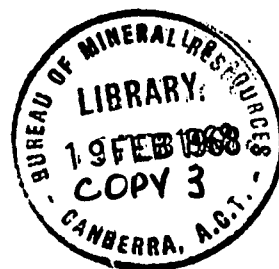


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A SUMMARY OF THERMAL AND MINERAL WATERS IN AUSTRALIA

by

I.R. McLeod



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Very few mineral and thermal springs are known in Australia. Those occurring in the Territory of Papua and New Guinea are described in a separate paper (Heming, 1967). As far as known, none of the Australian spring waters or their deposits have been used industrially, except limonite deposits from chalybeate springs near Mittagong in New South Wales. The water in the known thermal springs is probably ground water heated by circulation to deep levels, rather than juvenile water or meteoric water heated by volcanic action.

Salt is obtained from underground brine found near Rookhampton.

Mound springs discharging hot water occur around the margins of the Great Artesian Basin. They are most common west and south of Lake Eyre, and represent points of leakage from the aquifers of the basin.

The mounds are composed mostly of massive limestone and travertine. The water is alkaline; sodium and chloride are the most common ions, with lesser quantities of calcium, potassium, magnesium, and sulphate and carbonate. Water from a few of the springs is siliceous (e.g. Cadnaowie Spring and Billa Kalina Springs) and free carbon dioxide is present in some (e.g. Sulphur Springs). The content of total dissolved salts is generally a few thousand parts per million. A selection of analyses of the spring waters is given in Table 1. During the last 70 years the flow from the springs has decreased markedly, and, indeed, some have ceased flowing. This is a result of withdrawal of water from the aquifers by the numerous bores drilled in this period. A high geothermal gradient exists in the Great Artesian Basin, so water from most of the bores is hot - close to boiling in some.

Waters from the bores and springs have not been utilized for their mineral or thermal properties except, on a minor scale, for domestic or medicinal purposes.

Thermal springs are known near Talaroo, 45 km north of Einasleigh, and at Innot, 15 km east of Mount Garnet, both in north Queensland. The springs are in old rocks; Tertiary basalt flows crop out within a few kilometres of each.

TABLE 1

Analyses of waters from mound springs in Lake Eyre region
(from Ward, 1946)

	parts per million				
	1	2	3	4	5
K ⁺	23	32	18	21	44
Na ⁺	948	1529	742	1699	1970
Li ⁺	-	-	nil	0.4	0.3
Mg ⁺⁺	24	40	25	35	31
Ca ⁺⁺	30	100	82	144	208
Fe ⁺⁺ + Al ⁺⁺⁺	-	-	1	2	2
Cl ⁻	865	1970	856	2373	2825
Br ⁻	tr	nil	nil	tr	nil
H ⁺	-	-	-	8	6
SO ₄ ^{="}	129	366	434	416	652
CO ₃ ^{="}	531	375	149	502	371
NO ₃ ⁻	-	-	6	9	12
SiO ₂	-	-	26	26	20
Free CO ₂ (c.c./litre)	-	-	-	9	15

1. Bopeechee Springs
2. Mount Hamilton Spring
3. Cadnaowie Springs
4. Billa Kalina Springs
5. Sulphur Springs

The spring at Talaroo is in Precambrian metamorphic rocks. Water flowing from it is close to boiling point. An analysis of the water is given in Table 2. The spring has built a mound about 5 metres high composed mainly of calcium carbonate.

TABLE 2

Analyses of waters from hot springs
(parts per million)

	<u>1</u>	<u>2</u>
Total solids	715	594
Ca ⁺⁺	27	15
Mg ⁺⁺	0.8	nil
Na ⁺	242	176
Cl ⁻	245	165
CO ₃ ["]	91	92
SO ₄ ["]	96	32

1. Talaroo (recalculated from Denmead, 1948)
2. Innot hot springs (recalculated from Dunstan, 1901)

The Innot hot springs are in Nettle Creek, the water emerging from the sand in the bed of the stream. The country rock is Upper Carboniferous granite. The water has a temperature of about 90°C. Old sinter deposits occur close by, almost entirely covered by alluvium.

In addition to these, warm springs with water in the approximate range 20°C to 35°C are known at several places in Australia.

Mineral springs have been recorded from many places. The salts in most are mainly sodium chloride or calcium carbonate or both, and the total dissolved salts rarely exceed 3000 p.p.m. Water from some springs contains appreciable quantities of carbonate and has been bottled and sold as table water. Such springs include those at Helidon (Queensland), Rock Flat (New South Wales) and Daylesford (Victoria). Water from a bore near Ballimore in New South Wales has also been used as table water.

The deposit from chalybeate springs near Mittagong (New South Wales) was mined last century for iron ore, and this century for limonite for gas purification. Total production was probably only a few thousand tons. Indicated reserves total 1.5 million tons with a grade of 44 to 57 percent Fe, but are distributed amongst several deposits. Analysis of the water (Griffin, 1962) gave (parts per million):

Iron bicarbonate	85.5
Magnesium bicarbonate	32.0
Calcium bicarbonate	29.1
Sodium chloride	30.8
Potassium chloride	29.1
Magnesium chloride	18.5

Underground brine is tapped and evaporated to produce common salt at Port Alma, 30 km south-east of Rockhampton. The brine-bearing aquifer consists of gravel beds about 30 metres below the surface; it is said to be of considerable extent.

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