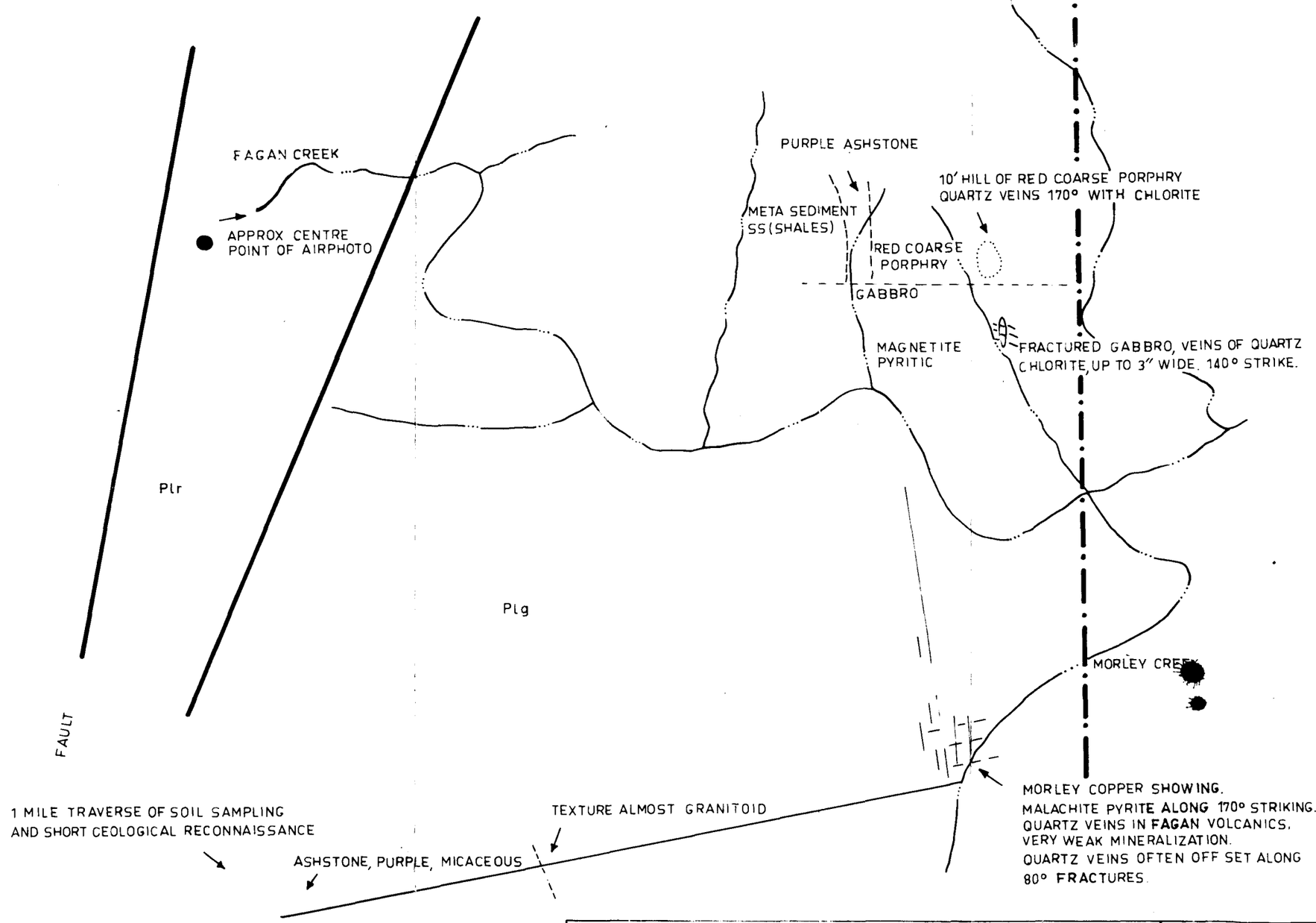
LOCATION: APPROX 90 AIR MILES NE OF BULMAN (WESTERN EDGE OF MITCHELL RANGES).



Plr RITARANGO BEDS
(mostly sandstone)

Plg FAGON VOLCANICS
RHYOLITIC VOLCANICS
RED, PURPLE, ASHSTONE

---- GEOLOGICAL BOUNDARY



CR 69/76.

FAGAN CREEK GEOLOGY					
SCALE	GEOLOGIST	DRAWN BY	SEE ALSO	DATE	L · 18
1000' : 1"	P · HAUSTEIN	L · M · LEWIS		1 · 4 · 1969	

WESTERN NUCLEAR (AUSTRALIA) PTY LIMITED

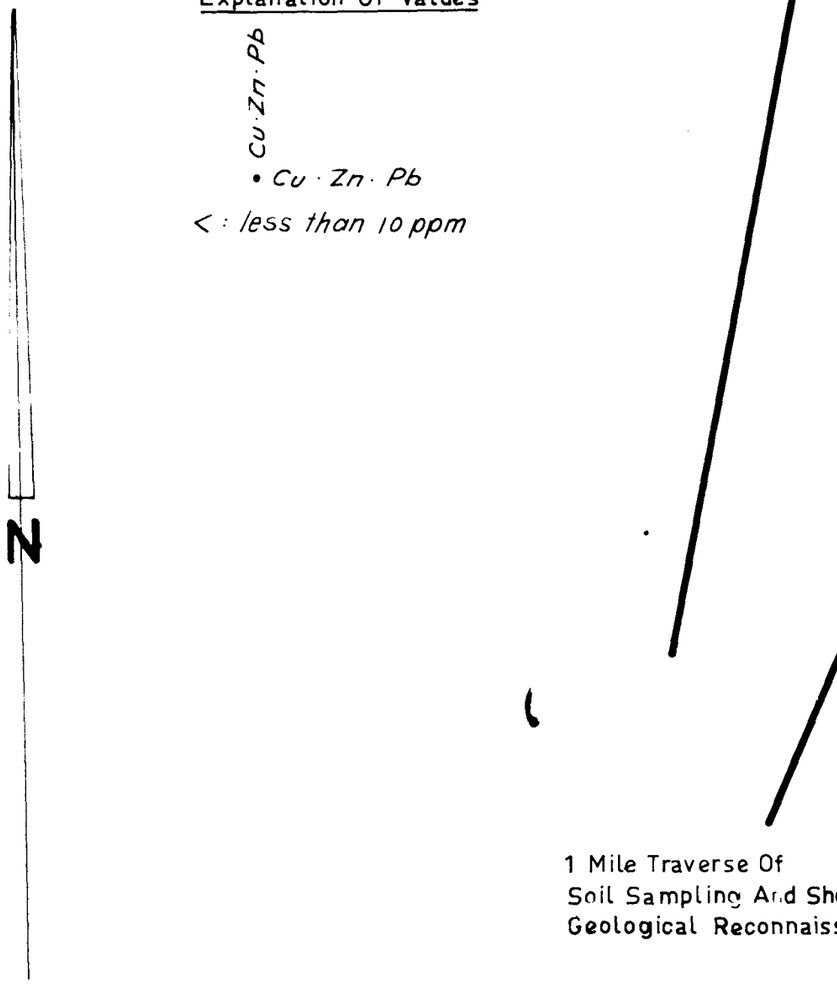
NOTE: This Fagan Creek Is Different From Fagan Creek On B.M.R Map (See Tungi Area Map).
Results Of Work Done During July 1968, To Follow Up The Morley Creek Copper Showing, Which Was Found, During Stream Sampling Survey 1967.
LOCATION: Approx 90 Air Miles N.E Of Bulman (Western Edge Of Mitchell Range)

Explanation Of Values

Cu · Zn · Pb

• Cu · Zn · Pb

< : less than 10 ppm



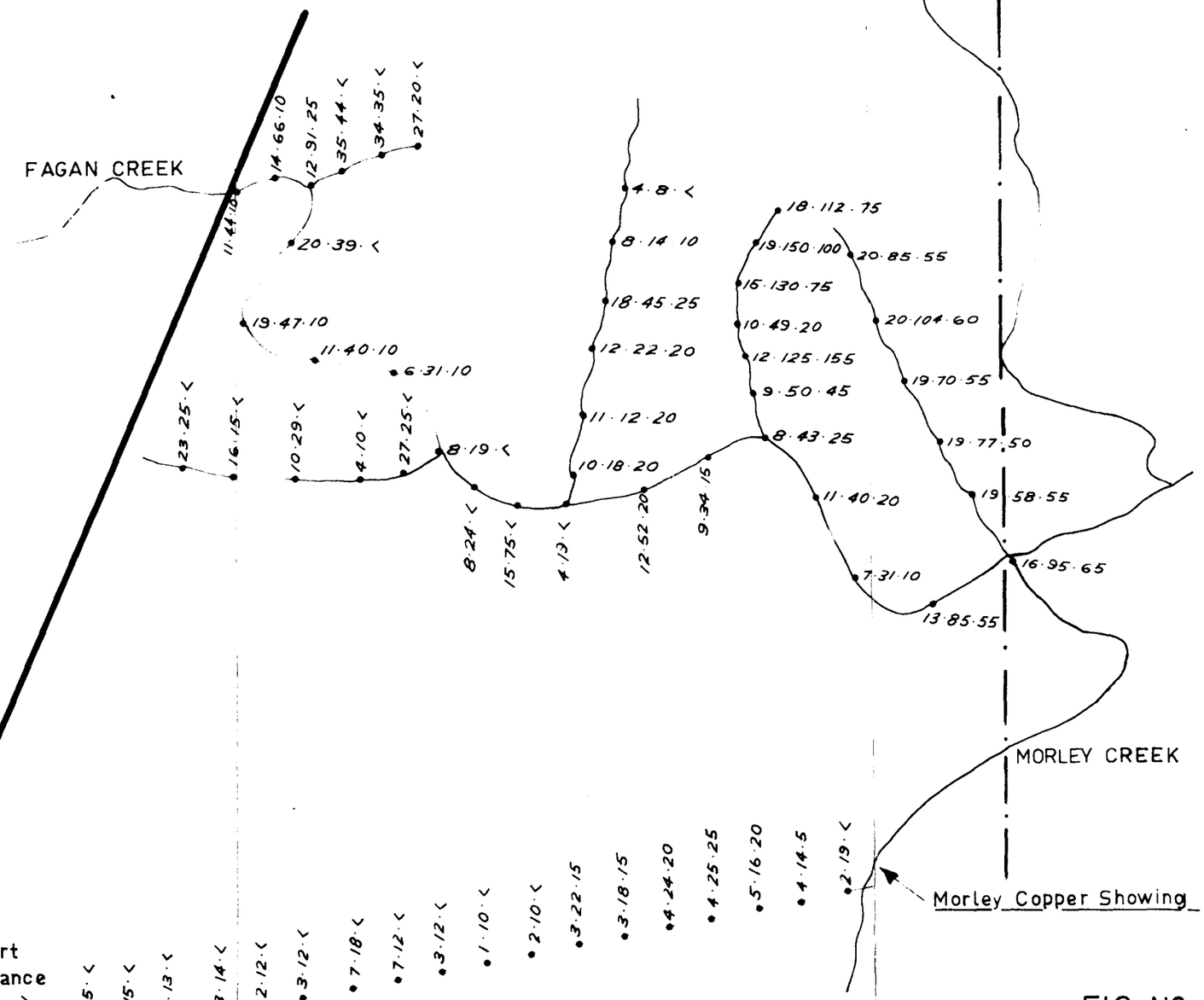


FIG No. 4

FAGAN CREEK Gcm					
SCALE 1000' : 1"	GEOLOGIST P. HAUSTEIN	DRAWN BY L. M. LEWIS	SEE ALSO	DATE 13 · 3 · 1969	L18A

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