COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS.

MT. ANDERSON—4-MILE GEOLOGICAL SERIES.

Sheet E/51-11, Australian National Grid.

EXPLANATORY NOTES No. 9.

Issued under the authority of Senator the Hon. W. H. Spooner, Minister for National Development.

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1. Urandangi, 1952.
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5. Springsure, 1957.
6. Sydney, 1957.
7. Jerilderie, 1957.
8. Derby, 1957.
9. Mount Anderson, 1958.
10. Noonkanbah, 1958.
11. Lennard River (in press).
12. Anketell, 1957.

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DEPARTMENT OF NATIONAL DEVELOPMENT.

Minister : SENATOR THE HON. W. H. SPOONER, M.M.

Secretary : H. G. RAGGATT, C.B.E.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS.

Director : P. B. NYE, O.B.E.

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Explanatory Notes on the Mt. Anderson 4-Mile Geological Map

Compiled by

J. N. Casey.

GENERAL.

The Mt. Anderson 4-mile Sheet area forms part of the Fitzroy Basin, which occupies the northern part of the larger Canning Basin of Western Australia. The Fitzroy Basin is bounded on the north by Precambrian rocks and on the south by a tectonic line referred to as the "Fenton Fault", which trends north-west and passes through the northern part of this Sheet; therefore, strictly the southern part of this Sheet area is not part of the Fitzroy Basin.

Only Permian, Mesozoic and Cainozoic rocks crop out; Ordovician rocks have been intersected in a structure bore at Dampier Downs.

Maps and photographs covering the Mt. Anderson 4-mile Sheet are: aerial photographs, flown by the R.A.A.F., at a scale of 1:50,000; photo-mosaic map (4 miles to 1 inch) prepared by and available from Division of National Mapping, Canberra; photo maps at 1 mile to 1 inch; dyeline maps controlled by slotted template assembly (at air-photo scale) with principle points and topography; and 4 mile to 1 inch topographical-cadastral map in colour prepared by and available from the Department of Lands and Survey, Perth.

PREVIOUS INVESTIGATIONS.

(*See also* BIBLIOGRAPHY.)

Hardman (1884) made the first geological investigations of the Fitzroy Basin; many fossils from his collections were described by Foord (1890). The development of pastoral stations in the Kimberley District stimulated the search for underground water, and Jack (1906) summarized the artesian water possibilities in the District; included in his report are descriptions of springs near Upper Liveringa Station, and Artesian bores near Mt. Wynne and Upper Liveringa.

Oil showings were reported from Prices Creek (east of the Sheet area) soon after the first World War, and interest in the district quickened. Blatchford and Talbot mapped part of the District (Blatchford, 1927), and the site for an oil bore at Mt. Wynne was determined in 1922 from this investigation. Gas and asphaltum from this bore were analysed by Simpson (1922). Clapp (1925, 1926) traversed south from Edgar Range, which he called the North Escarpment, to the McLarty Hills, and Woolnough (1933) made an aerial survey over country which included the Edgar Range and Nerrima areas.

Forman (1929) and Hobson (1936) summarized petroleum prospects and investigations.

Wade (1924, 1936, 1937, 1938) made a detailed stratigraphical study of the area to assess petroleum possibilities and select drilling sites for Freney Kimberley Oil Company. One of the selected sites was on the Nerrima Structure: drilling began on the Freney Nerrima No. 1 Bore in 1939 and was abandoned in 1941. (Waterford, 1941, gives a history of Freney Kimberley Oil Company's drilling activities in the district.)

Since 1940 several oil companies have initiated geological surveys in the area, of whom Associated Freney Oil Company and West Australian Petroleum Pty. Ltd. are still continuing their investigations.

The Bureau of Mineral Resources, Geology and Geophysics, began a systematic survey of the area in 1948, which was continued until 1956. Geological results were recorded by Guppy, Cuthbert and Lindner (1950), Guppy, Lindner, Rattigan, and Casey (1958), and Brunnschweiler (1954); and geophysical results by Wiebenga and van der Linden (1953), Vale, Smith and Garrett (1953), and Williams (1955). In 1956 the Bureau drilled a stratigraphic hole near Wilson's Yard, the position of which was determined partly by the results of a seismic survey along Jurgurra Creek carried out by West Australian Petroleum Pty. Ltd. The results are recorded by Henderson (1956).

Fossils from the area have been described by many workers. Chapman (1924) recorded the fossils collected by Blatchford and Talbot; brachiopods have been described by Hosking (1931), Prendergast (1935, 1941), Coleman (1957), and Thomas (1954, 1958); bryozoa by Crockford (1944, 1951, 1957); foraminifera by Crespin (1947, 1958); cephalopods by Miller (1936); and many fossils by Teichert (1939, 1940, 1942, 1945 and 1950).

Thomas and Dickins (1954) reviewed the Permian correlations.

PHYSIOGRAPHY.

The Mt. Anderson 4-mile Sheet area forms part of Jutson's (1934) physiographic divisions *Fitzroyland* and *Sandland;* Fitzroyland corresponds with what is known as *West Kimberley.*

The area lies in the physiographic divisions *Fitzroy Valley* and *Desert Plateau* of Guppy et al. (1958), with the Edgar Ranges, formed by wind erosion and the cutting back of Jurgurra Creek, marking the northern edge of the Plateau.

The major streams are the Fitzroy River in the north-east of the sheet, and its north-flowing tributaries Jurgurra and Nerrima Creeks.

The altitude of the Fitzroy River on the eastern margin of the Sheet is about 160 feet, and it falls to 88 feet at Mudjalla yard, a distance of about 50 miles. The altitude at Luluigui Homestead is 141 feet, at Liveringa aerodrome 130 feet, Myroodah homestead 175 feet, Nura Nura yard 160 feet, Wilson Yard 220 feet, Camelgooda Hill 394 feet, and Mt. Anderson about 1150 feet.

TABLE I.—STRATIGRAPHY OF MOUNT ANDERSON 4-MILE SHEET.

Period.	Stage.	Rock Unit.	Thickness.	Lithology.	Distribution.	Topography.	Palaeontology and Age.	Stratigraphic Relationship.	Economic Geology.	Principal Reference.
QUATERNARY		Residual Soils (Qrr)	Superficial	Variable sandy soil	From Dampier Downs homestead to Mount Alexander and Matches Springs. Also in north-east of area	Slightly undulating				Guppy et al. (1958)
		Alluvium (Qra)	0–100+ feet	Light-textured variable. Usually high sand content	Mainly along Fitzroy River and Jurgurra Creek	River banks and flood plains. Gullying common			Good water at shallow depths in normal seasons	Guppy et al. (1958)
		Sand and dunes (Qs)	0–100+ feet	Well-rounded quartz sand with variable amounts of iron oxide	Throughout area but especially south and west of Mount Arthur	Plains with east to west sand ridges (seifs)			Shallow water where sand is thick	Guppy et al. (1958)
TERTIARY		Pisolitic Ironstone (°°°)	About 10 feet	Ferruginous pisolites and nodules with rock fragments cemented in a sandy ferruginous matrix	Small outcrops at Sandfly Yard and south-east of Mount Arthur				Road metal	Guppy et al. (1958)
		Warrimbah Conglomerate (Tw)	50+ feet	Unconsolidated accumulations of pebbles and boulders, rounded and water-worn	Mouth of Nerrima Creek and between Nerrima Homestead and Mount Freney	Low ridges	No fossils found. Possibly Tertiary	Top eroded. Presumably unconformable on Permian or Mesozoic	Good, subartesian water between 50 and 60 feet	Guppy et al. (1958)
JURASSIC		Mowla Sandstone (JuO)	15+ feet	Boulder and pebble conglomerate, unsorted coarse and conglomeratic sandstone with some siltstone. Friable when not ferruginized	Mowla Bluff	Low rounded hills	No fossils found. Tertiary-Cretaceous or possibly Upper Jurassic	Unconformable on Jarlemai Formation. Contact sometimes transitional. Top eroded		Guppy et al. (1958) Brunnschweiler (1954)
	Middle Portlandian	Jarlemai Formation (Jur)	230–300 feet	Poorly stratified to massive sandy siltstone, silty sandstone, and silty ochreous claystone. Colours from white, pink and purple to brick red	Edgar Range to Mowla Bluff. Also at Mount Jarlemai, Matches Springs and south of Craven Ord	Mesas and buttes. Steep cliffs of Edgar Range Cuesta	*Buchia* spp. *Meleagrinella* sp.	Overlain by Mowla Sandstone. Conformable on Alexander Formation		Brunnschweiler (1954)
	Lower Portlandian or Kimmeridgian	Alexander Formation (Jua)	180 feet	Fine- to coarse-grained impure quartz sandstone with interbedded siltstone. Sandstone friable, brown to red. Siltstone pink or purple with mica flakes and quartz-sand lenses	Small scattered outcrops from Mount Alexander to Mount James. Possibly occurs north of Dampier Downs and north of Roebuck Downs	Buttes and low hills in Edgar Range	*Virgatosphinctes* sp. *Kossmatia* sp. Lower Portlandian or Kimmeridgian	Conformably overlain by Jarlemai Formation. Unconformable on Jurgurra Sandstone	Should be a good aquifer	Brunnschweiler (1954)
	Kimmeridgian or Lower Portlandian	James Sandstone (Juj)	80+ feet	Medium to conglomeratic sandstone, strongly cross-bedded and ferruginized	From Mount James to Mount Arthur	Capping low hills	No fossils found. Correlates with lower Alexander Formation on lithology	Top eroded. Unconformable on Permian		Guppy et al. (1958)
	Kimmeridgian or Lower Portlandian	Mudjalla Sandstone (Jm)	120+ feet	Unsorted, angular, medium- and coarse-grained sandstone with lensing conglomerate bands	North-west of Mudjalla Yard	Low, dissected areas	No fossils found. Correlates with lower Alexander Formation on lithology	Top eroded. Unconformable on Liveringa Formation	Probably a good aquifer	Guppy et al. (1958)
	Middle ? Jurassic	Jurgurra Sandstone (Jj)	15+ feet	Medium- and coarse-grained quartz sandstone, cross-bedded, micaceous, with clay pellets and thin siltstone beds	Along Jurgurra Creek from Mount Alexander to Roebuck Downs	Rock bars in creek bed	Small poorly preserved pelecypods. Fossil wood	Unconformably overlain by Alexander Formation. Lower beds not exposed	Probably a good aquifer	Brunnschweiler (1954)
JURASSIC OR TRIASSIC		Undifferentiated (R/J)	?	Probably sandstone. Bedding trends seen through sand cover on aerial photographs	Small areas west of Clanmeyer Pool		Probably Jurassic but may be Triassic			
TRIASSIC		Blina Shale (Rb)	100+ feet	Grey and brown siltstone, shale, and sandy shale; ferruginized conglomeratic sandstone	Limited area in the Dry Corner Syncline	Clay soil plains, low outcrops and float material	Bone fragments, *Isaura*, *Lingula*	Probably unconformably overlies Liveringa Formation. Top is exposed	Possible petroleum source bed	Brunnschweiler (1954)
PERMIAN	Upper Artinskian to Lower Kungurian	Liveringa Formation (Pl)	1,500+ feet	Greywacke and fine micaceous yellow and olive-green quartz sandstone with marine fossils at base, followed by thin-bedded ripple-marked sandstone and conglomeratic sandstone with plant remains	Large area from Mount James to Sandfly Yard, north to Liveringa Ridge and near Mount Wynne	Grassy plains with low strike ridges	Plants, gastropods, pelecypods, some brachiopods, foraminifera and bryozoa	Conformably overlies the Noonkanbah Formation, probably unconformably overlain by Blina Shale	Plant-bearing beds; good aquifer and low-grade coal reported from them. Low-grade iron oxide in basal beds	Guppy et al. (1958)
	Artinskian	Noonkanbah Formation (Pn)	<2,240 feet	Shale, calcareous siltstone, limestone and intraformational conglomerate. Some pyritic and carbonaceous material in fresh samples	Grant Range, Mount Wynne, Nerrima and Mount Arthur areas, and east of Clanmeyer Pool	Grassy plains with low strike ridges formed by calcareous beds	Rich faunal assemblage of brachiopods, bryozoa, corals, crinoids, foraminifera, some mollusca	Conformably overlain by Liveringa Formation and probably disconformably overlies Poole Sandstone	Possible petroleum source bed. Poor aquifer	Guppy et al. (1958)
	Lower Artinskian	Poole Sandstone (Pp)	700+ feet	Thin-bedded, white, fine micaceous quartz sandstone with plants, current-bedded and ripple-marked. At base is marine Nura Nura Member of ferruginous silty quartz sandstone and calcareous sandstone, fossiliferous	On the flanks of Grant Range and Mount Wynne areas and near Mount Arthur	Hills and dip slopes with basal marine calcareous bed forming small low outcrops	Plants in upper beds and marine fossils in basal unit	Disconformably overlies the Grant Formation and is overlain probably disconformably by the Noonkanbah Formation	Good aquifer	Guppy et al. (1958)
	Probably Sakmarian	Grant Formation (Pg)	8,000±	Sandstone, conglomerate, tillite, siltstone, shale, varved rocks. Intraformational contortion and cross-bedding. Blue-grey siltstone contains glaciated boulders. Contains limestone pebbles in Grant Range (Smith, 1951, p. 14)	Core of Grant Range and Mount Wynne area and near Mount Arthur	Hills and rises	Wood remains	Unconformably overlies Lower Carboniferous Laurel Beds and is overlain probably disconformably by Poole Sandstone	Good aquifer and reservoir rock for petroleum accumulation	Guppy et al. (1958)

[*To face page* 4.]

The north-east part of the area has been surveyed by Department of Interior, Survey Branch, Canberra, for a gravity survey by geophysicists of the Bureau of Mineral Resources; this area therefore has very accurate height control, which can be obtained from the Survey Branch.

The following information was taken from the Atlas of Australian Resources prepared by the Division of Regional Development, Department of National Development, Canberra:—

Normal mean winter (June, July, August) temperatures are 65°–70° F; normal mean summer (December, January, February) are 90°–95° F. The normal range of temperature is 40°–50° F. The area experiences less than five days per year of frosts. Annual average rainfall is 15″–25″ with a variability of 30–35% and a frequency of about 30 thunderstorms per year; most of the rain falls in January, February, March; the driest months are July, August, September, October. Rain falls on 25–50 days a year.

STRATIGRAPHY AND PALAEONTOLOGY.

Rock units are named according to the Australian Code of Stratigraphical Nomenclature. All formation names have been approved by the Stratigraphical Nomenclature Committee of Western Australia. The precise age of many of the rock units is still in doubt.

The stratigraphy and palaeontology are summarized in Table 1. No rocks older than Lower Permian crop out on the Mt. Anderson Sheet area, but the presence of Carboniferous rocks is recorded from the Grant Range No. 1 bore, and probable Ordovician rocks from the Dampier Downs structural hole, 7 miles north of Dampier Downs; both bores were drilled by West Australian Petroleum Pty. Ltd.

STRUCTURE.

The major structural feature is the "Fenton Fault" which trends north-west and can be traced by aerial photographs and on the ground from Mt. James to Clanmeyer Pool on Jurgurra Creek. In most places it marks the junction between known Permian rocks on the north-east side and sand and Mesozoic rocks to the south-west. The precise nature of this feature is not finally elucidated. Gravity work by the Bureau of Mineral Resources indicates a "downthrow" or depression to the north of 12,000 feet near Mt. James, 7,000 feet near Barnes Flow, 6,000 feet near Mt. Density, and no displacement at Jurgurra Creek (Wiebenga and van der Linden, 1953). The Bureau of Mineral Resources stratigraphic bore, drilled to 1,680 feet in 1956 at Wilson Yard, confirmed that there was little if any displacement across the "Fenton Fault" at Jurgurra Creek, for in this bore, Noonkanbah Formation was encountered at less than 30 feet depth: basal Liveringa and Noonkanbah Formation crop out 8 miles north-east across the fault line (Henderson, 1956). An extension of Wiebenga's (1953) results north-west from Jurgurra Creek suggests a "low" appearing on the south-west side and a "high" on the north-east side of the possible north-west extension of the "Fenton Fault".

A seismic survey along Jurgurra Creek by West Australian Petroleum Pty. in 1955-56 indicated a strong reflecting horizon which formed a "high" south of Wilson Yard; the top of this "high" was expected at 3,500–4,000 feet and it was thought to represent the top of the Permian section. However, the stratigraphic bore at Wilson Yard disproved this, and the reflecting horizon at 3,500–4,000 feet may mark the top of the Carboniferous or Devonian sediments in this area.

The "Fenton Fault" probably marks the northern limit of a north-west trending ridge which has been referred to as the Broome ridge. The Edgar Ranges would be near the crest of this ridge. Whether it was formed as a horst (controlled primarily by faulting) or represents a major basement high, has not been established.

Many closed anticlines and synclines occur on the Sheet area. The largest of these is the Grant Range anticline, which is closed in the Poole Sandstone; others are Mt. Wynne, Deep Well and Nerrima anticlines, and Myroodah, Dry Corner and McLarty synclines. All these structures are in the Permian formations. Small folds and faults occur in the Mesozoic rocks of the Edgar Range.

The Bureau of Mineral Resources and West Australian Petroleum Pty. Ltd. have carried out airborne magnetometer surveys over part of the area; the results are not yet (June, 1957) published. The Bureau has also carried out seismic surveys over the Nerrima Structure (Vale et al., 1953), the Deep Well Anticline (Williams, 1955), and across the "Fenton Fault" near Barnes Flow (unpublished); and gravity work in the Nerrima-Myroodah area (Wiebenga and van der Linden, 1953). Plate 1 shows the extent of geophysical survey so far carried out in the area.

The Freney Oil Co. drilled three bores in the Mt. Wynne area in 1922-25. The deepest (Mt. Wynne No. 3) was 2,154 feet; all bores were in the Grant Formation and small shows of oil were encountered. Freney Kimberley Oil Company (1932) N.L. drilled Nerrima No. 1 bore in 1939, which was abandoned in Grant Formation at 4,271 feet in 1941, after passing through Noonkanbah Formation and Poole Sandstone; there were no showings of oil or gas.

Associated Freney Oilfields N.L. drilled an oil bore to 9,072 feet at Nerrima in 1955, passing through Noonkanbah Formation, Poole Sandstone, and Grant Formation before terminating in probable Carboniferous sediments; small oil showings were encountered at about 2,700 feet in Grant Formation. The company then drilled Myroodah No. 1 to 6,001 feet in 1955-56; this bore was abandoned in Grant Formation with no showings of oil or gas.

West Australian Petroleum Pty. drilled an oil bore at Grant Range No. 1 in 1955 to 12,915 feet with no showing of oil or gas. The bore penetrated nearly 8,000 feet of Grant Formation before bottoming in Carboniferous sediments. This company also drilled a stratigraphic bore, Dampier Downs No. 1, which began in Jurassic sediments, and reached the top of the Permian sediments at about 1,000 feet, and bottomed at 4,000 feet in Ordovician rocks.

ECONOMIC GEOLOGY.

Underground Water.

Except for waterholes along the Fitzroy River, the pastoral industry depends entirely on underground water; it is therefore the chief economic mineral produced. About 40 bores and wells are producing water, at least of stock-water quality. Most are subartesian and most are equipped with windmills. Some, such as Barnes Flow, Little Flow and Green Spring, are springs which are equipped for watering stock. Guppy et al. (1958) give a general account of the bores.

Petroleum.

No oil or gas seepages are known—the gas from the hot springs near Mt. Wynne is not petroliferous—and only very small oil showings are reported from Associated Freney Nerrima No. 1 and Freney Oil Mt. Wynne No. 1 and 3 bores.

Of the outcropping formations, the Permian Noonkanbah Formation and Triassic Blina Shale are of petroleum source-bed type; the Grant Formation, Poole Sandstone, and Liveringa Formation contain permeable sandstones which could form reservoirs. Source beds in the Ordovician and Devonian sediments occur elsewhere in the Fitzroy Basin and may extend into this area at depth. Devonian reefs, calcarenite, and permeable sandstones, as well as Ordovician calcareous siltstone and dolomite, found elsewhere in the Fitzroy Basin and suitable both as source and reservoir rocks, may occur at depth, as, for example, the dolomite from Dampier Downs Station Bore.

Structural relief has been indicated by gravity, aeromagnetic, and seismic surveys, particularly along and south-east of the "Fenton Fault", and the "Broome ridge" could be a promising area for petroleum accumulation, particularly if Ordovician or Devonian reefs have developed along it.

Phosphate.

The bone bed which crops out at the base of the Blina Shale, 4 miles north-east of Dry Corner bore, contains a small quantity of phosphate.

Iron Ore.

The basal Liveringa Formation (the Lightjack Member) contains oolitic grey to green greywacke which contains low-grade iron oxide. A sample analysed by Edwards (1953) from north of Jimberlura Tank near Mt. Wynne contained 51% Fe_2O_3, 19% SiO_2, 13% Al_2O_3. This bed is very extensive and may prove to be a source of low-grade iron ore in the future.

Coal.

Thin seams of low-grade coal have been reported from wells and bores to the north of this area; the plant-bearing beds in the Liveringa Formation may contain coal seams, but none have been found in outcropping beds.

Road Metal.

Pisolitic ironstone and ferruginized and silicified sandstones are used as road metal; they occur in small quantities over wide areas.

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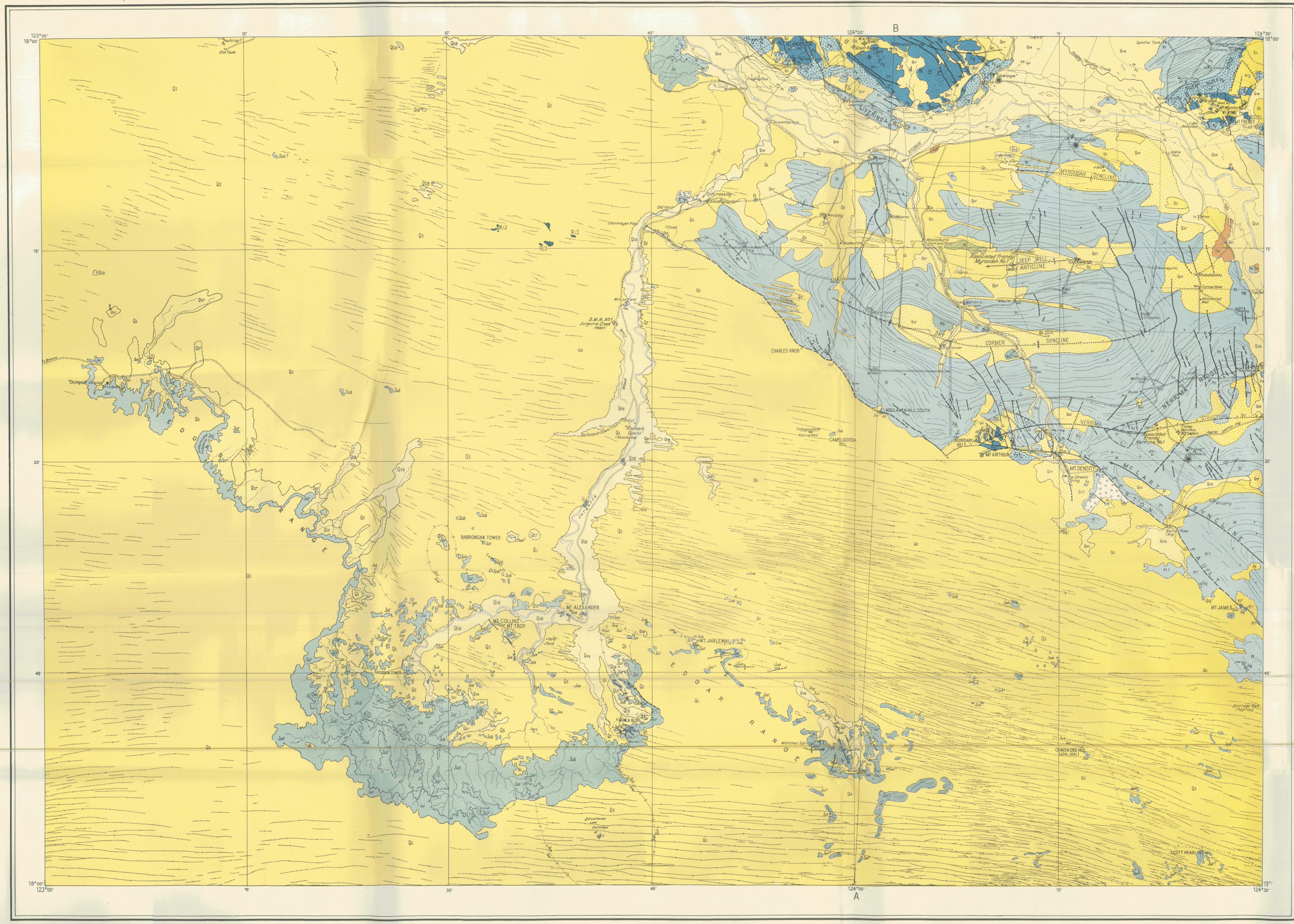
MT. ANDERSON

WESTERN AUSTRALIA

4 MILE GEOLOGICAL SERIES SHEET E 51-11

FIRST EDITION 1956



Reference

Period	Formation	Symbol	Description
QUATERNARY		Qzr	Residual soil
		Qza	Alluvium
		Qs	Sand, dunes
TERTIARY			Pisolitic ironstone
	Warrimbah Conglomerate	Tw	Poorly consolidated boulder beds forming old river terraces
JURASSIC	Mowla Sandstone	Juo	Sandstone, siltstone and conglomerate.
	Disconformity		
	Jarlemai Formation	Jur	Poorly bedded or massive unsorted sandy siltstone and silty sandstone; marine fossils
	Alexander Formation	Jua	Thin bedded sandstone with alternations of siltstone; marine fossils
	James Sandstone	Juj	Strongly cross-bedded ferruginized conglomeratic sandstone
	Mudjalla Sandstone	Jm	Unsorted medium and coarse sandstone; some plant remains
JURASSIC?	Jurgurra Sandstone	Jj	Cross-bedded medium and coarse mica-bearing sandstone with thin siltstone beds
TRIASSIC-JURASSIC		RJ	Sandstone
	? Unconformity ?		
TRIASSIC	Blina Shale	Rb	Grey and brown siltstone, shale and sandy shale exposed; blue grey shale in bores; marine fauna
	? Unconformity ?		
PERMIAN	Liveringa Formation	Pl	Micaceous silty sandstones, conglomeratic sandstone and silty sandstones; strongly ferruginized
	Noonkanbah Formation	Pn	Shale. siltstone. limestone. intraformational conglomerate
	Disconformity		
	Poole Sandstone	Pp	Well or thinly bedded micaceous silty sandstone and sandstone; well developed current bedding and ripple marking
	Disconformity		
	Grant Formation	Pg	Massive aqueoglacial unsorted silty sandstone, conglomeratic, sandstone, tillite, siltstone, shale, and varved rocks

Geological boundaries

- Established boundary, position accurate
- Established boundary, position approximate
- Probable boundary
- Established boundary, concealed by younger formation
- Inferred, probable or indefinite boundary, concealed

Strike and dip of strata

- Inclined
- Inclined showing prevailing dip
- Dip 0°-15° from photo-interpretation
- Trend lines photo-interpretation

Folds

- Established anticlinal crest – position accurate
- Established anticlinal crest – position approximate
- Inferred, probable or indefinite crest
- Established synclinal trough – position accurate
- Established synclinal trough – position approximate
- Inferred, probable or indefinite trough

(showing direction of plunge)

- Established fold exis, concealed, – position accurate
- Established fold exis, concealed, – position approximate.

Faults

- Established fault – position accurate
- Established fault – position approximate
- Probable fault
- Established fault concealed by younger formation
- Inferred, probable or indefinite fault, concealed
- ✱ PL1 Text reference-B.M.R. Bull. 36

- Track
- Homestead
- Hut
- Yard
- Fence
- Aerodrome
- (B) Bore with wind pump
- (A) Artesian bore with wind pump
- (SA) Sub-artesian bore with wind pump
- (W) Well
- (S) Spring
- (T) Earth tank
- (9072') Dry oil bore with show of oil
- (12915') Dry oil bore, S= stratigraphic bore only

(showing depth)

- Dune
- △1150 Trig. Station, height in feet

Compiled by the Bureau of Mineral Resources, Geology and Geophysics, Department of National Development. Topographic base from compilations by Royal Australian Survey Corps and Department of Lands and Surveys, Western Australia, from vertical small scale air photography by the Royal Australian Air Force. Published by the Bureau of Mineral Resources. Transverse Mercator Projection.

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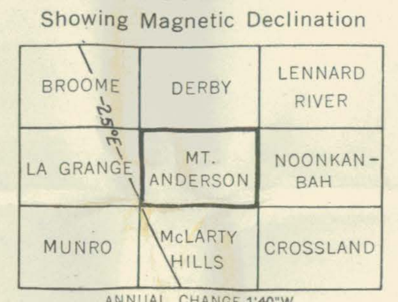
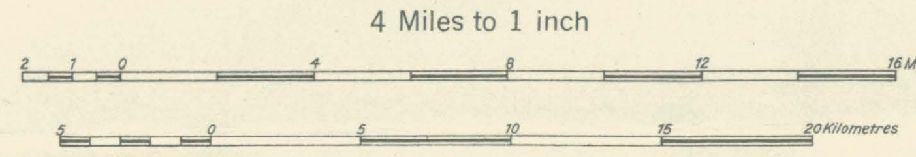
Showing Magnetic Declination

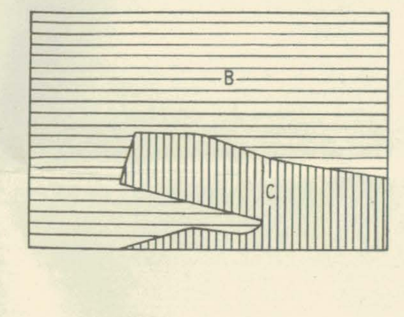


Scale

4 Miles to 1 inch



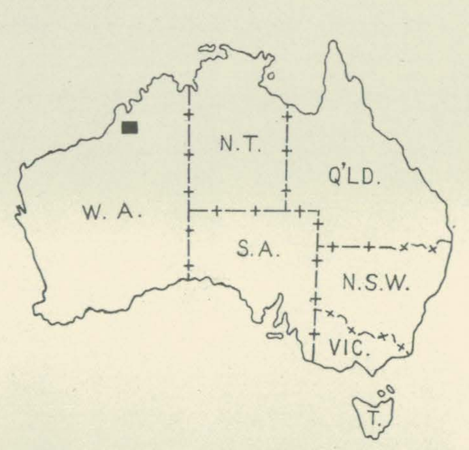
GEOLOGICAL RELIABILITY DIAGRAM



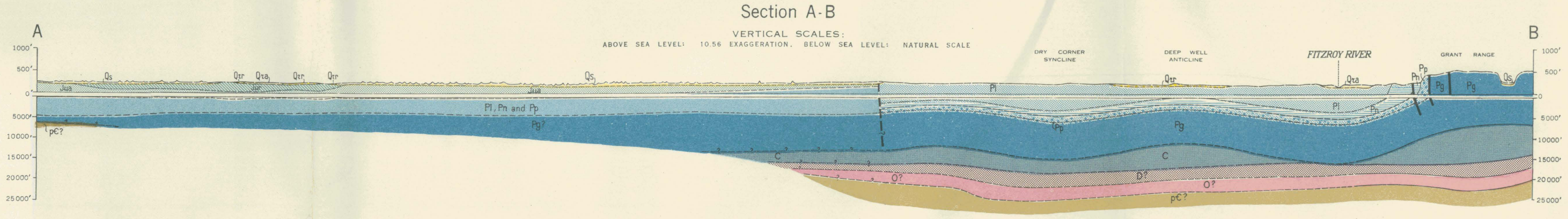
B Detailed reconnaissance - numerous traverses with photo-interpretation

C Photo-interpretation

Geology and compilation by: D. J. Guppy, A. W. Lindner, J. H. Rattigan, J. N. Casey, R. O. Brunnschweiler, A. B. Clarke December, 1955. Section compiled by: G. A. Thomas and M. A. Condon August, 1956.

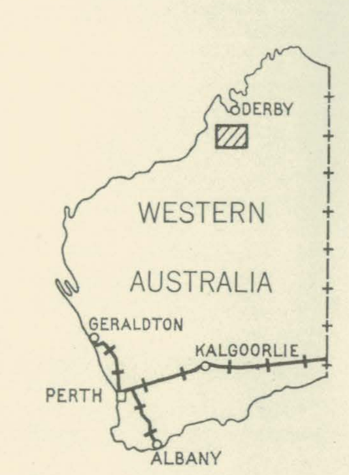


Section A-B



IN SECTION ONLY: Undifferentiated

C CARBONIFEROUS | D DEVONIAN | O ORDOVICIAN | pC PRECAMBRIAN



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SHEET E51-11

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