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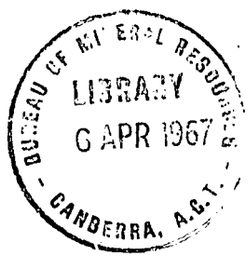

A PETROLOGICAL STUDY OF THE SEDIMENTS FROM MOUNT CHARLOTTE No.1 WELL, AMADEUS BASIN, NORTHERN TERRITORY.

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SUMMARY

This report is the result of the examination of cores and cuttings obtained from Mount Charlotte No.1 Well.

The petrological study has revealed some new information concerning the conditions of sedimentation, the mineral constituents and the cementing media.

Two important characters of the stratigraphy have been disclosed: the non deposition in this area of the Areyonga Formation and the Arumbera Sandstone.

Subdivisions previously defined from surface mapping and exploratory drilling can be justified. In this well from bottom to top they are:

- 2130 feet (true thickness) of Bitter Springs Formation divided into two members
  - The Gillen Member characterised by a highly saline and penesaline environment with primary chlorides, sulphates and precipitated carbonate
  - The Lower Creek Member characterised by normal marine conditions with development of algae.

  Glauconite and phosphate occur in both members.

- 1598 feet of Pertatataka Formation characterised by monotonous chloritic and pyritic shale and siltstone with interlaminated glauconitic and phosphatic sandstone.

- 740 feet of mainly halite and some siltstone correlated with the Chandler Limestone

- 792 feet of Jay Creek Limestone with marine carbonate and interfingering penesaline deposits

Two possible breaks may occur at the base of the Pertatataka Formation and at the base of the Chandler Limestone.

INTRODUCTION

The Mount Charlotte No.1 Well was drilled in the Amadeus Basin (N.T.) as a stratigraphic and structure test of the Mount Charlotte Anticline to a total depth of 6939 feet E - log. The well is situated about 85 miles south of Alice Springs and its co-ordinates are:

Latitude 24°53'41" S
Longitude 133°59'11" E

The aim of this study was to examine in detail the lithology of the Proterozoic and Cambrian rocks and to establish the presence or absence of the Arumbera Sandstone and the Areyonga Formation.

All cores and cuttings samples in the B.M.R. collection were examined. The work carried out on the sediments included a binocular microscope examination of all the available material and a thin section analysis of all cores and selected cuttings. A calcimetry log was prepared with an average interval of 40 feet. Numerous phosphate tests and some heavy minerals separation were made on cores and cuttings. An X-ray diffraction study was carried out on one sample to establish the nature of the phosphate.

DESCRIPTION OF LITHOLOGICAL UNITS

The sediments in the Mount Charlotte No.1 Well have been divided into lithological units based on their composition, texture and structure. All boundaries of the units correlated with formations determined in field outcrop, were delineated by observed lithological changes shown in the samples and on the electric logs.

The lithologies are also shown on the composite well log, Plate 1 (Sheet 1 , 2 and 3)

BITTER SPRINGS FORMATION

In this report the Bitter Springs Formation has been subdivided into two members, a lower halitic, anhydritic and dolomitic unit which may be referred to the Gillen Member and an upper dolomitic unit which may be correlated with the Loves Creek Member.

Equivalent of Gillen Member (T.D.(6939) to 5100 feet).

Lithology:

In this well the member is represented by fine laminated dolomite and anhydrite bands interfingered with halite, black shale, siltstone and very thin streaks of sandstone, especially in the lower part of the member.

Salt:

Grey, beige and pink, very coarse crystalline halite occurs between 6245 and 6112 feet, in a thick sequence including suspended broken pieces of grey and blackish laminated anhydrite with very fine grained dolomite rich in black matter; halite is also present in fine layers, and streaks at 6315, 6360, 6435, 6550, 6560, 6680, 6720 and 6760 feet. These thin salt layers are very well indicated on the micro-caliper by a very sharp increase in hole diamater.

The presence of those, generally highly contorted and truncated broken pieces which occur without any orientation in the salt mass, allow us to consider the salt as intrusive or being injected. It appears ~~that~~ in this unit even if it is in the normal sedimentary position interlayered in a primary anhydritic and dolomitic sequence.

Anhydrite and dolomite form the main components of this sequence; generally both anhydrite and dolomite occur in fine rythmically interlaminated layers with some syn-sedimentary structures. The anhydrite is a dense, microcrystalline, greyish-white rock, locally divided into thin laminae. Under the microscope, anhydrite shows bedding laminae usually 2 to 3 mm. thick; the laminated texture is caused by very thin marly intercalations and particularly by inverted grading of the anhydrite grains; these form a polygonal mosaic with euhedral tendency showing an increase in the crystal size from the base to the top (0.01 to 0.5 mm); the grains are mainly equidimensional, with lamellar sections of tabular individuals with their largest diameter lying in the bedding plane. This "pile of brick" texture (Carrozzi, 1960) is considered as a depositional effect by which elongated grains settled down with their largest diameter parallel to the deposition surface.

The marly layers are composed of very fine carbonate granules, mainly dolomite, of argillaceous matter and in places of haematite.

Generally the contact with the overlying dolomite is very abrupt, but in some cases is gradational with a progressive increase in minute dolomite crystals.

Anhydrite occurs also as isolated patches and lenses piled on top of one another in a anhydritic - dolomitic groundmass; within each lens the crystals are flat, rectangular, in parallel orientation, but the orientation in the adjacent lenses may be quite different, this rock grades to anhydritic dolomitic rocks in which anhydrite consists of a fine grained interlocking mass and dolomite ~~was~~ as small rounded granules disseminated throughout.

Interlaminated within this rythmic primary anhydrite there are five laminae of brownish to blackish-grey, cryptocrystalline dolomite very rich in black matter (bituminous?) and probably some clay; numerous layers have intraformational synsedimentary contortions, microslumping and some breccias with subrectangular elements corresponding to the disruption of the primary laminae.

Dolomite occurs also as thick, compact bands of hematitic cryptocrystalline to microcrystalline dolomite characterized by a variable detrital content (10% to 40%) of angular to rounded, fine to very coarse grains of quartz with scattered pebbles, some orthoclase and microcline, igneous and sericitized rock fragments; fine grained sandstone and carbonate lithics also occur; some of these detrital fragments have haematite coatings. Very rare glauconite grains, muscovite and green biotite occur scattered throughout associated with very rare tourmaline. Intergranular anhydrite and quartz - chalcedonic nodules including minute carbonate crystals are closely related to a diagenetic change, in the dolomite. Phosphate occurs as fine disseminated clusters.

Siltstone and shale, especially some very blackish shale are present in very thin layers grading to very fine sandstone.

The siltstone is very haematitic, also chloritic, locally very micaceous grading to illitic shale, with scattered rounded conglomeratic quartz, feldspar, igneous and sandstone rock fragments; dolomite content is always very low (about 5%), recrystallized anhydrite occurs in patches or fine fissures.

Sandstone is present, interbedded in the siltstone, in very fine layers; fine to very fine, exceptionally coarse grained, angular, well sorted quartz sandstone, with rare potassium feldspar, igneous and sericitized rock fragments, also some microquartzite; muscovite is present in minor amount; glauconite occurs as green to light brown grains, pellets or elongated crystals. The glauconite grains are full of cracks which is characteristic of primary glauconite. The elongated crystals show progressive changes between green biotite, pleochroic with a second order polarisation to typically developed green glauconite with a loss of their micaceous form and an increase in volume; numerous glauconite grains are altered to chlorite. Phosphate grains are present in all sandstone streaks in the forms of light pink to amber brown rounded grains, with high refringence (about 1.70) which appear to be detrital particles not different from the quartz grains; all these grains are in intimate association with fine quartz, but the phosphate is dominant. Phosphatic matter is also present in fine interstitial granules.

Several phosphate tests have been undertaken on samples of this section; the table of Appendix 3 shows the result. An X-ray diffraction test has been undertaken on one sample (5440 - 5450 feet) to determine the nature of the phosphate which appears to be well crystallized strengite ($FePOP_4 - 2\ H_2O$) (see Appendix 3.).

The cementing media is composed of quartz overgrowths, chlorite in flakes, in fine coatings or in pigments, some sericite but very abundant pyrite and limonite; carbonate minerals, anhydrite and rare gypsum have a diagenetic origin.

Equivalent of the Loves Creek Member (5100 feet to 4670 feet).

Lithology:

This sequence which has been tentatively correlated with the Loves Creek Member is a predominantly dolomitic unit with some interlaminated shale, siltstone and sandstone streaks with the same lithology as above. In this unit salt does not occur, nor does primary anhydrite and blackish dolomite, also the carbonate content is slightly higher than in the equivalent of the Gillen Member.

Dolomite: These rocks are predominantly white, also pink, compact or finely laminated, cryptocrystalline to microcrystalline with more or less haematite in fine clusters or intergranular spots; several coarse-grained dolomite rhombs are developed in grey to pink quartz- chalcedonic nodules. About 70% of this dolomite contains a variable detrital content with the same composition as the detrital dolomite in the Gillen Member.

Pellets occur in some levels as concretions and recrystallised algal structures.

Anhydrite and gypsum are present as intrusive layers, as spots in dolomite, siltstone and sandstone, disturbing the rock body, or as intergranular crystals.

In this unit the sulphate may be considered as of secondary origin in relationship with diagenesis changes and structural deformations.

Porosity

Throughout the total thickness of the Bitter Springs Formation, porosity is absent.

~~Bedding dips from core evidence and true thickness~~.

TABLE I.

Core	Depths in feet	Dip angle	Exoil Interpretation	This report	
15	4767	15°	Un-named Formation	Loves Creek Member	BITTER SPRINGS FORMATION
16	5040	4°			
17	5145	10 - 15°			
18	5300	25°	Bitter Springs Formation	GILES CREEK MEMBER	
19	5420	25°			
20	no recovery				
21	5821	not determinable			
22	6150	" "			
23	6385	20°			
24	6703	not determinable			
25	6750	30°			
26	6940	40°			

Table I indicates a normal increase of the dip angle with the depth. The average dip angle chosen for the Bitter Springs Formation in this report is 20° and the true thickness is 2130 feet. (2269 feet drilled thickness).

Contact between Bitter Springs Formation and Pertatataka Formations. This contact is indicated in the cuttings log by a sharp change in the lithology, and in the electric log by an increase in the resistivity and in the gamma ray log by an increase in value.

Lithification

In this mainly dolomitic sequence the changes that have taken place have been primarily due to lithification by compaction as shown by numerous styolites rich in black matter, although there is some recrystallization, doldmitization, silicification and development of anhydrite.

Dolomitization: In this evaporitic sequence the dolomitization must be considered generally as primary in association with precipitation of sulphate. Nevertheless, in the Loves Creek Member secondary dolomitization has taken place. This is evident in the carbonate rocks rich in pellets and algal structures.

Silicification: The silicification in the form of chalcedonic-quartz nodules is only present in the carbonate rocks including numerous minute carbonate crystals; very rare crystallization of secondary quartz with regular crystal form has been noticed.

Anhydrite and gypsum: Development of intrusive anhydrite and some gypsum in the form of crystals in dolomite, siltstone and sandstone, or filling cavities and fissures, have been noticed. The thick sequence of interlaminated anhyddite and dolomite may be considered as a primary precipitation of sulphate. The absence of primary gypsum could be explained by local thermal recrystallization accompanied by some differential deformation but metamorphism is not required to explain any of the secondary changes in this formation.

Salt intrusions: The detailed study of the cores in the salt sequence has revealed that the salt must be considered as intrusive but probably only local movement has taken place; it is normal to expect salt layers in this environment.

Environment

The Bitter Springs Formation must be considered as an association of evaporites and primary sedimentary accumulations including chlorites, sulphates, and inorganically precipitated carbonates. This succession is characterised by a marked cyclical repetition of members representing stages in the restriction of a seaway and the concentration of soluble salts. From the base to the top of the Bitter Springs Formation there is a gradual return to normal marine conditions indicated by the appearance of algae. These stages, which appear to be in reverse order, have been summarized in Table 2.

TABLE 2.

Environment	Description of main lithologies	Thickness in feet.
Normal marine	Dolomite with algal structures	432
Penesaline	Fine laminated dolomite and anhydrite.	1012
Saline	Halite with interbedded rythmic anhydritic dolomite and anhydrite.	830

Shale siltstone and numerous fine streaks of sandstone intervene and interrupt the stages and emphasize rapid changes in this evaporitic environment. The presence of glauconite, phosphate, pyrite and black matter (bituminous?) indicate anaerobic conditions and a slightly lower than normal pH. These sediments have been laid down in shallow water conditions in a basin which evolves from a saline to marine environment in which the coarse grained pebbles, indicating alluvial deposits, have been introduced.

PERTATATAKA FORMATION

The Pertatataka Formation (3072 - 4670 feet) is a monotonous sequence of grey greenish shale and siltstone with interlaminated very thin, sandstone streaks. Near the contact with the Bitter Springs Formation rare dolomite bands occur.

Lithology

Siltstone and shale, the predominant lithologies, occur as grey-greenish, also very rare brownish red, finely laminated rock; muscovite and some green biotite accentuate the bedding. The cementing media is composed of chlorite, illite?, limonite and haematite, with pyrite and black matter; minute dolomite crystals occur throughout.

Sandstone is present in fine laminae grading to siltstone and shale and composed of very fine to fine grained, angular, well sorted quartz, some potassium feldspar, very rare albite, igneous and sericitized rock fragments and exceptional muscovite. Authigenic glauconite occurs in grains, pellets or even in pigments and some in irregular aggregates moulded around detrital quartz particles. The glauconite is commonly associated with phosphatic grains (see also Appendix 4). Opaques, tourmaline, zircon and apatite form the accessory minerals. Cement is chlorite in different forms as well as some kaolinite, sericite, intergranular quartz and a very small amount of dolomite.

Porosity

The formation has no porosity.

Comments on the formation boundaries.

The contact with the Bitter Springs Formation is well defined as discussed above. It has not been possible to prove an angular unconformity between the formations but an unconformity must be expected because of the absence of the Areyonga Formation.

The detailed study of the top of the Pertatataka Formation shows that between 3130 and 3072 feet a progressive change appears in the lithology with the appearance of more reddish, sandy siltstone and interbedded fine grained sandstone beds, well indicated on the electric log and the gamma ray; both logs show a progressive change.

The rounded, coarse grained, reddish coated loose quartz and igneous quartz fragments, which appear between 3090 and 3072 feet appear to be cavings and belong to the Chandler Limestone. The petrological study of those sediments do not allow any correlation of this section with the Arumbera Sandstone; their reddish colour could have a secondary origin probably by weathering and dissolution of the overlying salt section. The limit has been picked at 3072 feet, at the contact with the salt, which is included in the Chandler Limestone.

Lithification

The major changes which have taken place in this formation have been in the form of compaction in the shale and siltstone, development of chlorite and glauconite in the sandstone and some dolomitization.

Environment

The thick and monotonous sequence of siltstone and shale with sandstone streaks could be considered as a relatively deep water sedimentation in quiet conditions and little oxygenated. However, the presence of glauconite and phosphate grains in the fine grained sandstone indicates a continental shelf environment.

CHANDLER LIMESTONE

In Mount Charlotte No.1, the Chandler Limestone is mainly an evaporitic section with a thin siltstone and dolomite sequence. Those sediments are present in this well between 3072 and 2332 feet.

Lithology

Salt occurs from 3072 to 2900 feet and 2798 to 2332 feet.

The halite is light pink, coarse crystalline with interbedded reddish clayey siltstone and scattered angular to rounded, coarse-grained quartz, potassium feldspar and some green biotite; several quartz lithics have reddish iron coatings; minute anhydrite and carbonate crystals occur throughout.

Very ferruginous, cryptocrystalline and slightly calcitic dolomite, haematitic mudstone and siltstone, slightly halitic and anhydritic with angular to rounded, coarse grained, ferruginous clastics occur between the salt sections.

Porosity

No porosity is apparent in this formation.

Limit

Both salty sections are very well indicated in the cutting log and by the electric and gamma ray logs, but especially by the caliper which indicatesmarked hole enlargement.

Lithification

In this evaporitic section diagenetic changes are obscured by the salt.

Environment

Deposition of the Chandler Limestone occurred in a highly saline environment with primary halite precipitation and minor clastics.

JAY CREEK LIMESTONE

The Jay Creek Limestone is present in Mount Charlotte No.1 Well between 2332 and 1540 feet. This predominantly silty formation with rare sandstone layers and interbedded sandy and anhydritic dolomite is characterized by its high anhydrite content and the presence of some algal structures; the interbedded dolomite represents 20% of the total thickness.

Lithology

Dolomite, which occurs in thin bands and interfingers with the detrital sequence, is compact to micro-laminated, cryptocrystalline to microcrystalline, slightly calcareous (between 10 and 20%), locally recrystallized in perfect dolomite rhombs, detrital content is in the form of angular, silt sized exceptionally coarse grained quartz, some potassium feldspar, muscovite and green biotite; haematite occurs in fine concretions or in intergranular, minute crystals. Some recrystallized algal? structures, also "rosettes", lumps and numerous carbonate concretions occur; glauconite occurs in small grains and rare chalcedonic quartz nodules.

Clayey shale, haematitic and micaceous, slightly calcareous, also chloritic siltstone are present grading to thin interlayers of very fine and angular slightly sericitic, chloritic and dolomitic sandstone.

Anhydrite and a small amount of gypsum occur with different textures:

- in lenses or patches, parallel to the bedding, mainly as equidimensional tabular individuals showing a "pile of brick" texture; in each lens, the anhydrite crystals have their own orientation, this anhydrite, occurring in the lower part of the formation, is interbedded with anhydritic dolomite or greyish cryptocrystalline dolomite
- as intergranular crystals, pseudomorphs after carbonate
- as microgranular crystals filling fractures, fissures and voids.

Porosity

The presence of some small vugs in the dolomitic bands indicate the presence of some porosity.

Contacts

The upper boundary with the Stairway Sandstone is well indicated in this well by a change in the silty and carbonate sedimentation grading to very coarse sandstone.

Lithification

Diagenesis is indicated by recrystallization of the carbonate, slight silicification in the form of quartz overgrowth in the sandstone and chalcedonic chert in the carbonate. Recrystallization of anhydrite followed the tectonic deformation.

Environment

The Jay Creek Limestone represents a shallow marine environment with a development of algae interfingering with penesaline deposits.

CONCLUSIONS

The petrological study of Mount Charlotte No.1 Well has shown that the subdivisions, defined from surface mapping can be correlated with

- 2130 feet of Bitter Springs Formation, divided into a lower unit, the Gillen Member and an upper unit of the Loves Creek Member.
- 1598 feet of Pertatataka Formation
- 740 feet of Chandler Limestone
- 792 feet of Jay Creek Limestone

and has shown that the Areyonga Formation and the Arumbera Sandstone are absent.

In this area the sedimentation during the Proterozoic and the Cambrian is characterized by two sequences of primary chlorite, sulphates and carbonates with development of algae separated by the monotonous shale of the Pertatataka Formation. These primary precipitation deposits, indicate a peneplained land area with arid climatic conditions.

A possible source rock could be the black shale in the Bitter Springs Formation but the general lack of porosity in the whole well does not allow any assumption of reservoir conditions.

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APPENDIX I.

CORE DESCRIPTIONS OF MOUNT CHARLOTTE NO.1 WELL

Jay Creek Limestone

C.4 1565 feet - Hard, light grey to reddish, slightly micaceous dolomite, presence of some small vugs.
Microcrystalline, finely haematitic dolomite with some scattered pyrite crystals.

1571 feet - Hard, greyish-green to reddish dolomite with sharp interlaminations; very thin bedded and wavy, very fine sandstone, siltstone and shale in contrasting colours of predominantly greenish, also grey and dark grey-brown.
Cryptocrystalline to microcrystalline dolomite with variable haematite and detrital quartz and oriented muscovite content with

- interlaminated, graded bedding, very fine sandstone grading to siltstone, rich in muscovite and greenish biotite on bedding planes with a calcareous and chloritic cement
- silty shale, very clayey (illite?) and rich in hydromuscovite

The percentage of calcareous matter decreases as the detrital and the clay content increase.

C.5 1832 feet - Grey white, dense to finely crystalline dolomite with greyish, very thin, poorly developed laminae and several, dark grey, crystalline spots.
Cryptocrystalline to microcrystalline dolomite, with concretionary structure and 5% microgranular anhydrite crystals scattered throughout.

1840 feet - Rusty red, gritty, very micaceous silty shale and siltstone with scattered white subspherical nests of anhydrite, ranging from pellets to 2 cm in size with the long axes parallel to the bedding.
Very haematitic siltstone, rich in iron concretions, muscovite and green biotite, calcareous with anhydrite either in nests bedded and elongated, either in form of scattered intergranular or microgranular crystals.

1843 feet - Greenish-grey, dense dolomite with broken laminae (1 to 2 cm thick) of rusty red and green shale and siltstone with abundant broken beds of white pure anhydrite in horizontally oriented flattened pieces ranging from flake size to 4 cm in the longest dimension and some very fine anhydrite layers.
Cryptocrystalline dolomite with fine layers of cryptocrystalline to microcrystalline, elongated anhydrite mixed with minute dolomite crystals and microgranular elongated anhydrite in nests; detrital quartz content, very variable, is located in fine layers, alternating with more clayey silty shale rich in muscovite and green biotite.

1845 feet - Rusty-red, compact shale grading to siltstone with some green nodules.
Very haematitic, calcitic and dolomitic silty shale and siltstone, rich in oriented muscovite and green biotite.

C.6 - 2203 feet - Greyish-green, dense and compact dolomite spotted with small white chips.
Cryptocrystalline to microcrystalline dolomite, locally microlaminated with 10% detrital, angular and silt-sized quartz, muscovite and rare brownish-green biotite, anhydrite occurs in nests as microcrystalline, elongated crystals with a typical "pile of brick" texture.

2205 - 2217 feet - Dark reddish-brown, slightly gritty, micaceous, silty shale, with irregular white anhydrite patches.
Very haematitic, micaceous, and calcareous siltstone.
Dip horizontal to 2°.

C.7 - 2303 feet - White to light grey, hard, finely laminated dolomite by very thin, greyish and brown layers of anhydrite with several vertical fractures filled with anhydrite. On the upper part of this core appears a black, argillaceous slickenside with a resinous luster and traces of horizontal movement. Cryptocrystalline dolomite with a great amount of microgranular anhydrite crystals, well developed in layers and in irregular fissures.

2305 feet - Grey, dense and compact dolomite.
Cryptocrystalline, calcitic dolomite, rich in carbonate pellets and several, recrystallized structures (algae?); detrital content is variable between 5 to 10% with coarse to silt-sized, rounded to angular quartz grains, igneous chert fragments and rare muscovite; glauconite is present in very small amount; microgranular anhydrite fills vugs and fractures.
Dip 10°.

Chandler Limestone

C.8 - 2609 - 2629 feet - Core broken into small pieces of coarse crystalline, clear to light pink salt; the lower half is mixed with reddish, clayey siltstone and scattered, angular to rounded, coarse quartz, rare orthoclase, some carbonate and anhydrite.

C.9 - 2905 - 2925 feet - Core broken into small pieces of pink and pinkish-brown, coarse crystalline salt.

Pertatataka Formation

C.10 - 3179 feet - Hard, greyish, laminated siltstone with very fine sandstone layers. A vertical fracture is filled with white anhydrite.
Sandstone: fine-grained, angular, well sorted quartzitic sandstone with 75% quartz, some orthoclase, microcline, albite, altered rock fragments, chalcedonic-quartz lithics; more or less altered, fine-grained glauconite, green biotite. Accessory minerals are tourmaline and zircon. The cement is composed of kaolinite slightly sericitized, intergranular quartz, limonite or haematite, chlorite, sericite and some dolomite.
Dip 12°.

C.11 - 3508 feet - Core broken into pieces of greyish-green, micaceous siltstone with very fine bedding planes rich in muscovite and green biotite, cement is chlorite, sericite and some black matter, cryptocrystalline calcite dolomite crystals are scattered throughout.

C.12 - 4033 feet - Core broken into pieces of grey-brown shale, finely laminated with interbedded fine streaks of very haematitic silty shale alternating with very fine siltstone layers.

C.13 - 4532 feet - Core broken into small pieces of greyish brown siltstone, finely laminated, micaceous and calcareous. Laminations are due to variation in iron mineral content; sericite and rare green biotite flakes appear parallel to the bedding.

Bitter Springs Formation

C.14 No recovery

C.15 - 4767 feet - Red brown, hard dolomite with some irregular patches of iron concentration and some greyish-white dolomite; bedding planes disturbed.
Cryptocrystalline to microcrystalline, very haematitic dolomite with subhedral dolomite rhombs usually coated by iron oxide; scattered, fine-grained, angular quartz occurs throughout with some orthoclase and rare mica, some of the quartz grains have a perfect authigenic hexagonal form.
Dip 15°.

C.16 - 5025 feet - Grey, very hard, compact and dense dolomite with vaguely defined bedding; numerous blackish stylolites occur. Cryptocrystalline to microcrystalline dolomite interlaminated with very thin, undulating clay layers and siltstone streaks rich in muscovite and brownish biotite, parallel to the bedding, chlorite occurs rarely in these laminae; quartz and potassium feldspar are present throughout associated with rare pyrite, tourmaline, zircon and opaques.

- 5033 feet - Grey, very hard, compact and dense dolomite with numerous blackish subhorizontal stylolites. Cryptocrystalline dolomite crowded with algal structures and rare silt sized, angular quartz grains.

- 5044 feet - Blackish-grey, very hard, compact and dense dolomite with numerous subhorizontal stylolites. Cryptocrystalline dolomite with a detrital content of 40% of silty to coarse grained, rounded to angular, poorly sorted quartz (dominant), with some silica overgrowths, rare orthoclase, microcline igneous quartz lithics, quartz-chalcedony chert and rare dolomite fragments occur with fine haematite coatings; tourmaline is present.

- 5047 feet - As above (5044 feet) but with secondary coarse intergranular anhydrite.
Dip 3° to 4°.

C.17 - 5140 feet - Grey-white, compact and dense anhydrite with some wavy blackish laminations interbedded every 3 or 4 cm. This anhydrite shows regular shape, very well-formed rectangular outline, corresponding to the fact that the normal habit of the mineral is tabular. This close packing is termed the "pile of brick" texture typical of primary anhydrite; it is due to the tendency for the crystals to be oriented with the low axis roughly parallel to the bedding. Very abrupt changes in the direction of orientation are frequent. Graded bedding is visible, and with minute dolomite crystals appear, a decrease in grain-size.

(C.17 - 5140 feet cont.)

The thin layers are made up of cryptocrystalline dolomite, scattered silt sized quartz grains and muscovite; the presence of clay and opaque matter could explain the dark colour.

5142 feet - as above.

5145 feet - Blackish-grey, dense, laminated dolomite with interbedded layers of white, crystalline anhydrite; some layers are broken into lenses or patches. Many vertical fractures are filled with anhydrite.
Microscopic description is as above (5140 feet).

C.18 - 5292 feet - Pink to reddish, also grey-green, anhydrite with disturbed layers of dolomite.
Microcrystalline anhydrite with characteristic "pile of brick" texture occurs together with inverse graded bedding showing grading to a mixture of minute anhydrite crystals and cryptocrystalline dolomite. The dolomite bands contain scattered silt sized quartz and muscovite flakes; indistinct clay content must be present.

5296 feet - Greyish-green and reddish, dense dolomite with interlaminated anhydrite and shale; fissures are filled with white anhydrite. Cryptocrystalline to microcrystalline dolomite with a high detrital content of angular to rounded, coarse grained quartz, potassium feldspar and quartz-chalcedonic chert, grades into microcrystalline anhydrite with "pile of brick" texture overlain by dolomitic and illitic shale.

5298 feet - Reddish, compact and dense, white spotted dolomite, Cryptocrystalline to microcrystalline haematitic dolomite with variable detrital content (10 to 40%) of silty to coarse grained, angular to rounded, poorly sorted quartz, rare orthoclase, microcline, granoblastic chert fragments, sandstone and dolomite pebbles and 5% unoriented muscovite; a few quartz-chalcedonic chert grains without haematite coatings, and anhydrite which occurs in lenses parallel to the bedding or in isolated intergranular crystals are both considered to be primary.

5301 feet - Grey, compact and dense, finely laminated and concretionary cryptocrystalline dolomite with rare silt sized to coarse grained quartz scattered throughout.
Some fissures are filled with white crystalline anhydrite.
Dip 25°.

C.19 - 5417 feet - Fine laminae of dark blackish-grey cryptocrystalline dolomite rich in black matter interlaminated with white crystalline anhydrite with "pile of brick" texture; numerous layers have formational contortions and collapse structures indicating a plastic sedimentary environment.

5422 feet - Grey to light grey rock composed of cryptocrystalline dolomite and cryptocrystalline to microcrystalline anhydrite with some very fine grained dolomite concretions, pyrite is abundant. Fissures are filled with anhydrite.
This is a synsedimentary reworked primary dolomite in a dolomitic anhydritic sequence.
Dip 25°.

C.20 No recovery

C.21 - 5819 feet - Blackish grey, very brittle and fissile silty shale showing slickensides, with very fine laminae of micaceous siltstone, rich in pyrite and illitic cement.

5821 feet - Interbedded, thin layers of :

- anhydrite, coarse to fine-grained, with "pile of bricks" texture including fine grained, angular quartz and some clay content,
- silty shale and siltstone, illitic and micaceous
- black shale, very rich in black matter.

Vertical fissures are filled with radiating anhydrite.
Dip 8° to 10°.

C.22 - 6137 feet - This core is composed mainly of beige, coarse-grained crystalline salt with pieces of grey and black, fine-grained orientated anhydrite with cryptocrystalline dolomite and black matter; these pieces occur suspended in the salt mass.

C.23 - 6381 feet - Greyish white, dense and compact anhydrite, with a characteristic "pile of brick" texture, minute dolomite crystals and some haematite occur throughout.

6385 feet - Reddish, compact and dense dolomite with interbedded white to pink, also greenish layers of anhydrite and some reddish shale.
This is a very haematitic, detrital dolomite with angular to rounded, silty to coarse-grained, poorly sorted quartz, rare orthoclase and microcline, some granoblastic igneous chert; anhydrite in intergranular texture is partly developed.
Fractures are filled with anhydrite.
Dip 20°.

C.24 - 6703 feet - Grey, compact and dense, micro-bedded anhydrite with very thin black layers and some white to light pink spots; sedimentary structures are micro-slumping, contorted, wavy and overfolded beds.

C.25 - 6750 feet - Grey to white, finely laminated anhydrite with "pile of brick" texture and blackish, fine-grained dolomite in very thin layers, intimately interbedded with the anhydrite.

6755 feet - Dark amber to blackish, coarse crystalline salt with a high content of black matter.
Some fracture filled with anhydrite and salt intersects this core.
Dip 30°.

C.26 - 6941 feet - Grey to dark grey, hard and dense, compact, cryptocrystalline dolomite, slightly haematitic grading to black, banded calcareous shale present in fine lenses or finely interbedded with dolomite.
Dip 40°.

APPENDIX 2.

CUTTING DESCRIPTIONS - MOUNT CHARLOTTE No.1 WELL.

by

S. Ozimic (I.F.P.)

1400 - 1440 feet : 50% to 70% grey and light pink, angular, moderately sorted, very fine to fine grained sandstone; few fragments contain lithics. 28% to 40% red, pink, green and grey micaceous siltstone. Some fragments of white to light pink altered material. Few loose subrounded to rounded quartz grains.

1440 - 1470 feet : 80% sandstone as above (1400 - 1440 feet)
20% micaceous siltstone as above (1400 - 1440 feet).

1470 - 1480 feet : 85% green, pink, red, white and yellowish, angular, moderately sorted, very fine to fine grained sandstone. 13% grey, yellow, red, pink and green, micaceous siltstone. Some fragments of white to light pink material. 2% clear, subrounded to rounded, poorly sorted, medium to very coarse-grained quartz.

1480 - 1550 feet : 5% to 35% white to light pink, angular to rounded, moderately sorted, very fine to very coarse grained sandstone. 5% to 15% greenish grey to brown, micaceous siltstone. Some fragments of altered material.
50% to 90% clear, white to pinkish, angular to rounded, moderately to well sorted, fine to very coarse grained; quartz; about half of the amount consists of well rounded, poorly sorted pebbles, 2 to 5 cm. across.

1550 to 1760 feet : 5% to 35% red, grey, greenish, brown angular to rounded, moderately to well sorted, very fine to very coarse grained sandstone . 35% to 95% green, red, brown micaceous siltstone and claystone. 1% to 45% yellowish grey fragments of limestone. Traces of white to light grey dolomite. Some loose grains of quartz.
Up to 10% of gypsiferous fragments.

1760 to 1870 feet : 30% to 85% red, grey, brown, micaceous, slightly sandy and dolomitic siltstone. 15% to 70% white to medium grey fragments of dolomite. Few fragments of sandstone and few loose grains of quartz.

1870 - 1930 feet : 85% red, grey, brown micaceous siltstone. 5% white to light grey fragments of dolomite. 10% white to pink fragments of anhydrite and gypsum.

1930 - 2330 feet : This interval consists mainly of red, brown and grey micaceous siltstone, some fragments are very calcareous and show abundant fractures containing dolomite.
Up to 100% of white to light grey fragments of dolomite with traces of anhydrite and some gypsum. Some fragments of grey to greenish sandstone, which apparently is caved at this depth. Few grains of loose quartz.

2330 - 2780 feet : 100% of white, finely crystallized salt.

2780 - 3020 feet : 20% to 60% red and grey, micaceous, chloritic spotted siltstone. Up to 10% white and grey fragments of dolomite. 25% to 80% white, finely crystallized salt.

3020 - 3070 feet : 100% white, finely crystallized salt.

3070 - 3110 feet : 50% to 65% red, micaceous, calcareous, chloritic spotted siltstone. 25% to 30% clear to red stained, subrounded to rounded, moderately sorted, fine to very coarse grained quartz. 10% to 25% white, finely crystallized salt.

3110 - 3140 feet : 100% red, grey, micaceous, calcareous siltstone. Some loose grains of quartz. Traces of salt.

3140 - 3440 feet: 40% to 95% grey to greenish, micaceous, chloritic spotted siltstone. Few fragments of dark grey shale. 5% to 60% clear to greenish and brown, angular, moderately sorted, very fine to very coarse grained sandstone. Some fragments contain lithics. Traces of glauconite pellets. 5% to 10% white, fine crystallized salt.

3440 - 3450 feet : 100% grey to light green, micaceous siltstone. Traces of lithic sandstone and some salt.

3450 - 4000 feet : 80% to 90% brick red to grey, micaceous, slightly calcareous siltstone. Some fragments of siltstone contain rounded, coarse grains of quartz, 10% to 20% grey, angular, poorly to moderately sorted, very fine to very coarse grained, chloritic spotted, lithic sandstone. Some pellets of glauconite.

4000 - 4680 feet : 75% to 100% brick red to grey, micaceous siltstone. 5% to 25% yellowish grey fragments of dolomite. Some anhydrite. Traces of chloritic sandstone.

4680 - 4760 feet : 10% to 30% red to brown, micaceous siltstone. 65% to 85% white to orange, fragments of dolomite. Up to 5% red fragments of chalcedony. Some salt and a few fragments of sandstone.

4760 - 4800 feet : 20% to 45% red, brown and grey, micaceous siltstone. 55% to 80% white, grey, orange to red, fragments of dolomite. Some fragments of chalcedony. Traces of salt.

4800 - 4820 feet : 100% red, grey, orange, fragments of dolomite. Some fragments of chalcedony. Traces of salt.

4820 - 4860 feet : No samples.

4860 - 6000 feet : 10% to 65% red, grey, greenish brown, micaceous siltstone with traces of glauconite spots. 10% to 20% red, grey, brown and clear, angular to subrounded, moderately sorted, very fine to very coarse grained, chloritic spotted sandstone. Some pellets of glauconite. Few red stained, well rounded quartz grains and pebbles. 25% to 80% white to grey fragments of dolomite and anhydrite.

6000 - 6600 feet : 20% to 40% red, greenish grey, brown, micaceous siltstone with traces of glauconite and chlorite. 5% to 10% red, grey, brown and clear, angular to rounded, moderately sorted, very fine to very coarse grained, chloritic spotted sandstone. Some glauconite pellets. 45% to 70% white, grey and red fragments of dolomite and anhydrite.

6600 - 6943 feet : 25% to 40% red, grey, greenish brown, micaceous siltstone and some shale. Some fragments are spotted with chlorite. 5% to 10% red, grey and brown, angular to rounded, moderately sorted, very fine to very coarse grained, chloritic spotted sandstone. Some pellets of glauconite. 55% to 70% white, grey to red, fragments of dolomite and anhydrite.

APPENDIX 3.

X-RAY ANALYSIS

An X-Ray diffraction analysis has been carried out on sample 5440 - 5450 feet (Bitter Springs Formation), by J.M. Rhodes (B.M.R.). Strengite $FePO_4 - 2H_2O$ and minor chlorite has been revealed. The complete results are given in the following table.

Sample 5440 - 5450 feet			A.S.T.M. index (Strengite)	
Angle	d Å	Intensity	d Å	Intensity
12°5	7.08	08	-	-
18°95	4.685	26	4.63	30
21°05	4.221	54	4.20	50
24°15	3.65	100	3.65	60
25°3	3.52	12	-	-
26°83	3.32	100	3.30	100
31°1	2.876	9	-	-
32°95	2.719	11	-	-

APPENDIX 4.

PHOSPHATE TEST RESULTS CARRIED OUT ON SAMPLES FROM THE MOUNT CHARLOTTE No.1 WELL.

by

S. Ozimic
(I.F.P.)

Method for colour test, for phosphatic content.

The samples of cores and cuttings were crushed into very fine silt size.

An amount of 0.25 grm. was placed in a test tube.

The Ammonium Molybdate $(NH_4)_6\ Mo_7\ O_{24}\ 2H_2O$ in acid solution was then poured over the crushed sample.

This has been left to stay and react for approximately two hours.

A few samples with slow-reaction were placed in a beaker with hot water, in order to speed up the reaction.

The results: good, medium, trace and poor trace, were determined by the shade of yellow colour. The colour of the samples was compared with a reference sample which contained 31% of phosphate, according to chemical analysis and which produced a very dark yellow colour with a fast reaction.

However, it is impossible to say how much in percent the samples of Mount Charlotte No.1 contain in phosphate - this would have to be determined by chemical analysis.

APPENDIX 4.

PHOSPHATE TEST RESULTS CARRIED OUT ON SAMPLES FROM THE MOUNT CHARLOTTE No.1 WELL.

Formation		Depth (feet)	Lithology	Result	Remarks
Jay Creek Formation	5 *	1832 - 1846'3	white dolomite - shale siltstone	none	
	6 *	2203 - 2221	dolomite - anhydrite-shale	"	
Pertatataka Formation	10 *	3172 - 3179'5"	siltstone - sandstone	"	
		3190 - 3230	sandstone, siltstone, dolomite	good	
	11 *	3508 - 3510'4	siltstone - dolomite	none	
	12 *	4020 - 40	grey shale	trace	
	13 *	4530 - 4532'4"	red dolomite -siltstone	"	
Bitter Springs Formation	15 *	4767 - 4768	red dolomite - siltstone shale	none	
	16 *	5025'5"-5050	grey dolomite	good	very fast reaction
	17 *	5137'9 - 5147'10	grey anhydrite -black dolomite	medium	
	19 *	5416 - 5426'3	black dolomite grey anhydrite	trace	
	21 *	5815 - 5825'5	black shale - siltstone anhydrite	good	
		5500 - 5510	sandstone -dolomite - siltstone	trace	very poor reaction
		5530 - 5540	" "	none	
		5550 - 5560	" "	trace	
		5570 - 5580	" "	trace	
		5590 - 5600	" "	medium	
		5910 - 5920	sandstone, siltstone- solomite - anhydrite	trace	very poor reaction
		5920 - 5930	" "	"	"
		5930 - 5940	" "	"	"
		5940 - 5950	" "	"	"
		5950 - 5960	" "	"	"
		5960 - 5970	" "	"	"
		5970 - 5980	" "	"	"
		5980 - 5990	" "	"	"
		5990 - 6000	" "	"	
		6300 - 6310	sandstone - siltstone - dolomite - anhydrite	"	good reaction
		6320 - 6330	" "	medium	
		6340 - 6350	" "	"	
		6360 - 6370	" "	"	
		6380 - 6390	" "	"	
		6390 - 6400	" "	"	
	24 *	6703 - 6713' 3"	grey anhydrite -some shale	trace	
	25 *	6745 - 6759'4"	grey anhydrite - dolomite	medium	

* core

Lat. 24° 53' 41" S
Long. 133° 59' 11" E
Elevation: GROUND 1,246' A.S.L.
K.B. 1,260' A.S.L.
B.M.R. WELL INDEX No. 304

MT. CHARLOTTE No.1

PLATE I (SHEET 1)
TRANSOIL PTY. LTD.
AMADEUS BASIN
NORTHERN TERRITORY

SCALE

FEET 100 50 0 100 200 300 FEET

Reference

- Conglomerate
- Sandstone
- Siltstone, claystone
- Shale
- Dolomite
- Limestone
- Salt
- Chalcedony
- Glauconite
- Gypsum and anhydrite

CONDUCTIVITY LOG NOT RUN BELOW 1830'

DEPTH	ANGULARITY	GRAIN SIZE (mm) (WENTWORTH)	CALCILOG %	COLOUR	CUTTINGS LOG % of LITHOLOGIES	CUTTINGS DESCRIPTION	S.P. MILLIVOLTS	INTERPRETED LITHOLOGY	CORES	RESISTIVITY Ohm m²/m	CONDUCTIVITY	GAMMA RAY API UNITS	CALIPER Hole diameter in inches	ACOUSTIC TRAVEL TIME Microseconds per foot	KEY MINERALS AND GRAINS	LITHOLOGICAL DESCRIPTIONS	DESCRIPTION OF UNIT	MEMBER	FORMATION	GROUP	AGE
1500'	▲ ■ ● ●	Sandstone: V. fine, Fine, Medium, Coarse, V. coarse; Conglomerate	1 minute; 10 minutes; ● Cores	Grey; Red to pink; Red to pink; Red to pink; White; White to grey; Grey to pink; Clear to white; White to grey; Red	No samples; (1) (2) (2a) (3a) (1) (2) (3) No samples; (2) (3) (3) (2) (2) (4) (3) (2)	(1) White to pink, angular, moderately sorted, very fine to fine-grained sandstone. Some lithic grains. Some loose angular quartz grains. (2) Red, pink, green and grey siltstone; very micaceous. (2a) Clear to pink, angular to sub-angular, moderately sorted, very coarse to medium-grained quartz. Some iron stained grains. Over half of quartz fraction consists of well rounded gravel up to 3 m.m. across. (3a) Yellowish to grey fragments of limestone. (1) Pink, red, yellow, green and white, angular, moderately sorted, very fine to fine-grained sandstone. Some loose, well rounded quartz. (2) Pink, red, yellowish, grey and green siltstone, slightly micaceous. Some altered fragments. (3) White to light grey dolomite. Some fragments are yellowish and medium greyish and appear more silty. (2) Pink, red, yellowish and grey siltstone; very micaceous to slightly micaceous. Some red to white fragments of anhydrite. The siltstone is slightly calcareous. (3) White to light grey fragments of dolomite. (3) White to light grey fragments of dolomite, some red to white anhydrite. (2) Medium grey, pink, red siltstone; calcareous and very micaceous. (3) As (3) above. (2) As (2) above. (4) Clear, white and yellowish fragments of salt. (3) White to light grey fragments of dolomite. (2) Brick red siltstone; carbonaceous and slightly micaceous.	−10 + RUN 1 Run with Induction Elc. RUN 1 Run with Guard Log 10	4 5 6 7 8 9	RUN 1 GUARD LOG RUN 1	RUN 1	0 100 200 RUN 1 RUN 2	5 15 FORXO RUN 1	130 230 30 130 RUN 1 BASE SHIFT RUN 2 130 30	Pellets, algal structures, lumps, rosettes Pellets Concretions, lumps Glauconite Glaucon te	Angular, fine-grained, well sorted sandstone, high quartz content, rare orthoclase in crystal shape and sericitised igneous rock fragments, rare muscovite and altered green biotite, heavy minerals are tourmaline, zircon, rutile, rare epidote and pyrite. Cement is silica overgrowths, sericitised kaolinite, hematite, chlorite and calcareous matter. Angular to rounded, fine to very coarse-grained with scattered conglomeratic size pebbles, poorly sorted sandstone, 30% quartz, sericitised orthoclase, igneous rock fragments. Cement: chlorite, hematite, sericite and carbonates. Interbedded Dolomite, siltstone and shale with thin streaks of sandstone. Dolomite: These dolomite horizons are compact to micro-laminated, cryptocrystalline to microcrystalline, slightly calcitic, locally recrystallized in perfect dolomite rhombs with a variable detrital content of angular, silt-sized quartz, occasionally coarse-grained. Some potash feldspar, muscovite and rare green biotite. Hematite occurs in concretions or in diffuse intergranular shape. Several recrystallised algal structures, also "rosettes", lumps and carbonate concretions occur. Some shaledomic-cherts and rare glauconite grains have been noticed. Siltstone and Shale: Variegated, hematitic, slightly micaceous siltstone, silty shale and illitic shale occur, locally chloritic and rich in black matter. A variable dolomite content occurs as cement in the siltstone. Sandstone: In very fine streaks, occure in the silty shale sequence. Angular, very fine-grained, well sorted quartz-sandstone, some orthoclase with crystal faces, microcline, muscovite and green biotite. Cement: micro-crystalline dolomite, rare silica overgrowth, hematite and limonite, chlorite and sericite. Mainly anhydrite and lesser amounts of gypsum occur through this formation in different shapes: a) In lenses or patches, parallel to the bedding with a typical brick-like texture interbedded with the dolomite horizons in the lower part of the formation. b) As intergranular crystals with a mosaic texture. c) As radiate, microgranular crystals filling solution-voids or fissures. d) As pseudomorph after carbonates with minute carbonate inclusions. Thick sequence of salt with some dolomite and siltstone interbeds. Salt: light pink, coarse crystalline halite with interbedded clayey siltstone, scattered angular to rounded, coarse-grained quartz, rare orthoclase, microcline and some green biotite. Minute flakes of chlorite, anhydrite and carbonate are present throughout. Dolomite: Cryptocrystalline, very hematitic, slightly calcitic, dolomite with variable quartz content, silt-sized and angular, some potash feldspar, green biotite grading to very sandy dolomite or silty shale. Anhydrite and Salt crystals occur throughout the sequence. Between 2880 and 2900 feet rounded to subangular, fine to coarse-grained quartz pebbles; some are iron-coated. These pebbles are interbedded in siltstone.	Coarse grained sandstone and conglomerate Reddish siltstone and shale with single coarse grained detritals and interbedded anhydritic dolomite locally with algal structures Coarse crystalline halite		STAIRWAY SANDSTONE JAY CREEK LIMESTONE PERTAOORTA CHANDLER LIMESTONE		ORDOVICIAN CAMBRIAN

3000'

3500'

4000'

4500'

Clear

Red to grey

Green to grey

Red to grey

Grey to brown

Grey

Grey

Brown to grey

Brown to grey

Yellow

(4) Clear white and light yellowish fragments of salt.

(1) Clear, angular to subrounded, moderately sorted, fine to coarse-grained quartz.

(1) Reddish, grey to yellowish, angular, moderately sorted, very fine to fine-grained glauconitic sandstone. Some loose glauconitic pellets.

(2) Red to grey, calcareous, slightly micaceous siltstone and some shale. The siltstone is glauconite spotted.

(1) Clear to greenish, angular, moderately sorted, very fine to fine-grained, glauconitic sandstone. Some loose quartz.

(4) As (4) above.

(2) As (2) above.

(1) Grey to light brown, angular, moderately sorted, very fine to fine-grained, glauconitic sandstone. Traces of lithics are found in the sandstone.

(2) Light grey, calcareous and micaceous glauconitic siltstone.

(1) As (1) above.

(2) Brownish grey, calcareous, micaceous siltstone. Some fragments of sandstone.

(2) Dark brown to medium grey, carbonaceous, micaceous siltstone.

10

11

12

13

Glauconite, phosphate

Glauconite

Glauconite, phosphate

Glauconite

Glauconite, phosphate

Sandy, ferruginous, micaceous siltstone, slightly glauconitic with interbedded, loose, rounded, coarse-grained quartz and lignite rock fragments.

Monotonous greenish shale and siltstone with interbedded sandstone streaks

Siltstone and shale: Grey-green, also brownish-red, finely laminated shale, silty shale, silty shale and siltstone grading into each other, rich in muscovite and some green biotite which emphasises the bedding, chlorite, pyrite and black matter. Clay is well developed in the shale, probably as illite. Fine, minute dolomite crystals occur in minor amounts. Laminations are due to variation in iron mineral, detrital quartz or clayey content.

Sandstone: Very fine to fine-grained, angular, well sorted sandstone with 70% quartz, minor amount of microcline, orthoclase, occasional albite, igneous and acretionary rock fragments and some chalcedony chert; mica is very rare; glauconite occurs in grains and pellets, which are full of cracks and as pigmental; glauconite also occurs as irregular aggregates moulded upon detrital quartz particles.

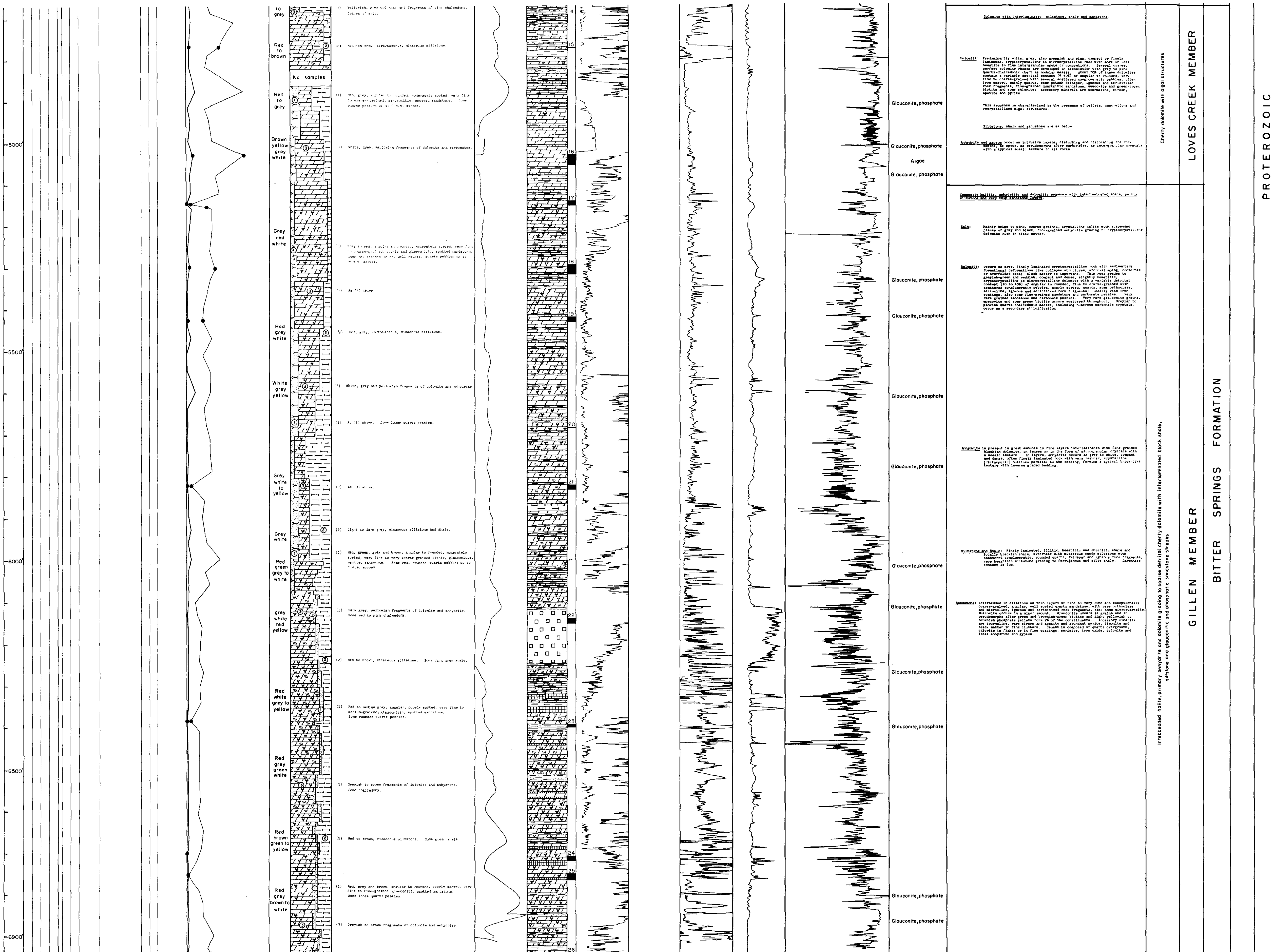
Yellowish to light brownish phosphatic pellets occur. Tourmaline and zircon form the accessory minerals.
Cement is essentially chlorite in flakes or in very fine coatings, kaolinite, sericite, some intergranular quartz, rare carbonate (dolomite) with a mosaic texture and blackish to brownish opaque matter.

Monotonous chloritic and pyritic shale and siltstone with interlayered very fine grained phosphatic and glauconitic sandstone streaks

Greenish and brownish, micaceous and slightly dolomitic, very sericitic shale and siltstone, rich in chlorite pyrite and brownish matter. Rare interbeds of greyish, cryptocrystalline to microcrystalline dolomite occur.

PERTATATAKA FORMATION

SHEET 2



To accompany Record 1966/120

Geologist: G. SCHMERBER I.F.P.

G53/A2/7

R.G.W.

SHEET 3