Records

45/103
GS 820
Hyd. 330.
DM 862/48

DEPARTMENT OF MINES.
SOUTH AUSTRALIA.

SALINITY PROBLEM - KEITH.

A Mr. J.T. Summers, who himself is recorded as having a bore on Section 246, Hundred of Stirling, has written to the Minister of Works asking that the Government send a drilling plant to Keith to investigate the reason for certain bores turning salt. He also asks that this be done as a charge against the Government, rather than any individual. Three bores are specifically mentioned, the No. 1 Community Centre bore, constructed by Department of Mines in 1946, R. Schulz bore (by private contract) and one of the Hotel bores (also by private contract). Concern is also expressed that the Hospital Bore (private contract) and the No. 2 Community Centre Bore may go salty in the future.

As regards the privately constructed bores, since this Department has no knowledge of the methods used in construction, or of the casing lengths, etc. it is not possible to comment except in generalised terms, and it is not considered possible to advise how these individual bores can be rendered serviceable again.

No. 1 Community Centre bore went saline six years ago and so far as I am aware, was abandoned. The Hotel bore was investigated by Mr. W. Johnson, Geologist, Department of Mines, in 1956 and recommendations were made to the S.A. Brewing Co. as to how they should proceed to re-obtain suitable water. The estimated cost was £1,300 and presumably the Brewery has not availed itself of this advice. As early as 1951 a warning was issued to the Hotel Manager that an abandoned deep bore on the property was a potential source of contamination of the main aquifer by salt water, but apparently no action resulted.

No. 2 Community Centre bore was drilled by us in 1952. My recollection is that pressure cement grouting was considered, but not done because of expense, the Community Centre being very short of money, and the Department would have had to

procure special equipment. The supply is restricted, and for a reason apparent from the general observations below, the life of the bore will probably be limited.

GENERAL CONSIDERATIONS.

As a result of various investigations and the drilling of several bores in the vicinity, I feel that the subsurface conditions are now reasonably well known.

Palaeontological examination of the sludges from No. 2 Community Bore show that Pleistocene sediments occur to a depth of 128 feet. These comprise limestones and sandy limestones which contain water at various depths. The waters vary greatly in quality, wells within the township area having salinities from 32 grains to 687 grains per gallon at less than 20 feet depth. They are believed to be corrosive and there is some local evidence that the more saline waters will hole casing in about five years.

From 128 - 168 ft. Ettrick marls occur. Elsewhere these marls contain saline and highly corrosive waters, the bore in question cutting 319 grain water at 140 feet.

Below 168ft. are carbonaceous clays alternating with sandy clays and sands containing good quality (approx. 80 grain) water, which has to be developed very carefully because of the relatively fine and unconsolidated nature of the sands. Early attempts to develop large supplies by blowing various bores with compressed air resulted in large quantities of this sand being removed, leaving in each case a cavity around the casing shoe into which the carbonaceous clays collapsed. As these clays are all that separate upper salt water from the main aquifer below, salt water was then able to move downwards and contaminate the aquifer, causing deterioration in quality. This result of blowing by compressed air was commented on by Geologist A.A.C. Mason in 1951, when he advised against the practice in future drilling. That the advice has since been disregarded is shown by a letter from Driller W. Courtney in 1955, describing his "blowing" of the A.M.F.

workshop bore and suggesting he do the same to the No. 2 Community Centre Bore.

No. 2 bore was carefully developed by bailer only, even surging being regarded as too severe, and it, therefore, has not been affected by the formation of such a cavity as described above (unless since "blown" without our knowledge).

Mention has been made at other times of the possibility that abandoned bores penetrating down through the upper salt waters into the main aquifer may act as conduits and allow the heavier salt waters to work downwards and cause contamination. If occurring on any scale, this could cause a rise in salinity in nearby bores.

Such abandoned bores are known to exist within the township area, and the possibility of their causing contamination cannot be overlooked. It does not as yet appear to be general, however, as several bores have maintained constant (approximate 80 grain) salinity during constant use over several years.

CAUSES OF SALINITY DETERIORATION.

There are two known and one suspected causes:

1. Improper construction methods, resulting in collapse of the clay band overlying the aquifer and the subsequent downward percolation of salt water outside the casing.

There is no means of remedying this. Bores so affected should be plugged and abandoned.

2. Corrosion of the casing by upper salt waters. The remedy for this is to insert a liner of smaller casing and pressure cement between the two. It should be done when the bore is first constructed, but can be done subsequently, even after failure.

3. Contamination of the aquifer by unplugged failure bores. This Department has no power to control the activities of private drillers or prevent malpractices such as the abandoning of failure bores without plugging. If such contamination is serious, there is no remedy other than to locate and plug the abandoned bores.

CONCLUSIONS AND RECOMMENDATIONS.

It should be apparent from the above that salinity failure may result from different causes, and each bore must be treated on its merits. In the case of No. 2 Community bore, it is my personal opinion that failure from cause No. 2 may occur, and can be dealt with, provided the Community centre is prepared to

meet the cost, which may be several hundred pounds. The bore is cased with 5 inch casing, and a 4inch liner would still permit the present supply to be extracted, as it is rather less than 1000 g.p.h.

As regards privately constructed bores, failure from cause No. 2 can also be dealt with, but details of construction are only hearsay, and failure from cause No. 1 may be the sole or a contributory cause. It cannot be rectified. The bores should be backfilled and redrilled elsewhere by a competent driller under close supervision, and the supply developed in the proper way.

General contamination of the aquifer by abandoned bores, if it does occur, is beyond the control of this Department, although the remedy is known, and has been stated above.

In view of what is believed to be a reasonably clear understanding of the problems involved, it does not seem necessary for this Department to send a drilling plant into the area.

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22-11-57

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