

TR18-46-52

## 9. Refraction seismic survey, North West Bay.

D.E. Leaman

W.R. Moore

Seventeen single-ended and five double-ended spreads were fired in North West Bay. Logistic support for the operation was provided by the Hobart Marine Board. The survey was undertaken with two objectives:

- (1) to locate the Tertiary valleys proposed by Moore (1972) and to determine which of the structural alternatives suggested was most likely, and
- (2) to obtain information on the rock units on the floor of North West Bay, especially near Margate.

### SURVEY

The hydrophone spacing was approximately 15 m. All single-ended spreads were fired with a 90 m extension. A plot of spread and shot positions is given in Figure 12. With the exception of the five double-ended western spreads firing was undertaken with the cable in tow. Charges were generally less than 2 kg, and a detonator was often all that was needed.

### INTERPRETATION

The interpretation (Table 1) is semi-quantitative due to lack of spread overlaps, reversals and marked steps in the bay floor. The conclusions based on, and deduction of, seismic velocities remain valid although the estimates of mud cover on the bay floor may be in error (the estimates are in general conservative).

### CONCLUSIONS

Bedrock in the northern and western parts of North West Bay is covered by a variable amount of mud (up to 14 m). The present survey has proved mud in the region of Spreads 1, 6, 7, 8 and 9 and indicated its presence in the region of Spreads 2, 3, 4 and 5, but no information is available for the deeper parts of the bay. There is little or no mud overlying the dolerite (fig. 13).

Several spreads show that steep interfaces are present and that the clays (and other Tertiary sediment) occupy distinct ravines in either sandstone or dolerite. Indeed both N-S valleys appear to occupy an eroded fault or igneous contact. The total thickness of Tertiary sediment present is unknown but must exceed 70-90 m.

There is uncertainty in the following interpretations. In Spread 13, the high seismic velocity layer may be dolerite but is listed as sandstone in the table in order to make allowance for the effect of a step in the bay floor and its geographical position. In Spreads 4, 9 and 14 the velocities of 2,000, 1,800 and 2,400 m/s may represent Tertiary material when considered in the light of the shape of the bay floor and the information from the surrounding areas.

Materials with a velocity less than about 2,500-3,000 m/s are easily dredged, but any channel deepening near Margate would require the use of explosives because the dolerite is massive and is not generally overlain by mud.

5 cm

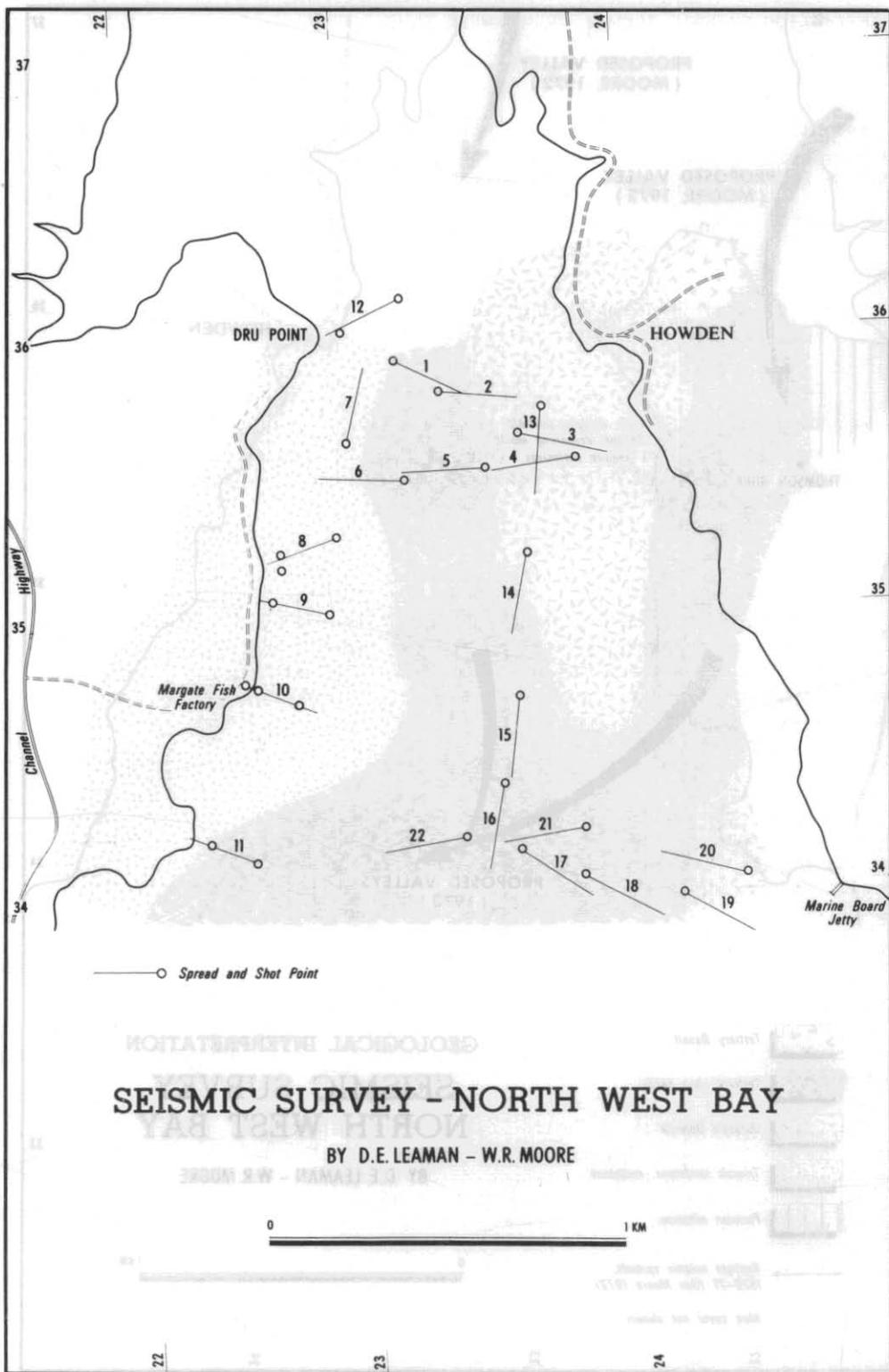


Figure 12.

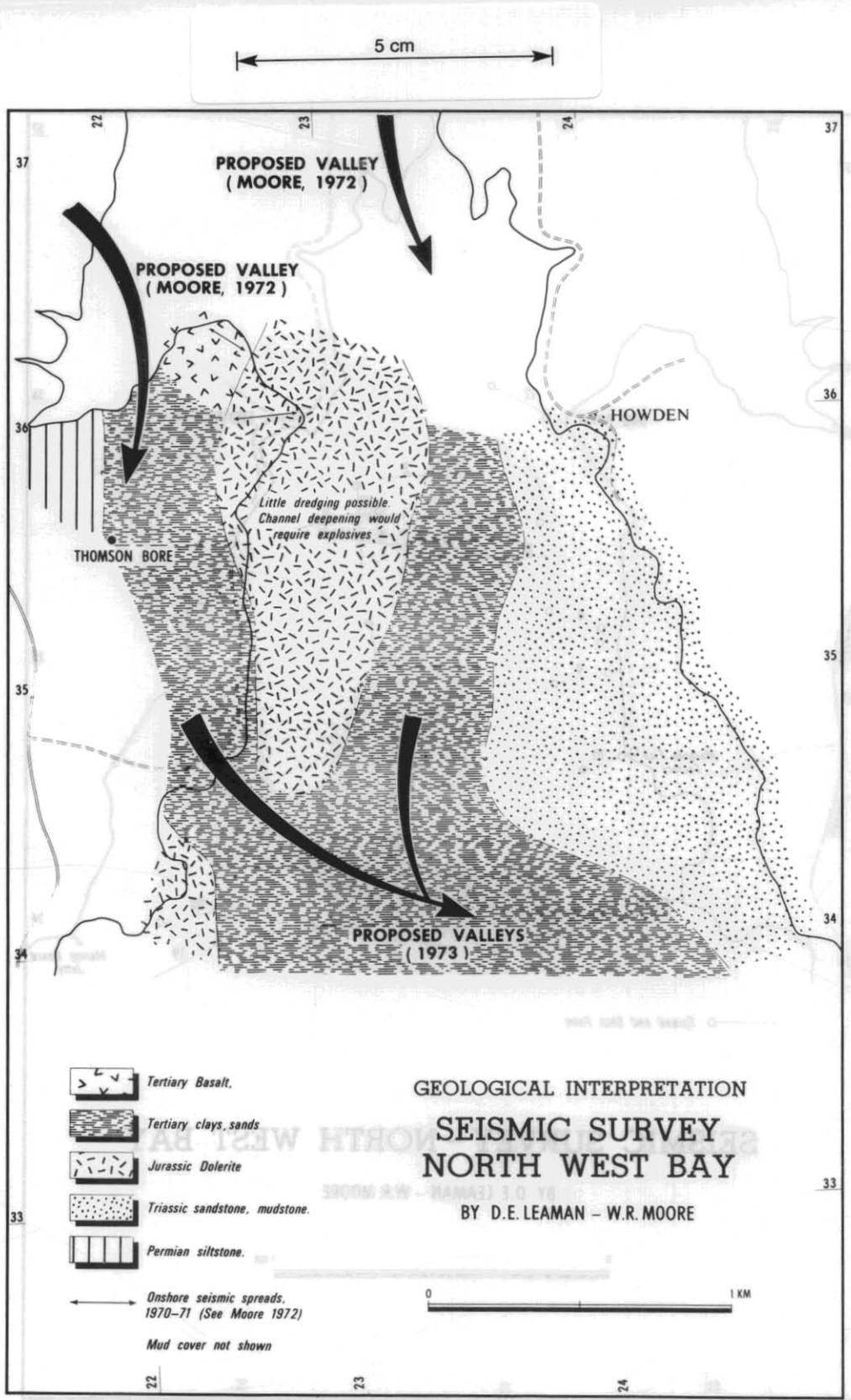


Figure 13.

Table 1 - SEISMIC RESULTS AND INTERPRETATION

Spread No.	Approximate water depth at shot point (m)	Layer	Seismic velocities (m/s)	Interface depth (m)	Interpretation
1	9	V <sub>0</sub> V <sub>1</sub>	1,500 3,000	14	V <sub>0</sub> water 9 m, mud 5 m, V <sub>1</sub> weathered dolerite
2	15	V <sub>0</sub> V <sub>1</sub>	1,500 1,800	-	V <sub>0</sub> water (and mud?) V <sub>1</sub> clay
3		V <sub>0</sub> V <sub>1</sub>	1,500 3,000	steeply dipping W	V <sub>0</sub> water (and mud?) V <sub>1</sub> massive sandstone?
4		V <sub>0</sub> V <sub>1</sub>	1,500 2,000	-	V <sub>0</sub> water (and mud?) V <sub>1</sub> weathered sandstone or stiff clay
5		V <sub>0</sub> V <sub>1</sub> V <sub>0</sub> V <sub>1</sub>	1,500 E 1,800 E 1,500 W >4,000 W	steeply dipping E	V <sub>0</sub> water (and mud?) V <sub>1</sub> clay V <sub>2</sub> dolerite
6	20	V <sub>0</sub> V <sub>1</sub>	1,500 5,000	25	V <sub>0</sub> water and mud V <sub>1</sub> relatively massive dolerite
7	15	V <sub>0</sub> V <sub>1</sub> V <sub>2</sub>	1,500 4,000 6,000	20	V <sub>0</sub> water and mud V <sub>1</sub> weathered dolerite V <sub>2</sub> dolerite
8	0,14	V <sub>0</sub> V <sub>1</sub>	1,500 3,000-5,000	0,28	V <sub>0</sub> water and mud V <sub>1</sub> relatively massive dolerite
9	0	V <sub>0</sub> V <sub>1</sub>	1,800 3,000	12	V <sub>0</sub> clay or decomposed dolerite V <sub>1</sub> weathered dolerite

Table 1 - continued

Spread No.	Approximate water depth at shot point (m)	Layer	Seismic velocities (m/s)	Interface depth (m)	Interpretation
8	14	V <sub>0</sub>	1,500	28	V <sub>0</sub> water and mud
		V <sub>1</sub>	3,000-5,000		V <sub>1</sub> relatively massive dolerite
10	0,15	V <sub>0</sub>	1,500	V <sub>0</sub> /V <sub>1</sub> (W) 18	V <sub>0</sub> (W) clay
		V <sub>1</sub>	2,300	steeply dipping W	V <sub>1</sub> (W) dolerite
		V <sub>2</sub>	4,500	V <sub>0</sub> /V <sub>1</sub> (E) 15 V <sub>1</sub> /V <sub>2</sub> (E) 40	V <sub>0</sub> (E) water V <sub>1</sub> , V <sub>2</sub> weathered dolerite
11	0	V <sub>0</sub>	1,500	steeply dipping E V <sub>1</sub> /V <sub>2</sub> 42	V <sub>0</sub> water
		V <sub>1</sub>	4,500(W)-1,700(E)		V <sub>1</sub> weathered dolerite - clay
		V <sub>2</sub>	6,000		V <sub>2</sub> dolerite
50	18	V <sub>0</sub>	1,500	-	V <sub>0</sub> water
		V <sub>1</sub>	1,800		V <sub>1</sub> clay
12	0	V <sub>0</sub>	1,500	-	V <sub>0</sub> water
		V <sub>1</sub>	4,000		V <sub>1</sub> , V <sub>2</sub> massive dolerite
		V <sub>2</sub>	6,000		
3	7	V <sub>0</sub>	1,500	-	V <sub>0</sub> water (and mud?)
		V <sub>1</sub>	2,500		V <sub>1</sub> weathered dolerite
		V <sub>2</sub>	3,000-5,000		V <sub>2</sub> dolerite
13	15	V <sub>0</sub>	1,500	-	V <sub>0</sub> water
		V <sub>1</sub>	3,000-5,000		V <sub>1</sub> massive sandstone (velocity high due to steps in bay floor)
14	20	V <sub>0</sub>	1,500	steeply dipping W	V <sub>0</sub> water
		V <sub>1</sub>	2,400		V <sub>1</sub> weathered sandstone or clay

Table 1 - continued

Spread No.	Approximate water depth at shot point (m)	Layer	Seismic velocities	Interface depth	Interpretation
			(m/s)	(m)	
15	21	V <sub>0</sub>	1,500	dipping boundary	V <sub>0</sub> water
		V <sub>1</sub>	1,800		V <sub>1</sub> clay
		V <sub>2</sub>	2,400-3,300		V <sub>2</sub> sandstone
16-19	16-22	V <sub>0</sub>	1,500	-	V <sub>0</sub> water
		V <sub>1</sub>	1,700		V <sub>1</sub> clay
20		V <sub>0</sub>	1,500	dipping boundary	V <sub>0</sub> water
		V <sub>1</sub>	1,700-2,500		V <sub>1</sub> clay - sandstone
21-22	20-25	V <sub>0</sub>	1,500	-	V <sub>0</sub> water
		V <sub>1</sub>	1,700		V <sub>1</sub> clay

