COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS



RECORD No. 1962-3

# ZEEHAN DAM SITE GEOPHYSICAL SURVEY, TASMANIA 1960

by

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## CONTENTS



## ILLUSTRATIONS



## ABSTRACT


This Record describes a seismic refraction and resistivity survey at a proposed dam site on the Pieman River, Tasmania.

The purpose of the survey was to determine the thickness and nature of overburden and the nature of bedrock. Seismic results indicate that the overburden is up to 110 ft thick; it consists of soil, scree material, and decomposed and weathered dolerite. The bedrock consists of jointed and unweathered dolerite.

## 1. INTRODUCTION

The Hydro-Electric Commission of Tasmania proposes to erect a power-station in the lower reaches of the Pieman River on the west coast of Tasmania. Several schemes have been proposed and investigated. The Zeehan dam is included in one of the proposals.

The dam site is located about 14 miles north-west of Zeehan, four miles north of the old Zeehan-Corinna track (Plate 1). The approximate coordinates are: 324 856 on the Smithton 4-mile map.

The Commission requested the Bureau of Mineral Resources, Geology and Geophysics to investigate the site, to determine the depth to bedrock and the composition of bedrock and overburden.

The survey was made in February 1960 by a geophysical party consisting of E.J. Polak, party leader, and D.J. Harwood and M.J.W. Duggin, geophysicists. The Commission provided additional assistants and did the topographical surveying. The assistance given by geologists and other officers of the Commission is acknowledged.

In this Record the term "bedrock" will refer to the deepest recorded seismic refractor; the term "overburden will refer to soil, scree material, and weathered or decomposed bedrock.

## 2. GEOLOGY

The area investigated is near the northern edge of the Eureka Plains (Plate 1). The site is wholly over Jurassic dolerite which intrudes folded Precambrian quartzite and slate, and Zeehan tillite of Permian (?) age. The dolerite is similar to other dolerites in Tasmania. A detailed description of dolerite in the Eureka Plains is given by Spry (1958).

Dolerite crops out in several places on the dam site. The outcrops were mapped by R. Mather (Plate 2). Elsewhere dolerite is covered by a thick mantle of the products of dolerite weathering. The outcropping dolerite is heavily jointed, the joints being filled with clay.

Plate 3 shows the descriptive logs of fourteen diamond-drill holes, drilled by the Commission. The locations of these holes are shown on Plate 2. The logs indicate that the weathered rock can be up to 96 ft thick, and that it consists of scree material and dolerite with weathered joints.

## 3. METHODS AND EQUIPMENT USED

Resistivity and seismic refraction methods were applied. The total length of traverses surveyed with the resistivity method was 10,150 ft, and with the seismic refraction method 16,850 ft.

Resistivity method

Different types of rock possess different electrical resistivity. Hard, non-porous, unweathered rocks have a high resistivity. Shearing and fracturing produce localised weathered zones which, because of the resultant increase in the water content and salinity, have a low resistivity. As a rule it may be said that the resistivity of a rock is approximately inversely proportional to the product of porosity and the salinity of the pore solutions.

In the Wenner method of resistivity surveying, which was used in the present investigations, four electrodes equally spaced in a straight line are moved along a traverse and resistance readings are taken at consecutive stations.

The instrument used was a Megger Earth Tester. This is a low-resistance meter, manufactured by Evershed and Vignoles, London, with scales 0 to 3, 0 to 30, 0 to 300, and 0 to 3000 ohm.

Seismic method

The seismic method of exploration depends on the contrast between the velocities of seismic waves through different rock formations. Hard, unweathered rocks have higher velocities than their weathered counterparts, while these in turn have higher velocities than soil and unconsolidated deposits.

Detailed descriptions of the seismic method have been given in previous reports to the Commission (Polak and Moss, 1959).

The equipment used in the seismic survey was an S.I.E. 12-channel refraction seismograph with T.I.C. geophones of a natural frequency of about 20 cycles per second to record longitudinal waves, and a three-component geophone to record longitudinal and transverse waves.

## 4. RESULTS

The results of the geophysical surveys are shown on Plates 4 to 9.

Interpretation of resistivity data

Plate 4 shows the resistivity profiles along Traverses A, X, C, D, E, and F. Two profiles are shown on each traverse, one with 50-ft electrode spacing, and the other with 100-ft spacing. The depth of penetration of the current applied is approximately the same as the electrode spacing. Therefore by using, for instance, a 50-ft electrode spacing in resistivity traversing, changes in resistivity within about 50 ft of the electrode, either laterally or at depth, will affect the resistivity profile.

High values of apparent resistivity indicate zones where the dolerite crops out or comes close to the surface; lower apparent resistivities indicate thicker overburden or deeper weathering. These relations are well illustrated by the correlations between the depth to bedrock from drilling data and the corresponding resistivity measurements with 100-ft electrode spacing. On graph "A", inset on Plate 4, the depth plotted is that of the top of the sound rock as mentioned on the Commission's drilling logs. On graph "B" the interpretation of the depth to the bedrock was reconsidered on the basis of full core recovery. Both interpretations are indicated on the drilling logs on Plate 3 by the capital letters A and B. The correlation coefficient of curve "B" is 0.87. The resistivity measurements seem to indicate the overburden thickness fairly well, with a standard error of 12 ft.

## Depth determination from seismic data

Longitudinal wave velocities for the various rock types at the dam site are shown in Table 1.

TABLE 1

| Rock type | Seismic velocity in ft/sec |
|---|---|
| Soil | 1000 |
| Scree material and completely weathered dolerite | 2000 to 3000 |
| Very weathered and slightly weathered dolerite | 5000 to 11,000 |
| Slightly weathered to massive unweathered dolerite | 11,000 to 18,000 |

On Plate 3, seismic velocities found near the drill-holes are shown on the drilling logs. The capital letter "S" indicates the top of the unweathered dolerite as found from the seismic data.

Plates 5 to 9 show the interpretation of the seismic results in the form of profiles.

Plate 9 inset shows a correlation between the depth to bedrock from drilling data (capital letter "A" on Plate 3), and the thickness of overburden determined from seismic work. The correlation coefficient is 0.91, and the standard error in the seismic depth determination is 4 ft.

## Dynamic properties of rocks

Table 2 shows the values of longitudinal and transverse velocities at the dam site, where they were recorded together. A density of 2.9 g/c.c. was accepted for dolerite. The dynamic properties of rocks were then calculated (see Polak and Moss, 1959).

TABLE 2

| Station No. | Apparent velocity (ft/sec) long. | Apparent velocity (ft/sec) trans. | True velocity | Poisson's ratio | Modulus in $10^6$ lb/in.$^2$ Young's | Bulk | Rigidity |
|---|---|---|---|---|---|---|---|
| G22 | 12,800 | 7100 | 18,000 | 0.275 | 9.1 | 6.8 | 3.6 |
| H26 | 7600 | 3900 | 16,000 | 0.32 | 8.13 | 7.7 | 3.2 |
| H22 | 8300 | 4300 | 19,000 | 0.30 | 10.2 | 8.6 | 4.0 |
| I8 | 7400 | 4200 | 18,000 | 0.27 | 12.5 | 9.1 | 5.0 |
| I14 | 16,800 | 9000 | 18,000 | 0.30 | 9.3 | 7.7 | 3.6 |
| I24 | 10,600 | 5600 | 18,000 | 0.30 | 9.3 | 7.7 | 3.6 |
| J25 | 6000 | 3400 | 17,000 | 0.32 | 9.08 | 8.5 | 3.4 |

Notes to Table 2.

(a) Apparent velocity was calculated by dividing the distance between the shot and geophone by the travel time of the wave.

(b) The travel time includes the time in overburden, therefore the Poisson's ratio for low apparent velocities (thick overburden or short shot distance) will be higher than the true Poisson's ratio.

(c) An error in assumed density of 0.1 g/c.c. would lead to an error of 4 per cent in the calculated value of Young's modulus.

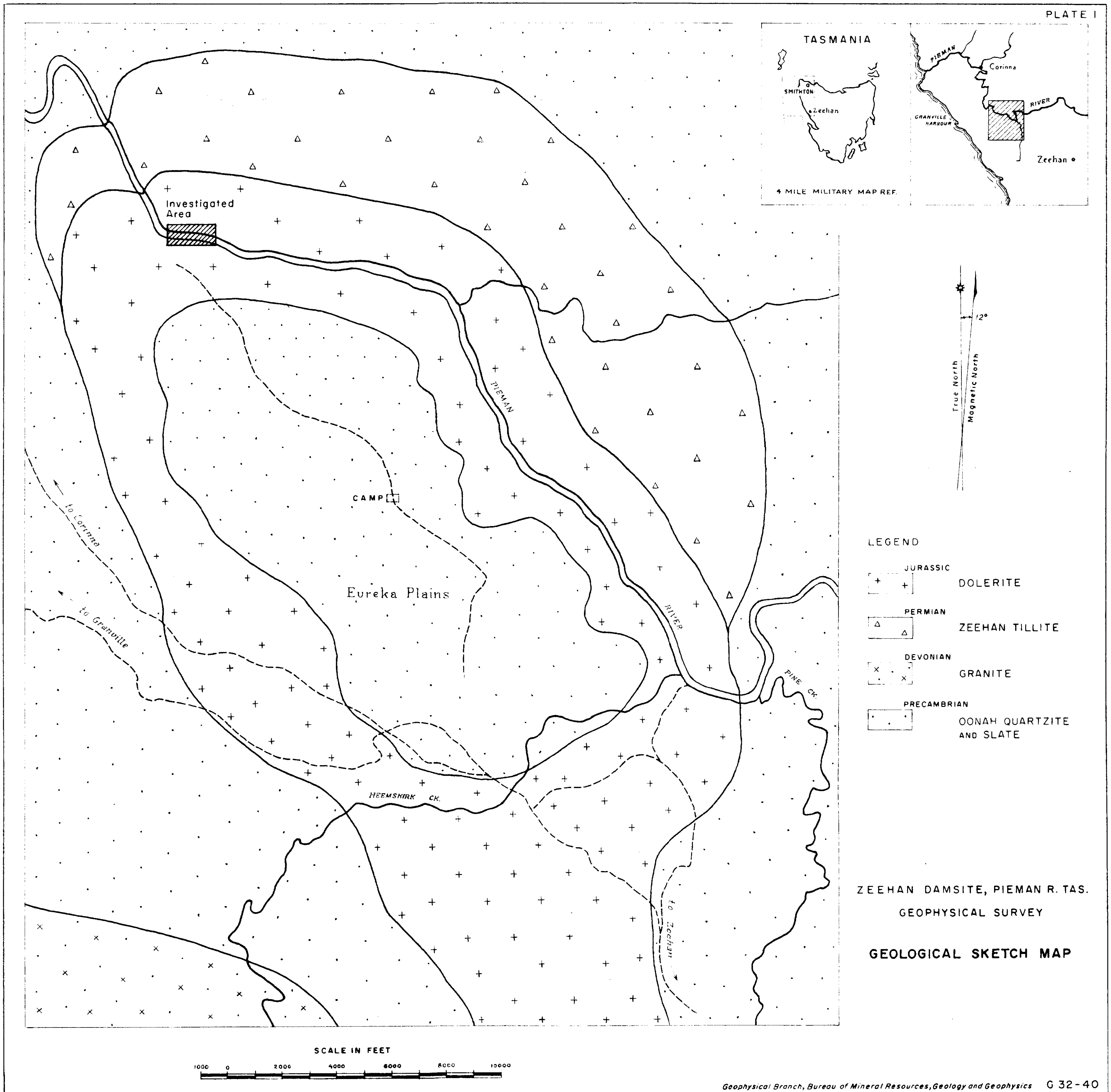
## 5. CONCLUSIONS

The geophysical survey provided information on the depth to the bedrock at dam site. The overburden consists of soil, scree material, and completely to partly weathered dolerite. The overburden is 110 ft thick near Station D6. The bedrock consists of dolerite, partly jointed and weathered along the joints.

## 6. REFERENCES

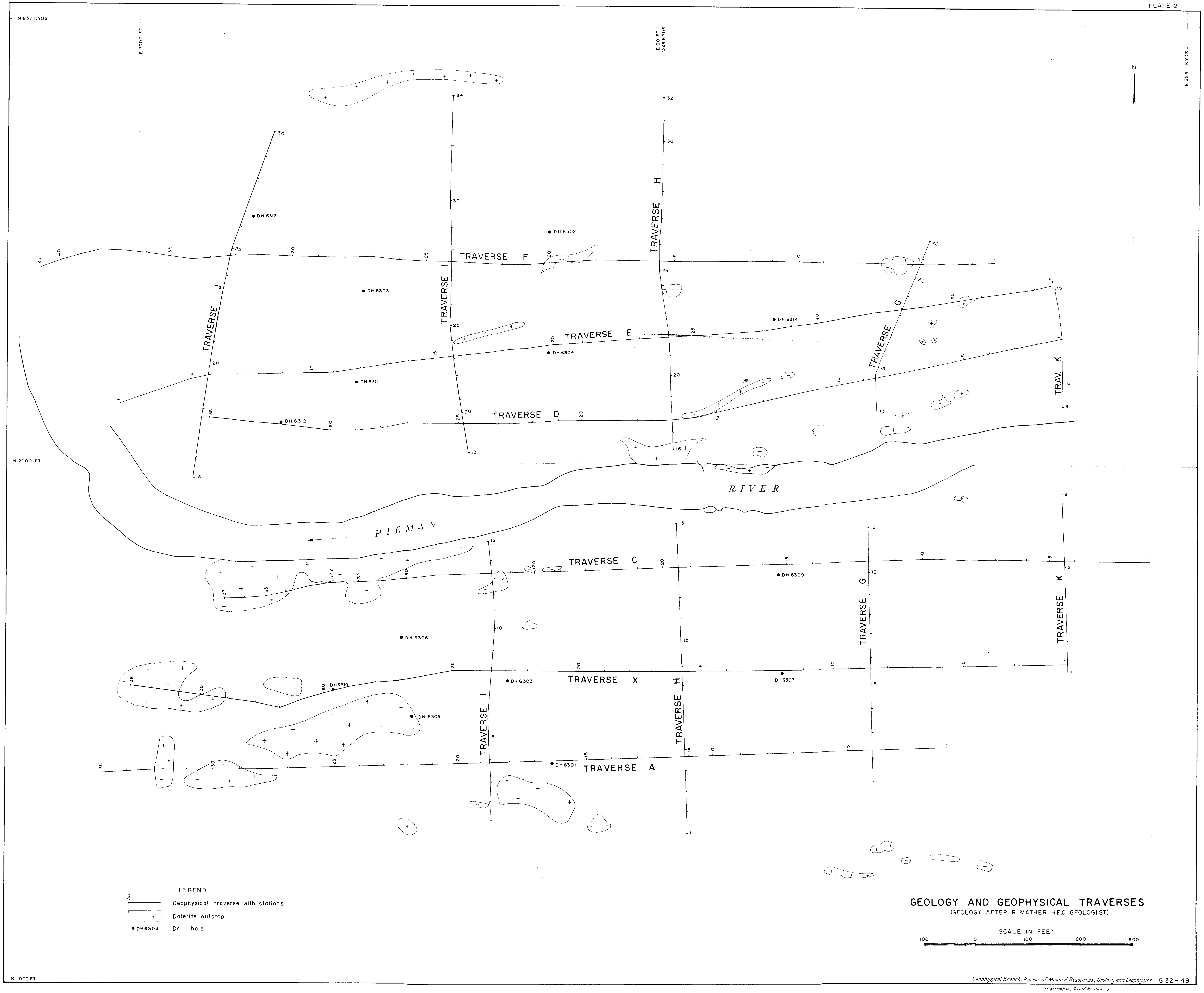
POLAK, E.J., and MOSS, F.J. 1959 Geophysical survey at the Cluny Damsite, Derwent River, Tasmania. Bur. Min. Resour. Aust. Rec. 1959-87.

SPRY, A. 1958 Some observations of the Jurassic dolerite of the Eureka cone sheet near Zeehan, Tasmania. Dolerite, a Symposium, p.93. University of Tasmania.




To accompany Record No 1962-3

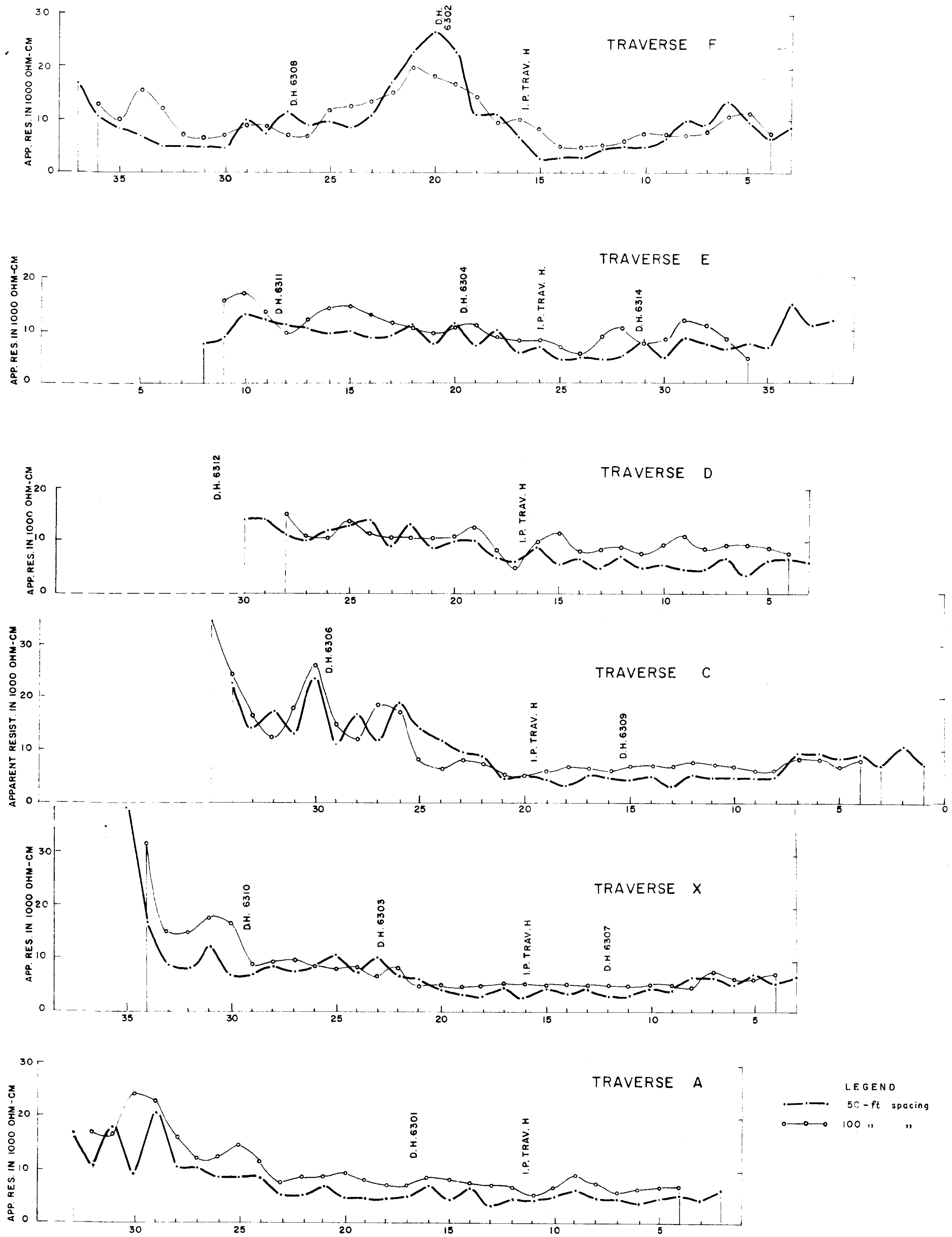
ZEEHAN DAMSITE, PIEMAN R. TAS.

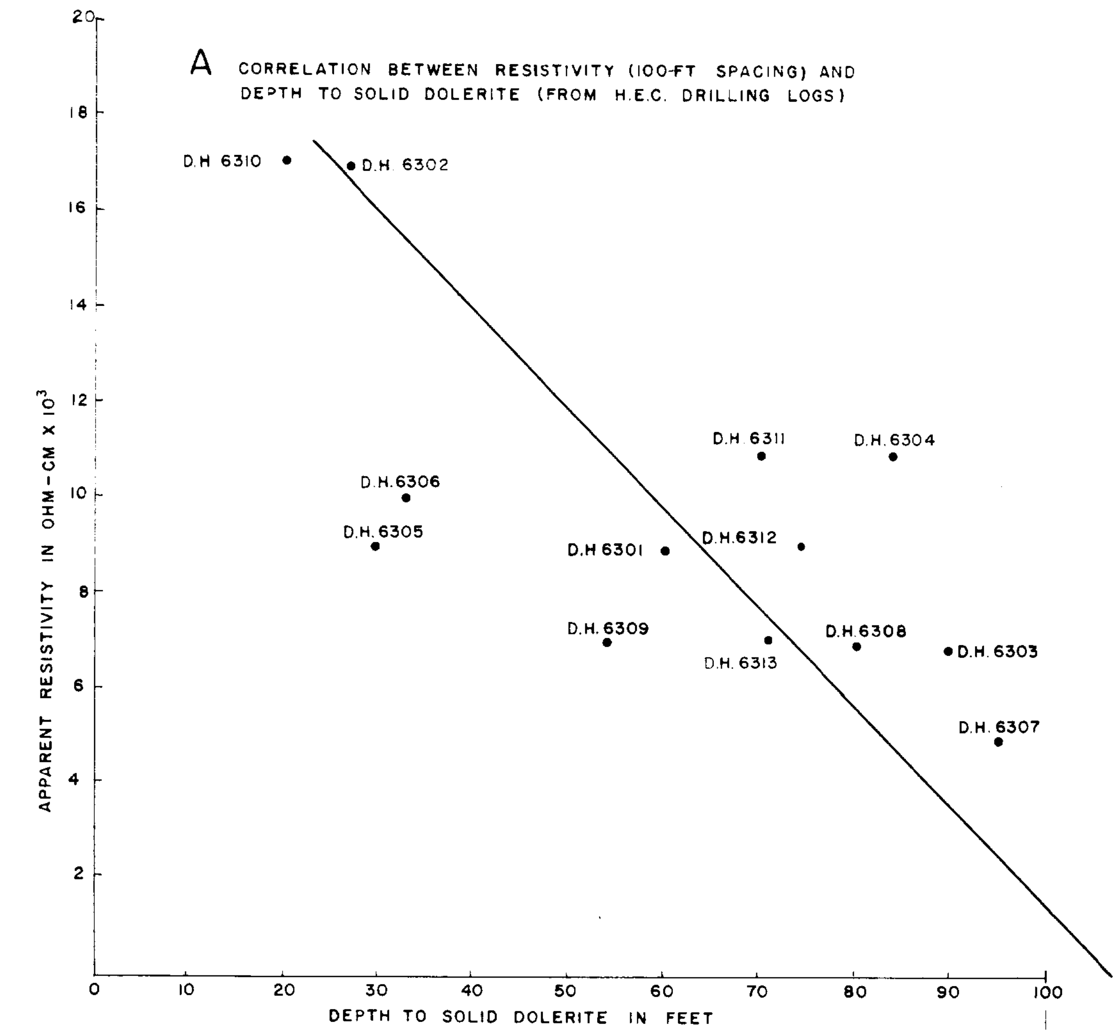



DRILL-HOLE LOGS & SEISMIC VELOCITIES

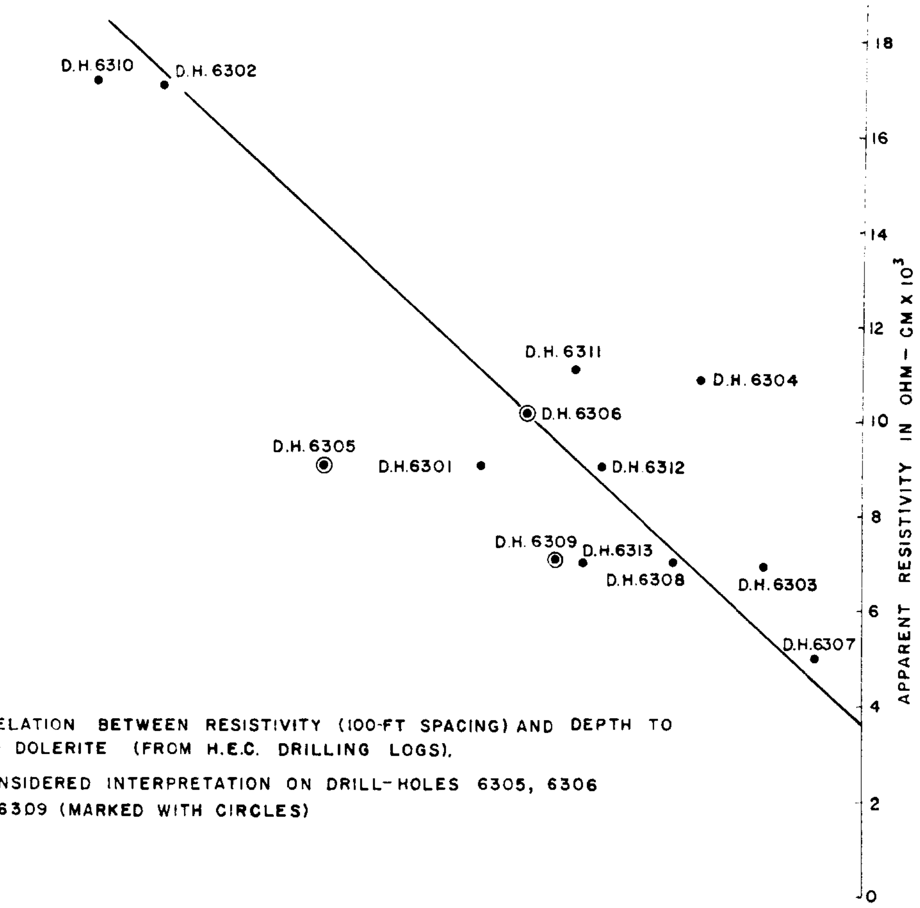
D.D.H. SECTIONS AFTER R. MATHER

ZEEHAN DAMSITE, PIEMAN R. TAS




A CORRELATION BETWEEN RESISTIVITY (100-FT SPACING) AND DEPTH TO SOLID DOLERITE (FROM H.E.C. DRILLING LOGS)




B CORRELATION BETWEEN RESISTIVITY (100-FT SPACING) AND DEPTH TO SOLID DOLERITE (FROM H.E.C. DRILLING LOGS).
RECONSIDERED INTERPRETATION ON DRILL-HOLES 6305, 6306 AND 6309 (MARKED WITH CIRCLES)

# RESISTIVITY PROFILES

HORIZONTAL SCALE IN FEET

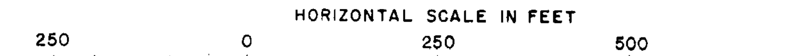
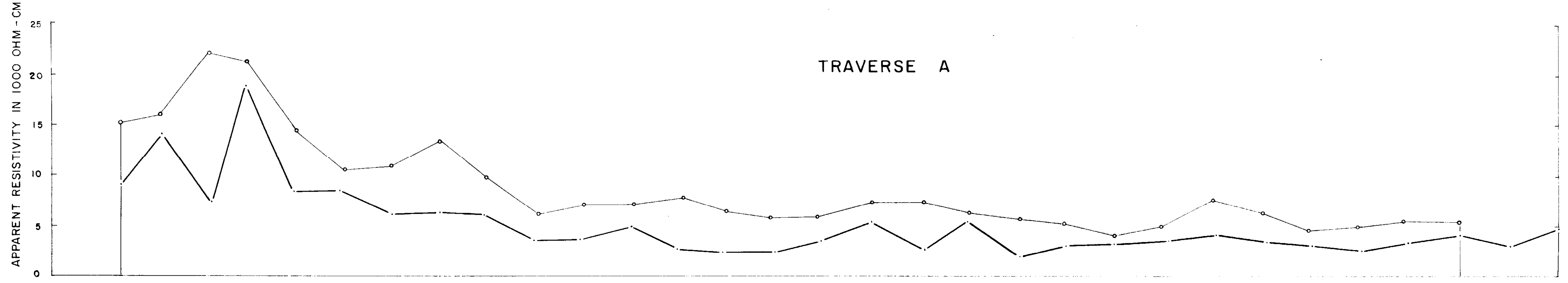
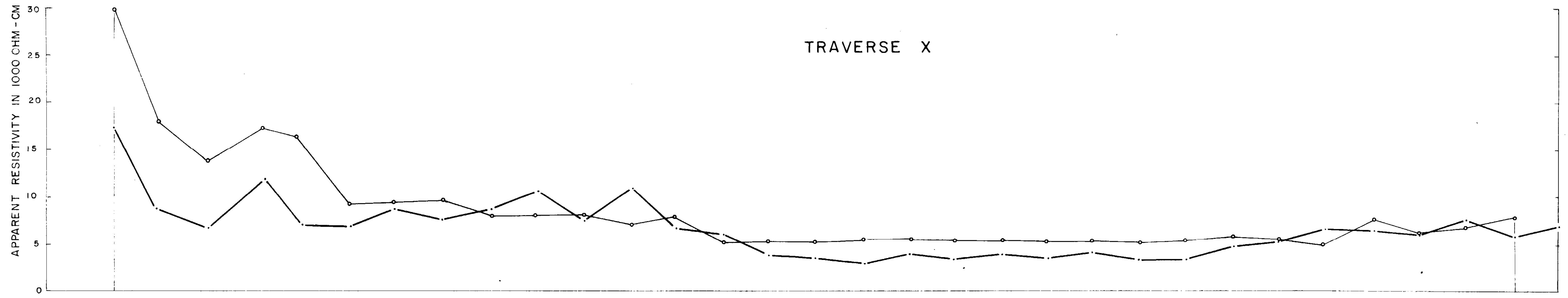
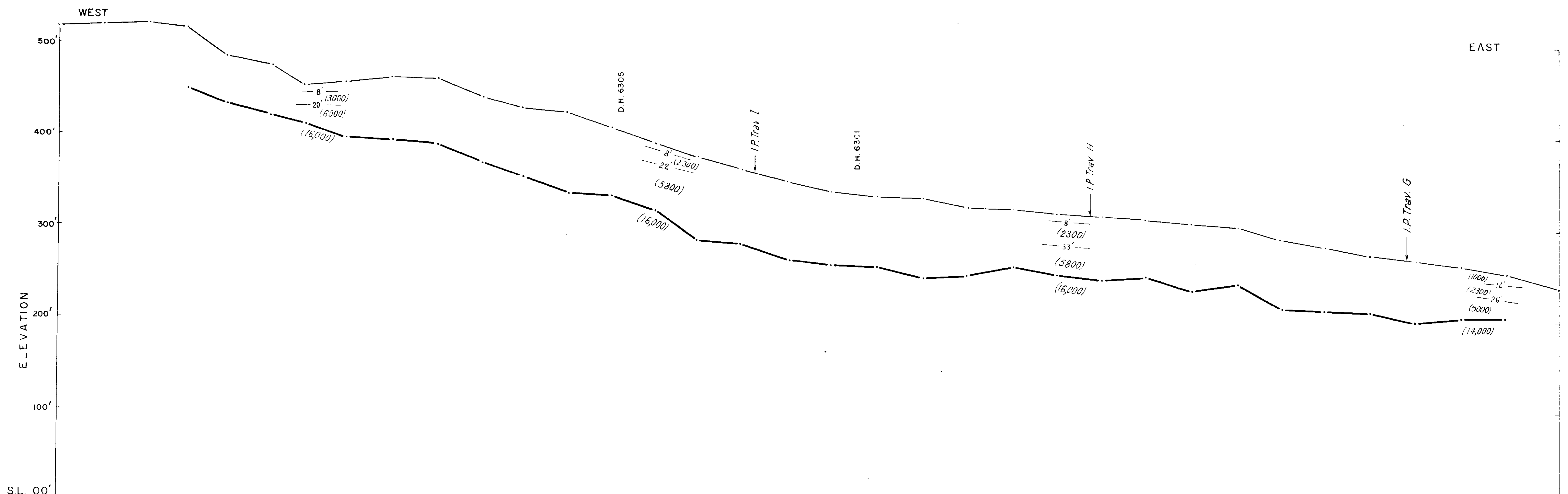


PLATE 5



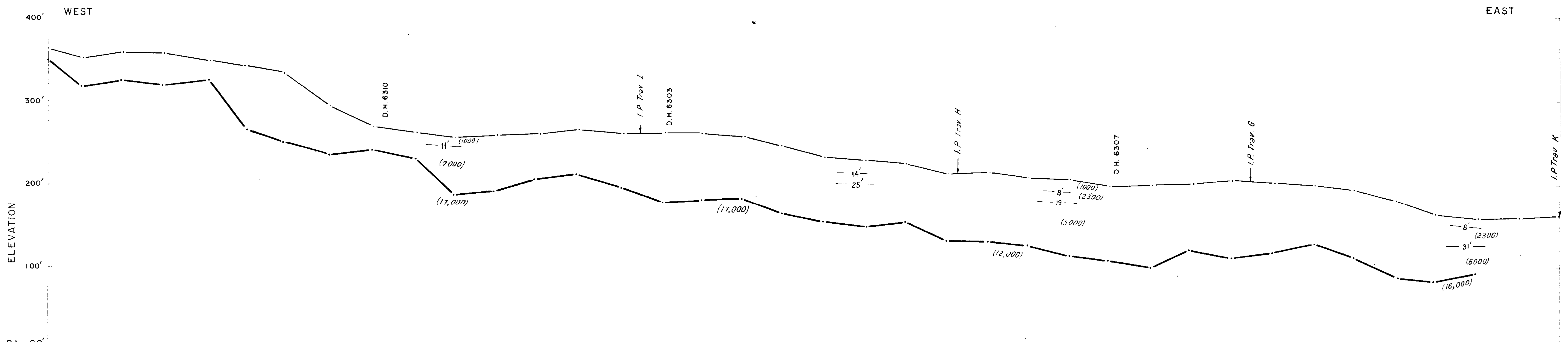

DATUM S.L. 00'

| STATION NUMBER | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | 521 | 525 | 526 | 520 | 489 | 480 | 457 | 461 | 465 | 465 | 446 | 435 |
| DEPTH TO BEDROCK | | | | 64 | | 51 | 44 | 60 | 70 | 70 | 73 | 80 |

| STATION NUMBER | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | 429 | 411 | 395 | 378 | 366 | 353 | 341 | 337 | 334 | 325 | 323 | 315 |
| DEPTH TO BEDROCK | 93 | 75 | 67 | 93 | 80 | 87 | 84 | 87 | 87 | 75 | 62 | 65 |

| STATION NUMBER | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | 316 | 312 | 308 | 303 | 290 | 282 | 273 | 267 | 261 | 254 | 241 |
| DEPTH TO BEDROCK | 66 | 66 | 73 | 61 | 76 | 73 | 63 | 71 | 57 | 52 | |

BASED ON H.E.C. PLAN A 7402




DATUM S.L. 00'

| STATION NUMBER | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | 365 | 350 | 357 | 357 | 351 | 345 | 328 | 294 | 271 | 266 | 259 | 261 | 263 |
| DEPTH TO BEDROCK | 15 | 19 | 31 | 38 | 23 | 80 | 76 | 61 | 27 | 31 | 69 | 69 | 57 |

| STATION NUMBER | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | 270 | 265 | 262 | 265 | 260 | 247 | 236 | 232 | 226 | 217 | 217 | 213 | 207 |
| DEPTH TO BEDROCK | 53 | 65 | 83 | 79 | 75 | 80 | 78 | 76 | 68 | 81 | 83 | 81 | 88 |

| STATION NUMBER | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | 202 | 204 | 206 | 209 | 210 | 206 | 197 | 187 | 170 | 166 | 160 | 171 |
| DEPTH TO BEDROCK | 89 | 97 | 78 | 92 | 81 | 68 | 80 | 92 | 78 | 65 | | |

BASED ON H.E.C. PLAN A 7403

LEGEND

| | |
|---|---|
| (1000) | FORMATION WITH VELOCITY 1000 FT/SEC |
| 19' | DEPTH TO FORMATION WITH DIFFERENT SEISMIC VELOCITY |
| I.P. Trav H | INTERSECTION POINT |
| —·— | UNWEATHERED BEDROCK |

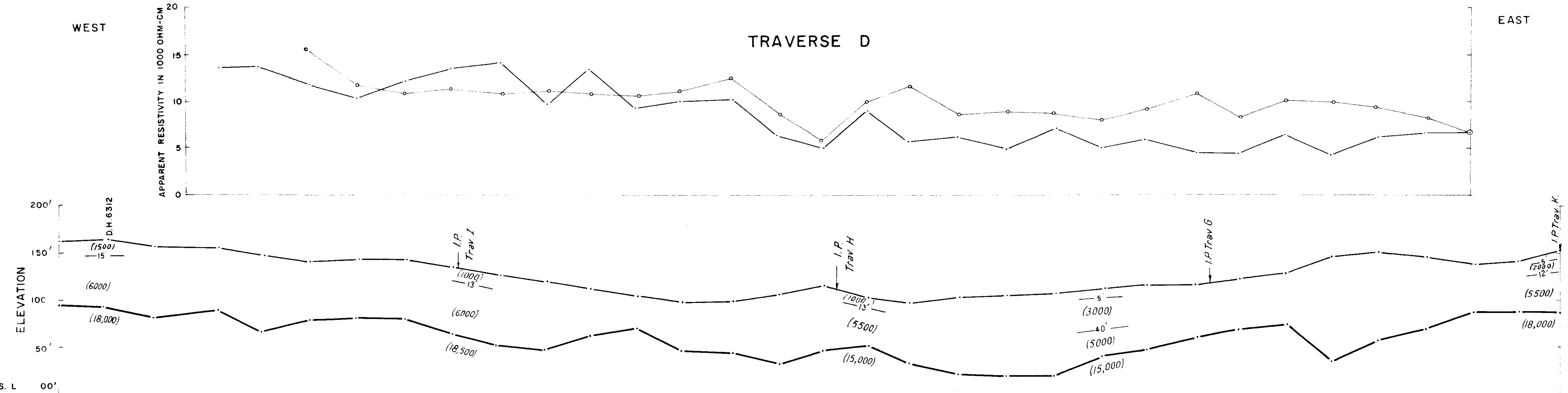
# TRAVERSES A AND X
# RESISTIVITY PROFILES AND SECTIONS

HORIZONTAL SCALE IN FEET
100 0 100 200 300
VERTICAL SCALES AS SHOWN

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. G 32-41
To accompany Record No. 1962-3

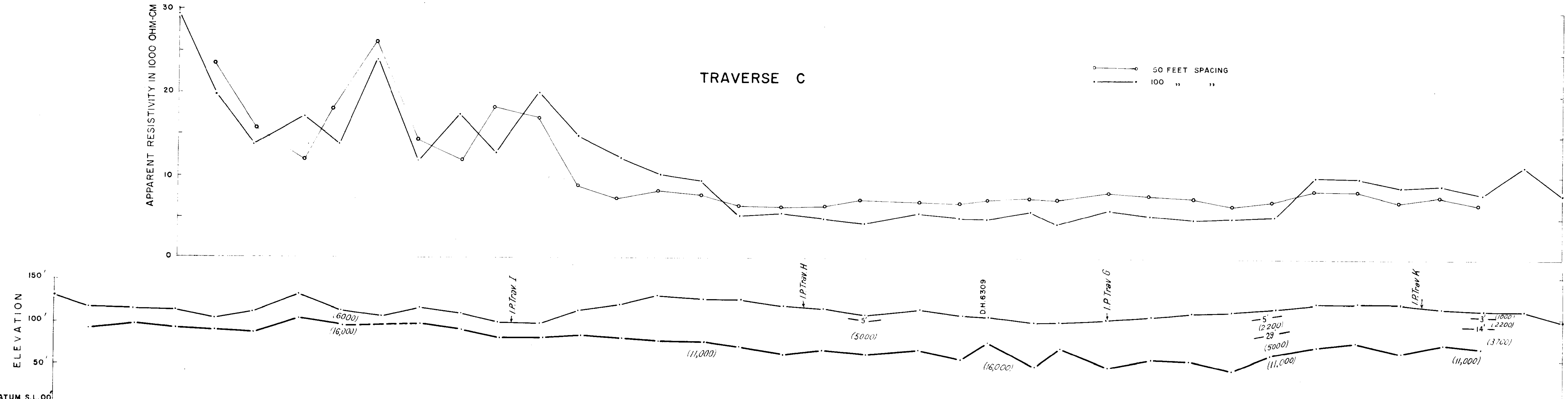
ZEEHAN DAMS PIEMAN R. TAS.

PLATE 6




| STATION NUMBER | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | | | | 163 | 154 | 147 | 149 | 148 | 140 | 131 | 125 | 116 | 109 | 103 | 102 | 111 | 120 122 | 110 | 102 | 109 | 110 | 115 | 118 | 121 | 122 | 128 | 135 | 152 | 157 | 154 | 144 | 141 | 160 |
| DEPTH TO BEDROCK | 68 | 72 | 72 | 65 | 80 | 61 | 61 | 61 | 73 | 73 | 73 | 50 | 33 | 50 | 53 | 73 | 68 | 50 | 65 | 83 | 89 | 88 | 72 | 68 | 57 | 53 | 50 | 110 | 91 | 76 | 50 | 53 | 65 |

BASED ON H.E.C. PLAN A 7405




| STATION NUMBER | 37 | 36 | 35 | 34 | 33 | 32A | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | 134 | 118 | 116 | 115 | 107 | 114 | 132 | 113 | 105 | 117 | 110 | 100 96 | 99 | 115 | 123 | 130 | 125 | 126 | 117 | 116 | 106 | 114 | 107 | 103 | 98 | 97 | 101 | 104 | 109 | 110 | 112 | 120 | 120 | 119 | 114 | 111 | 111 | 99 |
| DEPTH TO BEDROCK | | 22 | 19 | 22 | 14 | 22 | 29 | 17 | | 19 | 19 | 17 | 15 | 27 | 38 | 53 | 50 | 53 | 58 | 46 | 46 | 48 | 51 | 28 | 52 | 29 | 54 | 48 | 56 | 70 | 56 | 50 | 47 | 56 | 42 | 47 | | |

BASED ON H.E.C. PLAN A 7404

LEGEND

(3000) FORMATION WITH VELOCITY 3000 FT/SEC
40' " " DIFFERENT SEISMIC VELOCITY
I.P. Trav H INTERSECTION POINT
UNWEATHERED BEDROCK

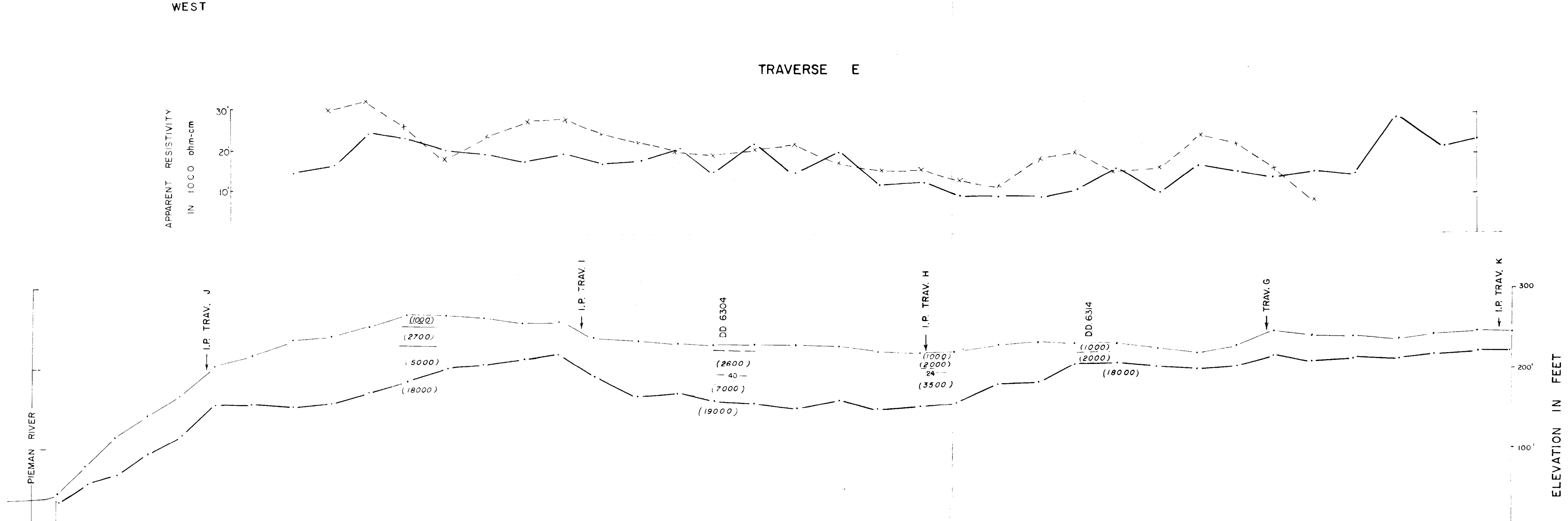
HORIZONTAL SCALE IN FEET 100 0 100 200 300
VERTICAL SCALES AS SHOWN

# TRAVERSES D AND C RESISTIVITY PROFILES AND SECTIONS

Geophysical Branch, Bureau of Mineral Resources, Geology & Geophysics. G 32-42
To accompany Record No. 1962/3

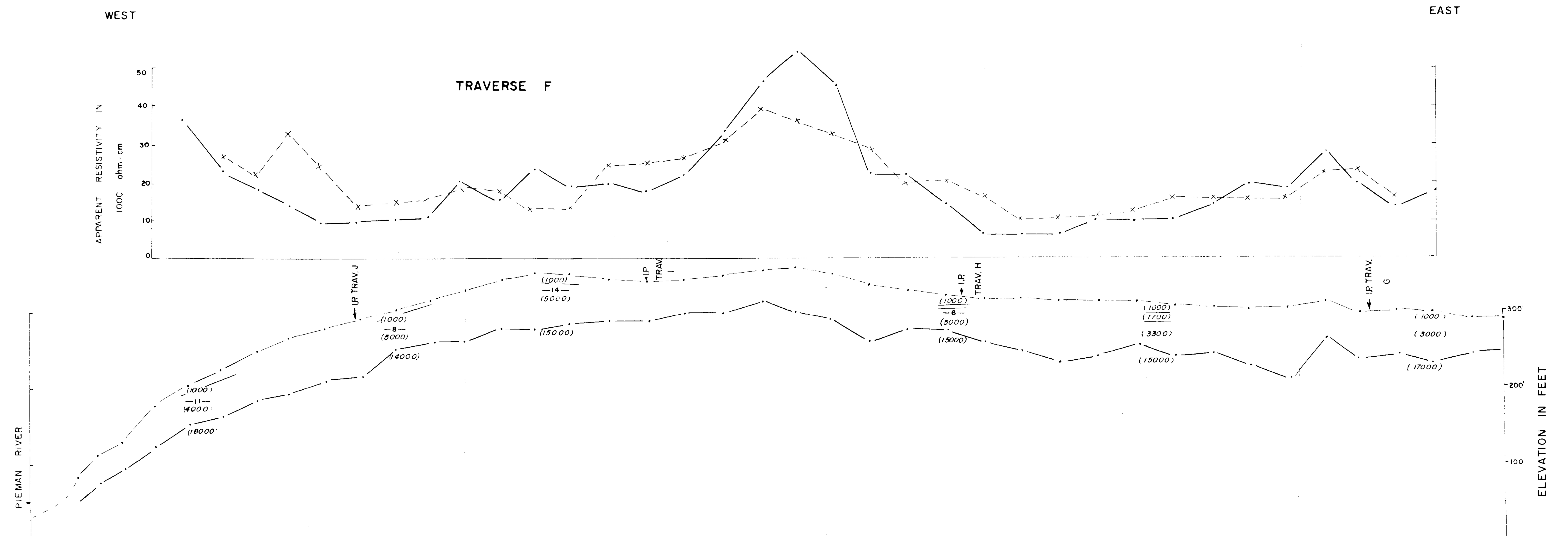
ZEEHAN DAMS. PIEMAN R. TAS.

ZEEHAN DAM SITE PIEMAN RIVER, TASMANIA




| STATION NUMBER | | 1 | 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 | 39 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | 284 | 39 | 73 | 108 | 155 | 162 | 198 | 21 | 230 | 236 | 251 | 263 | 263 | 260 | 252 | 254 | 238 | 232 | 227 | 224 | 227 | 226 | 226 | 221 | 218 | 219 | 227 | 233 | 230 | 232 | 225 | 219 | 226 | 246 | 240 | 241 | 234 | 243 | 246 | 246 |
| DEPTH TO BEDROCK | | 15 | 20 | 44 | 46 | 49 | 46 | 59 | 80 | 82 | 82 | 80 | 65 | 57 | 43 | 38 | 46 | 70 | 59 | 68 | 73 | 76 | 65 | 73 | 64 | 60 | 46 | 49 | 24 | 21 | 21 | 19 | 21 | 27 | 29 | 25 | 21 | 21 | 23 | 24 |

BASED ON H.E.C. PLAN A 7406




| STATION NUMBER | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | 81 | 109 | 130 | 175 | 202 | 230 | 242 | 261 | 276 | 287 | 297 | 310 | 322 | 337 | 347 | 343 | 337 | 336 | 337 | 343 | 35C | 354 | 344 | 329 | 326 | 315 | 313 | 314 | 309 | 310 | 309 | 304 | 302 | 301 | 302 | 316 | 296 | 299 | 298 | 290 | 288 |
| DEPTH TO BEDROCK | 33 | 30 | 35 | 54 | 48 | 57 | 60 | 72 | 66 | 75 | 48 | 52 | 67 | 62 | 73 | 63 | 57 | 52 | 41 | 48 | 39 | 57 | 58 | 73 | 48 | 43 | 55 | 67 | 78 | 70 | 56 | 63 | 59 | 73 | 95 | 45 | 59 | 53 | 67 | 45 | 45 |

BASED ON H.E.C. PLAN A 7407

LEGEND

RESISTIVITY

SPACING 50 FT

100 FT

(15,000) SEISMIC VELOCITY IN FT/SEC

TRAVERSES E AND F

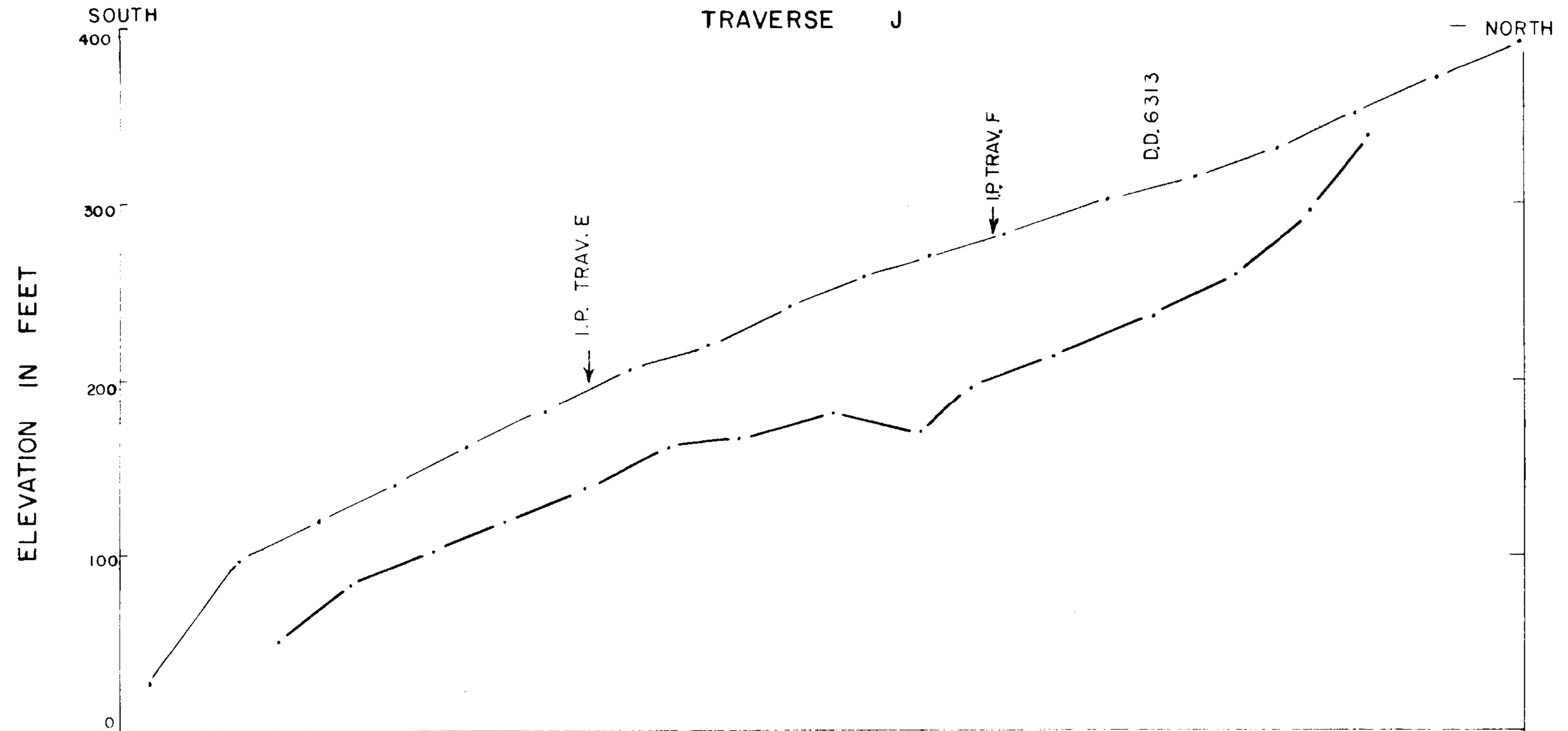
SECTIONS

SCALE IN FEET

100 0 100 200

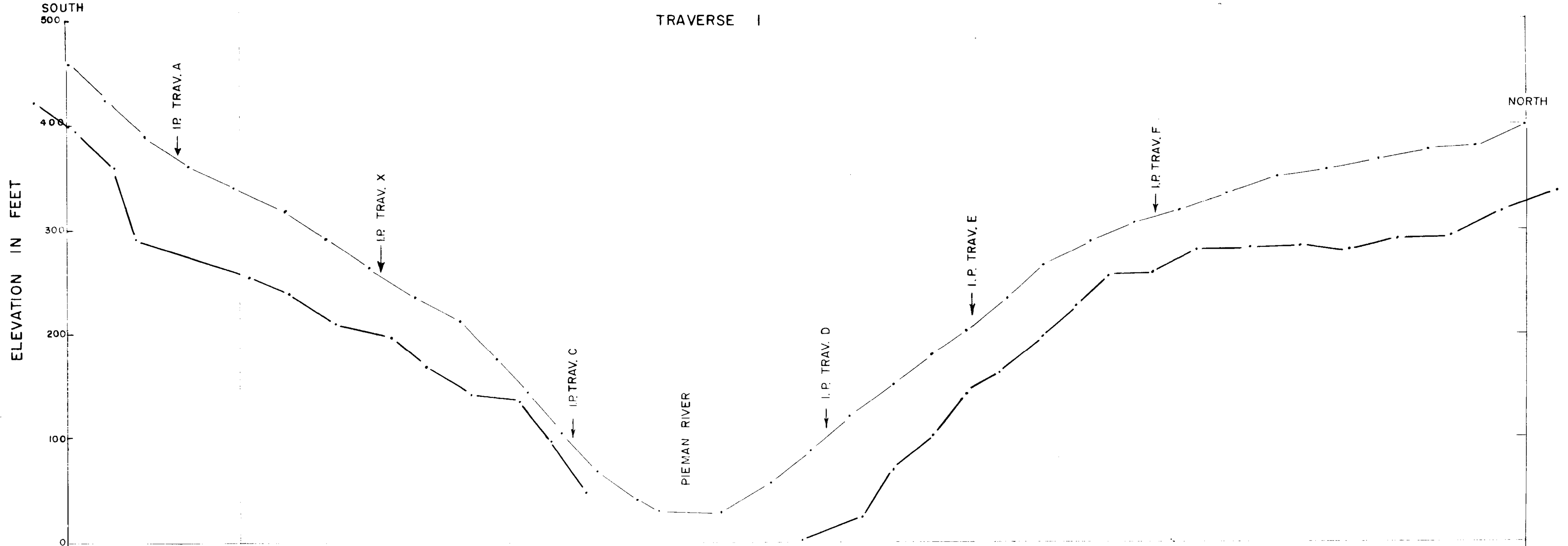
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G 32—43

To accompany Record No. 1962-3




| STATION NUMBER | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION ELEVATION | 28 | 96 | 119 | 140 | 163 | 183 | 206 | 220 | 243 | 260 | 272 | 290 | 304 | 316 | 332 | 352 | 372 | 393 |
| DEPTH TO BEDROCK | | 49 | 40 | 43 | 46 | 46 | 45 | 51 | 65 | 90 | 78 | 75 | 69 | 60 | 39 | 11 | | |

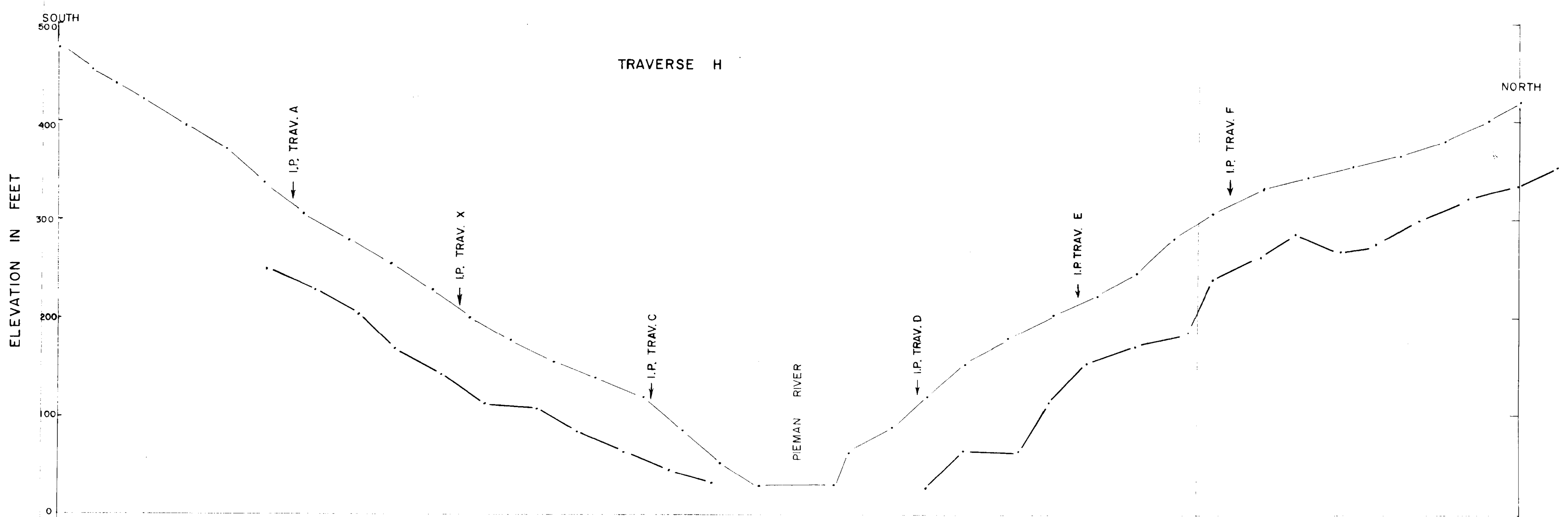
BASED ON H.E.C. PLAN A 7445




| Station number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station elevation | 46 | 426 | 390 | 364 | 342 | 320 | 295 | 266 | 240 | 216 | 180 | 146 | 110 | 71 | 41 | | 57 |
| Depth to bedrock | 50 | 44 | 44 | 90 | | 71 | 65 | 65 | 45 | 57 | 41 | 10 | 10 | 25 | | | 63 |

| Station number | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station elevation | 90 | 121 | 151 | 179 | 204 | 234 | 268 | 289 | 308 | 332 | 334 | 353 | 359 | 369 | 379 | 383 | 394 |
| Depth to bedrock | 78 | 63 | 60 | 87 | 48 | 48 | 48 | 33 | 49 | 40 | 52 | 70 | 79 | 73 | 85 | 64 | 69 |

BASED ON H.E.C. PLAN A 7444




| Station number | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station elevation | 477 | 454 | 441 | 423 | 397 | 372 | 339 | 305 | 283 | 259 | 232 | 204 | 178 | 156 | 139 | 122 | 87 | 55 |
| Depth to bedrock | | | | | | | | 66 | 61 | 62 | 73 | 68 | 70 | 50 | 60 | 60 | 49 | 18 |

| Station number | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station elevation | 64 | 89 | 124 | 156 | 181 | 204 | 224 | 249 | 285 | 309 | 333 | 345 | 337 | 368 | 384 | 406 | 425 |
| Depth to bedrock | | 67 | 63 | 103 | 76 | 56 | 64 | 76 | 52 | 64 | 55 | 82 | 82 | 70 | 64 | 70 | 76 |

BASED ON H.E.C. PLAN A 7443

NOTE SECTIONS CALCULATED FROM BROADSIDE SHOTS
DEPTHS PLOTTED NORMAL TO THE SURFACE

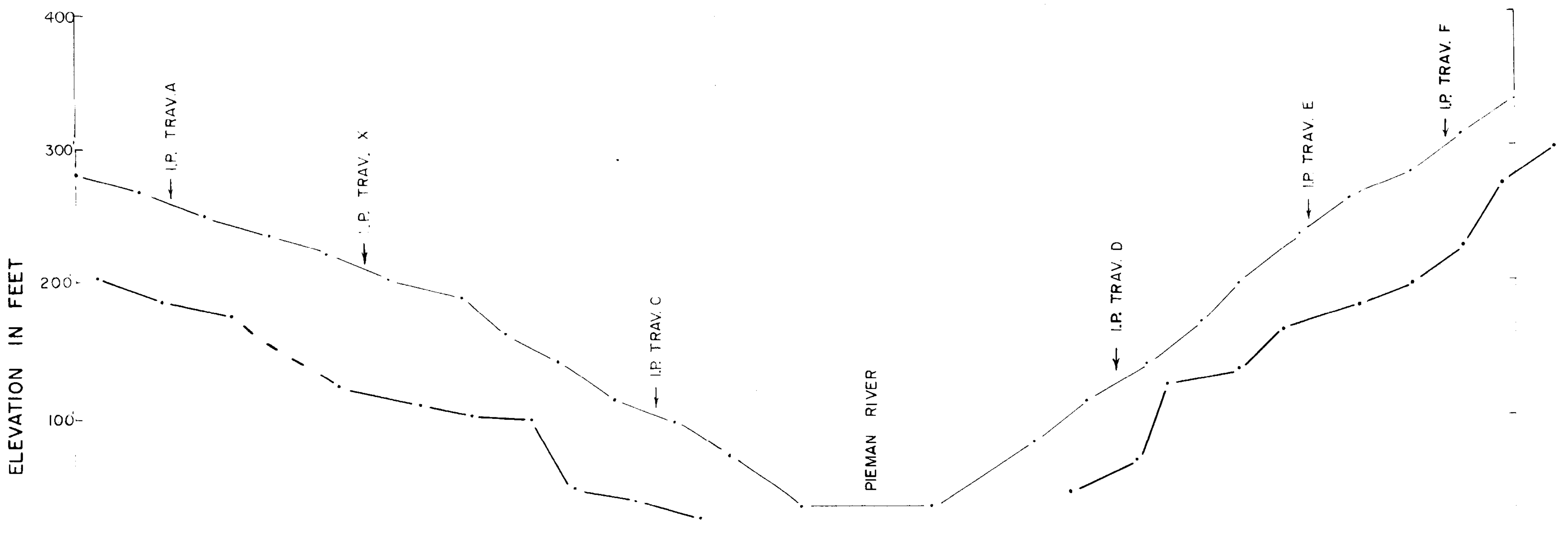
## TRAVERSES J, I, H
## SECTIONS

SCALE IN FEET

100 0 100 200

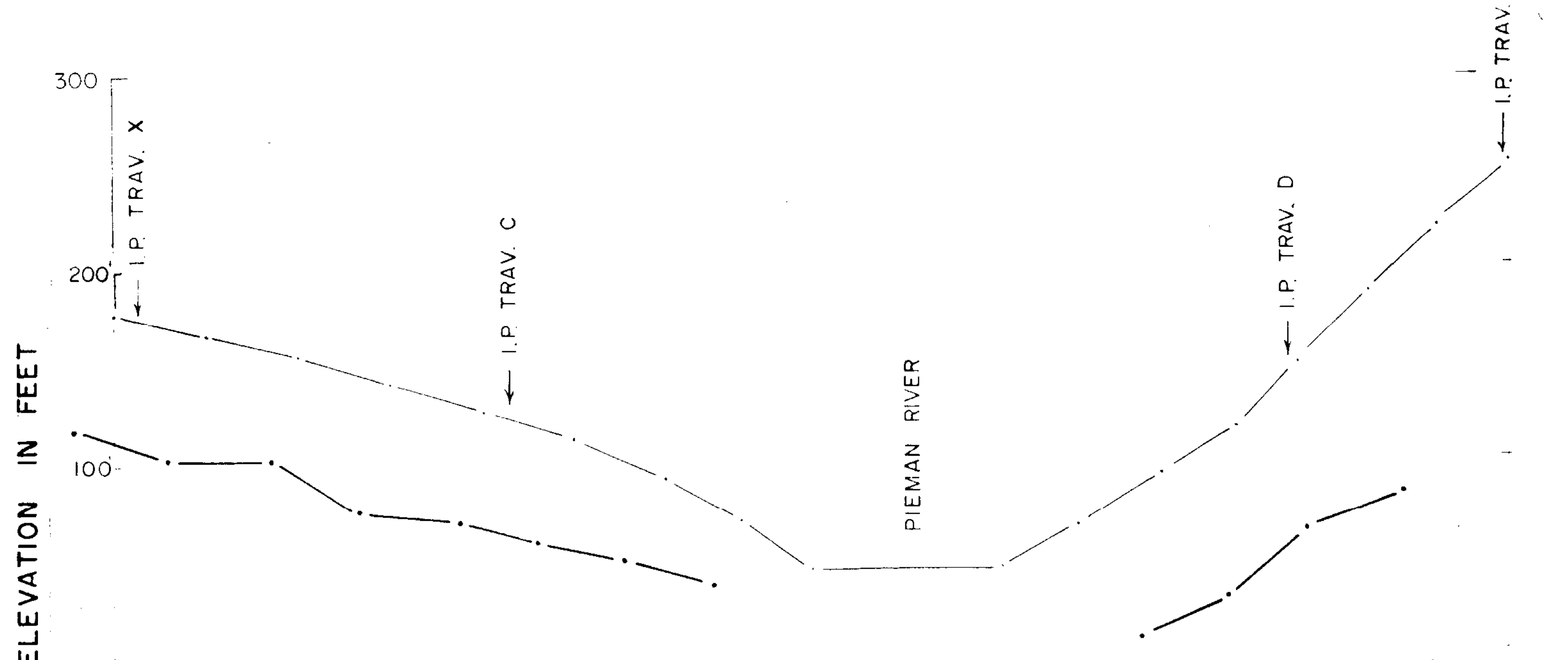
ZEEHAN DAMSITE PIEMAN RIVER TASMANIA

PLATE 9




| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION NUMBER | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| STATION ELEVATION | 250 | 268 | 248 | 236 | 221 | 203 | 168 | 161 | 141 | 113 | 96 | 69 | 80 | 112 | 138 | 171 | 199 | 256 | 265 | 282 | 311 | 337 |
| DEPTH TO BEDROCK | | 73 | 71 | 65 | | 91 | 88 | 67 | 49 | 73 | 62 | 51 | 48 | 57 | 17 | 45 | 45 | 66 | 78 | 69 | 48 | 33 |

BASED ON H.E.C. PLAN A7442

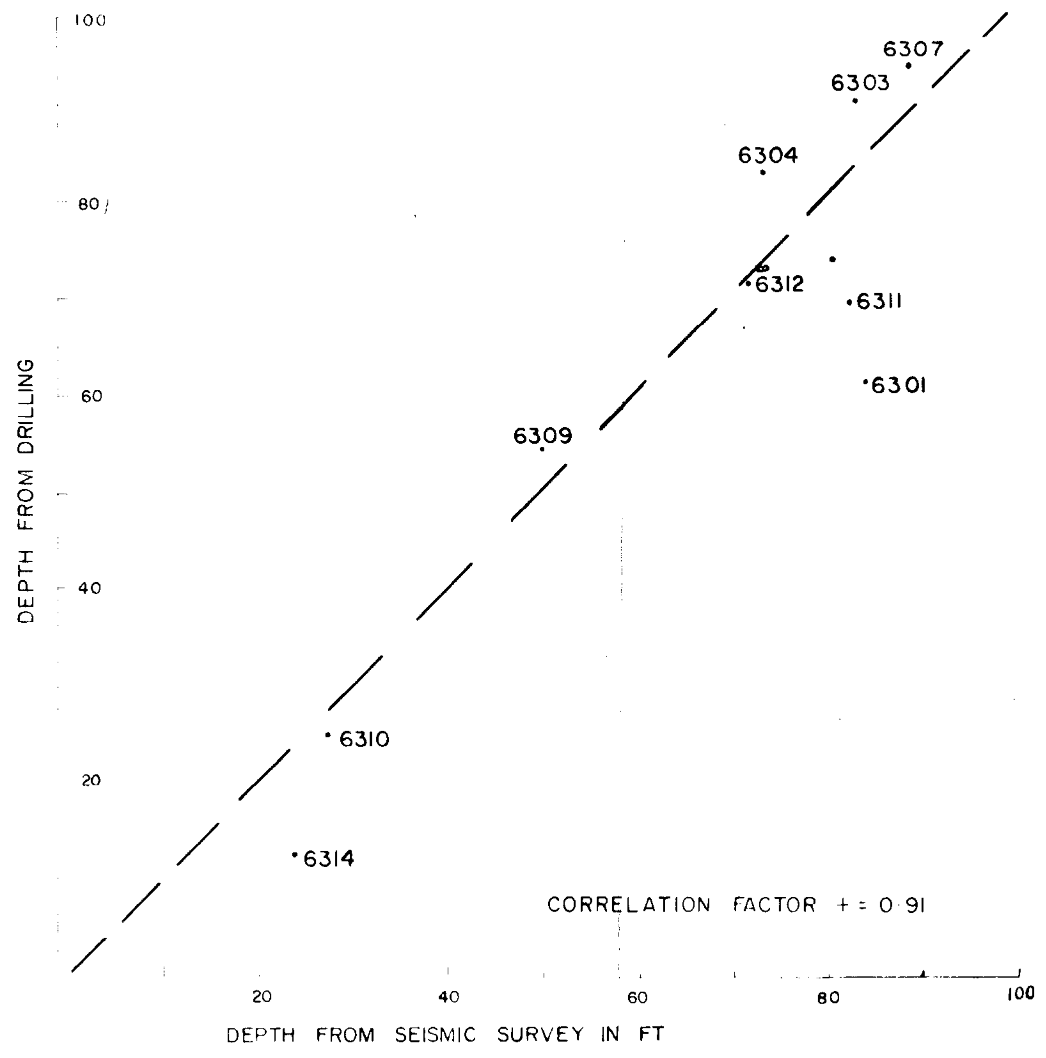



| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION NUMBER | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| STATION ELEVATION | 173 | 162 | 151 | 135 | 120 | 106 | 87 | 63 | 37 | 37 | 59 | 85 | 112 | 146 | 181 | 216 | 246 |
| DEPTH TO BEDROCK | 61 | 65 | 53 | 67 | 56 | 56 | 48 | 31 | | | 65 | 74 | 65 | 89 | | | |

BASED ON H.E.C. PLAN A7446

NOTE: SECTION CALCULATED FROM BROADSIDE SHOTS

DEPTH PLOTTED NORMAL TO THE SURFACE




## TRAVERSES G AND K

## SECTIONS

SCALE IN FEET

100 0 100 200

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*To accompany Record No. 1962-3*