DEPARTMENT OF SUPPLY AND DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS.

Report No. 1949/103
(Geol. Ser. No. 70)

POSSIBLE EVAPORITE DEPOSITS IN QUEENSLAND.

Report on a Reconnaissance Trip in July and August, 1949

by

E.K. Sturmfels

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I. SUMMARY

The area of Lake Mueller in Central Queensland, north-east of Aramac, contains some trona (sodium carbonate) in form of crusts; this occurrence is of no economic value. Small quantities of common salt are reported from two lakes in the same district, but further north. Both sodium carbonate and sodium chloride are probably derived from the leakage of artesian water.

Layers of fibrous gypsum definitely derived from primary gypsum were found in the lower strata of the Lower Cretaceous near Richmond and near Roma. However, the chances of finding evaporite deposits of importance in this formation are only small, since no gypsum beds were found in the numerous bores drilled in the Great Artesian Basin.

Gypsum which is probably derived from pyrite occurs in dark grey shales in the Permian of the Springsure-Rolleston area. The chances of finding evaporites at depth in the Permian of this area seem to be remote.

II. INTRODUCTION.

The possibilities of finding evaporite deposits in Queensland were investigated by C.L. Knight and E.K. Sturmfels on a reconnaissance trip from 10th July until 5th August, 1949.

The localities where indications of evaporite deposits were found or from which they are reported, are classified on the following pages according to the geological formations, and their position is shown on the accompanying map.

III. RECENT AND PLEISTOCENE OCCURRENCES

Lake Mueller is an extensive mud flat, about 16 miles north-east of Aramac, in Central Queensland. When visited in July, 1949, the lake was dry except for a few isolated pools.

The largest pool, of about 100 feet in width and 1000 feet in length, in the south-eastern part of the lake area, contains fresh water. Crusts of sodium carbonate in the form of trona ($Na_2CO_3.2H_2O$) less than half an inch thick extend over several thousand square feet on its northern shore. The inner belt of trona crusts is surrounded by an outer belt of calcite crusts. A water soak at the eastern end of this pool which lies higher than the water level of the pool itself is apparently the source of these crusts. The sodium carbonate and calcite crusts are thus

probably derived from leaking artesian water and crystallized through evaporation of this water in the mud.

Other smaller pools exist about half a mile north-west of the above-mentioned pool. Patches encrusted with sodium carbonate and situated on the margins of and between these pools lie less than an inch above the water level of the pools. The crusts of sodium carbonate were probably produced by the evaporation of water in the mud. Calcite crusts are found at greater distance from the pools than the sodium carbonate crusts, and at a higher level.

The reserves of sodium carbonate at Lake Mueller are negligible. The occurrence is not of economic value.

The extensive Lake Galilee, about 50 miles north-east of Aramac, is more or less filled with water throughout the year; sodium chloride crusts are said to form occasionally on its shores.

Local residents report that common salt has been gathered for domestic and pastoral purposes from the shores of Lake Buchanan, about 100 miles north-north-east of Aramac. Leakages of brackish artesian water are said to occur around Lake Buchanan as well as around Lake Galilee. Hence, the salt content of these two lakes is probably derived from artesian water since the surface water is usually fresh.

B. Dunstan (1920) reported that concentrated brines occur in bores on Casuarina Island, about 30 miles south-east of Rockhampton and that these brines were once used for making salt. The surface as seen from the air is an extensive mud flat without any indications of the geological formations underneath. Information supplied by Mr. Morton, Chief Geologist of the Queensland Geological Survey, revealed that the bores had already been abandoned for a long time when they were visited by Dunstan in 1914, and that there is some doubt whether brine of higher concentration than sea water was really struck in these bores.

IV. LOWER CRETACEOUS OCCURRENCES

Layers of fibrous gypsum commonly occur in the lower part of the Lower Cretaceous of the Great Artesian Basin.

Numerous fragments of fibrous gypsum together with peices of dark shale were seen on the top of some ridges, about 2 miles west-north-west of Richmond Downs Homestead and approximately 15 miles north of Richmond town. The flat fragments of fibrous gypsum were up to 1 inch thick. Outcrops of dolomite on/top of the ridges show a definite /the but variable dip, but no outcrops of gypsum beds were found.

A layer of fibrous gypsum about ½ inch thick found in a cutting just west of the Richmond hospital, about 1 mile east of Richmond town, could be traced for some hundred feet along the strike. This layer is interbedded between grey shales, a dolomite bed of several feet in thickness forming the top part of the exposed strata. The comparatively large extent of the gypsum layer, the fact that no vertical veins were observed, and the presence of the dolomite indicate that this gypsum layer was originally formed as an evaporite, deposited together with the adjoining sediments, and only later changed to fibrous gypsum.

Gypsum is stated by local residents to occur occasionally in excavations for tanks in the country west of Winton. However, the existence of a 'bed of gypsum of workable thickness', which has been reported from Chollarton near Collingwood by Jack and Etheridge (1892) could not be verified. Collingwood is the name of a surveyed township, which never came into existence, about 35 miles west of Winton; but the locality Chollarton was unknown even to the oldest residents of the district.

Near Roma, fibrous gypsum is often found in excavations made for tanks. Fragments of fibrous gypsum were found e.g. on the slopes of a tank close to North Bindango Homestead, nearly 30 miles west-north-west of Roma. Much coarsely fibrous gypsum was found on the bottom of an excavation made for a new tank approximately 1 mile east of Roma Downs Homestead, about 7 miles south-east of Roma; the gypsum formed apparently a layer more than 1 inch thick, and was overlain by grey shales. Much gypsum is said to occur in tanks also in the surroundings of Mitchell, about 50 miles west of Roma.

Mr. G. Ogilvie of the Queensland Irrigation and Water Supply Branch reported that a gypsum deposit about 6 to 10 feet thick occurs on or near the surface at Mooraberree Station, about 110 miles east-north-east of Birdsville, in the south-western part of Queensland, but that it is of recent origin formed in a depression. Similar gypsum deposits have been found further to the west, between Mooraberree Station and the Mulligan River. Ogilvie also reported that highly concentrated brine has been met with in an excavation near Lake Machatte in south-western Queensland at 10 feet below the surface, and at shallow depth in several other localities in the same area. The above mentioned gypsum deposits and brines are probably not connected with evaporite beds of the Lower Cretaceous, but were formed in a semiarid region with insufficient drainage.

Mr. Ogilvie, who is an authority on the problems of the Great Artesian Basin, stated that no gypsum beds have been reported from the numerous bores drilled through the Lower Cretaceous of this Basin. He thinks it is unlikely that the drillers, mostly experienced men, could have overlooked gypsum beds of more than a few feet in thickness.

Summarizing these observations and reports, it is certain that the lower part of the Lower Cretaceous strata was deposited under highly saline conditions. This lower part contains some gypsum which is probably derived from primary gypsum, but no evidence of large gypsum or salt deposits at depth was found. Rumbalara in the extreme south of the Northern Territory, nearly 200 miles west of the western border of Queensland, is the only locality from which thick primary gypsum beds of Lower Cretaceous age have been reported.

V. JURASSIC OCCURRENCES

No investigations were carried out in the Jurassic of the Roma - Charleville area. Jensen (1926) reported that the Jurassic beds of this area often show indications of salinity. However, the freshwater origin of these Jurassic strata is well established, and no evaporite deposits of any size can be expected.

VI. PERMIAN OCCURRENCES.

Shales containing gypsum occur in the Permian of the Springsure - Rolleston area in Central Queensland.

Reid (1930) reports gypsum from the Gypseous Stage as well as from the Dilly Stage. Reeves (1947) mentions the Gypseous Stage as an horizon within the Serocold Sandstone, but says also in the same publication that the Gypseous Stage is identical with the Dilly Stage which he thinks forms the base of the Permian. However, field investigations suggest that both concepts of the stratigraphy may have to be modified; thus, in the following report on reconnaissance field-work, names of formations have largely been omitted.

On Staircase Creek, 11 miles south-east of Springsure, near the Springsure - Rolleston road, dark grey shales about 40 to 60 feet thick and containing numerous thin layers of fibrous gypsum are well exposed in a cutting. The gypsum layers are less than ½ inch thick and more or less parallel to the bedding, but veins of gypsum are also found along steeply dipping joints. The face of the shales is covered with loose aggregates of alum which has most probably been formed by the oxidation of pyrite originally contained in the shales. This suggests that the gypsum may also have been formed by the same process.

These grey gypseous shales have an easterly dip of approximately 15 degrees and belong to the eastern limb of the Serocold Anticline. They are overlain by about 100 feet of non outcropping shales and by another 100 feet of alternating shales and sandstones; this series is followed by a thick sandstone formation (Reid's Aldebaran Sandstone and Reeves' Serocold Sandstone). Sandstones form apparently also the base of the dark grey gypseous shales on Staircase Creek; and underneath these sandstones dark grey shales appear again in several cuttings on one of the headbranches of Orion Creek, about 2 miles south-west of the above mentioned outcrops on Staircase Creek. The thickness of the dark-grey shales on Orion Creek is unknown but is at least 30 feet. These shales are very similar to the dark-grey shales on Staircase Creek, but do not contain any gypsum. It is possible that the shales on Orion Creek are a separate and lower member of the Permian divided from the gypseous shales on Staircase Creek by several hundred feet of sandstone; but it is also possible that both shale horizons are identical and are divided from each other by one or more antithetic faults.

On Aldebaran Creek, about 10 miles south of Staircase Creek and about 6 miles west of Meteor Downs Homestead, shales underlying a thick sandstone formation (Reid's Aldebaran Sandstone and Reeves' Serocold Sandstone) probably form the centre of the Serocold Anticline. However, these shales are nearly everywhere covered by thick soil; only one small outcrop, showing several feet of grey shale but no gypsum, was seen.

The gypsum which has so far been found in the Permian of the Springsure - Rolleston area is probably derived not from primary gypsum deposits but from the weathering of pyrite. Only primary gypsum beds would suggest the possibility of rock-salt and potash-salt deposits at depth.

Much geological information has been collected by Shell (Queensland) Development Pty. Ltd. from geological mapping and from drilling numerous bores during the last twelve years in the area between Springsure and the Carnarvon Range (about 70 miles south-south-east of Springsure). However, this information was not available for this report. If bores of Shell Development Pty. Ltd., drilled through the lower part of the Permian, did not find any indications of gypsum or other evaporites, it may be taken for granted that there is no chance of finding rock-salt and potash-salt deposits in the Springsure-Rolleston area.

The possibilities of finding evaporites in the Permian of the Bowen River - Issacs River area were thought to be too small to warrant field investigations.

It is not very likely that Permian beds occur under the Triassic in the South Moreton Anticline, according to Mr. Morton, Chief Geologist of the Queensland Geological Survey, since no outcrops of Permian are known in the surroundings of this anticline. Hence, no investigations were carried out in this area.

E.K. STURMFELS

Canberra, A.C.T.
2nd September, 1949.

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OCCURRENCES OF EVAPORITES IN QUEENSLAND

Map accompanying report of
1st September 1949 by E. K. Sturmfels.

+ Occurrence of Gypsum
• Occurrence of Common Salt on the Surface
Δ Occurrence of Sodium Carbonate

100 0 100 200 MILES

142° 148° 154°
4° 20° 26°

Cairns
Atherton
Mt. Garnet
Burketown
Townsville
Bowen
Bowen R.
Charters Towers
Richmond Hstd.
Richmond
Mt. Isa
Mackay
Lake Buchanan
Collingwood
Winton
Lake Galilee
Lake Mueller
Aramac
Isaacs R.
Longreach
Emerald
Rockhampton
Casuarina Is.
QUEENSLAND
Springsure
Staircase Ck.
Aldebaran Ck.
Rolleston
Carnarvon R.
Lake Machattie
Mooraberee Stn.
Mulligan R.
NORTHERN TERRITORY
Birdsville
Mitchell
Charleville
Nth. Bindango Hstd.
Roma
Roma Downs Hstd.
SOUTH AUSTRALIA
BRISBANE
Ipswich
Southport
South Moreton Anticline
NEW SOUTH WALES
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