1 : 250,000 GEOLOGICAL SERIES—EXPLANATORY NOTES

NEWCASTLE WATERS

NORTHERN TERRITORY

SHEET 3/52-9 INTERNATIONAL INDEX

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Explanatory Notes on the Newcastle Waters Geological Sheet

The Newcastle Waters Sheet area is in the central part of the Northern Territory of Australia; it lies between longitudes 132°E and 133°30'E and between latitudes 17°S and 18°S. Its southeastern corner is about 125 miles north by west of the mining township of Tennant Creek.

The area is covered by vertical air-photographs at a nominal scale of 1:85,000, flown by Adastr in 1963. In 1965 the Royal Australian Survey Corps and the Division of National Mapping, Department of National Development, issued a provisional planimetric sheet at 1:25,000 scale based on the 1963 photography. Mosaics at 1:63,360 scale and compilations at 1:100,000 scale based on the 1963 photography are available from the Division of National Mapping. During the 1966 geological survey (Randal & Brown, 1967), on which these notes are based, bores, tracks, and fences constructed since 1963 were mapped and are shown on the geological Sheet.

Only the eastern fifth of the Sheet area is under cultivation: the remainder forms part of a large tract of semidesert which covers much of the central-western part of the Northern Territory, and has been named the Wiso Tableland (Hossfeld, 1954).

The bitumen-sealed Stuart Highway, connecting Darwin to the north with Alice Springs, via Tennant Creek, to the south, traverses the northeastern part of the Sheet; the historic Murrangi Track from Newcastle Waters township to Top Springs in the Victoria River District also crosses the northeastern part of the area. This route is falling into disuse since the construction in 1964 of an all-weather road to Top Springs which leaves the Stuart Highway about 28 miles north of the Sheet area; but most of the government bores along the Track, which is a stock route, are maintained in working order. A network of bore tracks parallels Newcastle Waters (Creek) and the western edge of Lake Woods.

The only settlements are the small township of Newcastle Waters and the homesteads for Newcastle Waters and Sturt Plain cattle stations. The township of Elliott is about 3 miles east of the Sheet boundary on the Stuart Highway. Newcastle Waters township is at the junction of the Murrangi Stock Route (Murrangi Track), the Birdum and the Barkly Stock Routes, which are here along the Stuart Highway, and the main road to Beetaloo homestead, which is about 30 miles to the northeast.

The climate is monsoonal: the wet season lasts normally from December to March, but occasional winter rains occur. At Newcastle Waters township the
average annual rainfall for the period 1950-1965 was about 17 inches; the annual rainfall ranged from 6 inches in 1961 to 30 inches in 1950. The rainfall early in 1967 also was high and caused extensive flooding along Newcastle Waters (Creek). Winds are predominantly northwesterly during the wet season, and predominantly southeasterly for the remainder of the year.

Previous Investigations

The Sheet area had not been systematically mapped until 1966, although parts of it had been traversed by explorers and geologists engaged in reconnaissance geological mapping.

In 1861 and 1862 Stuart passed through the eastern part of the area during his attempts to cross the Australian continent from south to north. Brown (1895) travelled along the Overland Telegraph Line from Darwin to Adelaide in 1894-95. Winters (1915) journeyed along the Telegraph Line from Pine Creek to Newcastle Waters in 1914, and commented on Cambrian limestones and Cretaceous rocks. He briefly commented on the groundwater environment of the region, and considered it similar to that of the Barkly Tableland. Ward (1926) also visited part of the area in connexion with groundwater investigations.

Hossfeld (1954) used the term Wiso Tableland for the area between Newcastle Waters, Wave Hill, The Granites, and Barrow Creek. He believed the area was underlain by Cambrian sediments which were a continuation of those in the Buldiva Basin* to the north—the whole constituting the Buldiva-Wiso Basin. Recent mapping tends to support this concept in principle.

Noakes & Travas (1954) examined rocks along the Stuart Highway and used the term ‘Ashburton Sandstone’ for the Precambrian rocks of the Ashburton Range. These rocks are now referred to as the Tomkinson Creek Beds.

In 1965 the Newcastle Waters Sheet area was included in an airborne gravity survey carried out by Wongela Geophysical Pty Ltd for the Bureau of Mineral Resources (Flavell, 1965). It was also included in a photographic examination of the Wiso Basin by members of the Bureau of Mineral Resources and the Institut Français du Pétrole (Riverea, 1966).

Mapping at 1:250,000 scale by the Bureau of Mineral Resources has been completed in all the adjoining areas—to the north and west (Randal & Brown, 1967), to the east (Randal, Brown, & Doutch, 1966), and to the south (Milligan, Smith, Nichols, & Doutch, 1966). Between 1962 and 1965 the Survey Section of the Department of the Interior ran a series of third order levels along the Stuart Highway, the Murrani Track, the Beetaloo track, and across the desert along the southern boundary of the Sheet. Permanent benchmarks were erected at 5 to 8-mile intervals.

PHYSIOGRAPHY

Most of the Sheet area falls within the Western Plateau Drainage Division of the Australian continent (AWRC, 1965); the Division contains uncoordinated internal drainage systems of local extent. The only well defined

* Referred to by Noakes (1949) as the Daly River Basin, and by subsequent authors as Daly River Basin or Daly Basin.
drainage is the lower reaches of Newcastle Waters (Creek) and tributaries which rise in Sturt Plain in the northeast. The drainage is directed towards Lake Woods, the western part of which lies at about 650 feet above sea level. The three main landforms are: the grassy downs of Lake Woods and Sturt Plain, the northern prominences of the Ashburton Range, and the scrub-covered semidesert which covers most of the area. The divisions are obvious on the geological map.

The grassy downs are clayey black-soil plains supporting a good cover of mainly flinders and mitchell grasses with very few shrubs or trees. Sturt Plain and its associated plains in the north are the northwestern extremity of the vast tract of grassy downs of the Barkly Tableland which extends southeastwards to the Queensland border and beyond. In this Sheet area the downs are about 700 feet to 750 feet above sea level. The alluviated area of Lake Woods and its surrounding border of clayey black soil support good growths of mitchell and flinders grass and are similar in appearance to the grassy downs to the north; they are separated from Sturt Plain by the ridges of the Ashburton Range and the rubble-covered rises on its flanks.

The high ridges east of Newcastle Waters (Creek) are the northern extremity of the Ashburton Range, which extends south-southeastwards for about 120 miles. The ridges are about 800 feet above sea level at the highest points and are about 50 to 100 feet above the surrounding country. They are sharp strike ridges, but in the most eastern part the Range occurs as a truncated sand-covered tableland. The ridges are composed of the Precambrian Tomkinson Creek Beds, but the low rises on their flanks consist of Lower Cretaceous claystone and sandstone rubble.

The semidesert which covers most of the Sheet area consists of gently undulating sandy and gravelly plains covered by shrubs and small trees. South of latitude 17°30' there are small longitudinal sand dunes trending at about 110°, with a few interspersed and irregular transverse dunes. West of Lake Woods and about 8 miles apart, two sets of concentric dunes parallel the lake shore and apparently represent former strand-lines. Short transverse dunes abut against the western side of the western set of concentric dunes and in the south transgress it. Irregular north-trending dunes between meridians 132°45'E. and 133°E. may be the remnants of another set of lake strand-lines, now obscured by the development of the longitudinal dunes.

The slope of the semidesert is generally towards the south and southeast, but in the south the country rises again to elevated country in the adjoining South Lake Woods Sheet area (Milligan et al., 1966). In the southern part of the Newcastle Waters Sheet area the 700-foot topographic form-line outlines a saddle in the divide between the Lake Woods drainage and the Timor Sea Drainage Division (AWRC, 1965). Although the western part of the Newcastle Waters Sheet area slopes towards the latter division it contains no well defined drainage and is more conveniently included in the Western Plateau Drainage Division of AWRC (1965). The 700-foot contour has some physiographic significance farther east: the rims of the internal drainage lakes in the Barkly Tableland are at about 700 feet above sea level, as also are those of the valley of Newcastle Waters (Creek) near the township (Randal et al., 1966).
Hays (1967) includes the entire Sheet area within his Main Plateau division of the northern part of the Northern Territory.

**STRATIGRAPHY**

The Newcastle Waters Sheet area contains rocks of Precambrian, Middle Cambrian, and Lower Cretaceous ages, but most of it is covered by extensive superficial Cainozoic deposits. The stratigraphy is summarized in Table 1.

**PRECAMBRIAN**

The *Tomkinson Creek Beds* form the dissected ridges and sand-covered tableland of the Ashburton Range in the east. The unit was previously known as the Ashburton Sandstone (Noakes & Traves, 1954), but was never formally named or defined, and the name Ashburton had priority usage elsewhere. Randal et al. (1966) renamed the unit in the Helen Springs Sheet area pending later division into formations and perhaps groups; it is defined in Randal & Brown (1969).

The age of the Tomkinson Creek Beds is stated on the map as Lower Proterozoic, following Smith (1967), who considers the unit to be the same age as the Hatches Creek Group in the Davenport Ranges. Some workers believe that both units are Carpentarian because of isotopic ages determined for granites intruding the Hatches Creek Group, but Smith (op. cit.) questions the validity of the determinations. Glaucosic sandstone from the Beds near Banka Banka homestead in the Helen Springs Sheet area has been dated at 1560 million years (I. McDougall, A.N.U., pers. comm.) i.e. Carpentarian, but the sequence from which it came overlies the bulk of the Tomkinson Creek Beds with a marked angular unconformity. Hence it may be considerably younger than most of the unit, including that part of it in the Newcastle Waters Sheet area.

The unit is extensively folded and faulted. Its thickness is unknown, but to the south equivalent parts total no more than 11,000 feet.

**CAMBRIAN**

The Lower Cambrian *Antrim Plateau Volcanics* (Traves, 1955) are believed to occur in the subsurface in parts of the Sheet area. Regional mapping in the Northern Territory in the last few years suggests that the Antrim Plateau Volcanics which occur to the west and north, the Nutwoods Downs Volcanics to the northeast, and the Helen Springs Volcanics to the southeast, are contemporaneous and are continuous beneath the cover of Cambrian and Mesozoic rocks (Randal & Brown, 1967). The driller's log of Burge Bore in the southeast suggests that the bore penetrates basalt between 156 feet and 234 feet.

The lower Middle Cambrian *Merrina Beds* were named by Milligan et al. (1966) from BMR Scourhole WC3 near Merrina Waterhole in the Winnecke Creek Sheet area to the southwest. In the Newcastle Waters Sheet area the unit occurs as scattered boulders and pavements of dolomite near Benaud and Coolibah bores; chert and lateritized sandstone rubble in the south have been mapped as part of this unit in conformity with mapping by
<table>
<thead>
<tr>
<th>Age</th>
<th>Rock unit and Symbol</th>
<th>Lithology</th>
<th>Maximum known thickness (feet)</th>
<th>Distribution and topography</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAINOZOIC</td>
<td>Superficial deposits Cza, Czb, Czs</td>
<td>Alluvium; black soil, sand, sandy soil</td>
<td>20</td>
<td>Widespread; various</td>
<td></td>
</tr>
<tr>
<td>TERTIARY</td>
<td>Laterite Tl</td>
<td>Lateritized material of parent rock;</td>
<td>30?</td>
<td>Widespread; bevelled plateau surfaces disected on margins</td>
<td>Developed on all suitable rock types</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cemented pisolithic ironstone gravels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOWER CRETACEOUS</td>
<td>Mullaman Beds Klm</td>
<td>Sandstone, siltstone, claystone</td>
<td>Up to 300</td>
<td>Widespread in east; presumably under much of desert. Rubble-covered.</td>
<td>Non-marine unit overlais by marine units.</td>
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<tr>
<td></td>
<td>Merrina Beds Cme</td>
<td>Dolomite, dolomitic limestone, chert,</td>
<td>Up to 600</td>
<td>Presumably under desert in south.</td>
<td>Very few outcrops; presence inferred from drillers' logs and geology of areas to south.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>silicified carbonate rocks, sandstone.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>MIDDLE CAMBRIAN</td>
<td>Tindall Limestone Cmt</td>
<td>Limestone, dolomitic limestone, dolomite</td>
<td>Unknown: 500 to north</td>
<td>?Subsurface in northeast</td>
<td>Equivalent to upper unit of Montejnni Limestone.</td>
</tr>
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<tr>
<td></td>
<td>Montejnni Limestone Cmm</td>
<td>Unit 1: limestone and dolomite, minor chert</td>
<td>100</td>
<td>?Subsurface in west</td>
<td>Maximum observed thickness about 200 feet on Victoria River Downs Sheet area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit 2: Calcareous siltstone, mudstone</td>
<td>60</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Unit 1: Limestone with chert nodules and stringers, dolomite</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Siltstone, chert, sandstone, limestone</td>
<td>7170</td>
<td>Subsurface in southeast</td>
<td>Lower Middle Cambrian fossils in Tennant Creek and Helen Springs Sheet areas.</td>
</tr>
<tr>
<td>LOWER CAMBRIAN</td>
<td>Antrim Plateau Volcanics Cla</td>
<td>Basalt, tuff, agglomerate sandstone;</td>
<td>Extremely variable;</td>
<td>Subsurface</td>
<td>Equivalent to Nutwood Downs Volcanics to northeast and Helen Springs Volcanics to southeast</td>
</tr>
<tr>
<td></td>
<td></td>
<td>limestone and chert beds</td>
<td>at least 790 in Victoria River Downs Sheet area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOWER PROTEROZOIC</td>
<td>Tomkinson Creek Beds FIr</td>
<td>Medium to coarse quartz sandstone,</td>
<td>Less than 11,000</td>
<td>Ashburton Range; strike ridges and bevelled sand-covered tableland.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>minor siltstone and pebble conglomerate</td>
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</tbody>
</table>
Milligan et al. (op. cit.) in the adjoining South Lake Woods Sheet area. The Merrina Beds are probably penetrated by waterbores about Lake Woods and along the Murrani Stock Route.

Milligan et al. (op. cit.) report lower Middle Cambrian fossils in the lower part (carbonates) of the Merrina Beds and equate it to the lower Middle Cambrian Montejinni Limestone, which they observed conformably beneath the upper part (sandstone) of the Merrina Beds. No fossils have been found in the unit in the Newcastle Waters Sheet area, but probably the beds about Lake Woods and along the Murrani Stock Route represent the lower part.

The upper part of the Montejinni Limestone is equivalent to part of the lower Middle Cambrian Tindall Limestone of the Daly Basin (Randal & Brown, 1967); cuttings from waterbores in the eastern part of the Daly Waters Sheet area indicate that the Tindall Limestone occurs there. Randal & Brown believe that the Tindall Limestone occurs in the subsurface in the northeastern part of the Newcastle Waters Sheet area, where it may be equivalent in part to the Merrina Beds, and where it swings southeastwards to link with the Middle Cambrian units of the Georgina Basin—the Gum Ridge Formation near Tennant Creek and possibly the Anthony Lagoon Beds in the Barkly Tableland.

These lower Middle Cambrian units probably all represent sedimentation in a Middle Cambrian epicontinental sea which covered large areas of the Northern Territory and extended into Western Australia and Queensland.

**Mesozoic**

The Lower Cretaceous Mullaman Beds in the northern Wiso Basin contain lacustrine sediments overlain by marine sediments (Skwarko, 1967)—both types are represented in the Newcastle Waters Sheet area, but have not been separately mapped. Saccharoidal quartz sandstone and pebble conglomerate occur along the flanks of the Ashburton Range, and Brunnschweiler (1950) describes plant fossils in fine-grained sandstone near the causeway across Newcastle Waters (Creek) on the Stuart Highway. Skwarko (op. cit.) regards similar rocks to the north as ?Neocomian—Aptian in age. Elsewhere in the Sheet area there is extensive rubble of quartz sandstone, siltstone, siliceous siltstone, and claystone—some containing radiolaria. The radiolarian rocks are probably equivalents of either Aptian or Albian rocks farther north (Skwarko, 1967; Randal & Brown, 1967). The Lower Cretaceous rocks occur beneath superficial cover over much of the northern and eastern part of the Sheet area. Randal & Brown (op. cit.) illustrate contours on the Lower Cretaceous/Middle Cambrian unconformity and isopachs on the Lower Cretaceous rocks for the entire northern Wiso Basin, and have extrapolated these into this Sheet area. These contours have been used for tracing the edge of the Lower Cretaceous subcrop as shown on the map. According to Randal & Brown the thickness of the Lower Cretaceous rocks increases northwards: in bores along the Murrani Track in the northeast it appears to be about 200 feet, but in the central north it may be over 300 feet.
Cainozoic

Laterite profiles occur on Lower Cambrian basalt, Lower Palaeozoic sandstone, and Lower Cretaceous sandstone and claystone throughout the northern part of the Wiso Basin, and antedate Miocene limestones in the Wave Hill and Larrimah Sheet areas (Randal & Brown, 1967). In this Sheet area lateritic rubble occurs over the Lower Cretaceous Mullaman Beds and the sandstone parts of the Middle Cambrian Merrina Beds. Because of the poor exposures no profiles have been seen in situ. Lateritic pebbles scattered in the sand cover on the Tomkinson Creek Beds are believed to be remnants of lateritized Lower Cretaceous rocks; although the Beds are ironstained no laterite profiles have been seen in them.

Red and brown sand and sandy soils cover a large part of the Sheet area. Much of the sand has probably been reworked by wind; some has come from ancient shoreline deposits of Lake Woods, and some has probably been derived from sandstone in the Merrina Beds and the Mullaman Beds.

Heavy grey to brown clayey soils occur in the grassy plains about Sturt Plain and marginal to Lake Woods. They occur on areas underlain by Middle Cambrian carbonate rocks and Lower Cretaceous claystone and siltstone. The deposits are partly residual and partly alluvial.

Reworked clayey alluvium occurs in the central part of Lake Woods. It is finer-textured than the clayey black soils that border the lake.

STRUCTURE AND GEOLOGICAL HISTORY

The structure and geological history can be interpreted only by considering the adjoining areas of the central and northern Wiso Basin and its environs. Extensive sedimentation occurred during the Proterozoic in the surrounding regions of the Victoria River Basin to the west, the McArthur River Basin to the northeast, and the Davenport Geosyncline and its northern environs to the southeast. Proterozoic rocks which may occur in the subsurface in this Sheet area are the Victoria River Group in the west and, less probably, the Roper Group in the northeast; the Tomkinson Creek Beds—a probable correlate of the Hatches Creek Group of the Davenport Geosyncline—crop out in the east. The relationships of these units and their subsurface extent are virtually unknown. The Archaean rocks of the Arunta Block and the Lower Proterozoic Warramunga Group (beneath the Tomkinson Creek Beds) may extend into this area, but the nearest outcrops are 190 miles and 90 miles respectively to the south. Archaean rocks were encountered in a drill hole 20 miles west-southwest of Tennant Creek Township (P. W. Crohn, BMR, pers. comm.).

After the folding, uplift, and erosion of the Proterozoic rocks, extensive vulcanism during the Lower Cambrian produced the Antrim Plateau Volcanics to the west and north, the Nutwood Downs Volcanics to the northeast, and the Helen Springs Volcanics to the southeast. Remnants of this vulcanism probably occur in the subsurface of the Sheet area.

During the Middle Cambrian parts of the Northern Territory were covered by a widespread epicontinental sea, the sediments of which are represented here by the Merrina Beds and probably the Montejinni and Tindall Limestones, and
the Gum Ridge Formation. All these Middle Cambrian units rest either disconformably on Lower Cambrian volcanics or unconformably on the Proterozoic rocks.

The Merrina Beds and the Montejinni Limestone form part of the Wiso Basin, most of which lies to the south (Milligan et al., 1966); Randal & Brown (1967) suggest that the thickness of the Middle Cambrian rocks in the Newcastle Waters Sheet area increases from north to south. They also suggest that a basement high continues northwards from the end of the north-striking Tomkinson Creek Beds and passes through the Daly Waters Sheet area into the Larrimah Sheet area. Gravity contours (shown on the geological map) in the eastern part of the Sheet area parallel this trend. Elsewhere the gravity contours have no obvious trends and anomalous high values cannot be adequately explained on present knowledge. The basement high is postulated as the western margin of the Lower Palaeozoic Georgina Basin, which extends southeastwards into Queensland.

Little is known of the geological history of the Sheet area between Middle Cambrian and Lower Cretaceous times. Ordovician and Devonian rocks are known in the southern part of the Wiso Basin (Milligan et al., 1966) and Ordovician rocks are known in the Daly Basin to the north (Randal & Brown, 1967), but neither has been recognized in this Sheet area. Certainly some uplift and erosion occurred, and Randal & Brown state: ‘On a regional scale the base of the Mullaman Beds is notably flatter than the base of the lower Middle Cambrian rocks, indicating that gentle tilting (and erosion) of the Palaeozoic rocks preceded deposition of the Mullaman Beds; this is also indicated by the overlap of the Mullaman Beds on to Lower Cambrian and Proterozoic rocks’. And further ‘The configuration of the base of the Mullaman Beds may be controlled significantly by pre-depositional topography over much of the region. The strike ridges of the Ashburton Range existed during deposition of the Beds and the basal non-marine unit and some of the later marine units are variable in thickness (Skwarko, 1967)’.

The Lower Cretaceous sedimentation began in ?Neocomian-Aptian times in a lacustrine environment, followed by marine deposition in Aptian and Albian times. This sedimentation was widespread in the Northern Territory and Queensland, and in the Albian the sea may have been continuous with that of the Great Artesian Basin. The line on the map that shows the probable limit of the subcrop does not necessarily indicate the limit of sedimentation, although there is some evidence that outcrops along its exposed northward continuation in the Wave Hill Sheet area were close to the Lower Cretaceous shoreline (Randal & Brown, op. cit.).

Both the Lower Palaeozoic and the Lower Cretaceous sediments are essentially flatlying.

The Lower Cretaceous and some Middle Cambrian rocks were lateritized, presumably in the early Tertiary. Detrital lateritic pebbles occur as clasts in Miocene limestone units in the Wave Hill and Larrimah Sheet areas (Randal & Brown, op. cit.) and in Miocene limestone farther east (Randal & Nichols, 1963). No Tertiary limestones are known in this Sheet area, although the earth movements which created favourable environments and relief for their deposition elsewhere probably affected it also. These movements may have
initiated the downwarping which formed the internal drainage basin of Lake Woods. The lake itself appears to have been much larger than at present, although no chronology can be determined. Since and perhaps during the Tertiary, sand dunes have been built by southeast winds, presumably from weathered Middle Cambrian and Lower Cretaceous sandstones, and from ancient shoreline deposits of the lake. The lake is now gradually becoming choked with reworked clayey black soil.

**ECONOMIC GEOLOGY**

**Petroleum**

The petroleum prospects are not encouraging, although they cannot be reliably assessed until adequate subsurface investigations supplement the mapping. The Cambrian and Lower Cretaceous sequences contain marine fossiliferous rocks which may provide source rocks. But only the carbonate rocks, which have fracture porosity, the basal freshwater sandstone of the Lower Cretaceous, and perhaps sandy interbeds in the Merrina Beds to the south, are porous. Furthermore, the maximum combined thickness of the Palaeozoic and Mesozoic sediments at any time was probably less than 1000 feet (Randal & Brown, op. cit.), which reduces the chance of hydrocarbon accumulation even if hydrocarbons had been generated: no prospective traps either structural or stratigraphic have been recognized.

**Construction materials**

There is little good quality concreting sand: the ferruginous desert sand contains a great deal of clay and silt, and for even mediocre results requires a high proportion of cement. The clayey soils make excellent raised tanks (turkey nests) for the storage of borewater, but if the proportion of admixed sand or gravel is high the tanks are prone to leak. There are few suitable localities for obtaining road gravels by scraping; but suitable quarry sites occur in the Ashburton Range, where quartzitic rocks of the Tomkinson Creek Beds could be obtained and crushed, as is done to the southeast at Attack Creek on the Stuart Highway south of Banka Banka homestead.

**Water**

Because of the unreliability and sparseness of surface waters, cattle stations and public utilities are dependent on supplies of groundwater. Randal (in prep.) discusses the quality and occurrence of the groundwater of the Wiso Basin in detail and the following comments are taken from that report.

The only permanent waters are the long pools in Newcastle Waters (Creek) between Newcastle Waters township and Lake Woods. The water is very milky from suspended clayey matter. These pools are of varying reliability: they may be supplemented by springs issuing from the western side of the Ashburton Range, but these rapidly fail, and the high evaporation (about 110 inches/year) and the concentration of stock rapidly deplete the waterholes.

Groundwater is being obtained from the Precambrian Tomkinson Creek Beds, the Middle Cambrian Merrina Beds (and perhaps the Tindall Limestone in the northeast), and probably from the Lower Cretaceous Mullaman Beds.
Newcastle Waters town supply is from a bore in the Tomkinson Creek Beds; the supply is only mediocre; the salinity is less than 1000 ppm.

Water is obtained from cavities, joints, and fissures in the Middle Cambrian carbonate rocks, and perhaps also from sandstone interbeds. However, the carbonate rocks are covered by varying thicknesses of non-productive Lower Cretaceous rocks, and deep holes (up to 400 feet) have been drilled to obtain water from them. Randal (op. cit.) believes that future bores in this area should be drilled if necessary to at least 500 feet to find suitable supplies of water.

The salinity of the groundwater from the carbonate rocks ranges from less than 1000 ppm along Newcastle Waters (Creek) and Lake Woods, to over 2000 ppm at No. 10 Bore Murrangi Track, a few miles north of the Sheet area.

Because of the inadequacies of the drillers' logs it has not been possible to confirm that bores are drawing water from the Mullaman Beds, although this is certain in adjoining areas to the south and southeast. Some of the bores near Lake Woods and along the eastern part of the Murrangi Track may be drawing from the Mullaman Beds.
BIBLIOGRAPHY


