Section

Rept. Bk. No. 58/106
G.S. 2855
D.M. 260/64

DEPARTMENT OF MINES
SOUTH AUSTRALIA

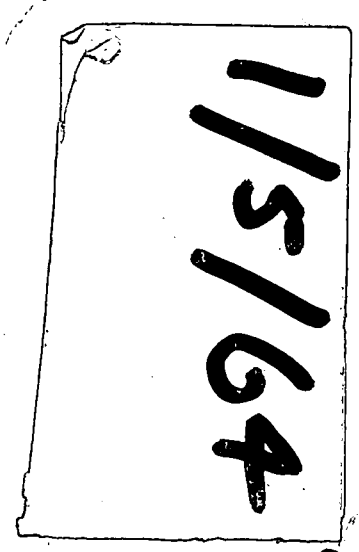
GEOLOGICAL SURVEY
GEOPHYSICS SECTION
(SEISMIC)

REPORT ON

RECONNAISSANCE SEISMIC REFRACTION SURVEYS, NARACOORTE TO PARUNA AND KINGSTON TO MENINGIE.

by

K.R. Seedsman
Senior Geophysicist



1st May, 1964

D.M. 260/64

Rept. Bk. No. 58/106
G.S. 2855
D.M. 260/64

DEPARTMENT OF MINES
SOUTH AUSTRALIA

REPORT ON

RECONNAISSANCE SEISMIC REFRACTION SURVEYS, NARACOORTE TO PARUNA AND KINGSTON TO MENINGIE.

INTRODUCTION:

The purpose of this report is to present the results of a number of short, reconnaissance, seismic refraction lines shot in 1961 and 1963 between the Gambier and Murray Basins and northward into the latter. One series of lines was shot in 1961 between Naracoorte and Paruna, the other, in 1963, between Kingston and Meningie. In these areas, a thin (less than 2000 feet) section of Tertiary and Quaternary sediments was expected to rest on granitic or metamorphic basement. The seismic work was carried out to check for any significant variations from this expected geological picture. The locations of the lines shot are shown on Plan L64-81.

In 1961, B.E. Milton was in charge of operations, and in 1963, G.W. Kendall. Computations were carried out by, or under the direction of these officers.

METHOD:

A short, single-line reversed refraction profile as described by Vale and Smith [1] was shot at each of the locations shown on plan L64-81 to record all refractors down to, and including, basement. Computations of depth, dip and velocity of refractors were made as described by Vale and Smith.

Recording was photographic through a set of T.I. 7000B seismic equipment from Hall Sears and Electro-Tech.geophones. Shot holes were drilled by Mayhew 1000 and Failing 1500 rigs.

---

(1) Vale, K.R. & Smith, E.R. 1961, "The Depth-Probing Technique using Seismic Refraction Methods". Bur. Min. Resour. Aust.

RESULTS:

The results of the work are presented on a series of plans showing corrected time-distance curves of refraction arrivals with interpreted depths and velocities of refractors recorded, as summarized below:-

Drawing No.	Line No.	Velocities of refractors V_1	V_n	Surface elevation at centre of line	Depth below surface of high speed refractor at centre of line
64-288	33	6800 ft/s	18700 ft/s	249'	1460'
64-289	31	?	18100 ft/s	210'	1500'
64-290	30	6700 ft/s	18500 ft/s	313'	1490'
63-31	28	6900 ft/s	19500 ft/s	360'	1380'
63-32	29	6800 ft/s	17700 ft/s	412'	1410'
63-28	25	7200 ft/s	18700 ft/s	370'	930'
63-27	24	6200 ft/s	18300 ft/s	359'	820'
63-26	23	6700 ft/s	18300 ft/s	309'	840'
63-25	22	6500 ft/s	17700 ft/s	315'	750'
63-29	26	6800 ft/s	18000 ft/s	303'	910'
63-30	27	6600 ft/s	16500 ft/s	293'	590'
64-291	15	6600 ft/s	17100 ft/s	303'	660'
64-292	12	6800 ft/s	18800 ft/s	260'	640'
64-293	10	6400 ft/s	19600 ft/s	253'	640'
64-294	17	6600 ft/s	18700 ft/s	180'	4000'
64-295	K0	6100 ft/s	17700 ft/s	17'	250'
64-296	K1	6600 ft/s	18800 ft/s	11'	380'
64-298	K3	6600 ft/s	17000 ft/s	42'	480'
64-297	K2	6800 ft/s	20100 ft/s	17'	1520'
64-299	K4	6600 ft/s	17800 ft/s	7'	1280'
64-300	K5	6600 ft/s	16500 ft/s	37'	730'

INTERPRETATION:

Velocities of high speed refractors recorded range from 16500 ft/s to 20100 ft/s. It is considered that in this area such velocities indicate basement of either igneous or metamorphic rock.

The overlying low velocity refractors are considered to be Tertiary sediments. Nowhere were there recorded definite re-

refractors of intermediate velocity which might indicate the presence of pre-Tertiary sediments. At line 17, south of the Kanawinka Fault, it is probable that a large part of the 4000 feet section above basement is of Cretaceous age but the sediments are apparently only mildly compacted and of low velocity.

Utilising the results obtained from most of the refraction lines reported here, and incorporating similar information from earlier reports (2) (3), a basement profile has been drawn along a north-south line approximately through Naracoorte and Renmark (plan L64-81). This shows that between the Kanawinka Fault in the south, and the latitude of Loxton in the north, basement is everywhere less than 2000 feet deep. Further to the south and north, basement plunges into the Gambier Basin and the deep trough in the Renmark area respectively.

Between Kingston and Meningie, the basement surface is irregular, and, where measured, less than 2000 feet deep. Nowhere is there present a sufficient thickness of sedimentary section to encourage further exploration for petroleum.

KRS:AWK
1.5.1964.

K.R. SEEDSMAN,
SENIOR GEOPHYSICIST
(SEISMIC)

---

(2) Seedsman, K.R. 1963. "Report on Reconnaissance Seismic Surveys in the Northern Portion of the Murray Basin, 1962". Geol. Surv. S. Aust. Report G.S. 2558 (not published).

(3) Seedsman, K.R. & Kondall, G.W., 1964. "Report on Reconnaissance Seismic Refraction and Gravity Surveys in the Northern Portion of the Murray Basin in South Australia, 1963". Geol. Surv. S. Aust. Report G.S.2832 (not published).

18700ft/s Refraction line with velocity and depth
-3800 below sea level of high speed refractor.
A___A' Line of profile.
LAKE ALEXANDRINA
THE COORONG
MENINGIE
TAILEM BEND
MURRAY BRIDGE
RIVER MURRAY
MORGAN
ROBE
KINGSTON
COONALPYN
KAROONDA
CULBURRA
TINTINARA
COOMBE
KEITH
BORRIKA
MILLICENT
MT. GAMBIER
PENOLA
NARACOORTE
BORDERTOWN
PINNAROO
PARUNA
LOXTON
RENMARK
STATE BORDER
SOUTH AUSTRALIA
VICTORIA
NEW SOUTH WALES
Sea Level
Ground Surface
Basement Profile
Tertiary
Cretaceous
Permian
FAULT ?
KANAWINKA
SCALE
Miles 8 4 0 8 16 24 32 Miles
S.A. DEPT. OF MINES
MURRAY BASIN SEISMIC REFRACTION SURVEYS
NARACOORTE–PARUNA AND KINGSTON–MENINGIE
LOCATION PLAN AND BASEMENT PROFILE
SEISMIC REFRACTION SURVEY 1965
ELEVATION ABOVE M.S.L.
HIGH SPEED REFRACTION
DEPTH BELOW M.S.L.
To accompany a report by K.R. Seedsman.
L64-1