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SHALLOW STRATIGRAPHIC DRILLING IN THE  
BURNSIDE GRANITE AREA, BATCHELOR 1;100 000 SHEET,  
NORTHERN TERRITORY, 1975

by

I.H. Crick



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## SUMMARY

During geological mapping in 1975 in the southeast quarter of the Batchelor 1:100 000 Sheet area, 32 shallow stratigraphic holes were drilled around the Burnside Granite, in mostly metasedimentary rocks of the Burrell Creek and Golden Dyke Formations.

The aims of the drilling were to identify bedrock beneath soil and alluvial cover, and to obtain fresh core samples from the Golden Dyke Formation to assist in elucidating its stratigraphy.

The lithology of the Golden Dyke Formation near the western boundary of the Burnside Granite is similar to that of the basal section at Rum Jungle. However, field relations suggest the section is nearer the middle of the formation as seen at Rum Jungle.

Near the eastern boundary of the granite, one hole intersected silicified greywacke of the Masson Formation.

Drilling results to the north, east, and south of the Burnside Granite indicate that the boundary between the Golden Dyke Formation and the Burrell Creek Formation is transitional.

Several cores from holes drilled in the Golden Dyke Formation have slightly anomalous Cu, Pb, and Zn values.

Radiometric logging showed that carbonaceous shales in the Golden Dyke Formation have slightly higher radioactivity than other rock types within the same formation. No anomalous radioactivity was found.



## INTRODUCTION

A program of shallow stratigraphic drilling was carried out by a BMR drilling crew during 1975 to assist the concurrent semi-detailed mapping of the Burnside Granite and surrounding rocks in the Batchelor 1:100 000 Sheet area. The Burnside Granite area is about 120 km southeast of Darwin, and is bounded by latitudes  $13^{\circ}15'$  and  $13^{\circ}30'S$  and longitudes  $131^{\circ}20'$  and  $131^{\circ}30'E$ . The granite is surrounded by Lower Proterozoic metasediments of the Burrell Creek and Golden Dyke Formations and interlayered amphibolites; soil and alluvium mantle most of the area. The Burnside Granite is a diapiric intrusion which has domed up the Lower Proterozoic metasediments.

The aims of the drilling were:

1. To identify bedrock beneath soil and alluvium.
2. To obtain fresh samples from the Golden Dyke Formation in areas of deep weathering.

### BMR drilling program

Thirty-two vertical holes (Pine Creek 1-32) were drilled, the average depth being 25 m, and the maximum 60 m. The drilling was carried out from 10 June to 16 July, 1975, by a crew led by K. Reine and K. Huth using a Mayhew 1000 rotary mobile rig.

During the drilling, cuttings were taken at intervals of 10 feet (3 m). Cores, generally about 1 m in length, were collected in most holes when fresh bed-rock was reached; recovery rates were generally good, in many cases being 100 percent, although many of the cores were broken. The holes were drilled using  $4\frac{1}{2}$  inch (11.4 cm) bits and rollers; occasionally a jackhammer was used, and cores were cut using  $3\frac{15}{16}$  inch (10.0 cm) diamond and tungsten carbide bits to give cores  $2\frac{1}{2}$  inches (6.3 cm) in diameter.

The author measured radiometric and self-potential logs of selected holes using a Widco Portalogger. A technical malfunction in the equipment prevented any resistance logs being made. Owing to the late arrival of the Portalogger on site (26 June 1975) holes nos. 1-9 were not logged. All cores and chips from holes not logged with the Portalogger were checked for radioactivity using an Austral scintillometer, model SG-2a.

Logs of holes by the Portalogger are presented in Figures 2-9.

### Synopsis of Geology

The geology of the area has been described by Sullivan and Iten (1952) and by Walpole et al. (1968).

Briefly, the geology of the Burnside area can be described as a granitic mass surrounded by rocks of the Golden Dyke Formation and interlayered amphibolites. The Burnside Granite is a homogeneous fine- to medium-grained biotite adamellite. The Golden Dyke Formation is composed of carbonaceous pyritic shale, with interbeds of dolomite near its base. Chert and siliceous shale form the upper part of the formation which grades into siltstone and greywacke of the overlying Burrell Creek Formation. Pink and grey silky to knotted schist, locally containing chiasolite, crop out near the granite. Low-grade deposits of gold, copper, and bismuth are contained in the Golden Dyke Formation, but mining, mainly for gold, ceased many years ago.

### RESULTS OF STRATIGRAPHIC DRILLING

The location of drill-holes is shown in Figure 1. Pine Creek 1-6 were planned to obtain samples of unweathered rock beneath Cainozoic alluvium and soil on a line extending northwards from the edge of the Burnside Granite. Pine Creek 1 intersected siltstone and feldspathic quartz arenite of the Burrell Creek Formation. Pine Creek 2 intersected green-grey phyllite and siltstone believed to be Golden Dyke Formation. Pine Creek 3

intersected quartz-feldspar arenite with intercalated shale bands considered to be transitional between the Golden Dyke and Burrell Creek Formations. Graphitic shale of the Golden Dyke Formation containing minor pyrite and pyrrhotite was intersected in holes 4 and 5. Massive chert was intersected at 11.3 m depth in hole 6.

Pine Creek 7, close to the eastern boundary of the Burnside Granite intersected coarse-grained amphibolite. Pine Creek 8, located 50 m nearer the granite, intersected amphibolite which gave way to silicified feldspathic quartz greywacke at depth. The greywacke probably belongs to the Masson Formation which underlies the Golden Dyke Formation.

Pine Creek 10, 11, and 12 were drilled about 500 m apart near the western edge of the granite. Pine Creek 10 intersected coarsely crystalline dolomite of the Golden Dyke Formation; Pine Creek 11 intersected carbonaceous shale and intercalated phyllite of the same Formation. Pine Creek 12 bottomed in granite.

Pine Creek 13-15, 17-19, 21, and 32, sited east and south of the granite intersected mainly feldspathic quartz arenite with locally interbedded siltstone and phyllite of the Burrell Creek Formation; the arenite in Pine Creek 32 showed graded bedding. The core cut in Pine Creek 16 is probably Golden Dyke Formation. Some holes which intersected appreciable amounts of siltstone and/or phyllite penetrated the transitional contact zone between the Burrell Creek and Golden Dyke Formation.

Holes 20, 23, 25, and 31 were sited in alluvium between outcrops of the Golden Dyke Formation in the vicinity of Howley Creek and Brocks Creek, an area where gold has been mined (Sullivan and Iten, 1952). Pine Creek 20, 23, and 25 intersected siliceous and carbonaceous shales of the Golden Dyke Formation containing minor pyrite, and Pine Creek 31 intersected siltstone of the same Formation.

Hole 24, located 1 km north of Howley Creek Siding between a prominent ridge of amphibolite and limonite-stained gossan intersected saccharoidal quartzite, shale, and schist, and bottomed in coarse-grained chloritic dolomite of the Golden Dyke Formation.

Owing to loss of circulation, Pine Creek 26 and 27, located 30 m apart and adjacent to the southeast boundary of the Burnside Granite, did not drill through hornfelsed carbonaceous shale of the Golden Dyke Formation into the granite. Hole 28, 0.6 km to the east of hole 27, intersected a pegmatite vein, carbonaceous argillite, and schist containing porphyroblasts of chiasolite, minor pyrite, and pyrrhotite-rich bands and veins, and bottomed in very fractured phyllite. Hole 29, located 2 km south of hole 27, intersected graphitic shale with minor carbonate, and pyrite- and pyrrhotite-rich bands and veins.

#### RESULTS OF RADIOMETRIC AND SELF-POTENTIAL LOGGING

The results of radiometric and self-potential logging are shown in Figures 2-9. Not all holes were logged owing to the late arrival of the Widco Portalogger. Owing to a technical malfunction, resistance logs were not obtained.

No radiometric anomalies were detected. In general, carbonaceous shale was slightly more radioactive than other rock types. Some minor variations in radiometric and self-potential values, not obviously due to changes in lithology, are probably due to minor variations in mineralogy, fractures, or weathering profiles. Differences in radioactivity related to changes in lithology occurred in:

- (1) Pine Creek 10 (Fig. 2) comparatively higher radioactivity, up to 0.013 mR/hr, at 34 feet (10.2 m) depth, in carbonaceous shale; values decrease in underlying arenite and carbonate bands.

(2) Pine Creek 24 (Fig. 6) comparatively slightly lower radioactivity in siliceous shale and schist, and even lower radioactivity in saccharoidal quartzite and dolomite.

(3) Pine Creek 30 (Fig. 9) a rise of about 0.005 mR/hr related to a change from alluvium to carbonaceous shale at 30 feet (9 m) depth. A peak of 0.024 mR/hr was recorded in the shale at 60 feet (18 m) depth - the highest value for this survey. Radioactivity decreased by 0.01 mR/hr farther down hole in amphibolite.

Probable significant variations in the self-potential log related to changes in lithology occurred in Pine Creek 30, where a peaking in values, followed by a drop of about 30 mV, relates to a change from carbonaceous shale to amphibolite.

## RESULTS OF COPPER, LEAD, AND ZINC ANALYSIS

Copper, lead, and zinc were determined in chip samples taken at 6-inch intervals in selected cores (Table 1). The cores were selected to give a range of suitable rock types in order to provide some idea of background values in the area. However, some of the values are slightly anomalous. In particular, core from Pine Creek 23 gave anomalous copper, lead, and zinc values, and cores from Pine Creek 29 and 30 gave slightly anomalous copper and zinc values. The anomalous values are probably associated with disseminated sulphide mineralization, mainly pyrite and pyrrhotite.

BMR registered No.	Drill Hole No.	Formation	Rock type	Cu	Pb	Zn
76870018	Pine Creek 3	Golden Dyke	arenite with shale	30	5	56
76870019	Pine Creek 4	Golden Dyke	carbonaceous shale	14	24	114
76870020	Pine Creek 9	Burnside Granite	biotite adamellite	3	29	29
76870021	Pine Creek 20	Golden Dyke	shale	9	27	81
76870022	Pine Creek 22	Burrell Creek	arenite	7	18	54
76870023	Pine Creek 23	Golden Dyke	banded siliceous shale	257	110	141
76870024	Pine Creek 25	Golden Dyke	carbonaceous shale	49	8	29
76870025	Pine Creek 27	Golden Dyke	carbonaceous hornfelsed shale	79	25	137
76870026	Pine Creek 29	Golden Dyke	carbonaceous argillite	68	16	174

Table 1. Cu, Pb, Zn contents, in ppm, of selected cores.

## CONCLUSIONS

Stratigraphic holes drilled into the Golden Dyke Formation near the western boundary of the Burnside Granite intersected dolomite interbedded with fine-grained metasediments. Although this section appears lithologically similar to the basal part of the Golden Dyke Formation at Rum Jungle, field relations suggest that it is nearer the middle of the formation.

Silicified greywacke of the Masson Formation, which underlies the Golden Dyke Formation, was intersected in one hole close to the eastern margin of the Burnside Granite. It probably correlates with the Acacia Gap Tongue of the Masson Formation at Rum Jungle, but further field work to the east of this area is needed to clarify this.

Drilling to the north, east, and south of the Burnside Granite indicates that the boundary between the Golden Dyke and Burrell Creek Formations is gradational.

## DETAILS OF DRILLING

PINE CREEK 1

Location: Lat.  $13^{\circ}15'10''\text{S}$  long.  $131^{\circ}27'\text{E}$ ; alt. 50 m;  
15 km NNW of Ban Ban Homestead.

Drilling data: Commenced and completed 10 June 1975; depth  
43 m; drilled with air.

Cuttings: 0 - 6.1 m, reddish brown clay;  
6.1 - 15.3 m, greyish brown clay;  
15.3 - 21.4 m, 70% milky quartz, 30% weathered  
grey-brown siltstone;  
21.4 - 30.5 m, grey feldspathic quartz arenite;  
30.5 - 35 m, 30% milky quartz, 70% dark  
grey silicified siltstone;  
35 m - 41.2 m, grey feldspathic quartz arenite.



Core: 41.2 - 43 m, 100% recovery, grey feldspathic  
quartz arenite; Burrell Creek Formation.

### PINE CREEK 2

Location: Lat.  $13^{\circ}16'10''\text{S}$ , long.  $131^{\circ}27'\text{E}$ ; alt. 50 m;  
12 km NNW of Ban Ban Homestead.

Drilling data: Commenced and completed 11 June 1975;  
depth 19.1 m; drilled with air and mud.

Cuttings: 0 - 3 m, red-brown clay.  
3 - 6.1 m, brown-grey clay with 10% red-brown  
pisolitic gravel.  
6.1 - 17.9 m, brown to green-grey, phyllitic  
siltstone with occasional milky quartz fragments.

Core: 17.9 - 19.1 m, 80% recovery, green-grey phyllitic  
siltstone, dip  $80^{\circ}$ ; Golden Dyke Formation.

### PINE CREEK 3

Location: Lat.  $13^{\circ}17'20''\text{S}$ , long.  $131^{\circ}27'10''\text{E}$ ;  
alt. 50 m; 10 km NW Ban Ban Homestead.

Drilling data: Commenced 11 June 1975, completed 12 June  
1975; depth 60.3 m; drilled with air and mud.

Cuttings: 0 - 3.1 m, reddish brown clay with 5% dark  
grey carbonaceous shale fragments.  
3.1 - 6.1 m, 40% white-grey clay, 40% red  
brown pisolites, 15% grey siltstone, 5% milky  
quartz fragments.  
6.1 - 12.2 m, grey clay with grey siltstone pebbles.

12.2 - 30.5 m, silt, khaki 12.2 - 15.3 m, brown-yellow 15.3 - 18.3 m, dark grey 18.3 - 30.5 m; 30.5 - 33.6 m, light grey clay. 33.6 - 39.7 m, grey speckled to red-brown siltstone with 25% clear to milky quartz. 39.7 - 51.9 m, grey-speckled to red-brown siltstone with coarser-grained grey speckled arenite 39.7 - 42.7 m; 10% clear to milky quartz. 51.9 - 59.1 m, grey to red-brown shale with 5% clear to milky quartz.

Core: 59.1 - 60.3 m, 80% recovery; fine, grey-speckled quartz-feldspar arenite (grainsize about 0.1 mm) with dark grey shale bands, 20 cm wide, showing occasional flame structures and small lenses; dip 75°; Golden Dyke Formation.

#### PINE CREEK 4

Location: Lat. 13°18'10"S, long. 131°27'10"E, alt. 50 m; 9 km NW Ban Ban Homestead.

Drilling data: Commenced and finished 12 June 1975; depth 33.6 m; drilled with air and mud.

Cuttings: 0 - 12.2 m, red-brown to grey-yellow clay with occasional quartz, chert, and shale pebbles. 12.2 - 18.3 m, soft, weathered, grey shale. 18.3 - 32.3 m, grey carbonaceous shale with graphite-rich band 31 - 31.5 m, and harder more siliceous bands, with minor pyrite and pyrrhotite along fracture and

cleavage faces, and minor clear to milky vein quartz.

Core: 32.3 - 33.6 m, 100% recovery, graphitic shale with minor pyrite and pyrrhotite disseminated along cleavage and fracture planes; siliceous carbonaceous shale 32.3 - 32.8 m; dip  $18^{\circ}$ ; Golden Dyke Formation.

#### PINE CREEK 5

Location: Lat.  $13^{\circ}19'10''\text{S}$ , long.  $131^{\circ}28'50''\text{E}$ ;  
alt. 55 m; 7 km NW of Ban Ban Homestead.

Drilling data: Commenced 13 June, 1975; completed 14 June 1975; depth 28.7 m; drilled with mud.

Cuttings: 0 - 9.2 m, yellow-brown to grey-yellow clay.  
9.2 - 27.3 m, grey to dark grey carbonaceous shale with minor pyrite, pyrrhotite and chalcopryrite formed in vugs and along cleavage and fracture planes; minor clear to milky vein quartz.

Core: 27.3 - 28.7 m, 100% recovery; grey to dark grey banded carbonaceous shale with minor pyrite, chalcopryrite and pyrrhotite formed along cleavage and in kaolin-filled fractures; dip  $30^{\circ}$ ; Golden Dyke Formation.

#### PINE CREEK 6

Location: Lat.  $13^{\circ}19'40''\text{S}$ , long.  $131^{\circ}27'40''\text{E}$ ;  
alt. 55 m; 6 km NW of Ban Ban Homestead.

Drilling data: Commenced and completed 17 June 1975; depth  
11.6 m; drilled with air and mud.

Cuttings: 0 - 11.3 m, yellow grey to grey clay.

Core: 11.3 - 11.6 m, 100% recovery, dark grey  
chert; Golden Dyke Formation.

### PINE CREEK 7

Location: Lat.  $13^{\circ}21'40''\text{S}$ , long.  $131^{\circ}28'50''\text{E}$ ;  
alt. 60 m; 4 km NW of Ban Ban Homestead.

Drilling data: Commenced and completed 17 June, 1975;  
depth 9.8 m; drilled with air and mud.

Cuttings: 0 - 6.1 m, reddish brown to yellow-grey  
sandy clay.  
6.1 - 9.2 m, yellow-grey clay with dark  
grey micaceous siltstone.

Core: 9.1 - 9.8 m, 100% recovery, coarsely crystalline  
amphibolite; thin section - cores of actinolite  
in green hornblende; granular plagioclase; minor  
biotite and opaques.

### PINE CREEK 8

Location: Lat.  $13^{\circ}21'50''\text{S}$ , long.  $131^{\circ}28'40''$ ; alt. 60 m;  
4 km NW of Ban Ban Homestead.

Drilling data: Commenced 18 June 1975, completed 22 June,  
1975; depth 18.6 m; drilled with air and water.

Cuttings: 0 - 6.1 m, sandy gravel.  
6.1 - 15.6 m, amphibolite  
with minor pyrite/pyrrhotite veinlets 9.2 - 12.2 m.

Core: 15.6 - 18.6 m, 100% recovery, silicified feldspathic quartz greywacke showing graded bedding; coarse grained quartz-biotite vein 16.4 - 16.6 m; dip 20°; thin-section - unsorted quartz grains, up to 5 mm, with overgrowths, cloudy oligoclase with quartz and biotite inclusions, minor biotite and opaques, several grains of molybdenite up to 2 mm long. Fresh water flowed from the hole at about 0.5 l/sec. Hole plugged with concrete. Analysis of water: pH 7.2, Sp. Cond. 355 umho; Zn 0.75, Cu 0.01, Cd 0.001, Pb 0.1, Fe 0.1, Mo 0.1, Ni 0.1 (all ppm); Masson Formation.

PINE CREEK 9

Location: Lat. 13°21'50"S, long. 131°28'40"E; alt. 60 m; 4 km NW of Ban Ban Homestead.

Drilling data: Commenced 22 June 1975, completed 23 June 1975; depth 20 m; drilled with air and water.

Cuttings: 0 - 9.2 m, granite gravel.  
9.2 - 12.2 m, granite gravel and clay.  
12.2 - 17.9 m, granite.

Core: 17.9 - 20 m, 80% recovery, medium-grained granite, saussuritized feldspar; highly weathered and broken 18.3 - 18.6 m; Burnside Granite.

PINE CREEK 10

Location: Lat.  $13^{\circ}22'20''\text{S}$ , long.  $131^{\circ}22'20''\text{E}$ ;  
alt. 60 m; 7 km N of Howley Ck. Siding.

Drilling data: Commenced and completed 30 June 1975;  
depth 10.5 m; drilled with air and mud.

Cuttings: 0 - 10 m, grey-yellow clay with sand and gravel  
containing pisolites, limestone, granite, and  
grey siltstone fragments.  
10 - 15.3 m, dark grey carbonaceous shale.  
15.3 - 18.4 m, reddish grey quartz-mica  
schist with minor light grey limestone  
and white dolomite containing minor  
disseminated chalcopyrite.  
18.4 - 19.6 m, grey-brown sandy clay with  
minor grey banded limestone, white dolomite,  
and reddish grey to grey phyllite.

Core: 19.6 - 20.5 m, 100% recovery, greyish white  
coarsely crystalline dolomite with small  
veins and vugs of calcite and minor bands  
of dark grey argillite containing finely  
divided pyrrhotite in veins and vugs; dip  $26^{\circ}$ ;  
thin section - subhedral intergrown grains up  
to 0.5 mm long of carbonate with scattered  
anhedral quartz grains up to 0.2 mm in diameter;  
Golden Dyke Formation.

PINE CREEK 11

Location: Lat.  $13^{\circ}22'20''\text{S}$ , long.  $131^{\circ}22'40''\text{E}$ ;  
alt. 60 m; 7 km N of Howley Creek Siding.

Drilling data: Commenced and completed 1 July 1975;  
depth 32.4 m; drilled with air and mud.

Cuttings: 0 - 9.2 m, shaly gravel with granite pebbles.  
9.2 - 31.3 m, spotty phyllite, graphitic and  
siliceous argillite, commonly red-brown, but  
becoming dark grey with increasing depth;  
minor pyrite and pyrrhotite along fracture  
and cleavage surfaces and in vugs.

Core: 31.3 m - 32.4, 100% recovery, silvery grey, spotty  
phyllite and dark grey carbonaceous argillite  
bands with minor disseminated pyrrhotite  
formed on cleavage and fracture surfaces; dip  
30°; thin section - equal amounts of quartz and  
muscovite and biotite flakes up to 0.3 mm in length  
showing strong lineations; occasional blebs of  
fine-grained quartz and biotite surrounded by  
larger muscovite and biotite flakes; minor opaques;  
Golden Dyke Formation.

PINE CREEK 12

Location: Lat. 13°22'20"S, long. 131°23'E; alt. 60 m;  
7 km N of Howley Creek Siding.

Drilling data: Commenced and completed 2 July 1975;  
depth 5.6 m; drilled with air and mud.

Cuttings: 0 - 5.2 m, shaly gravel becoming more sandy  
at 5 m with granite pebbles.

Core: 5.2 - 5.6 m, 100% recovery, medium-grained granite  
with vertical 2 cm-wide pegmatite vein;  
Burnside Granite.

PINE CREEK 13

Location: Lat.  $13^{\circ}24'50''\text{S}$ , long.  $131^{\circ}29'50''\text{E}$ ;  
alt. 60 m; 6 km NNE of the Fountain Head Siding.

Drilling data: Commenced and completed on 2 July 1975;  
depth 28.1 m; drilled with air and mud.

Cuttings: 0 - 6.1 m, red-yellow clay passing into yellow-grey  
clay and gravel.  
6.2 - 12.2 m, grey-brown silt becoming  
yellow brown 9.2 - 12.2 m.  
12.2 - 27.5 m; grey to brown mica-feldspar-  
quartz arenite, sub-schistose; grainsize  
about 0.1 mm.

Core: 27.5 - 28.1 m, 100% recovery, mica-feldspar-  
quartz arenite, sub-schistose; dip  $40^{\circ}$ ;  
Burrell Creek Formation.

PINE CREEK 14

Location: Lat.  $13^{\circ}25'40''\text{S}$ , long.  $131^{\circ}29'50''$ ; alt.  
50 m; 5 km NNE of Fountain Head Siding.

Drilling data: Commenced and completed 2 July 1975;  
depth 36.8 m; drilled with mud.

Cuttings: 0 - 30.5 m, yellow-brown clay becoming grey.  
9.2 - 30.5 m, with sand and quartz pebbles.  
30.5 - 35.1 m, grey to silvery grey mica-  
feldspar-quartz arenite with minor milky vein  
quartz.



Core: 25.1 - 36.8 m, 100% recovery, grey mica-feldspar-quartz arenite with darker pelitic 5 cm bands, 35.1 - 36 m; fractured, and fragmented mica-feldspar-quartz arenite with vertical 5 cm-wide milky quartz vein, 36 - 36.8 m, dip  $65^{\circ}$ ;  
Burrell Creek Formation.

PINE CREEK 15

Location: Lat.  $13^{\circ}26'40''\text{S}$ , long.  $131^{\circ}29'50''\text{E}$ ; alt. 50 m;  
 4 km NNE Fountain Head Siding.

Drilling data: Commenced and completed 3 July 1975; depth 29.9 m; drilled with mud.

Cuttings: 0 - 3.1 m, gravel.  
 3.1 - 6.1 m, yellow-grey, sandy clay.  
 6.1 - 26 m, brown-grey micaceous siltstone.  
 becoming more arenaceous and greyer at depth.  
 26 - 29 m, silvery-grey phyllite.

Core: 29 - 29.9 m, 100% recovery, grey mica-feldspar-quartz arenite with band of phyllite,  
 29.4 - 29.6 m, containing darker grey blebs of  
 (?)cordierite; Burrell Creek Formation.

PINE CREEK 16

Location: Lat.  $13^{\circ}27'40''\text{S}$ , long.  $131^{\circ}29'20''\text{E}$ ;  
 alt. 50 m; 2 km NE of Fountain Head Siding.

Drilling data: Commenced 3 July, 1975, completed 4 July, 1975;  
 depth 29.9 m; drilled with mud.

Cuttings: 0 - 9.2 m, sandy gravel with quartz pebbles.  
 9.2 - 29 m, mica-quartz-feldspar lutite and  
 quartz-mica-feldspar arenite, brown-grey to  
 speckled grey at depth; phyllitic 24.4 -  
 27.4 m.

Core: 29 - 29.9 m, 100% recovery, broken grey phyllitic  
 spotty shale with 2 cm milky quartz band 2 cm  
 wide; Golden Dyke Formation.

PINE CREEK 18

Location: Lat.  $13^{\circ}28'40''S$ , long.  $131^{\circ}27'E$ ;  
 alt. 50 m; 3 km WSW Fountain Head Siding.

Drilling data: Commenced and completed 7 July 1975;  
 depth 22.9 m; drilled with mud.

Cuttings: 0 - 5 m yellow brown clay and gravel.  
 5 - 22 m, brown-red, becoming greyer at  
 depth; mica-quartz-feldspar arenite with  
 minor bands of darker micaceous lutite.

Core: 22 - 22.9 m, 100% recovery, grey speckled  
 mica-quartz-feldspar arenite with 2 cm  
 band of dark grey lutite; dip  $70^{\circ}$ ;  
Burrell Creek Formation.

PINE CREEK 19

Location: Lat.  $13^{\circ}28'30''S$ , long.  $131^{\circ}26'10''E$ ;  
 alt. 50 m; 2 km ESE of Brock's Creek Siding.

Drilling data: Commenced and completed 8 July, 1975;  
 depth 28.1 m; drilled with mud.

Cuttings: 0 - 21.4m, yellow-red clay becoming grey at depth, with sandy gravel.  
21.4 - 27.5 m; grey-spotted mica-feldspar-quartz arenite.

Core: 27.5 - 28.1 m, 100% recovery, grey-speckled quartz-biotite-feldspar arenite with minor biotite-rich bands; dip  $65^{\circ}$ ; Burrell Creek Formation.

PINE CREEK 20

Location: Lat.  $13^{\circ}28'40''$ , long.  $131^{\circ}25'10''$ ;  
alt. 50 m; 1 km SSE of Brock's Creek Siding.

Drilling data: Commenced and completed 8 July 1975;  
depth 28.5 m; drilled with mud.

Cuttings: 0 - 3.1 m, yellow-grey clay and gravel.  
3.1 - 9.2 m, brown-yellow silt and gravel grading into grey-brown silt 6.1 - 9.2 m.  
9.2 - 27.5 m, brown (becoming dark grey at depth) shale with rare narrow bands of micaceous sandstone; minor pyrite.

Core: 27.5 - 28.5 m, 100% recovery, fractured dark grey shale with minor pyrite along cleavage and fractures, soft, weathered shale 28.2 - 28.5 m; dip along cleavage  $40^{\circ}$ ; Golden Dyke Formation.

PINE CREEK 21

Location: Lat.  $13^{\circ}29'30''$ S, long.  $131^{\circ}25'40''$ E;  
alt. 50 m; 3 km SSE of Brock's Creek Siding.

Drilling data: Commenced and completed 8 July 1975;  
depth 21.4 m; drilled with mud.

Cuttings: 0 - 3.1 m, reddish brown sandy clay with  
quartz pebbles.  
3.1 - 21.2 m, light brown quartz-mica-feldspar  
arenite, becoming grey at depth.

Core: 21.2 - 21.4 m, 100% recovery, grey quartz-  
mica-feldspar arenite showing graded bedding;  
dip 70°; Burrell Creek Formation.

PINE CREEK 22

Location: Lat. 13°27'S, long. 131°26'10"E;  
alt. 50 m; 3 km WNW of Howley Creek Siding.

Drilling data: Commenced and completed 9 July 1975;  
depth 18.1 m; drilled with mud.

Cuttings: 0 - 9.2 m, yellow-grey clay and gravel.  
9.2 - 12.2 m, grey clay and gravel.  
22.2 - 17.3 m, reddish grey to grey quartz-  
mica arenite.

Core: 17.3 - 18.1 m, 100% recovery, quartz-mica  
arenite showing graded bedding; dip 35°;  
thin section - unsorted quartz grains up to  
1.0 mm across, biotite, and lesser amounts of  
muscovite, minor opaques; Burrell Creek Formation.

PINE CREEK 23

Location: Lat. 13°27'10"S, long. 131°22'40"E;  
alt. 50 m; 0.5 km ESE of Howley Creek Siding.

Drilling data: Commenced and completed 10 July 1975;  
depth 12.8 m; drilled with mud.

Cuttings: 0 - 3.5 m, yellow grey clay and gravel.  
3.5 - 12.2 m, grey siliceous shale with  
minor disseminated pyrite.

Core: 12.2 - 12.8 m, 100% recovery, banded dark grey  
and light grey siliceous shale with minor  
disseminated pyrite concentrated along bedding  
and cleavage planes; dip 25°; Golden Dyke  
Formation.

PINE CREEK 24

Location: Lat. 13°26'40"S, long. 131°22'30"E;  
alt. 60 m; 1 km N of Howley Creek Siding.

Drilling data: Commenced and completed 10 July 1975;  
depth 29.5 m; drilled with mud.

Cuttings: 0 - 3.1 m, red-brown silt and gravel.  
3.1 - 9.2 m, grey siliceous shale.  
9.2 - 13.5 m, saccharoidal quartzite, grainsize 0.1  
- 0.5 mm, with thin dark micaceous bands.  
13.5 - 27.5 m, brown-yellow to pink schist with  
quartzite bands.

Core: 27.5 - 29.5 m, 100% recovery, coarse crystalline  
greyish-white to greyish green dolomite with thin  
locally wavy bands of dark grey phyllite; dolomite  
contains disseminated small crystals, 0.3 mm,

of pyrrhotite; dip  $40^{\circ}$ ; thin section - large grains of carbonate up to 0.5 mm with chlorite and lesser amounts of talc, and minor opaques;

Golden Dyke Formation.

PINE CREEK 25

Location: Lat.  $13^{\circ}28'10''\text{S}$ , long.  $131^{\circ}24'50''\text{E}$ ;  
alt. 50 m; 2 km ENE of Brock's Creek Siding.

Drilling data: Commenced and completed 11 July 1975;  
depth 23.7 m; drilled with mud.

Cuttings: 0 - 6.1, brown to light grey clay with shaly gravel.  
6.1 - 22.6 m, siliceous dark grey carbonaceous shale with minor quartz veining and minor pyrite in veins and vugs, and along cleavage and fracture surfaces.

Core: 22.6 - 23.7 m, 100% recovery, badly fractured and broken up dark grey carbonaceous shale with thin bands of light grey phyllite and siliceous shale, minor pyrite; dip  $50^{\circ}$ ;  
Golden Dyke Formation.

PINE CREEK 26

Location: Lat.  $13^{\circ}25'50''\text{S}$ , long.  $131^{\circ}26'20''\text{E}$ ;  
alt. 60 m; 5 km NNE of Brock's Creek Siding.

Drilling data: Commenced and completed 12 July 1975;  
depth 10.3 m; drilled with mud.

Cuttings: 0 - 3.1, grey silt and gravel.  
3.1 - 9.2, light grey clay and red-brown to grey siliceous shale.

9.2 - 10 m, dark grey siliceous shale with  
minor pyrite and pyrrhotite.

Core: 10 m - 10.3 m, 100% recovery, dark grey  
siliceous shale containing lamellae, veins,  
and vugs and disseminated pyrite and pyrrhotite;  
dip 25°; Golden Dyke Formation.

#### PINE CREEK 27

Location: Lat. 13°25'50"S, long. 131°26'20"E, alt.  
60 m; 5 km NNE of Brock's Creek Siding.

Drilling data: Commenced 11 July, 1975, completed 14 July  
1975; depth 21.8 m; drilled with mud.

Cuttings: 0 - 6.1 m, dark grey clay and shale gravel.  
6.1 - 12.8, dark grey siliceous carbonaceous  
shale with minor pyrite and pyrrhotite formed  
on cleavage and fracture surfaces.

Core: 12.8 - 21.8 m, 100% recovery, dark grey to  
light grey siliceous and graphitic shale  
with bands of phyllite. Minor pyrite and  
pyrrhotite bands and veins associated in  
places with small carbonate and tremolite  
veins; dip 25°; Golden Dyke Formation.

#### PINE CREEK 28

Location: Lat. 13°25'50"S, long. 131°26'20"E;  
alt. 60 m; 5 km NNE of Brock's Creek Siding.

Drilling data: Commenced and completed 14 July, 1975;  
depth 31.3 m; drilled with mud.

Cuttings: 0 - 3.1 m, clay and shale gravel.  
 3.1 - 29 m, carbonaceous shale with graphite-rich  
 and siliceous bands; minor schist and phyllite  
 banding; scattered chialstolite crystals, 2 mm  
 in length, 6.1 - 29 m; minor pyrite and pyrrhotite.

Core: 29 - 31.3 m, 100% recovery, altered pegmatite  
 vein 29 - 29.4 m, light to dark grey graphitic  
 siliceous shale with chialstolite porphyroblasts,  
 minor pyrite and pyrrhotite veining, also  
 disseminated along cleavage and fractures;  
 weathered, badly broken-up phyllite 31 - 31.3 m;  
 dip 20°; thin section - chialstolite porphyroblasts  
 up to 1.0 cm with alteration rims of sericite and  
 muscovite; fine-grained quartz and mica;  
 30% opaques, mainly graphite and pyrite;  
 minor small discontinuous pyrite veins;  
Golden Dyke Formation.

PINE CREEK 29

Location: Lat. 13°26'30"S, long. 131°25'40";  
 alt. 50 m; 3 km NNE of Brock's Creek Siding.

Drilling data: Commenced 14 July, 1975, completed 15 July  
 1975; depth 11.1 m; drilled with mud.

Cuttings: 0 - 6.2 m, brown-grey clay and gravel.  
 6.2 - 9.2 m, dark grey carbonaceous argillite  
 with small veins of pyrite; pyrite also  
 disseminated on cleavage and fracture surfaces.



Core: 9.2 - 11.1 m, 100% recovery, graphitic argillite with minor pyrite, pyrrhotite, and carbonate-rich bands and veins; thin section - 70% opaques, mostly carbonaceous, with porphyroblasts of cummingtonite in fine-grained quartz and chlorite, minor quartz-rich bands containing pyrite.

PINE CREEK 30

Location: Lat.  $13^{\circ}28'10''\text{S}$ , long.  $131^{\circ}25'40''\text{E}$ ;  
alt. 50 m; 2 km NNE of Brock's Creek Siding.

Drilling data: Commenced and completed 15 July, 1975; depth 23.6 m; drilled with mud.

Cuttings: 0 - 3.1 m, red-brown to grey sandy silt.  
3.1 - 12.2 m, shaly, sandy clay and silt.  
12.2 - 22.9 m, red-brown to dark grey carbonaceous shale with minor bands of quartzite, smoky-grey quartz, quartz-pyrite, and pyrite veins; minor pyrite on fracture and cleavage faces.

Core: 22.9 - 23.6 m, 100% recovery, greyish green amphibolite containing minor pyrite and pyrrhotite in small patches; thin section - laths of actinolite and tremolite up to 2 mm long, some as radial aggregates; cloudy feldspar, minor biotite and opaques;  
Golden Dyke Formation.

PINE CREEK 31

Location Lat.  $13^{\circ}28'\text{S}$ , long.  $131^{\circ}25'20''\text{E}$ ; alt. 50 m;  
1 km NNE of Brock's Creek Siding.

Drilling data: Commenced and completed 15 July 1975;  
depth 25.4 m; drilled with mud.

Cuttings: 0 - 3.1 m, reddish grey clay and pisolitic gravel.  
3.1 - 12.2 m, khaki clay changing to grey shaly  
gravel at depth.  
12.2 - 24.4 m, yellow-grey to brown-red siltstone  
and clay.

Core: 24.4 - 25.4 m, 90% recovery, argillaceous, fragmented  
silicified micaceous siltstone; Golden Dyke Formation.

PINE CREEK 32

Location: Lat.  $13^{\circ}29'30''\text{S}$ , long.  $131^{\circ}27'20''\text{E}$ ; alt.  
40 m, 3 km SW of Fountain Head Siding.

Drilling data: Commenced and completed 16 July 1975;  
depth 22 m; drilled with mud.

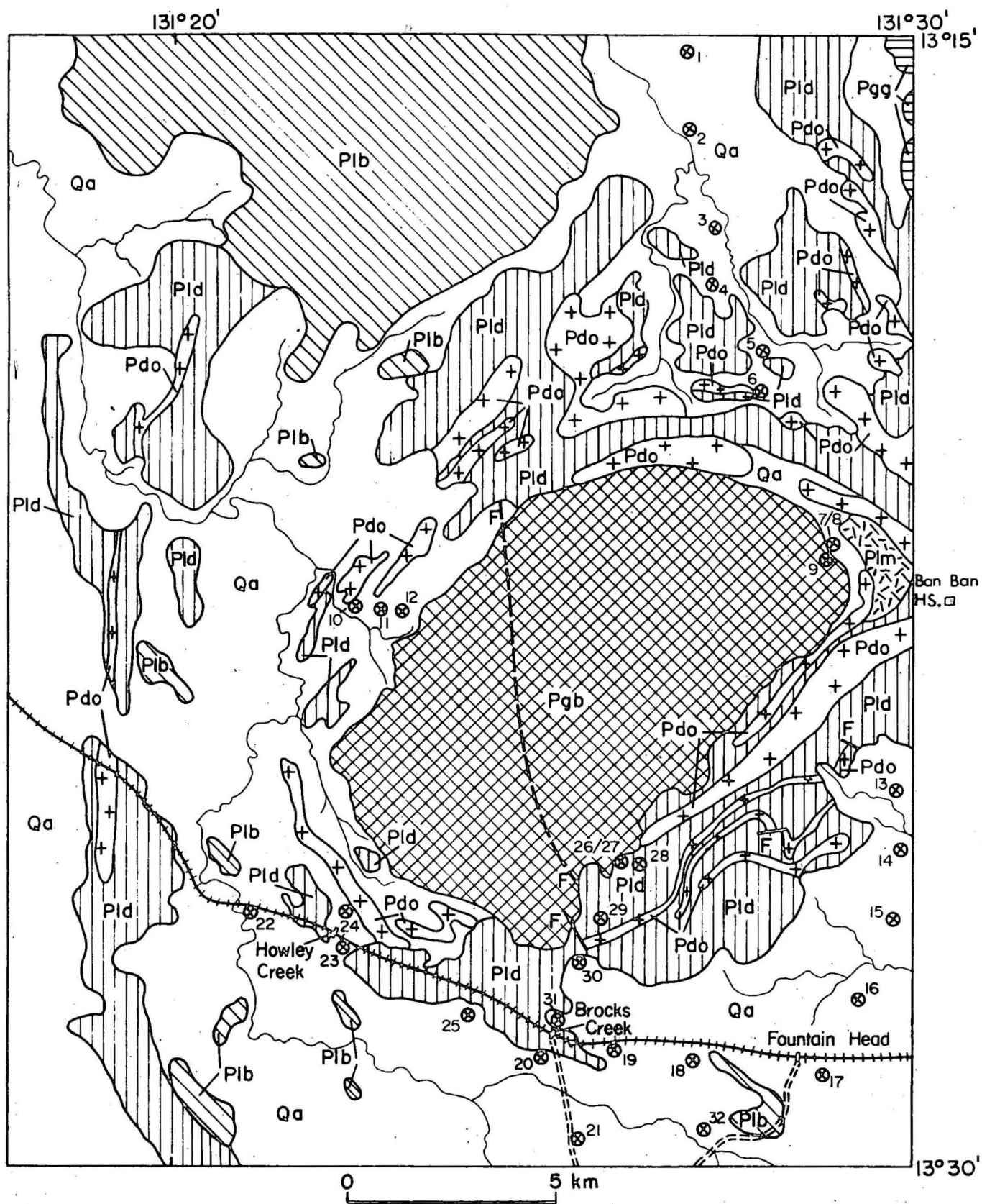
Cuttings: 0 - 6.2 m, silt, clay, gravel and quartz  
pebbles.  
6.2 - 21.4 m, brown-grey becoming grey with depth;  
quartz-mica-feldspar arenite with carbonaceous  
pyritic siltstone band between 15.3 and 18.3 m;  
arenite coarser-grained, 18.3 - 27.4 m.

Core: 21.4 - 22 m, 100% recovery, quartz-mica-feldspar  
arenite showing graded bedding; dip  $68^{\circ}$ ;  
Burrell Creek Formation.

## REFERENCES

SULLIVAN, C.J., and ITEN, K.W.B., 1952 - The geology and mineral resources of the Brock's Creek District, Northern Territory. Bur. Miner. Resour. Aust. Bulletin 12.

WALPOLE, B.P., CROHN, P.W., DUNN, P.R., and RANDAL, M.A., 1968 - Geology of the Katherine - Darwin Region, Northern Territory. Bur. Miner. Resour. Aust. Bulletin 82.



- |   |                        |
|---|------------------------|
| <span style="border: 1px solid black; padding: 2px;">Qa</span>  | Alluvium, soil         |
| <span style="border: 1px solid black; padding: 2px;">Pgb</span> | Burnside Granite       |
| <span style="border: 1px solid black; padding: 2px;">Pgg</span> | Margaret Granite       |
| <span style="border: 1px solid black; padding: 2px;">Pdo</span> | Para/ortho amphibolite |

- |   |                         |
|---|-------------------------|
| <span style="border: 1px solid black; padding: 2px;">Plb</span> | Burrell Creek Formation |
| <span style="border: 1px solid black; padding: 2px;">Pld</span> | Golden Dyke Formation   |
| <span style="border: 1px solid black; padding: 2px;">Plm</span> | Masson Formation        |

⊗ Stratigraphic drill hole

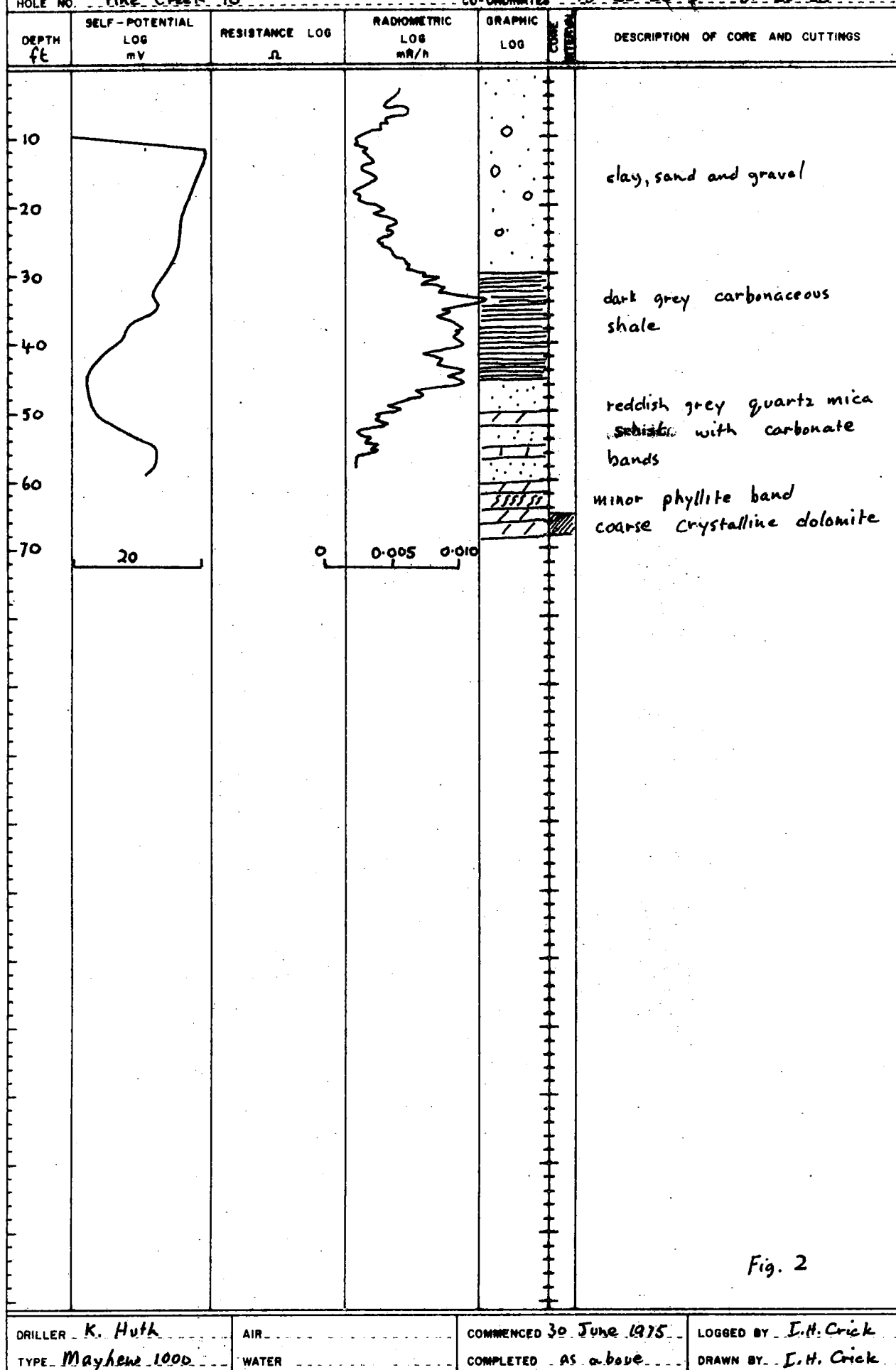
Record 1976/101

D52/A8/

Fig.1 Geological sketch map, Burnside Granite and environs, Batchelor 1:100,000 Sheet area

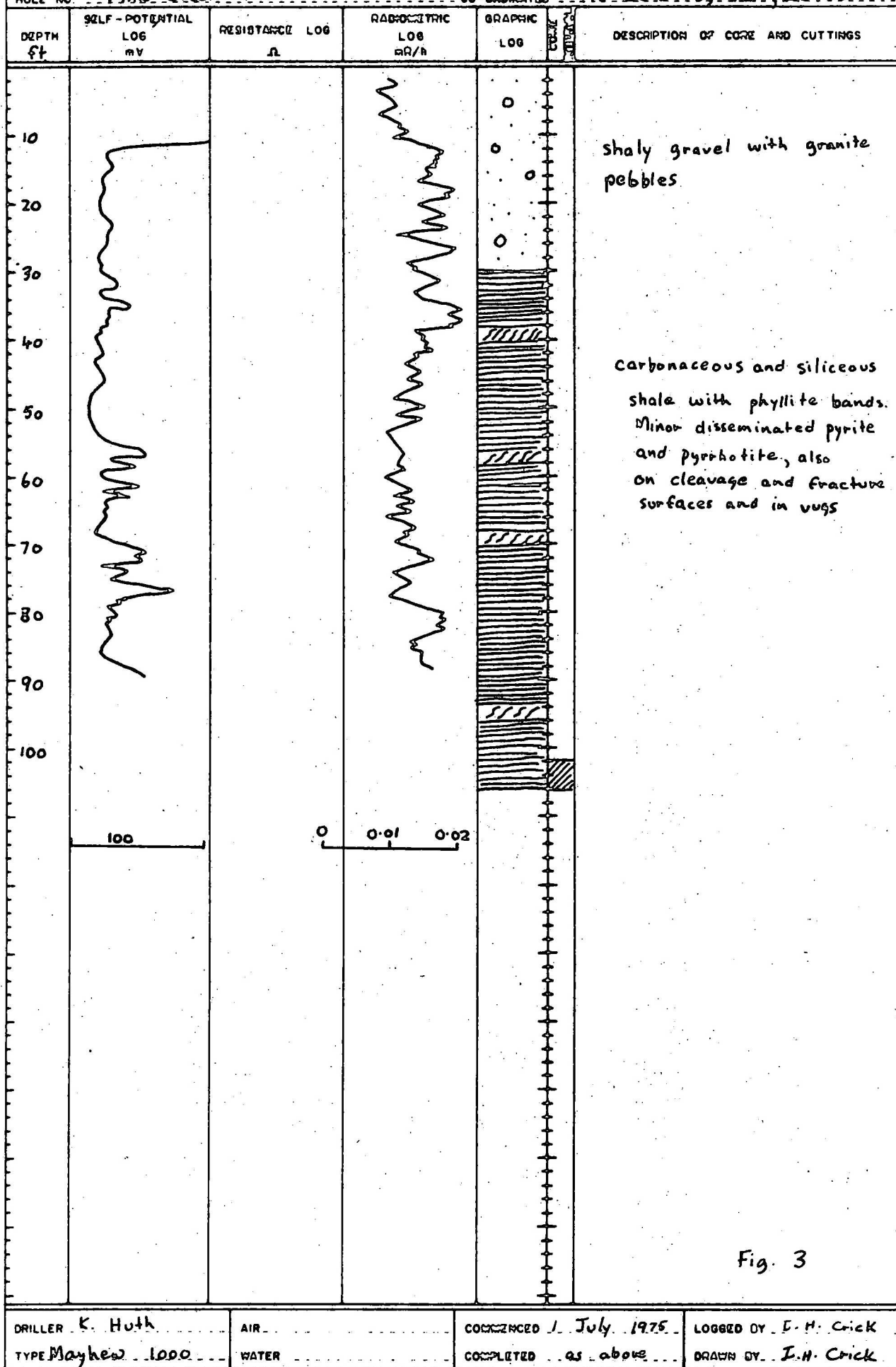
## GEOLOGICAL LOG OF DRILL HOLE

PROJECT Burnside Granite area, N.T. LOCATION 7 km. N. Howley Ck. Siding  
 HOLE NO. Pine Creek 10 CO-ORDINATES 13° 22' 20" S. 131° 22' 20" E.



## GEOLOGICAL LOG OF DRILL HOLE

PROJECT Burnside Granite area, N.T. LOCATION 7 Km N of Howley Ck Siding  
 HOLE NO. Pine Creek II CO-ORDINATES 13° 22' 20" S, 131° 22' 40" E



DEPTH ft	SELF - POTENTIAL LOG mv	RESISTANCE LOG $\Omega$	RADIO-METRIC LOG GR/A	GRAPHIC LOG	REMARKS	DESCRIPTION OF CORE AND CUTTINGS
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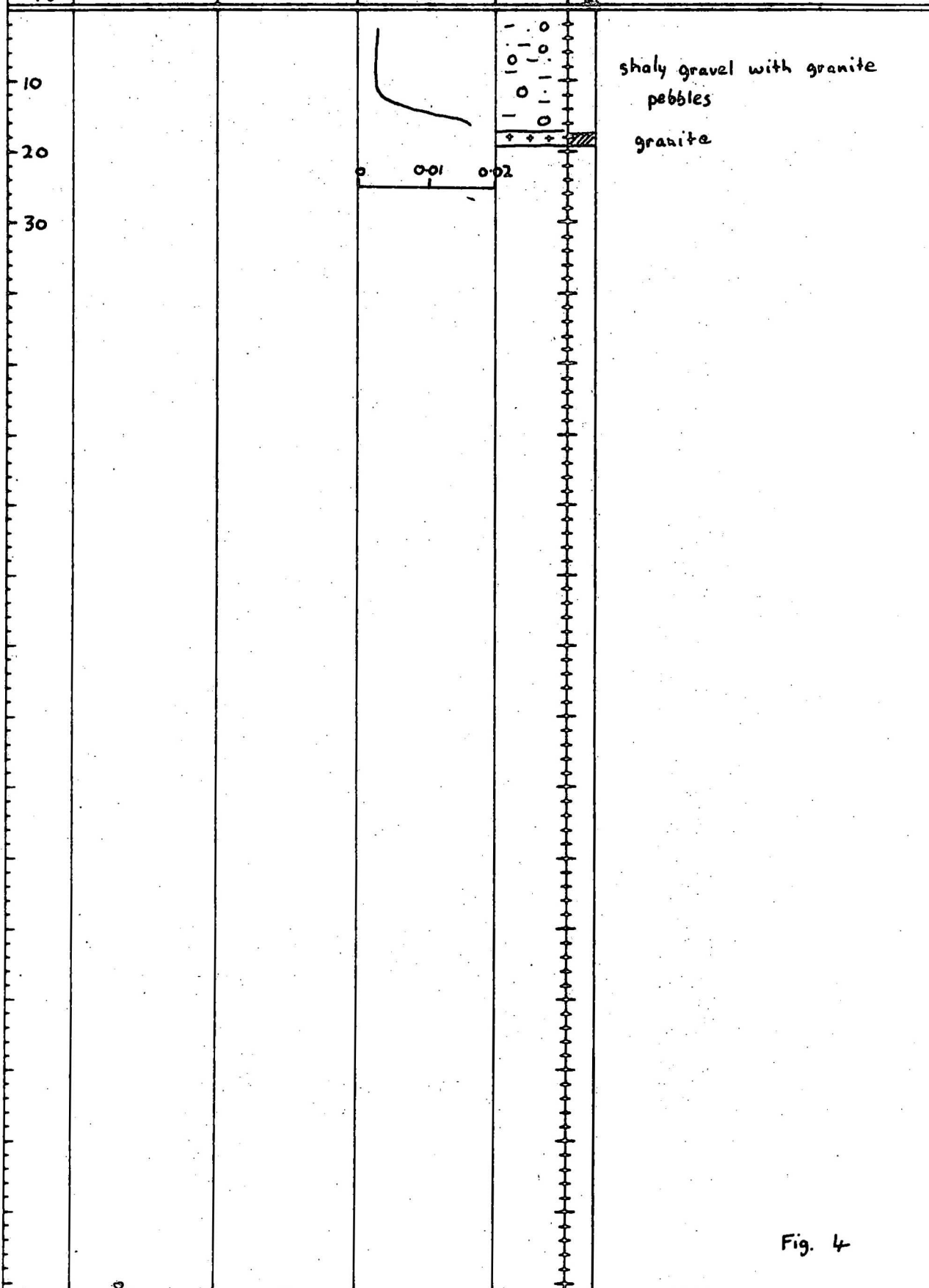
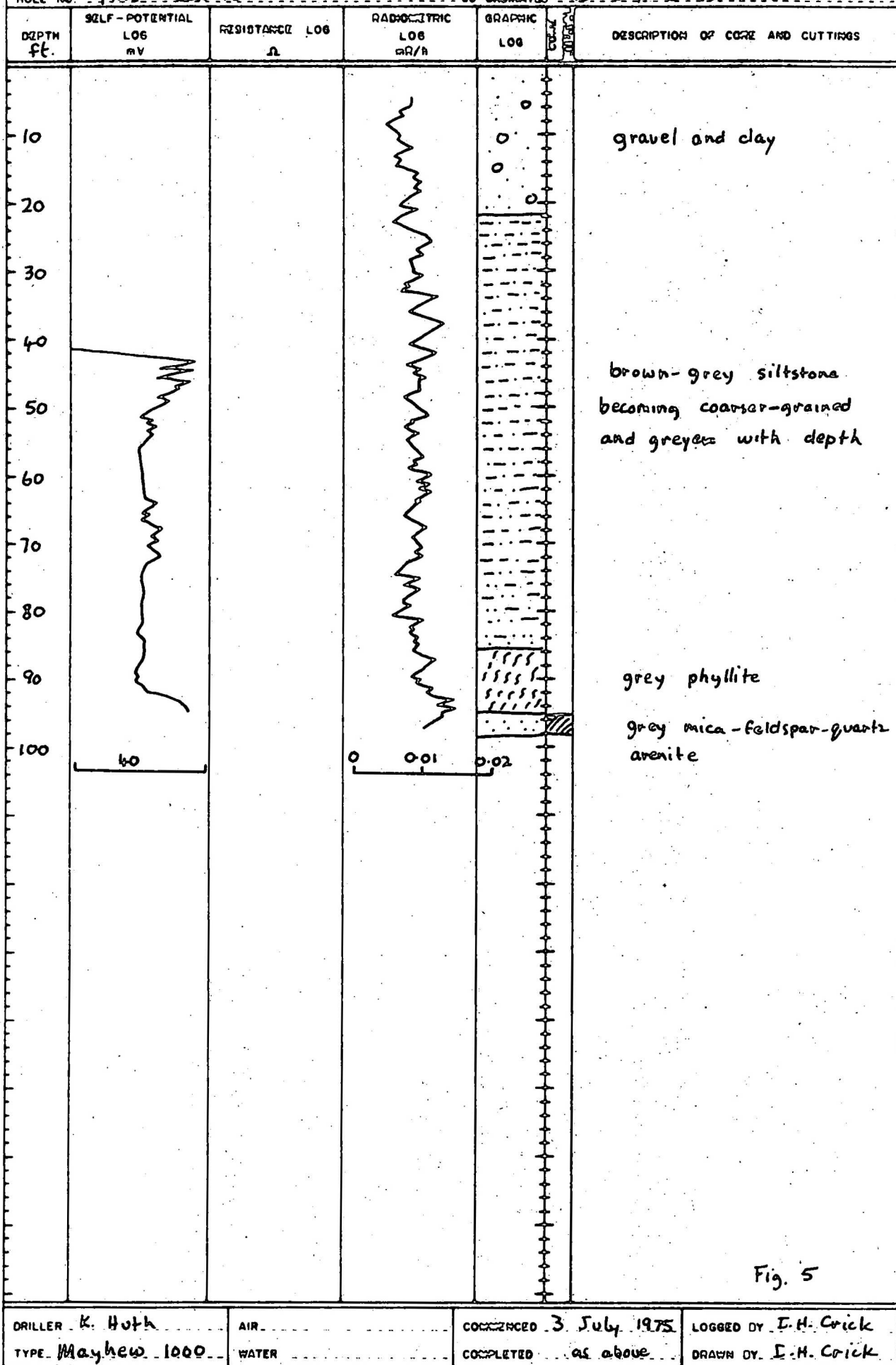


Fig. 4

DRILLER <u>K. Huth</u>	AIR _____	COMMENCED <u>2 July 1975</u>	LOGGED BY <u>I. H. Crick</u>
TYPE <u>Mayhew 1000</u>	WATER _____	COMPLETED <u>as above</u>	DRAWN BY <u>I. H. Crick</u>

## GEOLOGICAL LOG OF DRILL HOLE

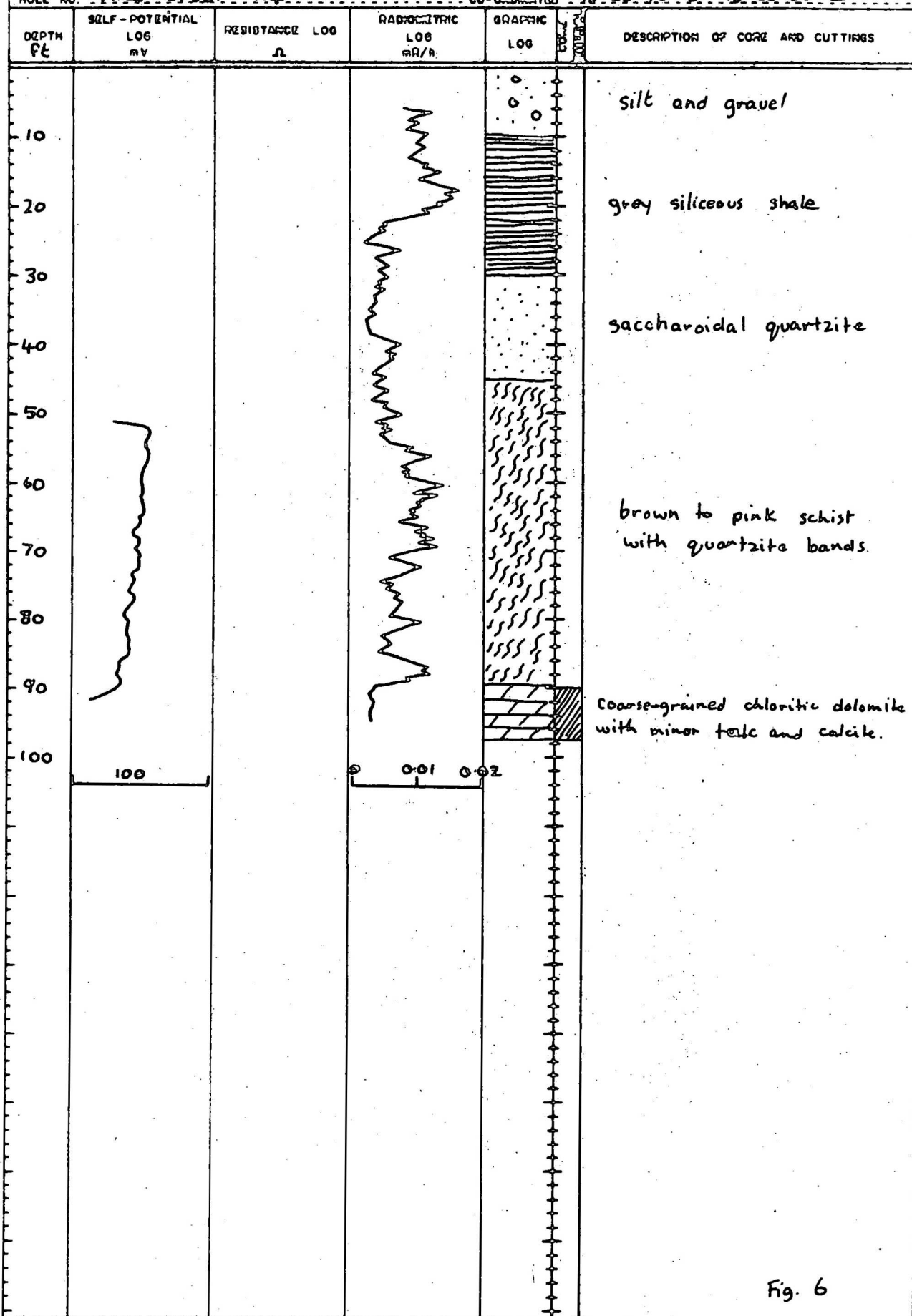
PROJECT Burnside Granite area, N.T. LOCATION 4 km NNE Fountain Head Siding  
 HOLE NO. Pine Creek 15 CO-ORDINATES 13° 26' 40" S 131° 39' 50" E





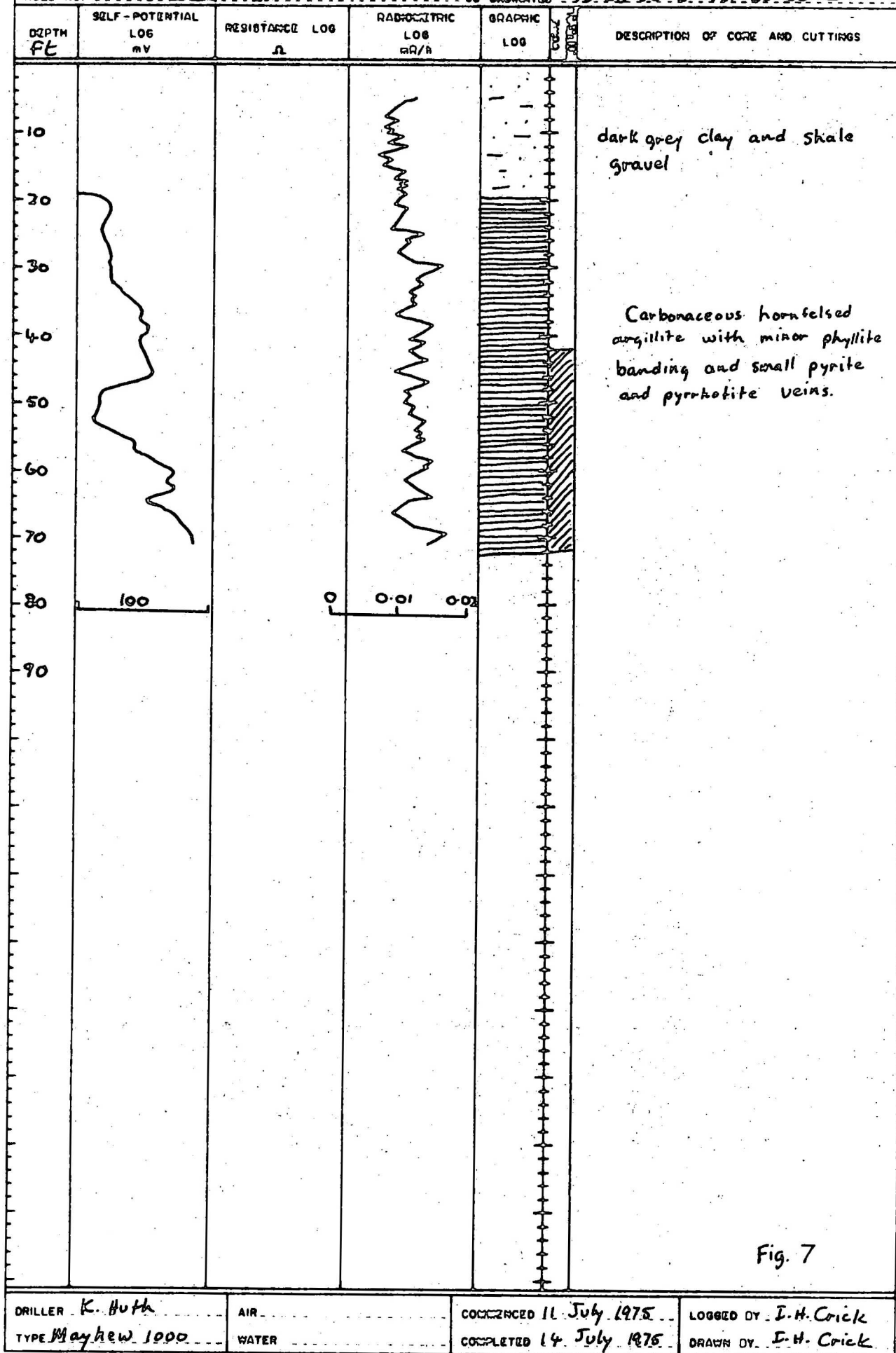
## GEOLOGICAL LOG OF DRILL HOLE

PROJECT Burnside Granite area, N.T. LOCATION 1 km N Howley Ck. Siding  
 HOLE NO. Pine Creek 24 CO-ORDINATES 13° 26' 40" S 13° 22' 30" E



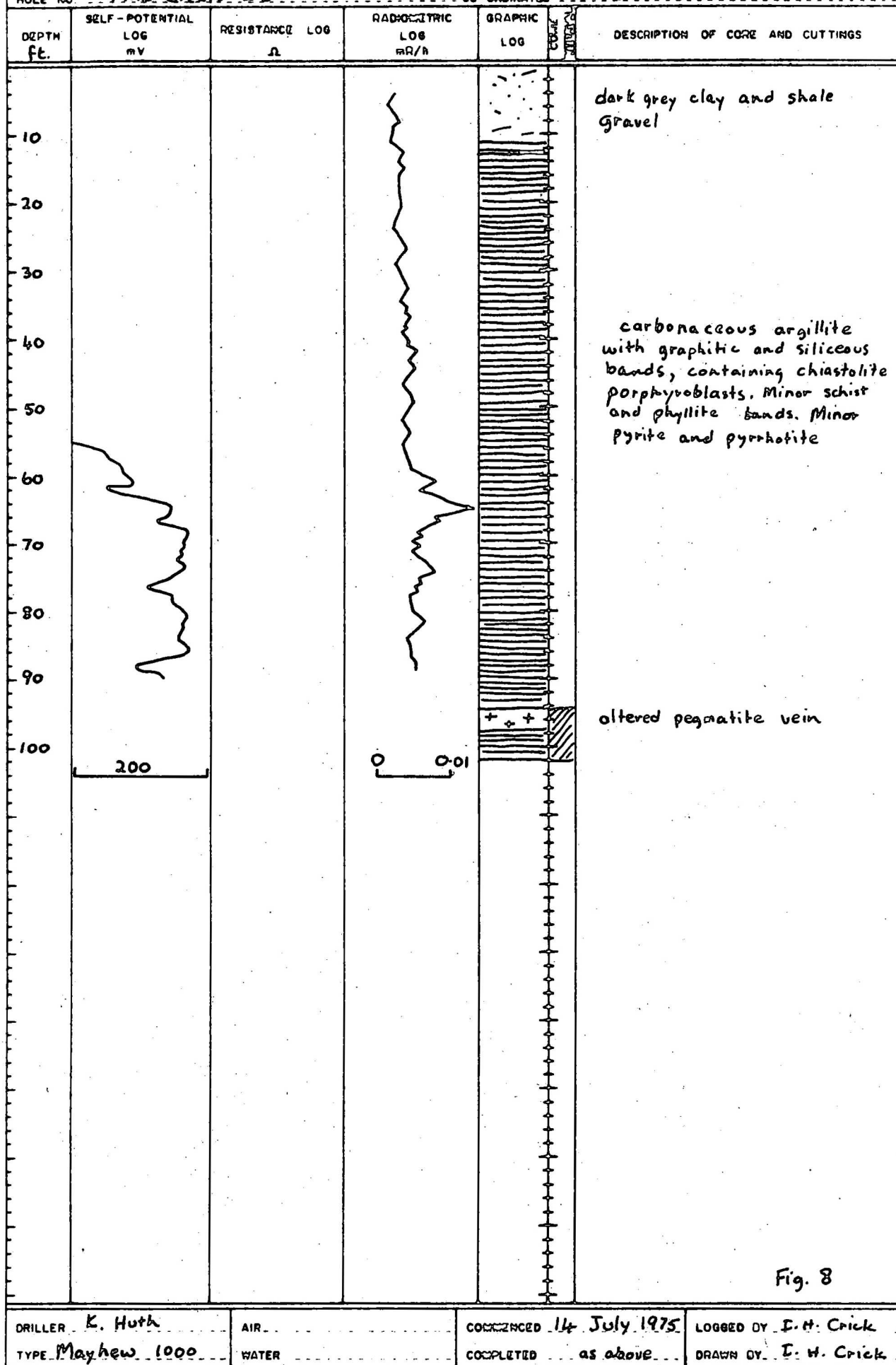
DRILLER <u>E. Huth</u>	AIR	COMMENCED <u>10 July 1975</u>	LOGGED BY <u>E. H. Crick</u>
TYPE <u>Mayhew 1000</u>	WATER	COMPLETED <u>as above</u>	DRAWN BY <u>E. H. Crick</u>

## GEOLOGICAL LOG OF DRILL HOLE

PROJECT Burnside Granite area, N.T.LOCATION 5 km NNE Brocks Crk. SidingHOLE NO. Pine Creek 27CO-ORDINATES 13° 25' 50" S. 131° 26' 30" E

## GEOLOGICAL LOG OF DRILL HOLE

PROJECT Burnside Granite area N.T. LOCATION 5 km NNE Brocks Ck. Siding  
 HOLE NO Pine Creek 2B CO-ORDINATES 13° 25' 50" S 131° 26' 20" E



## GEOLOGICAL LOG OF DRILL HOLE

PROJECT Burnside Granite area, N.T. LOCATION 15 km NNW Ban Ban HS  
 HOLE NO. Pine Creek 30 CO-ORDINATES 13° 15' 10" S 131° 27' E

