COMMONWEALTH OF AUSTRALIA

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BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No.1962/77

CLONCURRY GEOPHYSICAL SURVEY FOR UNDERGROUND WATER, QUEENSLAND 1960

by

P.E. Mann and W.A. Wiebenga

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SUMMARY

This Record describes a geophysical survey for underground water in the Cloncurry River valley, at the request of the Queensland Irrigation and Water Supply Commission, on behalf of the Cloncurry Shire Council.

Appreciable differences in ground water level in different sections along the valley suggest the presence of rock bars across the valley. In choosing bore sites it is desirable to know the position of these rock bars.

Plate 12 shows the location of rock bars that were indicated by ground water level data. Plate 13 shows the position of rock bars that were indicated by geophysical data. Good agreement exists between the two sets of indications. Sites that were based on geophysical data are suggested for water bores.

1. INTRODUCTION

The existing water supply for the town of Cloncurry is pumped from a bore in the bed of the Cloncurry River (T.W.S.well, see Plate 1). During the dry season, from April to December, this supply is supplemented from a well 3000 ft further up-stream, and known as Dempsey's Soak.

Because of the growing demand for water, the Irrigation and Water Supply Commission of Queensland (referred to as the Commission) began in 1956 an initial investigation to select sites for bores to augment the water supply. The Commission drilled several 4-in. bores at different locations in the river bed, principally to determine the nature and thickness of the alluvium. In general the results are regarded as inconclusive because it is suspected that some of the bores stopped at boulders rather than in the bedrock.

Appreciable differences in ground water level between the T.W.S. well location and the well at Dempsey's Soak suggests the presence of an underground rock bar. During the seismic survey, the ground water level was observed in some of the shallow (depth 2 to 3 ft) shot-holes. Observed ground water levels were plotted on the seismic profiles because they may be indirectly used to deduce or confirm the presence of rock bars.

Although investigations for a dam to collect surface water began in 1956, the Cloncurry town water supply will probably need to rely on ground water sources for some years to come. In choosing bore sites for water development, it would be desirable to know the location of any rock bars.

Hence, the Commission requested the Bureau of Mineral Resources to carry out a geophysical investigation to disclose any areas where rock bars across the valley are present beneath the alluvium.

The Bureau provided a geophysical party which consisted of P.E. Mann (party leader and geophysicist), D.J. Harwood (geophysicist), and J.P. Pigott (geophysical assistant). Four field assistants and some additional transport were supplied by the Commission. The topographical surveying was done by McIntyre and Associates, consulting engineers to the Cloncurry Shire Council. The Council supplied gelignite and detonators. Field operations took place between 10th and 27th June and between 25th and 27th July 1960.

2. GEOLOGY

The detailed geological information available at the time of the survey consisted of logs of bores drilled by the Commission between 1956 and 1958.

The regional geology of the area is described by Carter (1959). The alluvium in the river bed consists predominantly of sand, with clay, silt, and gravel, overlying bedrock of Lower Proterozoic age. The gravel stones, generally 2 to 3 in. in diameter, are well rounded.

The bedrock consists of quartzite, weathered basic volcanics, and schists. Outcrops along the river banks are rare.

A pink granite crops out at the Mount Isa-road crossing. Approximately one hundred yards down-stream from the power house is an outcrop of fractured quartzite with travertine. Black Mountain, opposite Black Mountain crossing, consists of siliceous haematite. Between the railway bridge and the gravel pit borehole line there are outcrops of mineralised dolerite 250 yards east of the river. At the gravel pit line heavily fractured schists of the Corella Formation crop out on both river banks (see Plate 1).

3. METHODS AND EQUIPMENT

Seismic method

The seismic refraction method used on this survey has been described by Heiland (1946, p.548) and Polak and Hawkins (1956).

The following arrangement of geophones and shot-points (called the geophone 'spread') were used :

(1) Normal spreads, in which the geophones are spaced 50 ft apart in a straight line, with shot-points at 50 and 200 ft beyond both ends in line with spread.

(2) Weathering spreads, to obtain information about the near-surface layers, with geophones 10 ft apart, and shot distances 10, 50, and 200 ft.

The equipment used was a portable 12-channel refraction/reflection seismograph, manufactured by Midwestern Geophysical Laboratories, Tulsa, Oklahoma. Brush geophones with a natural frequency of 20 c/s were used to record the vertical motion of the ground.

Resistivity method

In the resistivity method (Wiebenga, 1955) an electric current is applied to the ground through two current electrodes and the potential difference is measured between two additional electrodes at points between the two current electrodes. The ratio of the measured potential to the applied current is a measure of the ground resistance. In the Wenner configuration the electrodes are equally spaced.

The depth of penetration of the current is roughly the same as the electrode spacing. However, this depends to some extent on the relative resistivity values of the various subsurface layers through which the current passes to complete the electrical circuit. If the electrode spacing, and thus the depth of penetration, is kept constant and the electrode arrangement is progressively moved as a whole, then lateral variations in resistivity of the near-surface layers can be determined. A different electrode spacing can be used to measure the effect of lateral resistivity variations of layers to a different depth. The resistivity of a rock is approximately inversely proportional to the rock porosity and the salinity of the pore solutions. Assuming negligible variations in salinity and a bedrock with much lower porosity than the overlying alluvial sediments, resistivity traversing may be used to disclose the undulations of the bedrock or the presence of rock bars. In the present survey, resistivity traversing with a Wenner configuration was applied with electrode spacings of 50 and 100 ft.

The instruments used were a geophysical megger earth tester (Evershed & Vignoles) and a Japanese earth resistance meter (Yokogawa model L10).

4. RESULTS

Seismic velocities

Although the principal objective of the seismic method is the determination of the depth to elastic (seismic) discontinuities, the seismic velocities give some indication of rock type and the degree of weathering, jointing, and fracturing of the bedrock. Table 1 shows the observed seismic velocities with a tentative interpretation in geological terms, based on experience in other areas.

TABLE 1

Seismic Velocity (ft/sec)	Rock Type
1000±	Soil and sand.
2400 to 2700	Predominantly clay and silt, moist to water-saturated.
5000 to 5700	Water-saturated alluvial deposits, predominantly sand and gravel.
7000 to 11,000	Very weathered to weathered bedrock.
12,500 to 13,000	Moderately weathered bedrock.
13,000 to 14,000	Slightly weathered, or possibly fractured or sheared bedrock.
16,000 to 20,500	Unweathered bedrock.

In unconsolidated sediments in which sand and gravel predominate, the top of the 5000 to 5700-ft/sec layer may mark the ground water level; if water-saturated clay and silt are present the ground water level may coincide with the top of the 2400 to 2700-ft/sec layer.

Ground water level

The original evidence for assuming that there are rock bars in the river bed was based on observed ground water levels in bores; if a rock bar exists it acts as a subsurface dam (or barrier) causing ground-water gradients to be greater than average down-stream from the rock bar, and less than average up-stream.

During the seismic investigations, ground water was present in some of the shallow shot-holes (depth about 3 ft). Plate 12 shows a plot of the ground water levels observed in the shot-holes together with ground water levels from bore logs, with an exaggerated vertical scale of 50 to 1. The accuracy of the plotted water levels is probably within $\pm \frac{1}{2}$ ft. On Plate 12 there are also plotted the position of the top of the 5000-ft/sec layer, which is considered to be the main aquifer, and the top of the 2500-ft/sec layer, where it has been recorded. The ground water profile shows steeper than average gradients near stations 20, 104, 180, and 230. The possible location of rock bars is indicated by arrows on Plate 12 at stations 30, 112, 182, and 238. Possibly there is a minor rock bar near station 202.

Seismic and resistivity profiles

Plates 3, 5, 7, 9, and 11 show the results of seismic work in the form of cross-sections, together with resistivity data. With the aid of Table 1 the seismic velocities may be interpreted in geological terms. Plate 13 summarises the seismic depth-determinations in one cross-section with an exaggerated vertical scale of 50 to 1.

From stations 198 to 208, and from 238 to 348 (Traverses F, G, H, J, K, L, and M) the seismic profiles show a 2400 to 2700-ft/sec layer above the 5000-ft/sec layer. This layer, shown on Plate 12 but not on Plate 13, is a moist to water-saturated formation in which clay and silt predominate. Elsewhere along the traverse this layer is either missing or too thin to be detected. The ground water table agrees better with the top of the approximately 2500-ft/sec layer than with the top of the 5000-ft/sec layer, where both layers are present.

Bedrock velocities of 13,000 to 14,000 ft/sec suggest the presence of shear or fault zones near stations 178 (Traverse F) and 326 (Traverse K).

A zone of high-resistivity values on the 100-ft spacing resistivity profile between stations 182 (Traverse F) and 254 (Traverses G and H) (where the river valley is narrow) suggests shallow bedrock, probably with low-porosity alluvial gravel and sand.

Rock bars may be found in places where the weathered bedrock is shallow, viz. near station 38 (Traverse A), between stations 98 (Traverse C) and 128 (Traverse D), probably between stations 188 (Traverse F) and 248 (Traverse G), and perhaps south of station 348 (Traverse M).

5. CONCLUSIONS AND RECOMMENDATIONS

A comparison of Plates 12 and 13 shows very good agreement between the locations of rock bars suggested by ground-water-level data and by the seismic cross-sections.

Targets for water bores should be located between the indicated rock bars, where the weathered bedrock is deepest. On Plate 13 recommended locations for water bores are indicated near stations 56, 74, and 85; 152 and 158; 258, 268, and 277; and 314 and 325. In the selection of the sites the resistivity data have been taken into consideration. The borehole at station 325 should be deep enough to check whether the suggested shear zone in the bedrock contains a fresh-water supply or not.

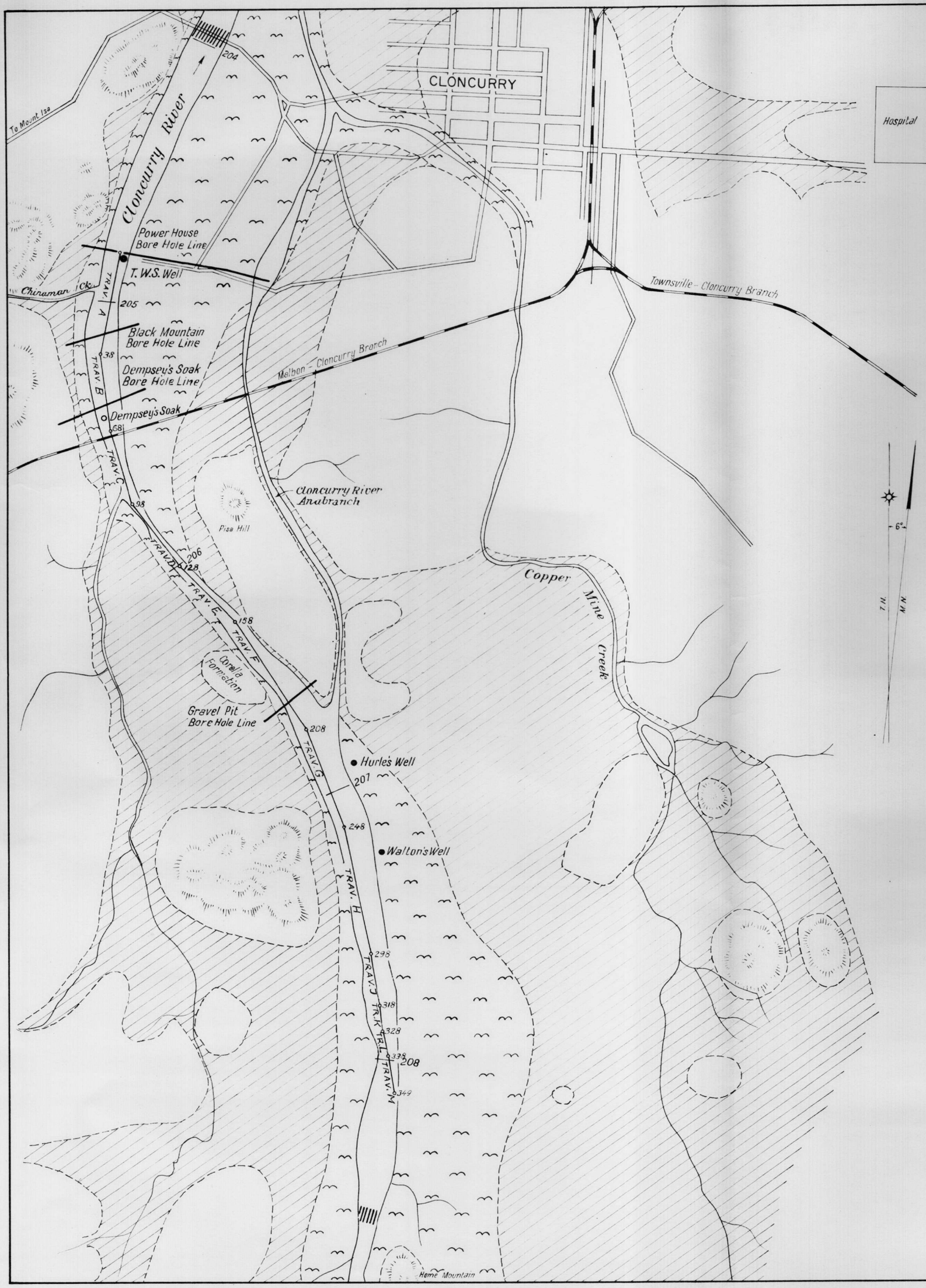
6. REFERENCES

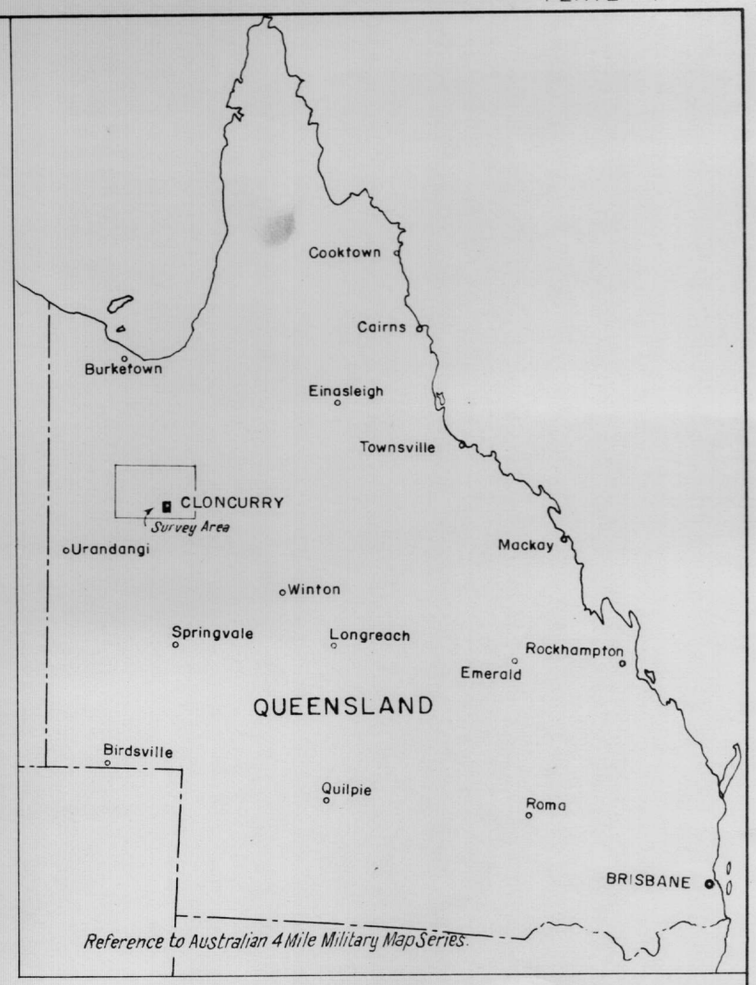
CARTER, E.K. 1959 Cloncurry - 4-mile geological series Bur. Min. Resour. Aust. Explanatory Notes No. 13.

HEILAND, C.A. 1946 GEOPHYSICAL EXPLORATION, p. 548, Prentice Hall, New York.

POLAK, E.J. and HAWKINS, L.V. 1956 Seismic refraction survey of the Dawson River damsite, Queensland. Bur. Min. Resour. Aust. Record 1956/108.

WIEBENGA, W.A. 1955 Geophysical investigations of water deposits, Western Australia. Bur. Min. Resour. Aust. Bull. 30.





LEGEND

- APPROXIMATE DEFINITION OF ALLUVIUM.
- " " " FLAT PEDIMENT AREAS – SOMETIMES SHALLOW SOIL COVER.
- ROCK BARS EVIDENT IN CLONCURRY RIVER CHANNEL.
- LOCATION OF I.W.S.C. BORE LINES.
- WELL
- SOAK
- 207 — ADOPTED MIDDLE THREAD MILEAGE (A.M.T.M)
- 128 — SEISMIC TRAVERSES WITH STATION NUMBER
- RAILWAY

CLONCURRY RIVER GROUND WATER INVESTIGATION
QUEENSLAND, 1960

GEOLOGY AND LOCATION OF GEOPHYSICAL TRAVERSES

SCALES

30 0 30 60 90 chains

2000 0 2000 4000 6000 feet

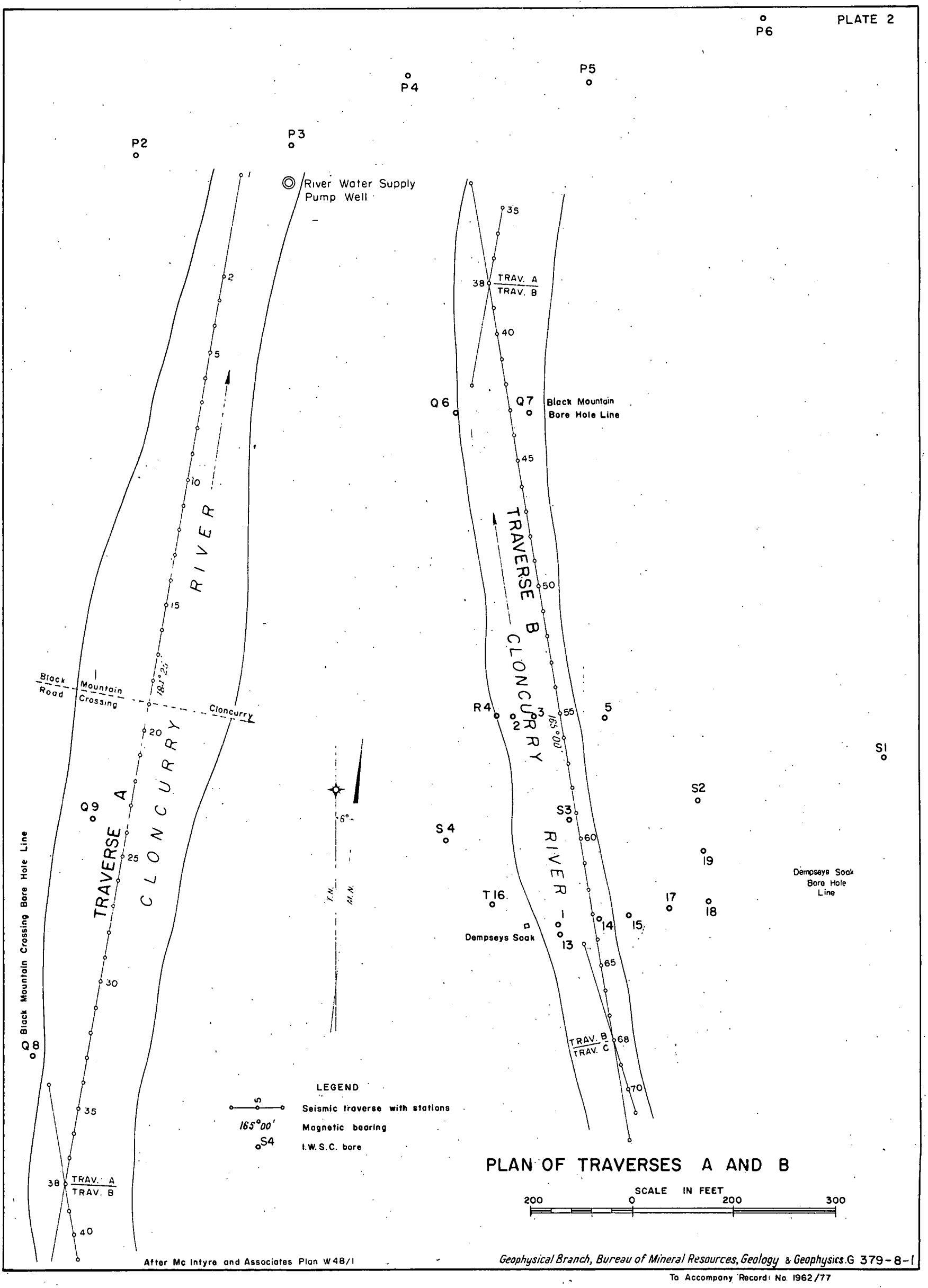
After I.W.S.C. Plan M 17416

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics G 379-7

To Accompany Record No 1962/77

PLATE 2

PLAN OF TRAVERSES A AND B



After Mc Intyre and Associates Plan W48/1

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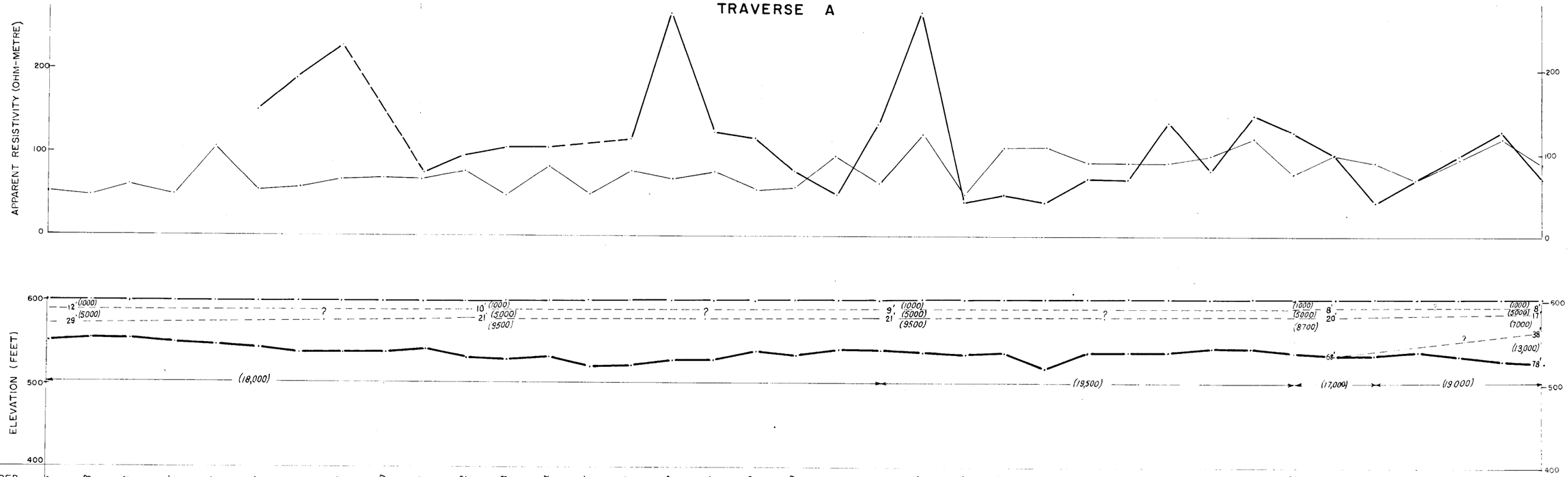
To Accompany Record No. 1962/77

CLONCURRY RIV. GROUND WATER INVESTIG. 1960

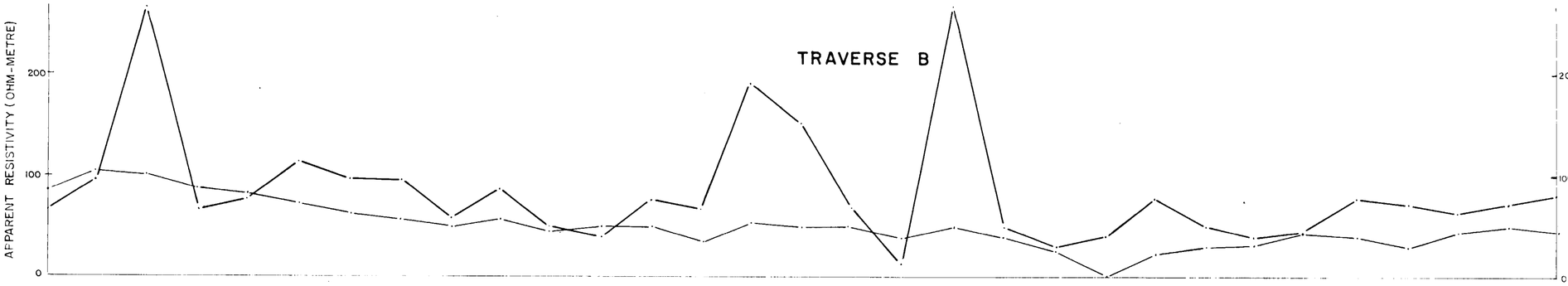
PLATE 3

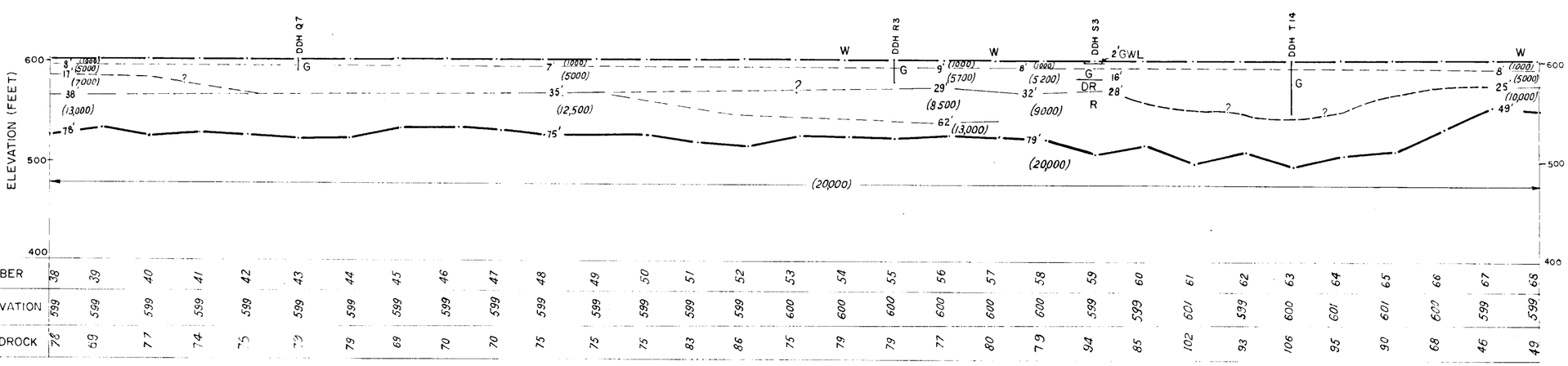
TRAVERSE A



STATION NUMBER	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
STATION ELEVATION	597	597	597	597	597	597	597	597	597	597	597	598	598	599	600	599	599	599	599	599	600	600	600	600	600	600	600	601	600	600	600	600	599	599	599	599	599
DEPTH TO BEDROCK	48	45	47	50	53	56	61	60	61	58	68	70	68	78	76	72	70	57	66	59	59	61	65	63	82	63	65	63	59	59	63	68	66	60	66	73	78

TRAVERSE B





STATION NUMBER	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
STATION ELEVATION	599	599	599	599	598	599	599	599	599	599	599	599	599	599	598	600	600	600	600	600	600	599	599	601	599	600	601	601	600	599	599
DEPTH TO BEDROCK	78	69	77	74	75	79	79	69	70	70	75	75	75	83	86	75	79	79	77	80	79	94	85	102	93	106	95	90	68	46	49

LEGEND

(20,000)	Formation with seismic velocity 20,000 ft/sec.
8'	Depth to formation with different seismic velocity
W	Shallow shot hole reaching water table
	Unweathered bedrock
	100 ft electrode spacing, resistivity traverse
	50 ft " " " "
	Boundary between seimic refractors

DRILL HOLE SECTIONS

G	Gravel
C	Clay
DR	Decomposed rock
R	Rock

HORIZONTAL AND VERTICAL SCALES IN FEET

100 0 100 200 300

TRAVERSES A AND B
CROSS-SECTIONS AND APPARENT-RESISTIVITY PROFILES

BASED ON Mc INTYRE AND ASSOCIATES PLAN W 48/1

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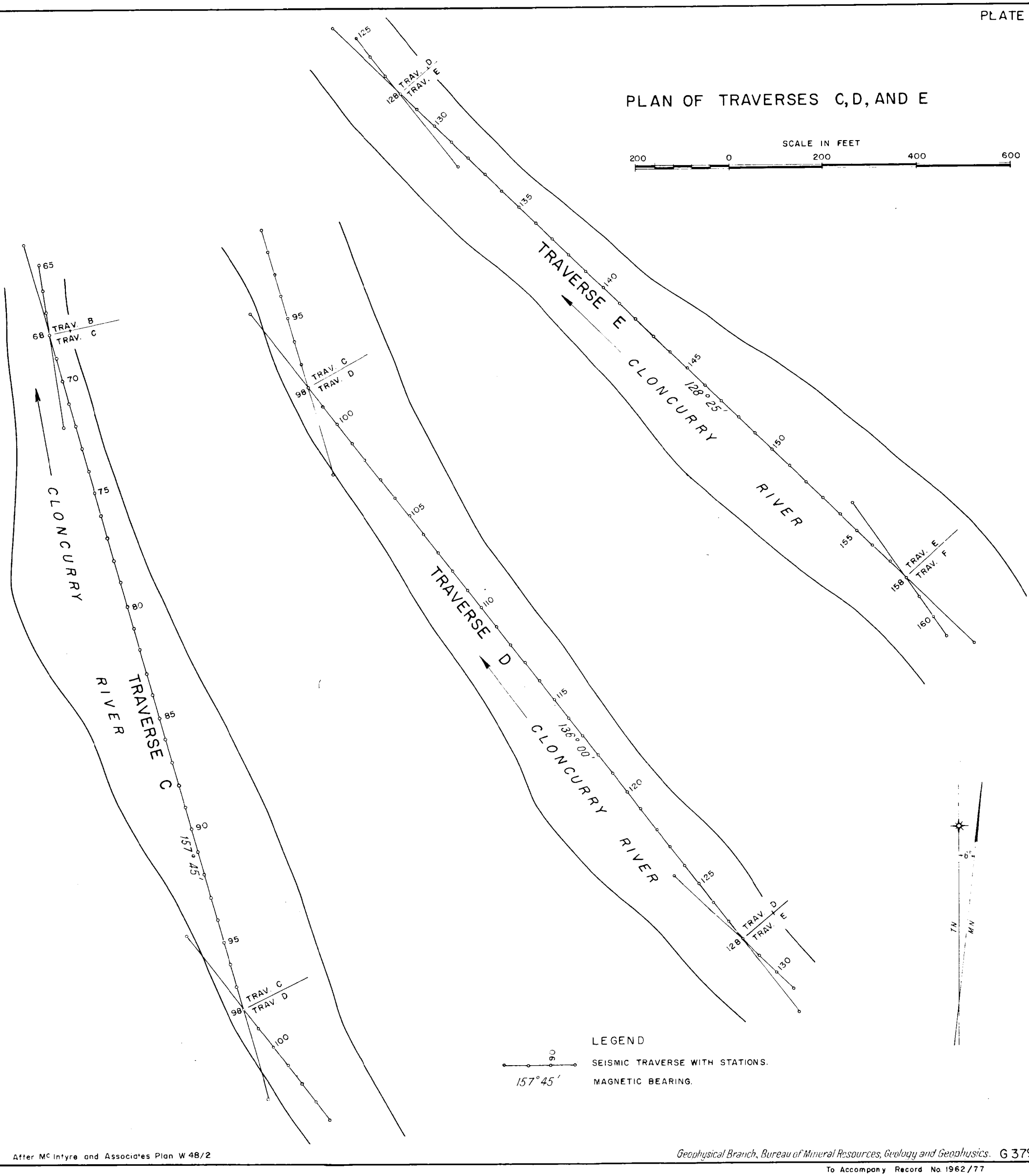
PLATE 4

PLAN OF TRAVERSES C, D, AND E

SCALE IN FEET

200 0 200 400 600



After Mc Intyre and Associates Plan W 48/2

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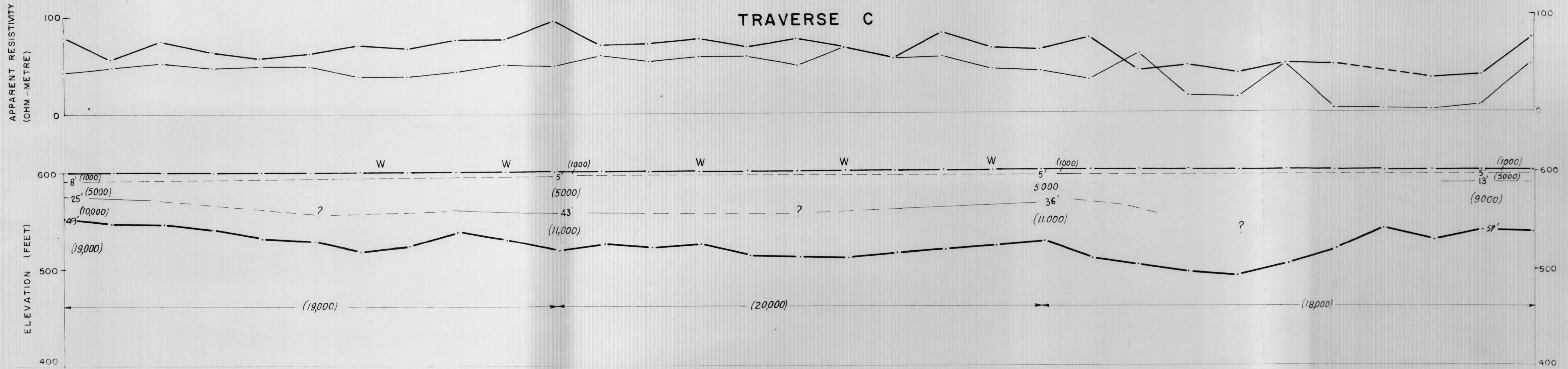
To Accompany Record No. 1962/77

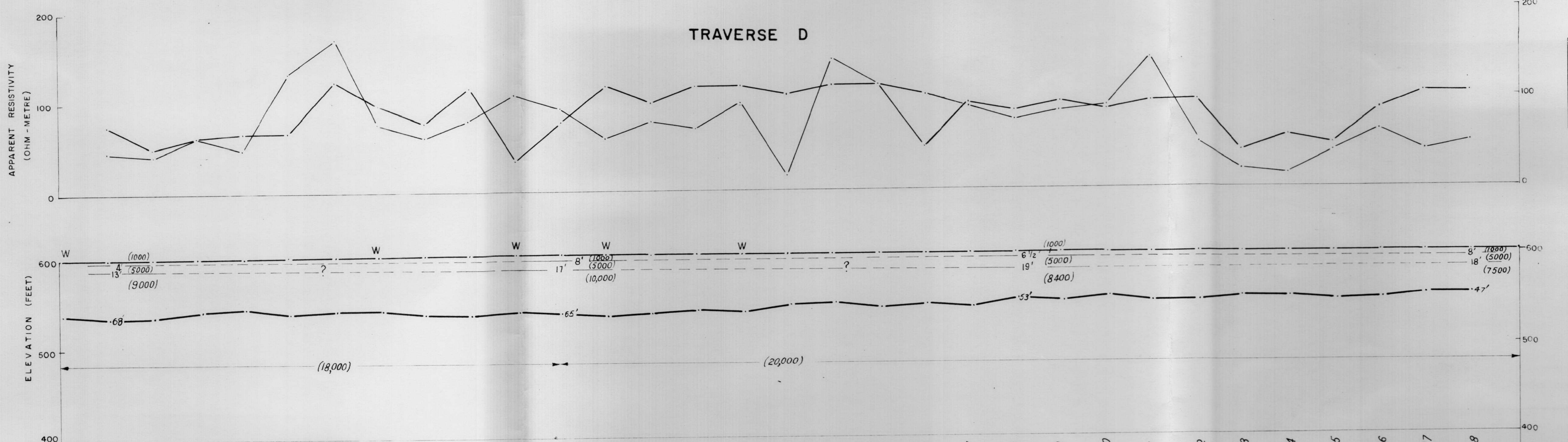
CLONCURRY UNDERGROUND WATER INVESTIG. 1960.

TRAVERSE C



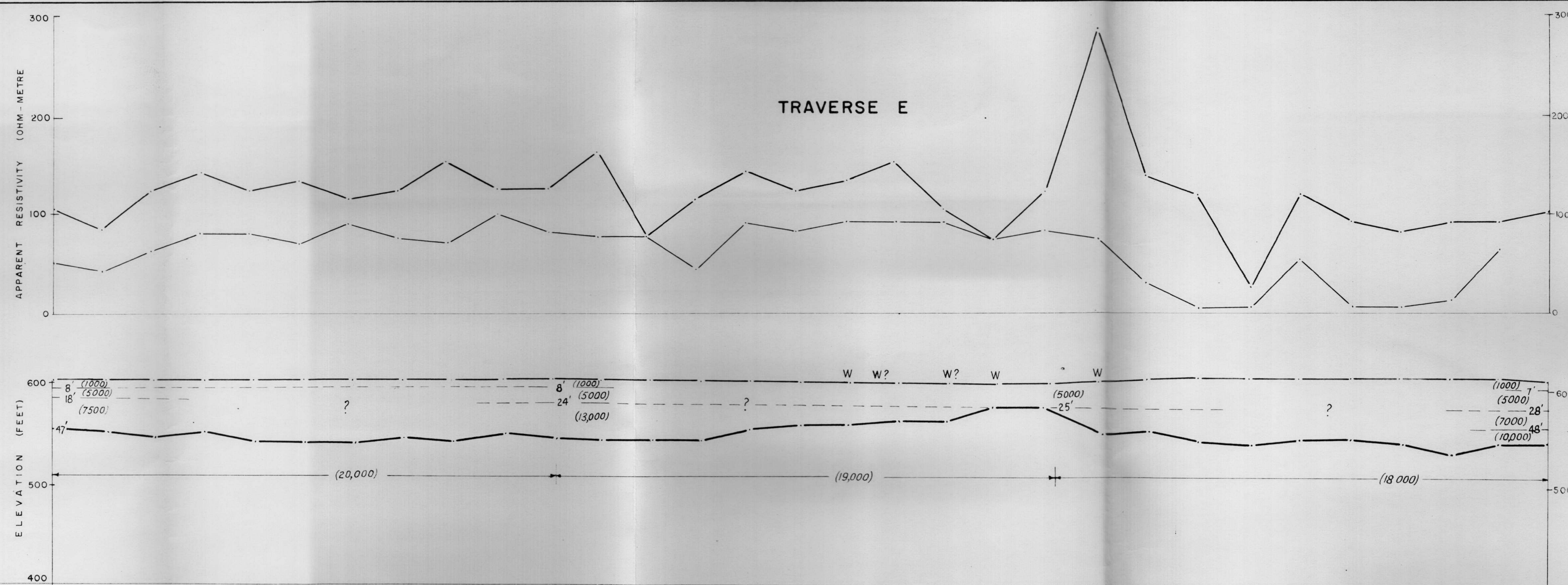
STATION NUMBER	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98
STATION ELEVATION	599	599	599	600	600	600	600	601	601	601	601	601	601	601	601	601	601	601	601	602	602	603	602	603	603	603	603	603	602	601	601
DEPTH TO BEDROCK	49	52	54	58	68	71	82	77	62	71	82	74	79	75	87	89	89	84	82	78	73	91	99	106	109	100	85	65	72	61	66

TRAVERSE D



STATION NUMBER	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128
STATION ELEVATION	601	601	602	601	601	602	602	602	602	602	602	602	602	603	603	603	604	604	604	604	604	604	605	605	605	604	603	604	604	604	604
DEPTH TO BEDROCK	66		59	57	62	59	62	65	66	61	65	68	66	63	65	56	53	59	57	59	53	53	49	53	54	50	50	55	52	47	47

TRAVERSE E



STATION NUMBER	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158
STATION ELEVATION	604	604	604	604	604	605	605	605	606	606	606	606	605	605	605	604	604	603	603	602	602	603	606	606	607	607	608	608	608	608	606
DEPTH TO BEDROCK	47	53	57	52	56	61	63	58	62	54	58	60	60	60	51	44	44	40	40	25	25	55	53	63	67	61	63	67	76	65	61

LEGEND

- (20,000) Formation with seismic velocity 20,000 ft/sec
- 5′ Depth to formation with different seismic velocity
- W Shallow shot hole reaching water table
- W? Probably water encountered but not noted by operator
- Unweathered bedrock
- 100 ft electrode spacing apparent-resistivity profile
- 50 ft " " " " "
- Boundary between seismic refractors

TRAVERSES C, D, AND E
CROSS-SECTIONS AND APPARENT-RESISTIVITY PROFILES

HORIZONTAL AND VERTICAL SCALES IN FEET

100 0 100 200 300

Level Datum is State Datum B. M. No. 63 in Court House Yard, Cloncurry R.L. 634·20

BASED ON Mc INTYRE AND ASSOCIATES PLAN W48/2

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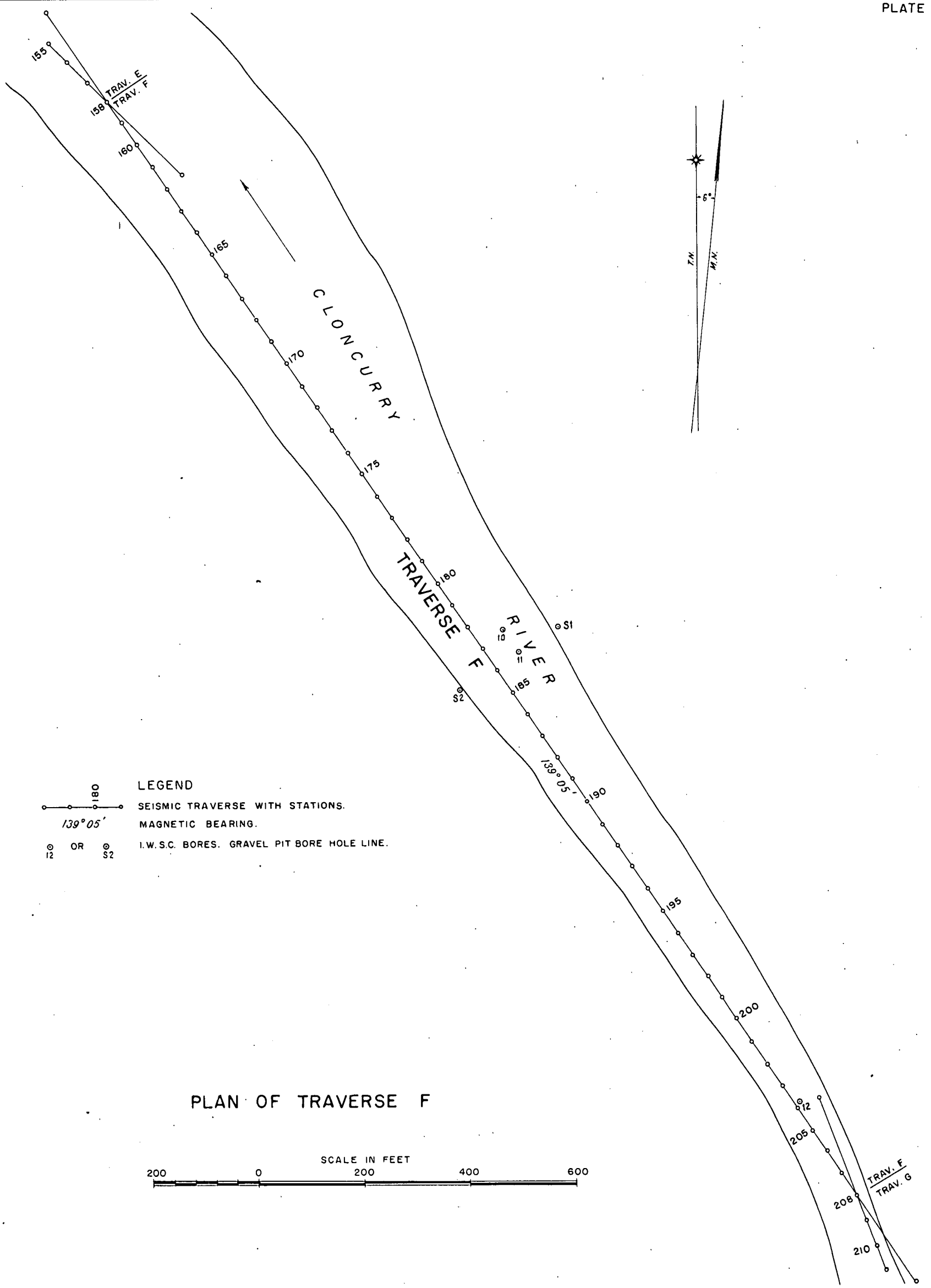
To Accompany Record No 1962/77

CLONCURRY RIV. GROUND WATER INVESTIGATION



PLAN OF TRAVERSE F

After Mc Intyre and Associates Plan W 48/3

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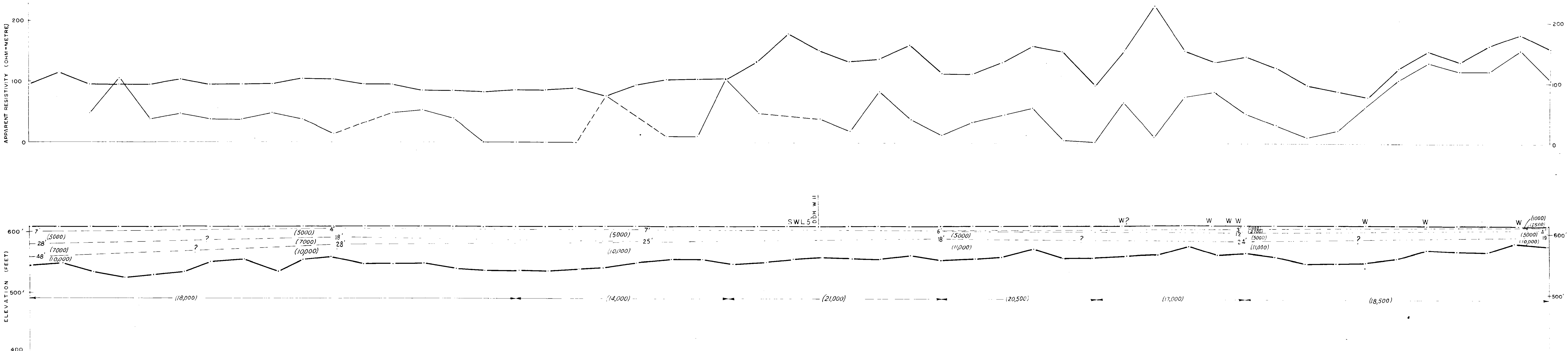
To Accompany Record No. 1962/77

CLONCURRY RIV. GROUND WATER INVESTIG. 1960



STATION NUMBER	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182
STATION ELEVATION	606	606	607	607	608	608	607	606	605	605	605	606	606	606	606	607	607	607	607	607	607	607	607	607	607
DEPTH TO BEDROCK	61	58	73	83	78	72	59	54	73	54	50	59	60	62	69	72	73	74	68	67	58	52	52	62	58

STATION NUMBER	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208
STATION ELEVATION	607	607	607	607	607	607	608	607	607	607	607	607	607	606	605	606	606	607	606	607	606	606	606	606	606	606
DEPTH TO BEDROCK	54	51	52	51	47	55	53	51	36	52	52	49	48	33	47	41	50	60	60	59	54	38	40	41	27	33

LEGEND

- (21,000') Formation with seismic velocity 21,000 ft/sec
- 5' Depth to formation with different seismic velocity
- W Shallow shot hole reaching water table
- W? Probably water encountered but not noted by operator
- Unweathered bedrock
- 100 ft electrode spacing, apparent-resistivity profile
- 50 ft " " " " "
- Boundary between seismic refractors

TRAVERSE F
CROSS-SECTION AND APPARENT-RESISTIVITY PROFILE

HORIZONTAL AND VERTICAL SCALES IN FEET

100 0 100 200 300

Level Datum is State Datum, B.M. No. 63 in Court House Yard Cloncurry R.L. 634·20

Based on Mc Intyre and Associates Plan W 48/3

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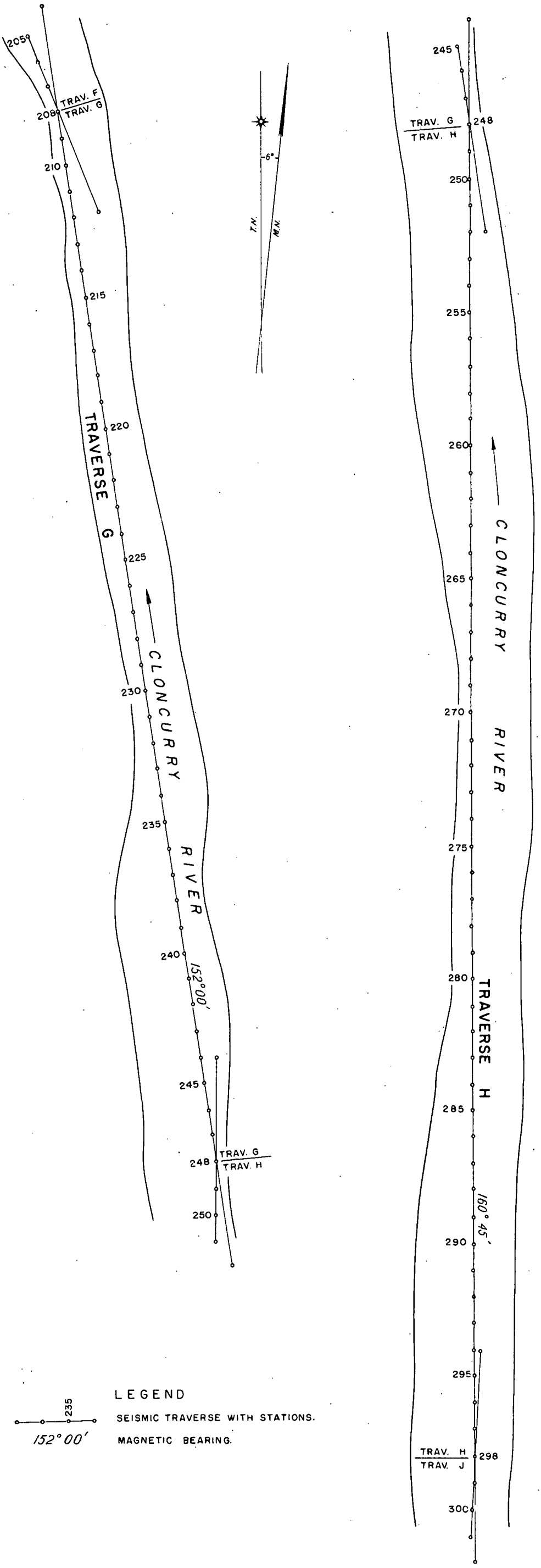
To Accompany Record No 1962/77

CLONCURRY RIV. GROUND WATER INVESTIGATION.



LEGEND

235 — SEISMIC TRAVERSE WITH STATIONS.

152°00' — MAGNETIC BEARING.

PLAN OF TRAVERSES G AND H

SCALE IN FEET

200 0 200 400 600

After Mc Intyre and Associates Plan W 48/4

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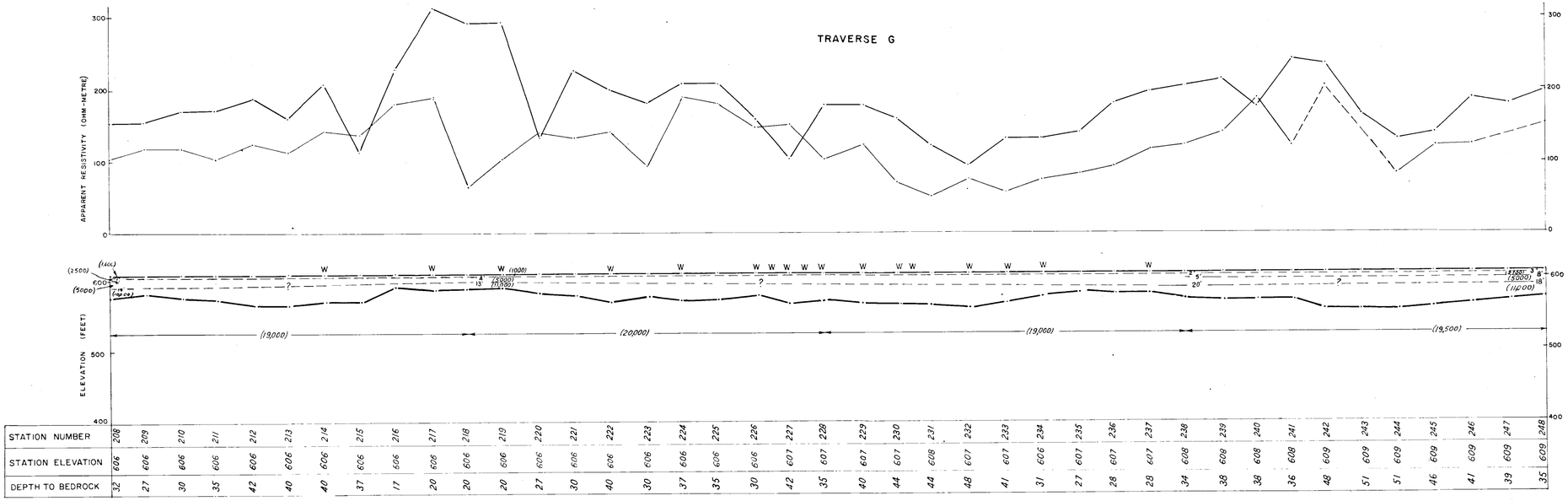
To Accompany Record No. 1962/77

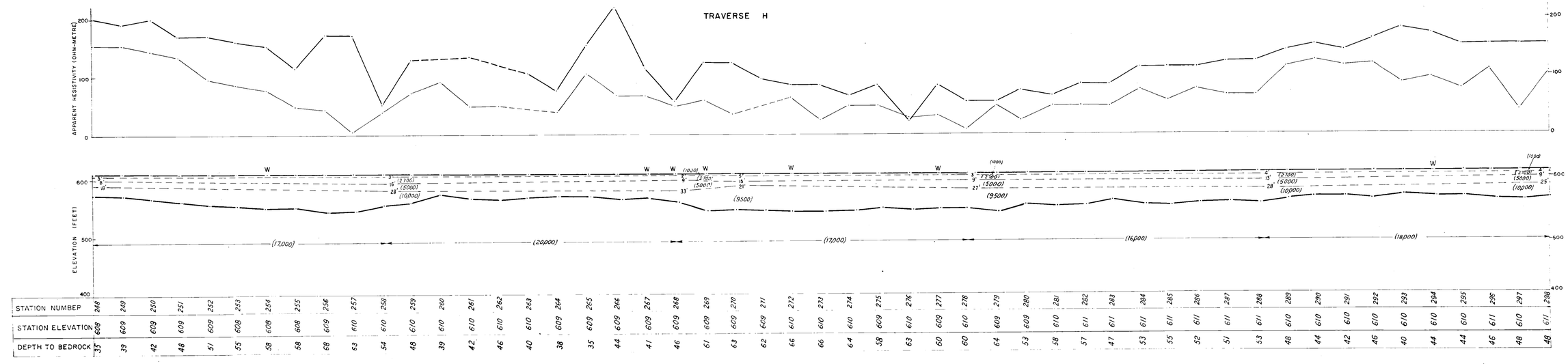
CLONCURRY RIVER UNDERGROUND WATER INVESTG. 1960.

TRAVERSE G



STATION NUMBER	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248
STATION ELEVATION	606	606	606	606	606	606	606	606	606	606	606	606	606	606	606	606	606	606	606	607	607	607	607	608	607	607	606	607	607	607	608	608	608	608	609	609	609	609	609	609	609
DEPTH TO BEDROCK	32	27	30	35	42	40	40	37	17	20	20	20	27	30	40	30	37	35	30	42	35	40	44	44	48	41	31	27	28	28	34	38	38	36	48	51	51	46	41	39	35

TRAVERSE H



STATION NUMBER	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298
STATION ELEVATION	608	609	609	609	609	608	608	608	609	610	610	610	610	610	610	610	609	609	609	609	609	609	609	609	610	610	610	609	610	609	610	609	609	610	611	611	611	611	611	611	611	610	610	610	610	610	610	610	611	610	611
DEPTH TO BEDROCK	35	39	42	48	51	55	58	58	68	63	54	48	39	42	46	40	38	35	44	41	46	61	63	62	66	66	64	58	63	60	60	64	53	58	57	47	53	55	52	51	53	48	44	42	46	40	44	44	46	48	48

LEGEND

- (20,000) Formation with seismic velocity 20,000 ft/sec.
- 5' Depth to formation with different seismic velocity
- W Shallow shot hole reaching water table
- Unweathered bedrock
- 100 ft electrode spacing, apparent — resistivity profile
- 50 ft " " " " "
- Boundary between seismic refractors

TRAVERSES G AND H
CROSS-SECTIONS AND APPARENT-RESISTIVITY PROFILES

HORIZONTAL AND VERTICAL SCALES IN FEET
100 0 100 200 300

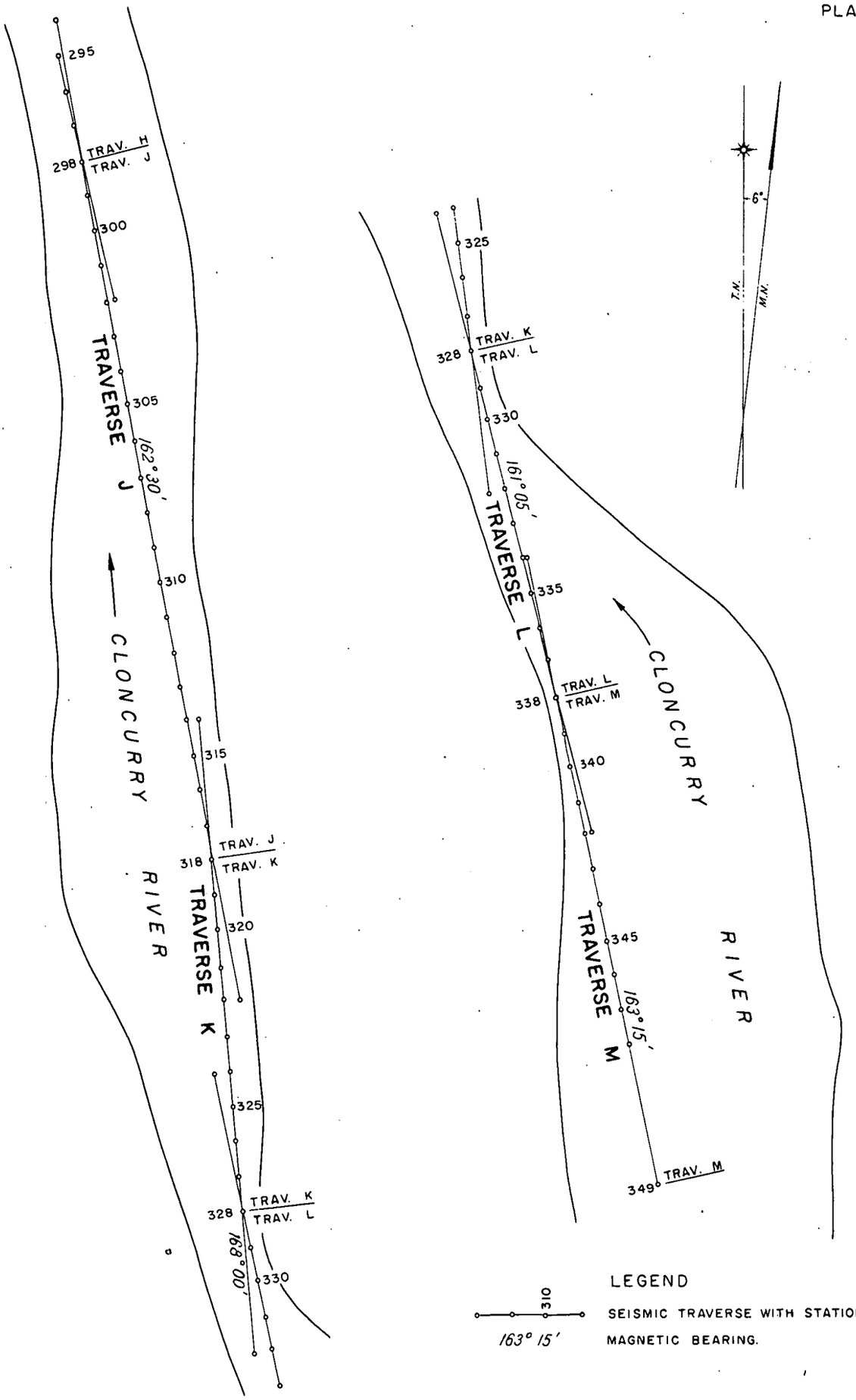
Level Datum is State Datum, B.M. No. 63 in Court House Yard, Cloncurry R.L. 634·20

BASED ON Mc INTYRE AND ASSOCIATES PLAN W48/4

Geophysical Branch, Bureau of Mineral Resources, Geology & Geophysics. G 379-15

To Accompany Record No. 1962/77

CLONCURRY R.V. GROUND WATER INVESTIGATION.



PLAN OF TRAVERSES J, K, L, AND M

SCALE IN FEET

200 0 200 400 600

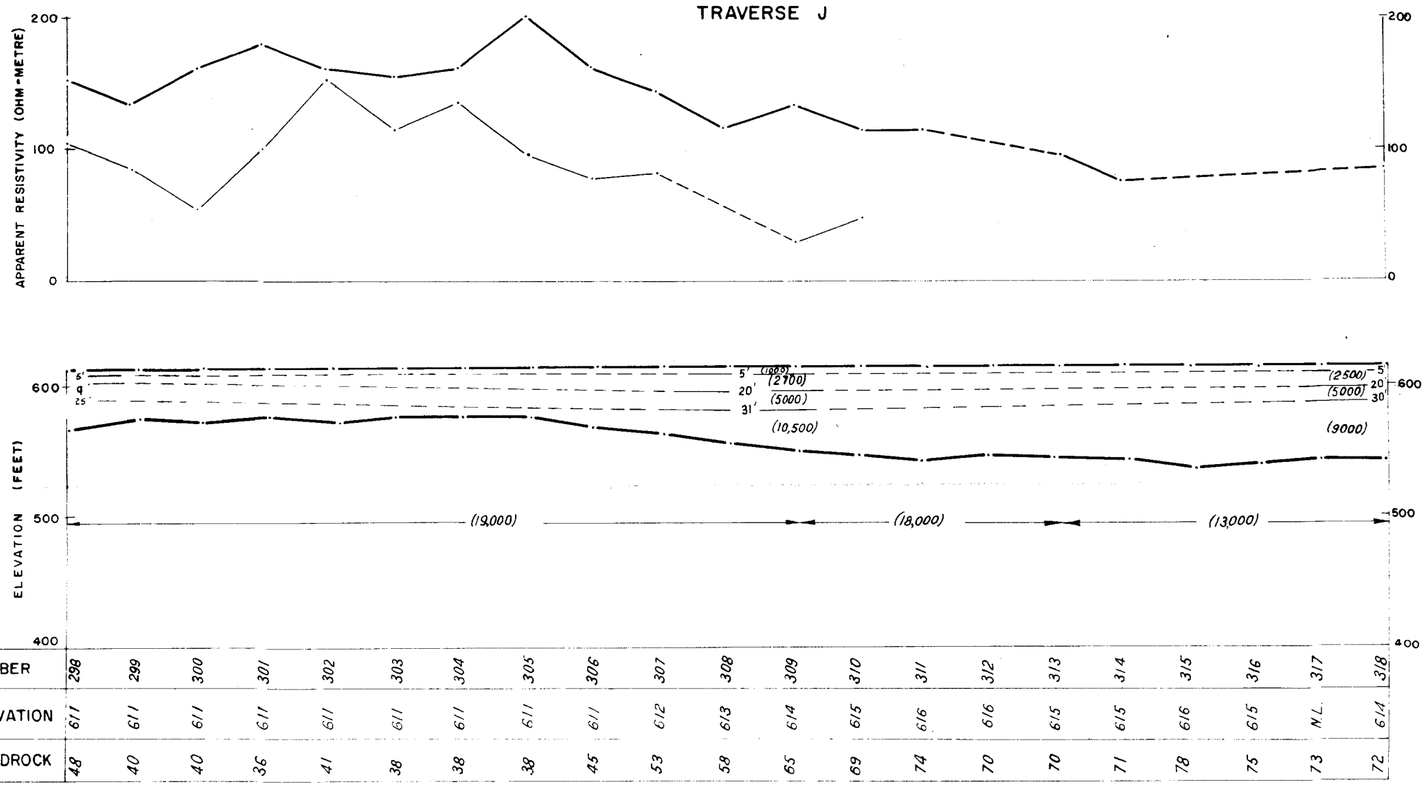
After Mc Intyre and Associates Plan W 48/5

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. G 379 - 16

To Accompany Record No. 1962/77

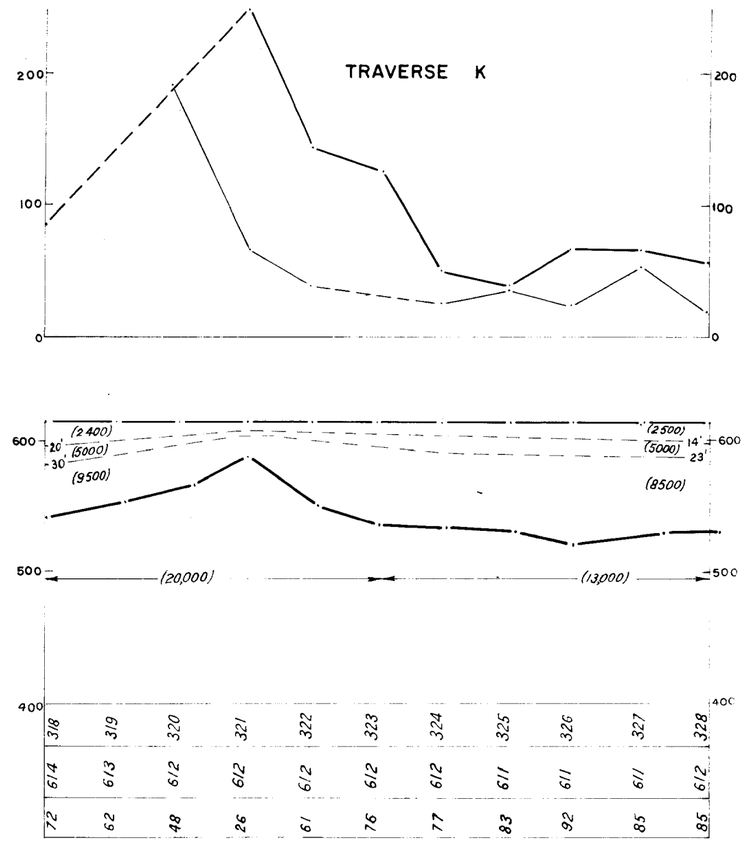
CLONCURRY RIVER UNDERGROUND WATER INVESTIG. 1960.

TRAVERSE J



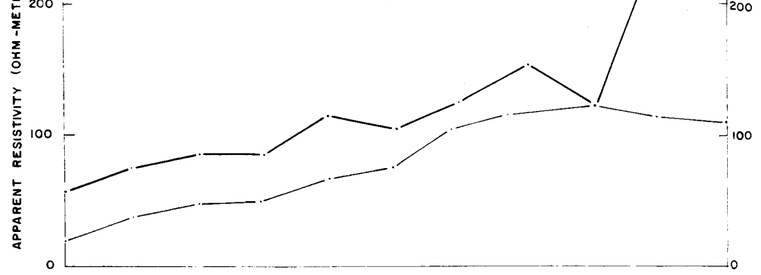
STATION NUMBER	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318
STATION ELEVATION	611	611	611	611	611	611	611	611	611	612	613	614	615	616	616	615	615	616	615	N.L.	614
DEPTH TO BEDROCK	48	40	40	36	41	38	38	38	45	53	58	65	69	74	70	70	71	78	75	73	72

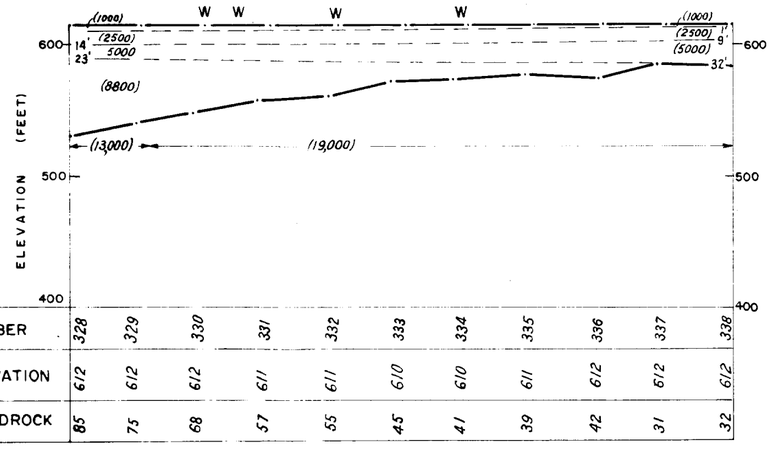
TRAVERSE K



STATION NUMBER	318	319	320	321	322	323	324	325	326	327	328
STATION ELEVATION	614	613	612	612	612	612	612	611	611	611	612
DEPTH TO BEDROCK	72	62	48	26	61	76	77	83	92	85	85

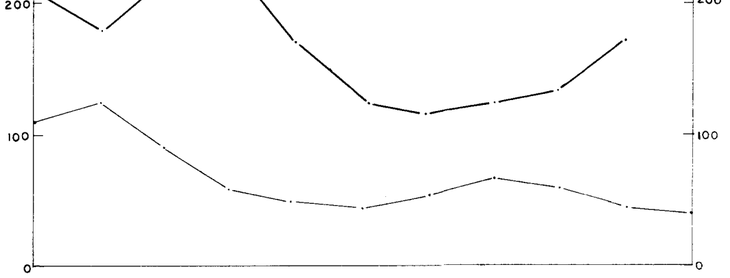
TRAVERSE L

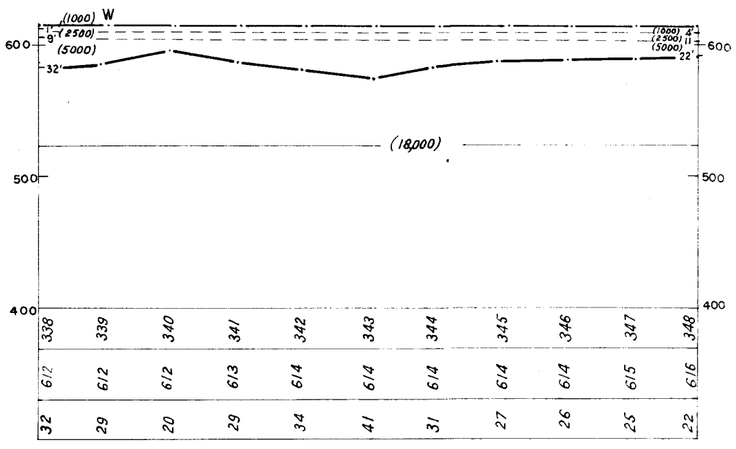




STATION NUMBER	328	329	330	331	332	333	334	335	336	337	338
STATION ELEVATION	612	612	612	611	611	610	610	611	612	612	612
DEPTH TO BEDROCK	85	75	68	57	55	45	41	39	42	31	32

TRAVERSE M





STATION NUMBER	338	339	340	341	342	343	344	345	346	347	348
STATION ELEVATION	612	612	612	613	614	614	614	614	614	615	616
DEPTH TO BEDROCK	32	29	20	29	34	41	31	27	26	25	22

LEGEND

(20,000)	Formation with seismic velocity 20,000 ft/sec.
14'	Depth to formation with different seismic velocity.
W	Shallow shot hole reaching water table
———	Unweathered bedrock
———	100 ft electrode spacing, apparent - resistivity profile
———	50 ft " " " " " "
— — —	Boundary between seismic refractors

TRAVERSES J, K, L, AND M
CROSS-SECTIONS AND APPARENT-RESISTIVITY PROFILES

HORIZONTAL AND VERTICAL SCALES IN FEET

100 0 100 200 300

Level Datum is State Datum, B.M. No 63 in Court House Yard, Cloncurry R.L. 634·20

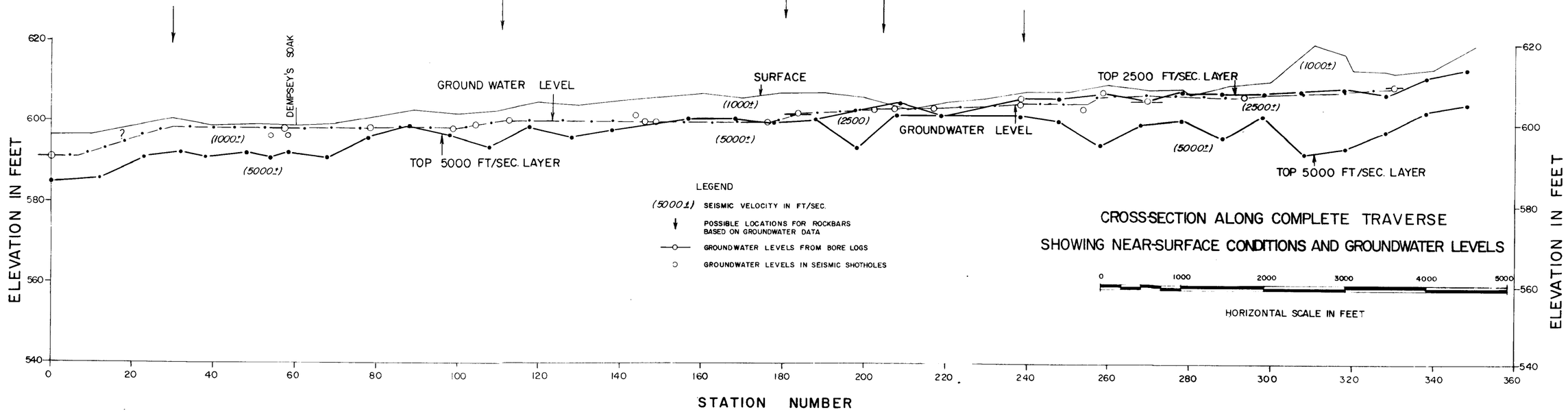
Based on Mc Intyre and Associates Plan W 48/5

Geophysical Branch, Bureau of Mineral Resources, Geology & Geophysics. G 379 - 17
To Accompany Record No. 1962/77

PLATE 12

NORTH

SOUTH



CROSS-SECTION ALONG COMPLETE TRAVERSE SHOWING NEAR-SURFACE CONDITIONS AND GROUNDWATER LEVELS

0 1000 2000 3000 4000 5000

HORIZONTAL SCALE IN FEET

CLONCURRY RIVER GROUNDWATER QLD 1960

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS G379-18

TO ACCOMPANY RECORD No 1982/77

NORTH

SOUTH

DEMPSEY'S SOAK

ALLUVIUM

ALLUVIUM

WEATHERED BEDROCK

WEATHERED BEDROCK

UNWEATHERED BEDROCK

UNWEATHERED BEDROCK

SHEAR ZONE

SHEAR ZONE

ELEVATION IN FEET

620
600
580
560
540
520
500

STATION Nos 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 STATION Nos

A B C D E F G H J K L M

NARROW VALLEY ZONE OF HIGH RESISTIVITIES

LEGEND

POSSIBLE LOCATION OF ROCKBARS BASED ON GROUNDWATER DATA

SUGGESTED TARGETS FOR WATER BORING

B TRAVERE B

SEISMIC CROSS-SECTION

ALONG COMPLETE TRAVERSE

0 500 1000 2000 3000 4000 5000

HORIZONTAL SCALE IN FEET

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G379-19

To Accompany Record No. 1962/77

CLONCURRY RIVER GROUNDWATER INVESTIGATION QLD 1980