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Geothermal Service of Canada

Service géothermique du Canada

SUBSURFACE TEMPERATURE DATA FROM ARCTIC WELLS

GEOTECH Engineering
Calgary, Alberta

Earth Physics Branch Open File Number 83-11
Ottawa, Canada, 1983

Price/Prix: $88.75

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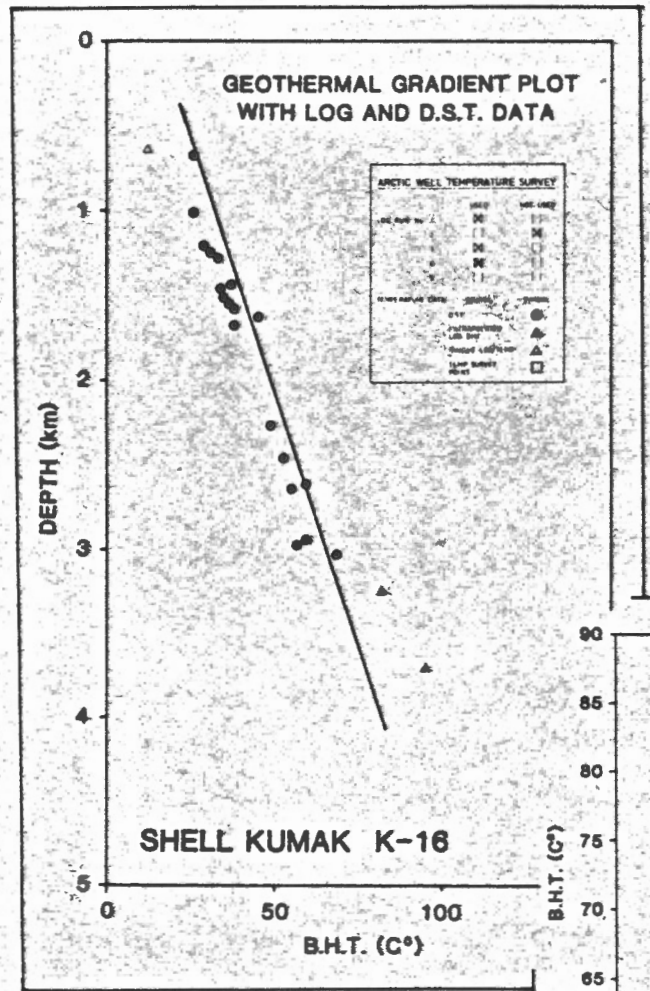
Abstract

All available subsurface temperature measurements made by industry in the search for hydrocarbons throughout the Mackenzie Delta/Beaufort Sea and the Arctic Islands have been collected and collated.. The data collection has been used to estimate undisturbed rock temperatures, geothermal gradients and to contour regional temperatures at depths of 1, 2, 3 and 4 km below the surface. A total of 344 wells were included in the study.

Résumé

Ce rapport présente une collecte et une mise en ordre de toutes les mesures de températures en profondeur effectuées par l'industrie pétrolière à la recherche d'hydrocarbures dans le Delta du Mackenzie, la mer de Beaufort et les îles de l'arctique. Les données recueillies ont été utilisées pour effectuer un estimé des températures des roches non-perturbées, des gradients géothermiques et pour établir des contours régionnaux des températures à 1, 2, 3 et 4 km. sous la surface. Un total de 344 puits sont inclus dans cette étude.

SUBSURFACE TEMPERATURE DATA FROM ARCTIC WELLS

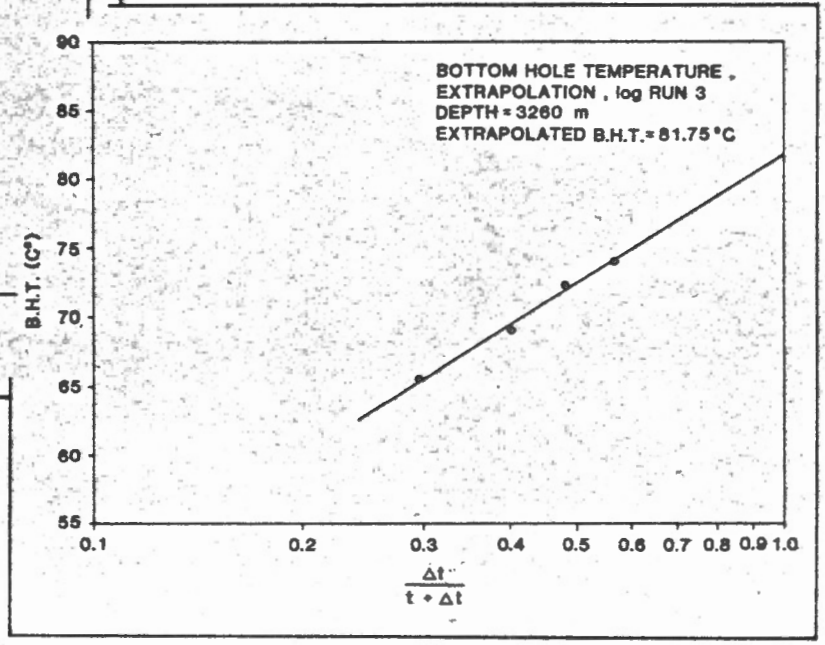


PREPARED FOR :

EARTH PHYSICS BRANCH

DEPARTMENT OF ENERGY, MINES AND RESOURCES

OTTAWA , CANADA
APRIL 1983



GEOTECH Engineering

GEOTECH

May 12th, 1983
WFB 83-019

Department of Energy, Mines & Resources
Earth Physics Branch
No. 1 Observatory Crescent
OTTAWA, Ontario K1A 0Y3

ATTENTION: Dr. A. Judge

Dear Dr. Judge:

GEOTECH is pleased to submit our final report, in six copies, for the Arctic Well Temperature Survey Project, D.S.S. File 15SQ.23235-2-0615. Along with the six final report copies we are enclosing, under separate cover, one copy of all original log header and drill stem test (D.S.T.) data sheets plus one copy of each temperature survey log used in the interpretation.

As requested in the contract all original log header and D.S.T. data were loaded on magnetic computer tape and the computer tape plus one copy of the data format are also included.

This fulfills GEOTECH's contractual obligation for the above project. We believe that the project was very worthwhile and has generated very useful and interesting data. GEOTECH wishes to offer special thanks to Dome Petroleum Limited, Gulf Canada Resources Inc., Shell Canada, Panarctic Oils Ltd., Lynes United Services and Haliburton for their help in collecting some of the enclosed data.

GEOTECH appreciates the opportunity to be of service to the Earth Physics Branch and hope that the enclosed data is suitable for your present needs. Should you have any questions on the data please do not hesitate to call us.

Sincerely yours,

Dr. W. F. Bawden, P. Eng.
Manager, Engineering Services

WFB/mt

tti ***GEOTECH****nical resources ltd.*
4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3 (403) 230-4128

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One Copy Only, Bound Separately

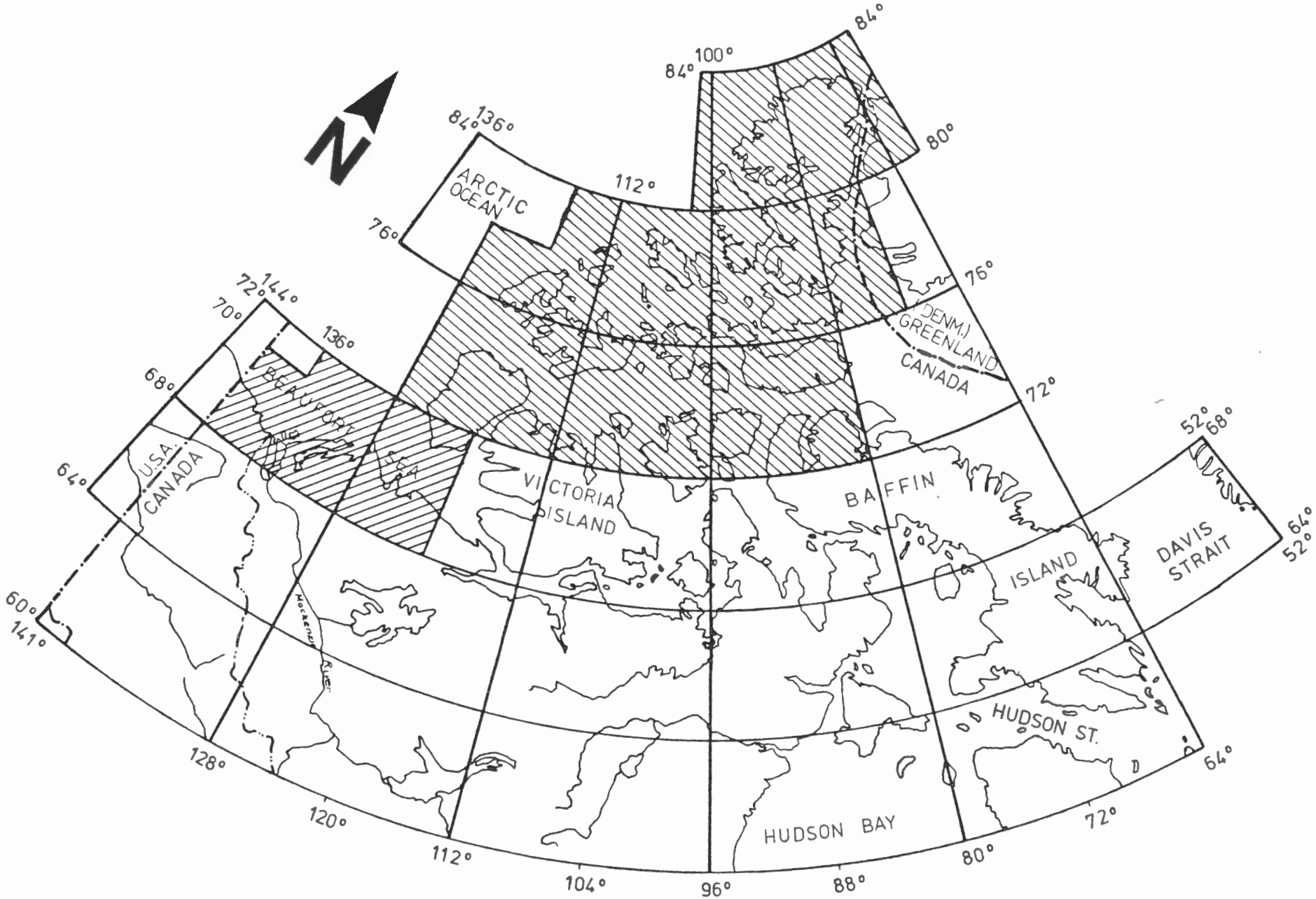
1.0 INTRODUCTION

tti GEOTECHnical resources, ltd., (GEOTECH), of Calgary, Alberta, was contracted in February 1983 by the Earth Physics Branch, Department of Energy, Mines and Resources, Ottawa, to collect and collate all available subsurface temperature observations from Arctic wells, (D.S.S. File Number 15SQ.23235-2-0615). The data is intended to complement the precise temperature surveys taken by the Earth Physics Branch in the MacKenzie Delta - Beaufort Sea, and the Arctic Islands. The three major sources of subsurface temperatures from industrial activities includes bottom-hole measurements made during routine well-logging operations and usually included in the header information on the logs, formation fluid temperatures measured during drill stem testing and, finally, temperature logs run by industry in wells.

Underground temperature information from all hydrocarbon exploratory wells within map sheets NTS 97, 107, 117, 120, 340, 560, 39, 49, 59, 69, 79, 89, 99, 48, 58, 68, 78, 88, 98, and off confidential status by December 31, 1982 was collected together. The study area is shown on Figure 1.1 and has been divided into two major subareas:

Study Area No. 1: High Arctic Islands

Study Area No. 2: Beaufort Sea - MacKenzie Delta



STUDY AREA 1

STUDY AREA 2

LOCATION MAP

GEOTECH

Data was collected from a total of 172 wells in Study Area 1 and 172 wells in Study Area 2.

Three prime data sources were used, as listed below:

i) Bottom hole temperature information from the headers of well-logs together with relevant information on depth and time since circulation in the well and mud temperature,

ii) Drill-stem test determination of formation temperature together with information on the depth of the measurement and, where available, information of water chemistry and formation pressure, and

iii) Downhole temperature surveys together with relevant information on the time since last circulation in the well and the accuracy of the survey.

The data collected was then used to calculate probable equilibrium temperatures at various depths and to develop graphs and maps of the probable variation of temperature with depth throughout the two regions examined, as discussed later. Where warranted by the data calculated temperatures were plotted and used to generate contoured isotherm maps at 1, 2, 3 and 4 kilometers depth.

Finally all of the raw data has been loaded on a computer tape, following a format agreed to between the Scientific Authority and GEOTECH, and the computer tape has been supplied to

the Earth Physics Branch as part of this contract. Copies of all original data including log header data, drill stem test data and temperature survey logs have also been supplied to the Scientific Authority as a single volume separate to this report.

2.0 DATA BASE

All hydrocarbon exploratory wells within map sheets NTS 97, 197, 117, 120, 340, 560, 39, 49, 59, 69, 79, 89, 99, 48, 58, 68, 78, 88, 98 and off confidential status were located. Well lists, with location by coordinates, are given for Study Areas 1 and 2 in Tables 2.1 and 2.2 respectively. The wells are also shown on well location maps, Figures 2.1 and 2.2, folded in the pocket at the back of the report. Temperature data was derived from various petroleum companies, service companies and commercial data sources in Calgary as discussed below.

2.1 Well Log Temperature Data

Logs from wells which are not "tight-hole" become public after one year. The log header information for all non confidential wells in Study Areas 1 and 2 were obtained on contract from Riley's Datashare International Ltd., in Calgary.

2.2 Drill Stem Test Temperature Data

Drill stem test temperature data was obtained from operating companies, service companies and commercial data banks. Dome Petroleum Ltd., Gulf Canada Resources Inc., and Shell Canada provided their Arctic well D.S.T. temperature data

TABLE 2.1: WELL LIST - Study Area 1

Name	Latitude	Longitude	Temperature Data Source
BP et al PANARCTIC HOTSPUR J-20	76/09/37/N	104/04/43/W	2
BP et al PANARCTIC EMERALD K-33	76/42/43/N	113/43/21/W	3
BP et al PANARCTIC SATELITE F-68	77/17/27/N	116/55/10/W	3
BPOG GRAHAM C-52	77/21/14/N	90/51/25/W	3
CAN CITIES JACKFISH H-69	62/28/47/N	121/27/32/W	2
CHEVRON et al MUSKOX D-87	73.811/	117.59/	1
CHEVRON et al PARKER RIVER J-72	73/31/42.1/N	115/52/25.0/W	3
COLUMBIA IKKARIKTOK M-64	72/23/26/N	121/50/49/W	2
DOM. EXPL. CANSO et al BATH. CALEDONIANRIVER J-34	75/33/31/N	98/43/00/W	3
DOME ARCTIC VENTURES CROCKERS I-53	80/02/ /N	98/55/ /W	3
DOME ARCTIC VENTURES SUTHERLAND O-23	77/42/53.07/N	102/08/38.78/W	3
DOME et al WINTER HABOUR #1	74/48/06/N	110/30/37/W	1
DOME et al WALLIS A-73	77/52/13.4/N	102/26/28.6/W	3
DOME PANARCTIC N. DUNDAS N-82	74/41/47.7/N	113/25/41.1/W	3
DOME ARCTIC VENTURES WALLIS K-62	77/57/43.08/N	102/25/16.23/W	3
DOME SHERRARD O-54	76/13/44/N	108/20/10/W	3
DOME WEATHERAU O-10	75/49/51.9/N	108/31/50/W	1
ELF CAPE NOREM A-80	77/29/13/N	110/27/05/W	3
ELF et al DRYER BAY L-49	76/08/35.58/N	121/48/36.91/W	3
ELF INTREPID INLET H-49	76/51/26/N	118/47/36/W	3
ELF JAMESON BAY C-31	76/40/12.041/N	116/43/46.397/W	3
ELF NANUK D-76	73/05/13/N	123/23/45/W	3
ELF OIL EXP UMINMAK H-07	73/36/29/N	123/00/30/W	3
ELF OIL TIRITCHIK M-48	72/47/42/N	120/45/49/W	2
ELF STORKERSON BAY A-15	72/54/00/N	124/33/29/W	2
ELF WILKINS E-60	77/59/19/N	111/21/45/W	3
ELFEX ANDERSON L-32	77/11/37.5/N	118/14/14.4/W	3
ELFEX et al WILKIE POINT J-51	76/30/31/N	117/19/48/W	2
ELFEX KUSKHAAK D-16	73/25/03.5/N	120/05/18.3/W	3
GULF NEIL O-15	80/44/36.1/N	83/04/49.6/W	2
H.B. NORCEN PHILLIPS CAPE ALLISON L-50	77/49/30.85/N	100/18/00.46/W	3
HORN RIVER DEPOT PL L-24	79/23/40/N	85/44/21.91/W	3
HORN RIVER MID FIORD J-53	79/52/37/N	94/57/10/W	3
IMP PANARCTIC et al HOODOO L-41	78/10/37/N	99/54/13/W	2
IMP PANARCTIC et al MOKKA A-02	79/31/12/N	87/01/14/W	2
IMP PP SHERWOOD P-37	78/16/47/N	89/45/26/W	2
IMPERIAL IOE PANARCTIC et al DEVON E-45	75/10/	91/30/	3
IMPERIAL PANARCTIC UNION PPL-E AMUND M-05	78/24/48/N	95/04/24/W	3
KMG YOUNG BAY F-62	72/41/25/N	96/49/30/W	3
LOBITOS et al CORNWALLIS RESOLUTE BAY L-41	74/40/40/N	94/44/38/W	3
MOBIL CORNWALL O-30	77/29/47/N	94/38/58/W	3
MOBIL SADENE D-02	68/51/01/N	126/47/15/W	2
MURPHY VICTORIA IS F-36	72/45/18/N	117/11/13/W	2
N-52 HOODOO	78/10/00/N	100/00/00/W	1
PANARCTIC KING CHRISTIAN D-18A	77/47/08.94/N	101/06/50.059/W	3
PANARCTIC KING CHRISTIAN N-06	77/45/ /N	101/02/ /W	3
PANARCTIC AIEG DOME PDC BALAENA D-58	77/37/11/N	100/22/24/W	1
PANARCTIC AIEG DOME SKATE B-80	77/45/00/N	104/30/00/W	1
PANARCTIC AIEG PHILLIPS CISCO B-66	77/30/00/N	106/20/00/W	1
PANARCTIC AIEG PPC DOME MACLEAN I-72	77/30/00/N	104/00/00/W	1
PANARCTIC AIEG WHITEFISH G-63	77/12/23.9/N	106/53/26.4/W	1
PANARCTIC AIEG WHITEFISH H-63	77/20/00/N	106/40/00/W	1
PANARCTIC AMUND CENTRAL DOME H-40	76/19/28.333/N	96/15/15.808/W	3
PANARCTIC APOLLO C-73	75/32/00.01/N	111/58/58.06/W	3
PANARCTIC ARCO et al BLUE FIORD E-46	77/15/27/N	86/18/07.8/W	3
PANARCTIC BENT HORN A-57	76/26/00.9/N	103/49/19.1/W	3
PANARCTIC BENT HORN F-72			3
PANARCTIC BEN HORN F-72A (Whipstock)	76/21/27.15/N	103/58/15/W	3
PANARCTIC BENT HORN N-72	76/21/50.7/N	103/58/11.9/W	3
PANARCTIC BEVERLEY G-13	75/02/20.26/N	108/05/23.24/W	3

TABLE 2.1: WELL LIST - Study Area 1 Continued

Name	Latitude	Longitude	Temperature Data Source
PANARCTIC BROCK C-50	77/49/00.12/N	114/17/24.09/W	3
PANARCTIC BROCK I-20	77/59/40/N	114/33/51/W	2
PANARCTIC C FLTWOOD L-21	76/30/42/N	103/40/49.4/W	2
PANARCTIC CAPE FLEETWOOD M-21	76/30/47.8/N	103/40/37/W	1
PANARCTIC CHAR G-07	77/36/25.85/N	99/31/8.23/W	3
PANARCTIC CHARLES POINT G-07	76/26/26.75/N	103/01/03.36/W	3
PANARCTIC COLLINGWOOD K-33	76/32/44.7/N	108/43/27.5/W	3
PANARCTIC CSP EID S M-66	76/25/58/N	86/26/06.9/W	2
PANARCTIC DEMINEX CORNWALLIS CENTRAL DOME OME K-40	75/09/40.27/N	94/43/13.70/W	2
PANARCTIC DEPOT ISL C-44	76/23/14.47/N	114/17/44.65/W	3
PANARCTIC DOME BAY P-36	78/25/52.4/N	103/15/47.54/W	3
PANARCTIC DOME DUNDAS C-80	74/39/02.05/N	113/22/59.78/W	2
PANARCTIC DRAKE E-78	76/27/19.3/N	108/29/25.2/W	3
PANARCTIC DRAKE F-16	76/25/15.43/N	108/35/38.89/W	3
PANARCTIC DRAKE F-76	76/25/24.05/N	108/28/43.33/W	2
PANARCTIC DRAKE P-40	76/29/50.1/N	107/12/07.9/W	3
PANARCTIC DRAKE POINT K-67	76/28/00/N	108/59/00/W	1
PANARCTIC DRAKE PT K-79	76/28/36.54/N	108/58/58.98/W	3
PANARCTIC DRAKE PT L-67A, L-67	76/26/36.85/N	108/55/23.012/W	3
PANARCTIC DUMBBELLS E-49	78/28/74.22/N	100/24/12.44/W	3
PANARCTIC EAST DRAKE I-55	76/24/39.8/N	107/48/54.5/W	3
PANARCTIC ELF BAR HARBOUR E-76	74/15/27.5/N	123/53/49.8/W	3
PANARCTIC ELUE POINT A-41	78/10/5.56/N	101/50/17.06/W	2
PANARCTIC et al BENT HORN A-02	76/21/5.7/N	104/00/53.14/W	3
PANARCTIC et al BENT HORN M-12	76/21/54.05/N	104/06/56.84/W	3
PANARCTIC et al CAPE MAMEN F-24	77/30/00/N	109/10/00/W	1
PANARCTIC et al CASTLE BAY C-68	74/07/11/N	120/49/59/W	3
PANARCTIC et al CHADS CREEK B-64	76/23/08.2/N	109/54/21/W	3
PANARCTIC et al CISCO C-42	77/20/00/N	106/15/00/W	1
PANARCTIC et al DRAKE POINT D-68	76/27/5.01/N	108/55/42.7/W	3
PANARCTIC et al GRASSY I-34	76/23/43.28/N	113/11/24.33/W	3
PANARCTIC et al HECLA C-32	76/21/09.4/N	110/13/46.2/W	3
PANARCTIC et al NOICE D-41	78/20/3.561/N	104/24/13.618/W	3
PANARCTIC et al PEDDER POINT D-49	75/38/09.051/N	118/48/15.592/W	3
PANARCTIC et al RICHARDSON POINT G-12	75/41/14.4/N	105/34/47.8/W	3
PANARCTIC et al SABINE BAY A-07	75/26/06.1/N	110/00/49.9/W	3
PANARCTIC et al SCULPIN K-08	78/10/00/N	104/45/00/W	1
PANARCTIC et al WEST POLLUX E-59	79/ 8/24.1/N	105/29/18.9/W	3
PANARCTIC et al WHITEFISH A-26	77/15/09.29/N	106/38/13.707/W	3
PANARCTIC FOSHEIM N-27	79/36/54.23/N	84/43/18.994/W	3
PANARCTIC GARNIER O-21	73/40/52.194/N	00/36/45.168/W	2
PANARCTIC GEMINI E-10	79/59/22.27/N	84/04/10.26/W	3
PANARCTIC GULF EGLINGTON P-24	75/53/52.9/N	118/07/39.1/W	3
PANARCTIC HALCYON O-16	80/15/53.18/N	84/06/39.95/W	3
PANARCTIC HEARNE F-85	74/44/15.9/N	110/55/57.9/W	3
PANARCTIC HECLA F-62	76/21/16.73/N	110/24/31.4/W	3
PANARCTIC HECLA J-60	76/19/37.88/N	110/19/49.07/W	3
PANARCTIC HECLA N-52	76/21/52.5/N	110/50/44.9/W	3
PANARCTIC HELICOPTER J-12	78/41/32.595/N	100/36/18.552/W	3
PANARCTIC HOME TENN et al SIRIUS K-28	79/17/34.2/N	103/43/37.9/W	3
PANARCTIC HOODOO E-05	78/04/16.6/N	99/33/47.6/W	3
PANARCTIC HOODOO H-37	78/06/27.13/N	99/45/37/W	3
PANARCTIC ISACHSEN J-37	79/ /39.57/N	105/ /35.66/W	3
PANARCTIC JACKSON BAY G-16	78/05/21.8/N	101/06/50.4/W	2
PANARCTIC KEY POINT O-51	76/10/54.52/N	104/21/04.40/W	3
PANARCTIC KING CHRISTIAN D-18	77/47/08.94/N	101/06/50.059/W	2
PANARCTIC LEA POINT K-32	75/21/37.9/N	105/43/29.5/W	2
PANARCTIC LOUISE O-25	78/44/57.17/N	102/41/58.42/W	3
PANARCTIC MACKLIN PNT D-23	78/22/04.4/N	104/44/50.2/W	3
PANARCTIC MARIE BAY D-02	76/21/01.12/N	115/33/31.17/W	3
PANARCTIC MAY POINT H-02	79/21/23.9/N	85/00/47.3/W	3
PANARCTIC NOICE G-44	78/23/23.44/N	104/21/39.31/W	3
PANARCTIC NOICE H-41	78/20/18.6/N	104/20/43.6/W	2
PANARCTIC NOICE W B-24	78/23/02.29/N	104/41/16.6/W	2
PANARCTIC ELDGRIDGE BAY E-79	75/58/21.02/N	109/29/38.42/W	2

TABLE 2.1: WELL LIST - Study Area 1 Continued

Name	Latitude	Longitude	Temperature Data Source
PANARCTIC NOICE W N-33	78/22/49.2/N	104/48/33.5/W	2
PANARCTIC NORCEN AILG DESBARATS B-73	76/42/08.24/N	105/57/06.71/W	3
PANARCTIC OILS TOWSON PT G-63	75/12/	106/23/	1
PANARCTIC ROB HARB K-07	76/36/32.2/N	104/02/14.1/W	2
PANARCTIC ROCHE PT J-43	76/42/45.148/N	109/46/22.197/W	1
PANARCTIC ROMULUS C-42	79/51/34.24/N	84/22/41.9/W	3
PANARCTIC SABINE BAY A-07	75/26/06.1/N	110/00/49.9/W	3
PANARCTIC SABINE H-49	76/48/15.06/N	108/45/11.25/W	3
PANARCTIC SANDY POINT L-46	76/25/38.4/N	115/18/14.24/W	3
PANARCTIC SHERRARD BAY F-14	76/13/19.05/N	108/35/51.08/W	3
PANARCTIC SOPHIE PNT G-19	76/18/29.36/N	103/04/59.2/W	3
PANARCTIC SOUTH DRAKE D-76	76/22/06/N	108/29/29.53/W	3
PANARCTIC STOKES R J-11	76/20/34.31/N	101/35/03.97/W	3
PANARCTIC SW HECLA C-58	76/17/04.68/N	111/20/52.82/W	3
PANARCTIC TALEMAN J-34	79/53/35/N	83/47/00/W	3
PANARCTIC TENN N.W. HECLA M-25	76/27/45.03/N	111/19/14.47/W	3
PANARCTIC TENN et al SOUTH DRAKE D-73	76/22/06.06/N	108/29/29.53/W	3
PANARCTIC TENN SUN DOME JACKSON G-16A	78/05/21.8/N	101/06/50.04/W	3
PANARCTIC TENNECO et al DRAKE B-44	76/26/8.87/N	108/16/3.25/W	3
PANARCTIC TENNECO et al HECLA I-69	76/18/36/N	110/23/15/W	3
PANARCTIC TENNECO et al KRISTOFFER BAY B-06	78/15/01.08/N	102/35/00.69/W	3
PANARCTIC TENNECO et al PAT BAY A-72	77/21/1.628/N	105/26/57.058/W	3
PANARCTIC TENNECO et al POLLUX G-60	79/09/23.51/N	104/57/23.35/W	3
PANARCTIC TENNECO et al ZEUS F-11	75/50/22.6/N	113/36/24.51/W	3
PANARCTIC TENNECO et al PAT BAY A-72	77/21/01.628/N	105/26/57.058/W	3
PANARCTIC THOR H-28	78/37/22.32/N	103/10/33.4/W	3
PANARCTIC THOR P-38	78/07/48.95/N	103/15/04.63/W	3
PANARCTIC TOWSON PT F-63	75/52/17.18/N	106/24/36.09/W	3
PANARCTIC UESEY A-27	76/56/4.6/N	109/08/07.1/W	2
PANARCTIC W AMUND I-44	78/23/39.704/N	97/50/17.547/W	3
PANARCTIC W BENT HORN C-44	76/23/9.3/N	104/17/10/W	3
PANARCTIC W BENT HORN E-43	76/11/15.51/N	104/18/44.43/W	3
PANARCTIC W BENT HORN I-01	76/20/32.26/N	104/00/35.8/W	3
PANARCTIC W BENT HORN I-01A	76/20/33.26/N	104/00/36.8/W	3
PANARCTIC W HECLA C-05	66/24/08.56/N	110/31/54.98/W	3
PANARCTIC W HECLA P-62	76/21/54.94/N	110/52/54.65/W	3
DEMINEX CGDC FOC AMOCO ORKSUT I-44	72/23/44/N	122/42/12/W	2
PHILLIPS et al HAZEN STRAIT F-54	77/3/16/N	110/21/10/W	3
SUN G A KRC CON PANARCTIC ELVE M-40	78/09/58/N	101/49/40/W	3
SUN K.R. PANARCTIC SKYBATTLE BAY C-15	77/14/17/N	105/06/09/W	2
SUN K.R. PANARCTIC ALLISON RIVER N-12	75/11/52.405/N	98/35/42.632/W	2
SUN K.R. PANARCTIC KITSON RIVER C-71	76/10/12.537/N	112/58/55.919/W	3
SUN LINCKENS ISLAND P-46	77/45/47.01/N	97/45/26.52/W	2
SUN OIL YOUNG D-21	76/20/10/N	98/40/40/W	3
SUN PANARCTIC RUSSEL E-82	73/51/29.44/N	98/56/48.91/W	3
SUN RUSSELL H-92	73/51/29.4491/N	98/56/48.9194/W	1
TEXEX KING PNT WEST B-53	75/32/03/N	108/20/27/W	3
UNION MAUNIOR M-48	66/57/54/N	124/24/00/W	2

Temperature Data Source LEGEND:

1: D.S.T. Data Only

2: Log Header Data Only

3: D.S.T. and Log Header Data

4: No D.S.T. or Log Header Data

TABLE 2.2: WELL LIST - Study Area 2

Name	Latitude	Longitude	Temperature Data Source
AMOCO INUVIK D-54	68/23/12.77/N	133/44/24.81/W	1
AMOCO ULSTER-SCURRY A-1 INUVIK B-54	68/23/29/N	133/43/47/W	2
AQUITANE TREELESS CK I-51	67/54/42.04/N	135/24/28.01/W	3
B.A.-SHELL REINDEER D-27	69/10/00/N	134/30/00/W	3
BANFF AQUITANE RAT PASS K-35	67/54/42.55/N	135/21/56.83/W	3
CANDEL IROQUOIS I-11	67/50/40/N	129/30/05/W	3
CDR TENLEN A-73	67/52/7.5/N	130/43/21.5628/W	3
CHEVRON FISH RIVER B-60	68/39/03/N	136/13/39/W	3
CHEVRON SOBC UPLUK C-21	69/20/10/N	135/21/22/W	3
CHEVRON UPLUK A-42	69/21/11/N	135/25/34/W	3
CHEVRON UPLUK M-38	69/27/56/N	135/24/54/W	3
CPOG CROSSLEY K-60	68/30/00/N	129/15/00/W	3
CPOG KUGALUK N-02	38/31/55/N	131/31/19/W	3
DOME CROCKER I-53	80/02/00/N	98/55/00/W	3
DOME HUNT GULF KOPANOAR 2I-44	70/23/43.560/N	135/12/12.311/W	2
DOME NEKTORALIK K-59	70/28/34.815/N	136/16/50.753/W	3
ELF AMAGUK H-16	69/35/23/N	131/02/54/W	3
ELF et al KILIGVAK I-29	69/28/38/N	131/20/16/W	3
ELF HORTON RIVER G-02	69/51/22.5/N	127/15/56.25/W	2
ESSO ADGO J-27	69/26/30.3/N	135/50/52/W	3
ESSO et al ISSUNGNAK 2-0-61	70/01/00.5/N	134/18/51.779/W	3
ESSO et al ISSUNGNAK 0-61	70/01/00.45/N	134/18/47.93/W	3
ESSO MAYOGIAK M-16	69/25/55/N	132/49/29/W	3
ESSO NAPARTOK M-01	68/30/47/N	134/32/18/W	3
GULF E. REINDEER A-01	68/40/13/N	134/00/31/W	3
GULF E. REINDEER C-58	68/50/00/N	133/30/00/W	2
GULF E. REINDEER G-04	68/53/15.9/N	133/46/3.3/W	3
GULF E. REINDEER P-60	68/39/45/N	133/43/00/W	2
GULF E. REINDEER C-38	68/47/10/N	133/38/15/W	2
GULF IMP SHELL TITALIK K-26	69/05/30/N	135/06/15/W	2
GULF IMP SHELL REINDEER F-36	69/05/20/N	134/39/00/W	2
GULF KIKORALOK N-46	69/05/45/N	134/56/32/W	1
GULF KILAGMIOTAK F-48	69/27/29/N	134/11/51/W	2
GULF KILAGMIOTAK M-16	69/25/52/N	134/04/30/W	2
GULF MOBIL ATIGI O-48	68/57/48/N	133/56/07/W	3
GULF MOBIL IKHILL I-37	68/46/34/N	134/07/50/W	2
GULF MOBIL KAMIK D-48	68/57/12.39/N	133/27/29.86/W	3
GULF MOBIL KAMIK D-58	68/57/13/N	133/29/51/W	3
GULF MOBIL KAMIK F-38	68/57/23/N	133/23/54/W	3
GULF MOBIL KAMIK L-60	68/59/41/N	133/29/24/W	3
GULF MOBIL PARSONS P-53	68/52/49/N	133/42/57/W	3
GULF MOBIL SIKU C-11	69/00/4.89/N	133/33/49.87/W	3
GULF MOBIL YA YA A-28	69/20/ /N	134/30/ /W	2
GULF MOBIL YA YA M-33	69/12/57/N	134/39/44/W	3
GULF OGEOQEOQ J-06	68/45/42/N	133/46/00/W	3
GULF OGRUKNANG M-31	68/50/52.09/N	134/24/50.47/W	4
GULF OIL PARSONS N-10	69/00/ /N	133/30/ /W	3
GULF PARSONS A-44	68/53/05/N	133/40/36/W	3
GULF PARSONS D-20	68/59/9.29/N	133/34/24.81/W	1
GULF PARSONS F-09	68/58/34/N	133/31/33/W	1
GULF PARSONS K-09	68/58/34/N	133/31/23/W	2
GULF PARSONS L-37	68/56/42.7/N	133/39/54.6/W	3
GULF PARSONS L-43	68/51/38/N	133/41/56/W	3
GULF PARSONS N-17	68/56/53/N	133/33/59/W	3
GULF PARSONS O-27	68/56/53/N	133/35/56/W	3
GULF PARSONS P-41	68/50/50.81/N	133/40/28.59/W	3
GULF RED FOX P-21	69/10/48/N	133/35/01/W	2
GULF REINDEER A-41	69/00/12/N	134/40/18/W	2
GULF SIKU A-12	69/01/0.31/N	133/32/31/W	3
GULF SIKU C-55	69/04/04/N	133/43/57/W	4
GULF SIKU E-21	69/00/29/N	133/36/54/W	1

TABLE 2.2: WELL LIST - Study Area 2 Continued

Name	Latitude	Longitude	Temperature Data Source
GULF TOAPOLOK H-24	69/13/17/N	134/50/24/W	3
GULF TOAPOLOK O-54	69/13/57.45/N	134/58/30.94/W	3
GULF TUNUNUK F-30	69/00/00/N	134/30/00/W	3
GULF YA YA I-17	69/16/35/N	134/32/49/W	3
IMP CIGOL KANGUK F-42	69/51/26/N	131/11/21/W	3
IMP DELTA IKATTOK J-17	69/16/40.57/N	136/18/13.00/W	3
IMP DELTA V KURK M-39	69/08/55/N	135/24/54/W	3
IMP IOE UMIAK N-10	69/29/50/N	134/16/25/W	3
IMP IVIK J-26	69/35/42/N	134/20/38/W	3
IMP IVIK N-17	69/36/51/N	134/19/16/W	3
IMP MALLIK A-06	69/30/00/N	134/30/00/W	3
IMP MALLIK P-59	69/28/49/N	134/42/45/W	3
IMP MAYOGIAK L-39	69/28/41/N	132/54/30/W	3
IMP SARPIK B-35	69/24/07/N	136/23/04/W	3
IMPERIAL ADGO C-15	69/24/12.733/N	135/49/3.119/W	3
IMPERIAL ADGO F-28	69/27/16.626/N	135/51/15.776/W	3
IMPERIAL ADGO P-25	69/24/56.84/N	135/50/29.93/W	3
IMPERIAL AKKU F-14	69/23/15/N	132/19/08/W	3
IMPERIAL AMOROK N-44	69/53/59/N	130/56/16/W	3
IMPERIAL ARNAK L-30	69/49/44.54/N	133/52/2.14/W	3
IMPERIAL ATERTAK E-41	69/40/00/N	132/30/00/W	3
IMPERIAL ATKINSON A-55	69/44/09/N	131/57/54/W	3
IMPERIAL ATKINSON M-33	69/42/48/N	131/54/43/W	3
IMPERIAL IMMERK B-48	69/37/8.3/N	135/10/50.7/W	2
IMPERIAL IMNAK J-29	69/08/41/N	133/06/05/W	3
IMPERIAL IOE et al ISSERK E-27	69/56/20.039/N	134/22/10.773/W	3
IMPERIAL IVIK C-52	69/31/12/N	134/28/52/W	3
IMPERIAL IVIK K-54	69/33/36/N	134/29/01/W	3
IMPERIAL KANNERK G-42	70/01/23.99/N	131/12/56.05/W	3
IMPERIAL KAPIK J-39	69/58/32/N	130/08/10/W	3
IMPERIAL KIMIK D-29	68/38/05/N	132/22/10/W	3
IMPERIAL KUGMALLIT H-59	69/38/21.52/N	133/27/48.92/W	3
IMPERIAL LANGLEY E-29	69/18/29/N	135/36/56/W	3
IMPERIAL LOUTH K-45	69/54/32/N	131/26/47/W	3
IMPERIAL MAGAK A-32	69/31/09/N	132/07/32/W	3
IMPERIAL MALLIK J-37	69/26/38/N	134/38/23/W	2
IMPERIAL MALLIK L-38	69/27/44/N	134/39/25/W	3
IMPERIAL MAYOGIAK J-17	69/26/42.603/N	132/48/12.432/W	1
IMPERIAL NATAGNAK K-53	69/42/39/N	131/43/55/W	3
IMPERIAL NETSERK B-44	69/33/03.04/N	135/35/57.74/W	3
IMPERIAL NETSERK F-40	69/39/22.7/N	135/54/21/W	3
IMPERIAL NUKTAK C-22	69/41/07/N	134/51/30/W	3
IMPERIAL NUNA A-32	69/01/14/N	133/22/34/W	3
IMPERIAL PIKIOLIK M-26	69/25/55/N	132/37/26/W	3
IMPERIAL PULLEN E-17	69/46/16/N	134/19/41/W	3
IMPERIAL RUSSELL H-23	70/02/18/N	130/06/28/W	3
IMPERIAL SARPIK B-35	69/24/7.21/N	136/23/10.04/W	3
IMPERIAL TAGLU C-42	69/30/00/N	134/45/00/W	3
IMPERIAL TAGLU F-43	69/22/17/N	134/45/47/W	2
IMPERIAL TUNUNUK K-10	69/00/00/N	134/45/00/W	3
IMPERIAL UMIAK J-37	69/26/36/N	134/23/08/W	3
IMPERIAL WAGNARK C-23	69/12/01/N	133/21/45/W	3
IMPERIAL WAGNARK G-12	69/11/21/N	133/18/14/W	3
IOE ATKINSON H-25	69/44/20/N	131/50/06/W	3
IOE BLOW RIVER YT-E-47	68/46/20/N	137/27/13/W	3
IOE ELLICE O-14	69/03/56/N	135/48/16/W	3
IOE ESKIMO J-07	69/16/43/N	132/30/59/W	3
IOE KANGUK I-24	69/53/40/N	131/05/12/W	3

TABLE 2.2: WELL LIST - Study Area 2 Continued

Name	Latitude	Longitude	Temperature Data Source
IOE MAYOGIAK P-17	69/30/ /N	132/45/ /W	2
IOE NATAGNAK H-50	69/49/27/N	131/40/11/W	3
IOE NATAGNAK K-23	69/50/00/N	131/30/00/W	3
IOE NUVORAK O-09	69/58/55/N	130/30/56/W	3
IOE PIKIOLIK E-54	69/23/15/N	132/44/35/W	3
IOE SPRING RIVER YT N-58	69/07/53/N	138/44/05/W	2
IOE TAGLU D-55	69/24/14/N	134/59/34/W	3
IOE TAGLU G-33	69/30/00/N	134/45/00/W	3
IOE TAGLU H-54	69/23/20/N	134/58/06/W	3
IOE TAGLU WEST P-03	69/22/54.906/N	135/00/23.591/W	3
IOE TUK F-18	69/17/29/N	133/04/01/W	3
IOE TUKTU O-19	69/18/55/N	132/48/17/W	3
IRKALUK B-35	70/35/05/N	135/10/12.67/W	1
KENALOOAK J-94	70/43/46.66/N	133/58/35.25/W	1
KOAKOAK O-22	70/21/53.874/N	134/06/40.102/W	1
KOPANOAR M-13	70/22/55.396/N	135/05/34.136/W	1
MOBIL GULF SADENE D-02	68/51/01/N	126/47/15/W	3
NERLERK M-98	70/27/47.624/N	133/29/44.374/W	2
ORVILRUK O-3	70/22/47.991/N	136/30/52.519/W	1
PACIFIC ROLAND BAY L-41	69/20/30.693/N	138/56/55.092/W	3
SHELL AKLAVIK A-37	68/16/15/N	135/07/46/W	3
SHELL BEAVER HOUSE CREEK H-13	68/22/16.372/N	135/33/3.043/W	2
SHELL GULF TITALIK O-15	69/05/02/N	135/03/05/W	3
SHELL KIPNIK O-20	68/49/59.9/N	134/48/18.9/W	2
SHELL KUGPIK L-24	68/53/31.52/N	135/22/13.09/W	3
SHELL KUGPIK O-13	68/52/50/N	135/18/15/W	3
SHELL KUMAK C-58	69/17/6.149/N	135/13/53.504/W	2
SHELL KUMAK E-58	69/17/29.48/N	135/14/55.28/W	3
SHELL KUMAK J-06	69/15/34.98/N	135/00/57.812/W	3
SHELL KUMAK K-16	69/15/32.93/N	135/03/58.2/W	3
SHELL NAPOIAK F-31	68/20/25/N	134/53/49/W	3
SHELL NIGLINTGAK B-19	69/18/11/N	135/18/9/W	3
SHELL NIGLINTGAK H-30	69/19/24/N	135/20/06/W	3
SHELL NIGLINTGAK M-19	69/18/49/N	135/19/26/W	3
SHELL TULLAGAK K-31	68/50/38/N	135/09/22/W	3
SHELL ULA A-35	68/44/02/N	135/52/57/W	3
SHELL UNAK B-11	68/40/9.63/N	135/18/40.4/W	3
SHELL UNIPKAT I-22	69/11/37.38/N	135/20/27.43/W	1
SOBC CAN SUP et al N ELLIS J-23	69/12/27.06/N	135/51/27.07/W	3
SUN CCL-BUX et al GARRY G-07	69/26/23/N	135/30/56/W	3
SUN SOBC et al GARRY P-04	69/23/45.8/N	135/30/19.4/W	3
SUN UNARK L-24A	69/33/30/N	134/37/00/W	3
SUNOCO PELLY B-35	69/34/14/N	135/23/45/W	3
TARSIUT A-25	69/54/9.251/N	136/20/20.270/W	3
UKALERK 2C-50	70/09/05.598/N	132/44/08.492/W	1
UKALERK C-50	70/09/05.271/N	132/43/47.247/W	4
UNION AKLAVIK F-17	68/06/20/N	135/04/00/W	3
UNION AKLAVIK F-38	68/07/15/N	135/09/11/W	3
UNION WOLVERINE H-34	68/23/19/N	130/38/00/W	3

Temperature Data Source LEGEND:

1: D.S.T. Data Only

2: Log Header Data Only

3: D.S.T. and Log Header Data

4: No D.S.T. or Log Header Data

for the study areas to GEOTECH. Panarctic Oils Ltd. made their D.S.T. temperature data available through Lynes United Services. The remaining data was obtained commercially through Canadian Hydrodynamics Ltd., of Calgary, Alberta.

2.3 Temperature Survey Data

Well lists from Riley's Datashare indicate those logs run in each well and the depth interval logged. Temperature survey logs were selected from wells having been surveyed. Copies of the temperature survey logs were purchased and interpreted for bottom hole temperature. One copy of each temperature survey log where true formation temperatures could be interpreted are included under separate cover as part of this report.

3.0 DATA ANALYSIS METHODOLOGY

It is well known that downhole temperatures recorded during routine logging operations do not measure true, static formation temperature. Due to cooling effects while circulating (i.e., conditioning hole prior to logging operations), recorded temperatures can be 4° C (25° F) to 20° C (90° F) lower than true, static formation temperature.

A simple and rapidly applied analytical technique has been developed for analyzing maximum bottom hole temperatures (BHT), which are recorded during well logging operations, to determine static formation temperature. The method requires use of a maximum recording thermometer on each logging run. Besides maximum borehole temperature for each log run, it is necessary to record the time (after circulation stops) that the logging instrument was last on bottom. Also, duration of hole conditioning (i.e. circulation time) prior to logging must be known.

Since a rise in pressure was found to be similar to a rise in temperature, it has been suggested that increases in BHT after circulation is stopped may be analyzed in a manner similar to Horner's pressure build-up technique.

Both temperature and pressure build-up can be described by the diffusivity equation, subject to constraints of an initial condition and a set of boundary conditions. A

recent study has shown that, mathematically, the inner boundary condition for the temperature case is not analogous to that for the pressure case. However, since under most practical field conditions in-situ temperature gradient changes very slowly, particularly for short circulating times, the proposed method will give a reliable estimate of true, static formation temperature. Extremely long circulation times (in excess of a day) would lead to static temperature estimates somewhat lower than actual.

The basic criterion for the technique is the straight-line relationship on semilogarithmic paper of maximum recorded temperature (BHT in °C or °F), versus the ratio of:

$$\frac{\Delta t}{t + \Delta t}$$

where

Δt = time after circulation stopped in hours, and

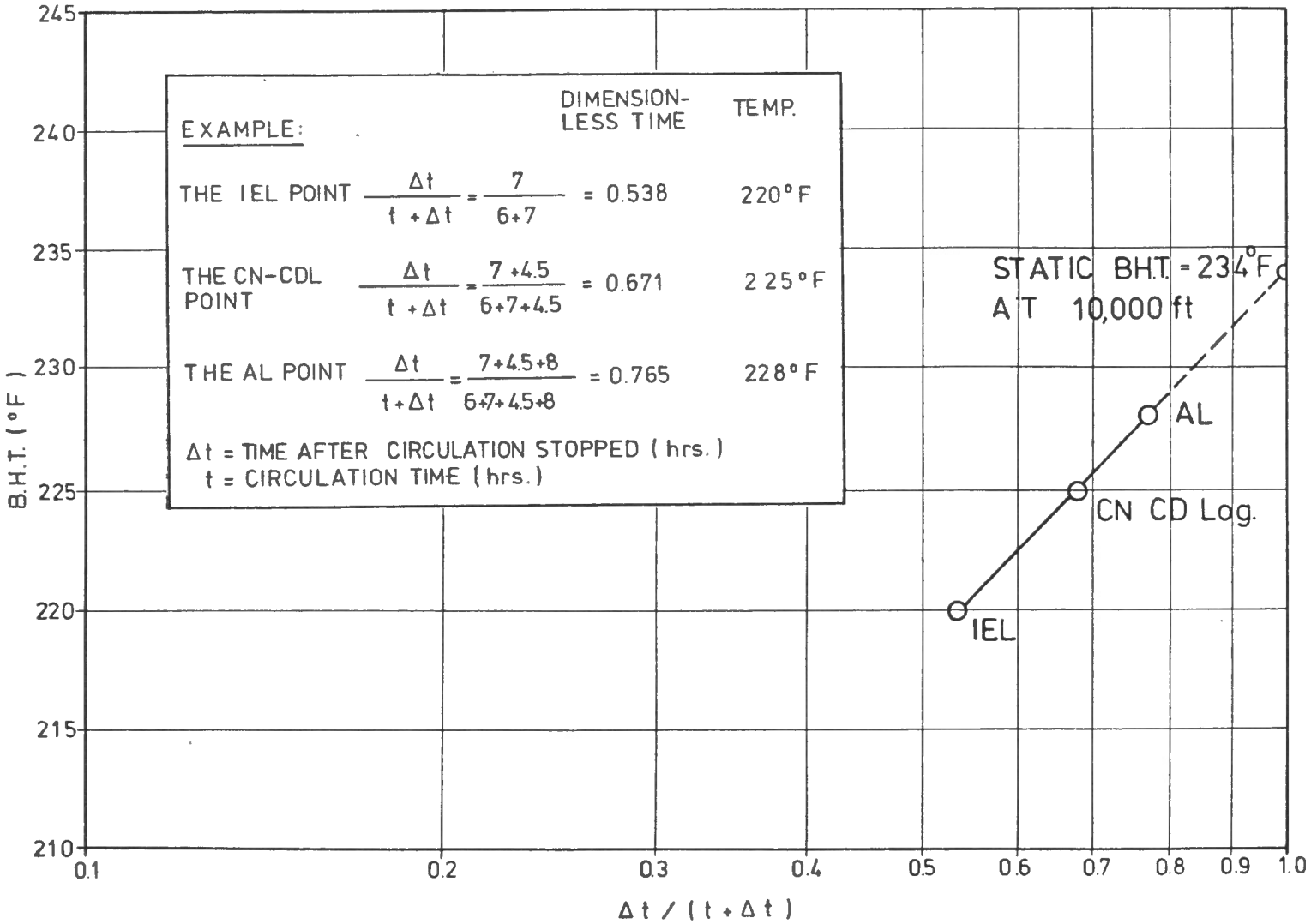
t = circulating time, in hours.

Then, extrapolation of this straight line to a time ratio of

$$\frac{\Delta t}{t + \Delta t} = 1$$

will define true, static formation temperature.

Figure 3.1 shows an example of the above described analytical procedure. In this case three logs, each with a maximum recording thermometer have been run to 3048 metres.



DETERMINATION OF STATIC FORMATION TEMPERATURE

REFERENCE : FERTL, W. H. and WICHMANN, P.A.
"HOW TO DETERMINE STATIC B.H.T. FROM WELL LOG DATA".

FIGURE 3.1

GEOTECH

For each case the dimensionless time has been calculated and plotted versus temperature. The best straight line fit to these points is then extrapolated to a time ratio of 1.0 to estimate the true formation temperature.

Drill stem tests are run with either a maximum recording thermometer or with a Kuster type continuous recording temperature gauge. In the former case the data would be analysed as shown above. If a Kuster type continous temperature record is available it can generally be used to determine the true formation temperature. Figure 3.2 shows an example. Here we see a standard Kuster temperature recorder used to record a temperature profile during a large water flow from a drill-stem test. Note that the plateau temperature here is an excellent point at which to take an undisturbed formation-temperature reading. Kuster recorders have also been used to record open-hole temperatures, in place of high-resolution, continuous-recording thermometers. It must be remembered, however, that any use of Kuster-type gauges calls for accurate and excessive note-taking, along with time observation to relate the recorded chart to downhole temperatures and times.

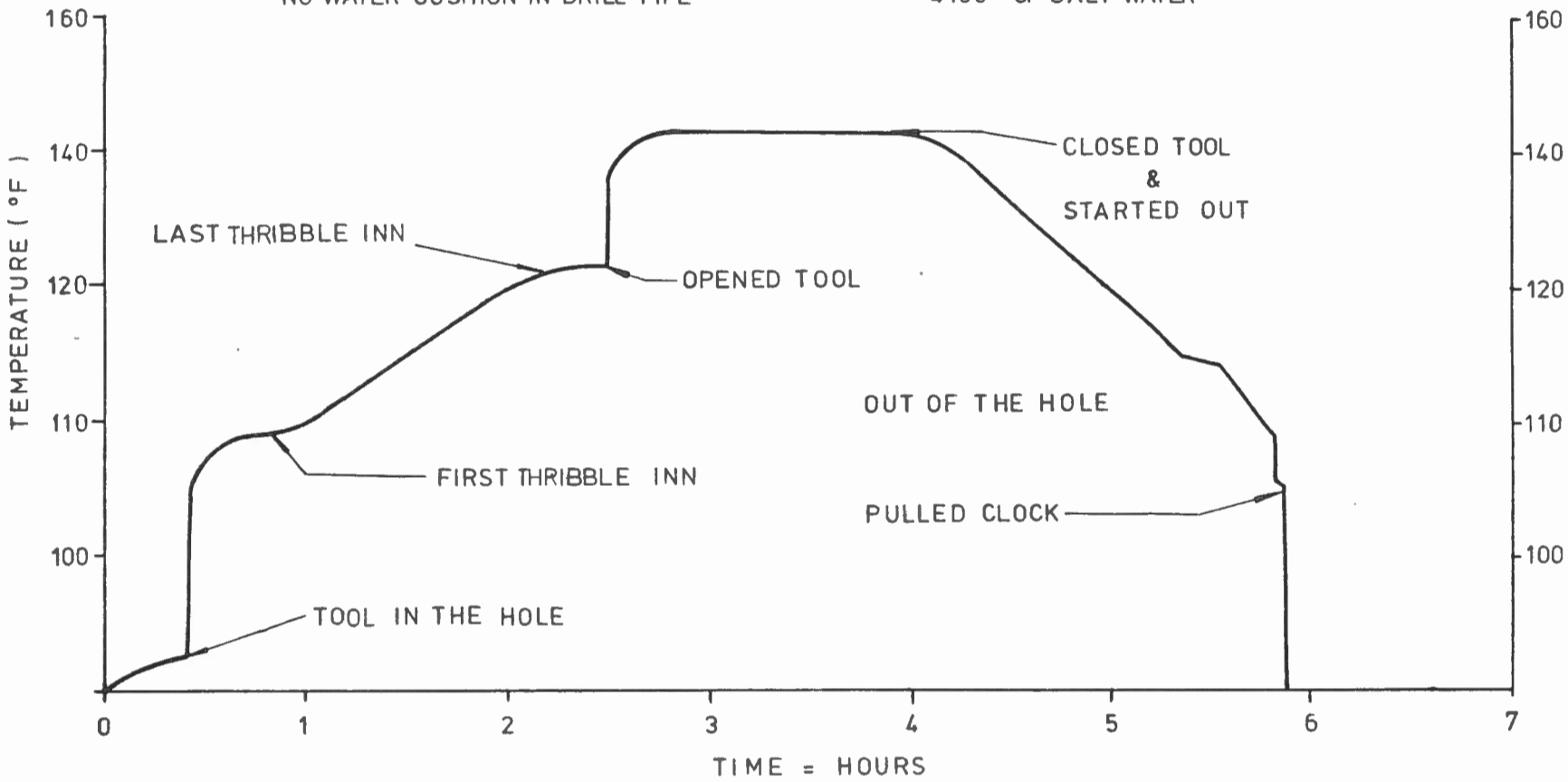
It was found during the present study, from discussion with various service companies (i.e. Lynes United Services, Halliburton, Johnson Testers, etc.), that essentially all D.S.T.'s run in the study areas used continuous recording temperature

TEST DATA

DF. ELEVATION	292	4 1/2" drill pipe	7606
12 1/4" hole to	4595	7" packer set at	7606
7 5/8" rathole from 4595 to 4625		Thermometer below testing tool	

MUD WT: 10 lb / Gal
NO WATER CUSHION IN DRILL PIPE

RECOVERY : 90' OF MUD
4166 ' OF SALT WATER



TEMPERATURE RECORD DURING A DRILL STEM TEST

REFERENCE : CONNOLLY, E.T. "GEOTHERMAL SURVEY OF NORTH AMERICA PROGRESS REPORT AND ASSOCIATED DATA - GATHERING PROBLEMS". FOURTH FORMATION EVALUATION SYMPOSIUM OF THE CANADIAN WELL LOGGING SOCIETY, CALGARY, 1972

FIGURE 3.2

GEOTECH

probes. The majority of tests used a Kuster type mechanical temperature probe. Recently these have been replaced with electronic digital recording probes.

Where available well temperature survey logs were obtained and, where possible, interpreted to obtain a direct measure of the true bottom hole temperature. In many cases temperature surveys were run either;

i) only in the uppermost part of the well for permafrost determination, or

ii) following cementing to obtain cement tops.

Data from the above sources is of little or no value in the present study and only those temperatures determined to be accurate formation temperature at depth have been used in this analysis. Copies of all useable temperature surveys obtained have been included as part of the raw data volume(s) under separate cover to the Scientific Authority.

4.0 DATA COLLECTION AND REDUCTION

As noted previously raw data was obtained from operating companies, service companies and commercial data services. In the following sections details of collection and data reduction techniques for each data type, (i.e. well log headers, D.S.T.'s and temperature surveys), are discussed in detail. The theory concerning formation temperature determination was discussed in Section 3 of this report.

4.1 Temperature Data from Open Hole Logs

As noted previously, well log results become public after one year and copies of the logs may be obtained through various commercial agencies. For the present study the required data is all contained on the well log header for each log run.

GEOTECH contracted Riley's Datashare International to retrieve the appropriate well header information from all available wells in the study areas and provided a standard form for recording this data. The type form is shown on the following page, Figure 4.1. In the majority of cases fewer than five log runs were done in a well, with three log runs being the average. With each log run space was left for five individual logs.

FIGURE 4.1:

GEOTECH

TEMPERATURE DATA FROM
OPEN HOLE LOGS

WELL NAME _____

LOCATION _____ ° _____ ' _____ " Latitude
_____ ° _____ ' _____ " Longitude

LOG RUN #1 Drillers Depth _____ FT _____ M
Drilling Stopped _____ HRS _____ DAY _____ MO _____ YR
Circulation Stopped _____ HRS _____ DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C

LOG RUN #2 Drillers Depth _____ FT _____ M
Drilling Stopped _____ HRS _____ DAY _____ MO _____ YR
Circulation Stopped _____ HRS _____ DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C

LOG RUN #3 Drillers Depth _____ FT _____ M
Drilling Stopped _____ HRS _____ DAY _____ MO _____ YR
Circulation Stopped _____ HRS _____ DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C

Figure 4.1 gives a typical example of a well from Study Area 1, (well H-49). In this case only two log runs were done, each comprising three separate logs. In this case sufficient data was obtained from each log run to extrapolate the true formation temperature. These plots are shown in Figures 4.3 and 4.4 which indicate bottom hole temperatures, (BHT), of 32.7° C and 102.3° C at depths of 1374 m and 3812 m respectively. In each case the circulation time, t, is calculated as

t = time circulation stopped (hrs.) - time drilling stopped (hrs.), and

the time since circulation stopped, Δt, is calcuated as

Δt = time tool on bottom (hrs.) - time circulation stopped (hrs.)

In the majority of cases the original well header data is reported in British units of feet and degrees Farenheit and these first had to be converted to S.I. units of meters and degrees Celcius.

Figure 4.5 gives a second example from Study Area 1, well B-06, having three log runs. In this case only one temperature is given for log run one although two separate logs have been run. It is not known for the B.H.C. sonic log whether the maximum recording thermometer malfunctioned or whether the operator failed to record the temperature. Log runs two and

FIGURE 4.2:

GEOTECH

TEMPERATURE DATA FROM
OPEN HOLE LOGS

WELL NAME PANARCTIC SABINE H-49

LOCATION 76 ° 48 ' 15.06 " N Latitude
108 ° 45 ' 11.25 " W Longitude

LOG RUN #1 Drillers Depth ____ FT 1374.6 M
Drilling Stopped 02:00 HRS 14 DAY 5 MO 74 YR
Circulation Stopped 10:30 HRS 15 DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C
D.I.L.		1374	23:40/15	13.2		30
B.H.C.		1374	15:30/15	5.0		28.3
C.N.F.D.		1374	19:40/15	9.2		28.9

LOG RUN #2 Drillers Depth ____ FT 3810 M
Drilling Stopped 12:00 HRS 27 DAY 6 MO 74 YR
Circulation Stopped 15:00 HRS 27 DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C
D.I.L.		3812	03:30/28	12.5		94.4
B.H.C.		3812	07:00/28	16.0		97.8
C.N.F.D.		3812	21:15/27	6.25		91.1

LOG RUN #3 Drillers Depth ____ FT ____ M
Drilling Stopped ____ HRS ____ DAY ____ MO ____ YR
Circulation Stopped ____ HRS ____ DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C

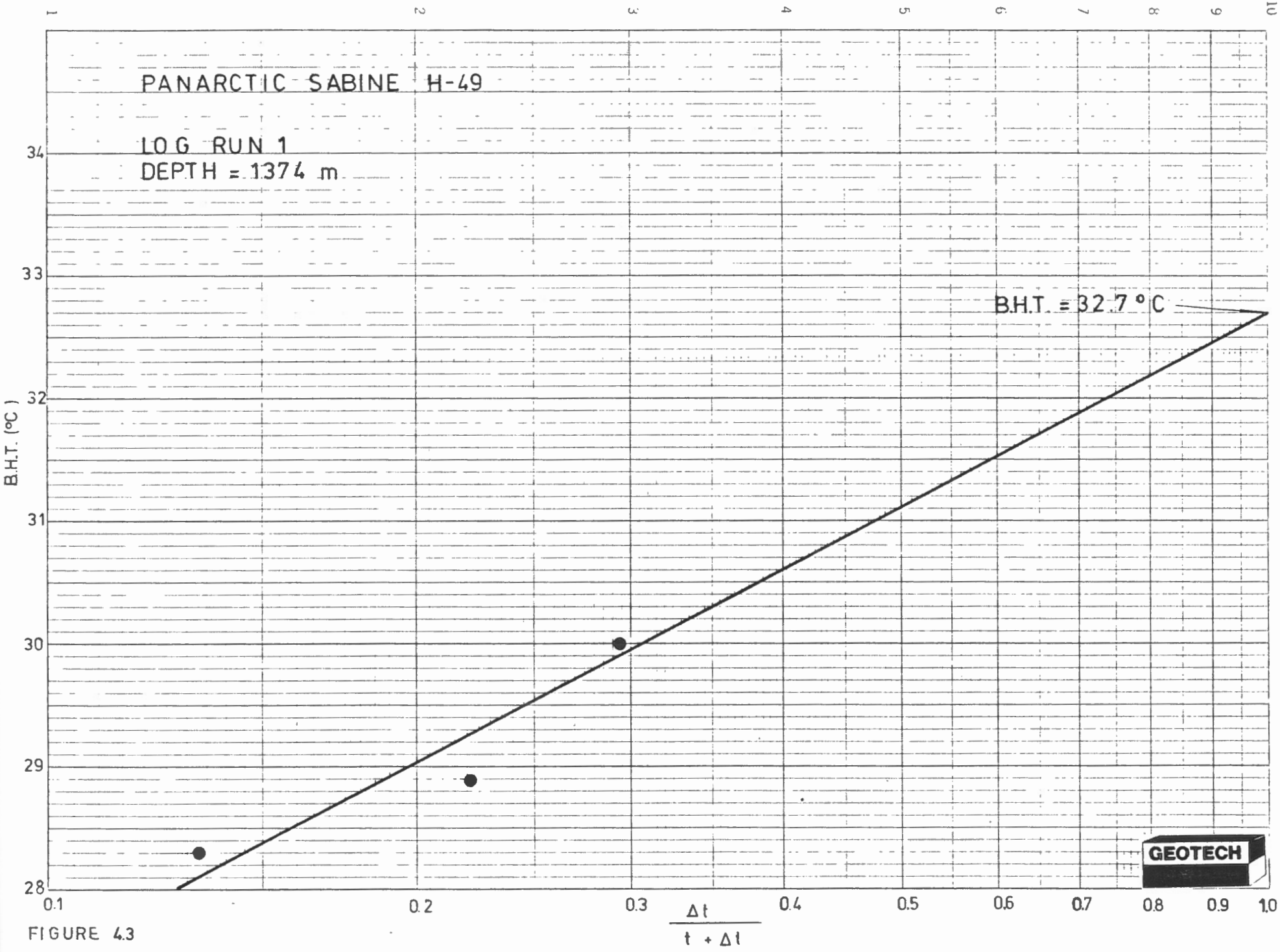

PANARCTIC SABINE H-49
LOG RUN 1
DEPTH = 1374 m
B.H.T. = 32.7 °C
B.H.T. (°C)
34
33
32
31
30
29
28
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Δt / t + Δt
GEOTECH

FIGURE 4.3

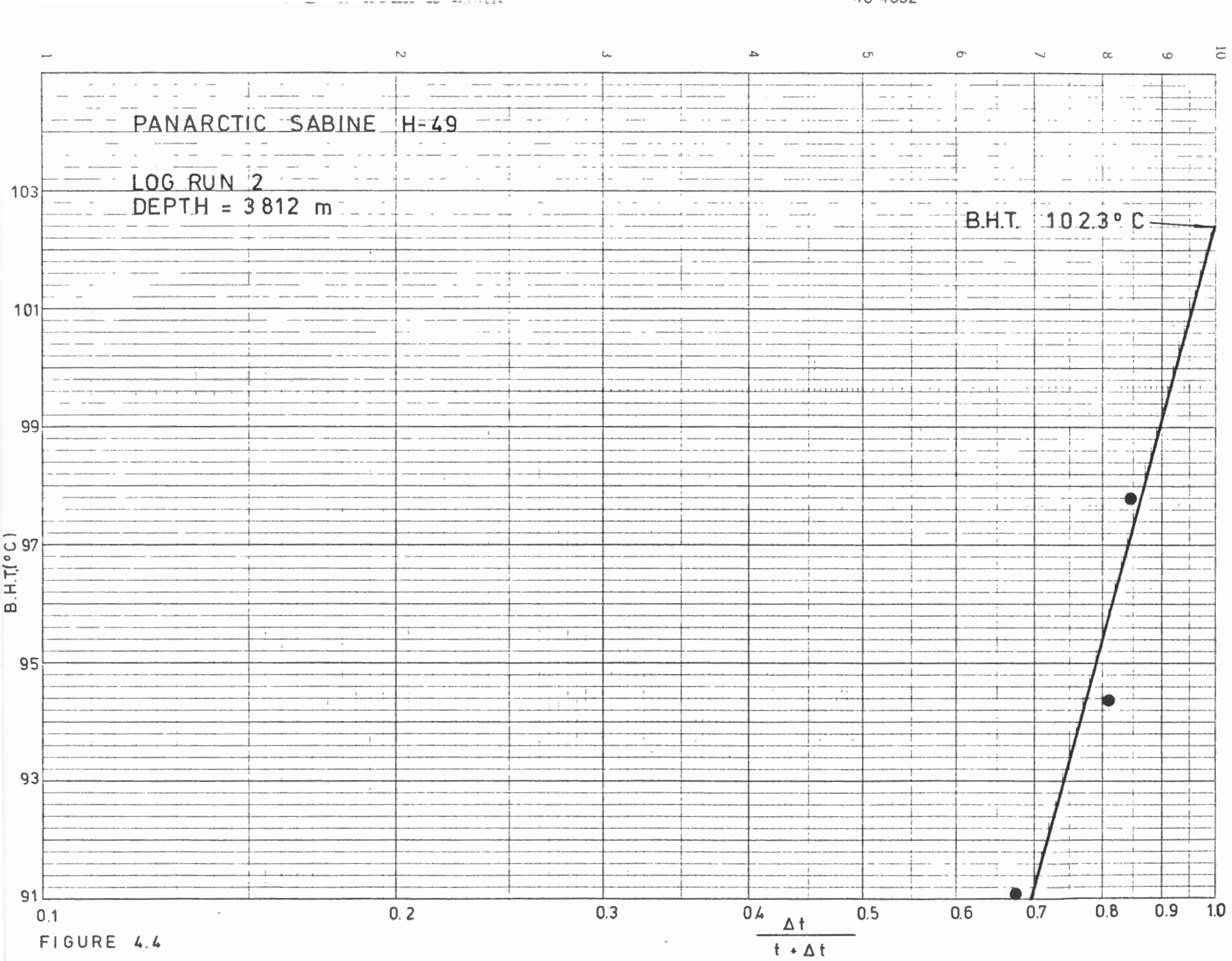

PANARCTIC SABINE H-49
LOG RUN 2
DEPTH = 3812 m
B.H.T. 102.3° C
B.H.T.(°C)
103
101
99
97
95
93
91
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Δt / t + Δt

FIGURE 4.4

FIGURE 4.5:

GEOTECH

TEMPERATURE DATA FROM
OPEN HOLE LOGS

WELL NAME PANARCTIC TENNECO et al KRISTOFFER BAY B-06

LOCATION 78 ° 15 ' 01.08 " N Latitude
102 ° 35 ' 00.69 " W Longitude

LOG RUN #1 Drillers Depth ____ FT 518.2 M
Drilling Stopped 12:00 HRS 20 DAY 11 MO 71 YR
Circulation Stopped 14:00 HRS 20 DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C
D.I.L.		517.6	18:00/20	4.0		17.22
B.H.C.		517.6	19:30/20	5.5		--

LOG RUN #2 Drillers Depth ____ FT 1630.0 M
Drilling Stopped 22:00 HRS 19 DAY 12 MO 71 YR
Circulation Stopped 06:00 HRS 20 DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C
D.I.L.		1627	23:10/20	17.2		47.2
B.H.C.		1627	03:40/21	21.7		48.3
F. DEN.		1627	14:30/20	8.5		43.9
S.N.P.		1627	18:00/20	12.0		47.8

LOG RUN #3 Drillers Depth ____ FT 3904 M
Drilling Stopped 05:00 HRS 5 DAY 3 MO 71 YR
Circulation Stopped 10:00 HRS 5 DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C
D.I.L.		3903	18:20/5	8.3		94.4
B.H.C.		3903	22:10/5	12.2		100.0
F. DEN.		3903	10:20/6	24.3		109.2
S.N.P.		3903	16:30/6	30.5		110.8

three each had four individual tools run and appropriate data recorded. The plots of estimated formation temperature for the latter two runs are shown on Figures 4.6 and 4.7 and indicate B.H.T.'s of 53.5° C and 115.0° C at depths of 1628 m and 3903 m respectively.

Figure 4.8 shows the well log header data obtained from well C-50, Study Area 1. In this case three log runs were done, each having four tools run, but no B.H.T. extrapolations were possible. In log run number one the records indicate that the same downhole temperature was recorded by each tool although the time since circulation varied from 6 to 13 hours. It is not known whether the temperature recorder was malfunctioning in this case or whether the well had actually stabilized.

In log run number two the records indicate zero circulation time, (i.e. $t = 0$). The down hole temperatures measured, however, show the temperature to be increasing with increasing time since circulation. Calculation of $(\frac{\Delta t}{t + \Delta t})$ results in a value of 1.0 in each case and hence no B.H.T. extrapolation is possible.

In log run three no data was recorded to calculate either t or Δt. No B.H.T. extrapolation is possible although the recorded temperatures are increasing with time since circulation. The fact that the last two temperatures recorded are identical may indicate that the wellbore temperature has

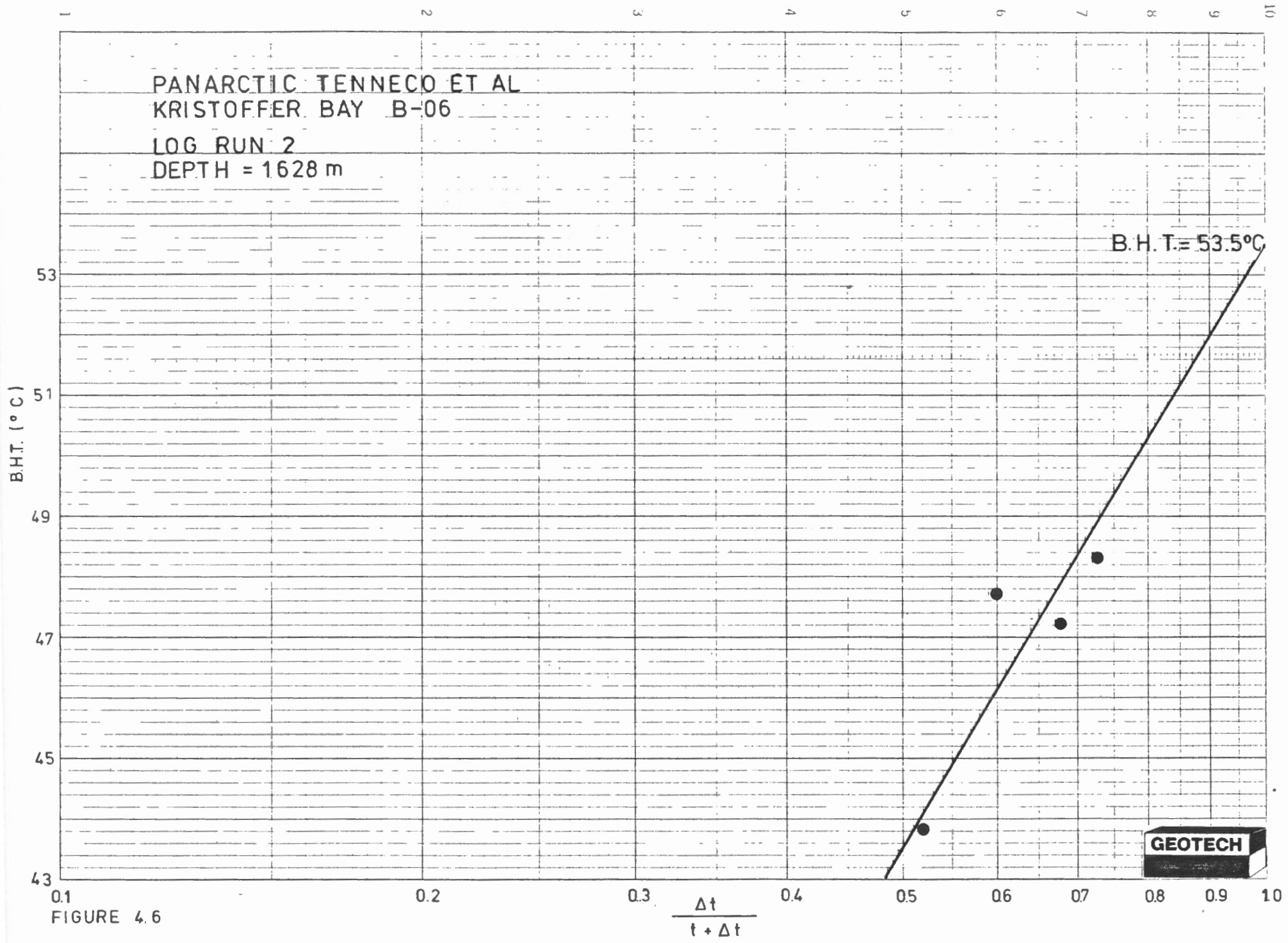

PANARCTIC TENNECO ET AL
KRISTOFFER BAY B-06
LOG RUN 2
DEPTH = 1628 m
B.H.T.= 53.5°C
B.H.T. (°C)
53
51
49
47
45
43
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Δt / t + Δt
GEOTECH

FIGURE 4.6

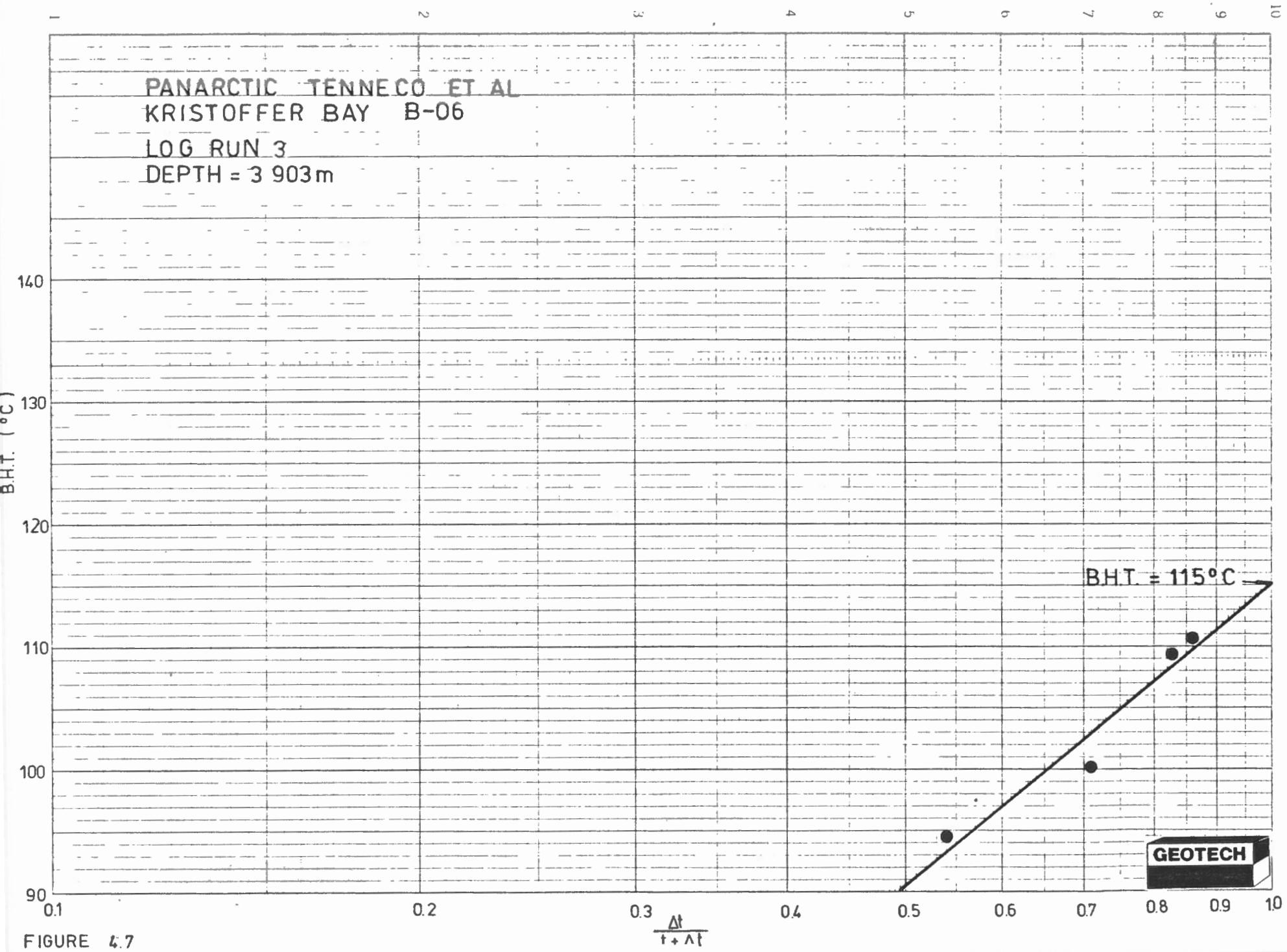

PANARCTIC TENNECO ET AL
KRISTOFFER BAY B-06
LOG RUN 3
DEPTH = 3 903m
B.H.T. = 115°C
GEOTECH
B.H.T. (°C)
140
130
120
110
100
90
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Δt / t + Δt

FIGURE 4.7

FIGURE 4.8:

GEOTECH

TEMPERATURE DATA FROM
OPEN HOLE LOGS

WELL NAME PANARCTIC BROCK C-50

LOCATION 77 ° 49 ' 00.12 " N Latitude
114 ° 17 ' 24.09 " W Longitude

LOG RUN #1 Drillers Depth ____ FT 548.6 M
Drilling Stopped 13:00 HRS 26 DAY 11 MO 71 YR
Circulation Stopped 15:00 HRS 26 DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C
D.I.L.		550	21:00/26	6.0		30
B.H.C.		550	21:00/26	6.0		30
F. DEN		550	02:00/26	11.0		30
S.N.P.		550	04:00/26	13.0		30

LOG RUN #2 Drillers Depth ____ FT 1566.7 M
Drilling Stopped 21:00 HRS 24 DAY 12 MO 71 YR
Circulation Stopped 21:00 HRS 24 DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C
D.I.L.		1569	09:30/25	36.5		38.9
B.H.C.		1567	02:30/26	29.5		41.1
F. DEN.		1560	22:30/25	25.5		41.1
S.N.P.		1560	19:00/25	22.0		40.0

LOG RUN #3 Drillers Depth ____ FT 3961.2 M
Drilling Stopped -- HRS -- DAY 3 MO 72 YR
Circulation Stopped -- HRS -- DAY

TYPE LOG	DEPTH FT	DEPTH M	TOOL ON BOTTOM	TIME SINCE CIRCULATION	TEMP °F	TEMP °C
D.I.L.		3965	22:30/17	--		87.2
B.H.C.		3965	04:15/18	--		83.9
F. DEN.		3965	20:30/18	--		87.2
S.N.P.		3965	11:30/18	--		85.6

stabilized but this may simply be an instrument malfunction.

The last two examples, wells B-06 and C-50, exemplify the various problems encountered with the well header temperature data resulting in the inability to extrapolate formation temperatures from some or all log runs in various wells. In some wells no formation temperature data could be obtained although several log runs had been performed.

A final factor which contributed to data being discarded related to confusion in reported times. In some cases tools are reported as being on bottom prior to the end of circulation. In other cases abnormally large, (e.g. hundreds of hours), circulation times are reported. This can result in the calculated value of $(\frac{\Delta t}{t + \Delta t})$ being less than 0.1 and bottom hole temperature can not be extrapolated.

4.2 Temperature Data from Drill Stem Tests

Drill stem test temperature results were obtained from operating companies, service companies and a commercial data source. A type form was supplied to each group, as shown in Figure 4.9. Drill stem test data from the two examples used in Section 4.1, wells H-49 and B-06, are shown in Figures 4.10 and 4.11. Since only continuous temperature recorders are used with the D.S.T.'s it was assumed that recorded

FIGURE 4.9:

GEOTECH

TEMPERATURE DATA FROM

D.S.T. RECORDS IN ARCTIC WELLS

WELL NAME: _____

LOCATION: _____° _____' _____" Latitude

_____° _____' _____" Longitude

D.S.T. No. _____

Test Date: _____(Day) _____(Month) _____(Year)

Formation: _____

Interval: _____ to _____ Feet ____ Metres ____

Temperature: _____ °F _____ °C

Water Salinity: _____ ppm

Peak Pressure Recorded: _____psi, _____ Kpa

Gauge Type: K-3 _____ AK-1 _____ DMR _____

Range: _____ to _____ psi, Kpa

REMARKS: _____

_____

_____

D.S.T. No. _____

Test Date: _____(Day) _____(Month) _____(Year)

Formation: _____

Interval: _____ to _____ Feet _____ Metres _____

Temperature: _____°F _____°C

Water Salinity: _____ ppm

Peak Pressure Recorded: _____psi, _____Kpa

Gauge Type: K-3 _____ AK-1 _____ DMR _____

Range: _____ to _____ psi, Kpa

REMARKS: _____

_____

_____

FIGURE 4:10 a

GEOTECH

TEMPERATURE DATA FROM

D.S.T. RECORDS IN ARCTIC WELLS

WELL NAME: PANARCTIC HOMESTEAD POR N. SABINE H-49

LOCATION: 76 ° 48 ' 15.06 " Latitude N

108 ° 45 ' 11.25 " LongitudeW

D.S.T. No. 1

Test Date: 31 (Day) 05 (Month) 74 (Year)

Formation: Wilke Point

Interval: 2693 to 2701 Feet ____ Metres X

Temperature: _____ °F 63 °C

Water Salinity: -- ppm

Peak Pressure Recorded: _____psi, 17627 Kpa

Gauge Type: K-3 X AK-1 _____ DMR _____

Range: _____ to _____ psi, Kpa

REMARKS: _____

D.S.T. No. 2

Test Date: 05 (Day) 06 (Month) 74 (Year)

Formation: Borden Island

Interval: 3013 to 3017 Feet ____ Metres X

Temperature: _____ °F 73 °C

Water Salinity: -- ppm

Peak Pressure Recorded: _____psi, -- Kpa

Gauge Type: K-3 X AK-1 _____ DMR _____

Range: _____ to _____ psi, Kpa

REMARKS: Misrun - unable to obtain packer seat

FIGURE 4.10 b:

GEOTECH

TEMPERATURE DATA FROM

D.S.T. RECORDS IN ARCTIC WELLS

WELL NAME: H-49

LOCATION: ____ ° ____ ' ____ " Latitude

____ ° ____ ' ____ " Longitude

D.S.T. No. 3

Test Date: 06 (Day) 06 (Month) 74 (Year)

Formation: Borden Island

Interval: 3018 to 3024 Feet ____ Metres X

Temperature: ____ °F 90.5 °C

Water Salinity: -- ppm

Peak Pressure Recorded: ____ psi, 31193.0 Kpa

Gauge Type: K-3 X AK-1 ____ DMR ____

Range: ____ to ____ psi, Kpa

REMARKS: ____

D.S.T. No. 4

Test Date: 28 (Day) 06 (Month) 74 (Year)

Formation: Schei Point

Interval: 3527 to 3536.5 Feet ____ Metres X

Temperature: ____ °F 90 °C

Water Salinity: --- ppm

Peak Pressure Recorded: ____ psi, 35262.0 Kpa

Gauge Type: K-3 X AK-1 ____ DMR ____

Range: ____ to ____ psi, Kpa

REMARKS: ____

FIGURE 4.10 c:

GEOTECH

TEMPERATURE DATA FROM

D.S.T. RECORDS IN ARCTIC WELLS

WELL NAME: H-49

LOCATION: _____ ° _____ ' _____ " Latitude

_____ ° _____ ' _____ " Longitude

D.S.T. No. 5

Test Date: 30 (Day) 06 (Month) 74 (Year)

Formation: Schei Point

Interval: 3526 to 3532 Feet ____ Metres X

Temperature: _____ °F 85 °C

Water Salinity: -- ppm

Peak Pressure Recorded: _____ psi, -- Kpa

Gauge Type: K-3 X AK-1 _____ DMR _____

Range: _____ to _____ psi, Kpa

REMARKS: _____

_____

_____

D.S.T. No. _____

Test Date: _____ (Day) _____ (Month) _____ (Year)

Formation: _____

Interval: _____ to _____ Feet _____ Metres _____

Temperature: _____ °F _____ °C

Water Salinity: _____ ppm

Peak Pressure Recorded: _____ psi, _____ Kpa

Gauge Type: K-3 _____ AK-1 _____ DMR _____

Range: _____ to _____ psi, Kpa

REMARKS: _____

_____

_____

FIGURE 4.11:

GEOTECH

TEMPERATURE DATA FROM

D.S.T. RECORDS IN ARCTIC WELLS

WELL NAME: PANARCTIC TENNECO et al KRISTOFFER BAY B-06

LOCATION: 78 ° 15 ' 01.08 " Latitude N

102 ° 35 ' 00.69 " Longitude W

D.S.T. No. 1

Test Date: 10 (Day) 12 (Month) 71 (Year)

Formation: Heiberg

Interval: 1427 to 1437 Feet ___ Metres X

Temperature: ___ °F 39.4 °C

Water Salinity: -- ppm

Peak Pressure Recorded: ___ psi, 15589 Kpa

Gauge Type: K-3 ___ AK-1 ___ DMR ___ Lynes 8191

Range: ___ to ___ psi, Kpa

REMARKS: ___

D.S.T. No. 2

Test Date: 28 (Day) 12 (Month) 71 (Year)

Formation: Heiberg

Interval: 1640 to 1662 Feet ___ Metres X

Temperature: ___ °F 49.4 °C

Water Salinity: -- ppm

Peak Pressure Recorded: ___ psi, 16,844 Kpa

Gauge Type: K-3 ___ AK-1 ___ DMR ___ Lynes 5806

Range: ___ to ___ psi, Kpa

REMARKS: ___

temperatures were representative of the true formation temperature. Formation names, where known, are recorded on the data sheets. The formation pressures recorded represent the maximum pressure recorded on the chart, not extrapolated true formation pressures. These may then be regarded as lower bounds to the true formation pressure.

Space was allotted on the data sheet to note the type of temperature gauge used and its range. It was found however that basically all of the tools had nearly the same range from about 0° C to about 170° C. None of the recorded temperatures were out of range.

As with the well log header data, most of the D.S.T. data was recorded in British units and had to be converted to S.I. No particular interpretation problems were encountered with the D.S.T. temperature data and all of the recorded data was used for the final interpretation.

4.3 Temperature Survey Data

Temperature logs are available on numerous wells in the Beaufort while only a few are recorded in the Arctic Islands.

Some of the temperature logs were recorded to establish the base of the permafrost zone. On these logs a reading just below the permafrost confirms temperature gradients established from deeper readings.

Temperature logs recorded at deeper levels are used for various purposes; to locate cement tops behind casing, lost circulation zones, fluid entry into the wellbore or assist in analysing operational problems in the borehole. The temperature values in the majority of these cases are not valid for gradient determination as fluid movement inside the wellbore, open hole or cased hole, will have affected the readings.

Those logs recorded when temperatures have stabilized after circulation or recorded specifically for temperature gradient determination have been incorporated in the gradient plots. Copies of these logs are enclosed in the Appendix.

4.4 Data Computer File

As part of the project all of the raw well log header and D.S.T. temperature data was loaded on magnetic tape and sent to the Scientific Authority. Figure 4.12 gives an example of the data output from the computer file. A value of (-1) in any of the columns indicates that no data was available. The units used are all S.I.:

time	=	hours
depth	=	metres
temperature	=	degrees Celcius
pressure	=	kilopascals

Well name : IMPERIAL ATERTAK E-41 SET-1
Latitude : 69/40/00/N Longitude : 132/30/00/W

DST #	Date	Interval	Temp	Pressure
1	18/06/72	1364.0- 1368.0	28.3	13762
2	19/06/72	1358.0- 1362.0	31.1	13287
3	20/06/72	1358.0- 1362.0	26.7	13886
4	20/06/72	1358.0- 1362.0	26.7	13576
5	21/06/72	1261.0- 1268.0	25.6	8825
6	22/06/72	1261.0- 1268.0	27.8	12825
7	22/06/72	1239.0- 1245.0	25.6	12397
8	23/06/72	1239.0- 1245.0	30.6	-1
8	23/06/72	1239.0- 1245.0	30.6	-1
9	24/06/72	1239.0- 1245.0	38.9	-1
10	28/06/72	1239.0- 1245.0	42.2	12776

Well name : GULF MOBIL SIKU C-11
Latitude : 69/00/4.89/N Longitude : 133/33/49.87/W

RUN #	Drillers Depth	Circ Time	Log Type	Depth	Time	Temp
1	1219.2	17.5				
			DIL	1219.2	3.00	15.6
			BHC	1212.5	6.00	16.7
2	3779.5	8.5				
			DIL	3780.1	14.00	75.6
			CNFD	3792.3	71.50	76.1
			PROX M	3792.3	104.50	77.8
3	3944.1	25.8				
			DIL	3944.4	7.25	72.8
			BHC	3944.1	10.58	75.6

Figure 4.12:

5.0 DATA ANALYSIS

The methodology of collecting down hole temperature data was described in the previous section of this report. One of the key data sources, well log header data, required interpretation, as described in Section 4.1. The drill stem test and temperature survey data was interpreted directly. Estimated formation temperatures were then plotted versus depth in kilometers for each well. Figures 5.1 and 5.2 show examples of final temperature gradient plots for wells H-49 and B-06 used previously (Section 4). In each case the legend on the figure(s) indicates the number of log runs completed and which, if any, of these have been used for temperature gradient determination. The figures indicate both those log runs where bottom hole temperature extrapolations where possible, (black triangles), and also those wells where, although extrapolation curves could not be done, the data indicated that the bottom hole temperature may have stabilized (open triangles). As discussed in Section 4, D.S.T. data was assumed to indicate true formation temperature. Hence, Figure 5.1 shows that two log runs were done and each provided sufficient data for bottom hole extrapolations. In addition, six D.S.T.'s were run. A best fit straight line was then fit through the data from which temperatures at 1, 2, 3 and 4 km can be determined.

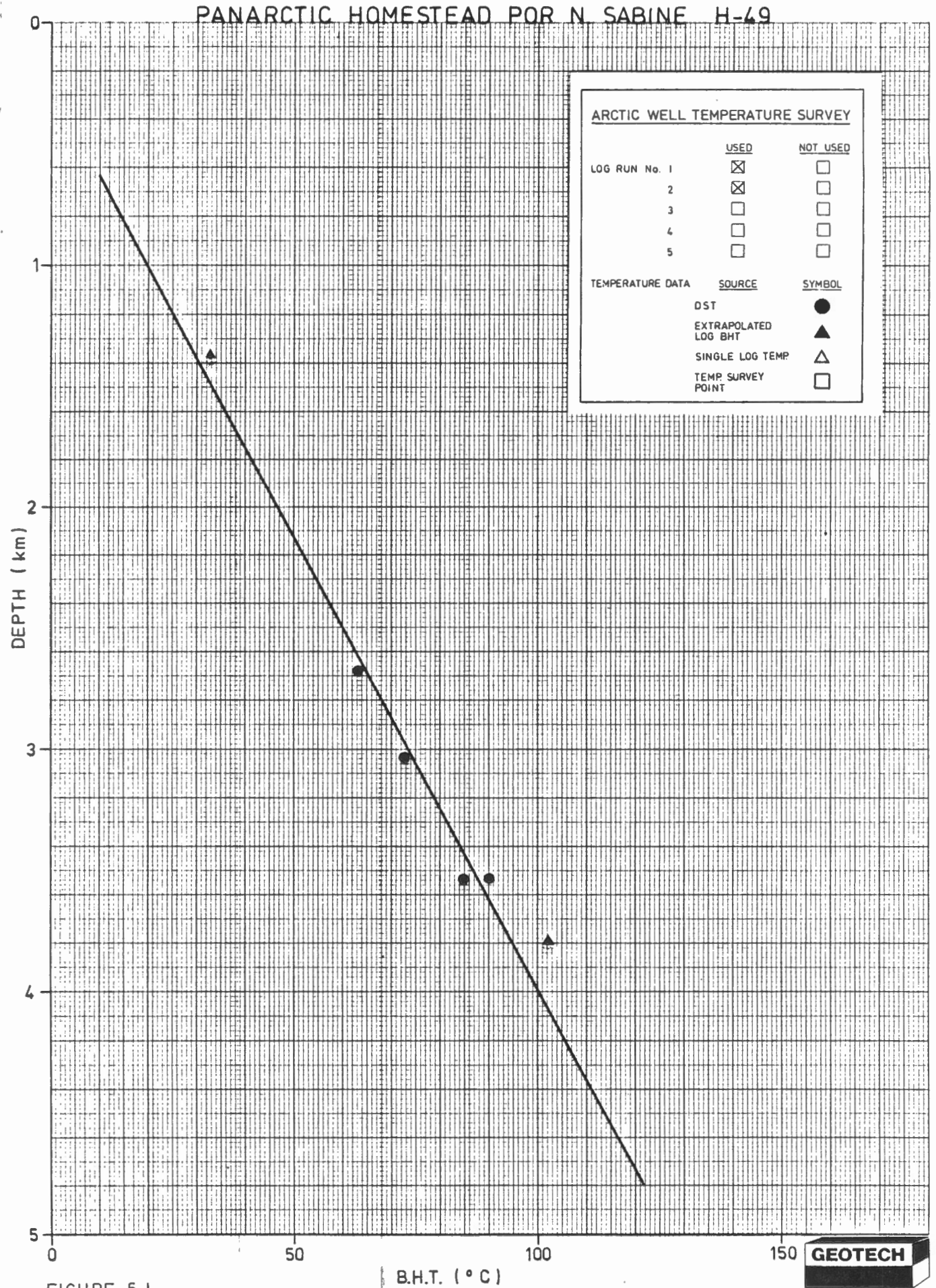


FIGURE 5.1

46 1512
K•E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

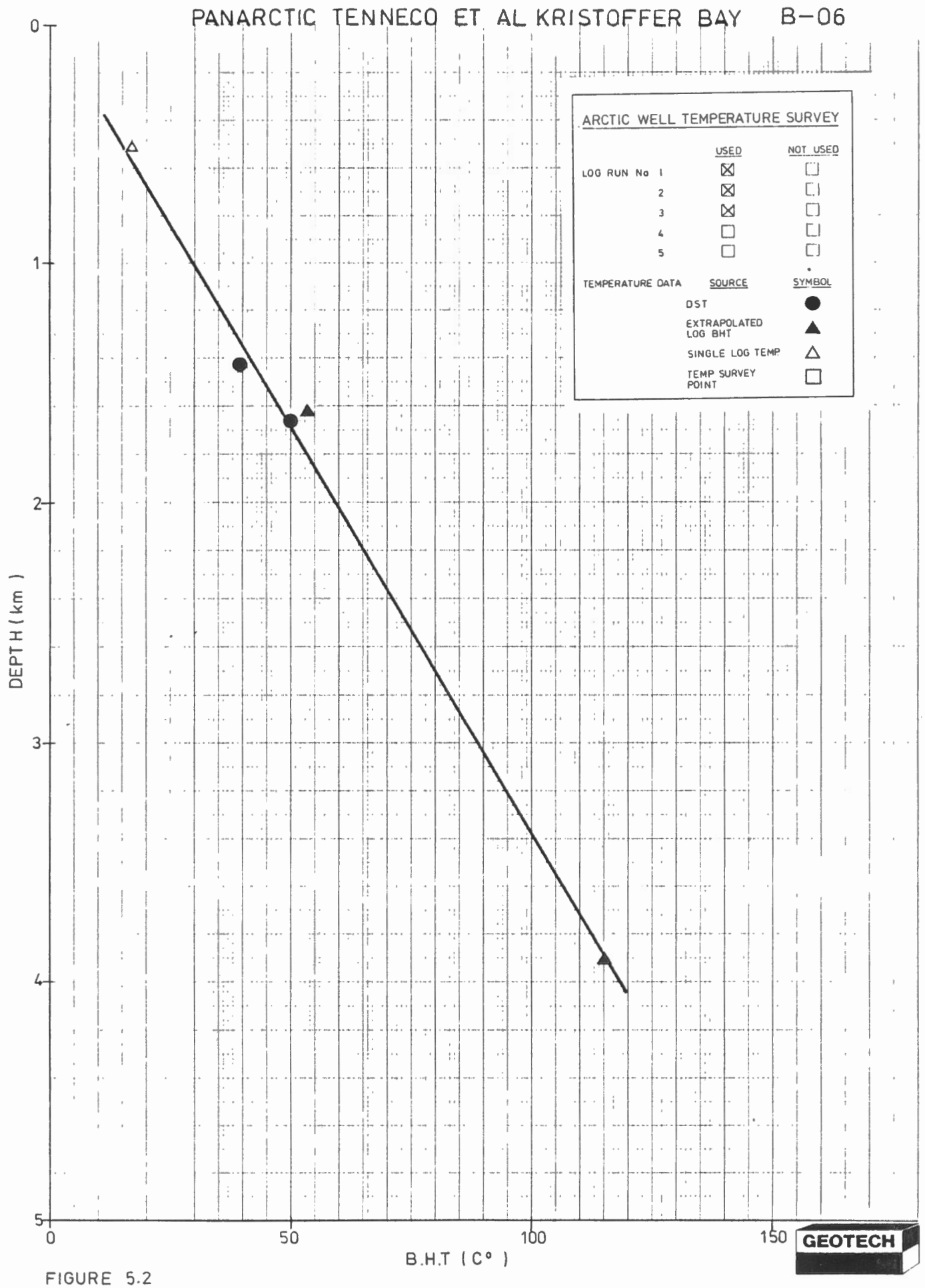

PANARCTIC TENNECO ET AL KRISTOFFER BAY B-06
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T (C°)
GEOTECH
46 1512

FIGURE 5.2

In Figure 5.2 three log runs were done. The data from log runs two and three allowed B.H.T. extrapolations while the data from log run one only gave one temperature. The data from each log run has been plotted, with the data from log run one indicated as a single log temperature. Two D.S.T. temperatures were also available as shown on Figure 5.2. Again a best fit straight line has been passed through the data allowing temperature extrapolation at various depths.

In some cases well log temperature data could not be used to evaluate probable formation temperature. In Figure 5.3 five log runs were performed. Data from log runs 2, 3, and 4 allowed extrapolation of the formation temperature and log run five was included as a single log run temperature point. The data from log run one however could not be interpreted and was thus discarded. Ten D.S.T. temperature were also available in this case and Figure 5.3 shows the plot of temperature data versus depth with a linear average gradient line superimposed. The data shown in this example is typical of many of the wells surveyed and is typical of the disparity observed in measured temperatures. It is evident from Figure 5.3 that all recorded D.S.T. temperatures are not necessarily indicative of equilibrated formation temperature. This is, of course, a function of the duration of a given drill stem test and the sensitivity of the particular instrument used. For the purpose

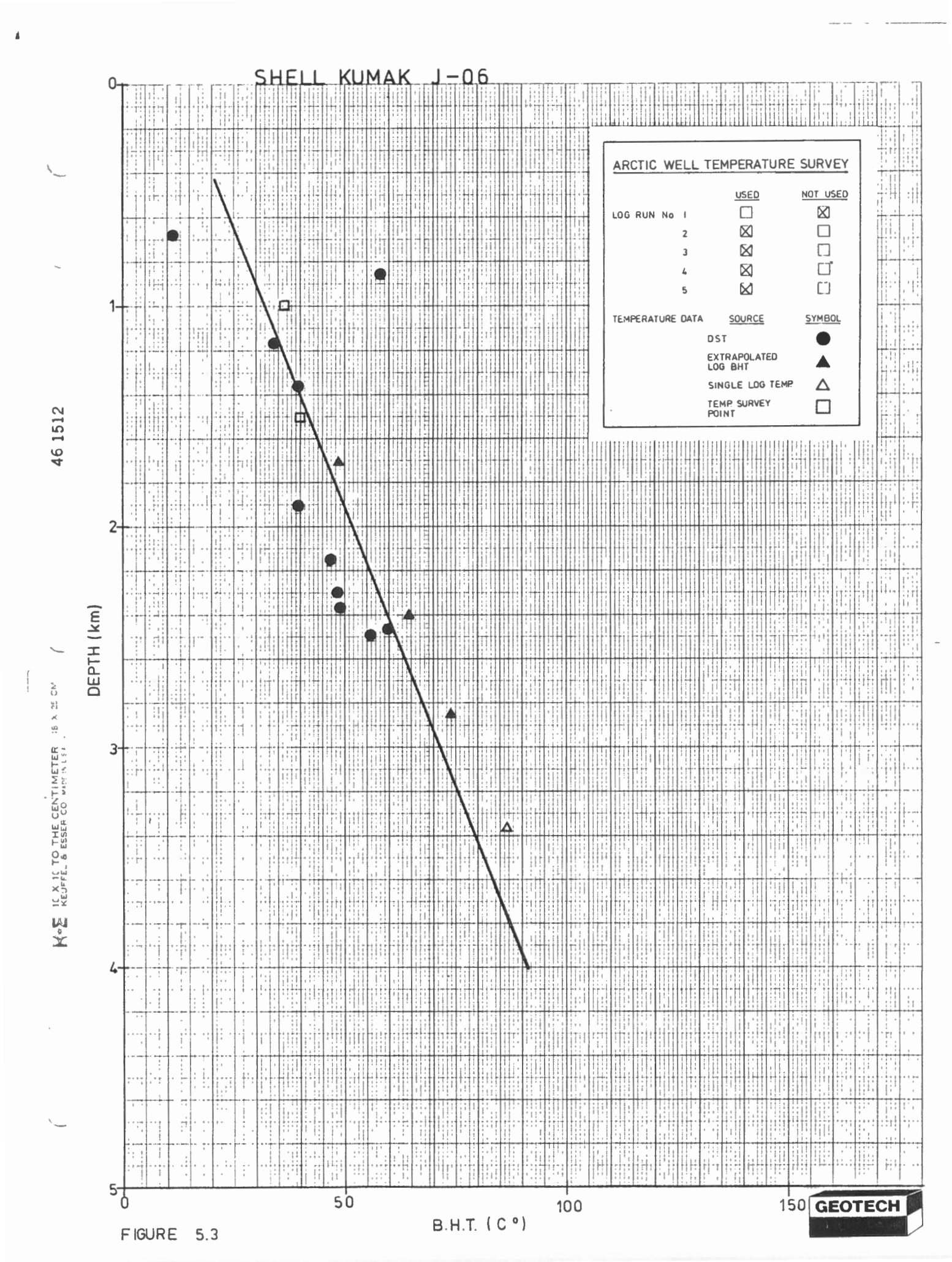

SHELL KUMAK J-06
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH
46 1512
KE
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

FIGURE 5.3

of the present study it has been assumed that an average linear temperature gradient, as shown in Figures 5.1, 5.2, and 5.3, are representative of the average geothermal gradient in that well.

In many cases the data did not justify any temperature versus depth extrapolation. Figures 5.4 and 5.5 give typical examples of wells where no temperature - depth curve could be established. In Figure 5.4 two log run and one D.S.T. temperatures were available. Neither log run allowed extrapolation of true formation temperature and are hence presented as single log run temperature points. Also, all three data points are within the upper 1 km of depth. As expected the recorded D.S.T. temperature exceeds the single log run temperatures recorded.

Figure 5.5 gives a second example, this with one single log temperature and one D.S.T. temperature record. Again no temperature extrapolation versus depth is possible with the available data.

Recorded formation temperature data is shown plotted versus depth for each well, as available, in Appendicies A and B. In each case the temperature - depth profiles are arranged alphabetically and numerically according to the well number in Study Area 1 (Appendix A), and Study Area 2 (Appendix B):

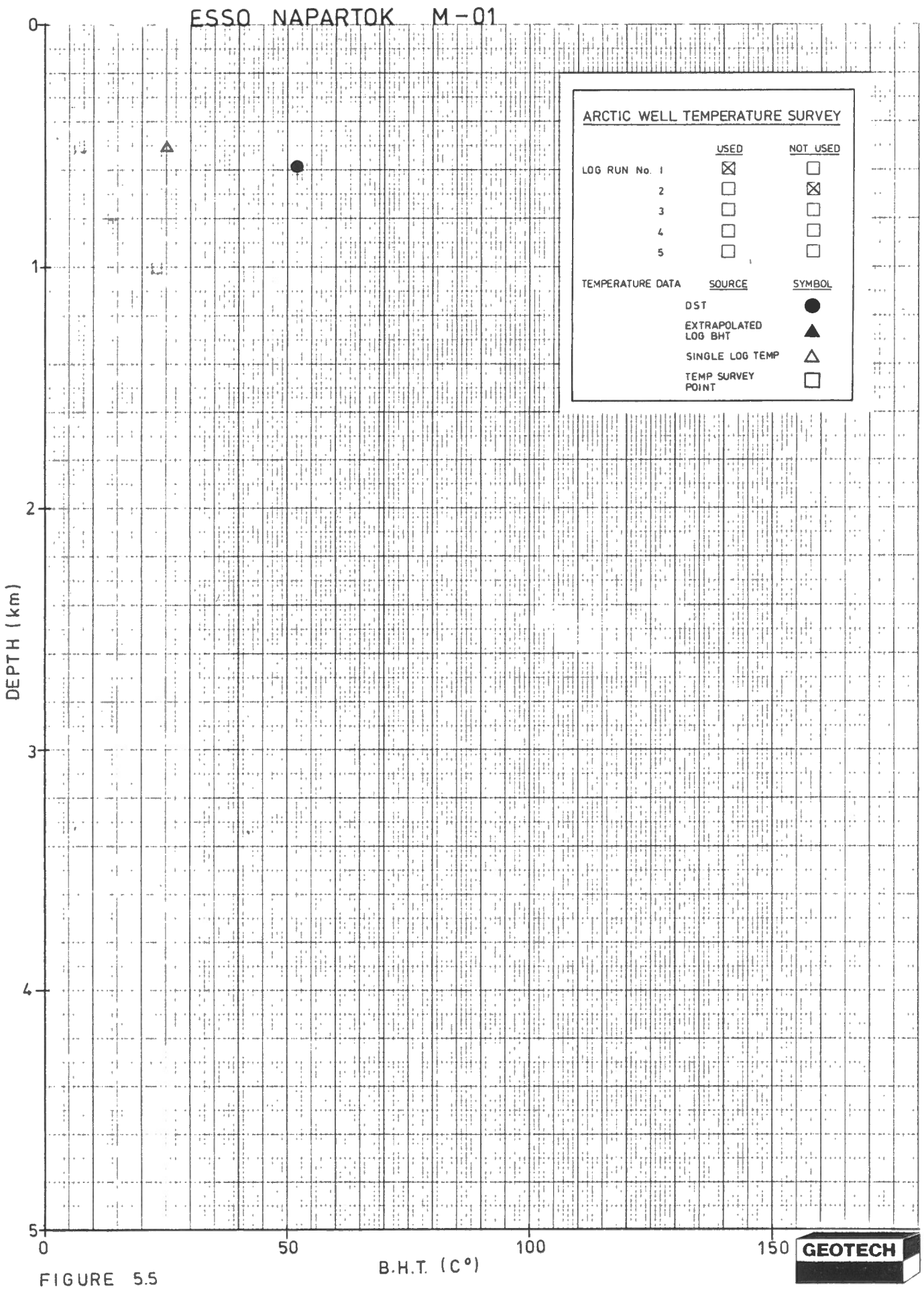


FIGURE 5.5

46 1512

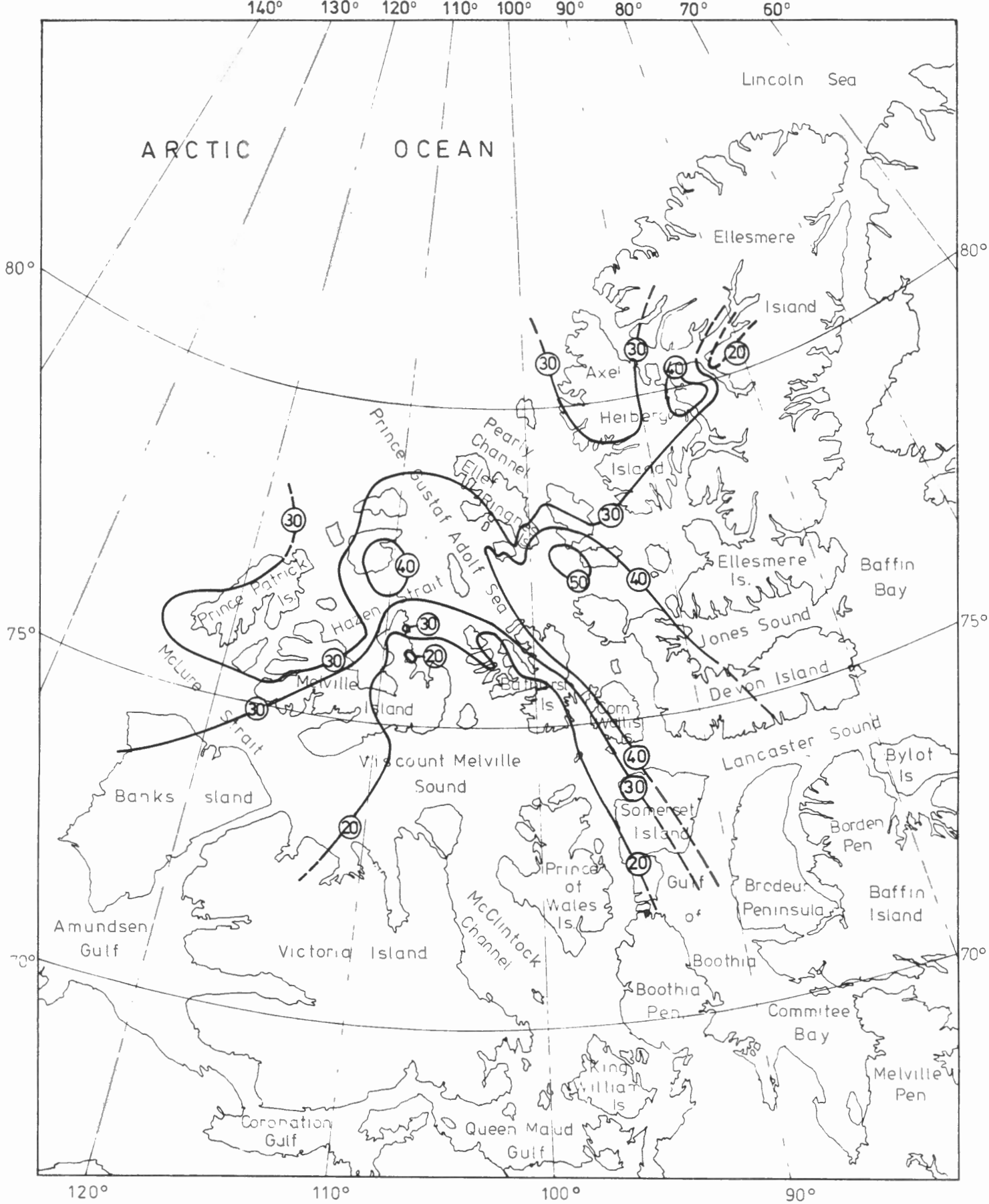
K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

i.e. well Shell Kumak J-06 is located in Appendix B, alphabetically under J and numerically as 06 within the J group.

Wells with a data base such as shown in Figures 5.1 through 5.3 were used, as appropriate, to derive formation temperatures at depths of 1, 2, 3 and 4 km. These same wells were used to establish average geothermal gradients, (e.g. °C/km). Isotherm maps have then been prepared of formation temperature at depths of 1, 2, 3 and 4 km's for Study Areas 1 and 2. Furthermore, contoured geothermal gradient maps have also been prepared for the Study Areas.

Figures 5.6 through 5.9 show contoured isotherm plots for Study Area 1, using a 10° C contour interval. The above figures were sketched on a very large scale map of Study Area 1 to show general data trends. Figures 5.6 a through 5.9 a show the same isotherm contours on smaller scale maps and include the actual data points, etc. These latter maps are folded in the pocket located at the back of the report.

The isotherm maps from 1, 2, 3 and 4 km depths are very consistent. High temperature, (heat source), zones occur in western Melville and Prince Patrick Islands, eastern Bathurst and Cornwallis Islands, the Ellef Ringnes Island and Prince Gustof Adolf Sea, and the eastern Axel Heiberg and western Ellesmere Island areas. Low temperature, (heat sink)



ISOTHERM PLOT

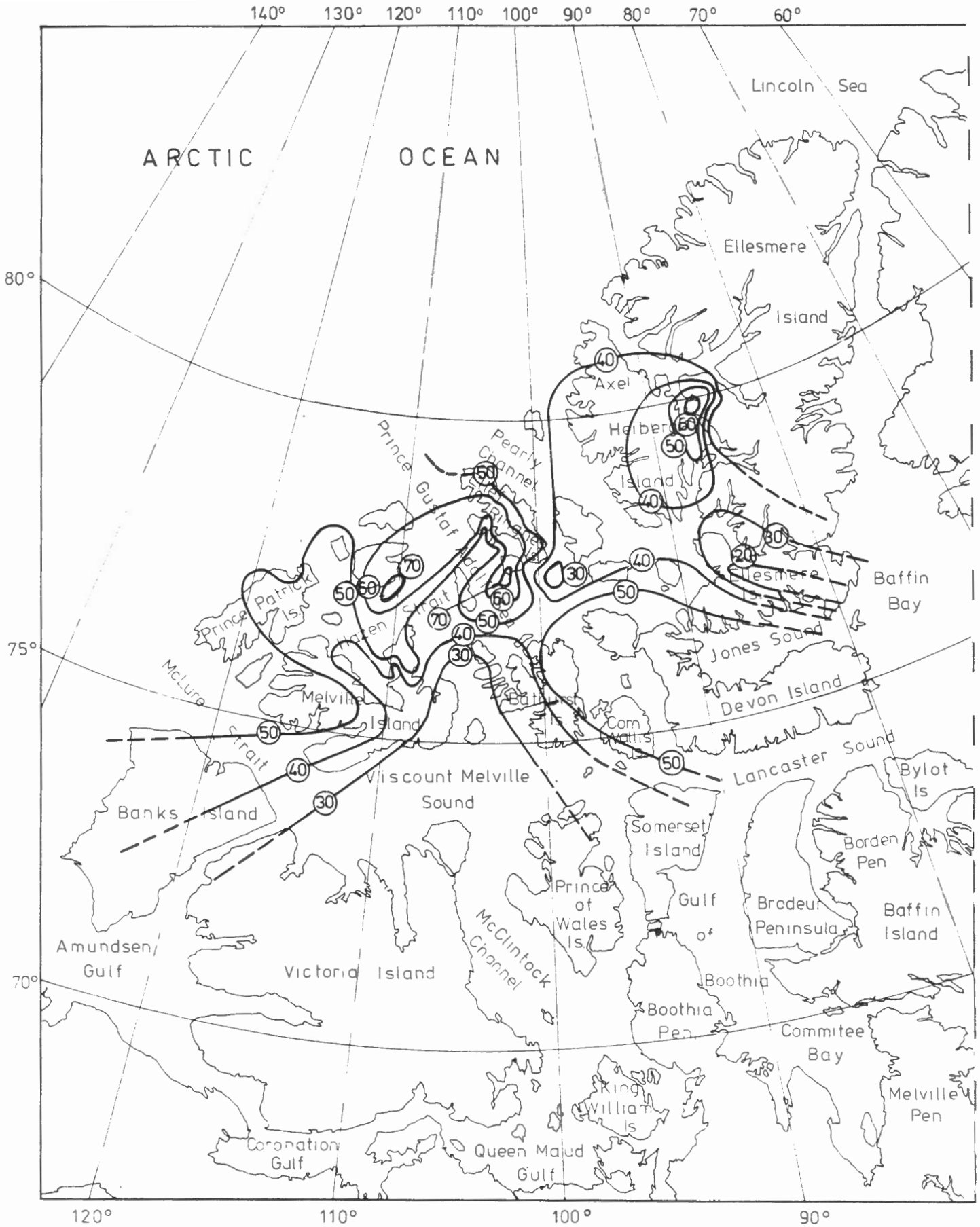
STUDY AREA 1

DEPTH = 1 KM

N.T.S.

FIGURE 5.6

GEOTECH



ISOTHERM PLOT

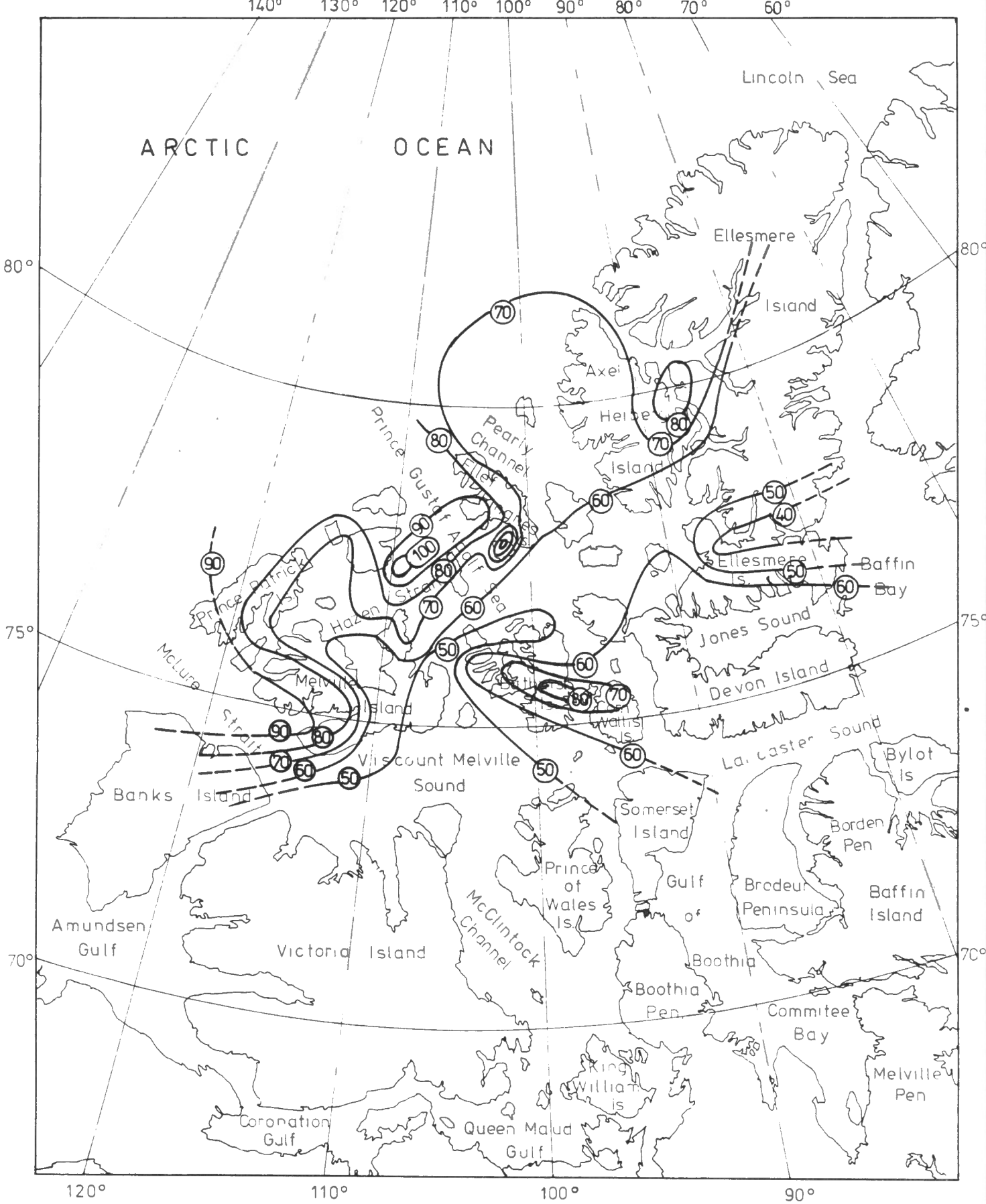
STUDY AREA 1

DEPTH = 2 KM

N.T.S.

FIGURE 5.7

GEOTECH



ISOTHERM PLOT

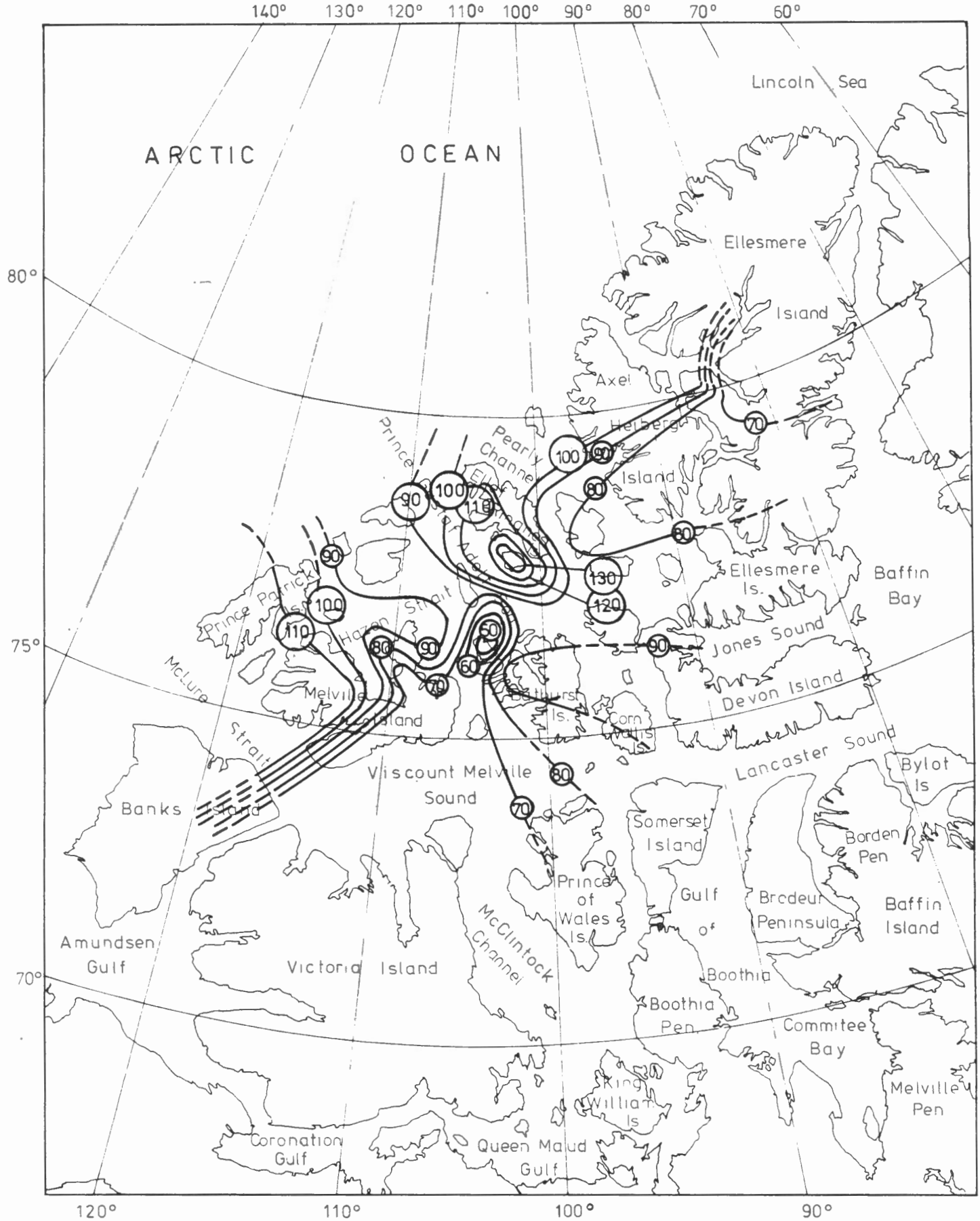
STUDY AREA 1.

DEPTH = 3 KM

N.T.S.

FIGURE 5.8

GEOTECH



ISOTHERM PLOT

STUDY AREA 1
DEPTH = 4 KM

N.T.S.

FIGURE 5.9

GEOTECH

areas occur around the west and north coasts of Bathurst Island and in southern Ellesmere Island. The maximum differential temperature recorded between heat source and heat sink zones increases with depth. At 1 km. the maximum differential temperature is of the order of 30° C while at 4 km. it is of the order of 80° C.

Figures 5.10 through 5.13 show contoured isotherm plots for Study Area 2 using a 10° C contour interval. The data points used are shown on these figures. The maximum temperatures recorded for Study Area 2 at 1, 2, 3 and 4 km. depths are of the same order as for Study Area 1. The maximum differential temperatures recorded in Study Area 2 range from about 20° C to about 40° C, considerably less than maximum differental temperatures recorded in Study Area 1. Heat source and sink zones then tend to be less well defined in Study Area 2. Higher temperature, (heat source), zones consistently occur around the Eskimo Lakes region west of Tuktoyaktuk, along the west coast of Mackenzie Bay and offshore between latitudes 69° 40' N and 70° N around longitude 136° W. A lower temperature, (heat sink), zone follows a NE-SW trend just west of Tuktoyaktuk.

Figures 5.14 and 5.15 show contoured plots of the geothermal temperature gradient for Areas 1 and 2 respectively.

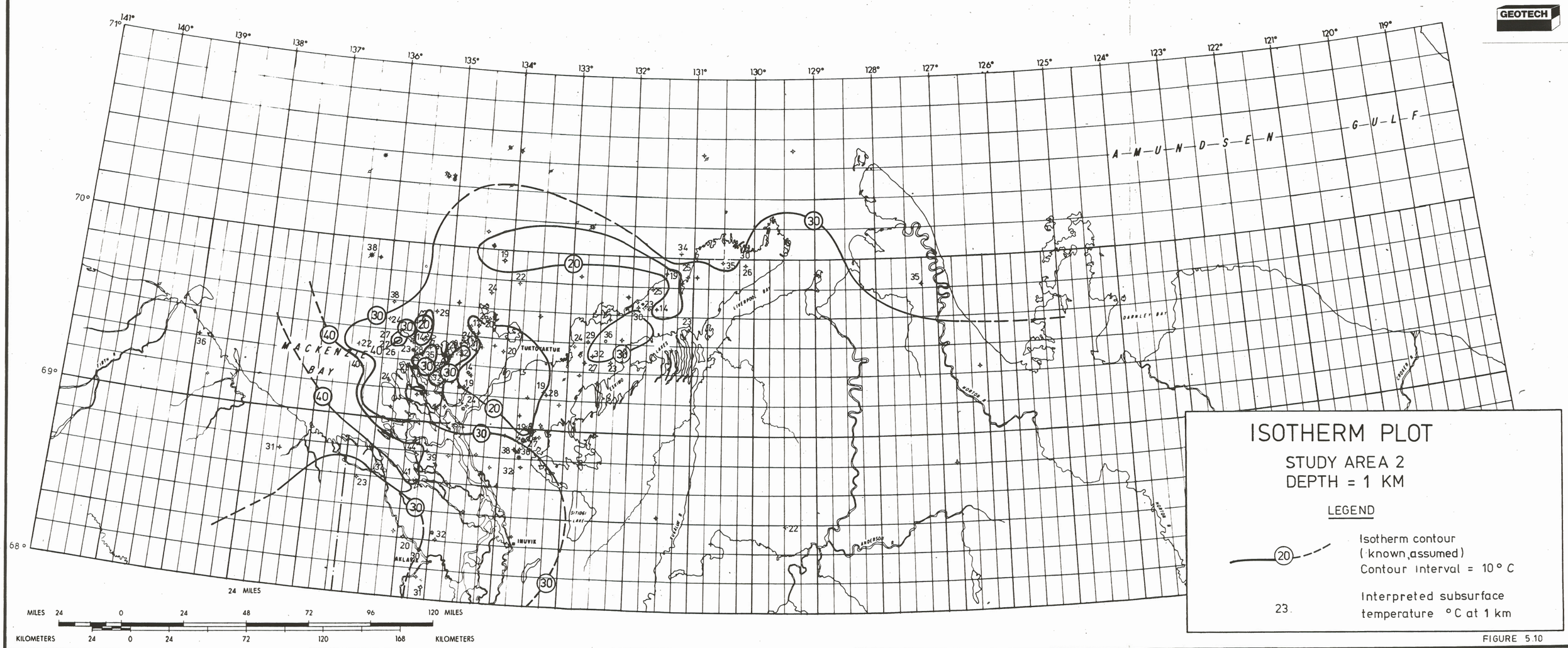

GEOTECH
ISOTHERM PLOT
STUDY AREA 2
DEPTH = 1 KM
LEGEND
Isotherm contour (known, assumed)
Contour Interval = 10 ° C
Interpreted subsurface temperature °C at 1 km
23
A-M-U-N-D-S-E-N G-U-L-F
MACKENZIE BAY
TUKTOYAKTUK
INUVIK
AKLAVIK
LIVERPOOL BAY
DARNLEY BAY
24 MILES
MILES 24 0 24 48 72 96 120 MILES
KILOMETERS 24 0 24 72 120 168 KILOMETERS

FIGURE 5.10

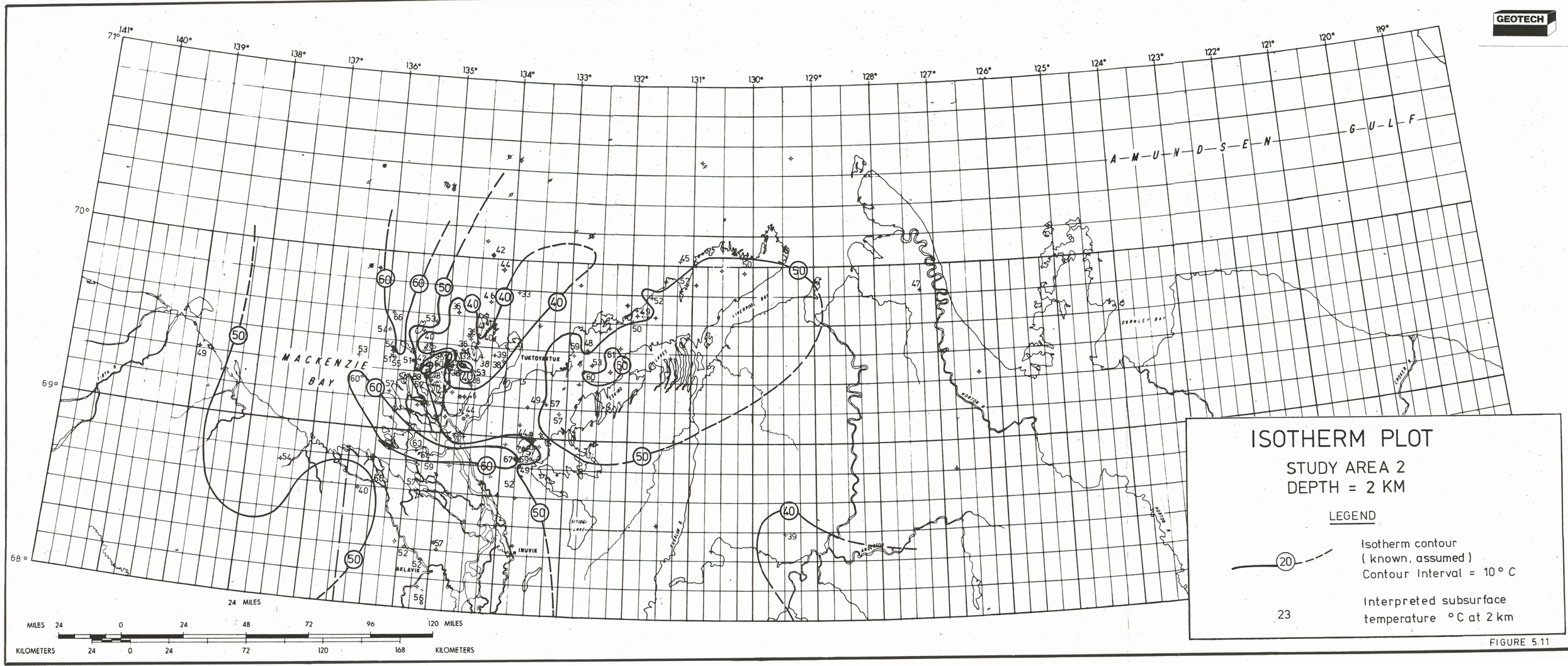
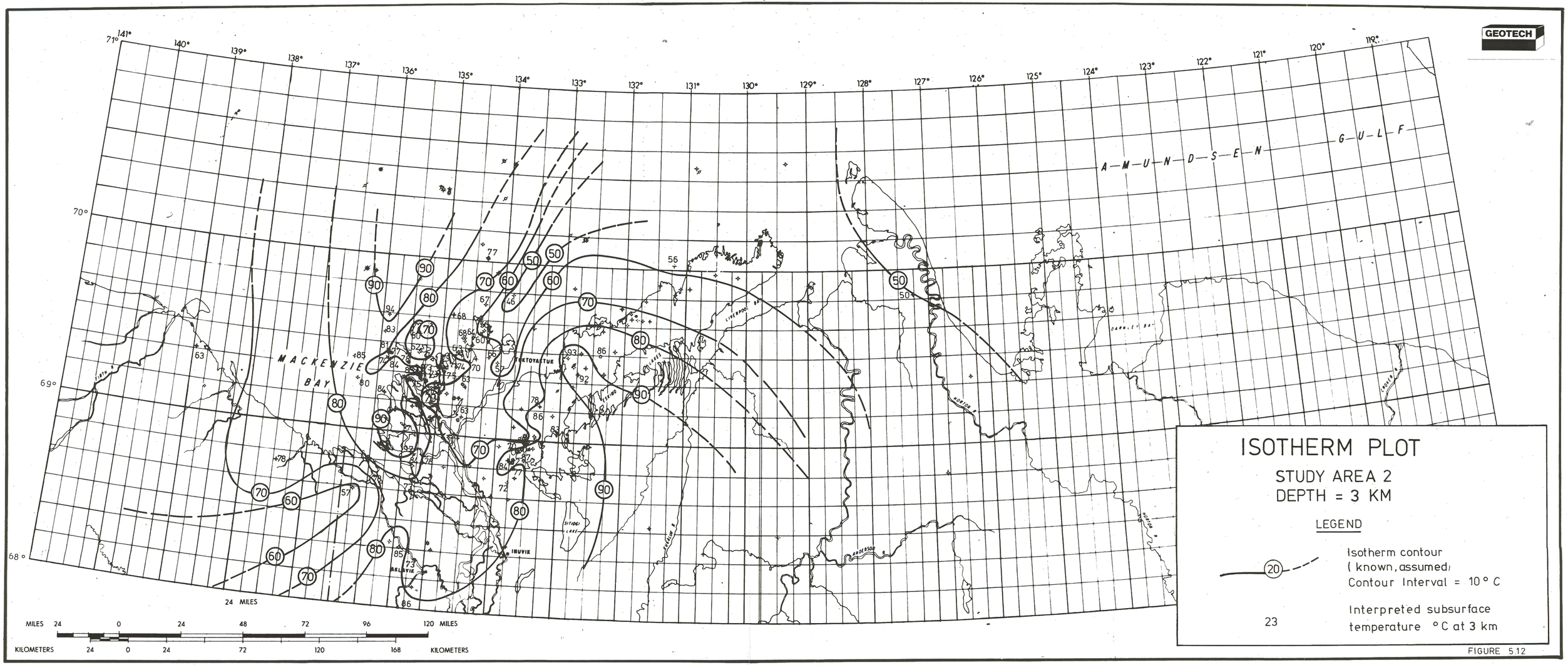

GEOTECH
ISOTHERM PLOT
STUDY AREA 2
DEPTH = 2 KM
LEGEND
Isotherm contour
(known, assumed)
Contour Interval = 10 ° C
Interpreted subsurface
temperature °C at 2 km
23
MACKENZIE BAY
AMUNDSEN GULF
TUKTOYAKTUK
INUVIK
AKLAVIK
LIVERPOOL BAY
DARNLEY BAY
24 MILES
MILES 24 0 24 48 72 96 120 MILES
KILOMETERS 24 0 24 72 120 168 KILOMETERS

FIGURE 5.11



ISOTHERM PLOT

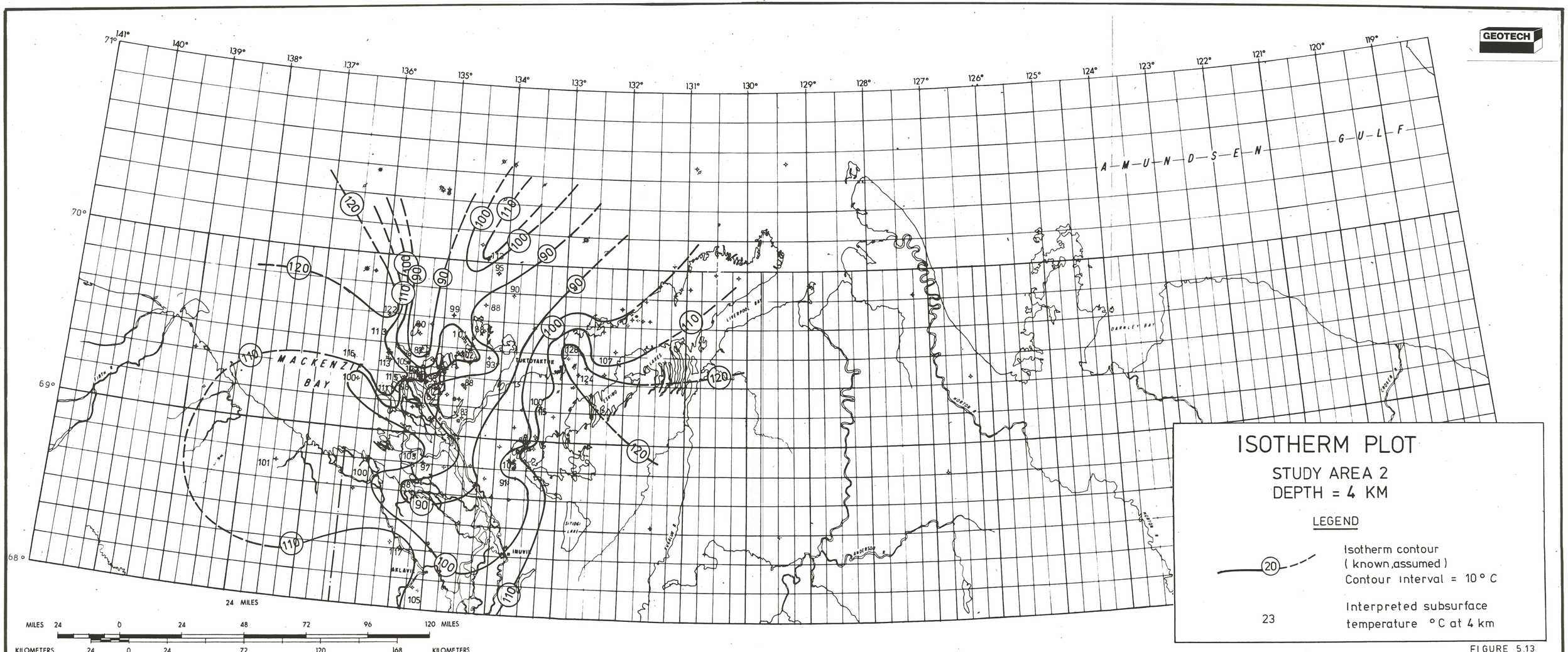
STUDY AREA 2
DEPTH = 3 KM

LEGEND

20 — Isotherm contour (known, assumed)
Contour Interval = 10 ° C

23 — Interpreted subsurface temperature °C at 3 km

FIGURE 5.12



ISOTHERM PLOT

STUDY AREA 2
DEPTH = 4 KM

LEGEND

20 — Isotherm contour (known, assumed)
Contour Interval = 10° C

23 — Interpreted subsurface temperature °C at 4 km

FIGURE 5.13

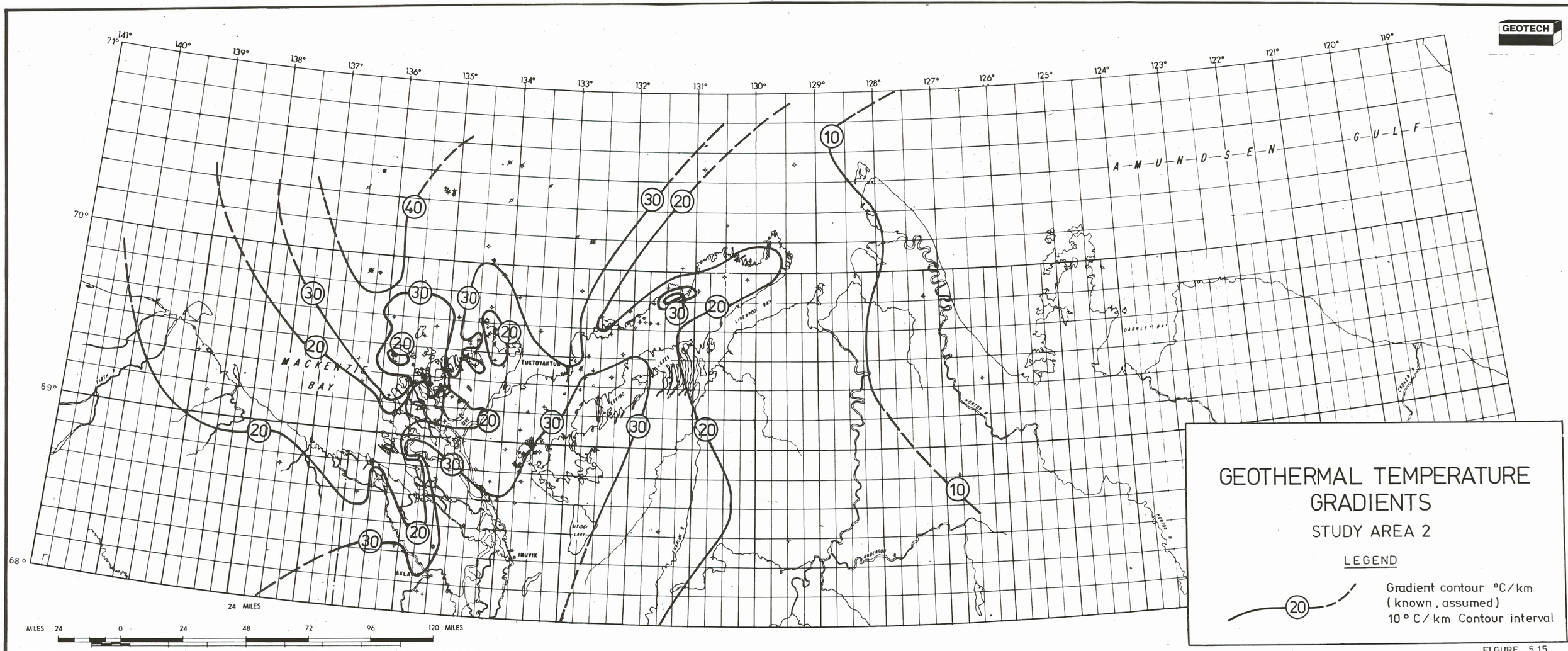
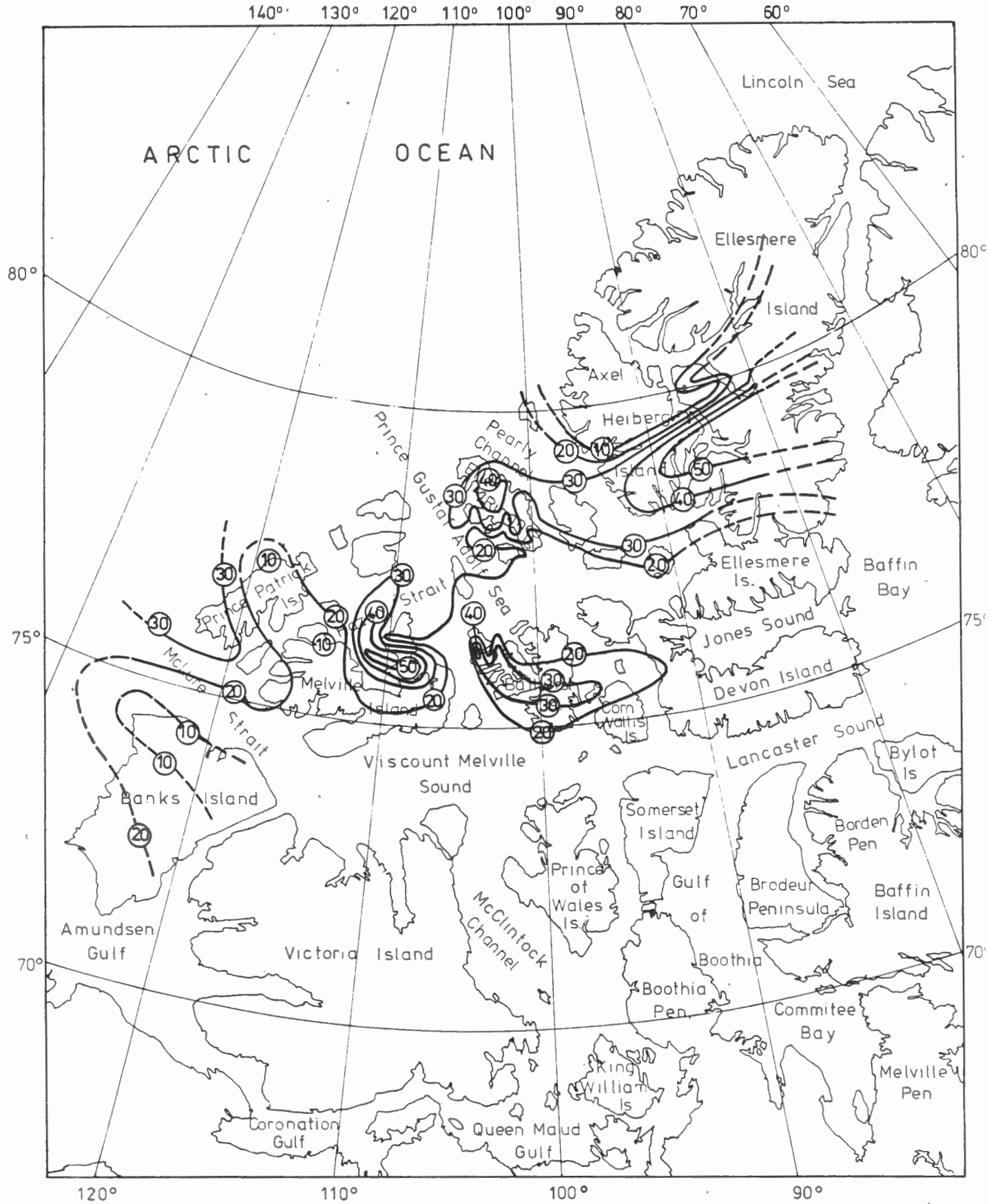

GEOTECH
141°
140°
139°
138°
137°
136°
135°
134°
133°
132°
131°
130°
129°
128°
127°
126°
125°
124°
123°
122°
121°
120°
119°
71°
70°
69°
68°
A—M—U—N—D—S—E—N G—U—L—F
MACKENZIE BAY
TUKTOYAKTUK
INUVIK
LIVERPOOL BAY
DARNLEY BAY
40
30
20
10
24 MILES
MILES 24 0 24 48 72 96 120 MILES
KILOMETERS 24 0 24 72 120 168 KILOMETERS
GEOTHERMAL TEMPERATURE GRADIENTS
STUDY AREA 2
LEGEND
Gradient contour °C/km
(known , assumed)
10 ° C / km Contour interval

FIGURE 5.15

Figure 5.14 a, folded in the back pocket of the report, gives an enlarged version of this map for Study Area 1. The gradients shown are in °C/km.

In Study Area 1 high gradient zones, (i.e. rapid temperature increase with depth), occur on eastern Melville Island, northern Ellef Ringness Island, southern Axel Heiberg Island and northwestern Bathurst Island. Gradients as high as 50° C/km. occur in these areas. In other areas gradients as low as 10° C/km. were measured. Study Area 2 shows a more uniform gradient distribution with values generally falling between 20 and 30° C/km. One 40° C/km. contour occurs in the northwest of the area around latitude 70° N and longitude 136° W. A 10° C/km. contour bounds the eastern edge of the area roughly following longitude 128° W.



GEOTHERMAL TEMPERATURE GRADIENT

STUDY AREA 1

N.T.S.

GEOTECH

FIGURE 5.14

6.0 DATA QUALITY AND DISTRIBUTION

In Study Area 1 the majority of wells are located between latitudes 75° N and 80° N and between longitudes 96° W and 120° W, i.e. in the west central portion of the Arctic Islands, (see Figure 2.1). Reasonably good well coverage exists through the above area whereas elsewhere in Study Area 1 there is virtually no subsurface information available.

Study Area 2, geographically much smaller than Study Area 1, has a broader regional well cover, (see Figure 2.2). The majority of wells in this area are located between longitudes 130° W and 136° W. The most intense well concentration occurs in the Mackenzie delta itself, southwest of Tuktoyaktuk.

The quality of subsurface temperature data obtained in the study regionally is quite good. Factors affecting the quality of individual log header temperature extrapolations, drill stem test temperatures, etc. were discussed in Section 4 of this report. In all cases recorded temperatures can be strongly affected by the detailed operational history of the well prior to the temperature measurement. In some cases anomalous temperatures occur relative to other data in a given well. For temperature-depth extrapolation any such anomalous data has been discarded. Anomalous data points might be clarified by detailed analysis of the original tower sheet

records, etc. Such an analysis, however, is beyond the scope of the present study. Similarily well temperature surveys obviously influenced by recent cementing operations, flowing the well, etc., were discarded. Very few temperature logs are run in Study Area 1. Many of the logs run in Area 2 are restricted to the upper portion of the well to determine the depth of the permafrost zone.

For the purpose of data extrapolation at depth a straight line temperature gradient was assumed and, where warranted by the data, a best fit line was passed through the data by eye. In the majority of cases the data fit the straight line assumption reasonablly well (see Appendicies A and B). A more sophisticated analysis might indicate a nonlinear curve fit to be superior in certain cases, but such analysis are beyond the scope of the present study. Also the near surface permafrost zone was ignored since very little data from these shallow depths were available.

Only those wells having sufficient extrapolated log header temperature data and/or drill stem test temperature data were used to extrapolate subsurface temperatures at 1, 2, 3 and 4 km. depths and to calculate temperature gradients for the isotherm and contour gradient plots discussed in Section 5. A high degree of confidence is given to the general trends and

order of magnitude temperatures shown on the above figures. Although, as noted earlier, the analysis could be improved by incorporating detailed assessment of the complete well records it is very doubtful that the improvement obtained would justify the considerable additional effort required.

7.0 DISCUSSION

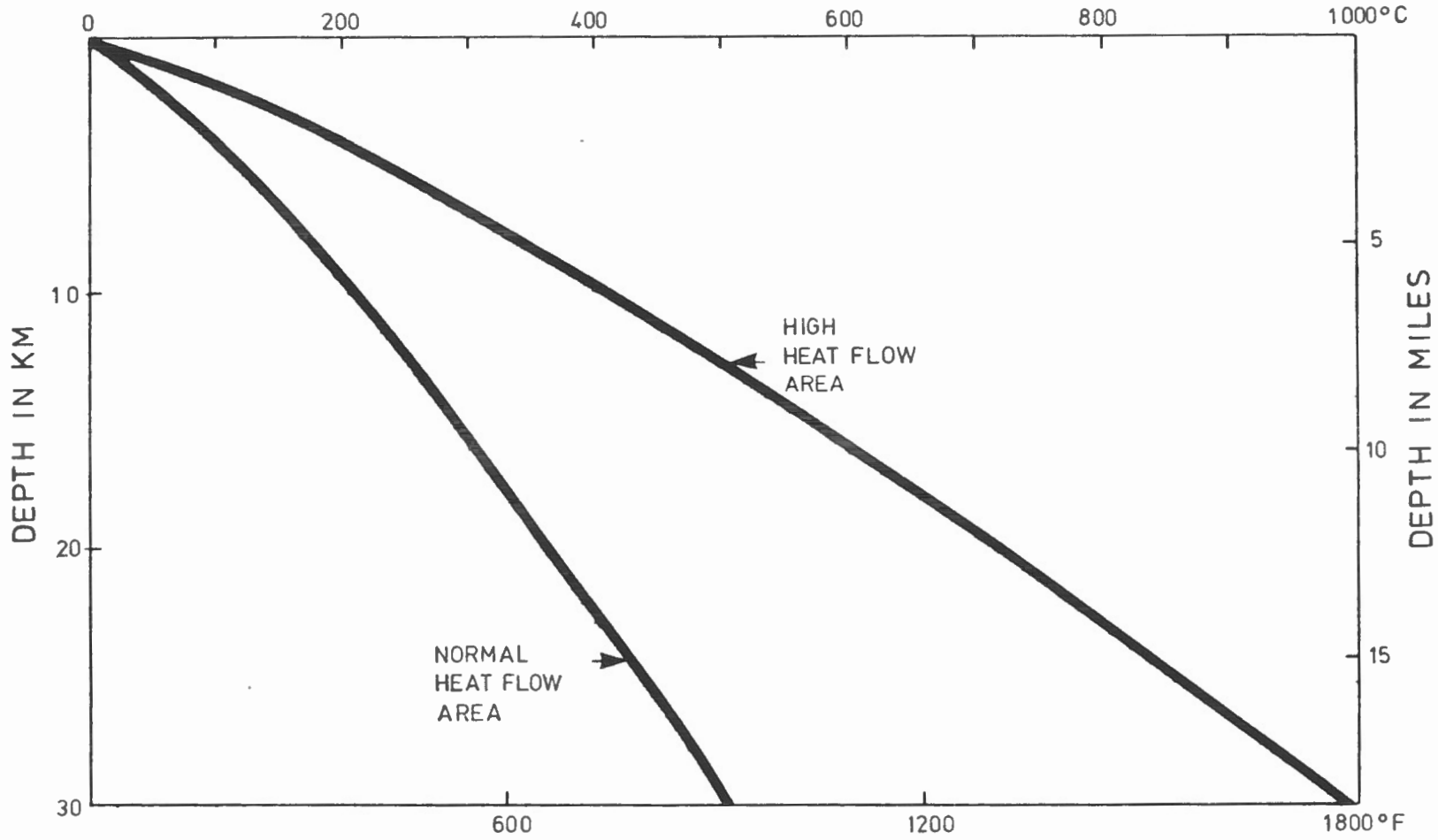
In the present study available subsurface temperature data was obtained from 344 wells in the Arctic Islands and Beaufort Sea - Mackenzie Delta areas of the Canadian Arctic, north of latitude 68° N. Subsurface temperatures were interpreted from well log header, drill stem test and temperature survey data and were used, as appropriate, to derive temperature-depth plots for each well. Where possible the temperature-depth plots were extrapolated to obtain estimated subsurface temperatures at 1, 2, 3 and 4 km. depths.

Using the above data contoured isotherm plots for 1, 2, 3 and 4 km. depths plus contoured geothermal gradient plots were generated as discussed in Section 5. From the data shown on the above plots it is evident that the subsurface thermal regimes in Study Areas 1 and 2 are markedly different. Figure 7.1 shows a generalized plot of normal versus high heat flow curves with depth. Based on this data, in the upper 10 km. of the crust, one could expect the following average gradients:

i) normal heat flow, approximately 20° C/km., and

ii) high heat flow, approximately 40° C/km.

Figures 5.14 and 5.15 then suggest that Study Area 2 represents a normal heat flow region whereas Study Area 1 has numerous high heat flow zones. In both of the study areas, the



TEMPERATURE VS DEPTH IN EARTH

(AFTER THE PETROLEUM INFORMATION CORPORATION, 1979)

GEOTECH

FIGURE 7.1

interpretation is limited by the degree of well coverage. Study Area 2 has a more complete well coverage than Study Area 1. If subsurface temperature data can be obtained from outside of those areas already having a strong data base, it may alter somewhat the regional subsurface temperature interpretations shown herein.

REFERENCES

Connolly, E.T., "Geothermal Survey of North America Progress Report and Associated Data - Gathering Problems". Fourth Formation Evaluation Symposium of the Canadian Well Logging Society, Calgary, 1972

Fertl, W.H., and Wichmann, P.A., "How to Determine Static B.H.T. From Well Log Data", World Oil, January, 1977, pp. 105-106.

Petroleum Information Corporation: "The Geothermal Resources - Earth's Natural Heat Providing Energy Now", 1979

APPENDIX A

TEMPERATURE - DEPTH PLOTS

STUDY AREA 1

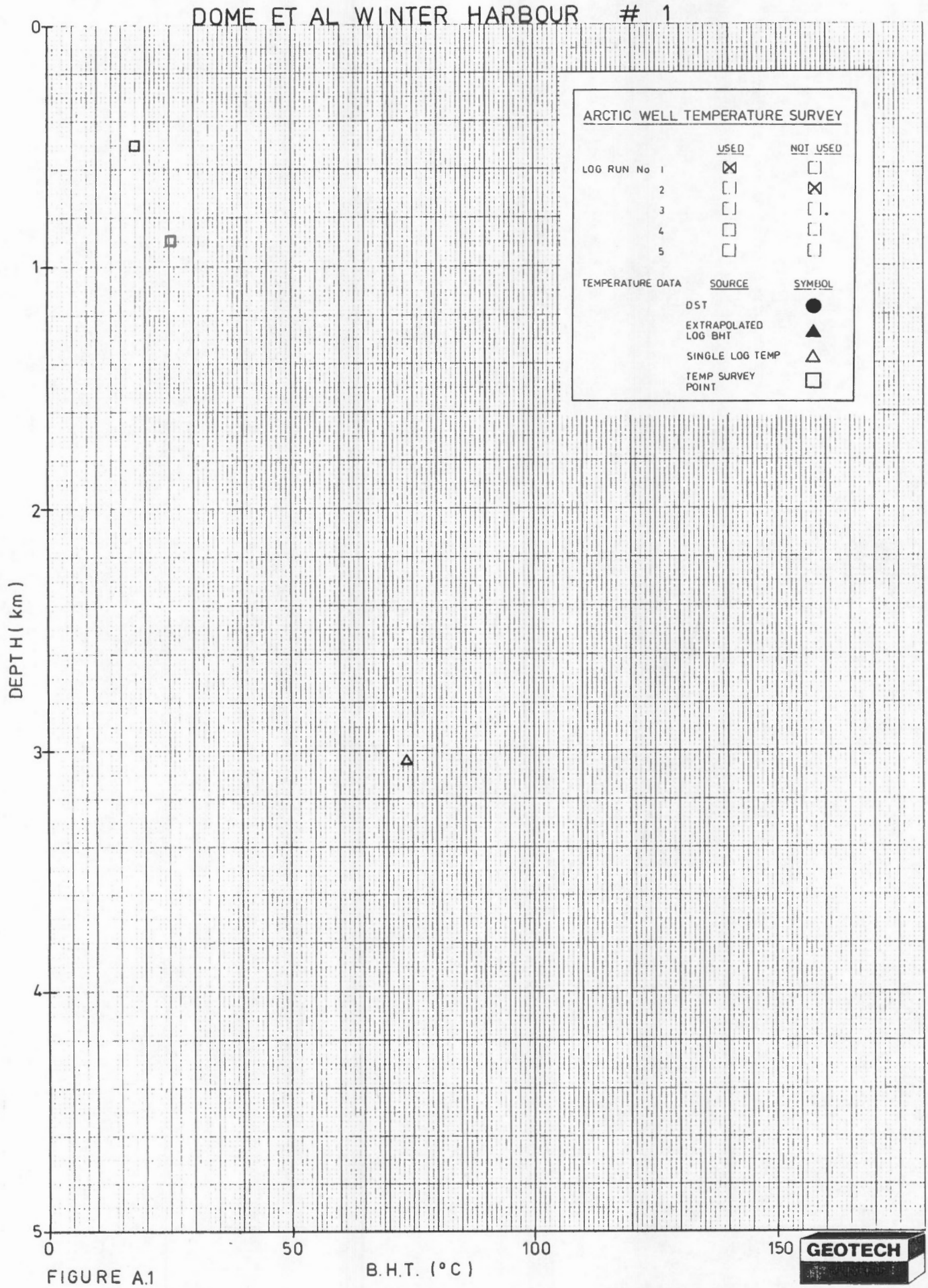

DOME ET AL WINTER HARBOUR # 1
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.1

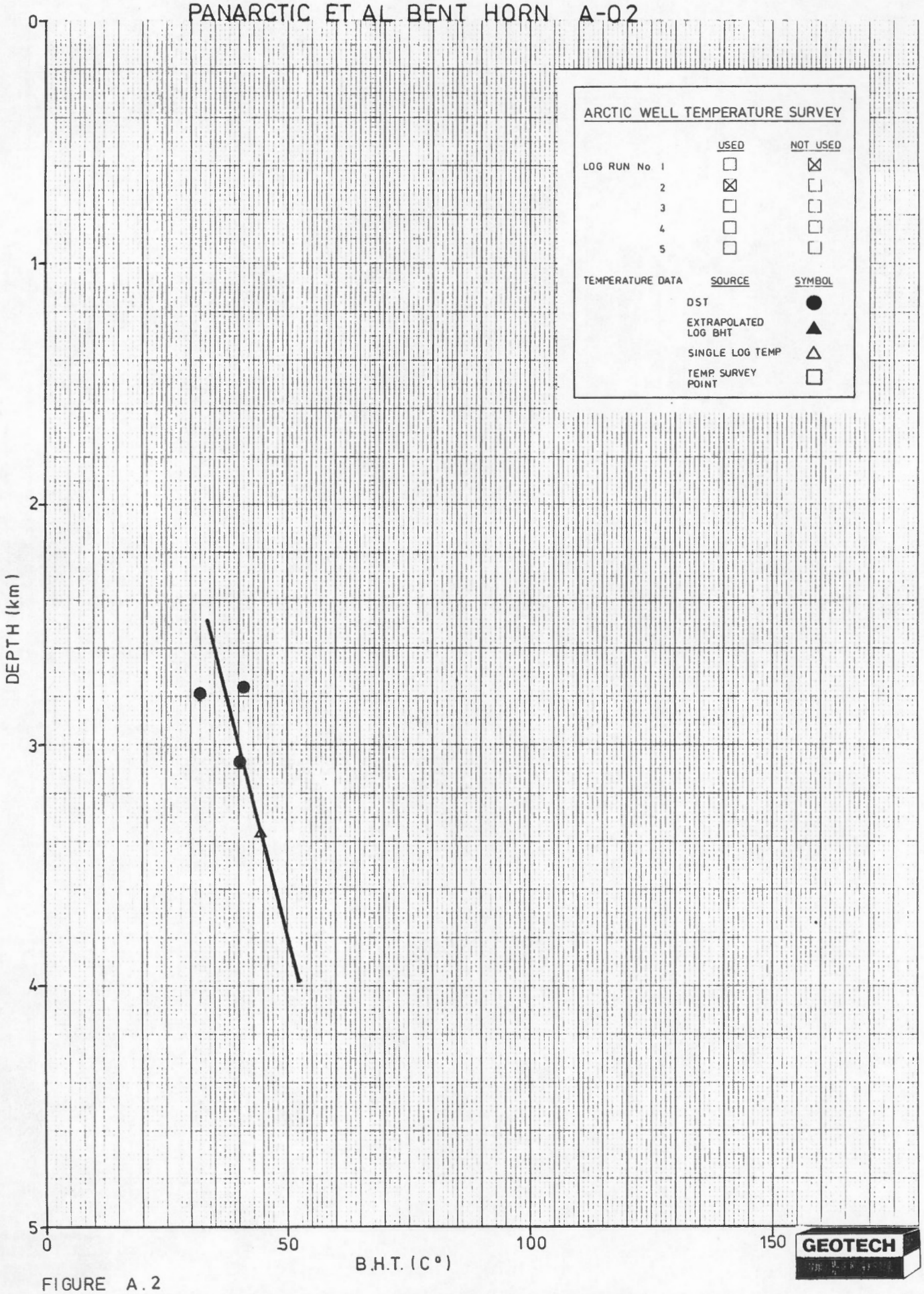

PANARCTIC ET AL BENT HORN A-02
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.2

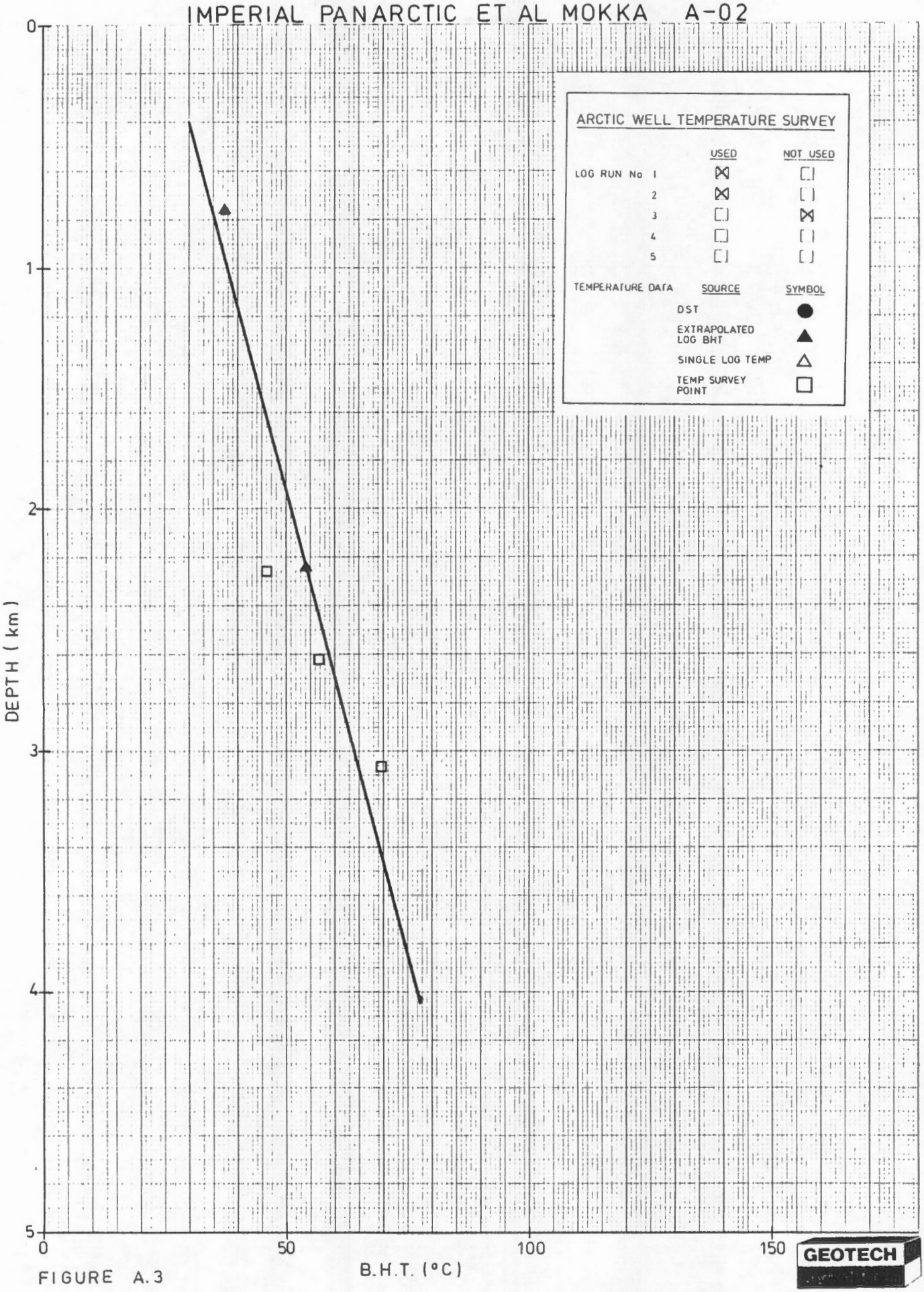

IMPERIAL PANARCTIC ET AL MOKKA A-02
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.3

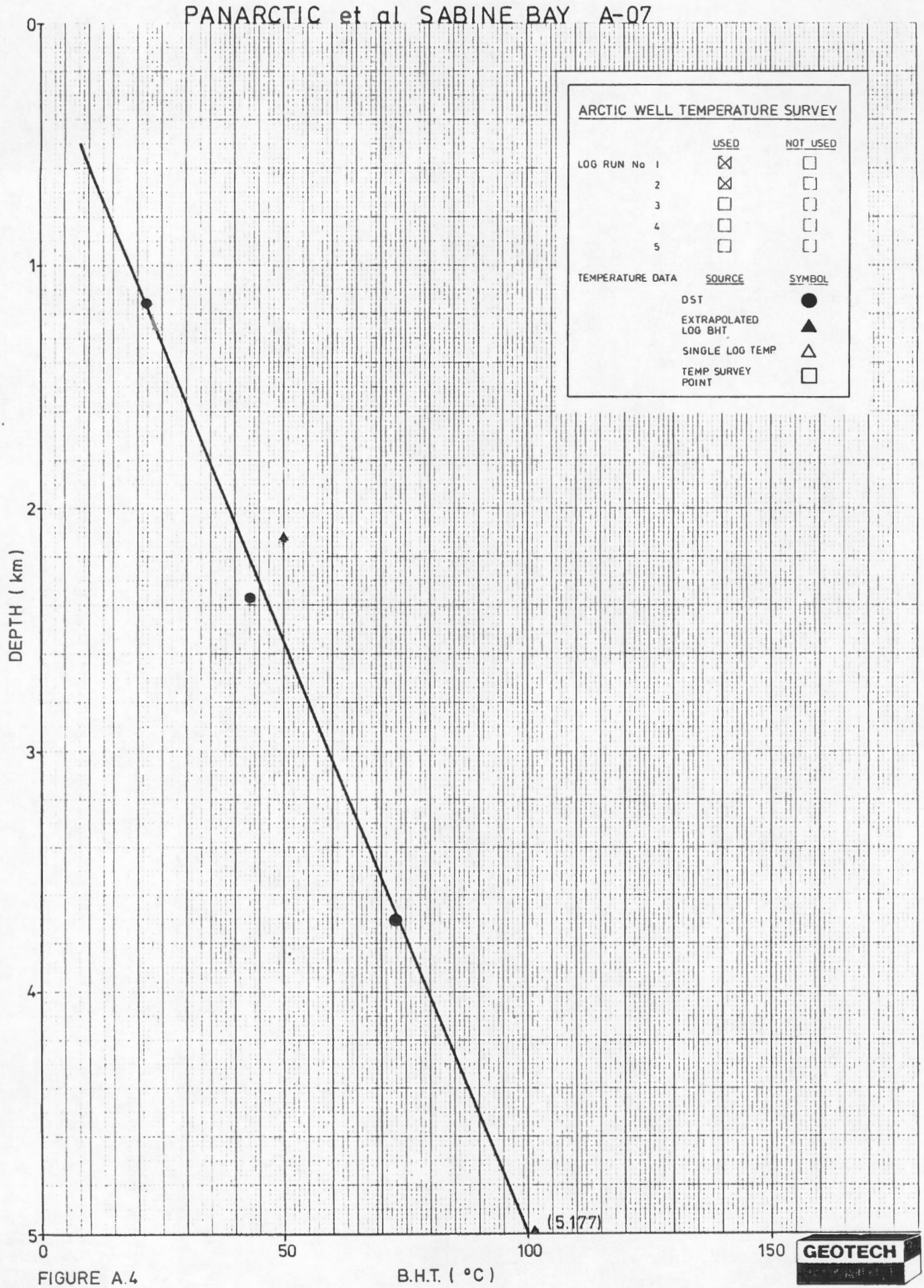

PANARCTIC et al SABINE BAY A-07
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
(5.177)
GEOTECH

FIGURE A.4

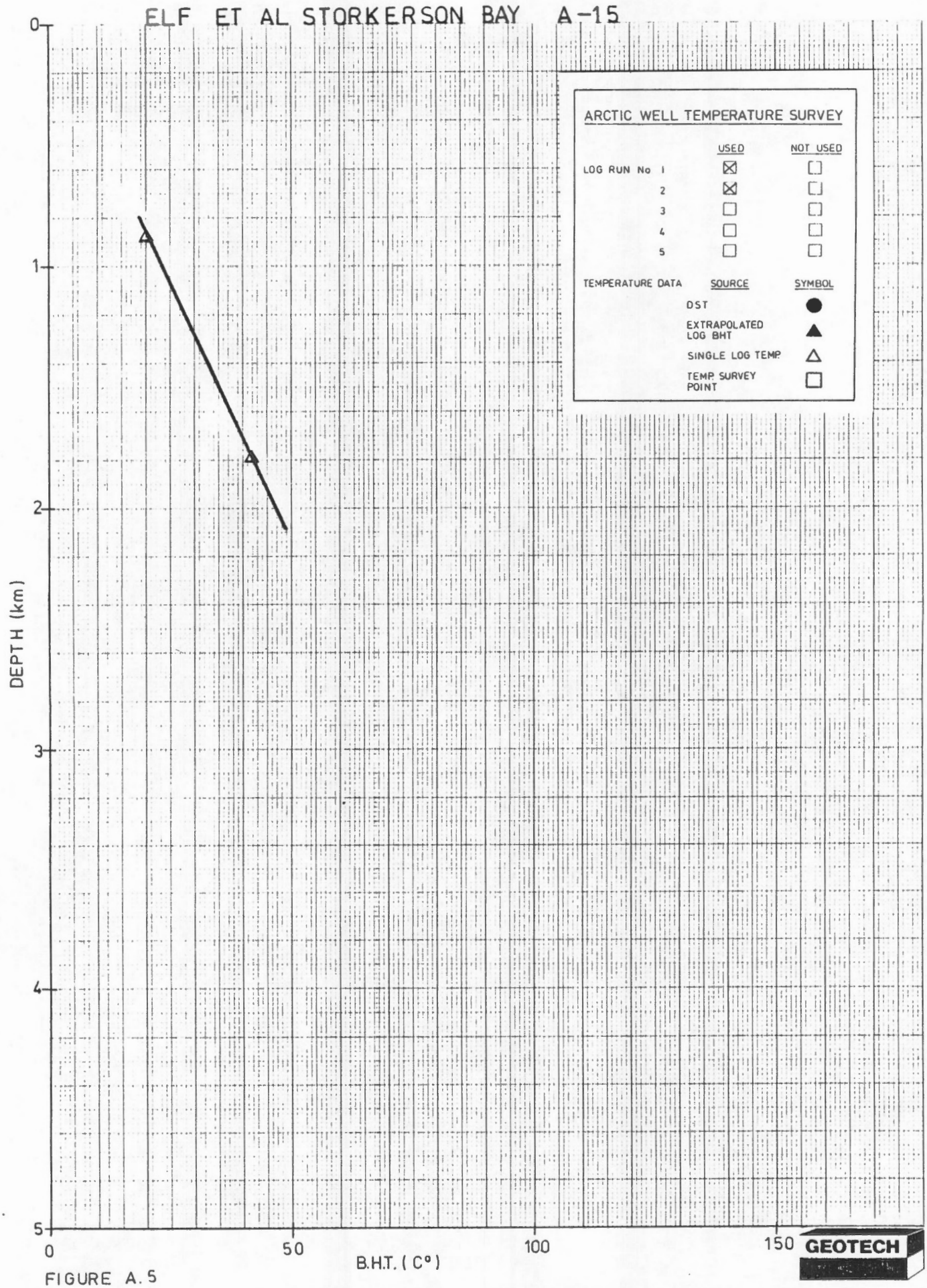

ELF ET AL STORKERSON BAY A-15
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE A.5

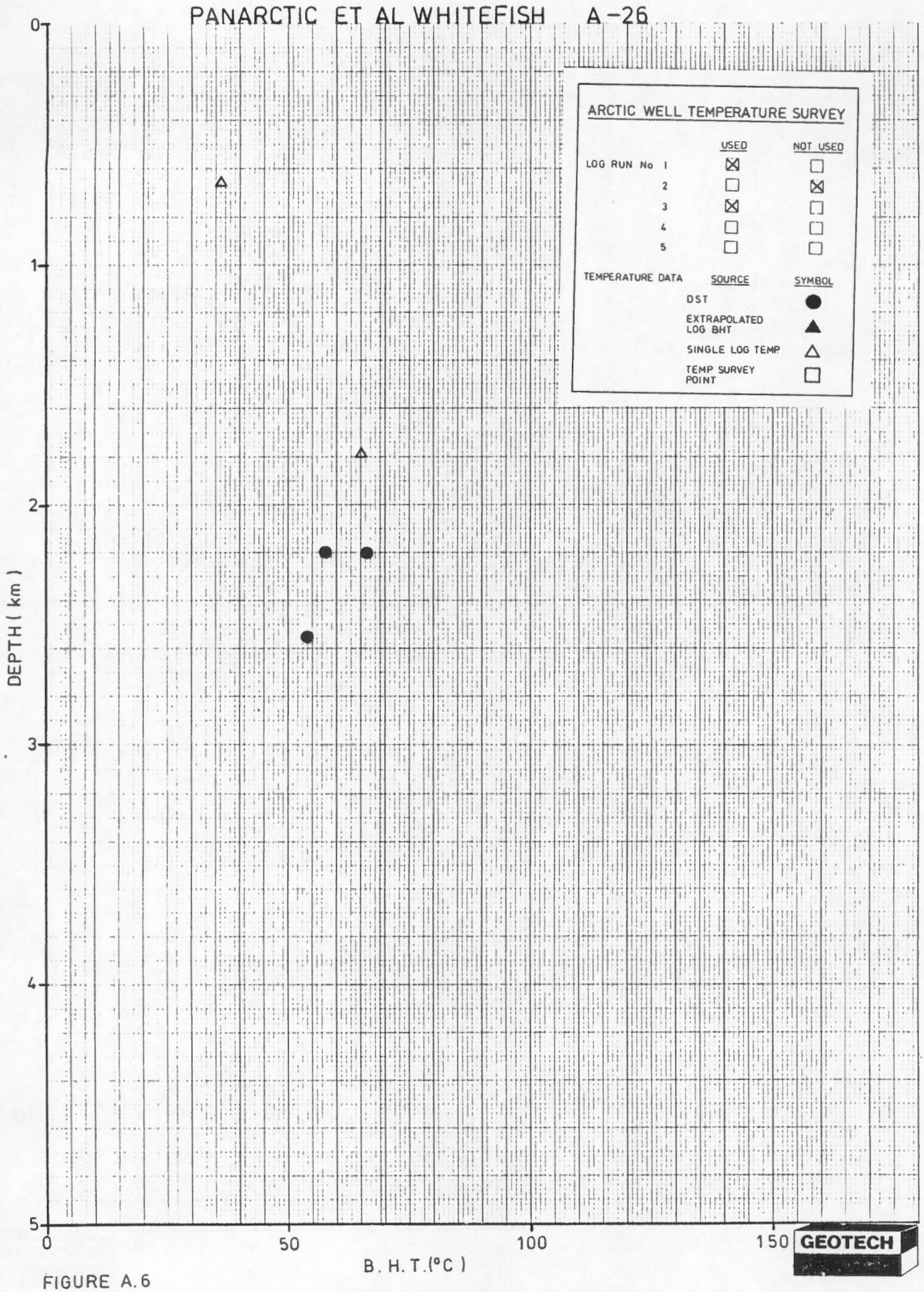

PANARCTIC ET AL WHITEFISH A-26
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (°C)
GEOTECH

FIGURE A.6

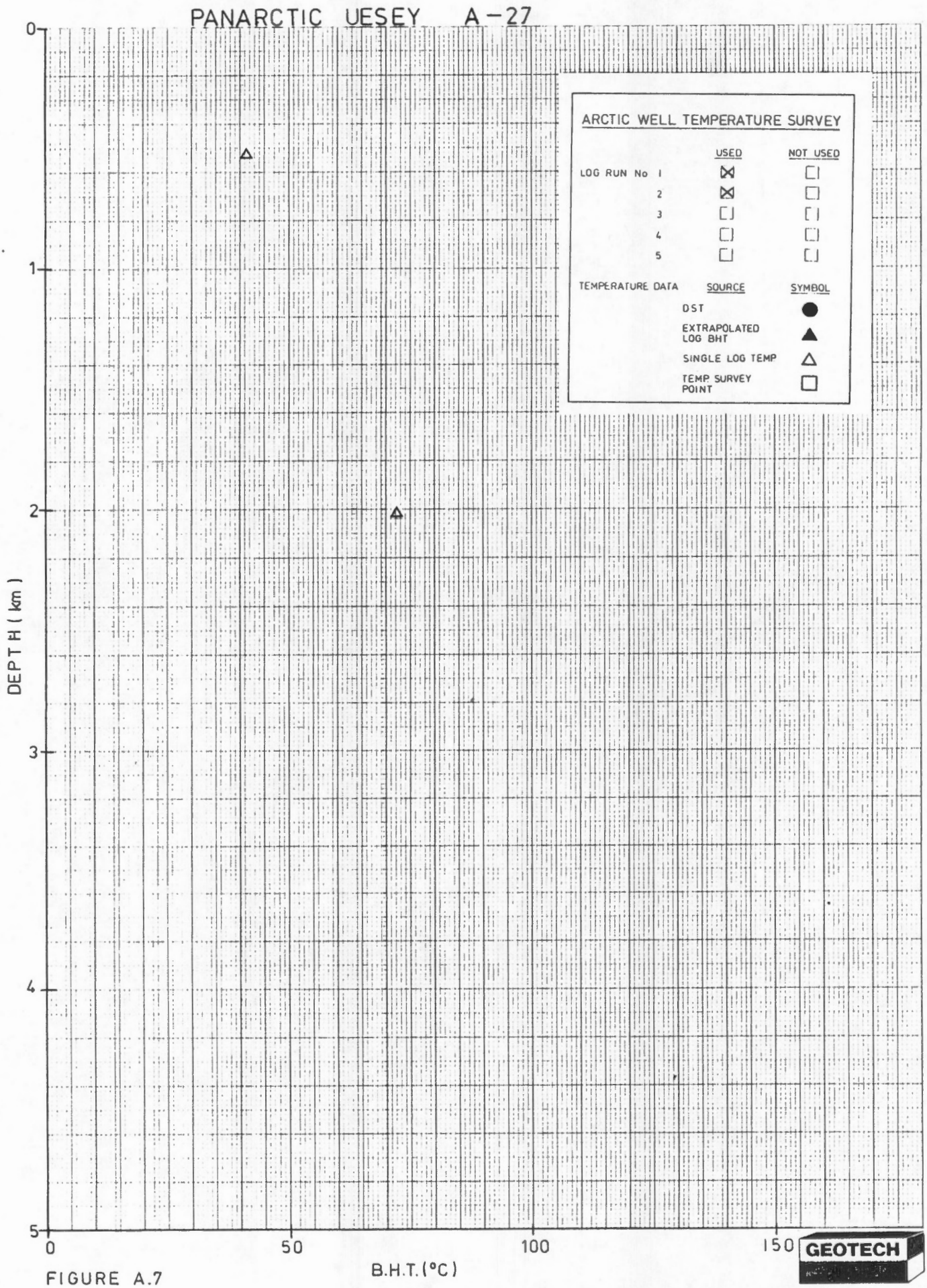


FIGURE A.7

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KEUFFEL & ESSER CO

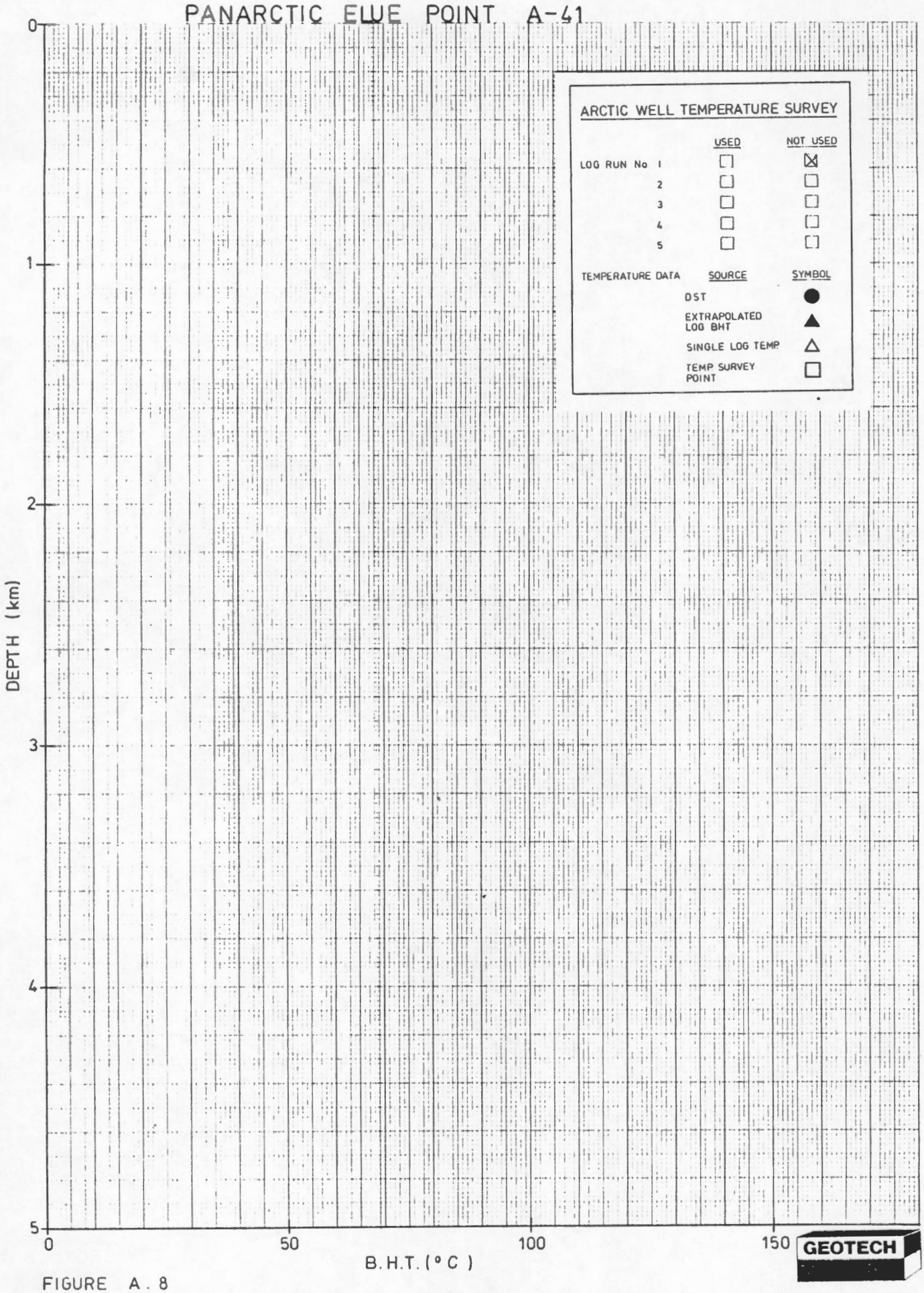

PANARCTIC ELUE POINT A-41
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A . 8

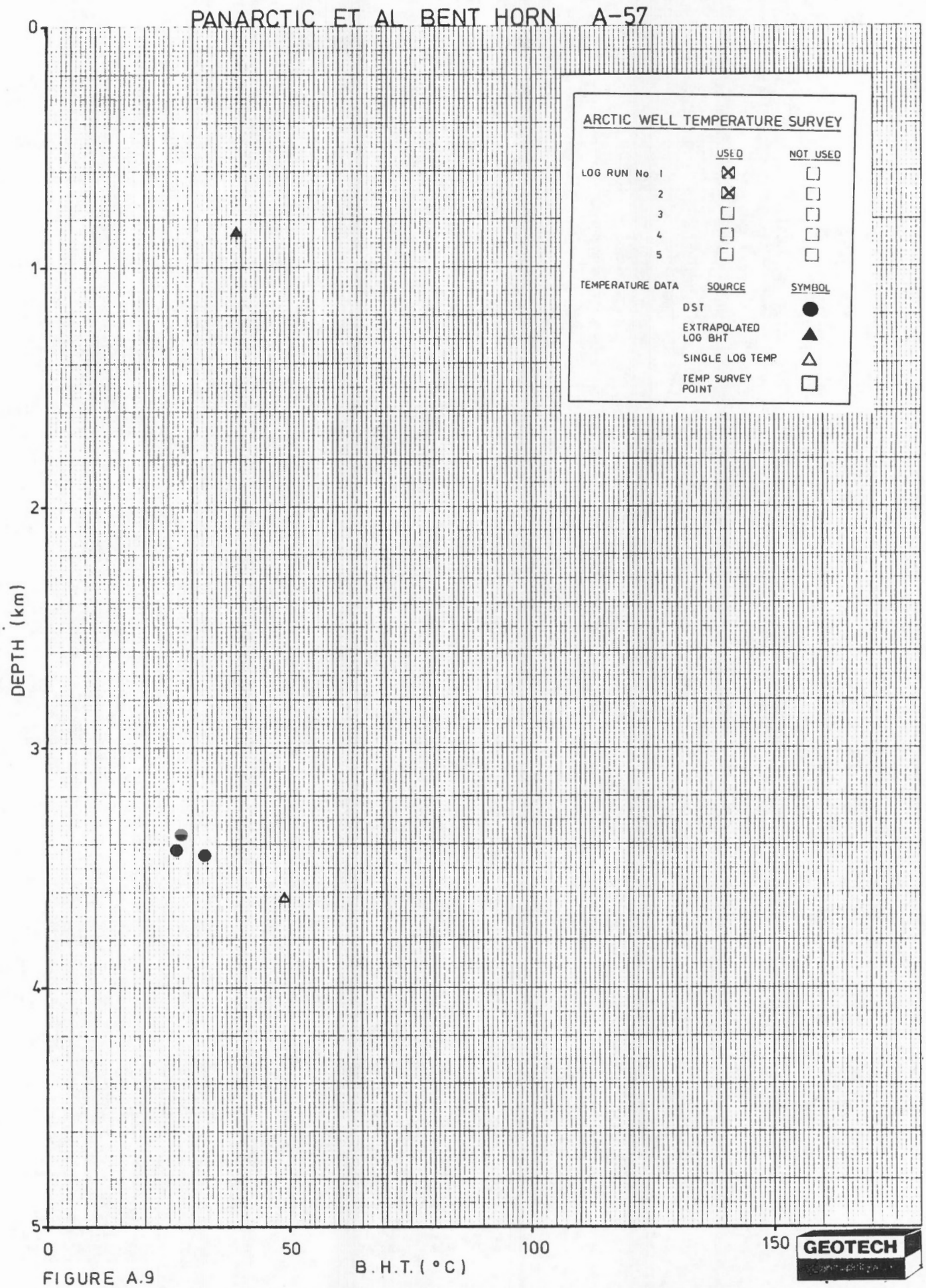

PANARCTIC ET AL BENT HORN A-57
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.9

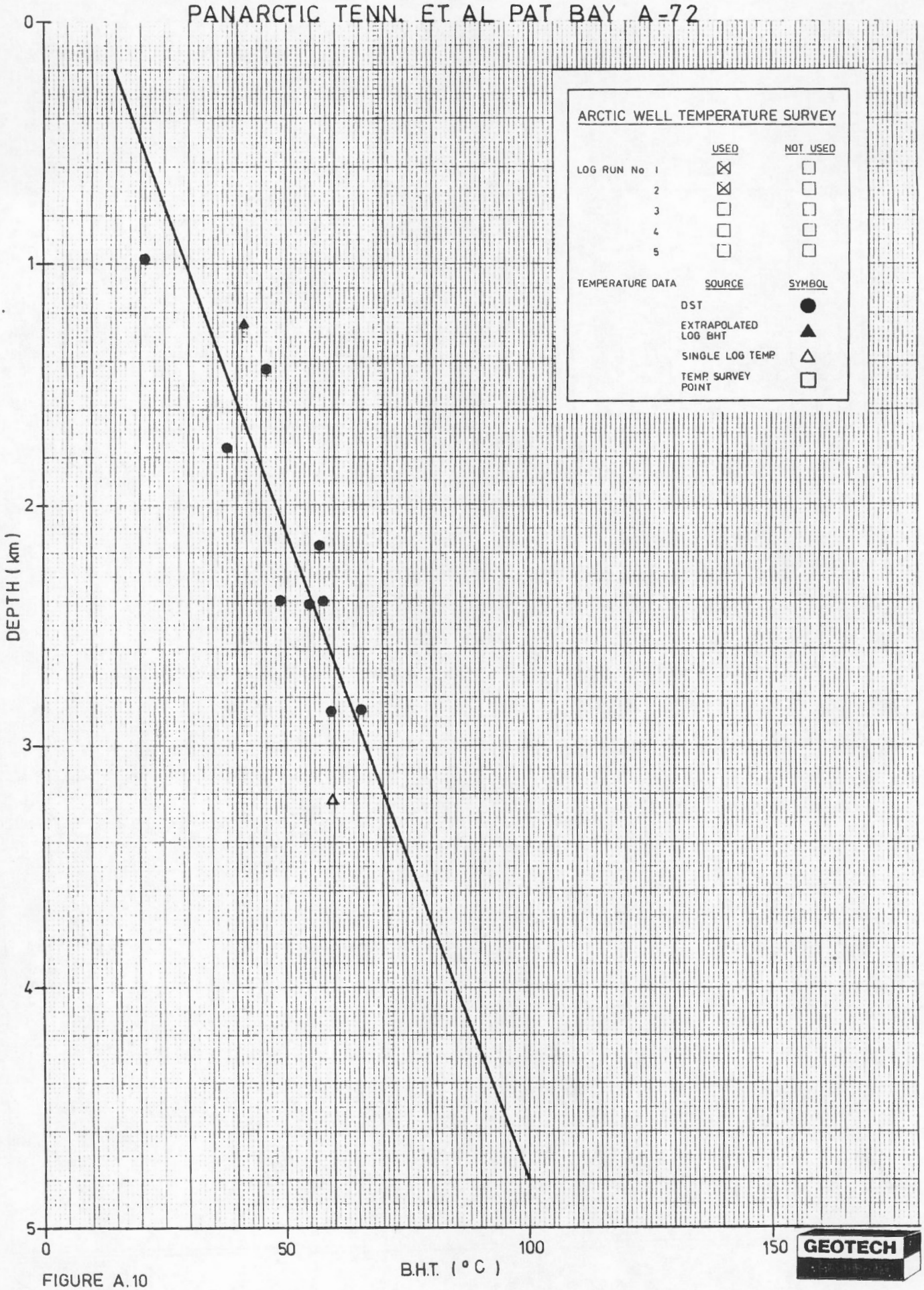

PANARCTIC TENN. ET AL PAT BAY A-72
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.10

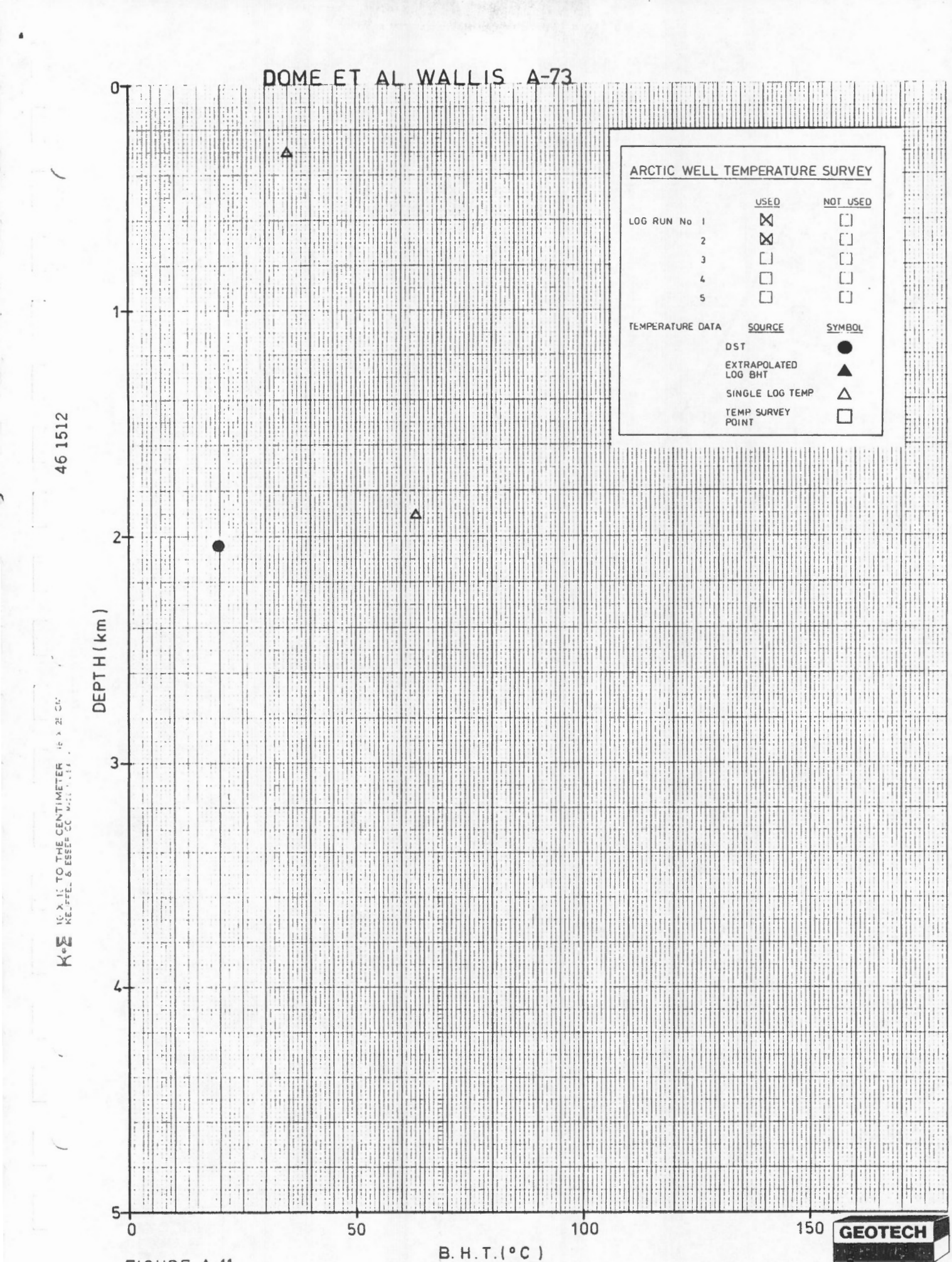

DOME ET AL WALLIS A-73
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
GEOTECH

FIGURE A.11

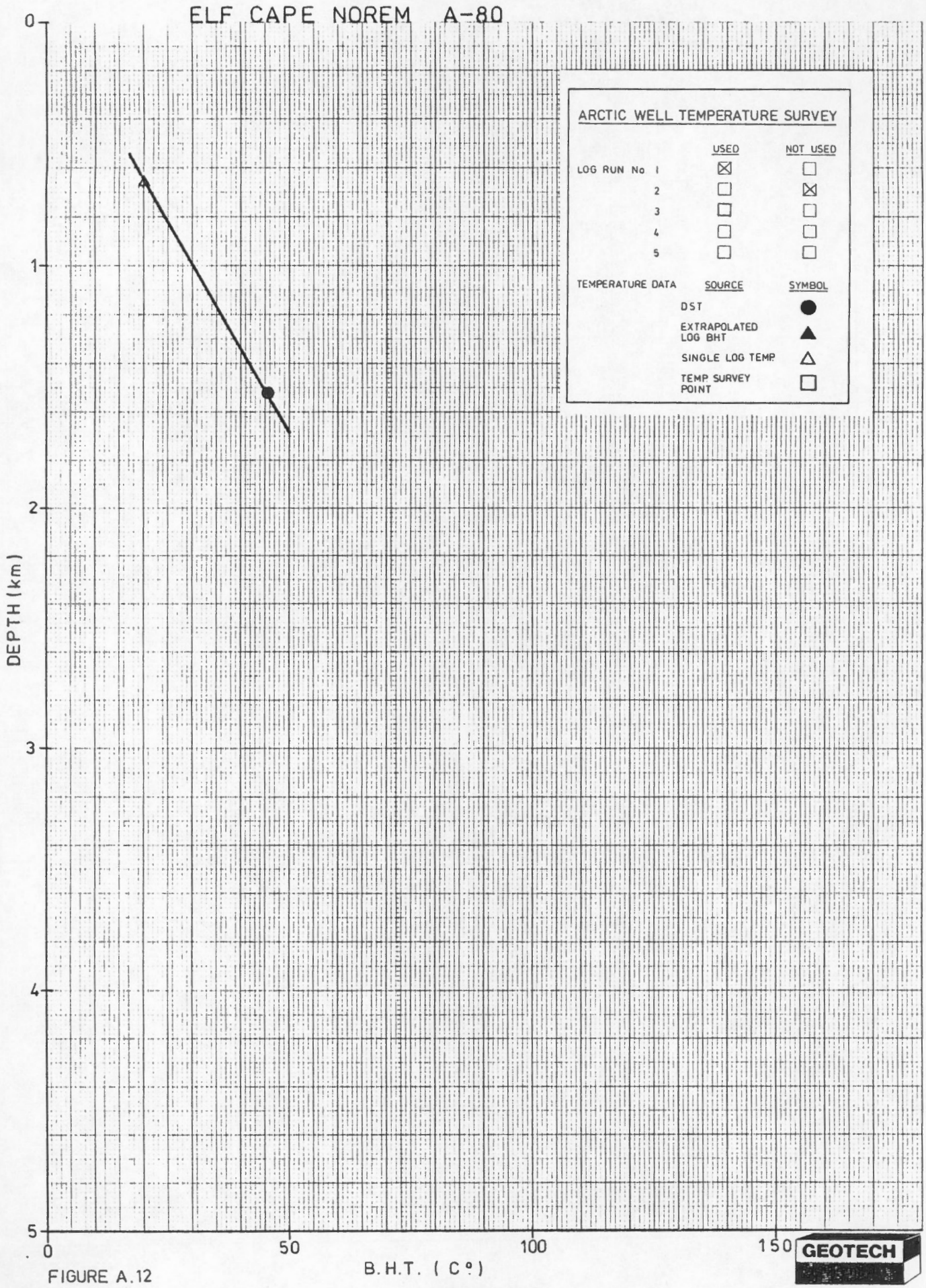
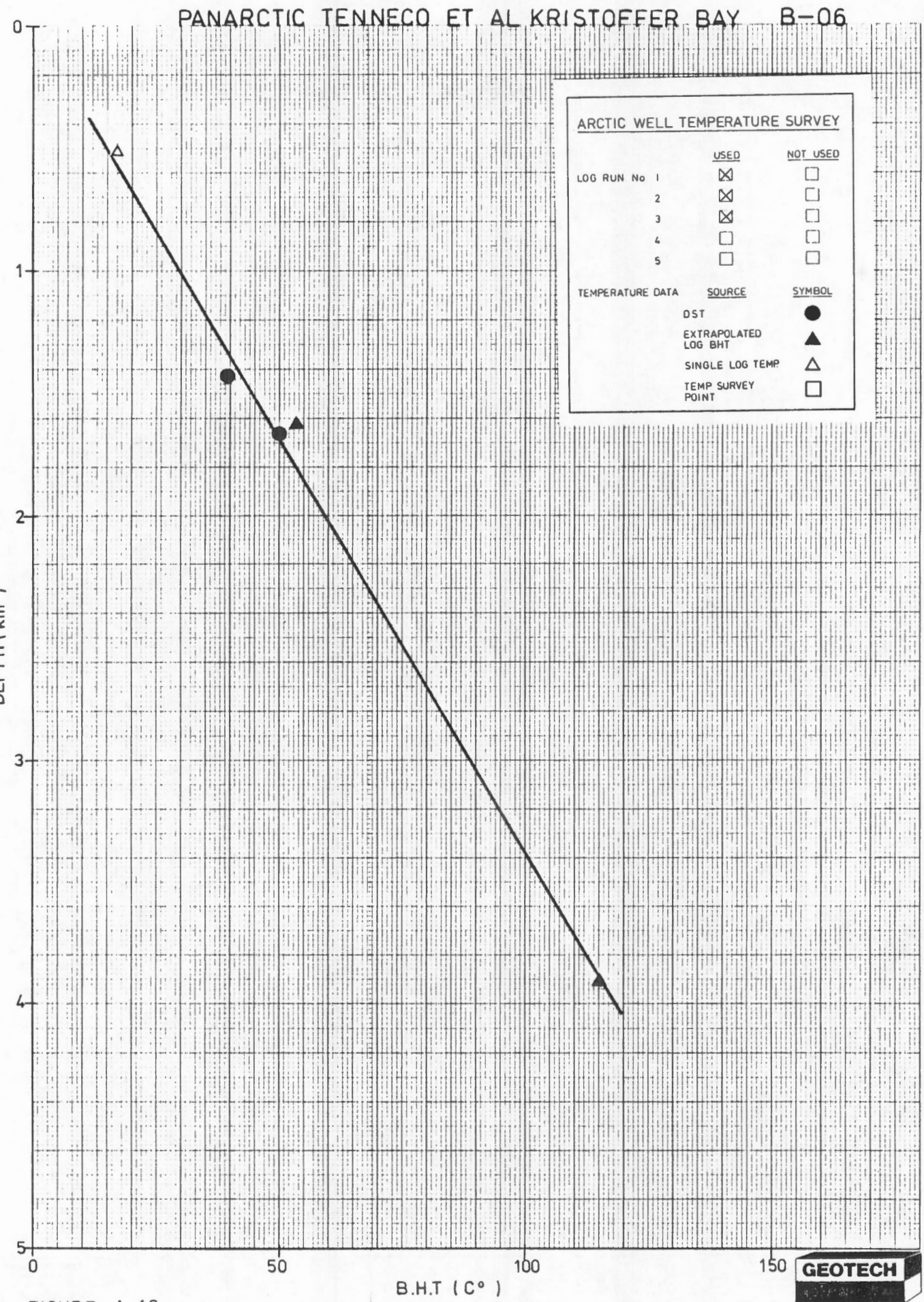


FIGURE A.12

46 1512
KEUFFEL & ESSER CO



46 1512

K+E 10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

FIGURE A.13

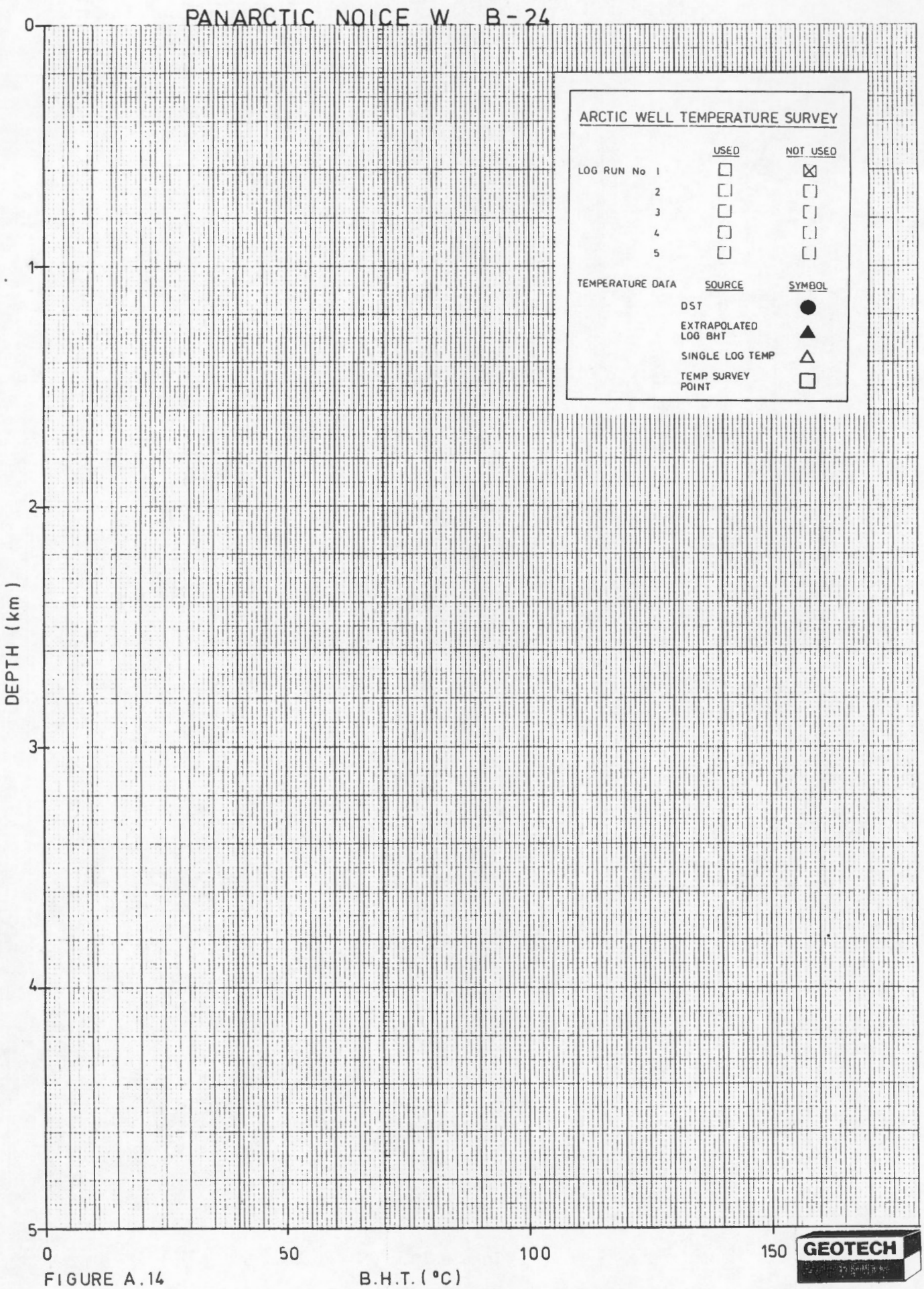


FIGURE A.14

46 1512
KEUFFEL & ESSER CO

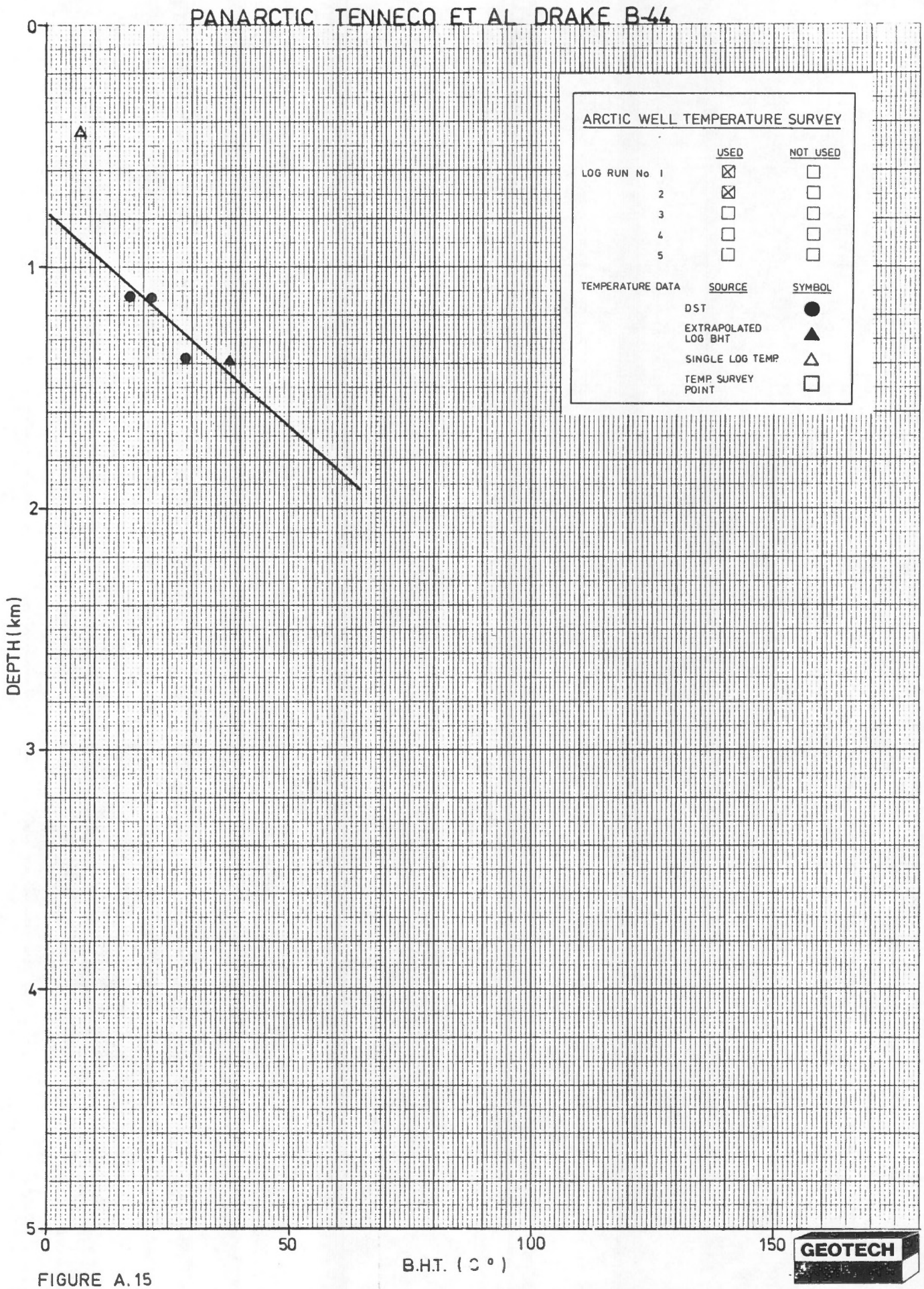

PANARCTIC TENNECO ET AL DRAKE B-44
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C °)
46 1512
K+E 10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE A.15

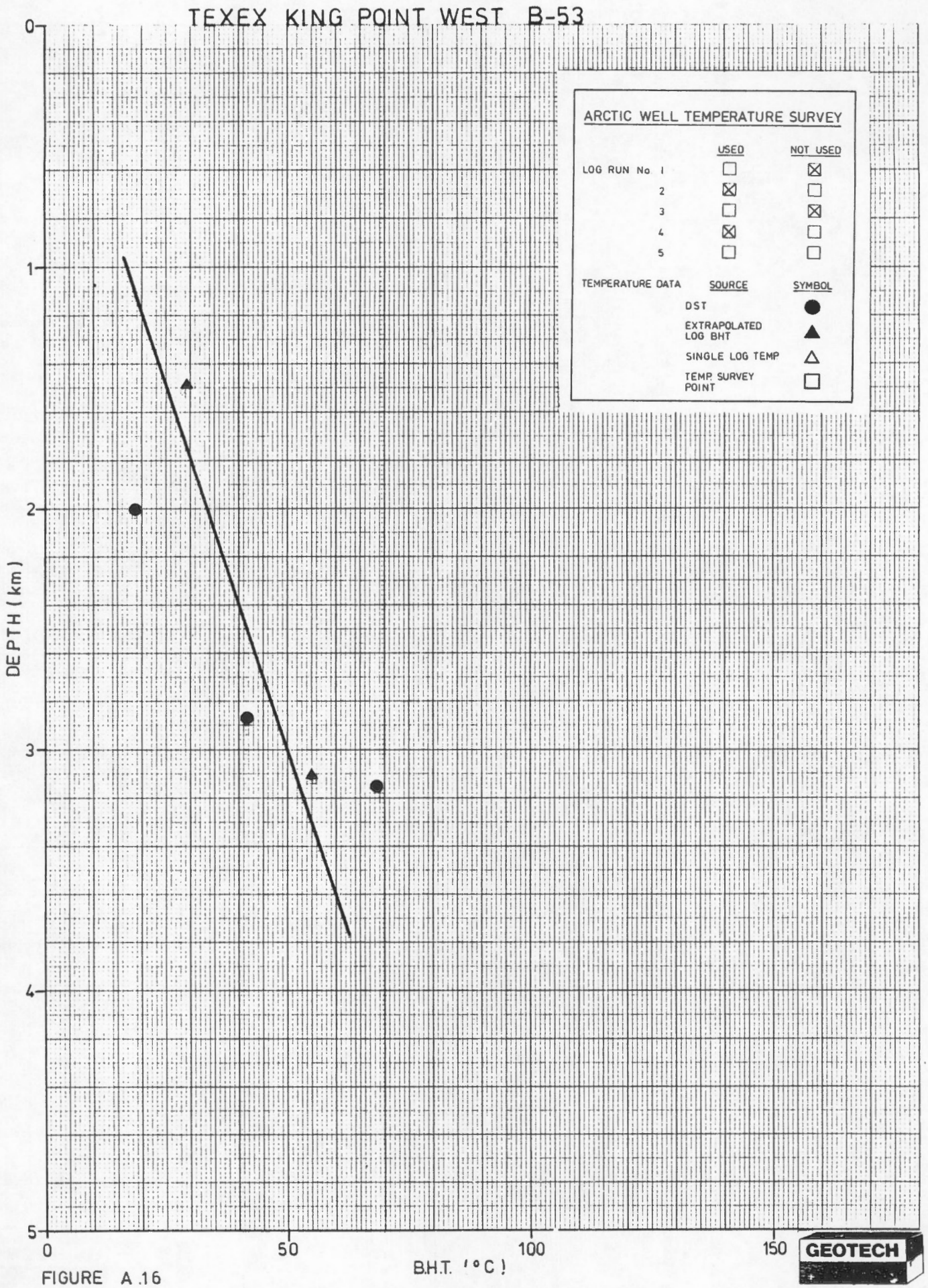


FIGURE A.16

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM.
KEUFFEL & ESSER CO MADE IN USA

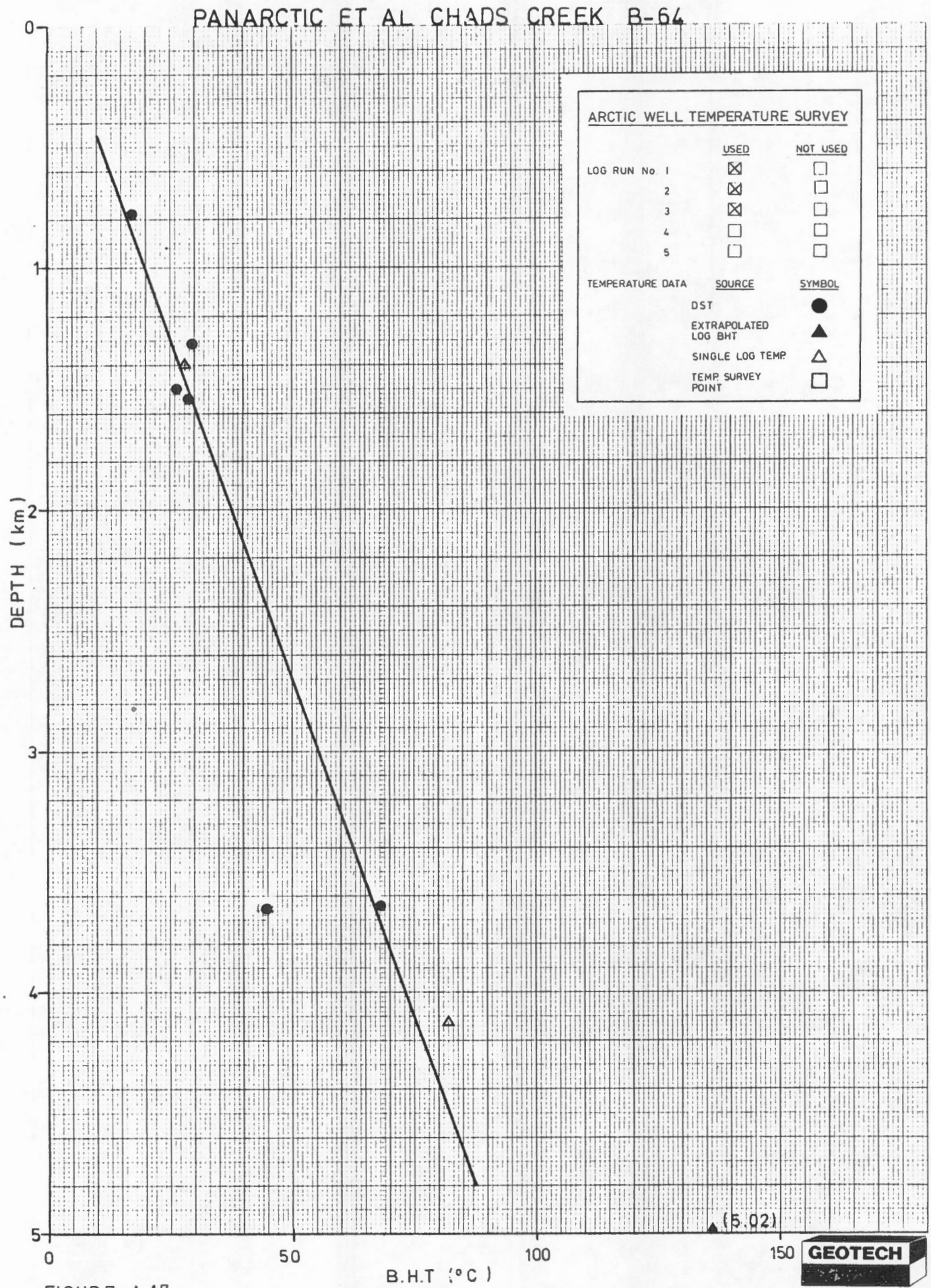

PANARCTIC ET AL CHADS CREEK B-64
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T (°C)
(5.02)
GEOTECH
46 1512
K&E 10 X 10 TO THE CENTIMETER 16 X 25 CM.
KEUFFEL & ESSER CO MADE IN U.S.A.

FIGURE A.17

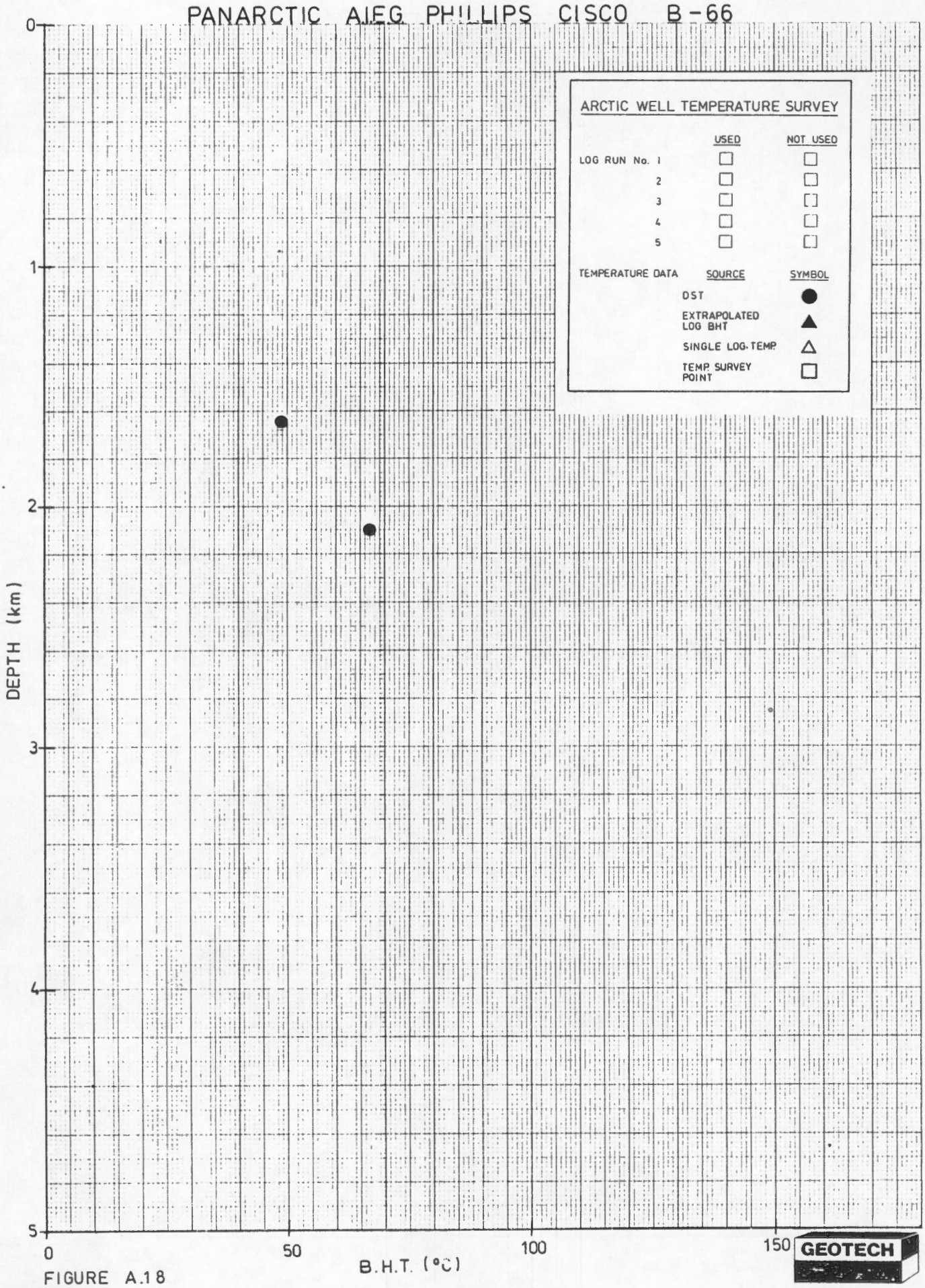
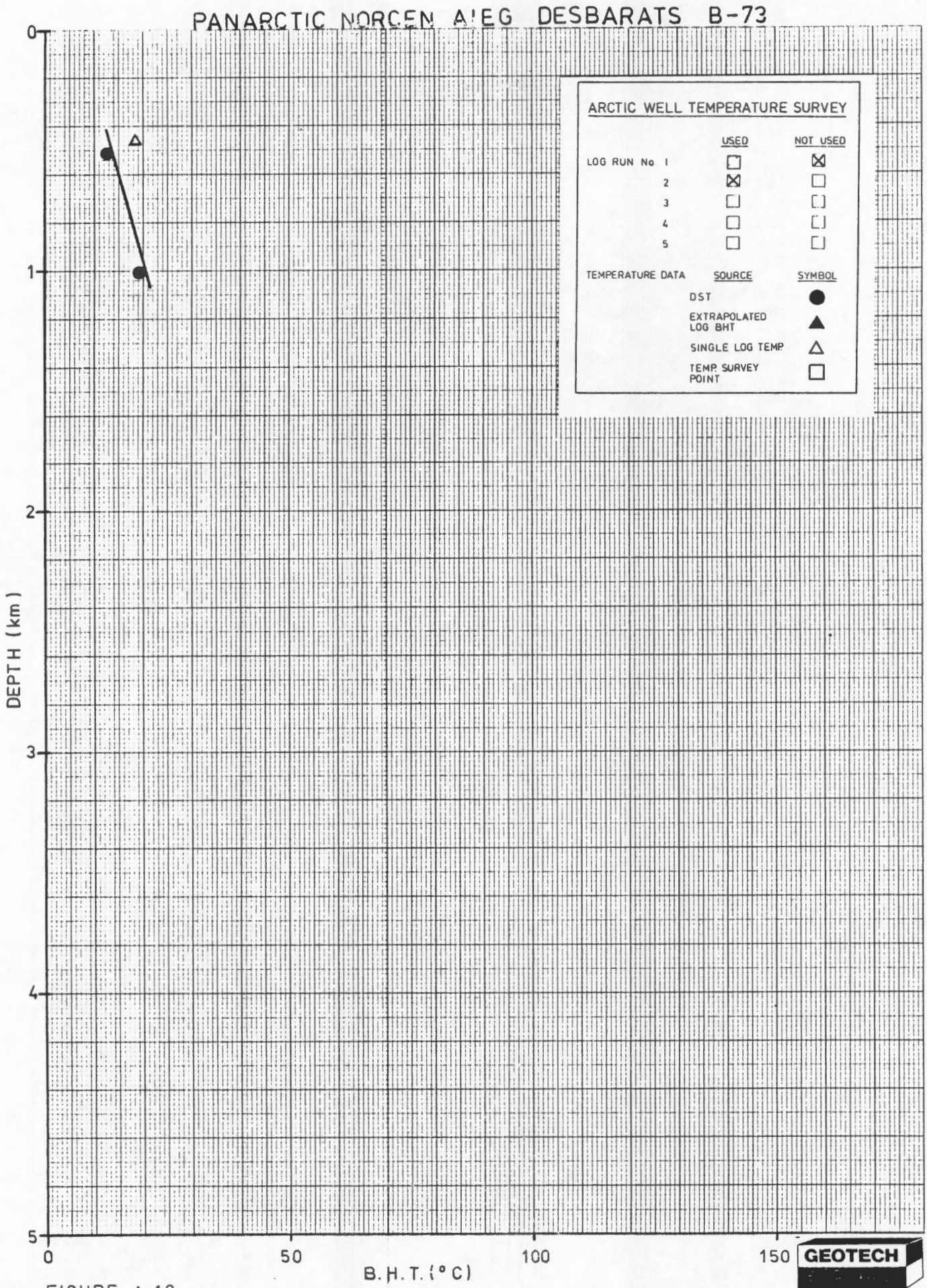


FIGURE A.18

46 1512
K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.



46 1512

K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

FIGURE A.19

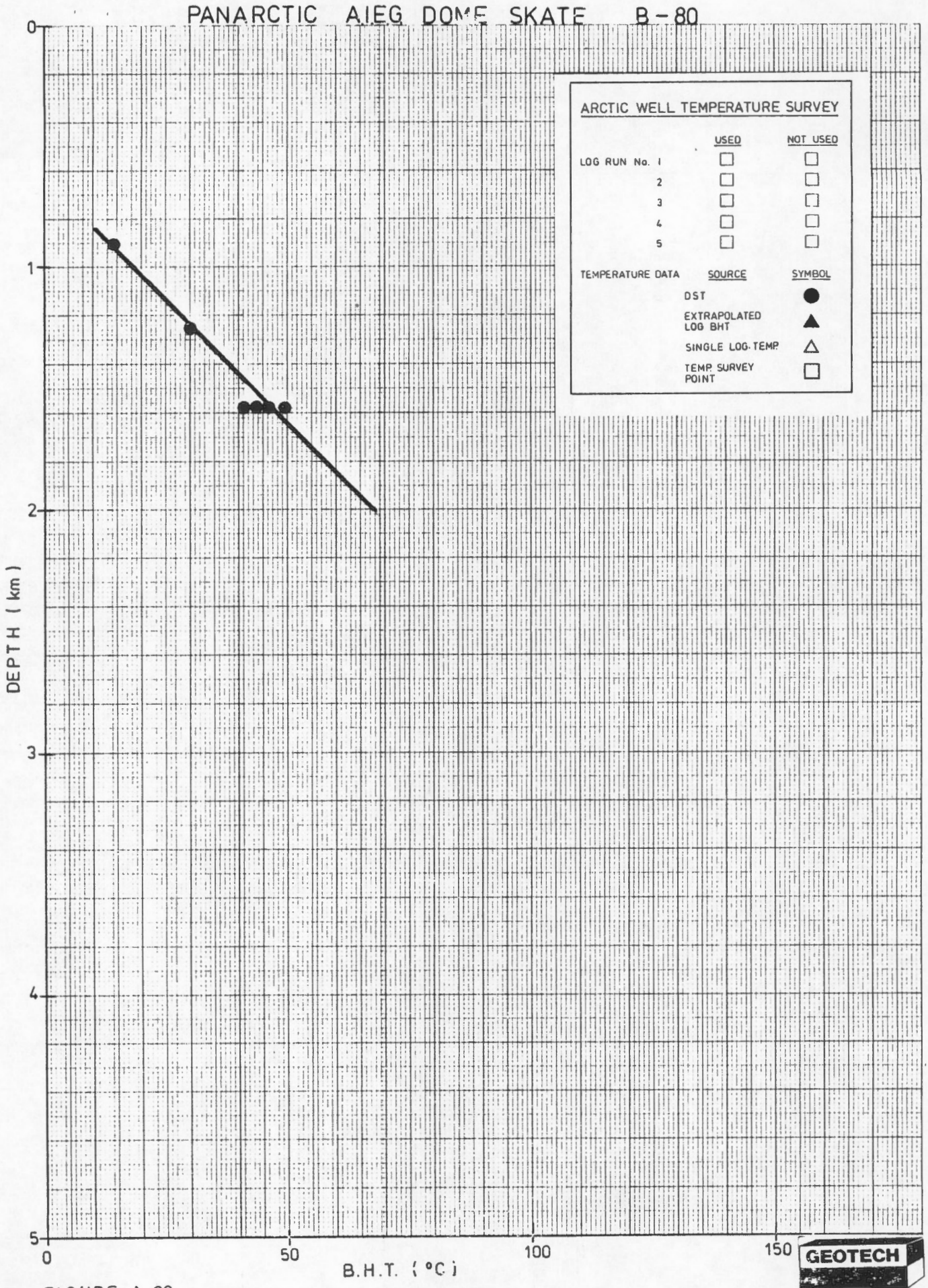


FIGURE A.20

46 1512
K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

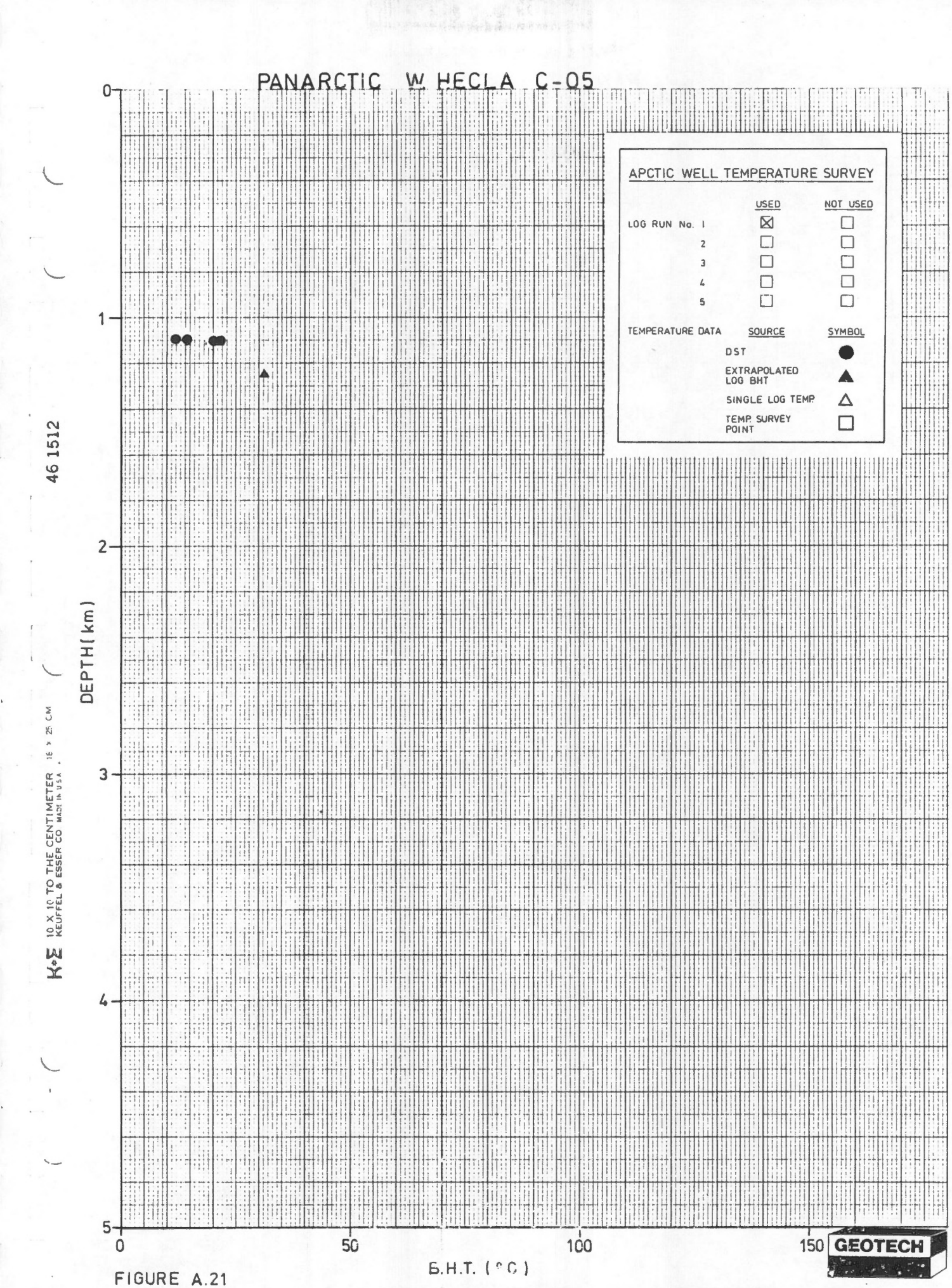

PANARCTIC W HECLA C-05
APCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
K+E 10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE A.21

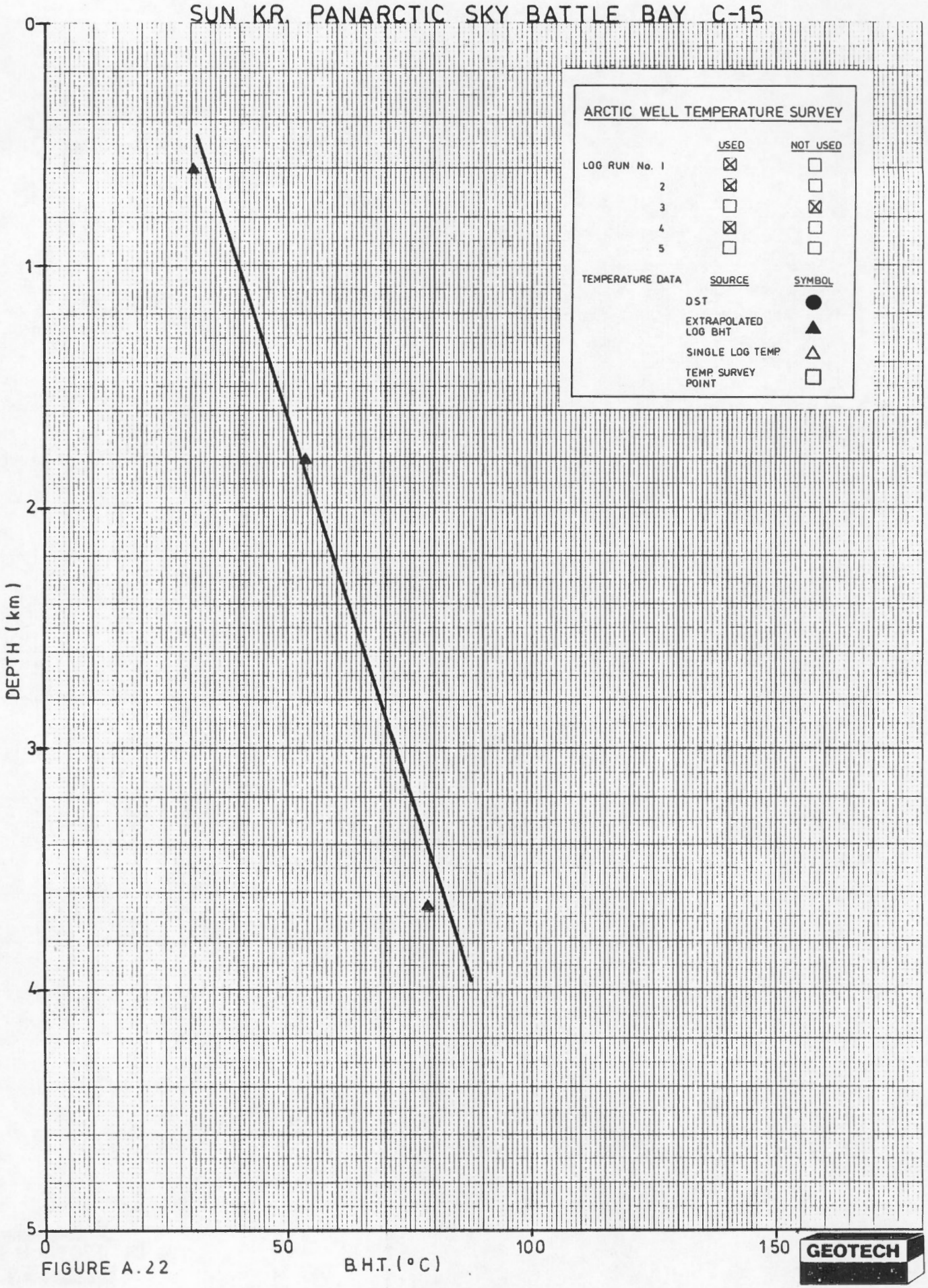

SUN KR. PANARCTIC SKY BATTLE BAY C-15
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.22

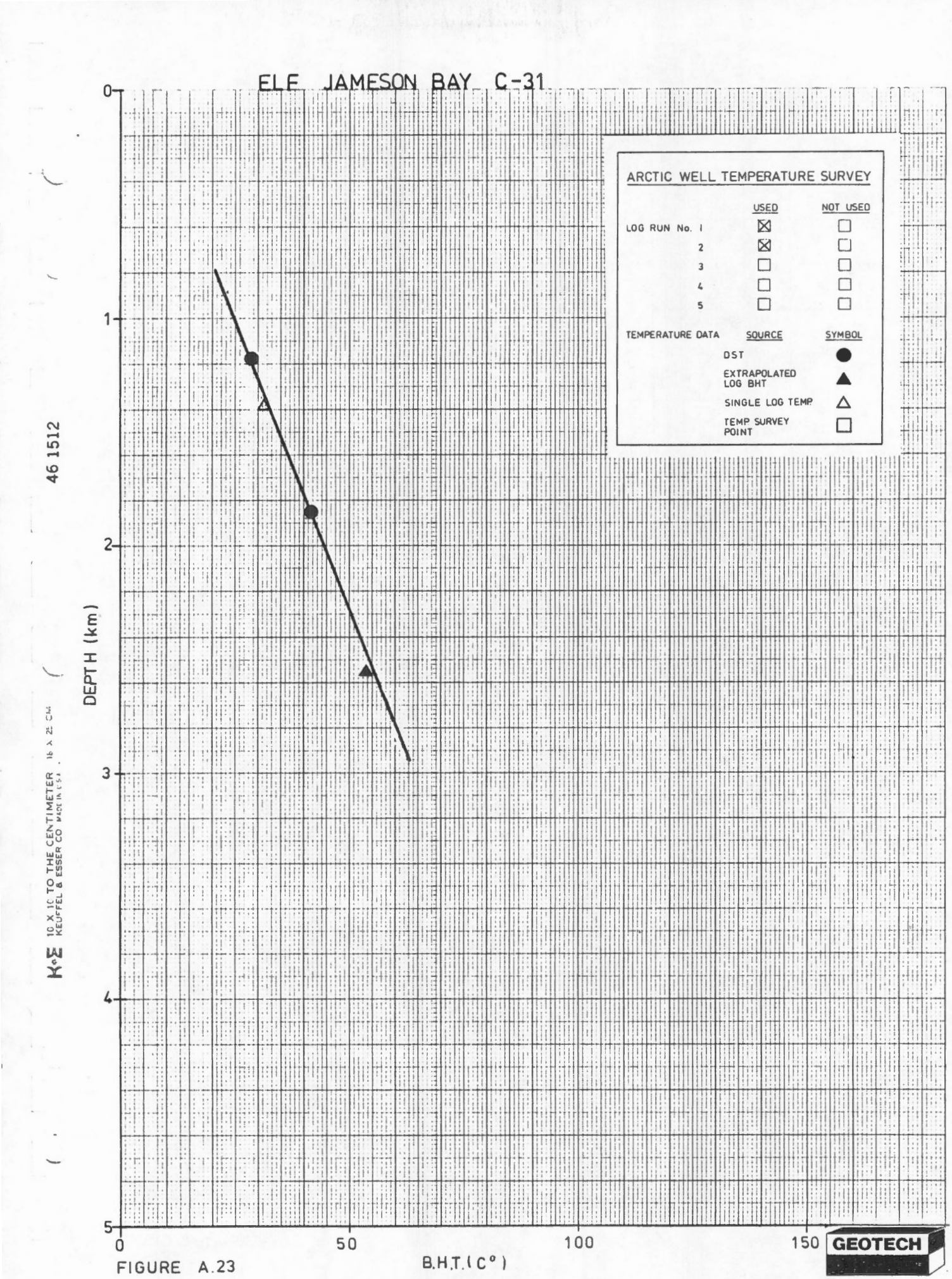

ELF JAMESON BAY C-31
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE A.23

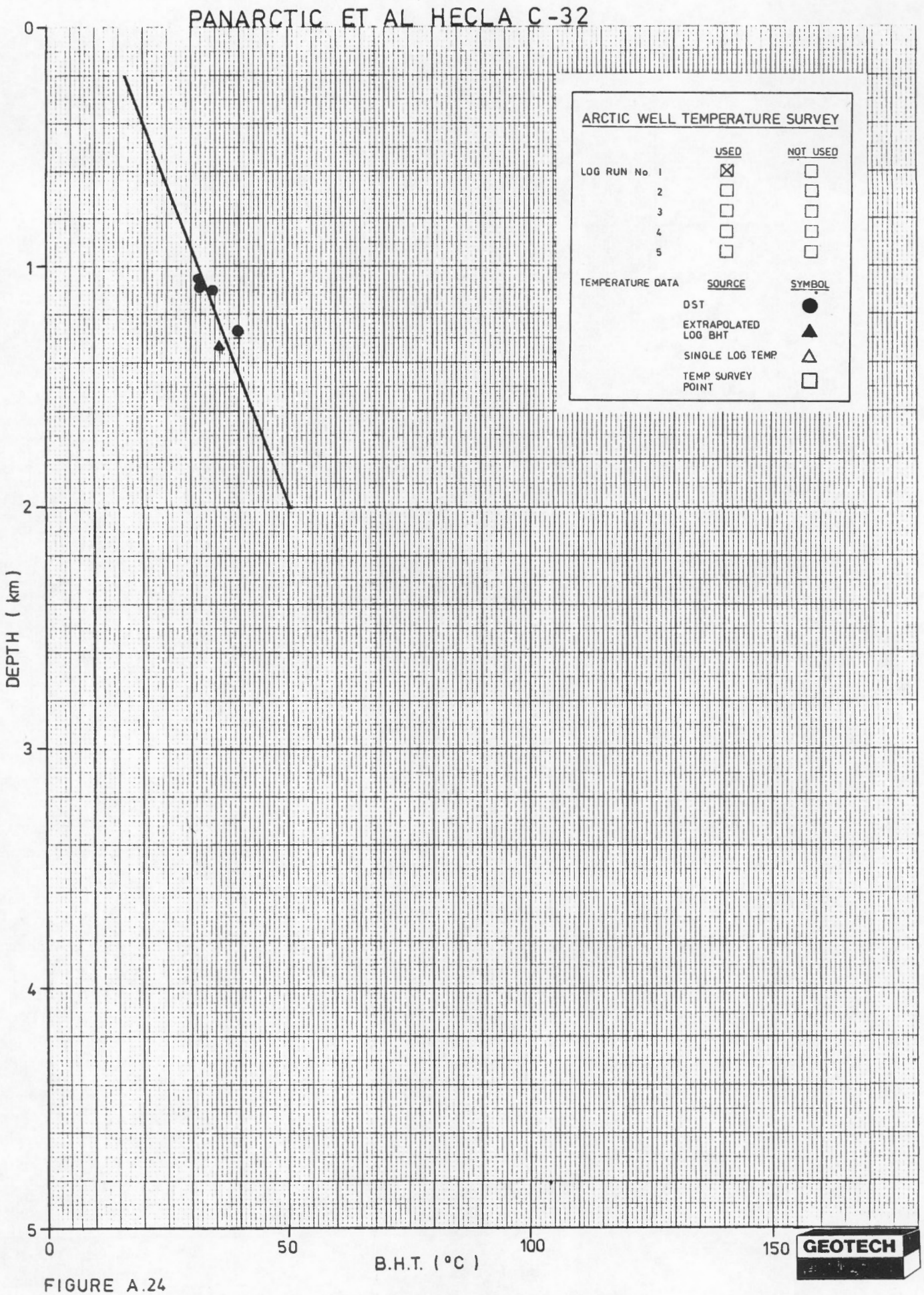


FIGURE A.24

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 x 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

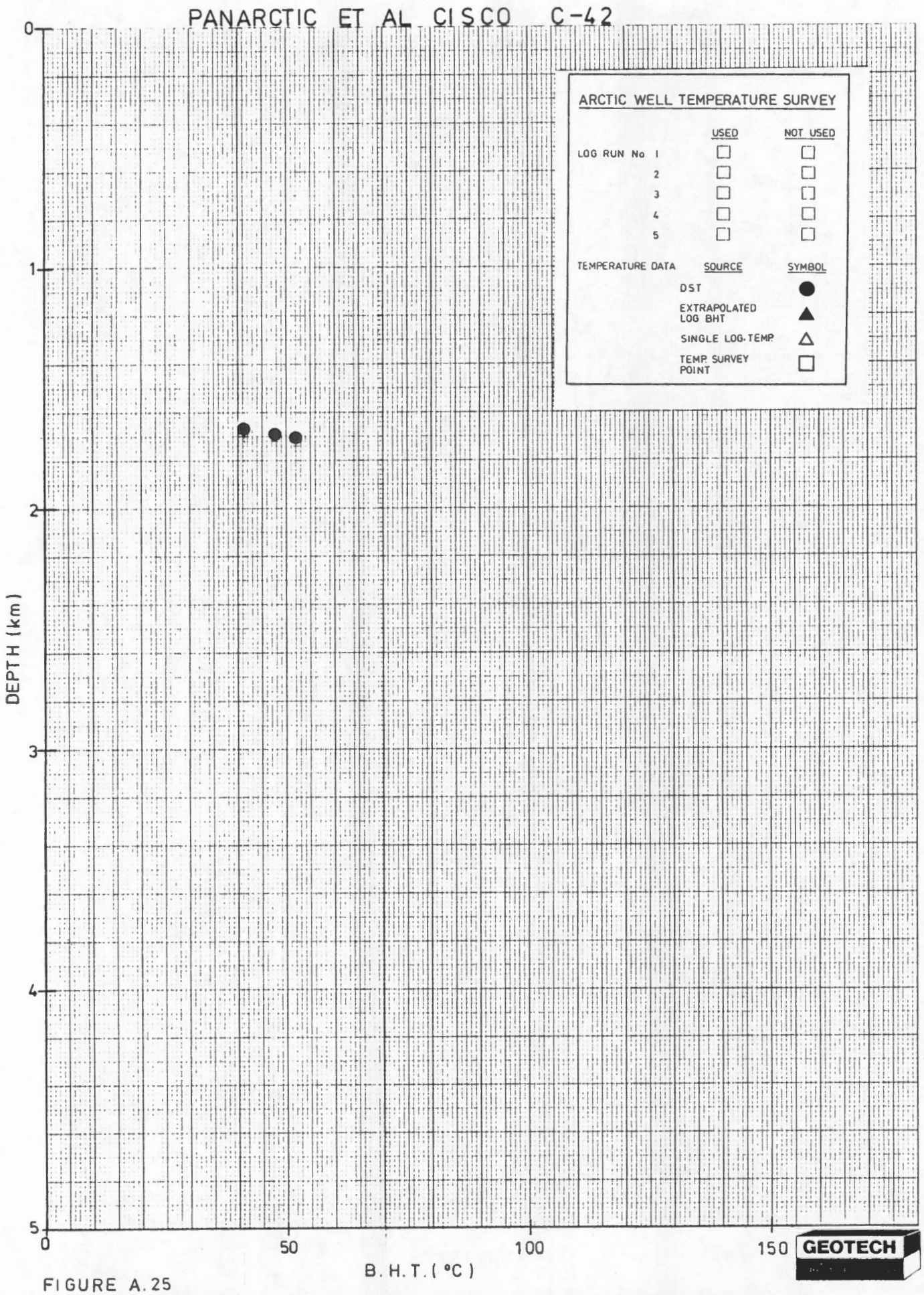

PANARCTIC ET AL CISCO C-42
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.25

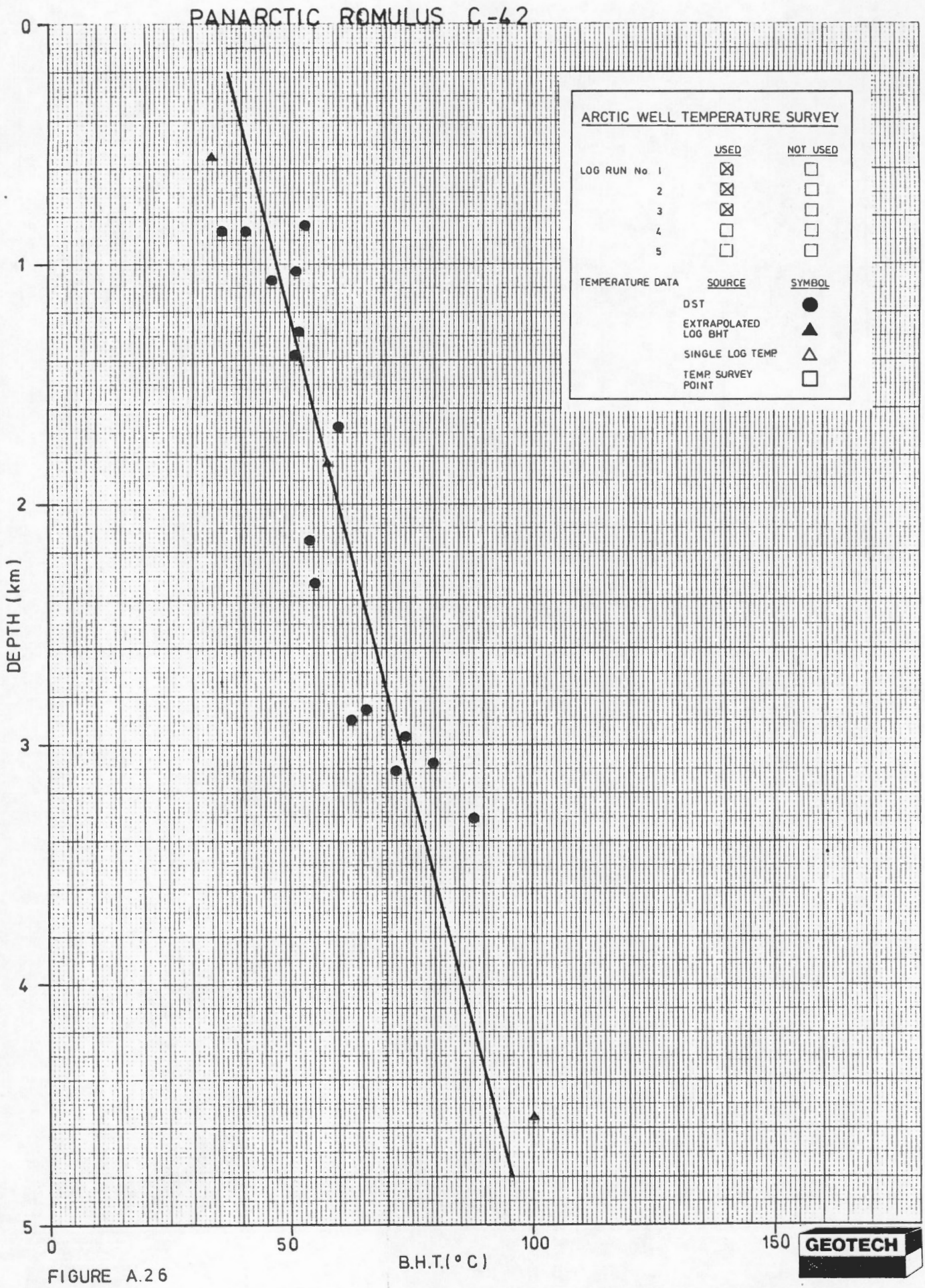

PANARCTIC ROMULUS C-42
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE A.26

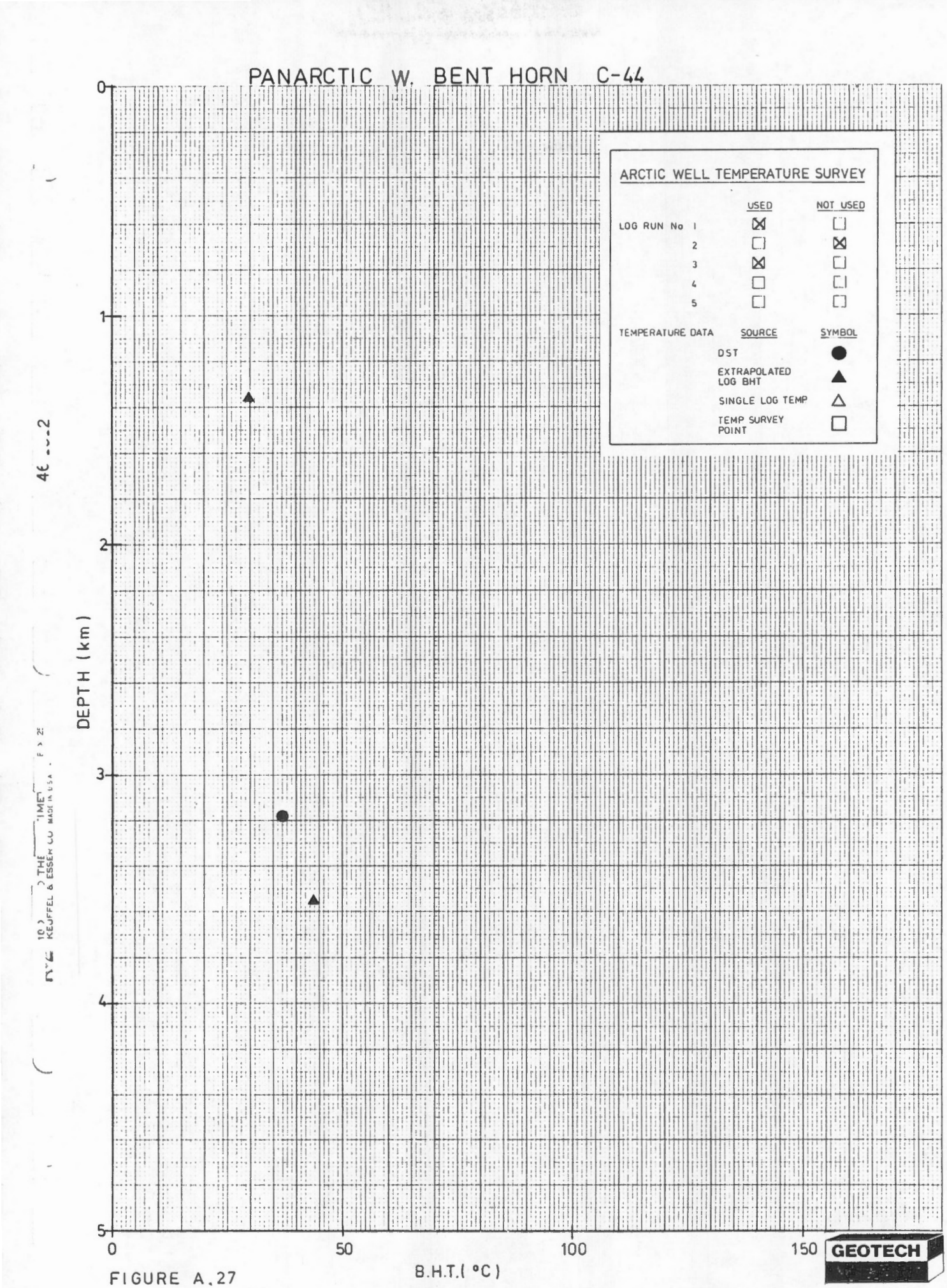

PANARCTIC W. BENT HORN C-44
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE A.27

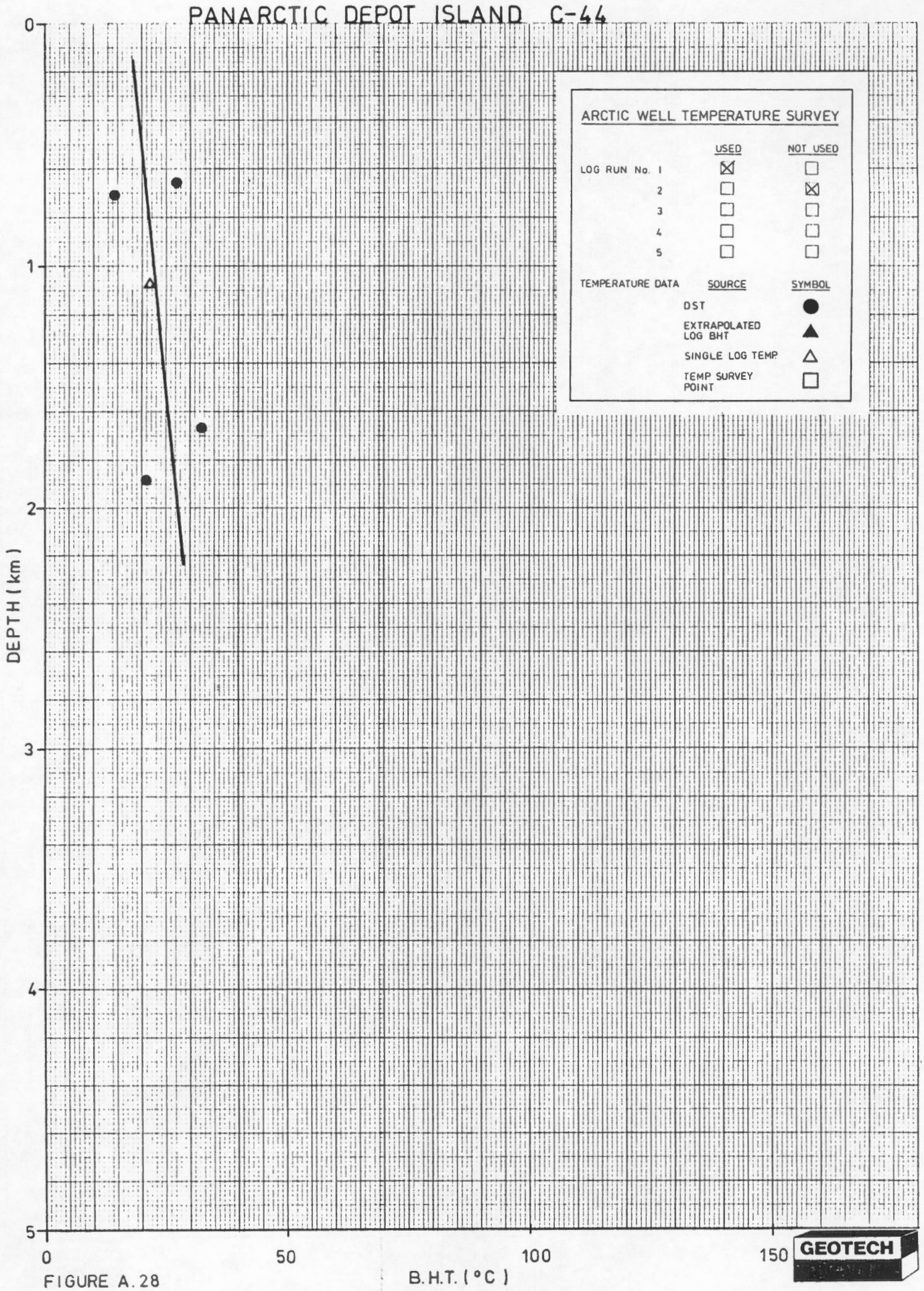

PANARCTIC DEPOT ISLAND C-44
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH
46 1512
KEUFFEL & ESSER CO MADE IN USA

FIGURE A.28

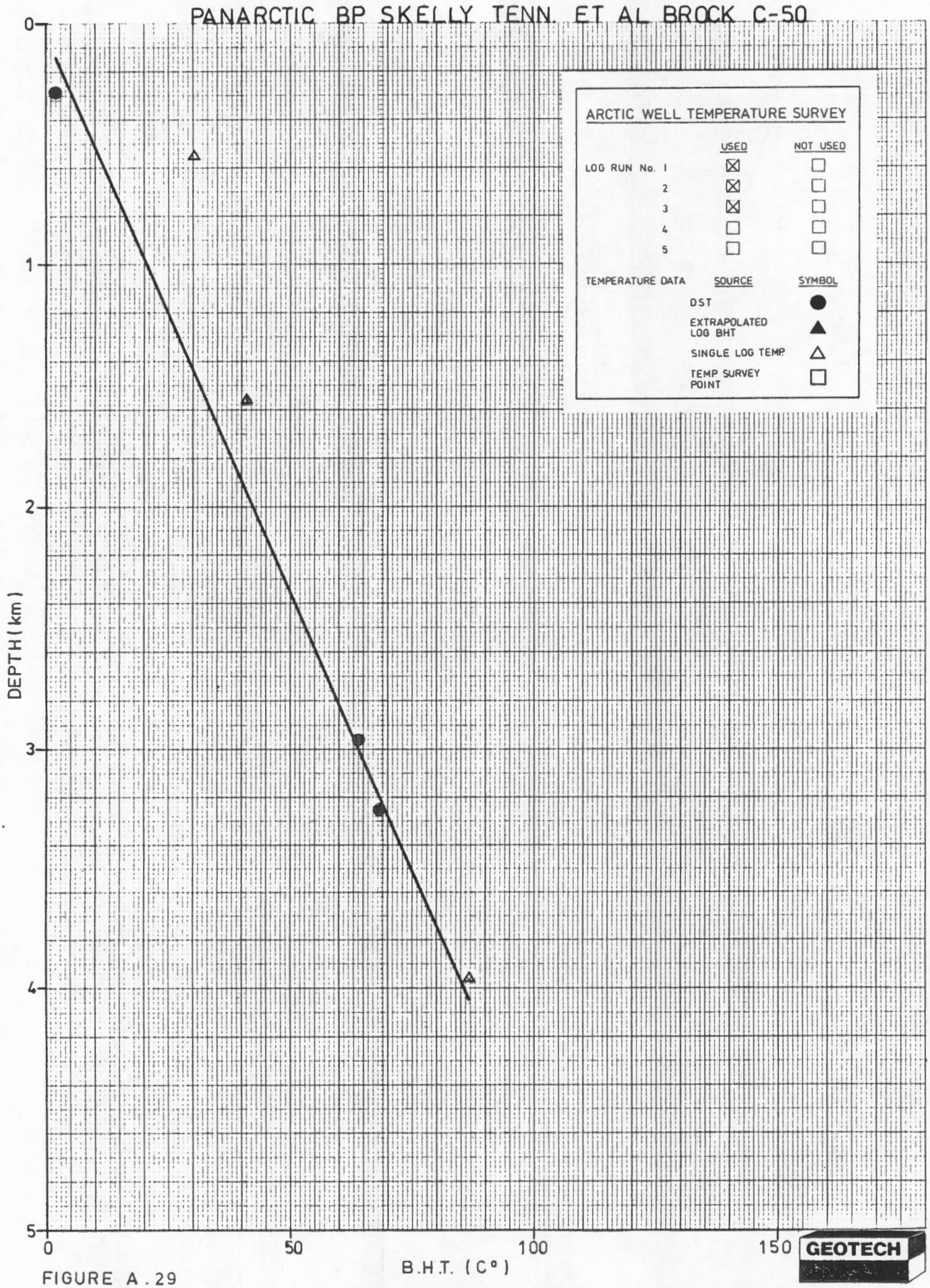


FIGURE A.29

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

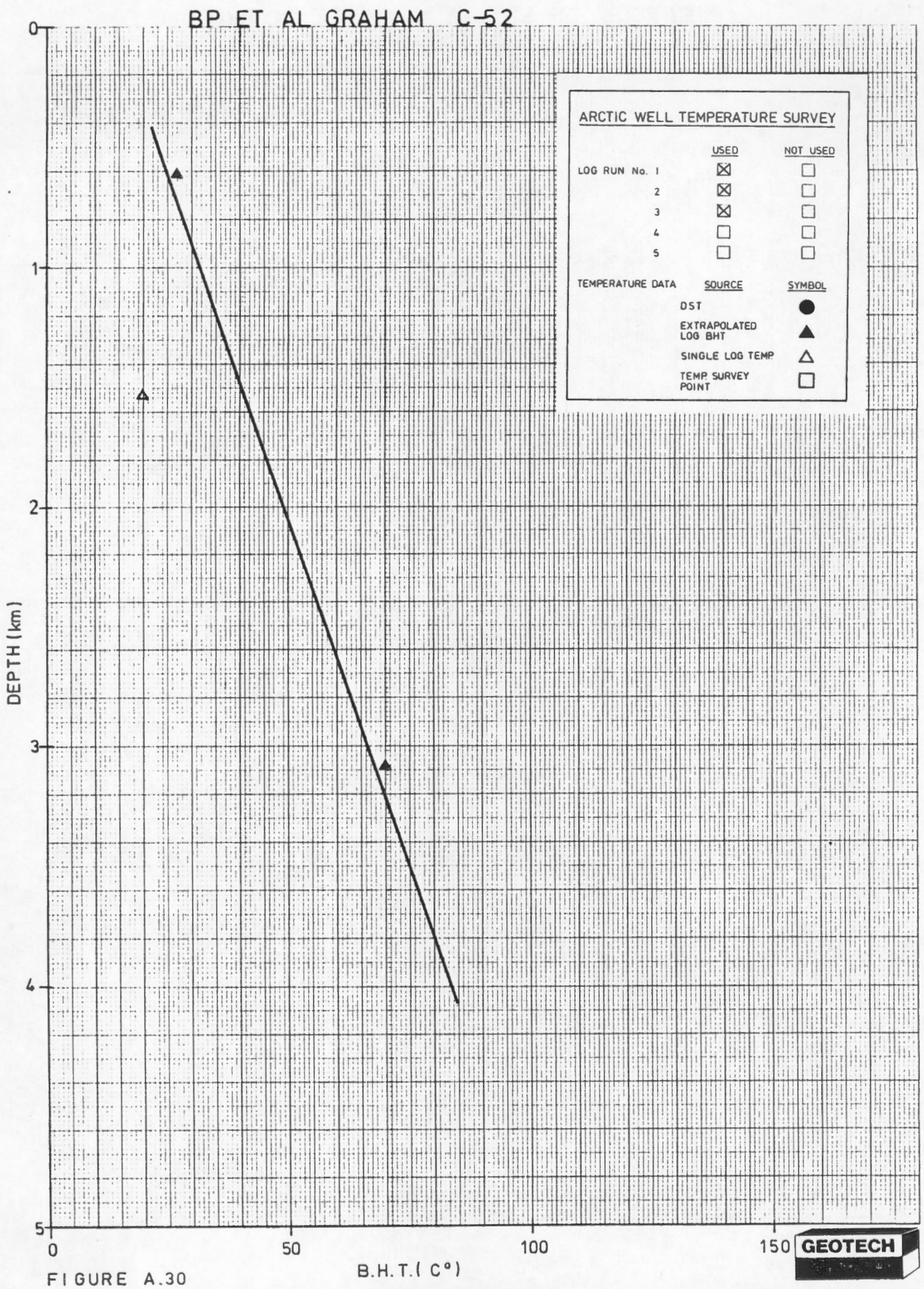

BP ET AL GRAHAM C-52
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(C°)
GEOTECH

FIGURE A.30

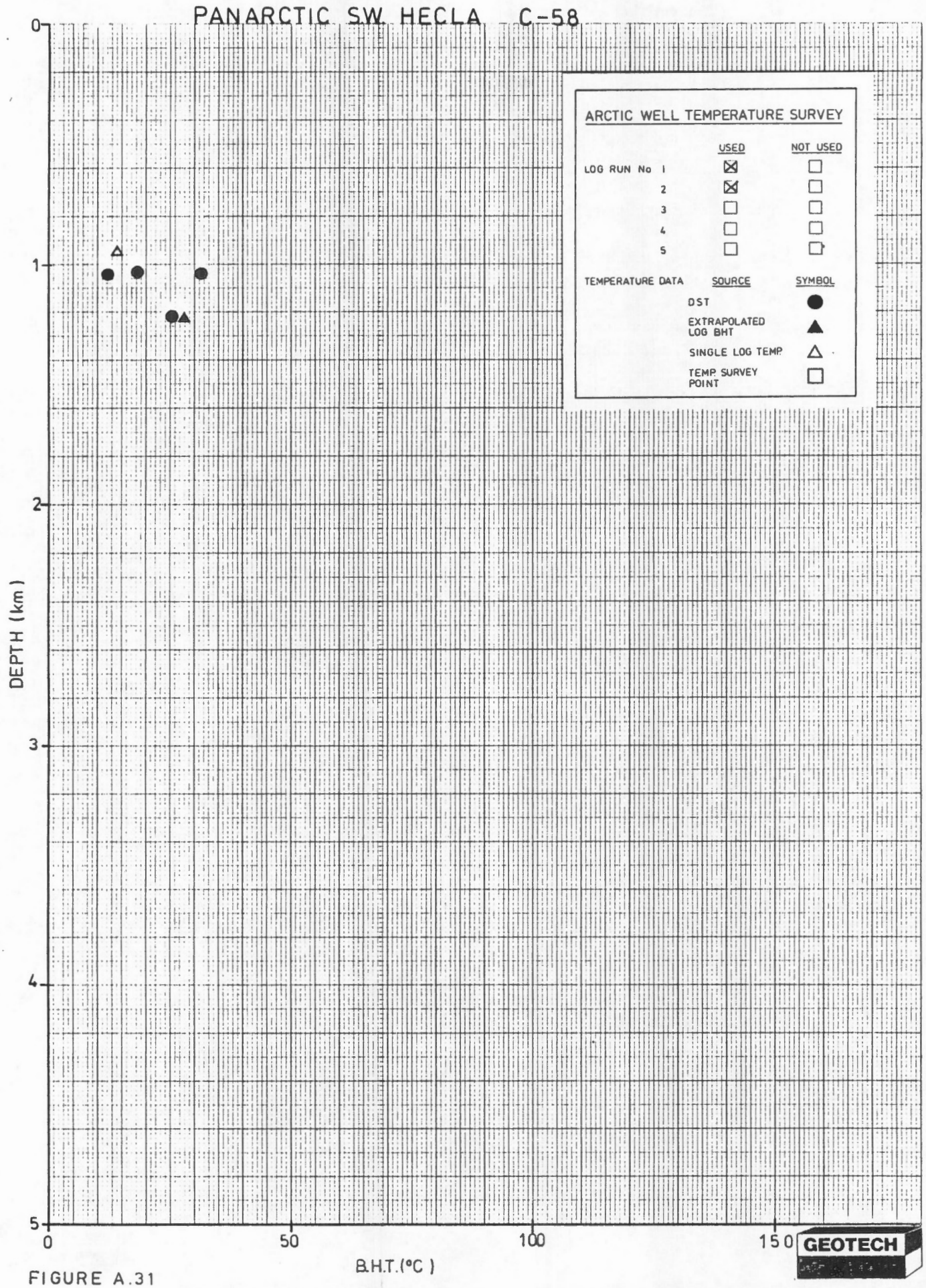

PANARCTIC S.W. HECLA C-58
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
KEUFFEL & ESSER CO MADE IN USA
GEOTECH

FIGURE A.31

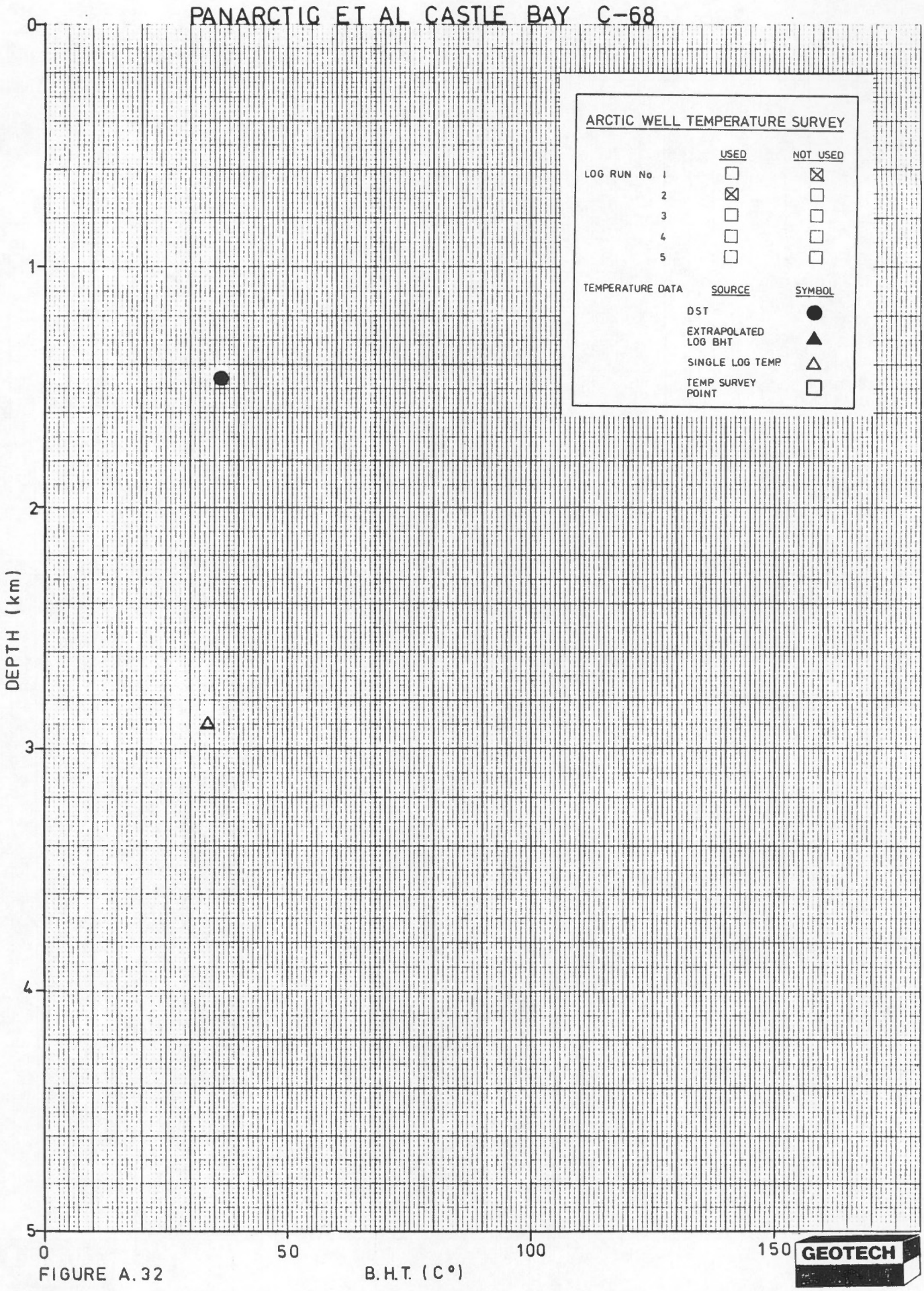


FIGURE A.32

46 1512
K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

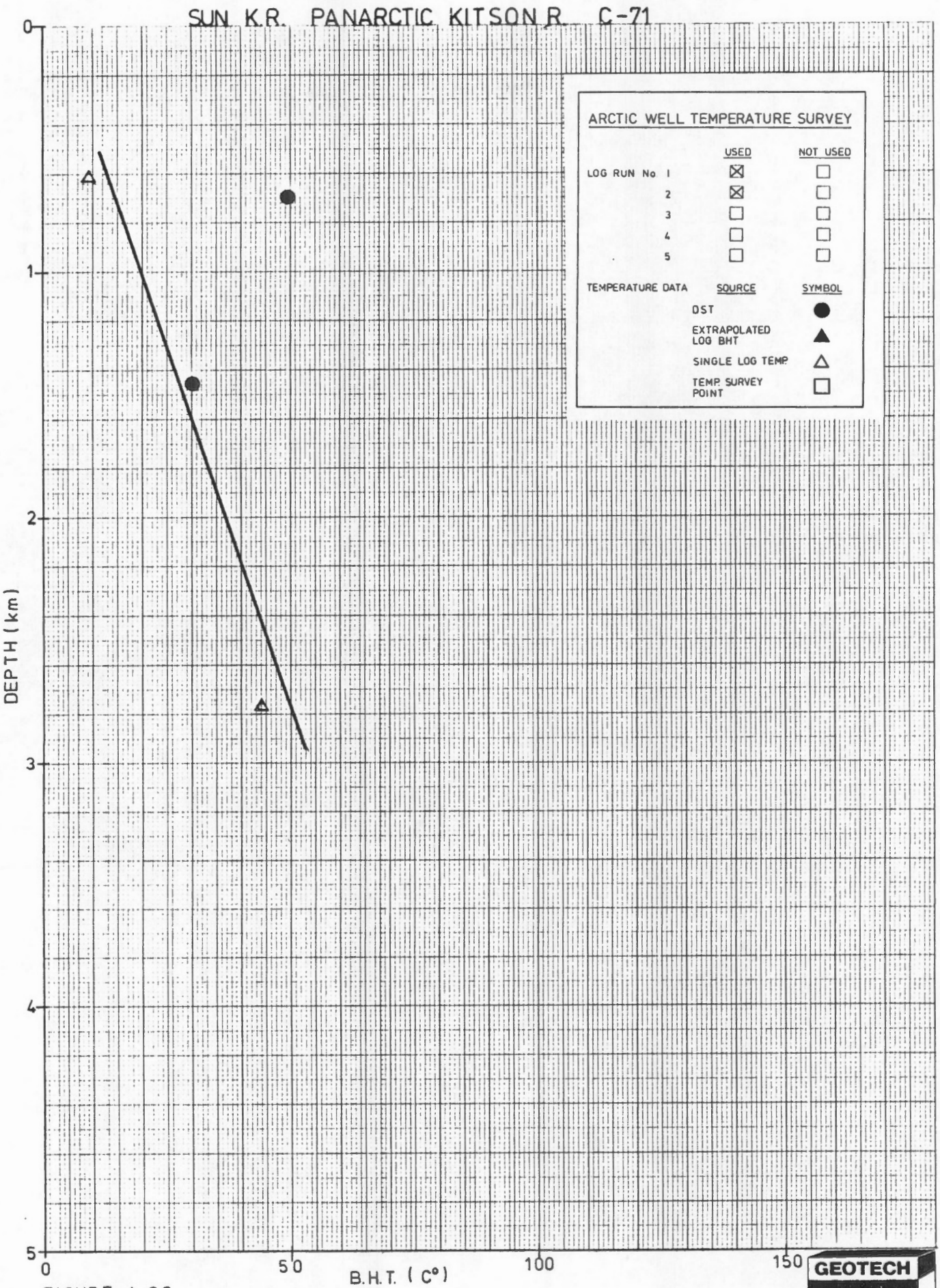

SUN K.R. PANARCTIC KITSON R. C-71
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE A.33

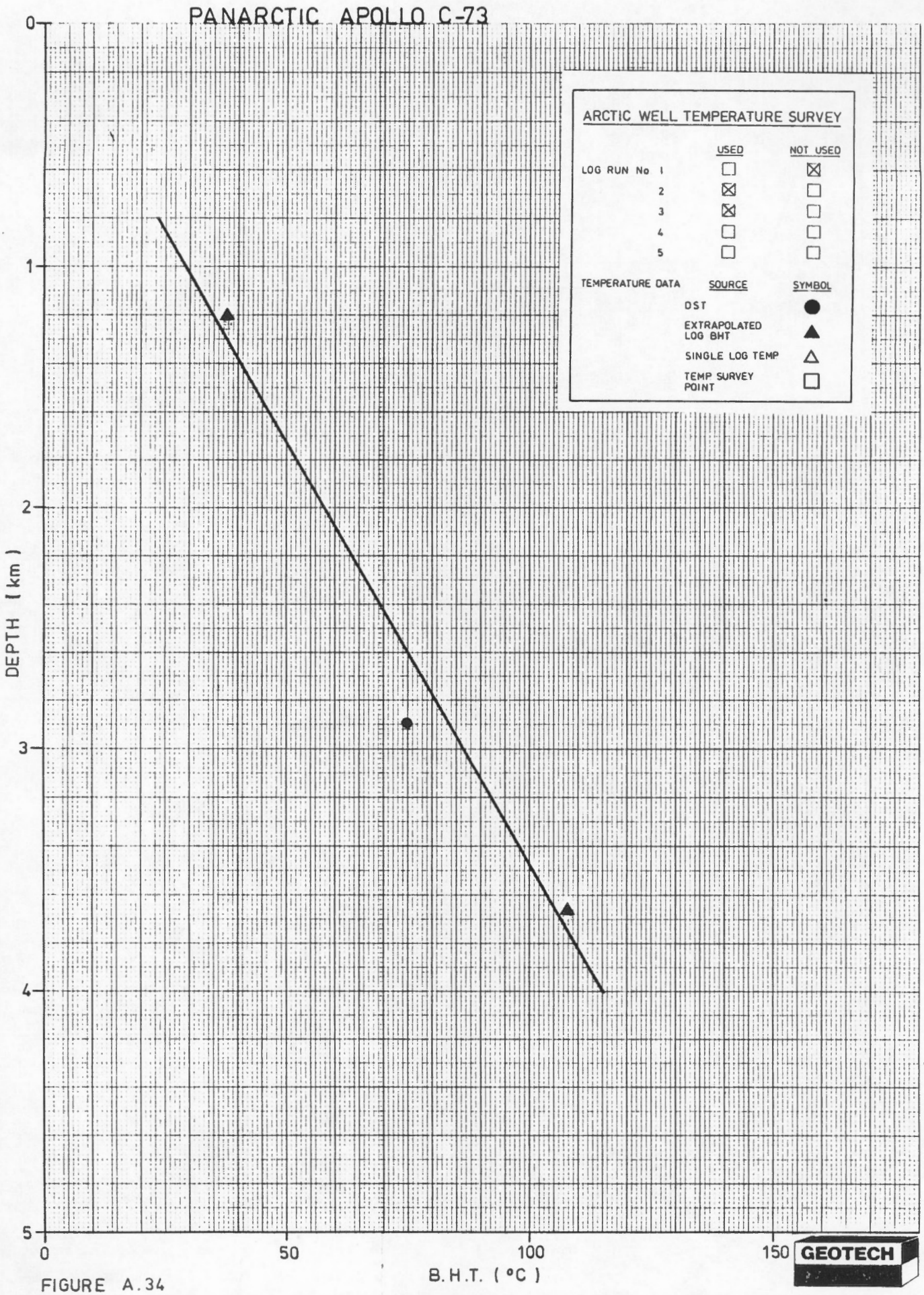

PANARCTIC APOLLO C-73
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.34

MOBIL SADENE D-02

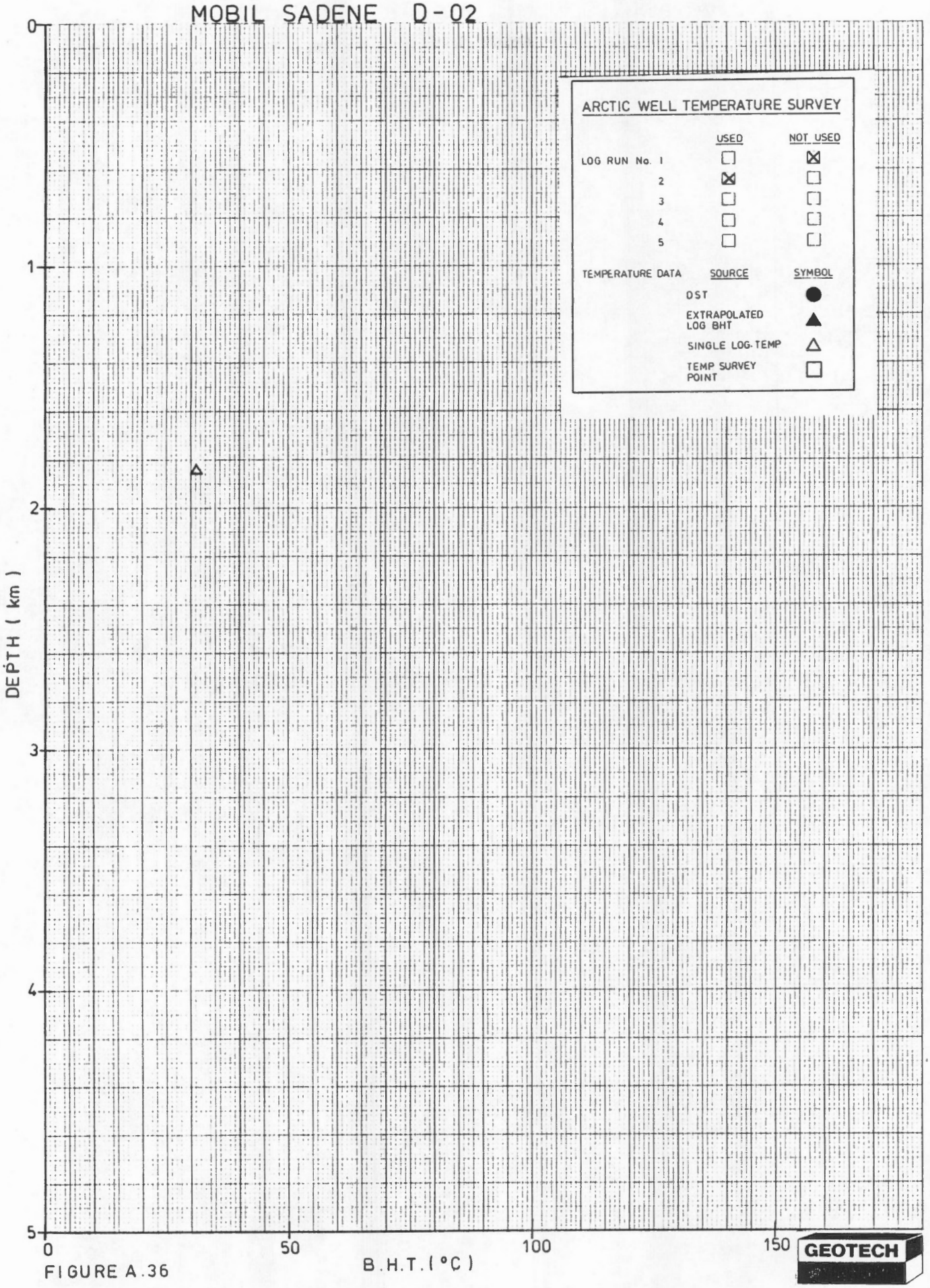


FIGURE A.36

GEOTECH

46 1512
KEUFFEL & ESSER CO MADE IN USA

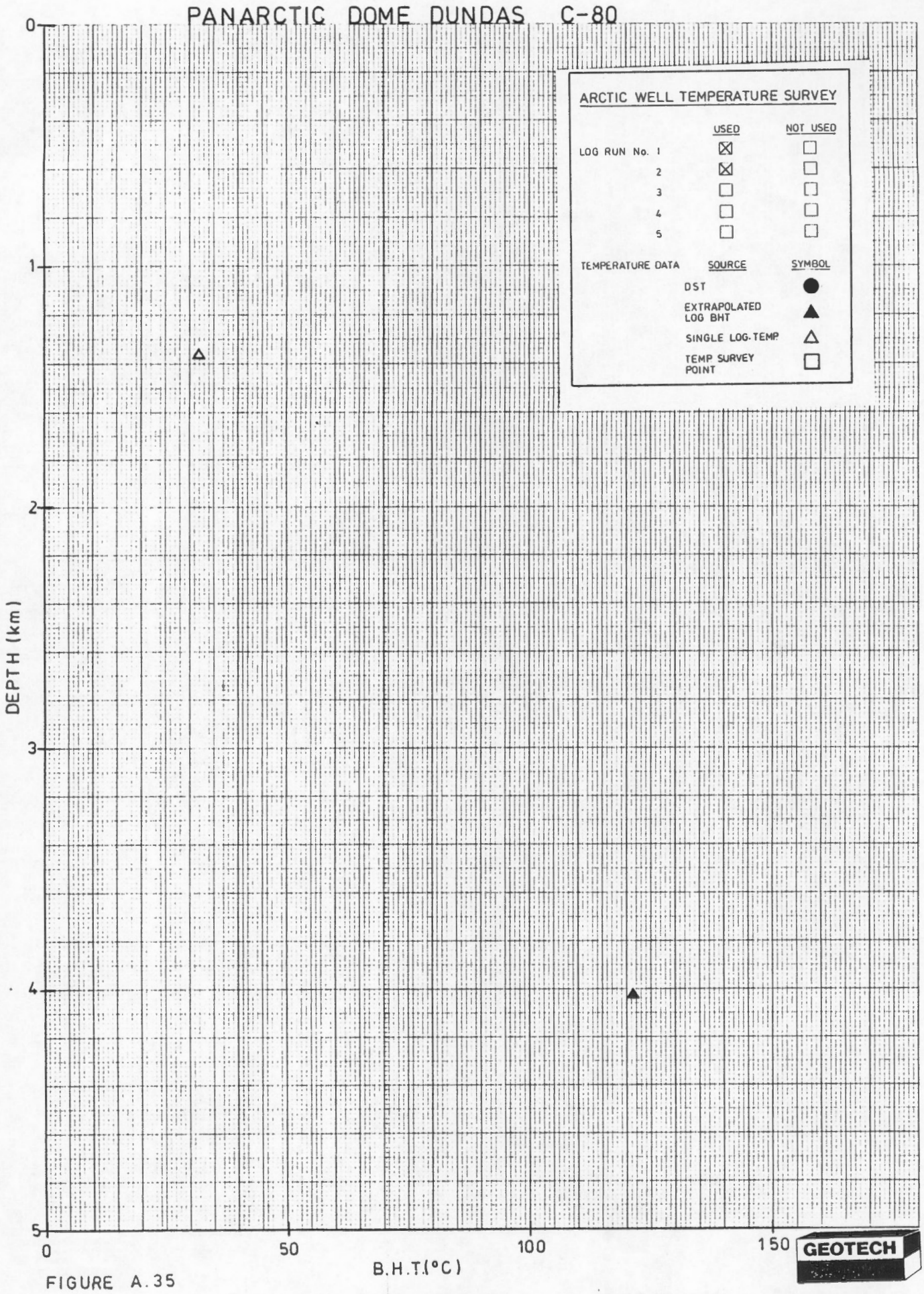
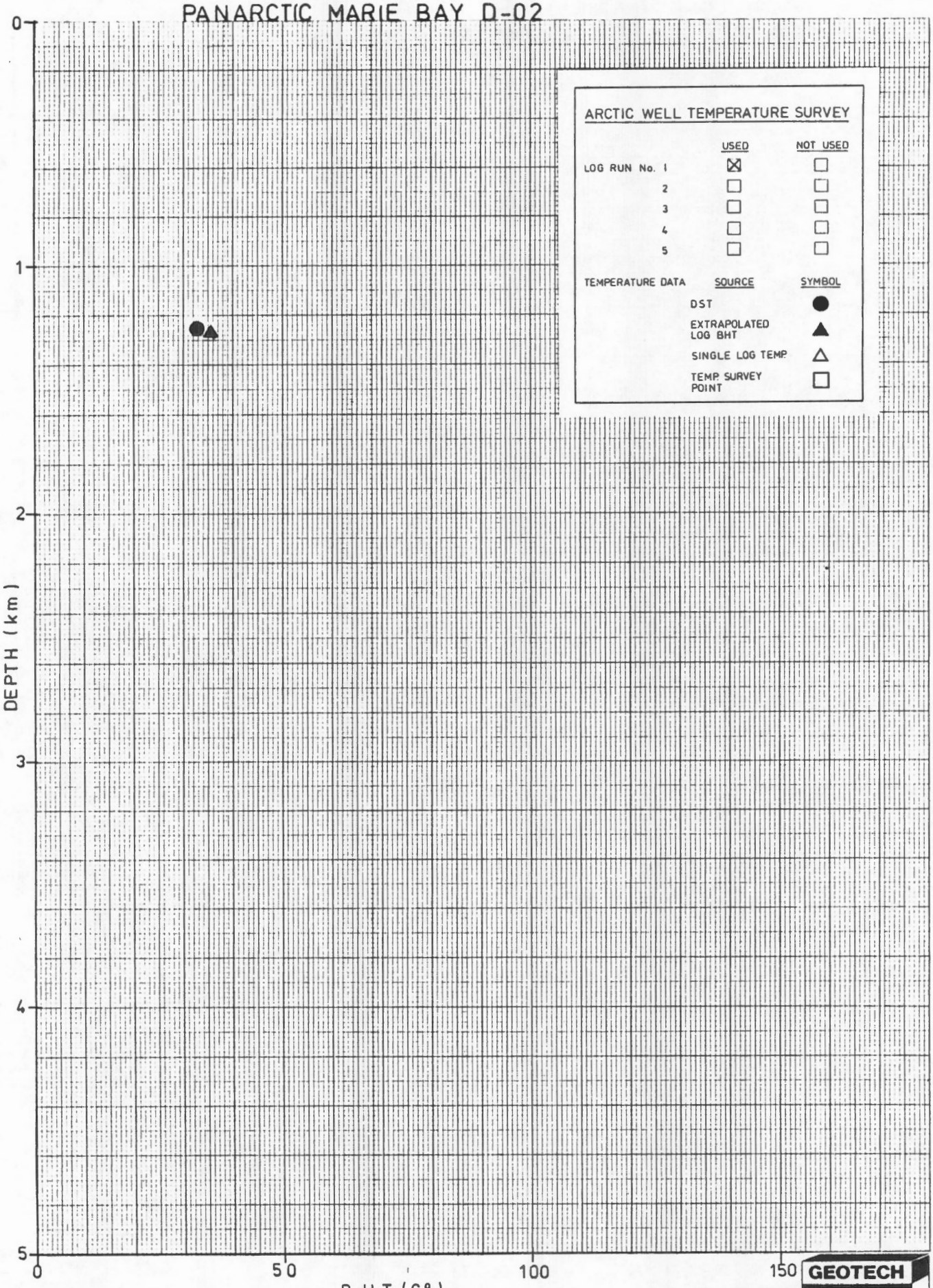

PANARCTIC DOME DUNDAS C-80
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE A.35

PANARCTIC MARIE BAY D-02

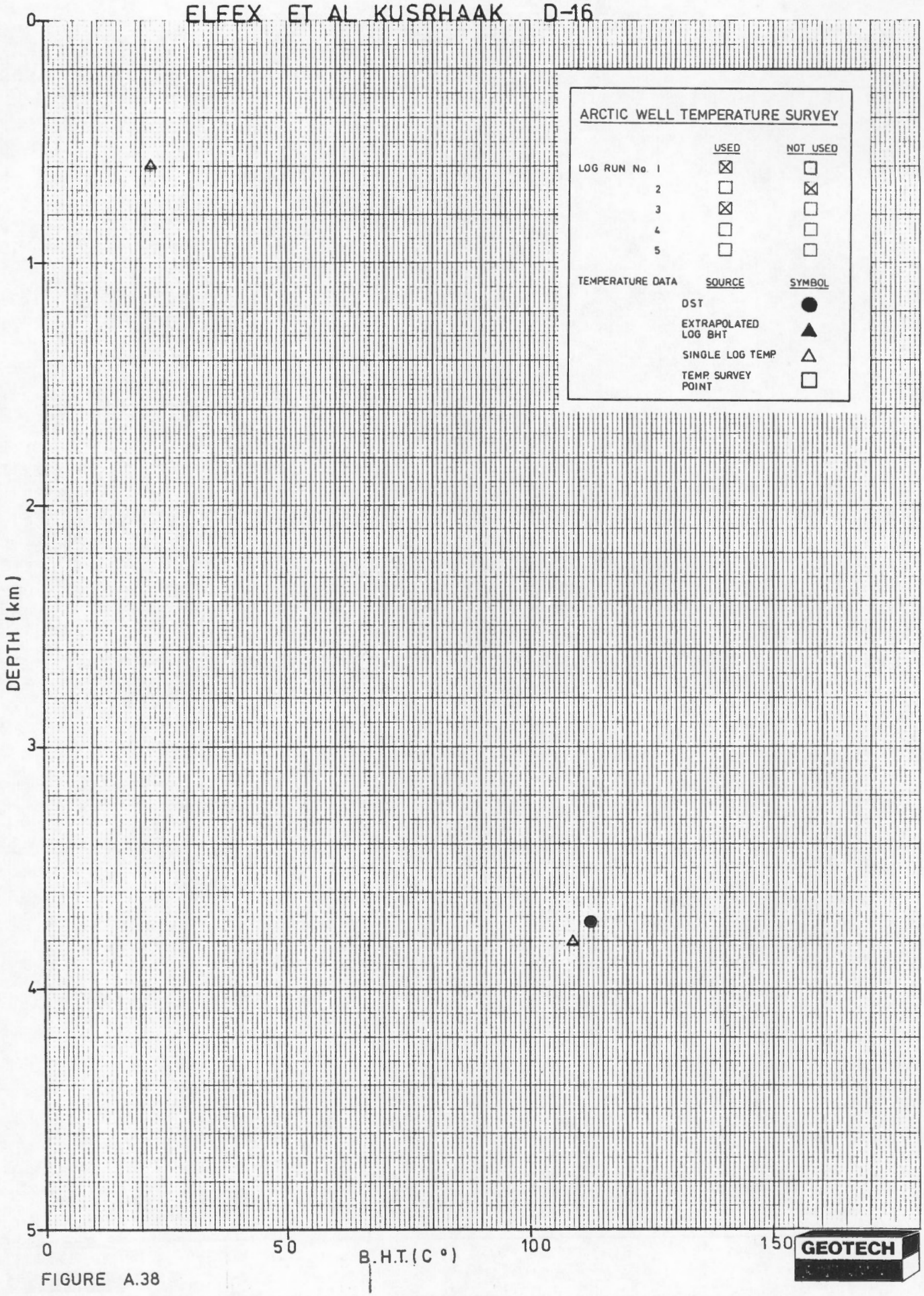


46 1512

K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

GEOTECH

FIGURE A.37



46 1512

K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

FIGURE A.38

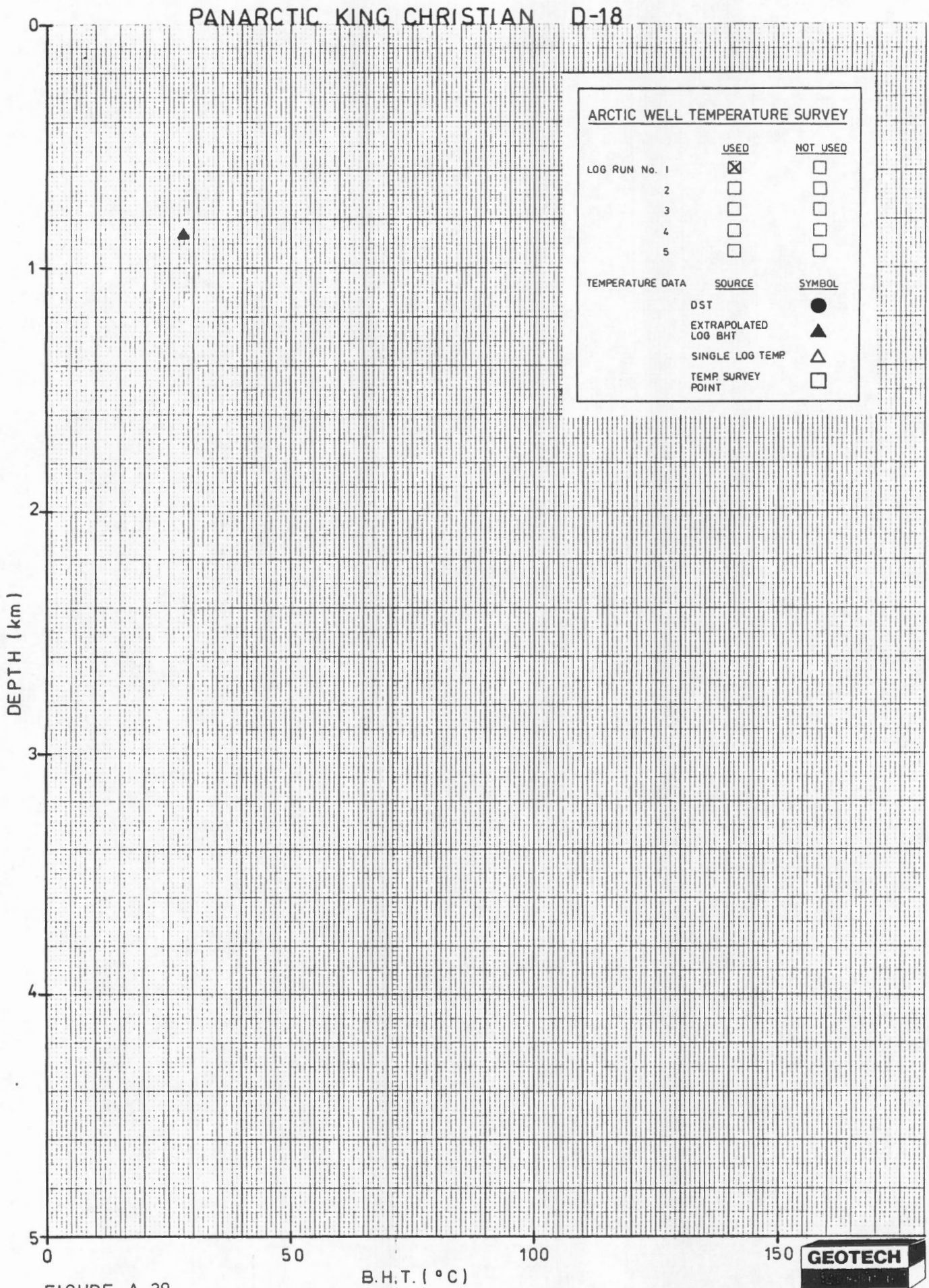
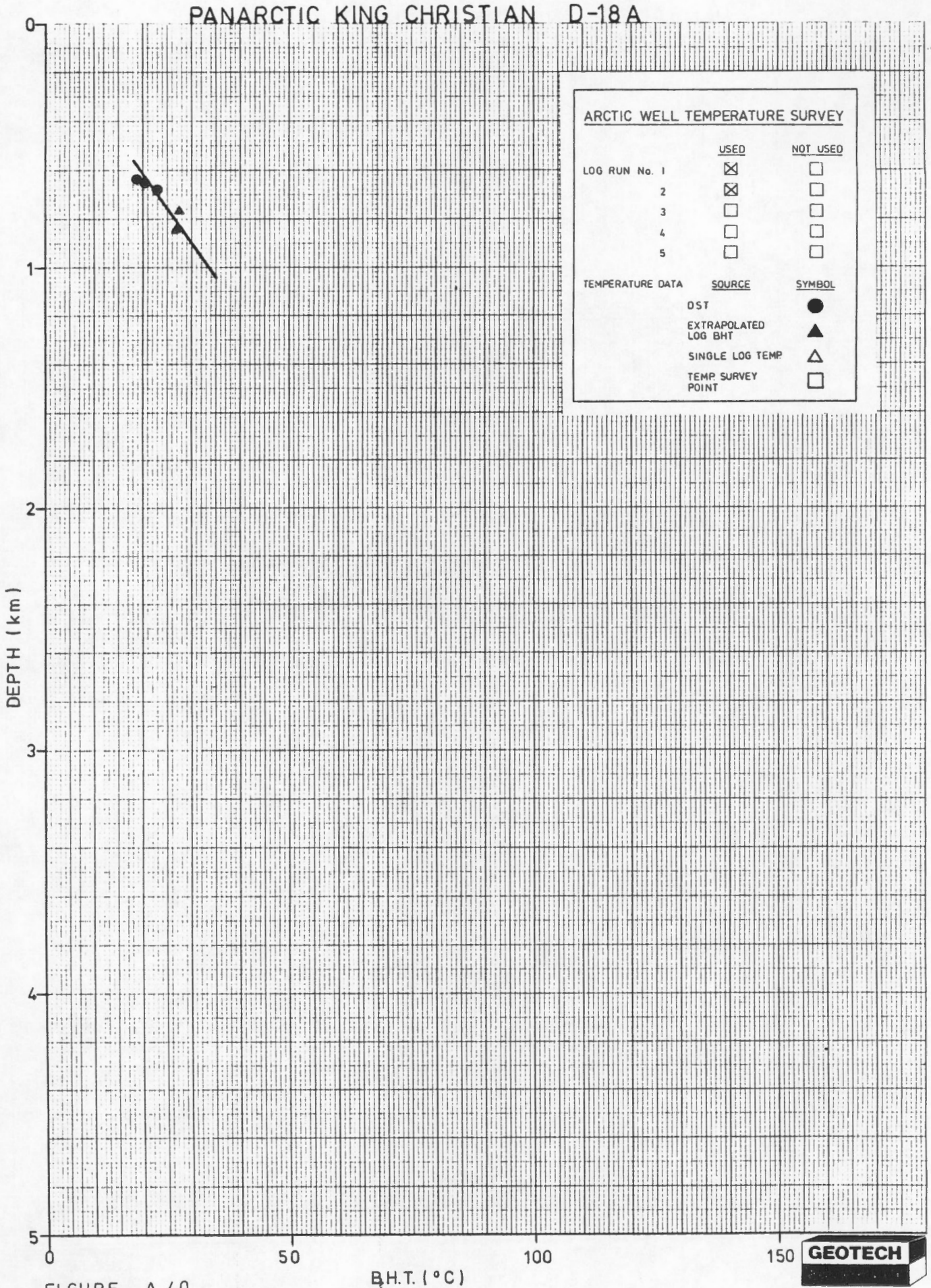

PANARCTIC KING CHRISTIAN D-18
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.39



46 1512

10 X 10 TO THE CENTIMETER 18 X 25 CM.
KEUFFEL & ESSER CO MADE IN U.S.A.

FIGURE A.40

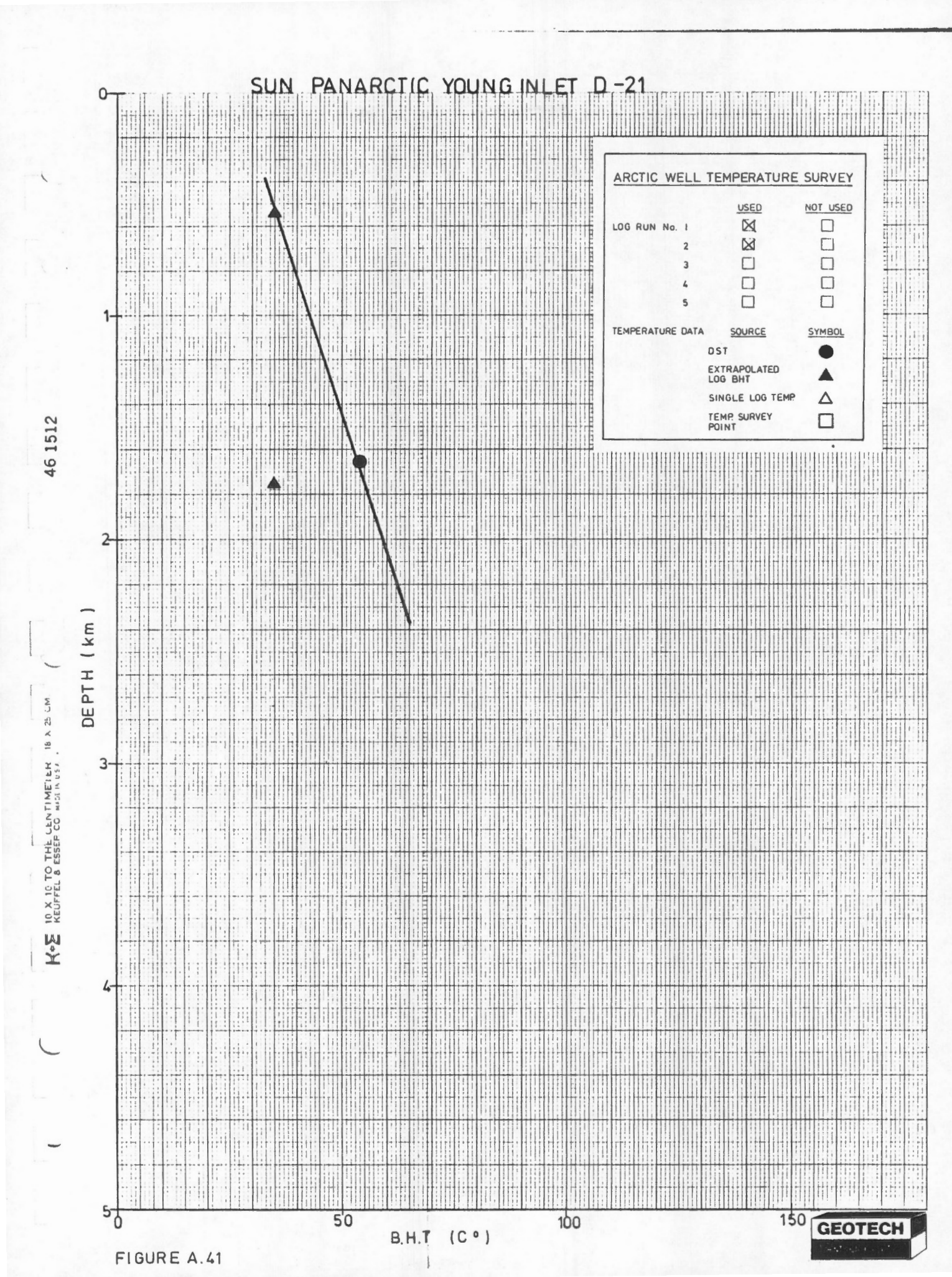

SUN PANARCTIC YOUNG INLET D-21
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T (C°)
GEOTECH
46 1512
10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN USA

FIGURE A.41

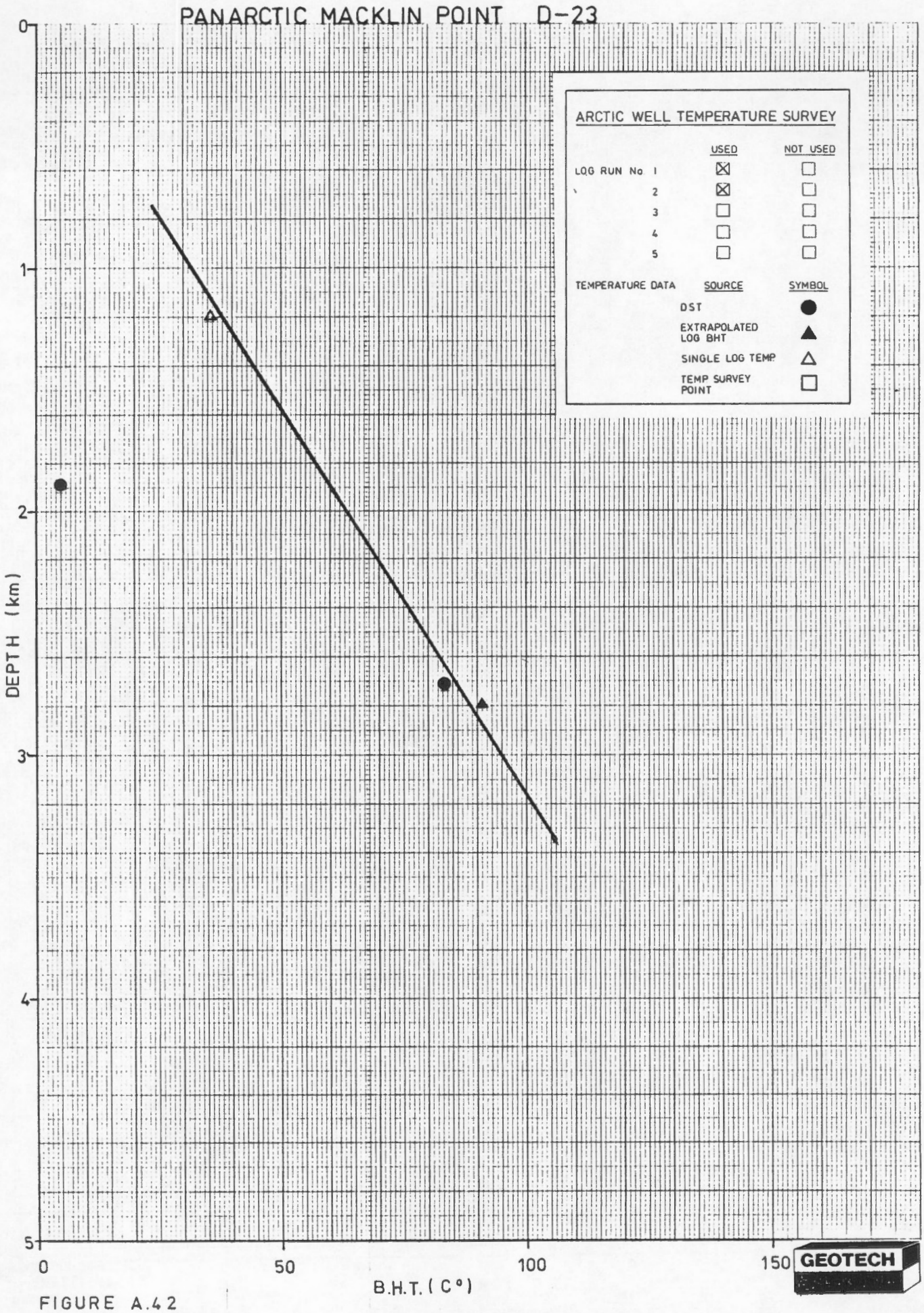


FIGURE A.42

46 1512
KOE 10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

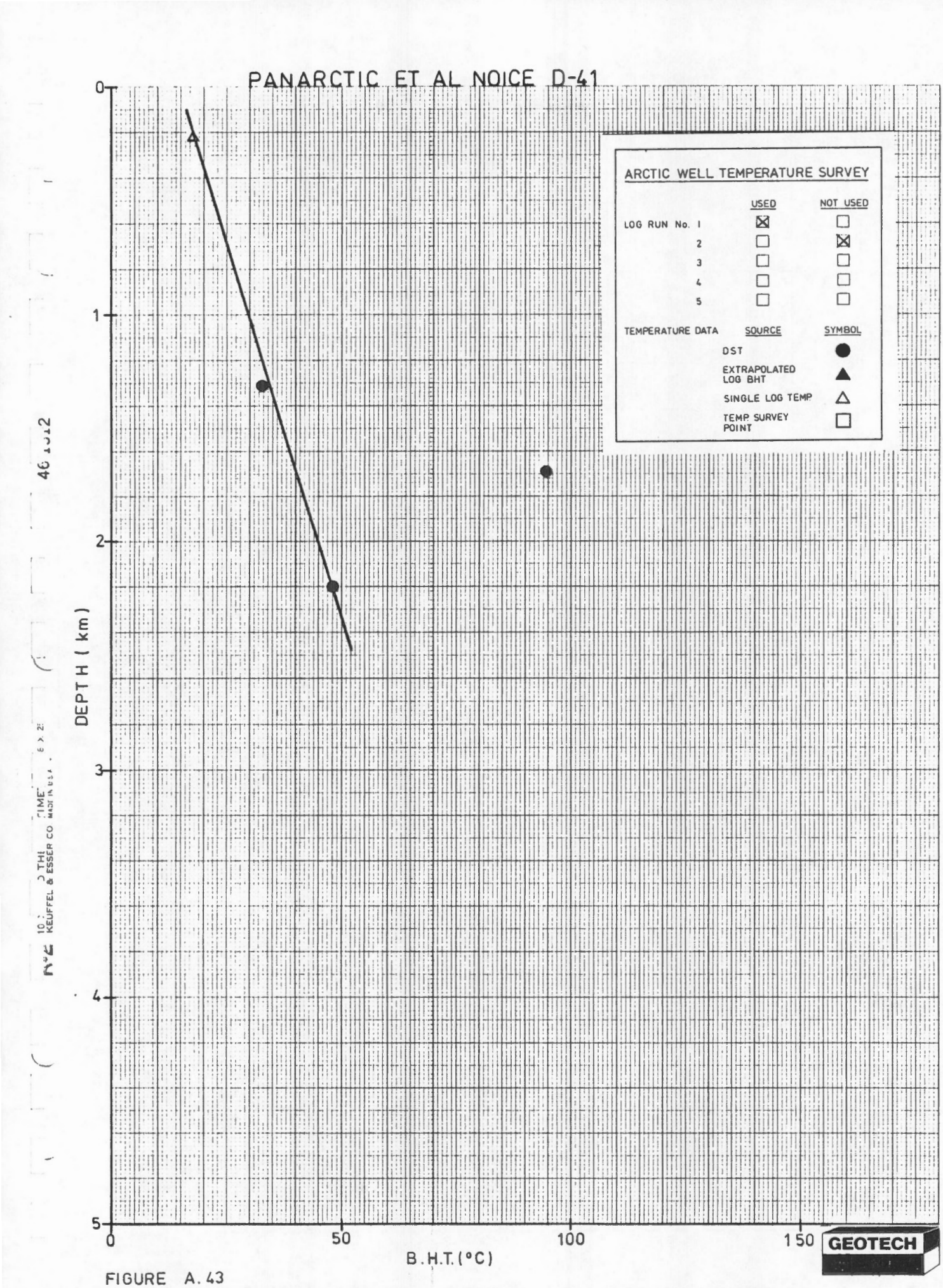

PANARCTIC ET AL NOICE D-41
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE A.43

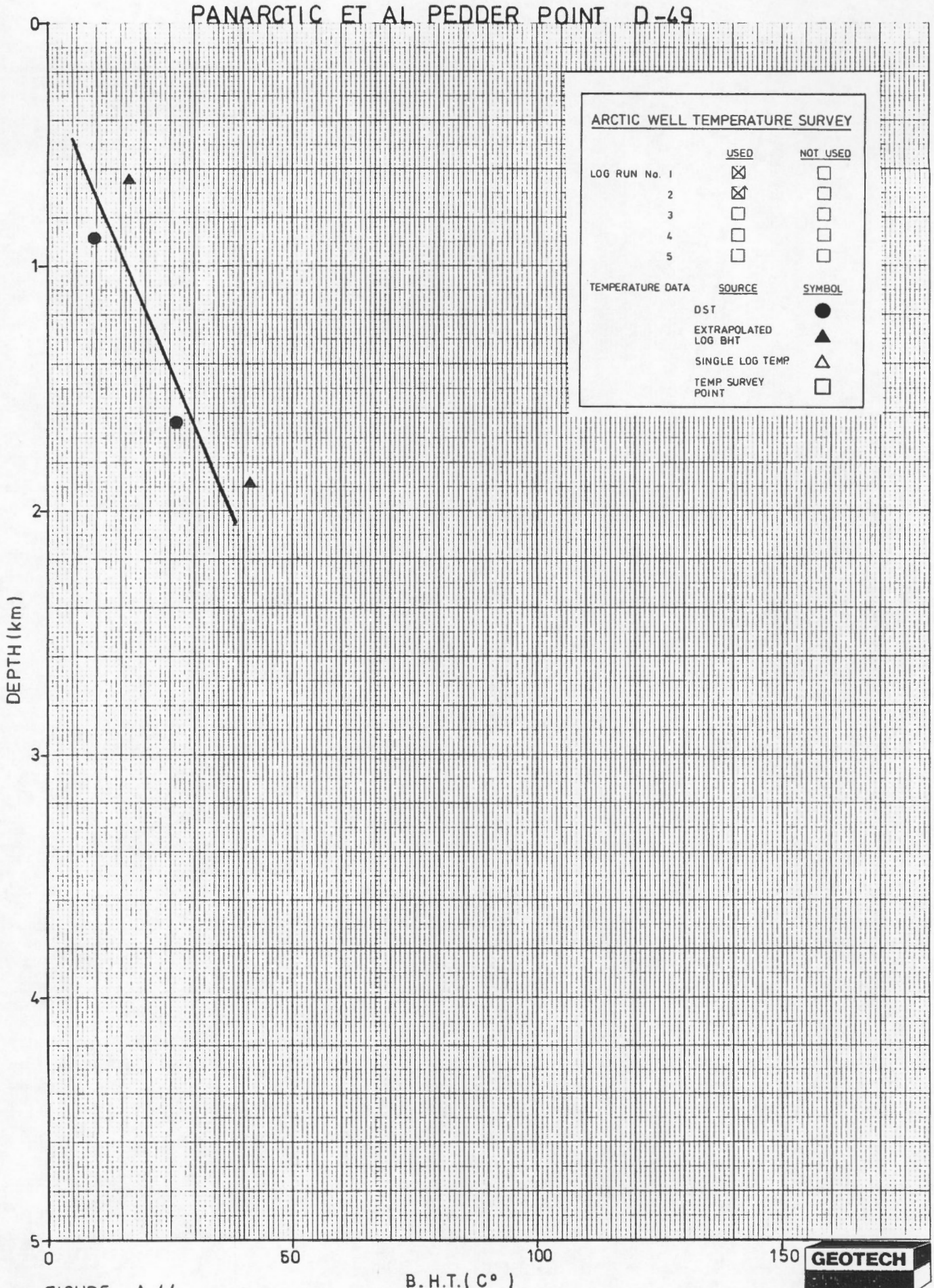


FIGURE A.44

46 1512
KE 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

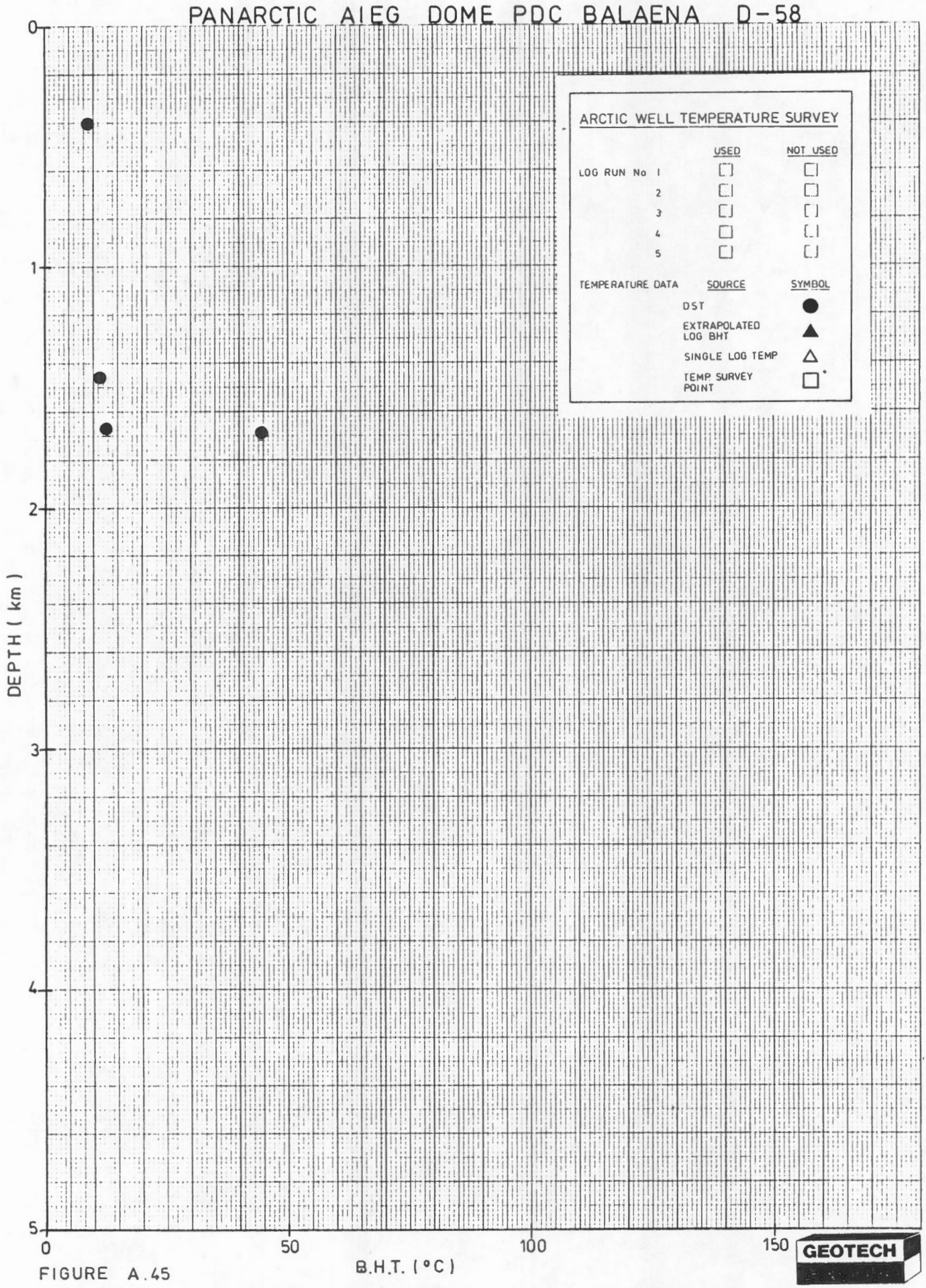

PANARCTIC AIEG DOME PDC BALAENA D-58
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.45

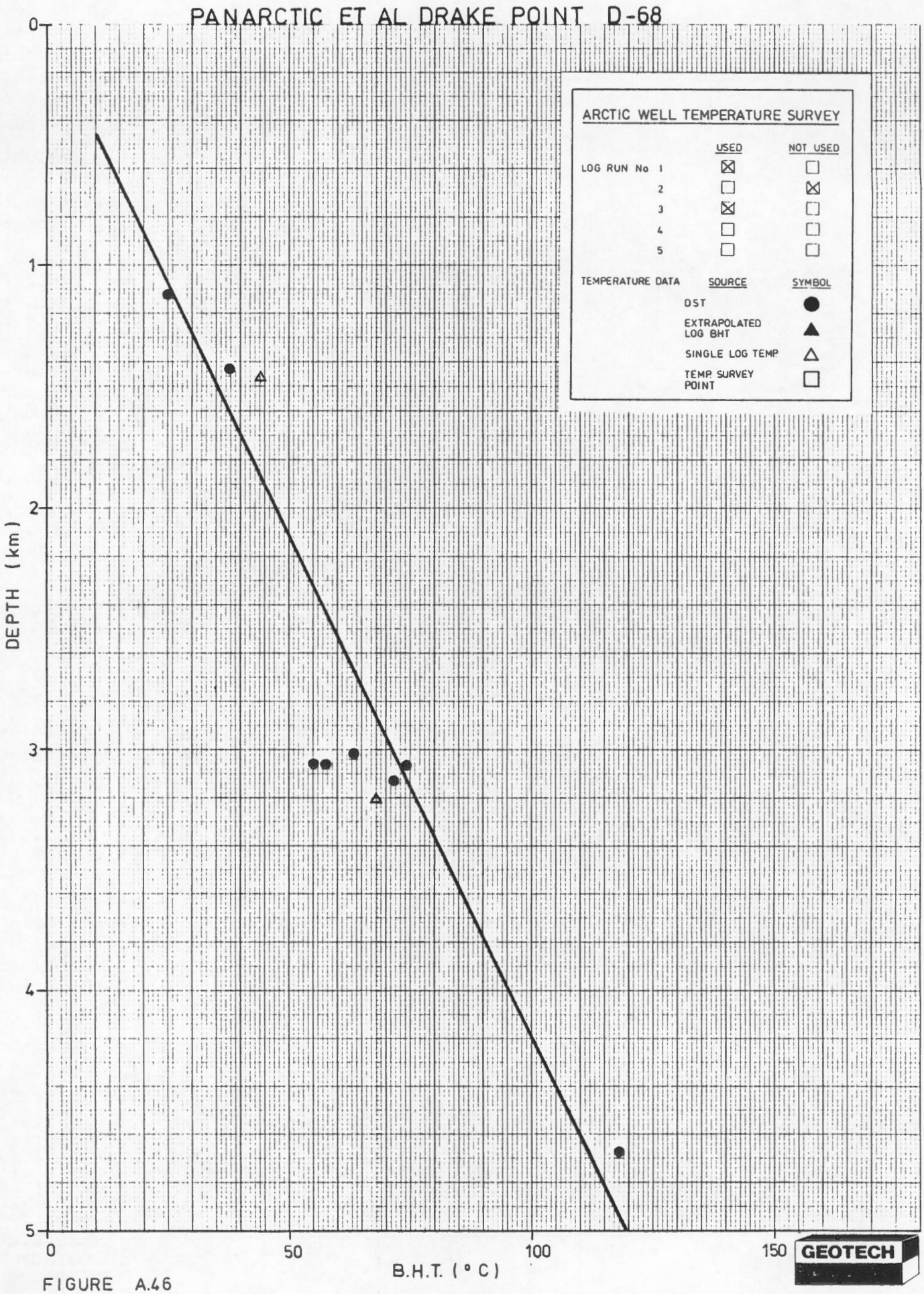


FIGURE A.46

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

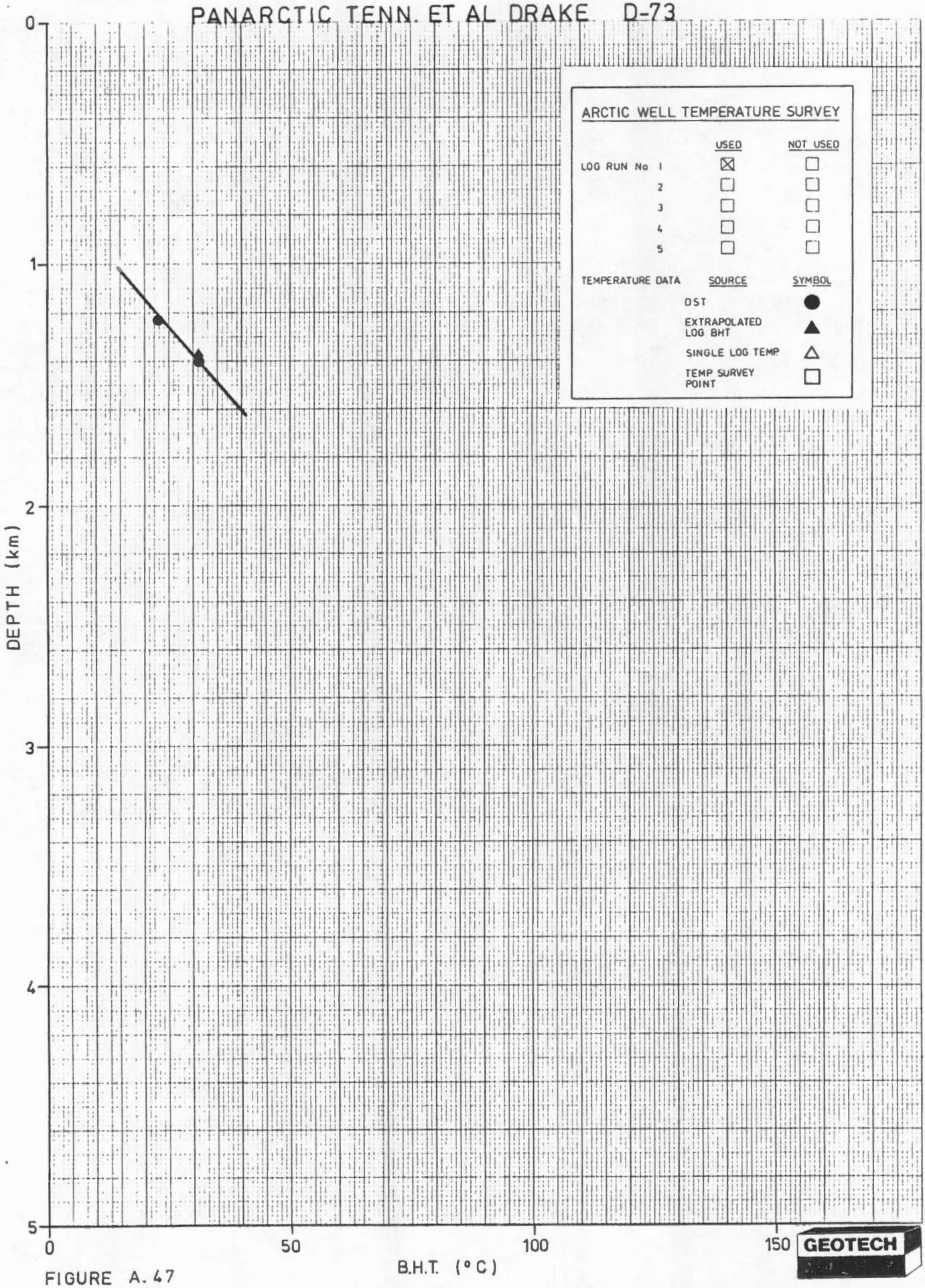

PANARCTIC TENN. ET AL DRAKE D-73
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
KE
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO
GEOTECH

FIGURE A. 47

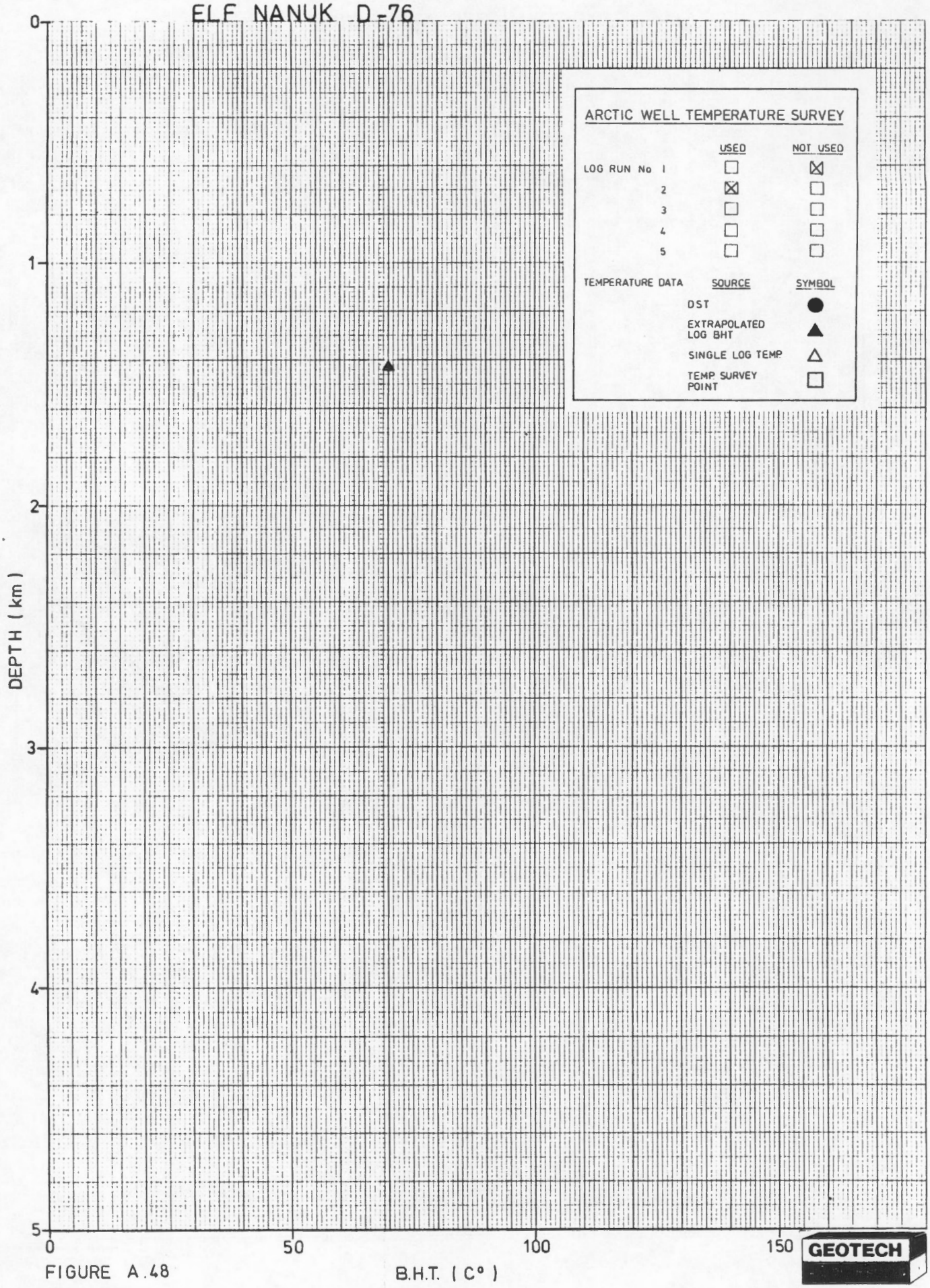


FIGURE A.48

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM.
KEUFFEL & ESSER CO MADE IN USA

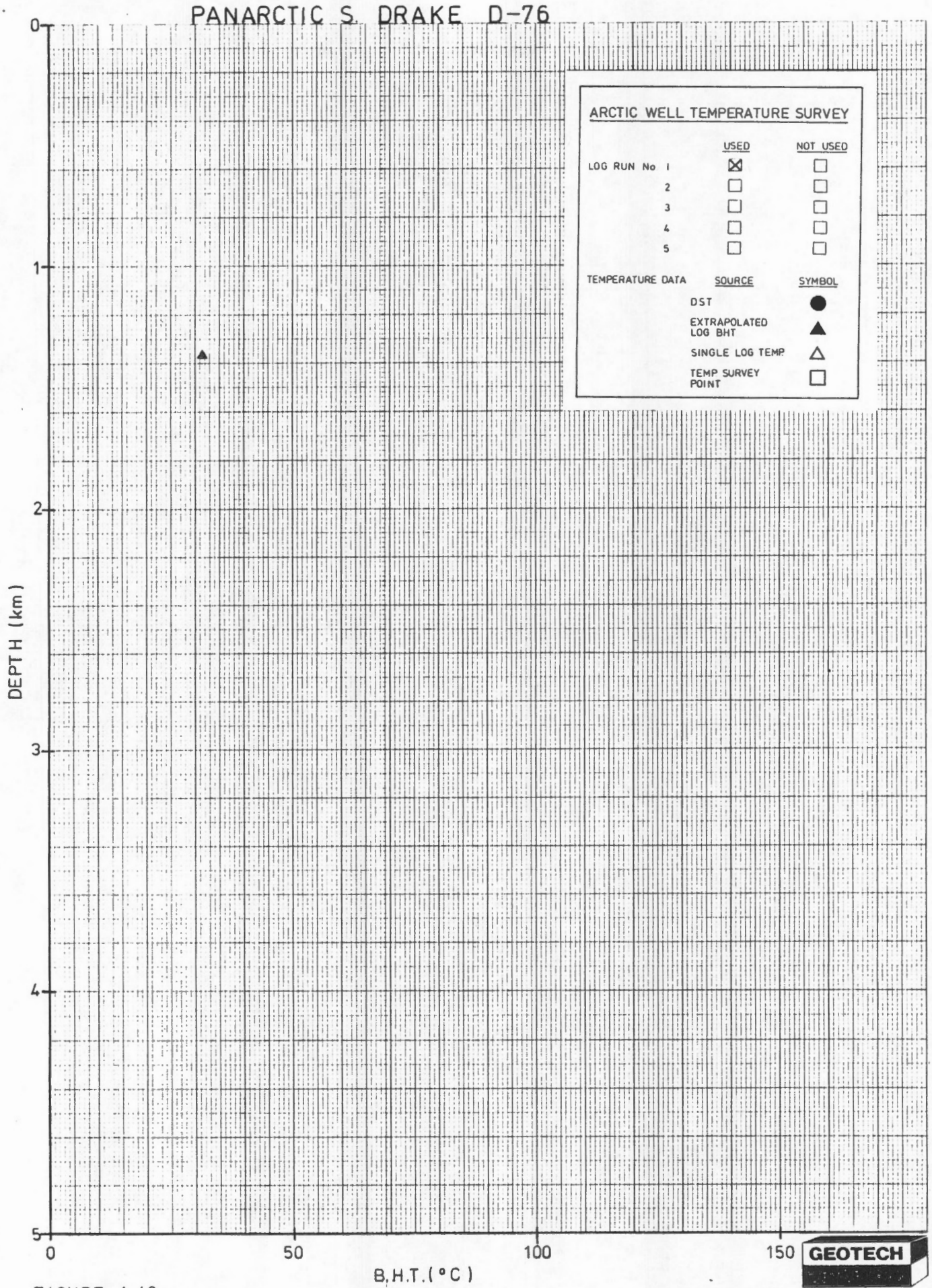

PANARCTIC S. DRAKE D-76
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE A.49

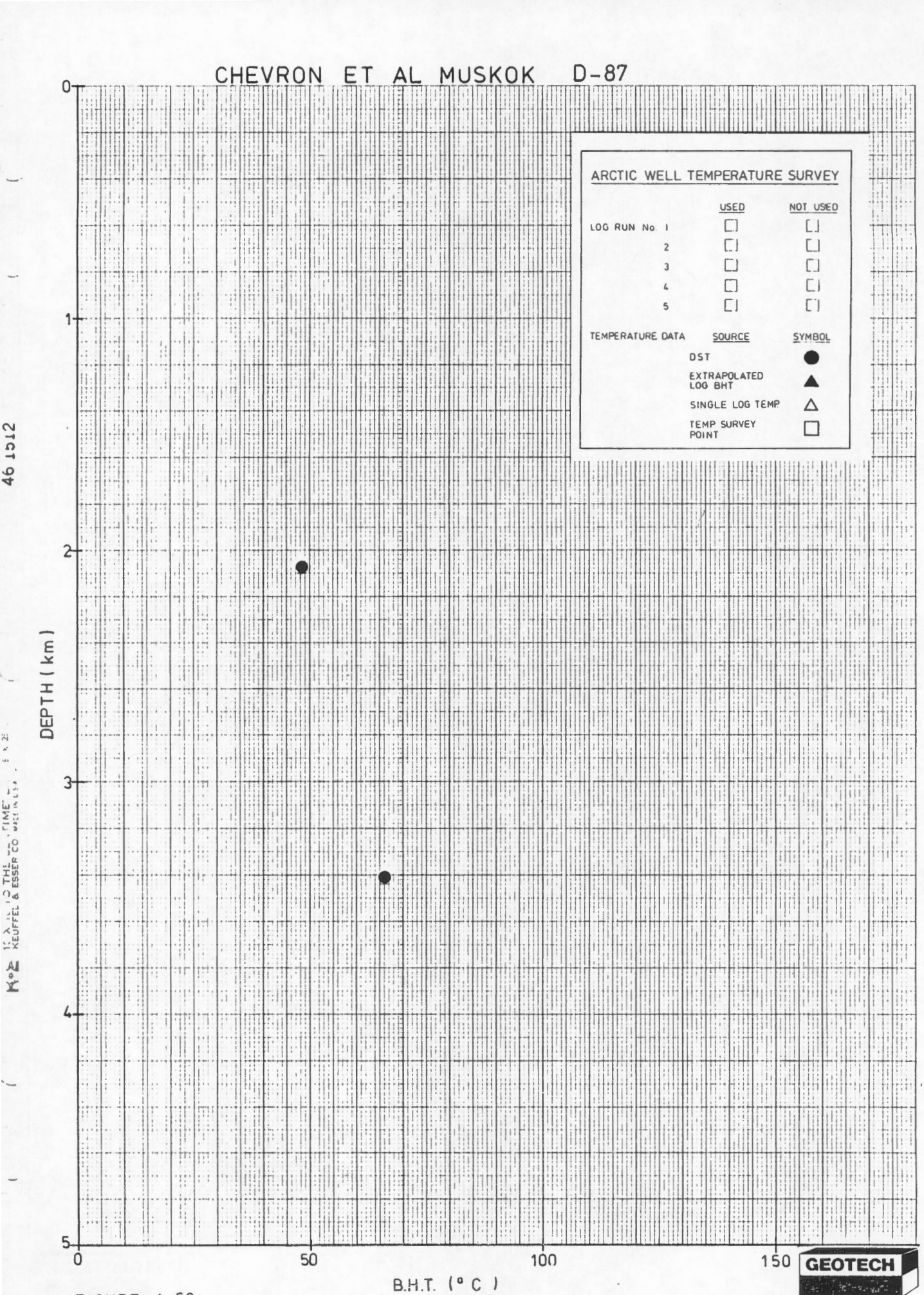

CHEVRON ET AL MUSKOK D-87
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (° C)
GEOTECH

FIGURE A.50

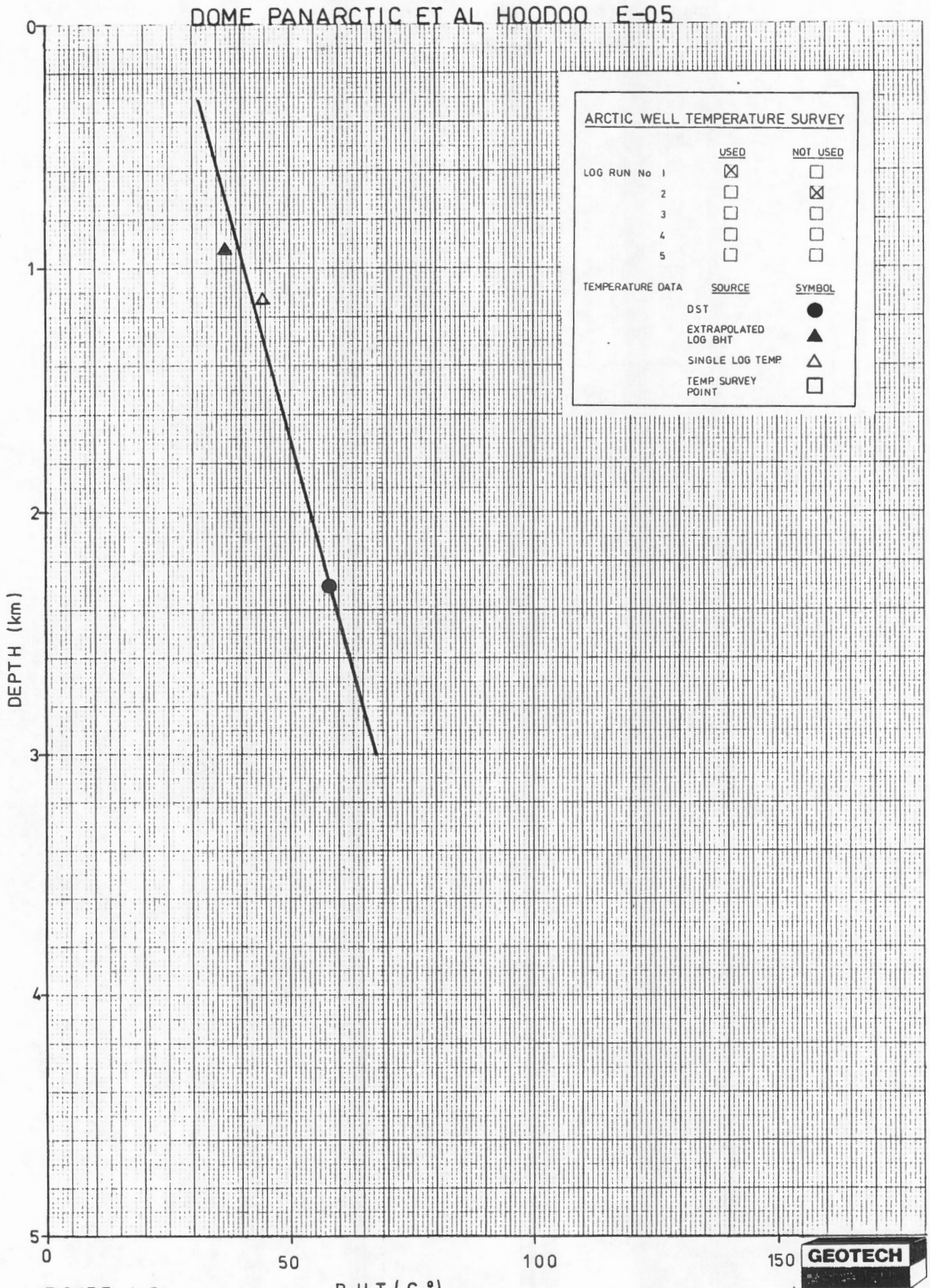


FIGURE A. 51

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

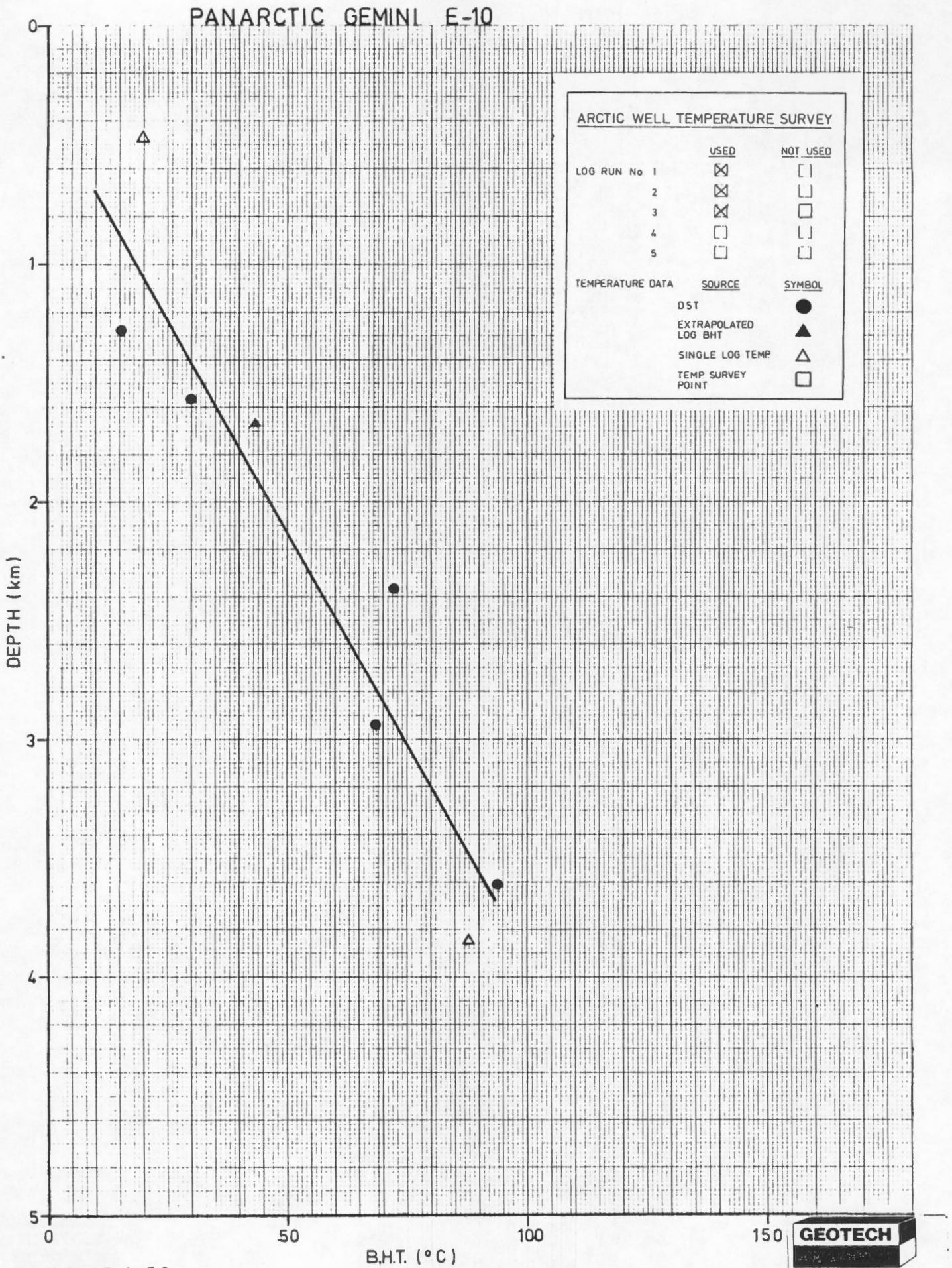

PANARCTIC GEMINI E-10
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.52

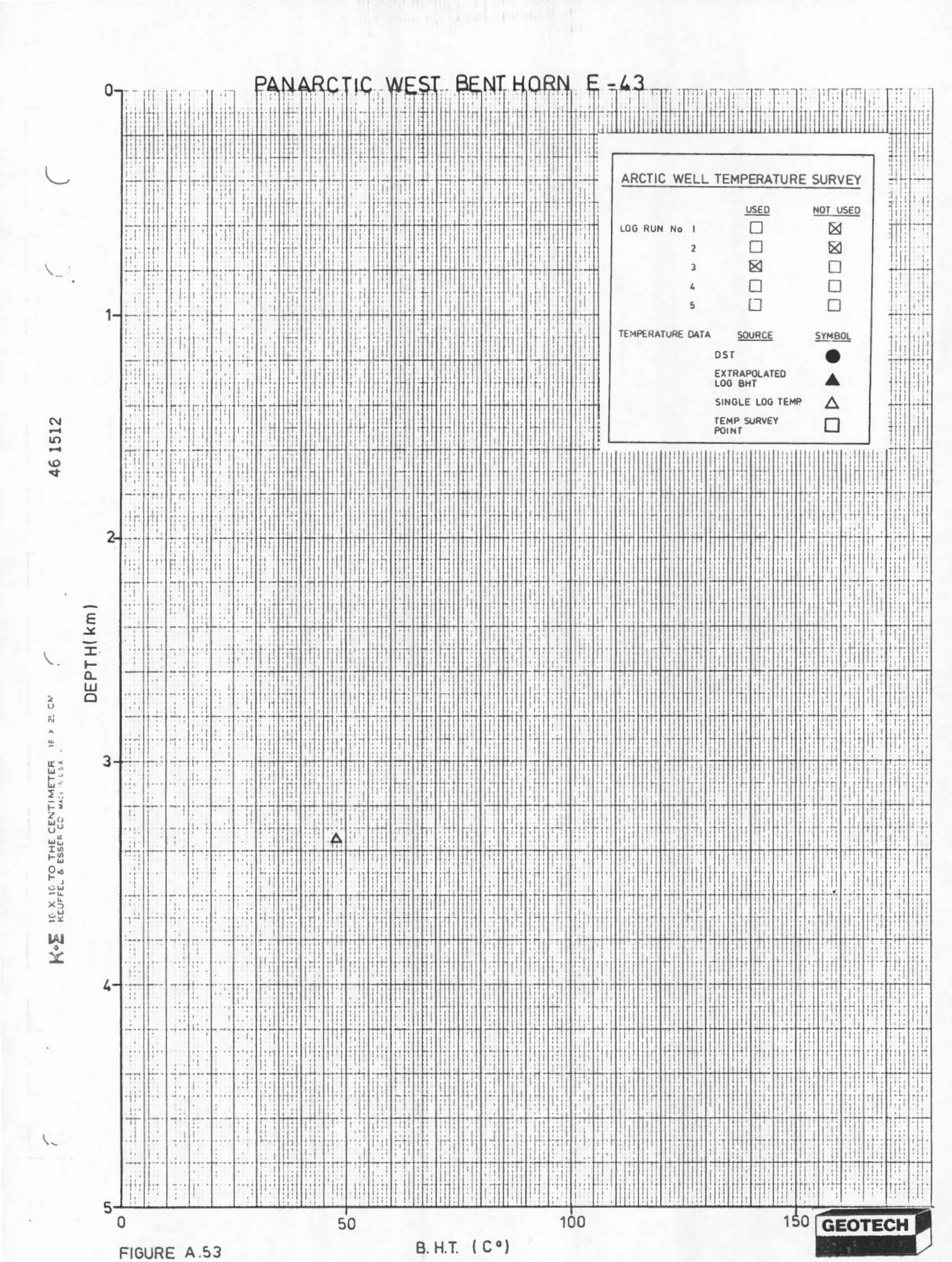

PANARCTIC WEST BENTHORN E-43
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO
GEOTECH

FIGURE A.53

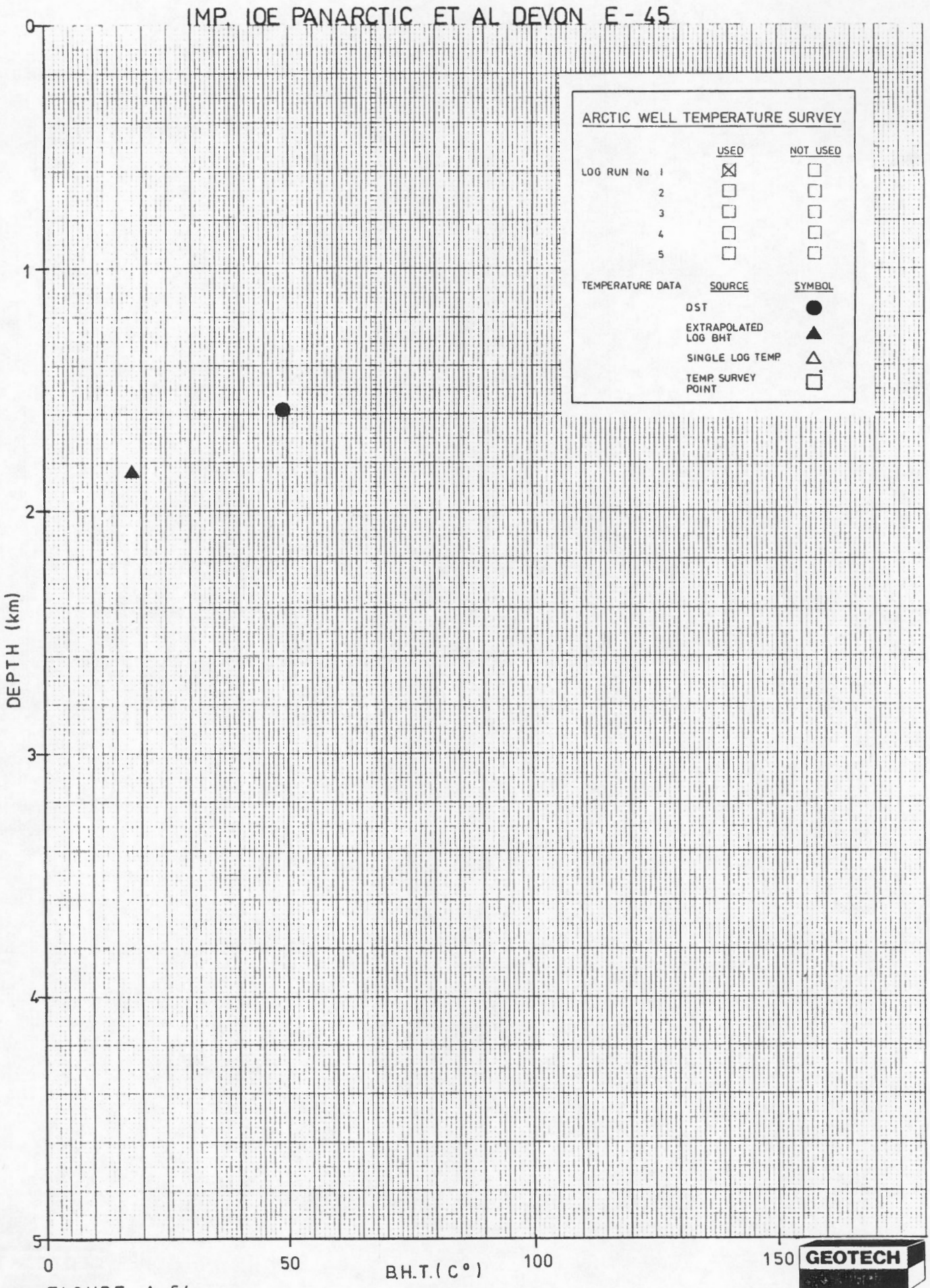

IMP. IOE PANARCTIC ET AL DEVON E-45
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(C°)
GEOTECH

FIGURE A.54

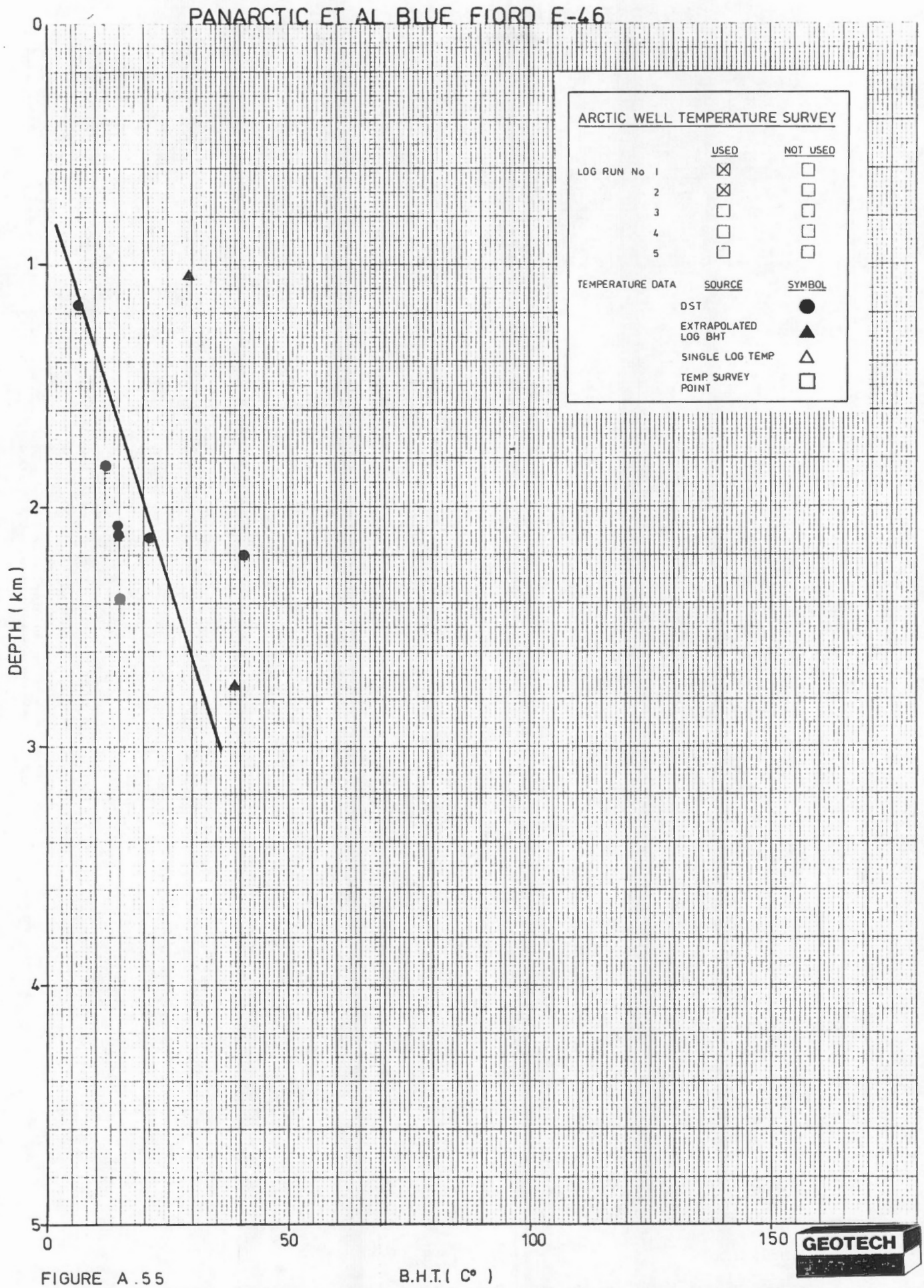
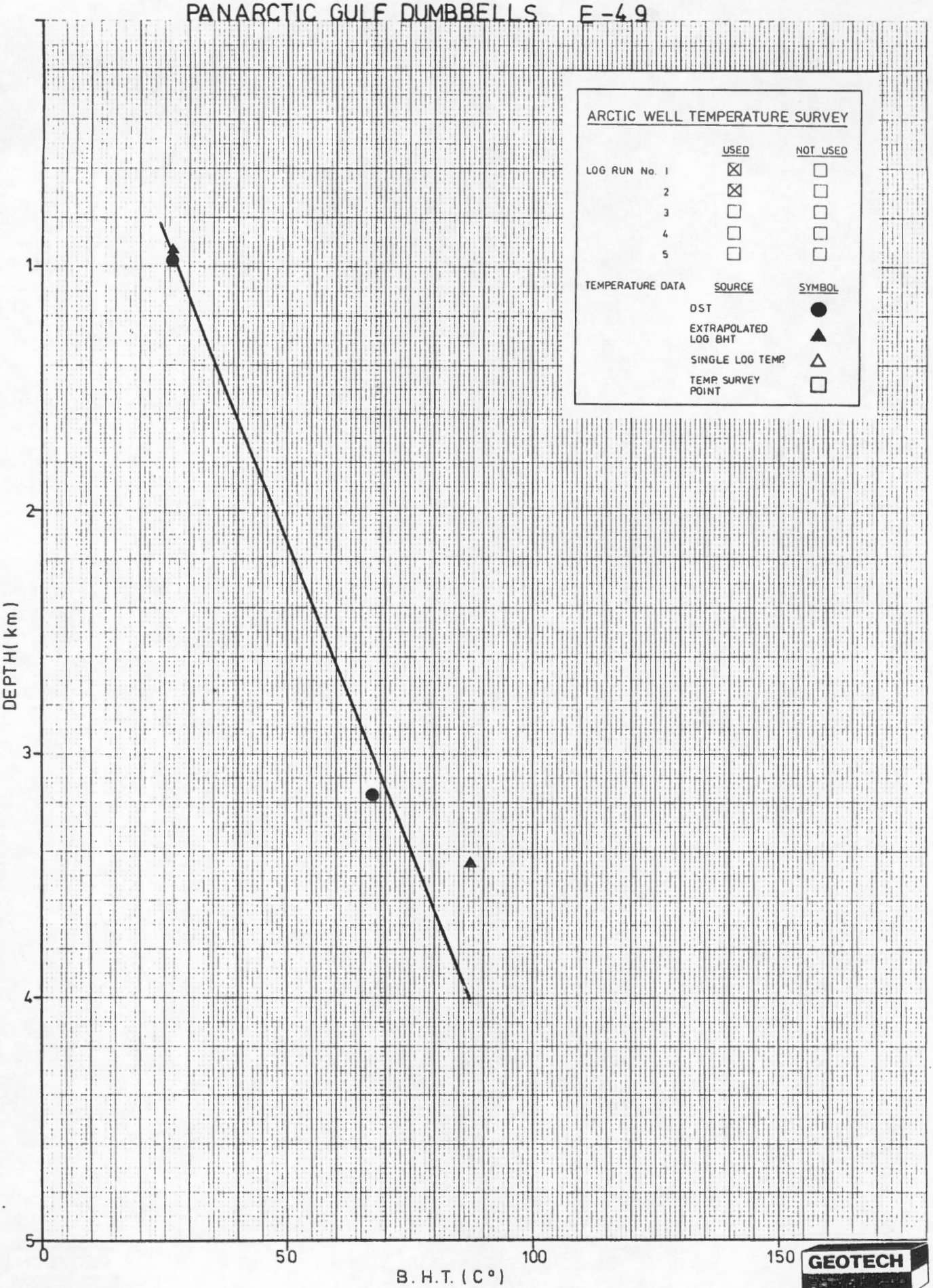


FIGURE A.55

46 1512
K+E 10 X 10 TO THE CENTIMETER 12 X 25 CM.
KEUFFEL & ESSER CO MADE IN U.S.A.

PANARCTIC GULF DUMBBELLS E-49



GEOTECH

FIGURE A 56

46 1512
KEUFFEL & ESSER CO

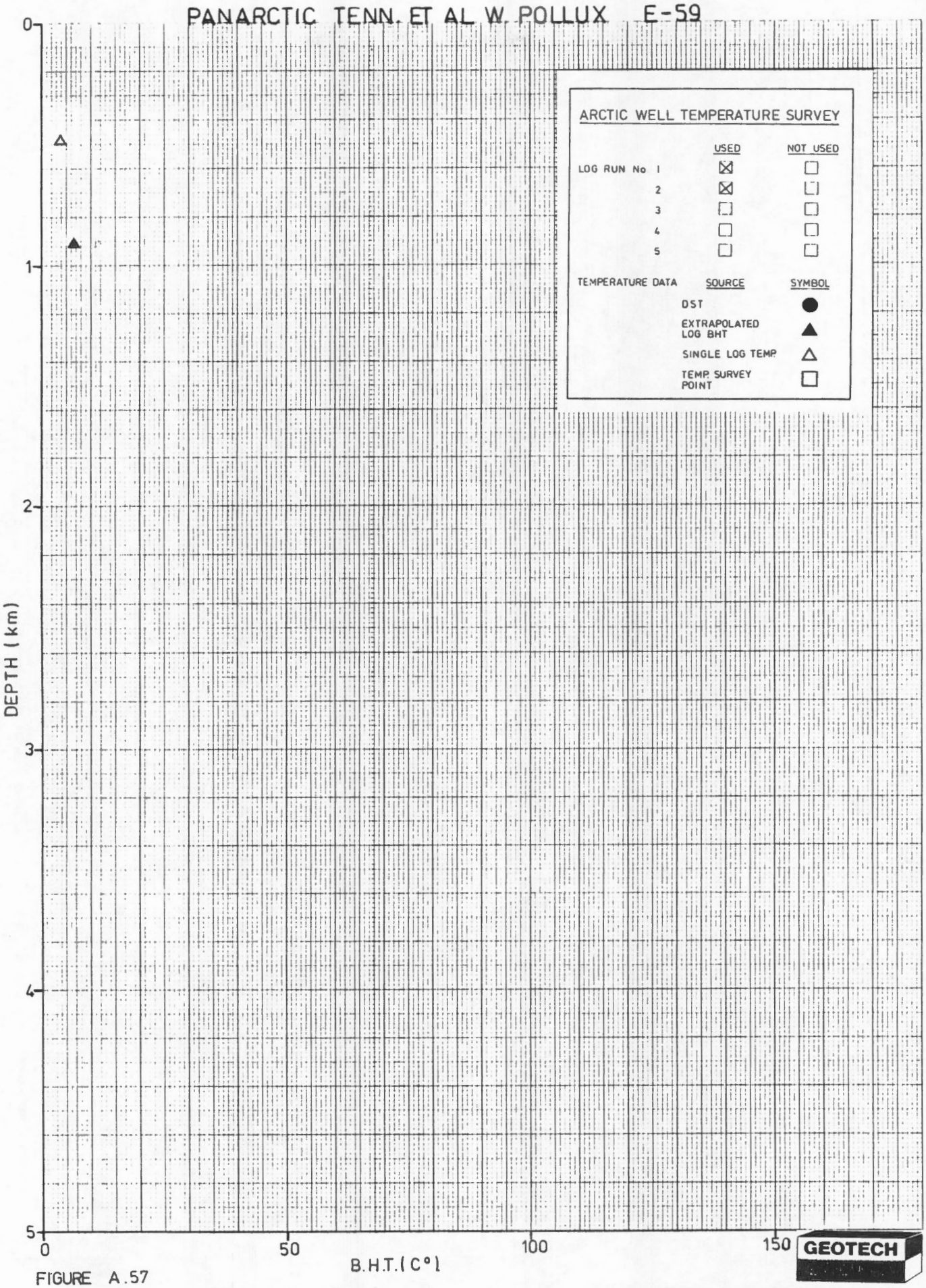


FIGURE A.57

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

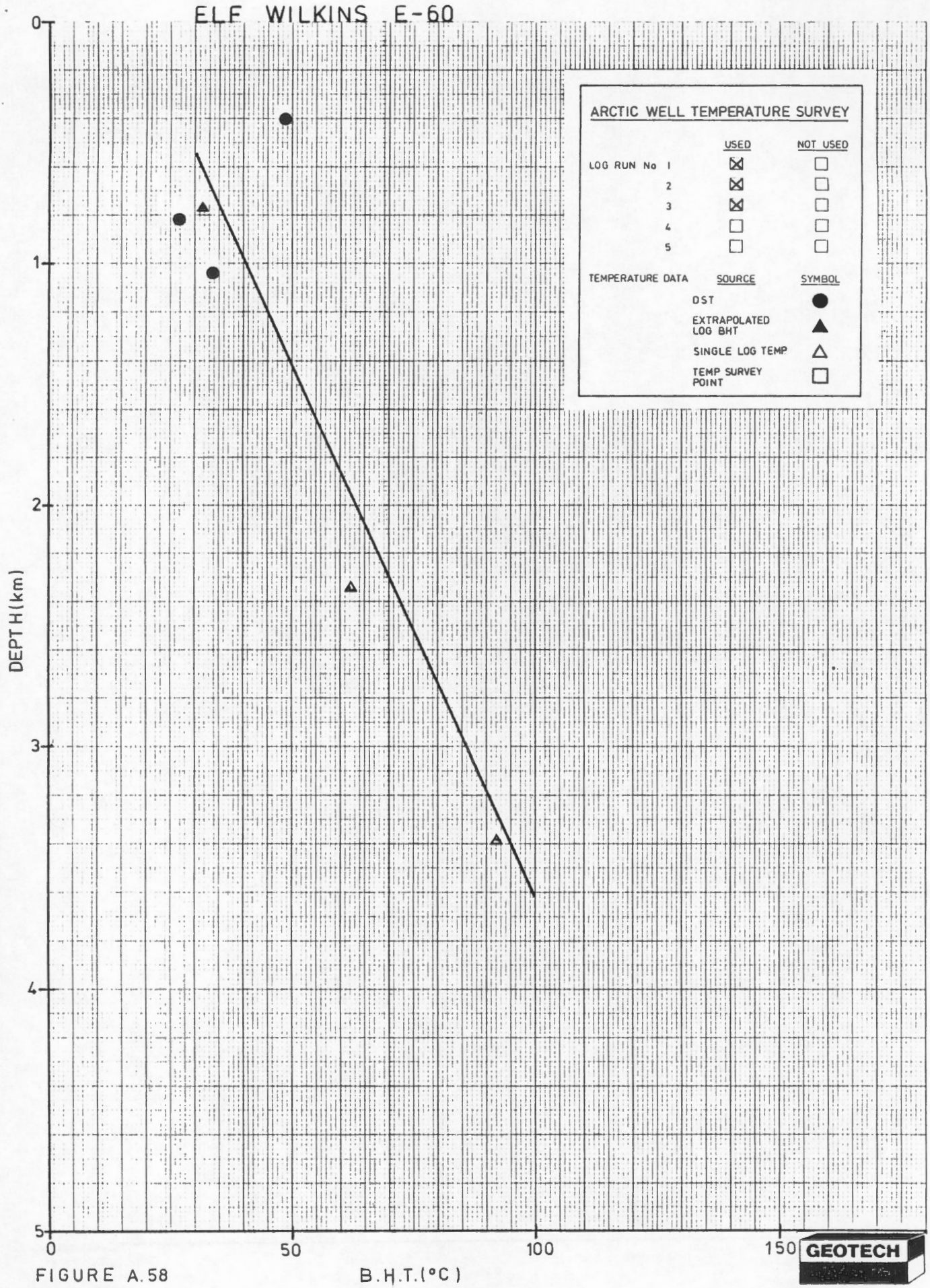

ELF WILKINS E-60
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE A.58

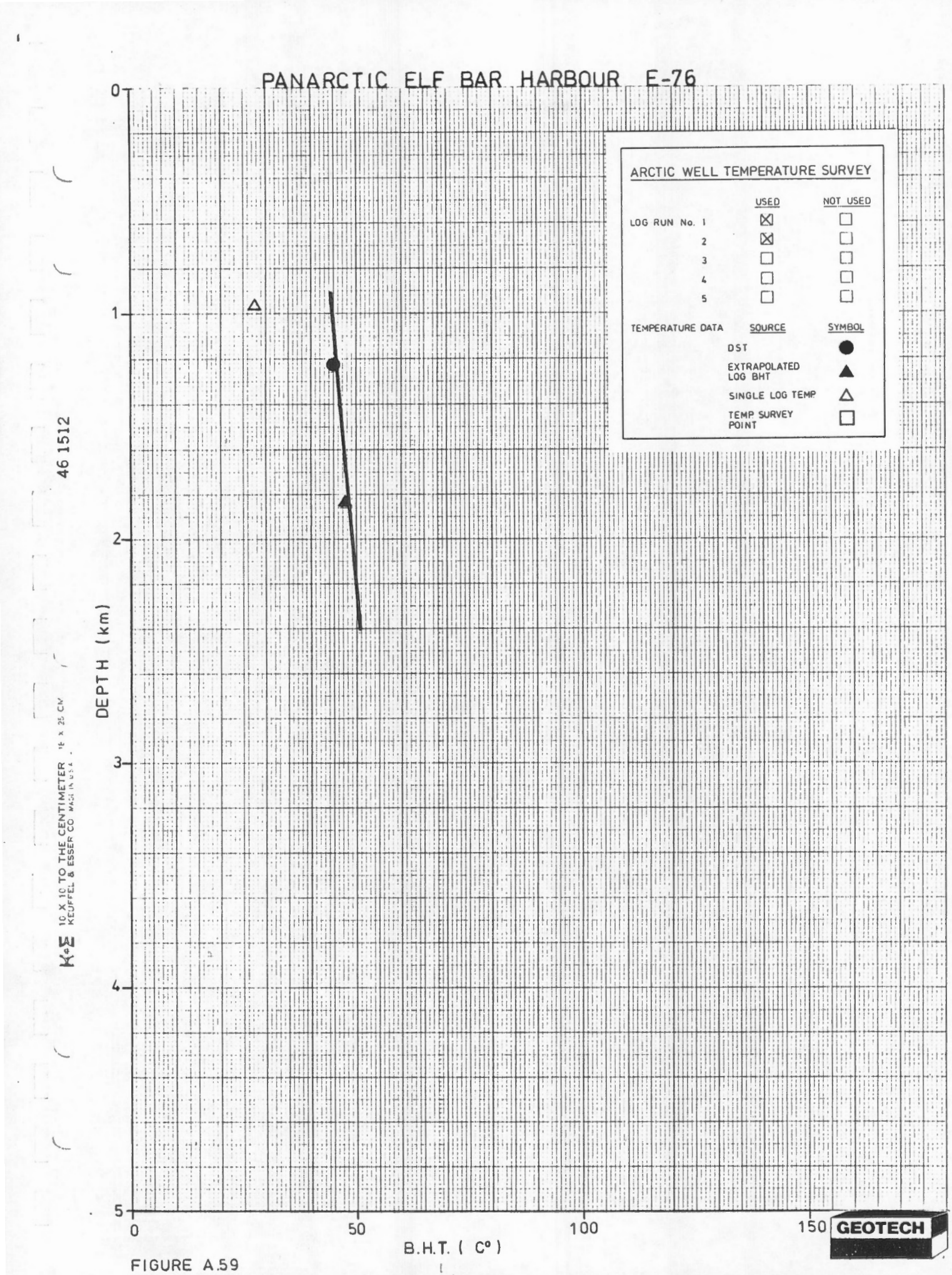

PANARCTIC ELF BAR HARBOUR E-76
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH
46 1512
K&E 10 X 10 TO THE CENTIMETER 25 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

FIGURE A.59

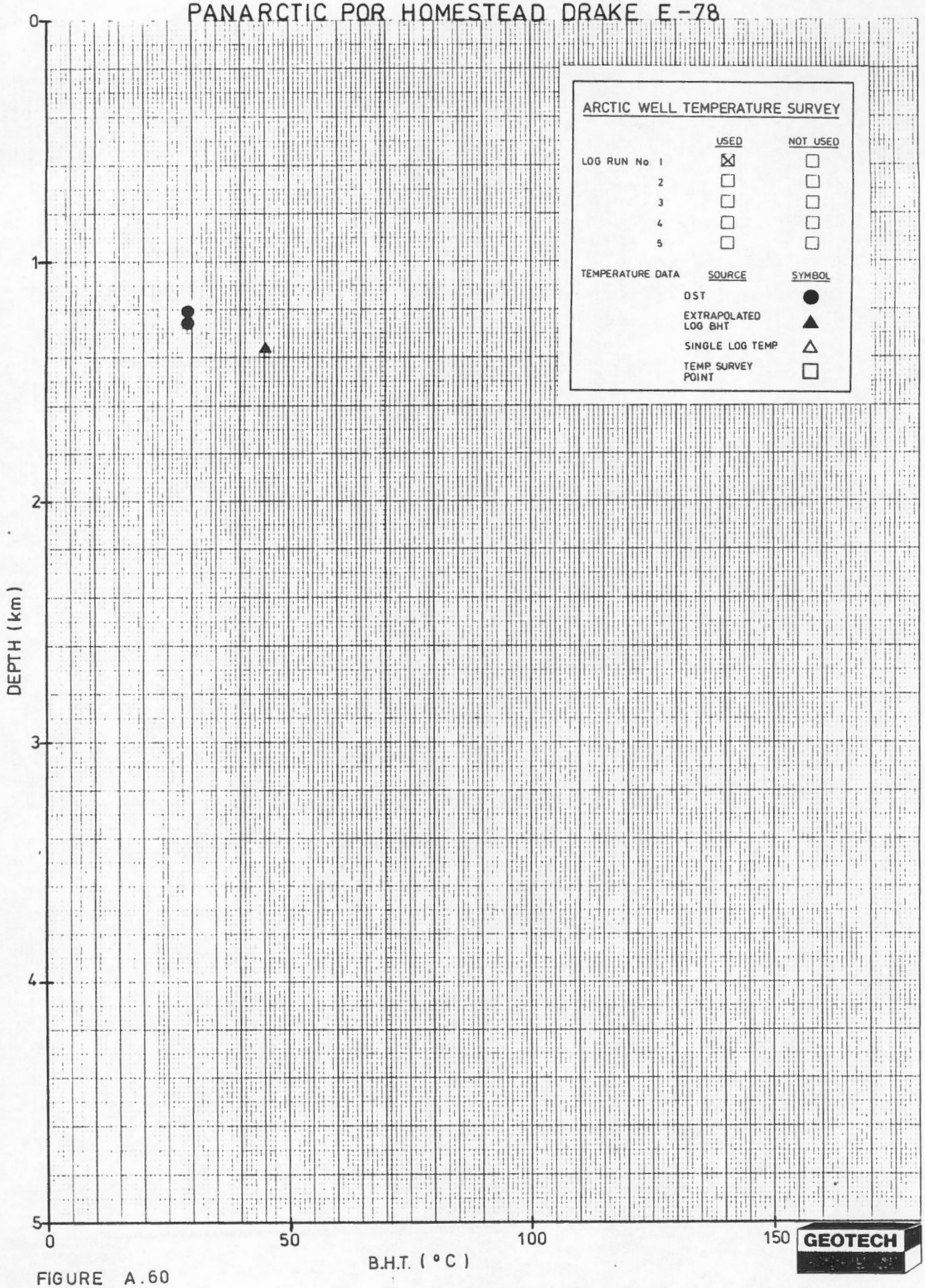

PANARCTIC POR HOMESTEAD DRAKE E-78
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.60

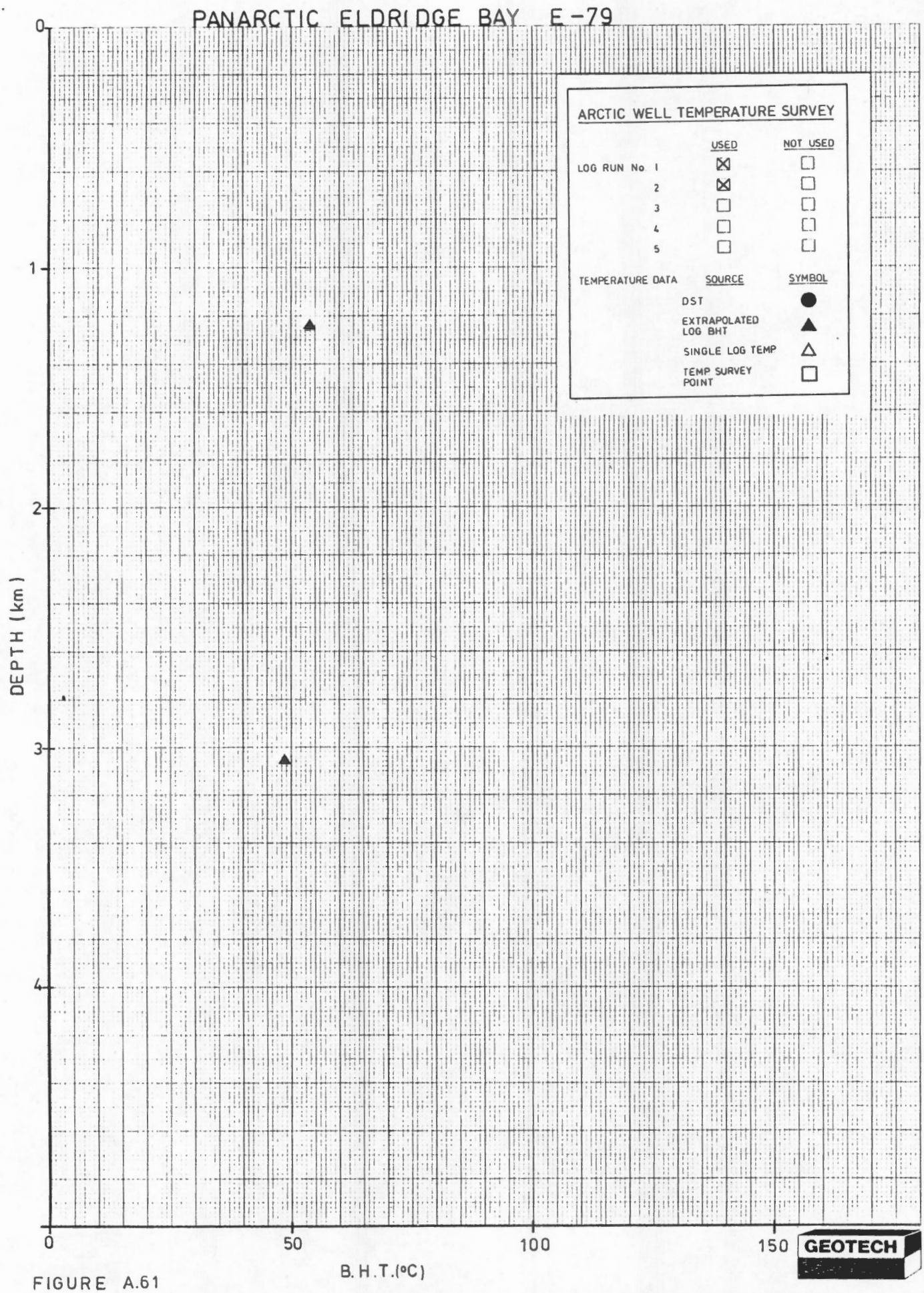

PANARCTIC ELDRIDGE BAY E-79
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE A.61

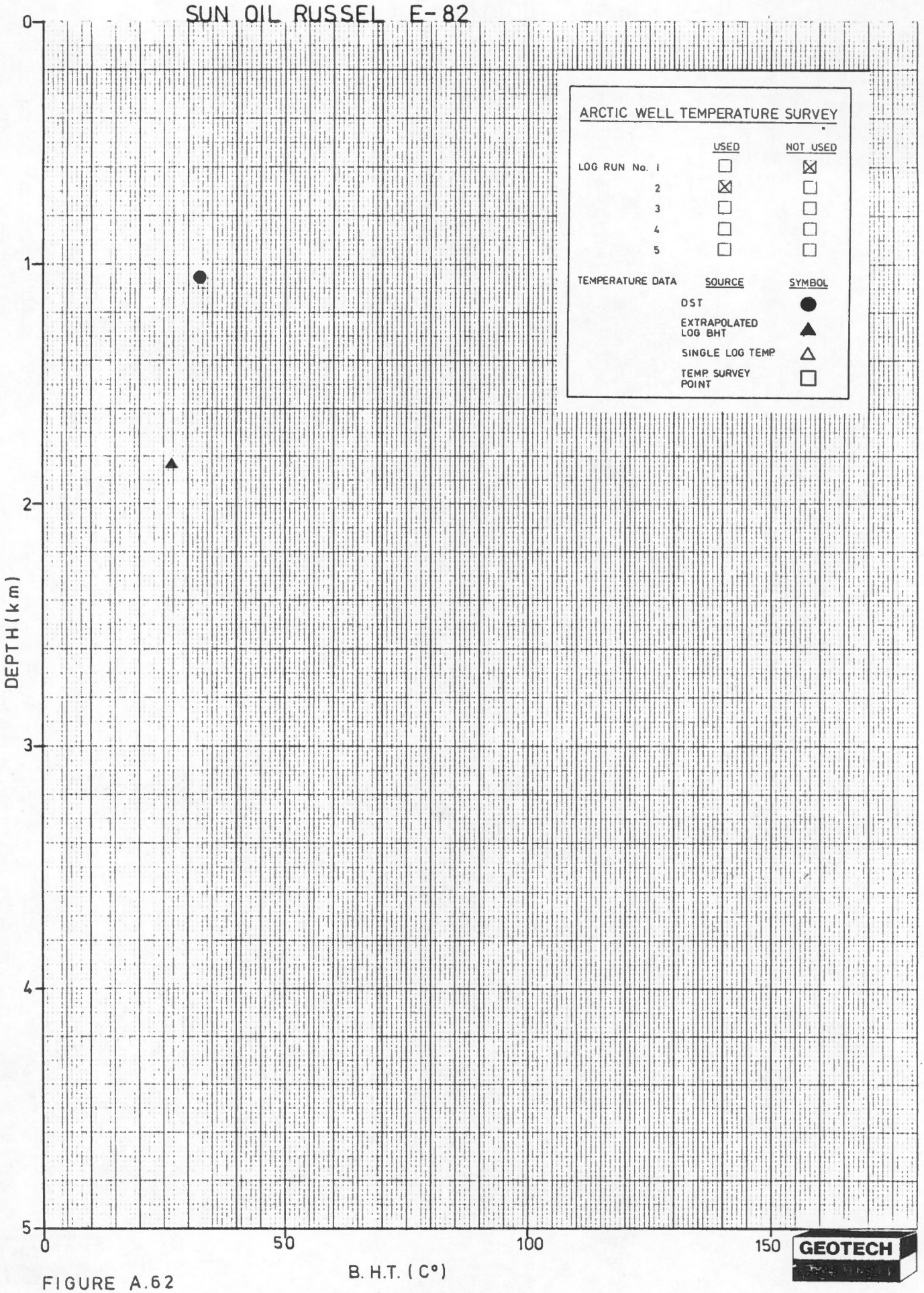


FIGURE A.62

46 1512
KEUFFEL & ESSER CO MADE IN U.S.A.

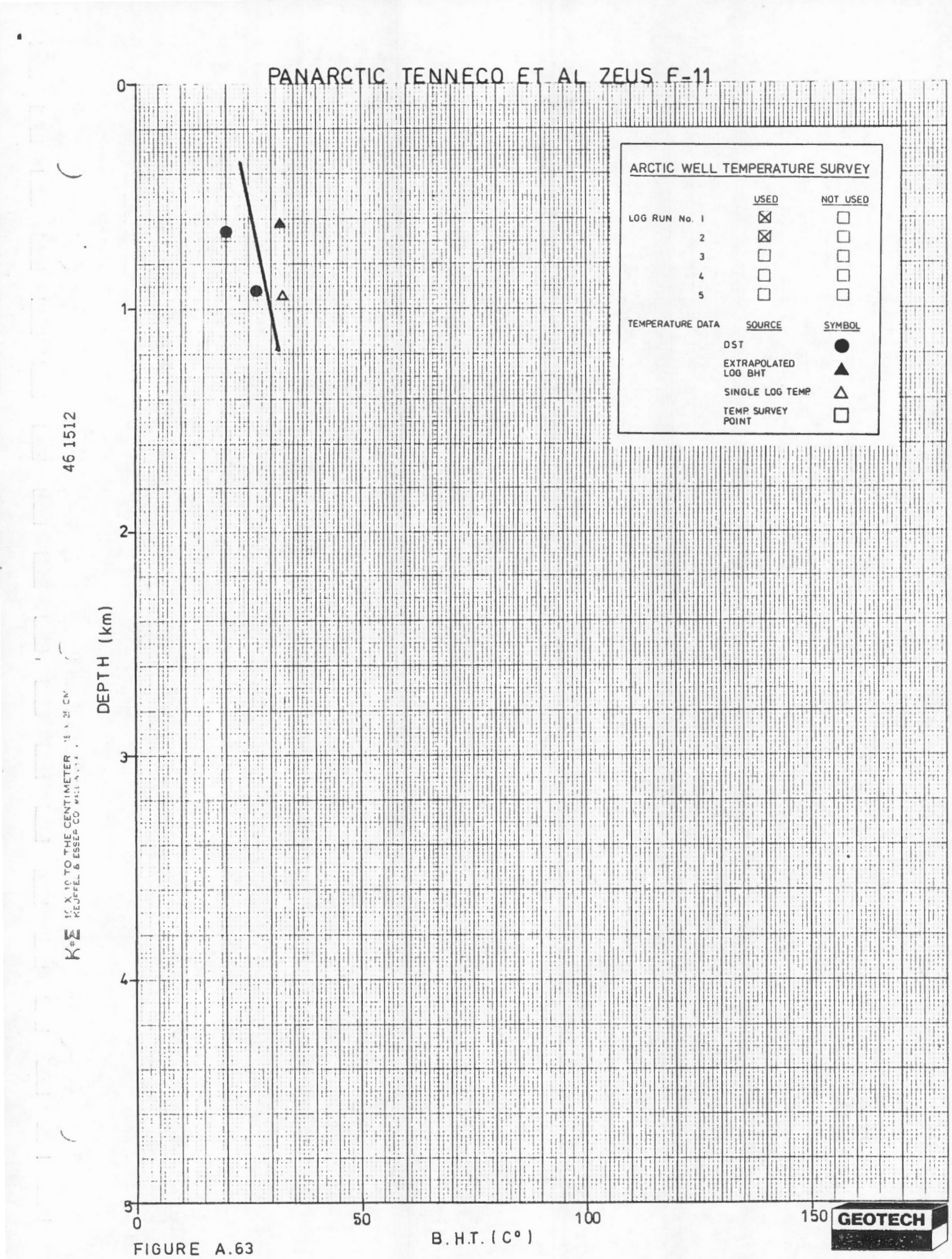

PANARCTIC TENNECO ET AL ZEUS F-11
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE A.63

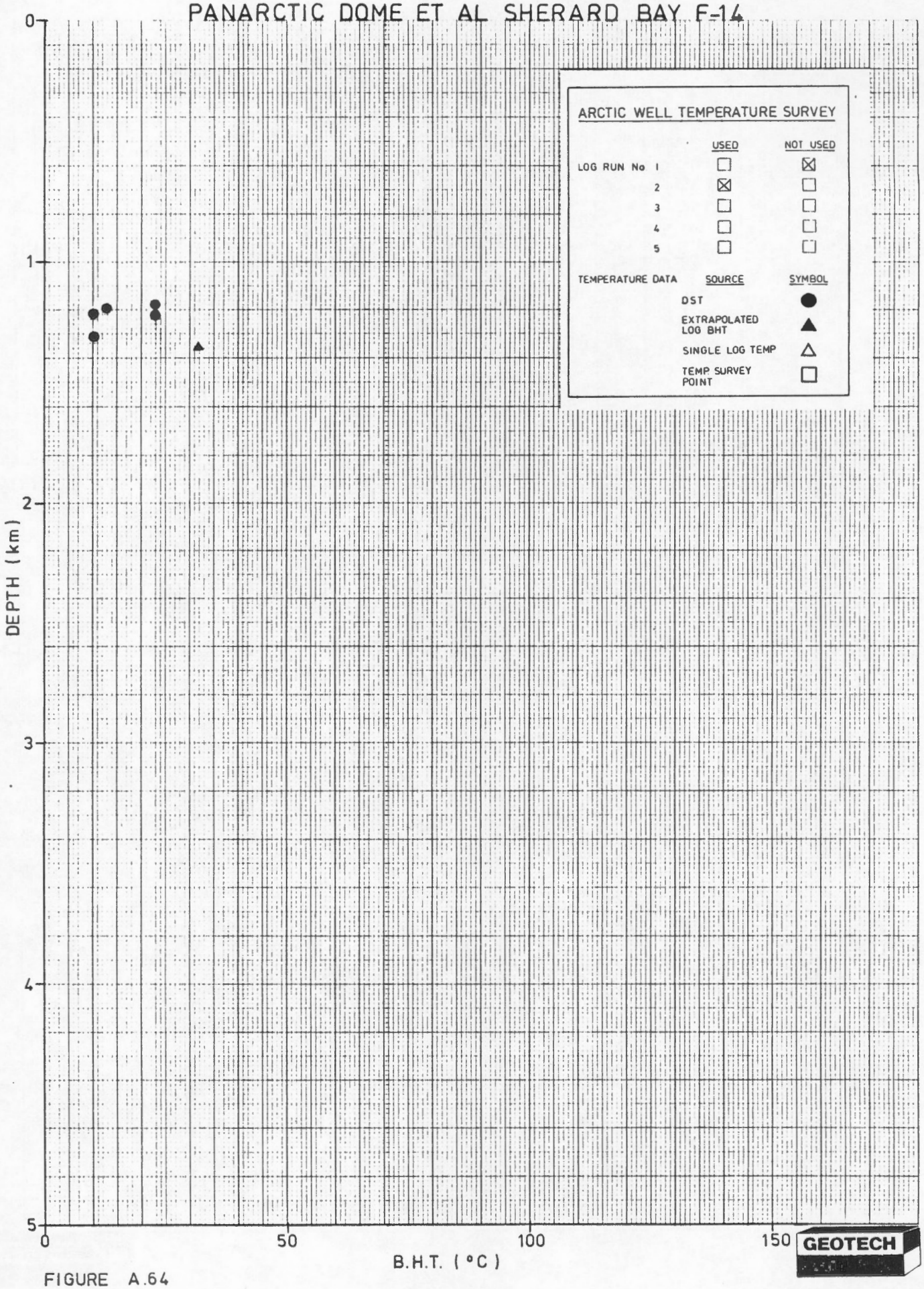

PANARCTIC DOME ET AL SHERARD BAY F-14
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.64

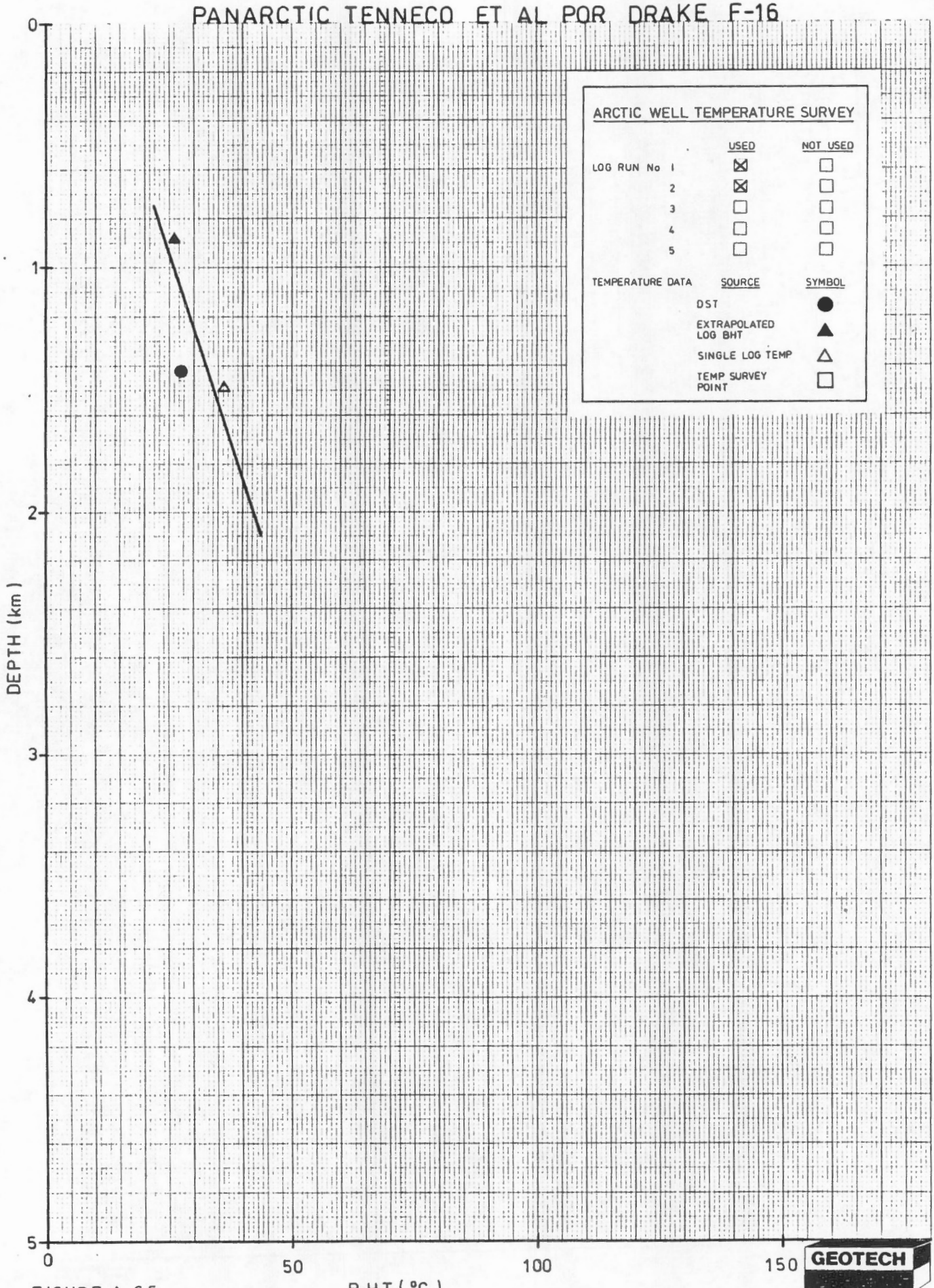


FIGURE A.65

46 1512

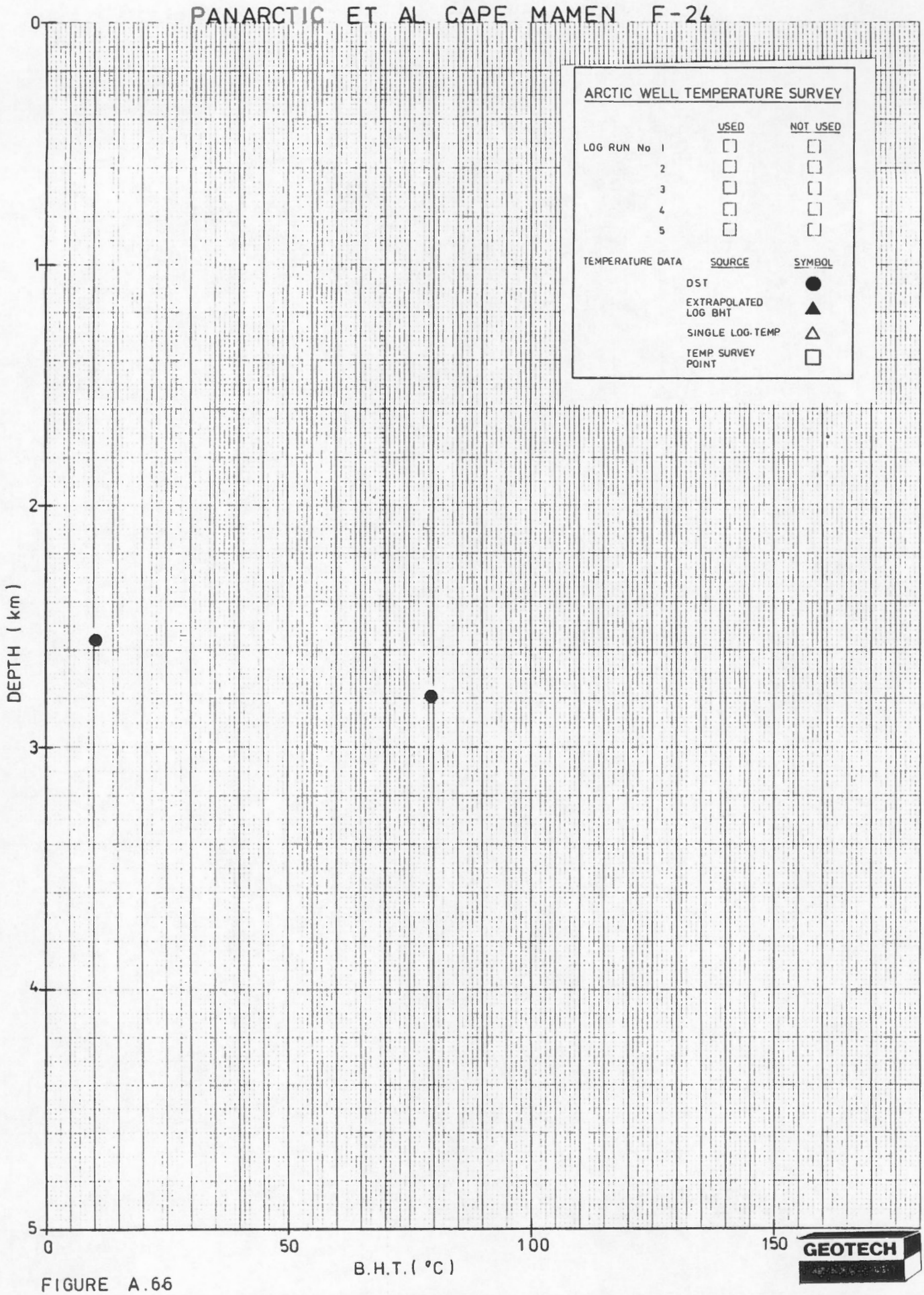


FIGURE A.66

46 1512

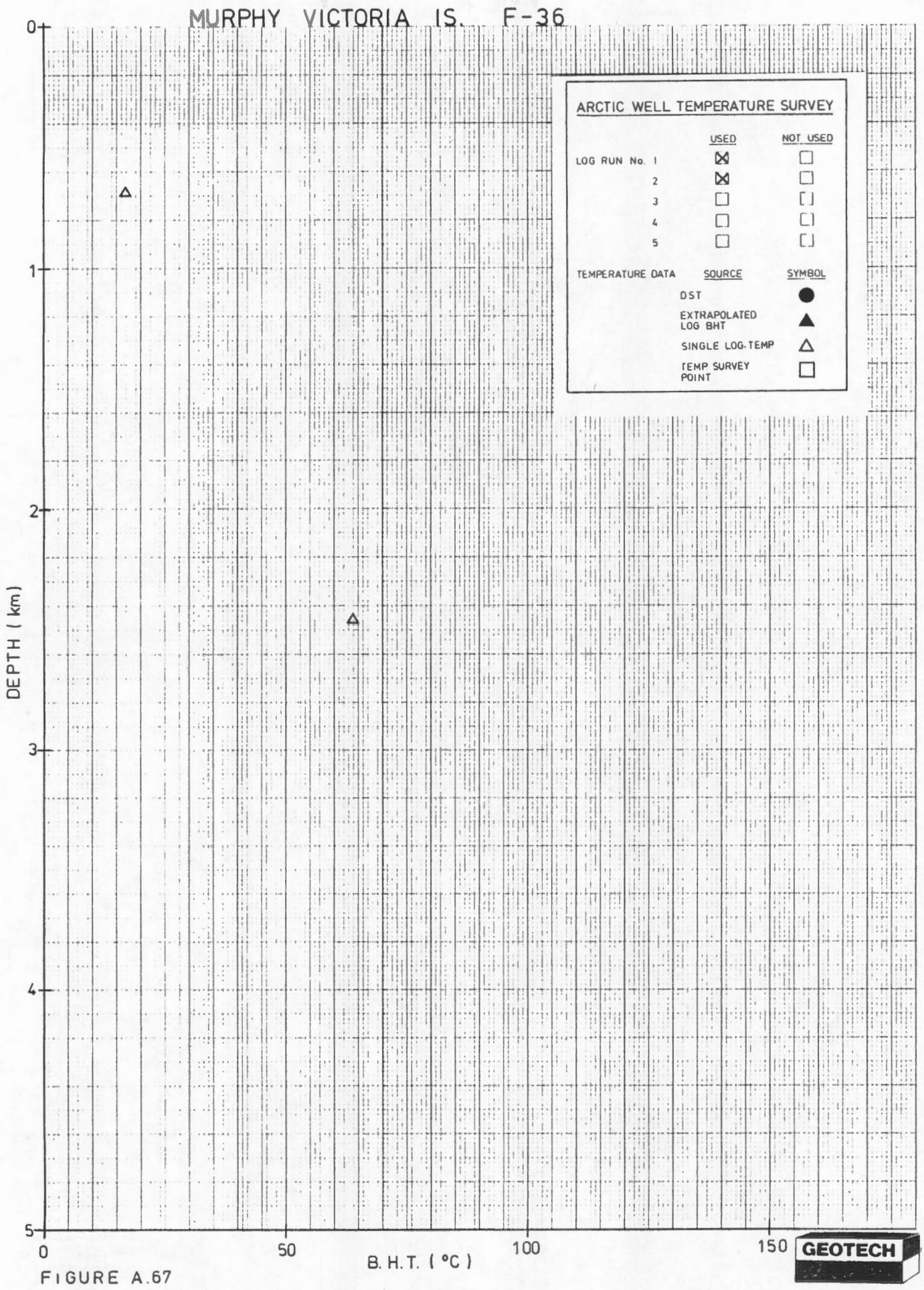


FIGURE A.67

46 1512

KE 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN USA

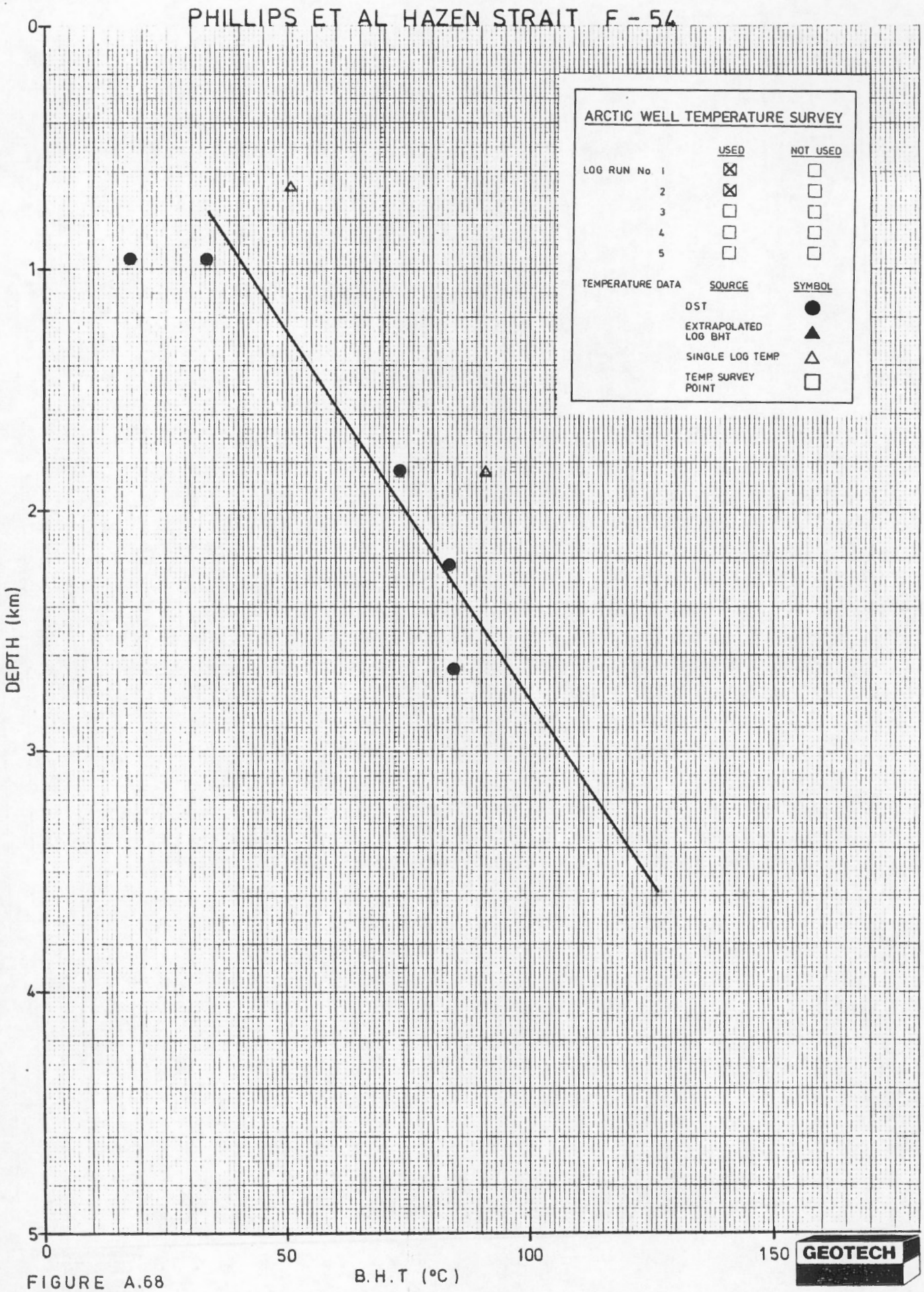

PHILLIPS ET AL HAZEN STRAIT F-54
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T (°C)
GEOTECH

FIGURE A.68

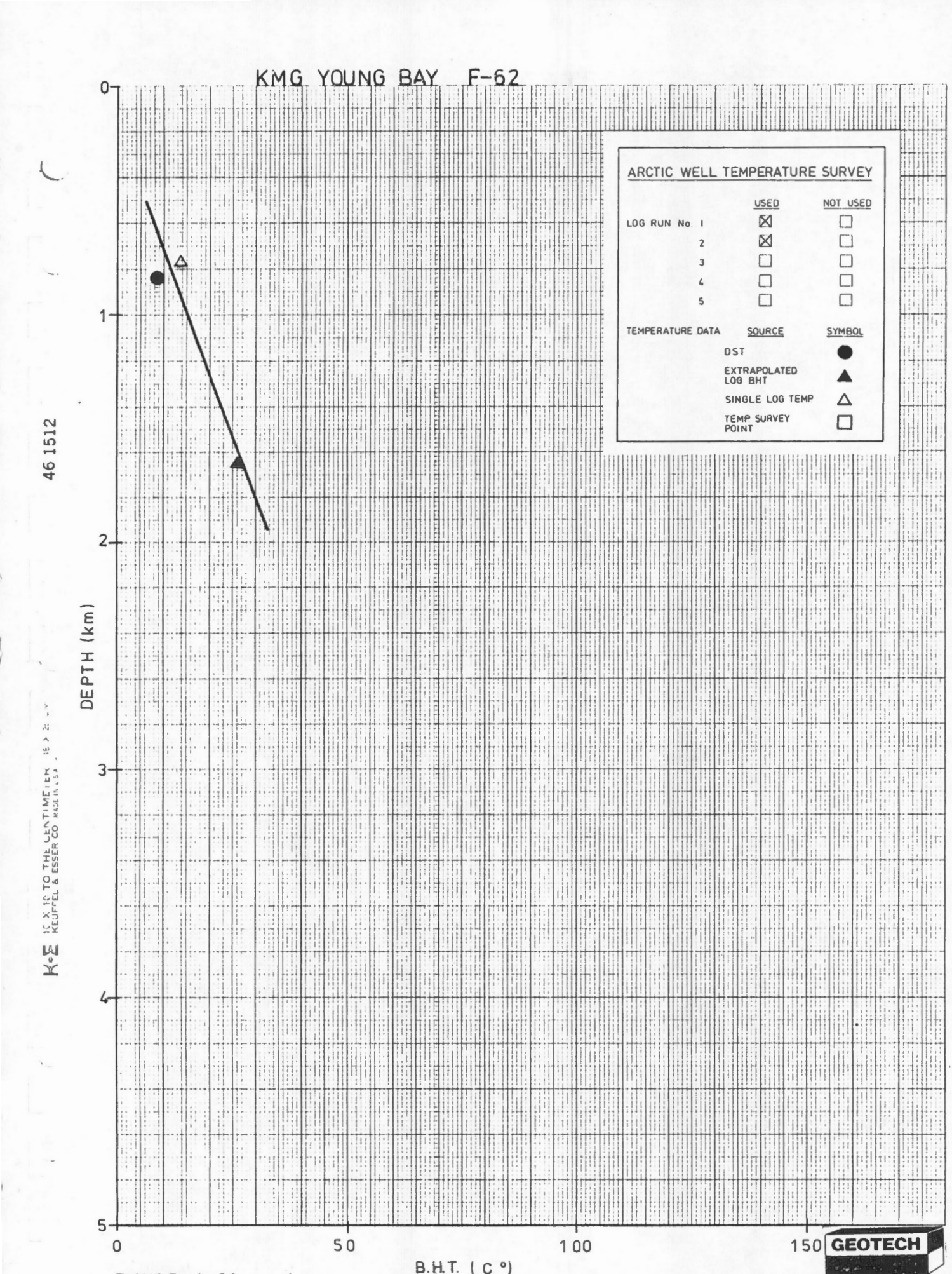

KMG YOUNG BAY F-62
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C °)
GEOTECH
46 1512
KE
KEUFFEL & ESSER CO

FIGURE A .69

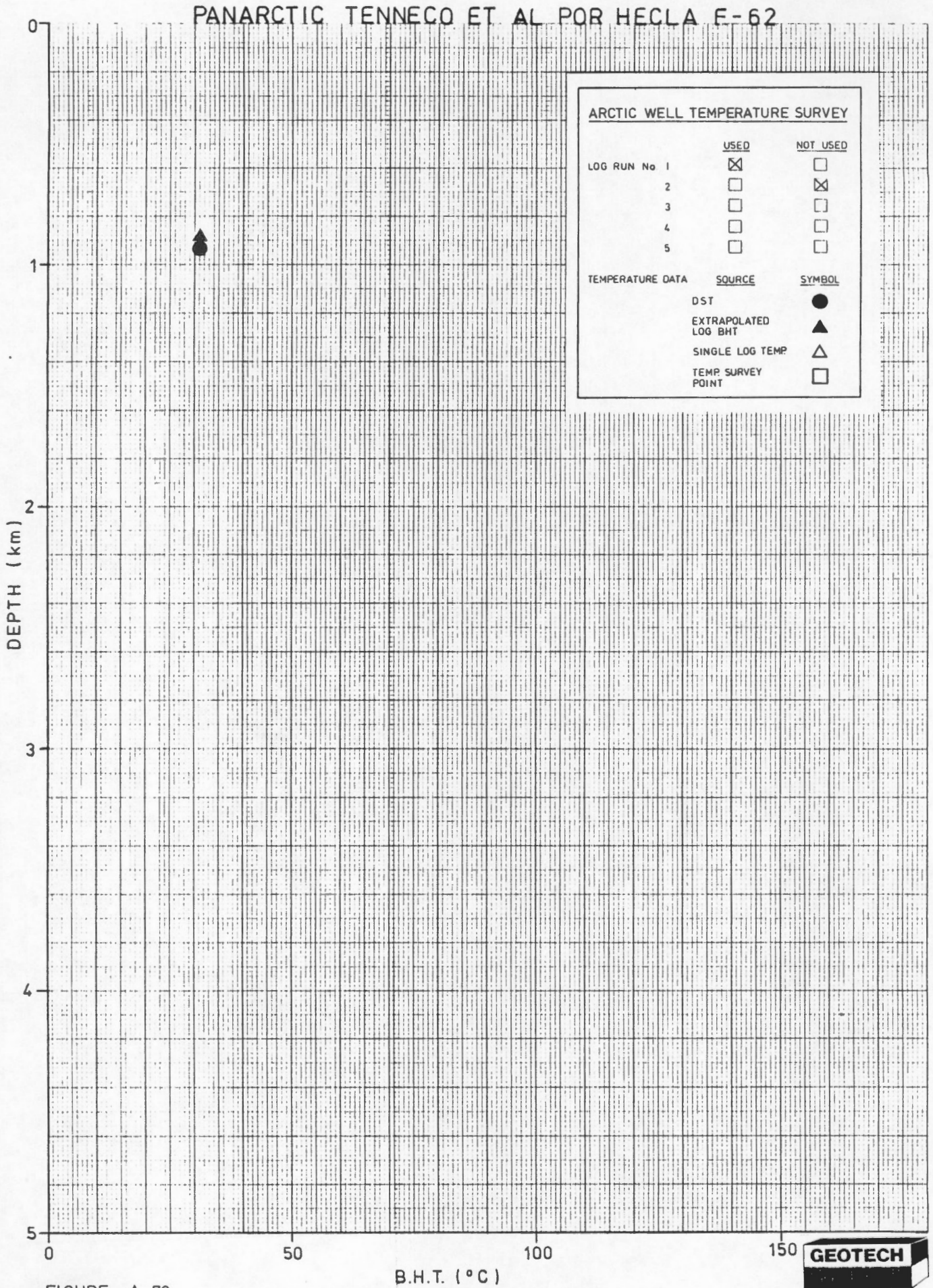

PANARCTIC TENNECO ET AL POR HECLA E-62
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A. 70

PANARCTIC TOWSON POINT F-63

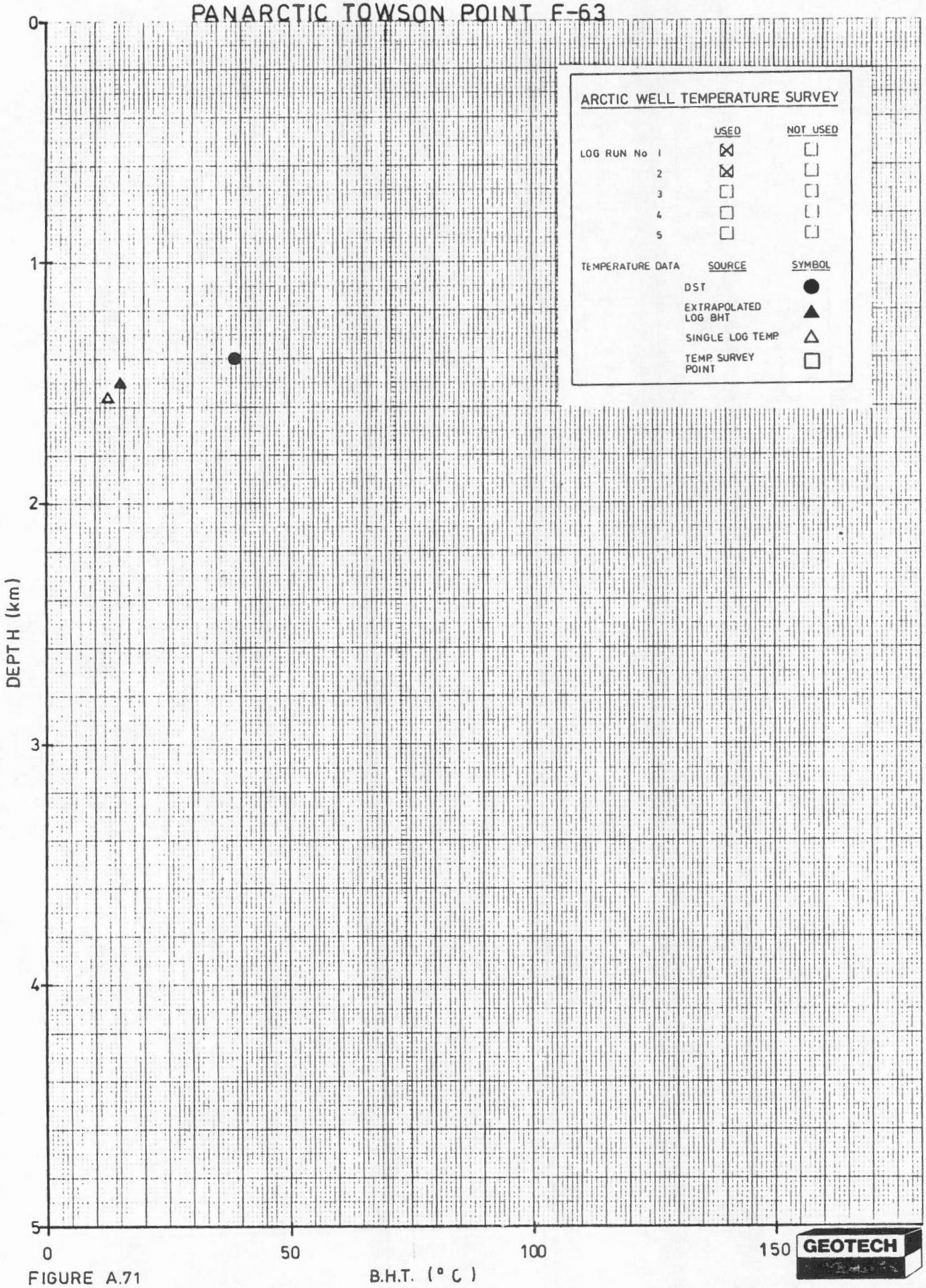


FIGURE A.71

-512

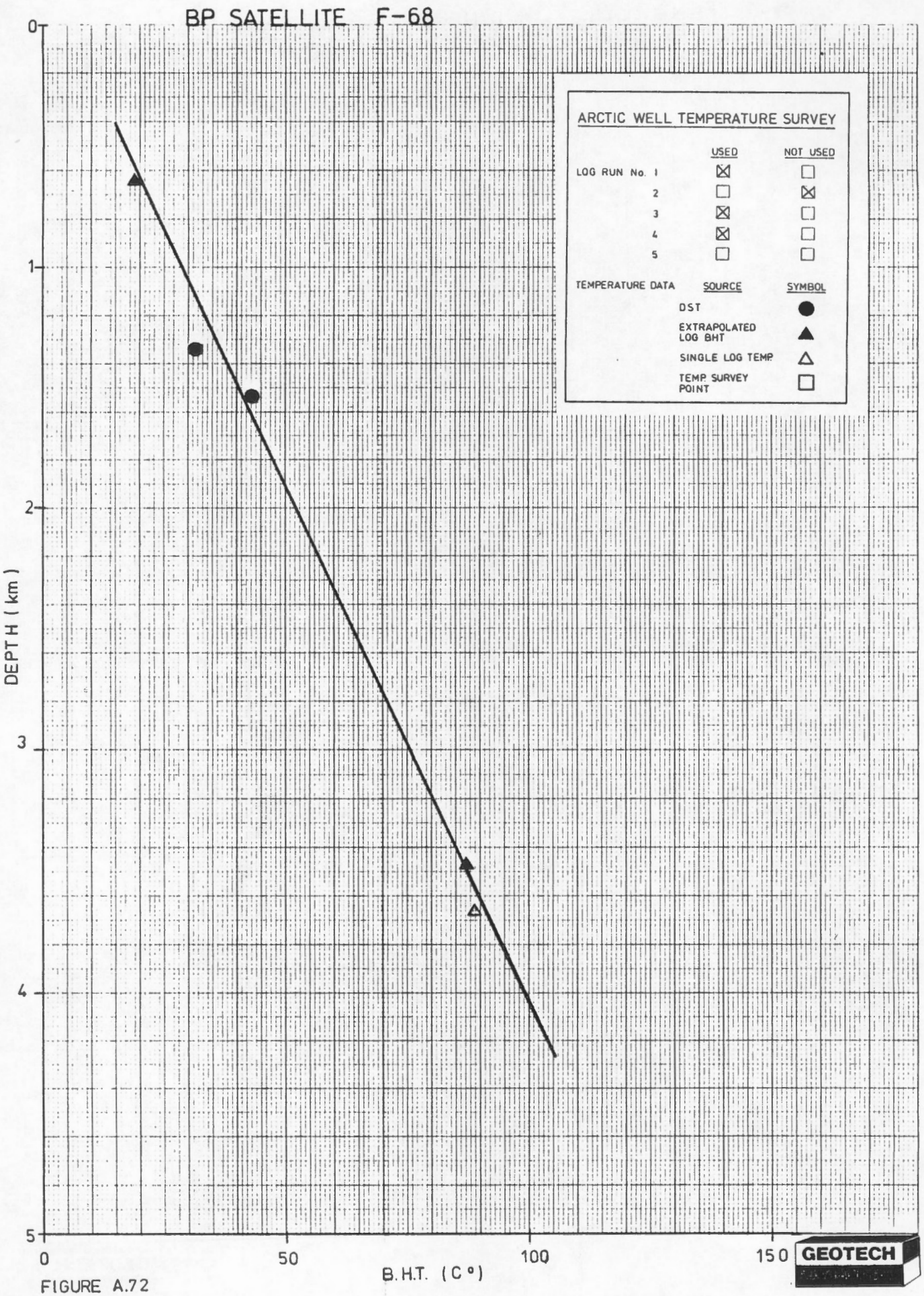


FIGURE A.72

46 1512

KEUFFEL & ESSER CO MADE IN USA

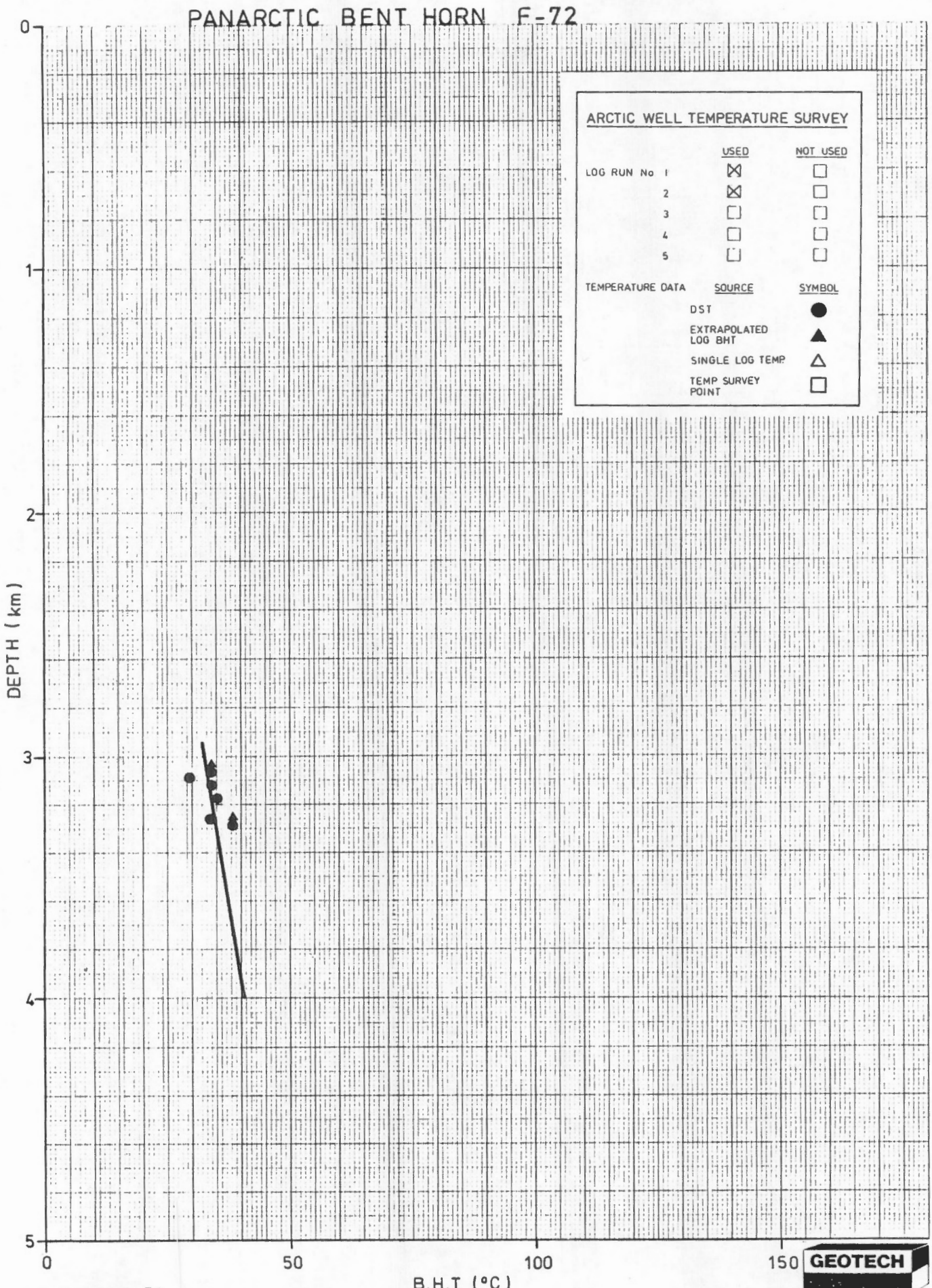

PANARCTIC BENT HORN F-72
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.73

PANARCTIC BENT HORN F-72 A

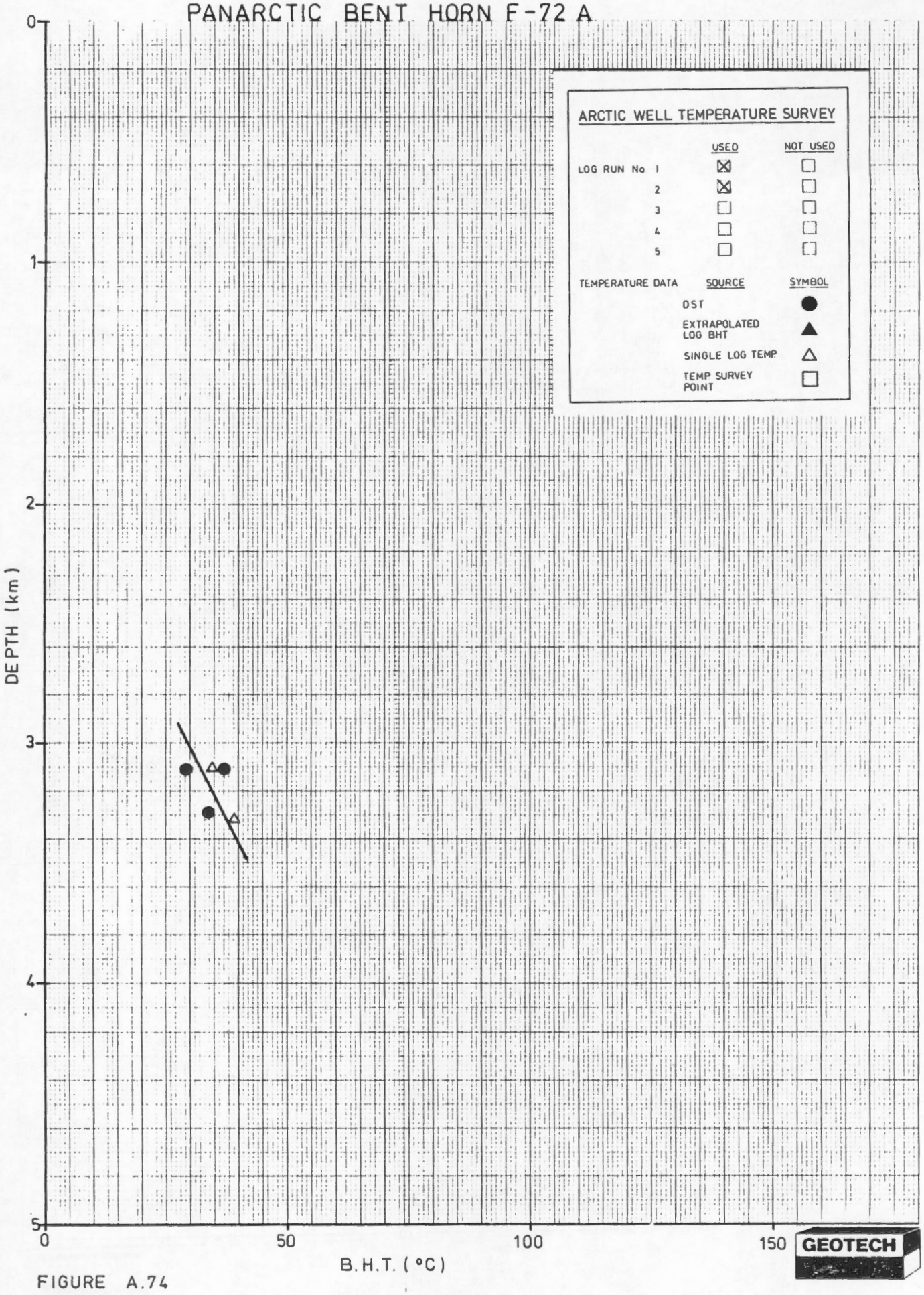


FIGURE A.74

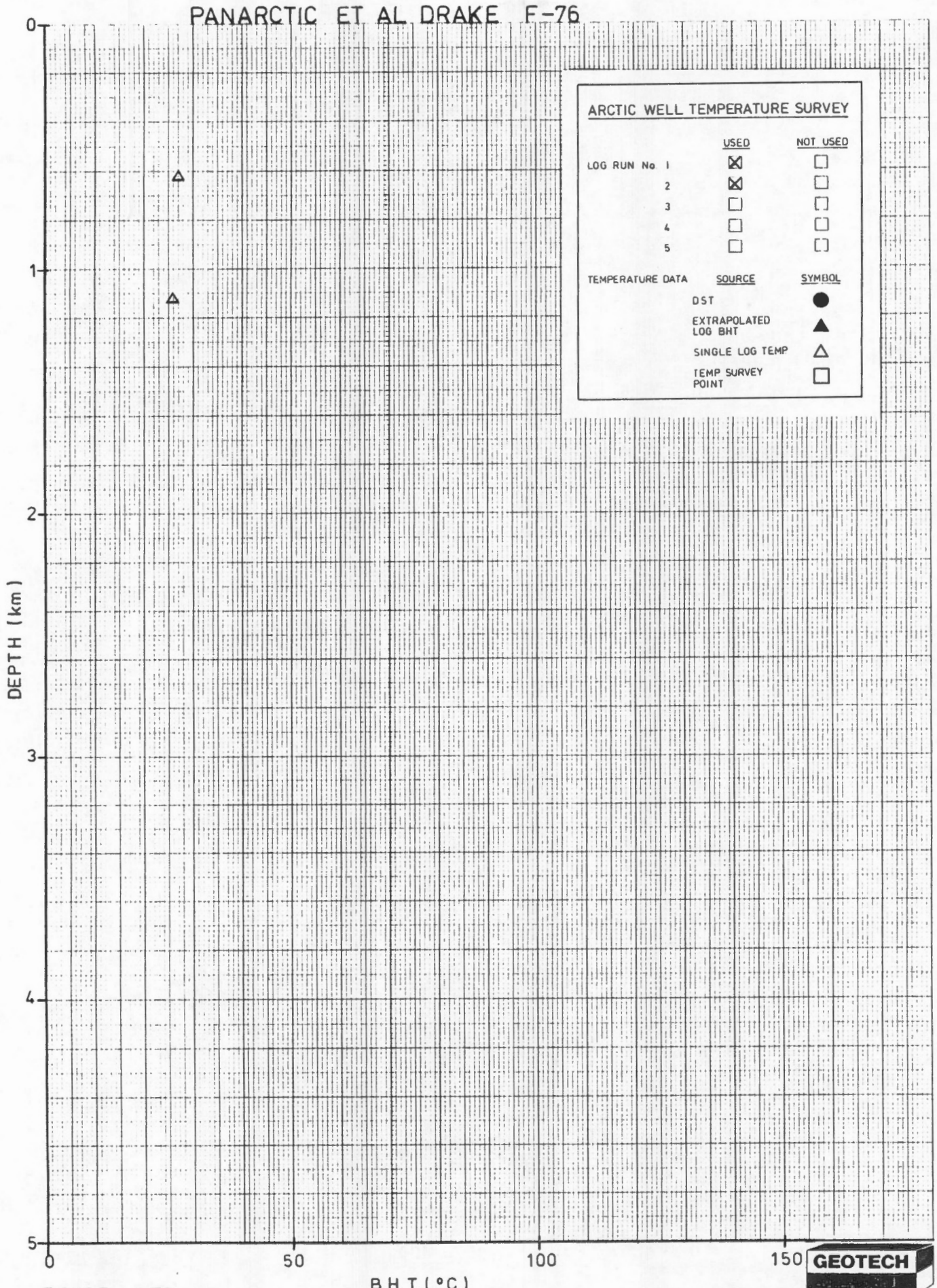


FIGURE A.75

46 1512
K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.

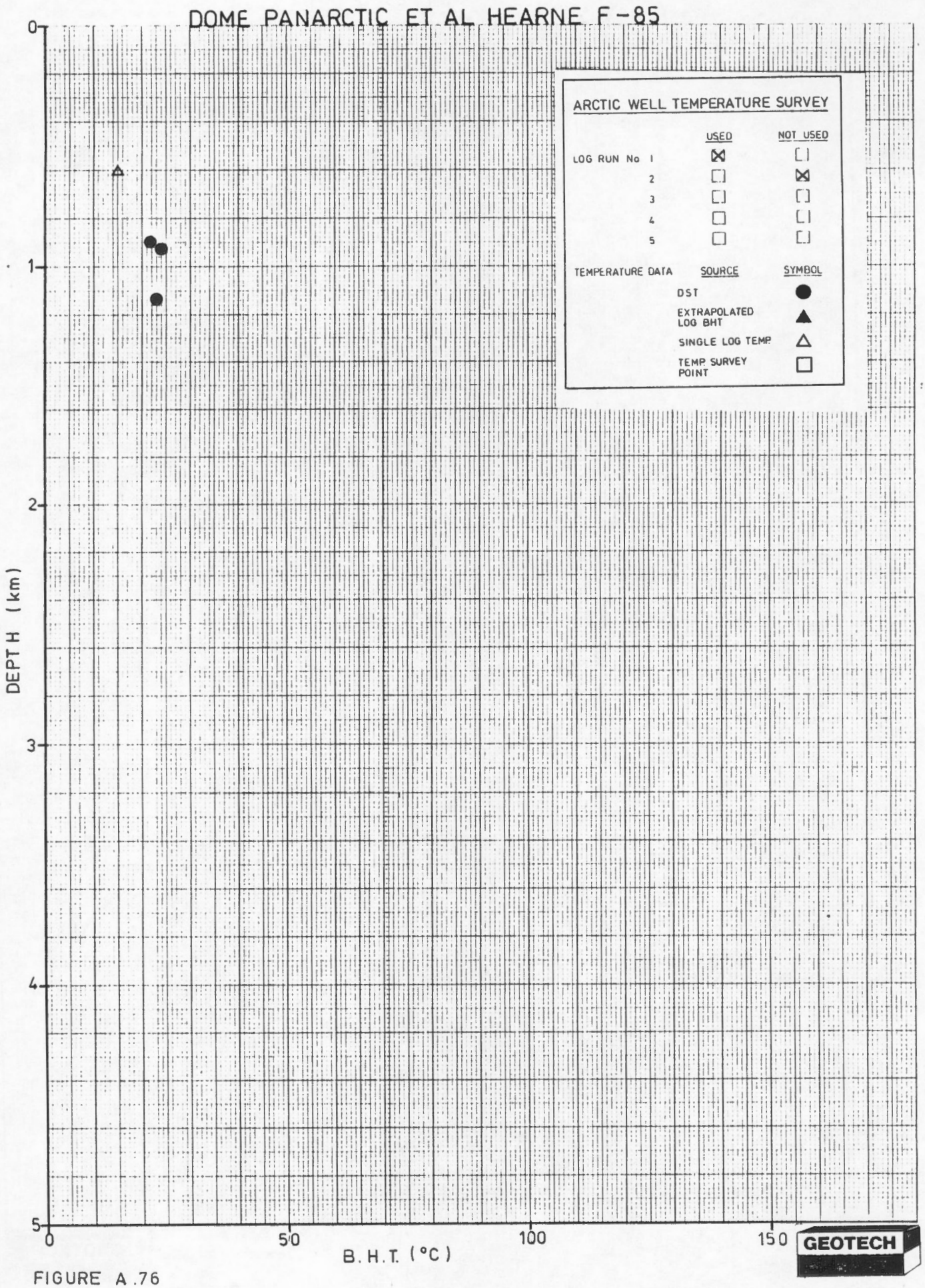


FIGURE A.76

46 1512

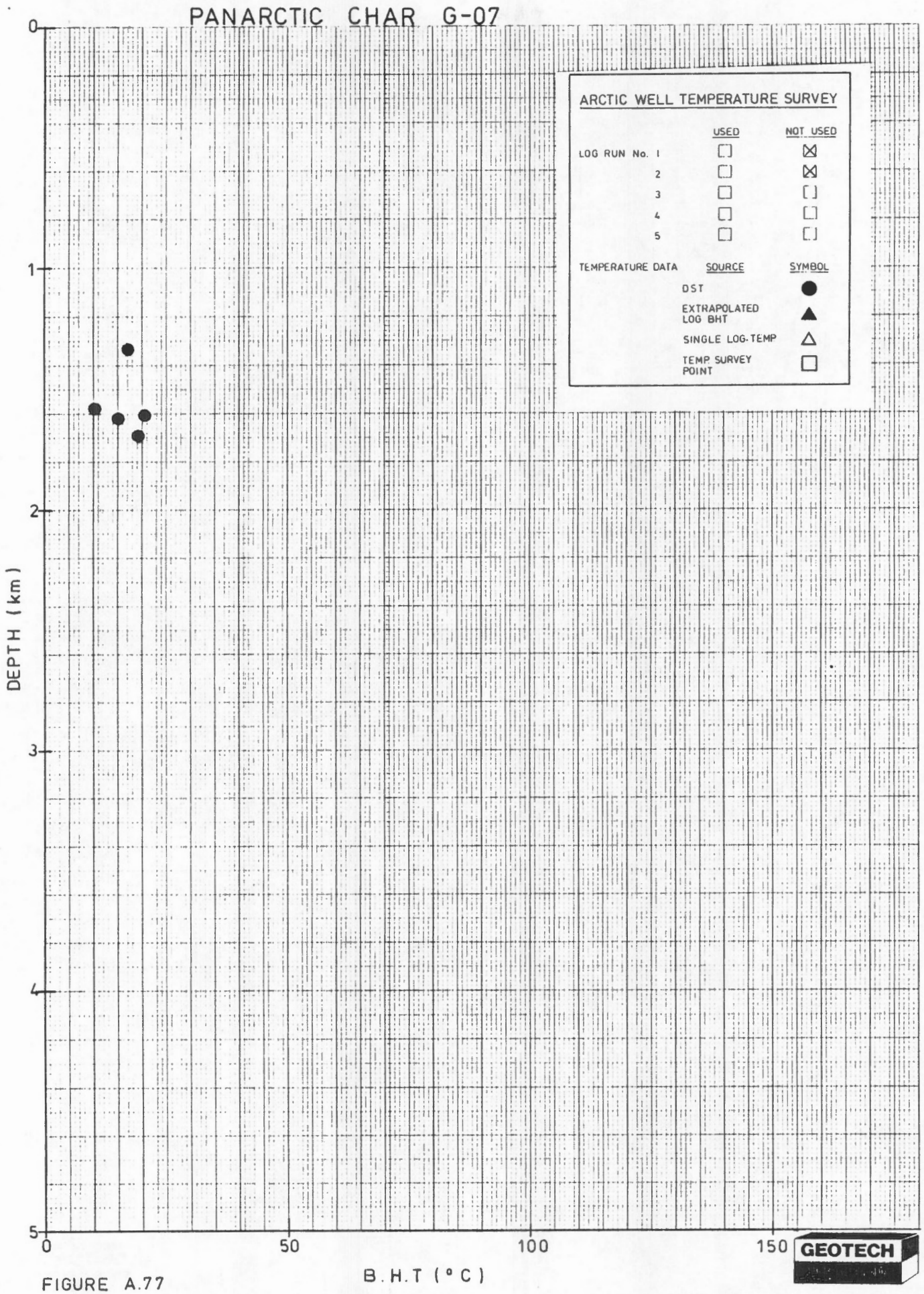

PANARCTIC CHAR G-07
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T (°C)
46 1512
K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO
GEOTECH

FIGURE A.77

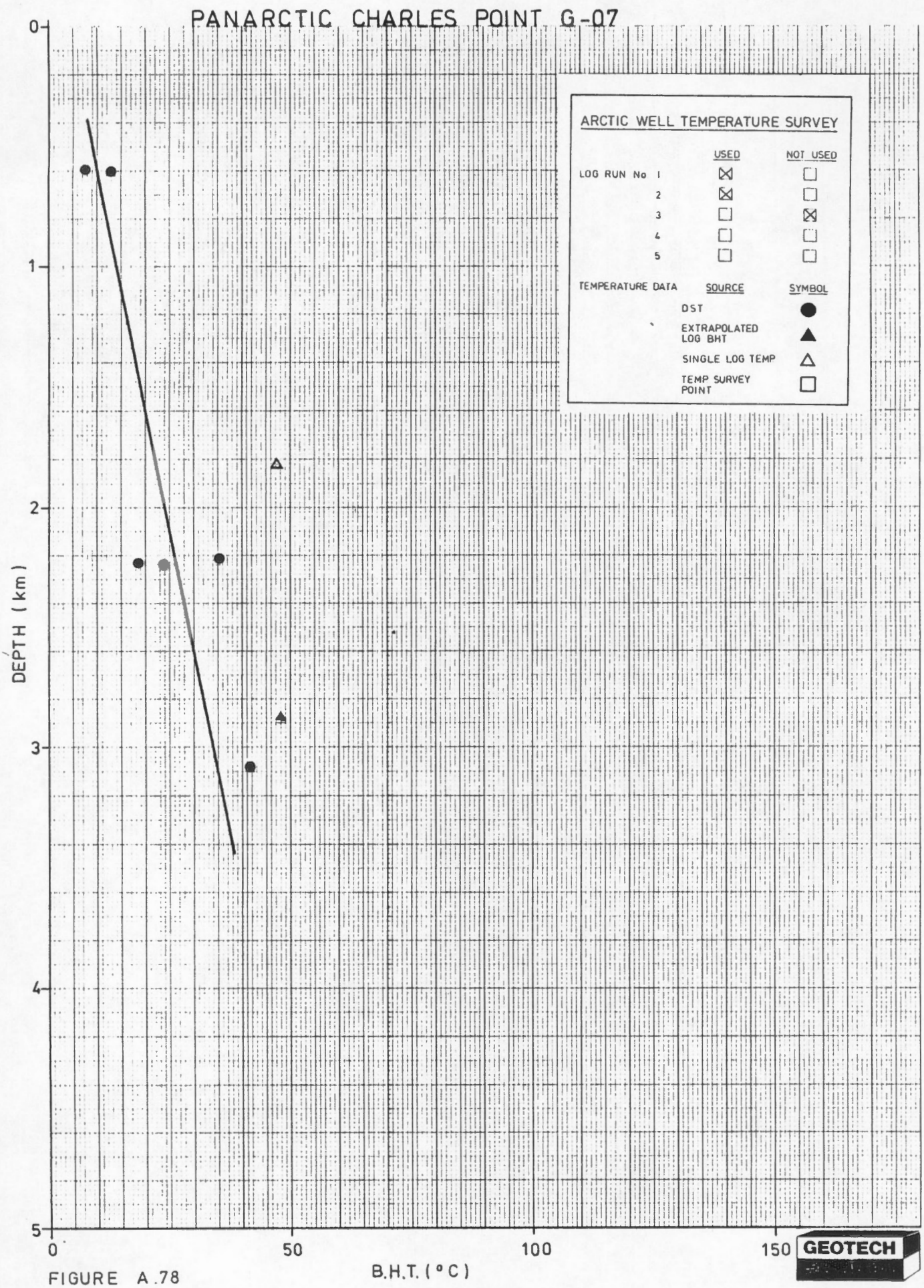

PANARCTIC CHARLES POINT G-07
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.78

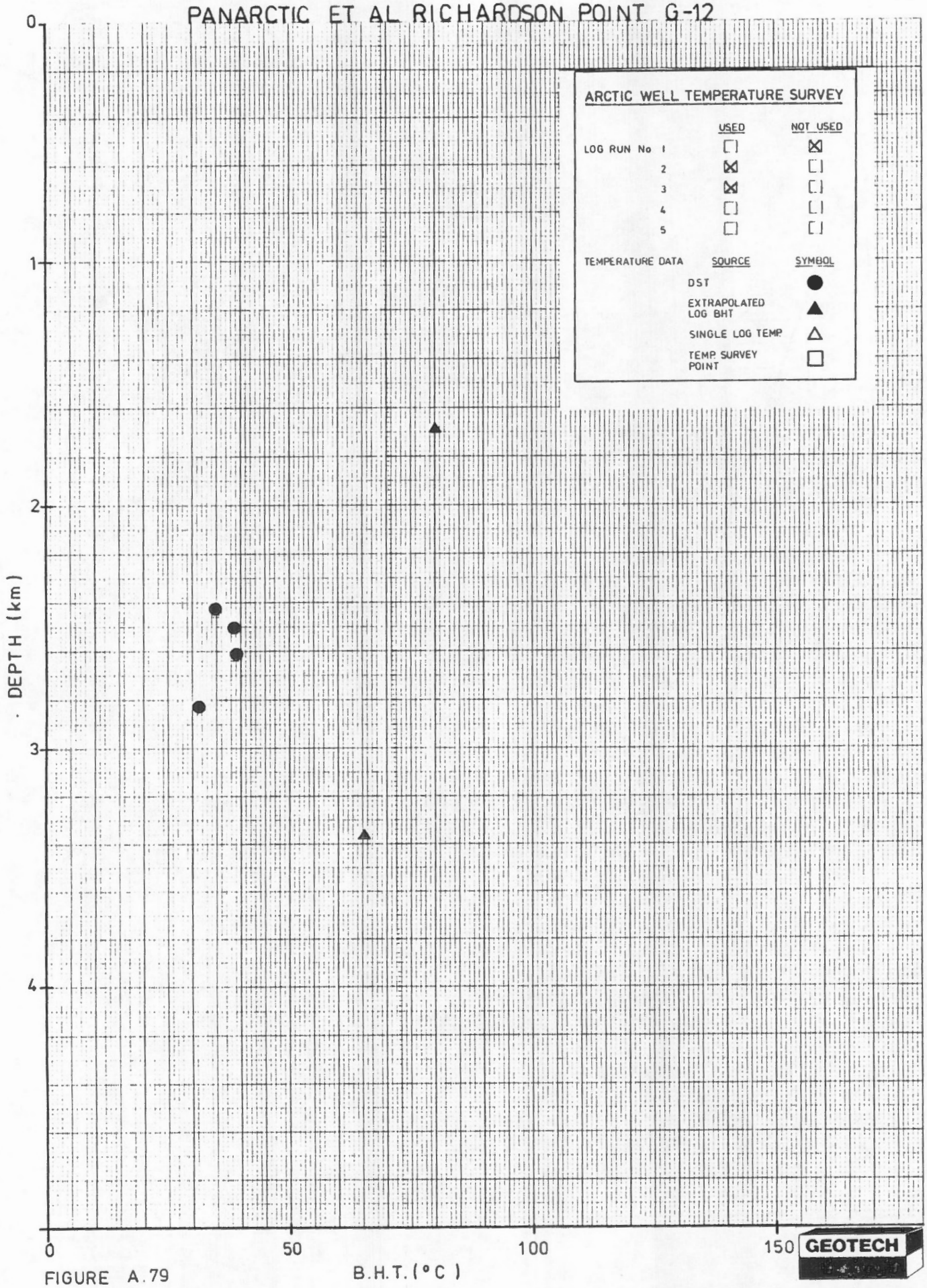

PANARCTIC ET AL RICHARDSON POINT G-12
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.79

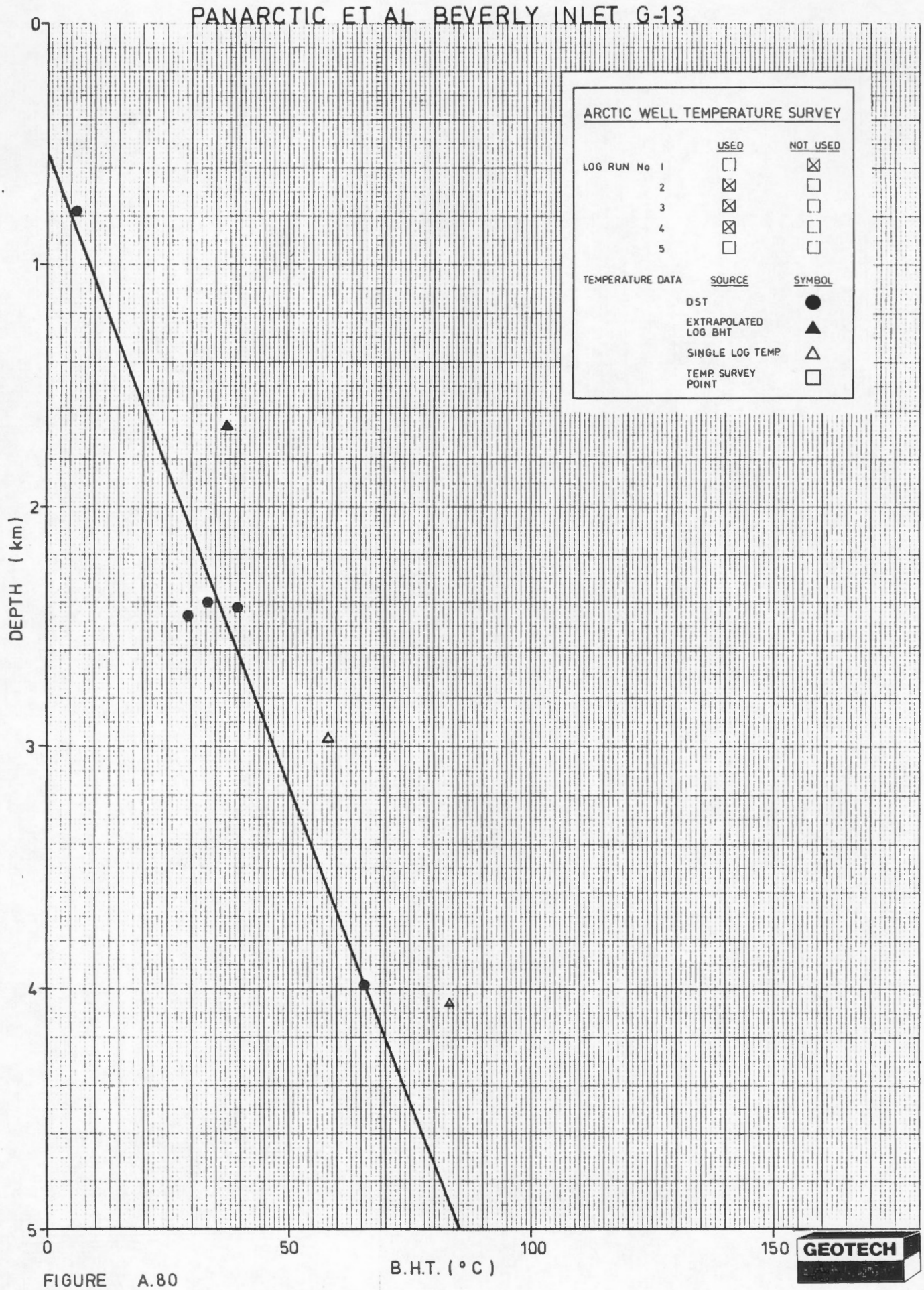


FIGURE A.80

46 1512

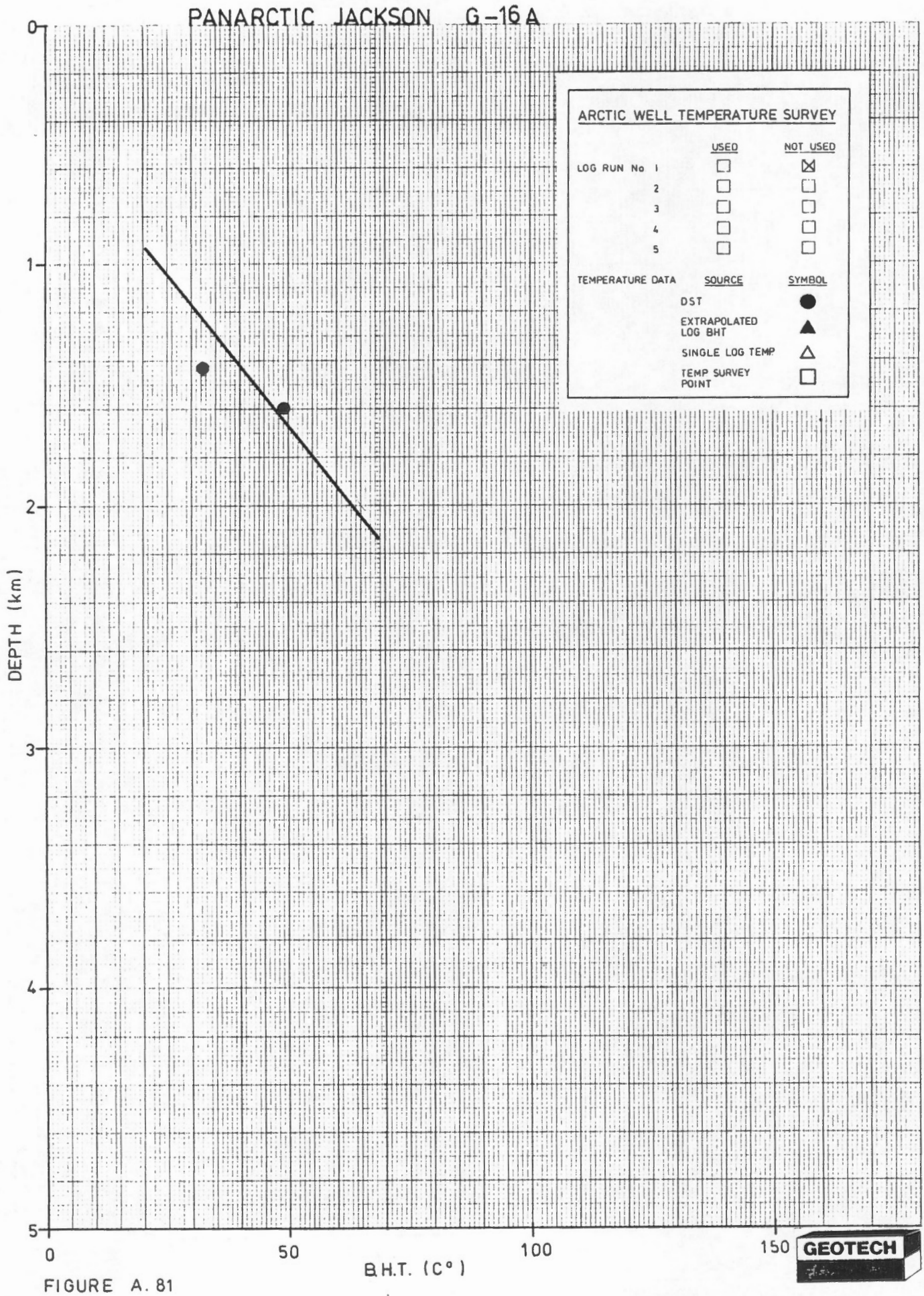

PANARCTIC JACKSON G-16A
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A. 81

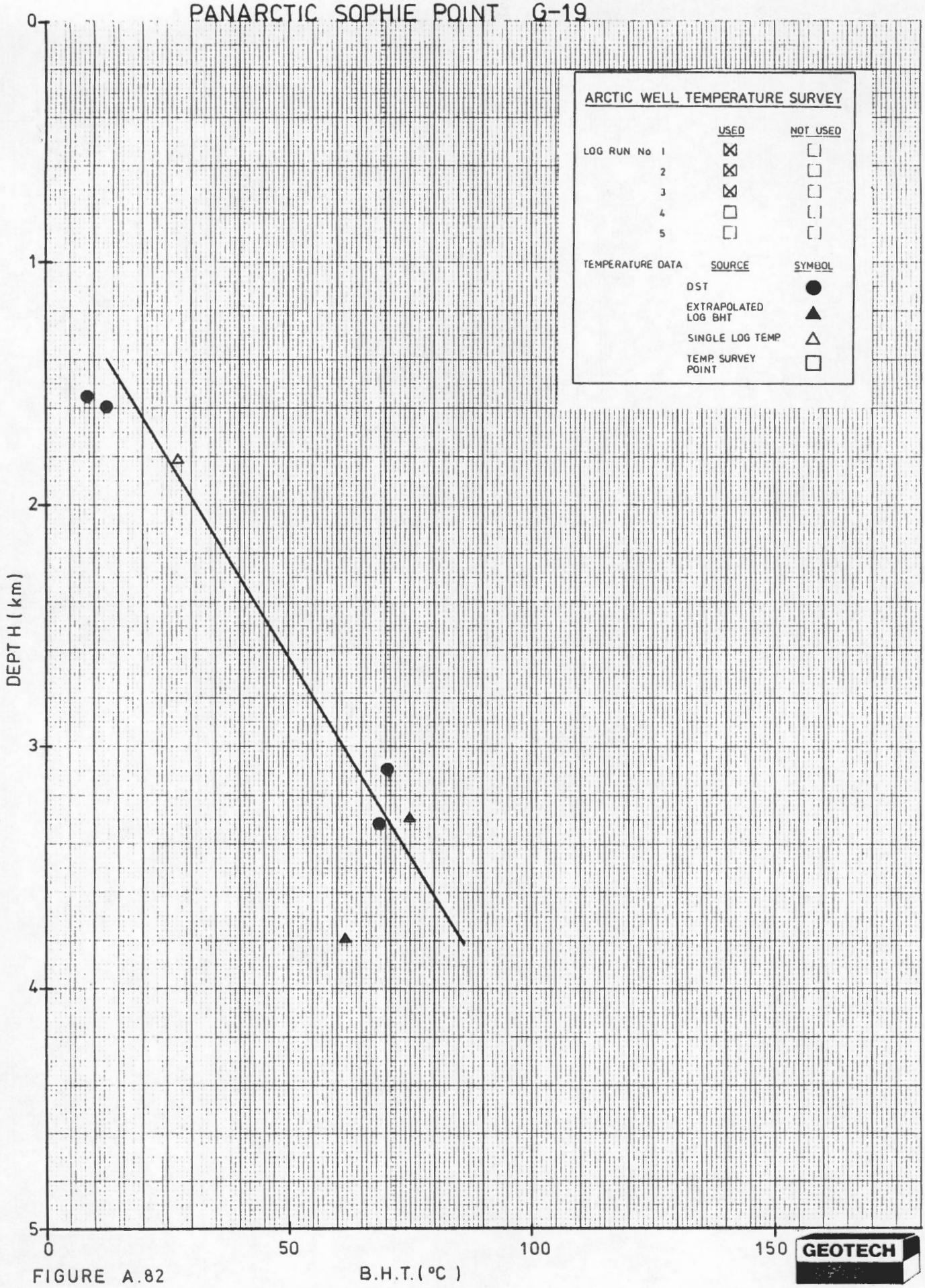
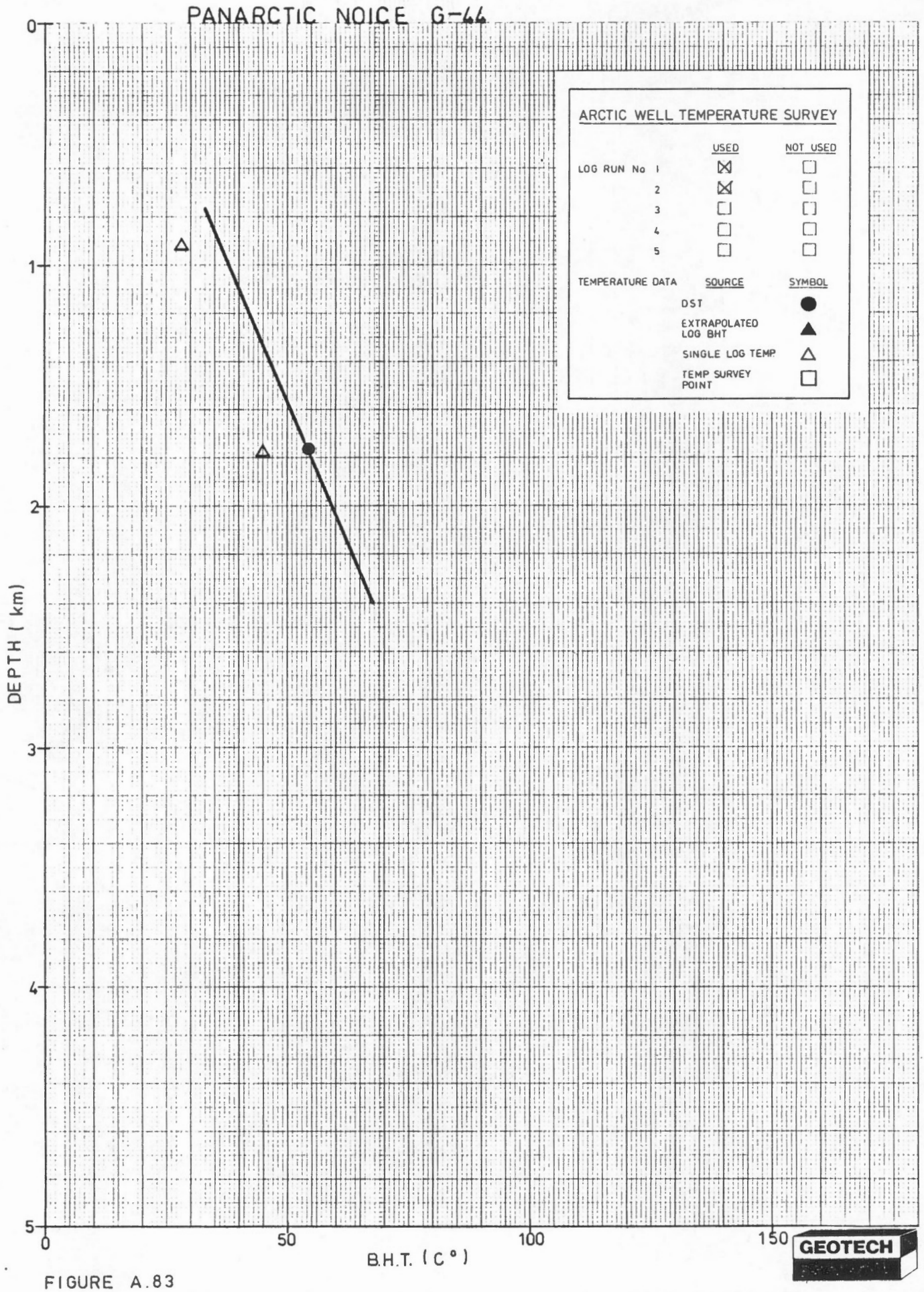

PANARCTIC SOPHIE POINT G-19
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.82



46 1512

KEUFFEL & ESSER CO

GEOTECH

FIGURE A.83

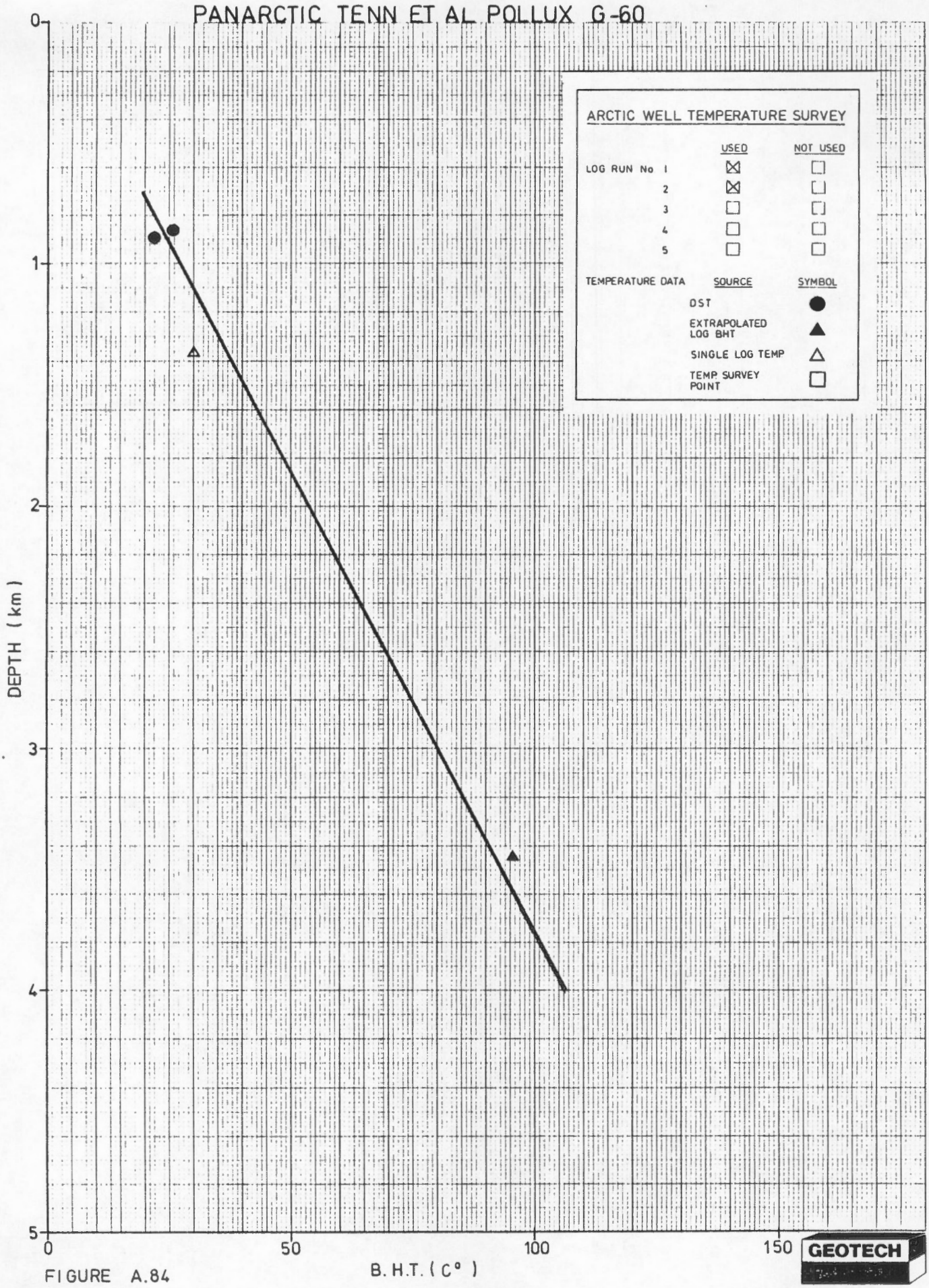

PANARCTIC TENN ET AL POLLUX G-60
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.84

PANARCTIC OILS TOWSON PT. G-63

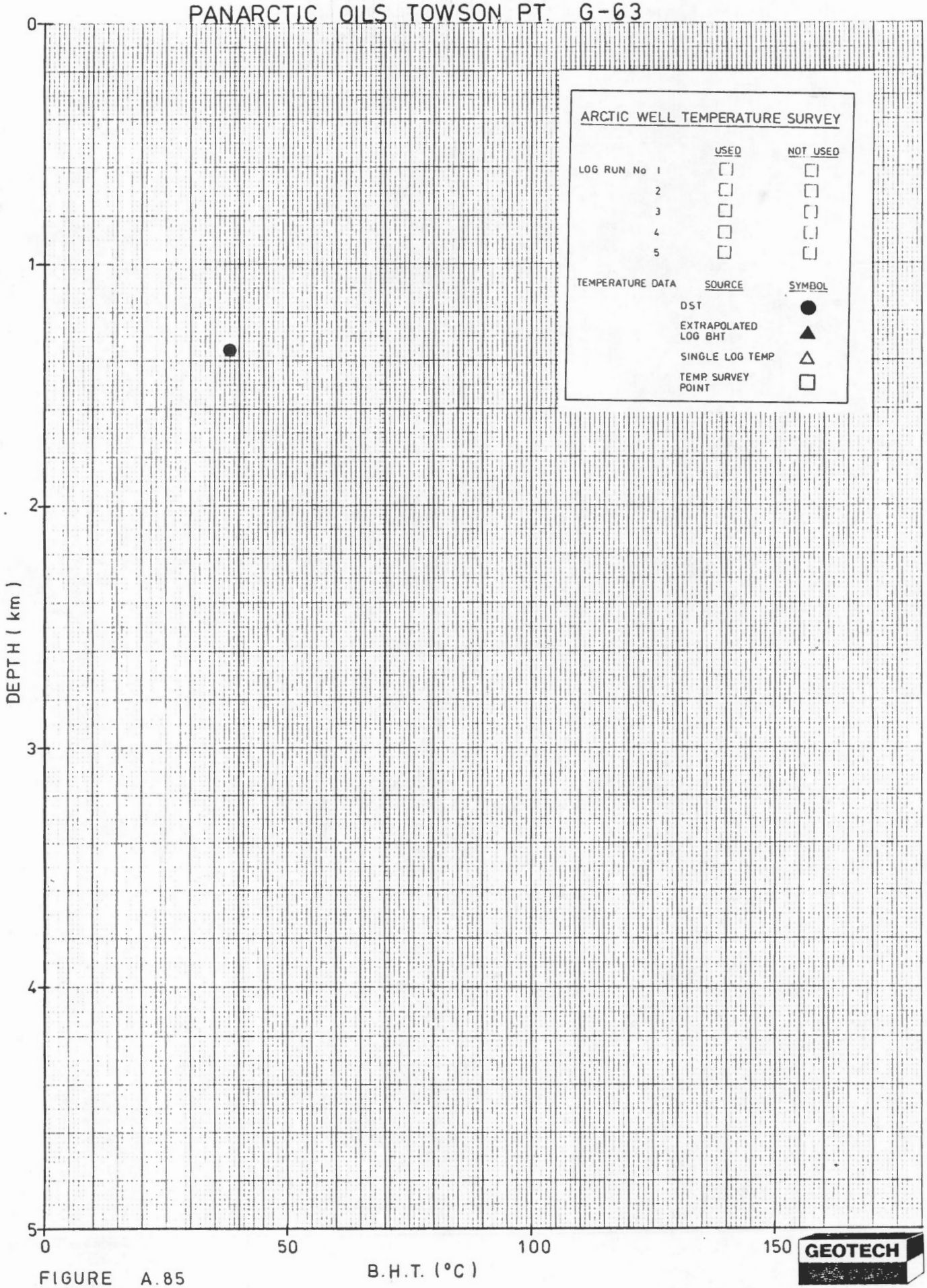


FIGURE A.85

GEOTECH

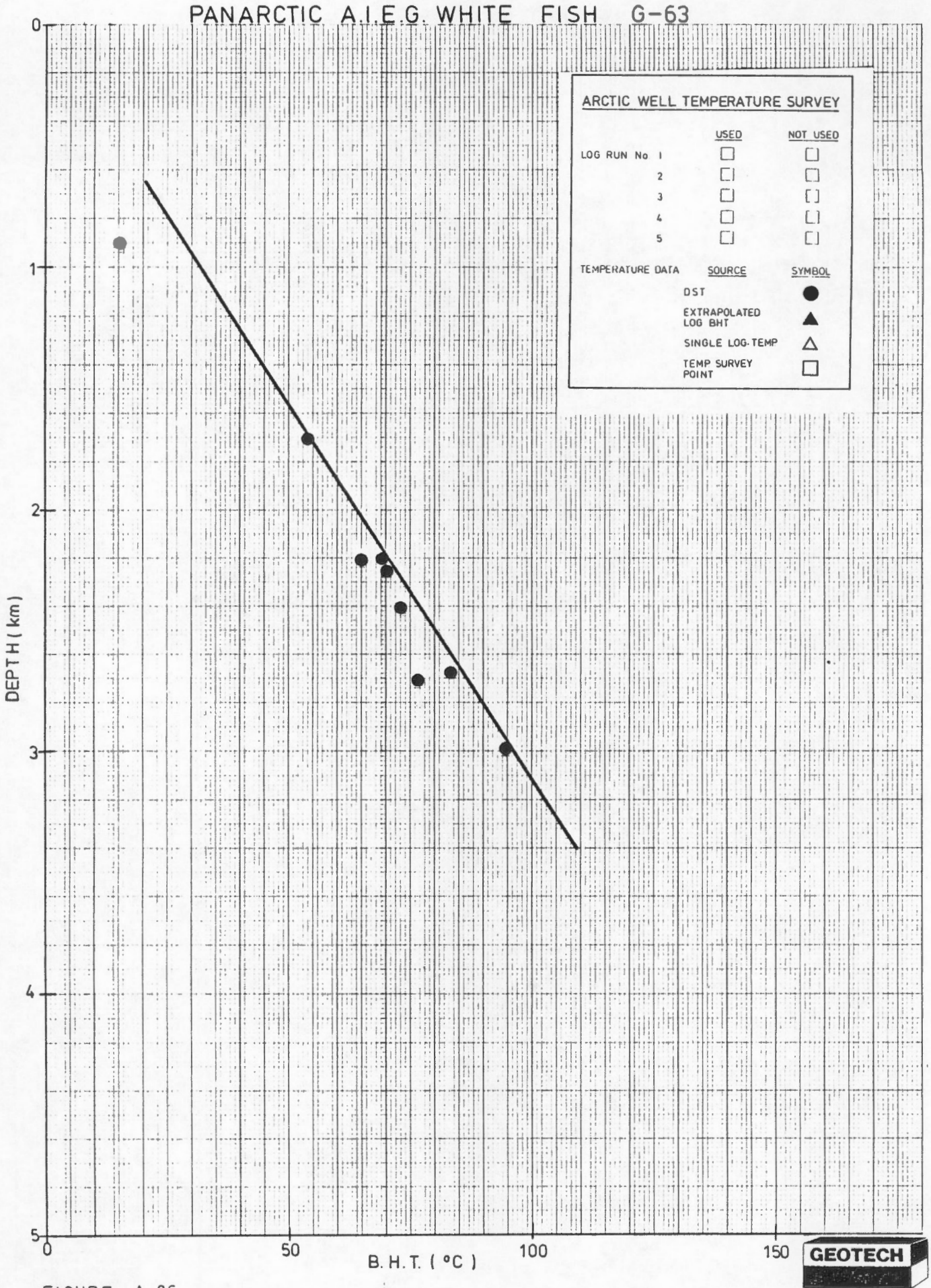

PANARCTIC A.I.E.G. WHITE FISH G-63
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.86

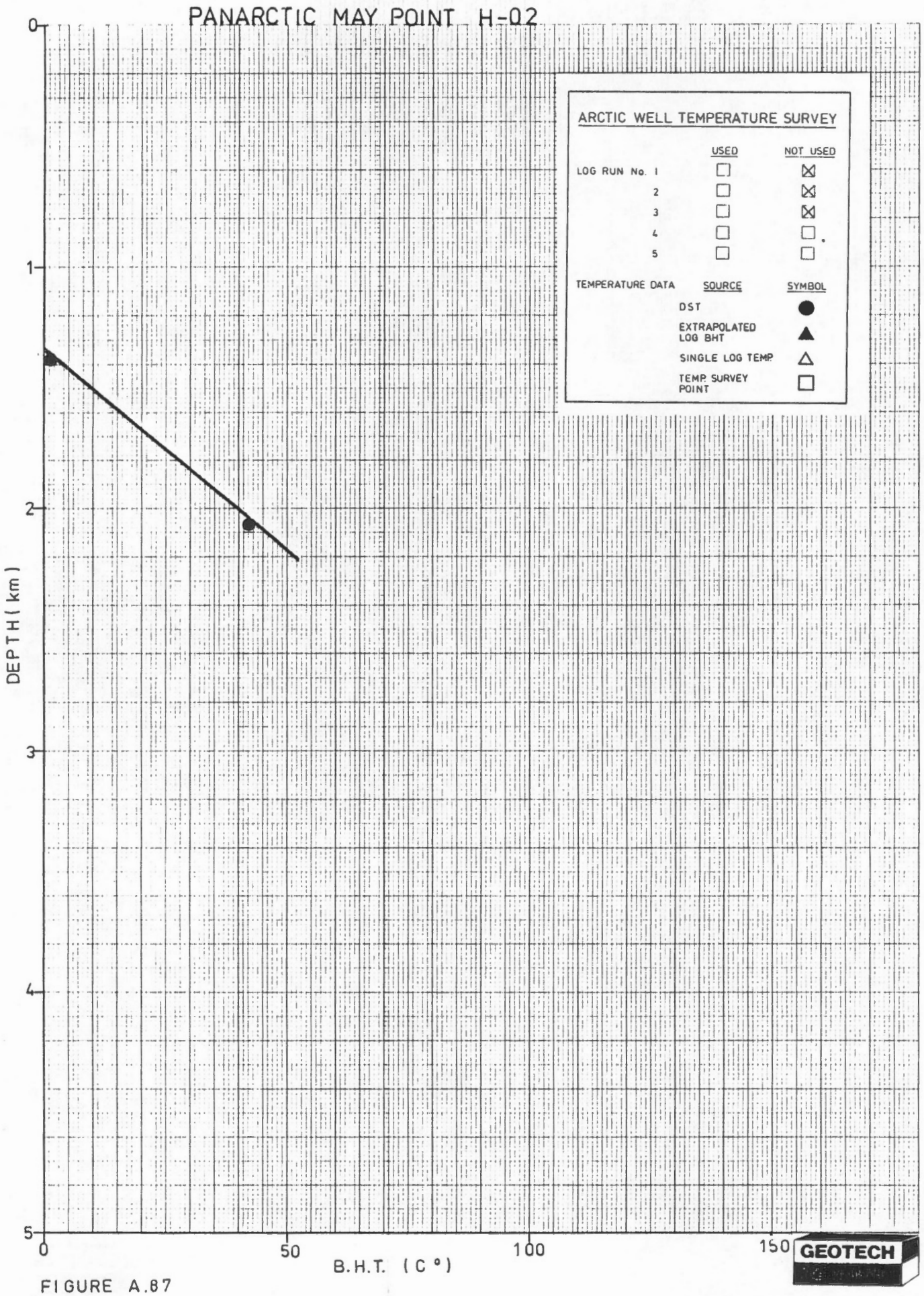

PANARCTIC MAY POINT H-02
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.87

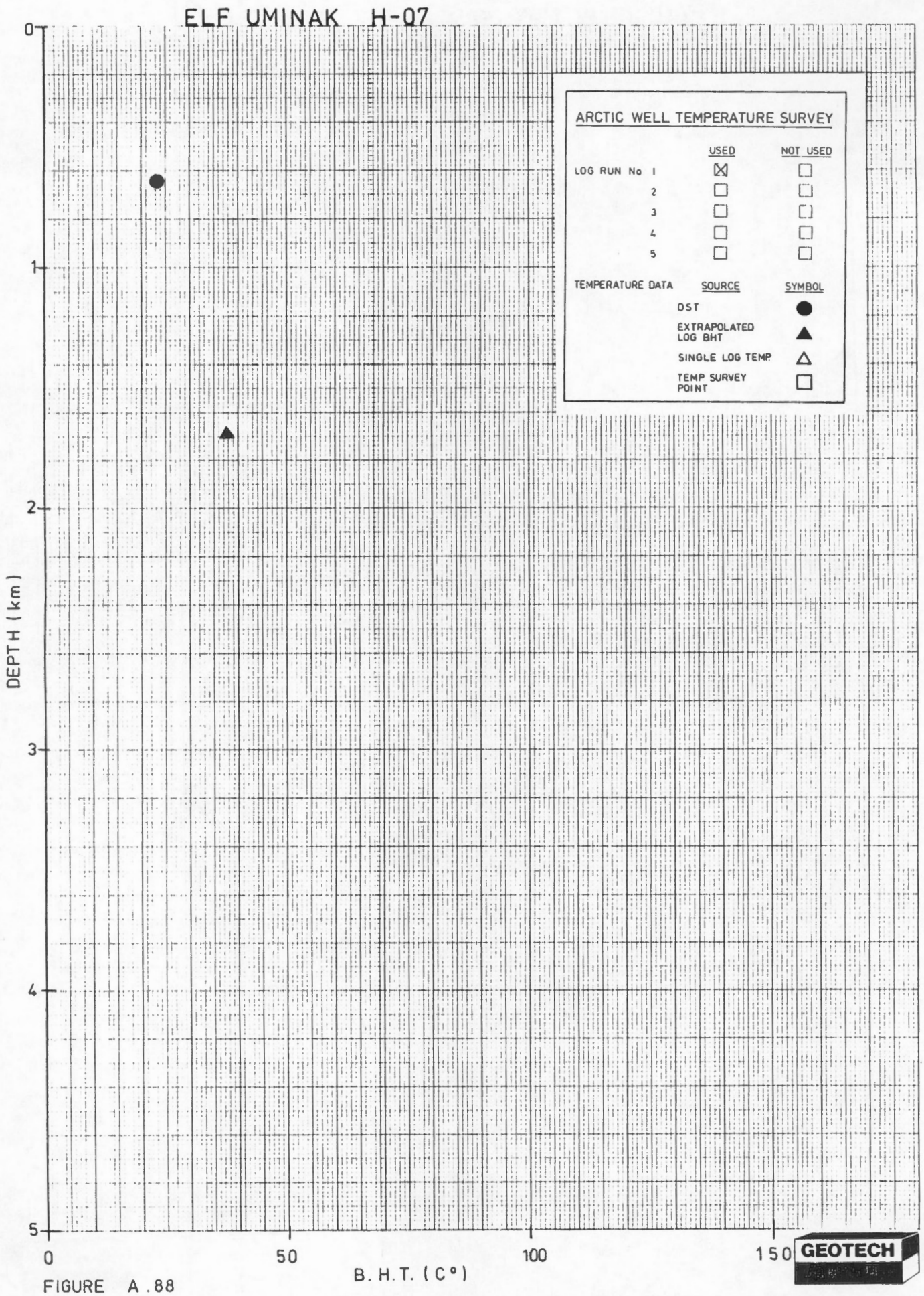

ELF UMINAK H-07
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (C°)
GEOTECH

FIGURE A.88

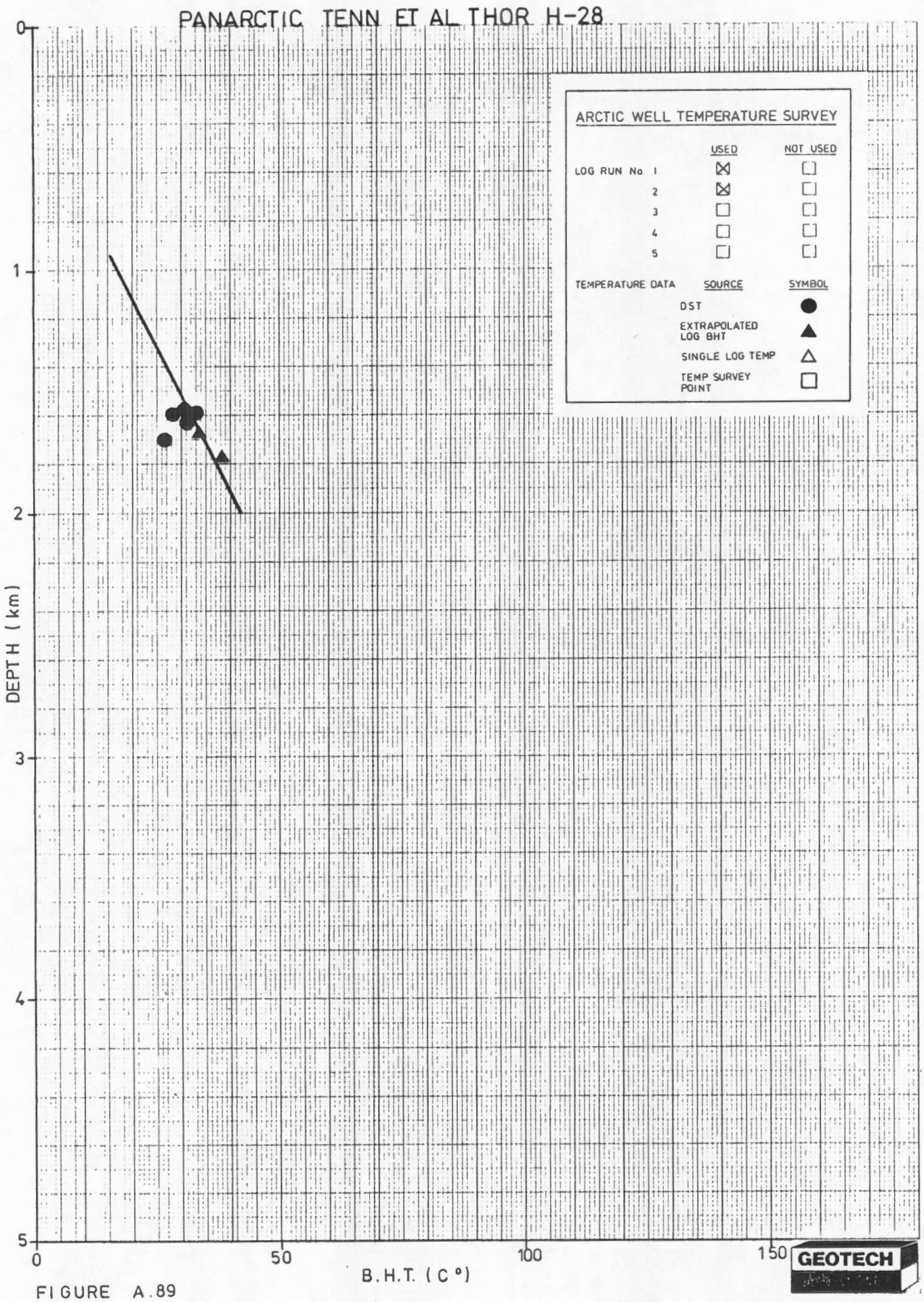

PANARCTIC TENN ET AL THOR H-28
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.89

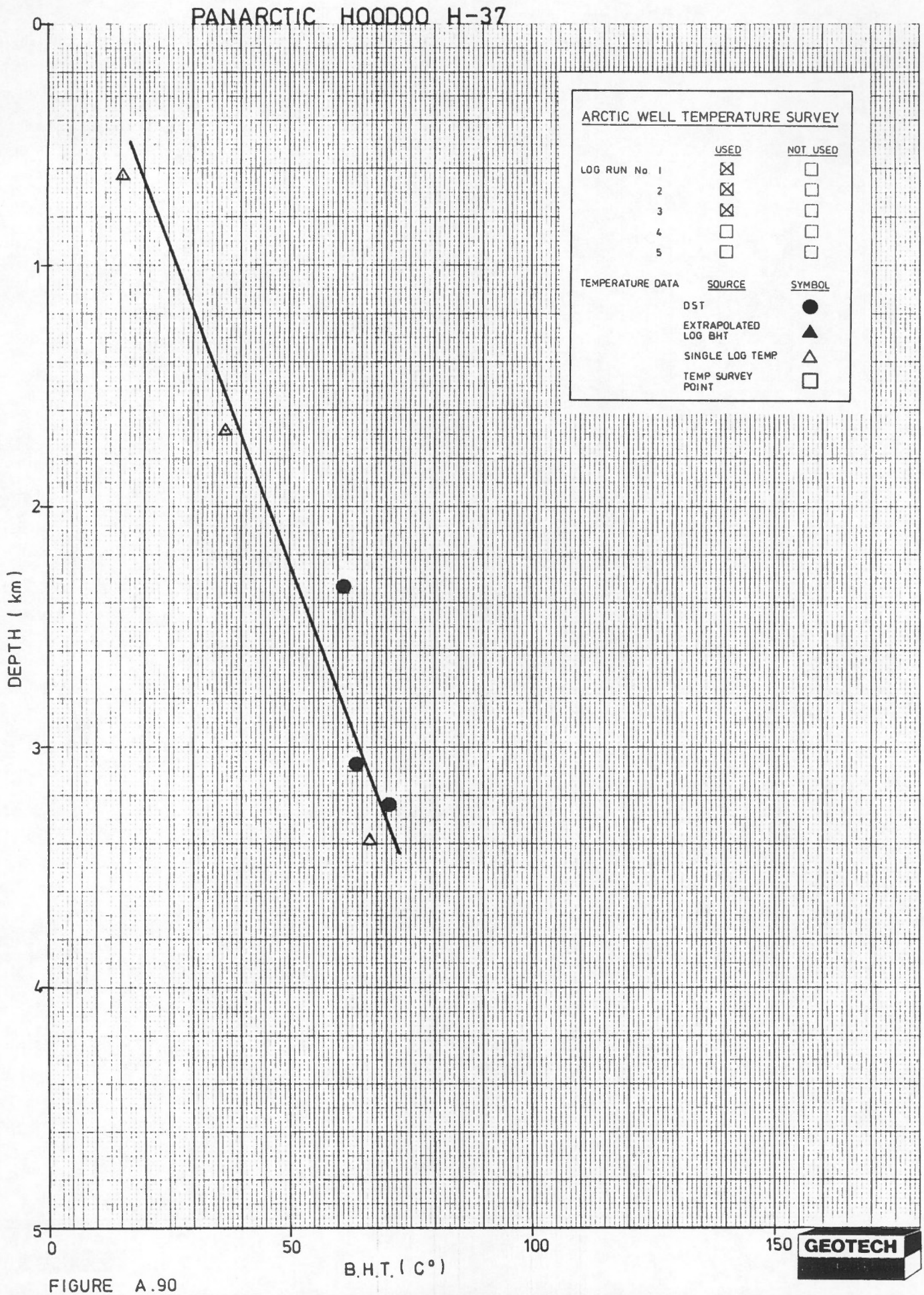


FIGURE A.90

46 1512
10 X 10 TO THE CENTIMETER 16 x 25 CM
KEUFFEL & ESSER CO

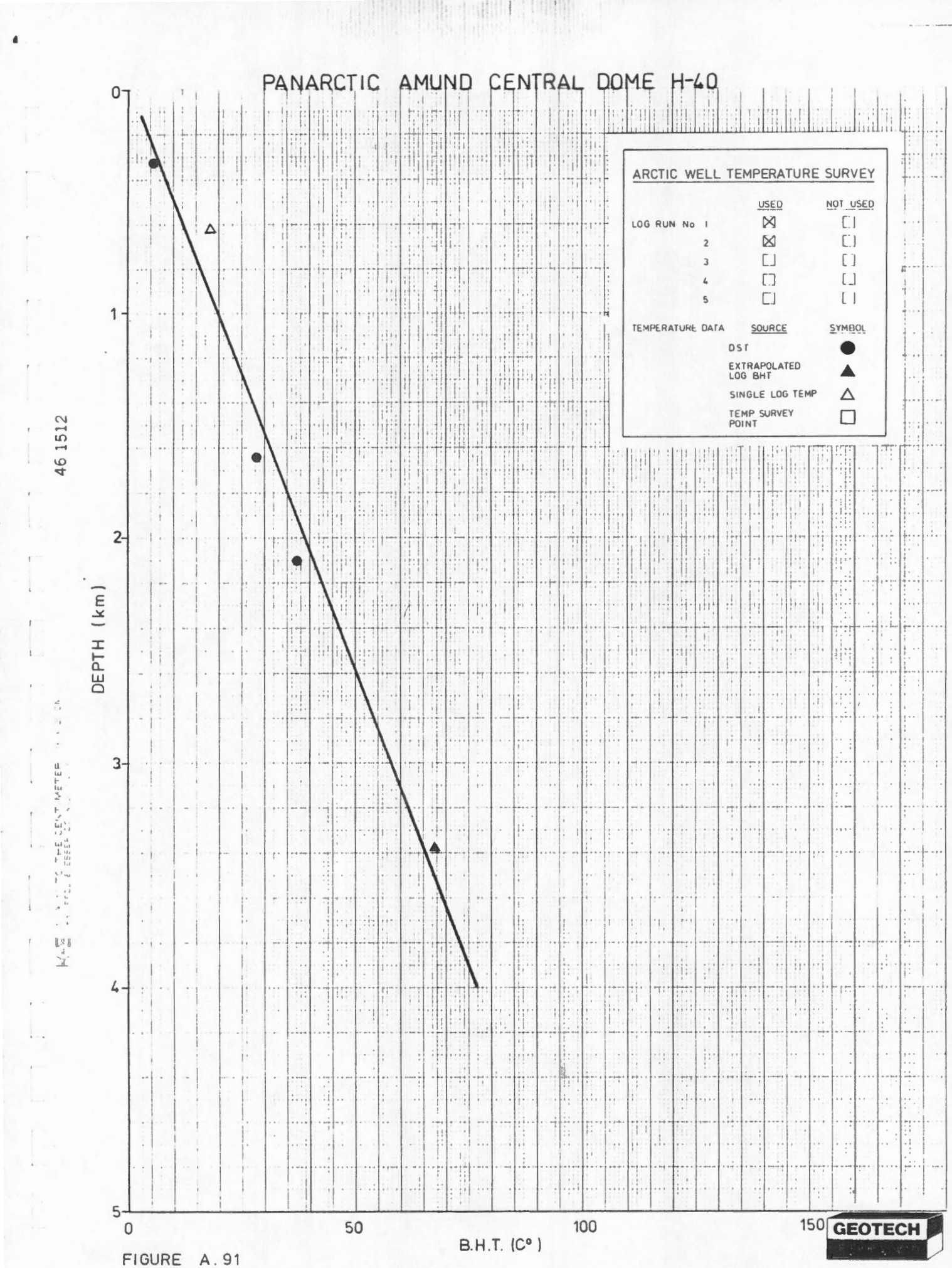

PANARCTIC AMUND CENTRAL DOME H-40
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH
46 1512

FIGURE A. 91

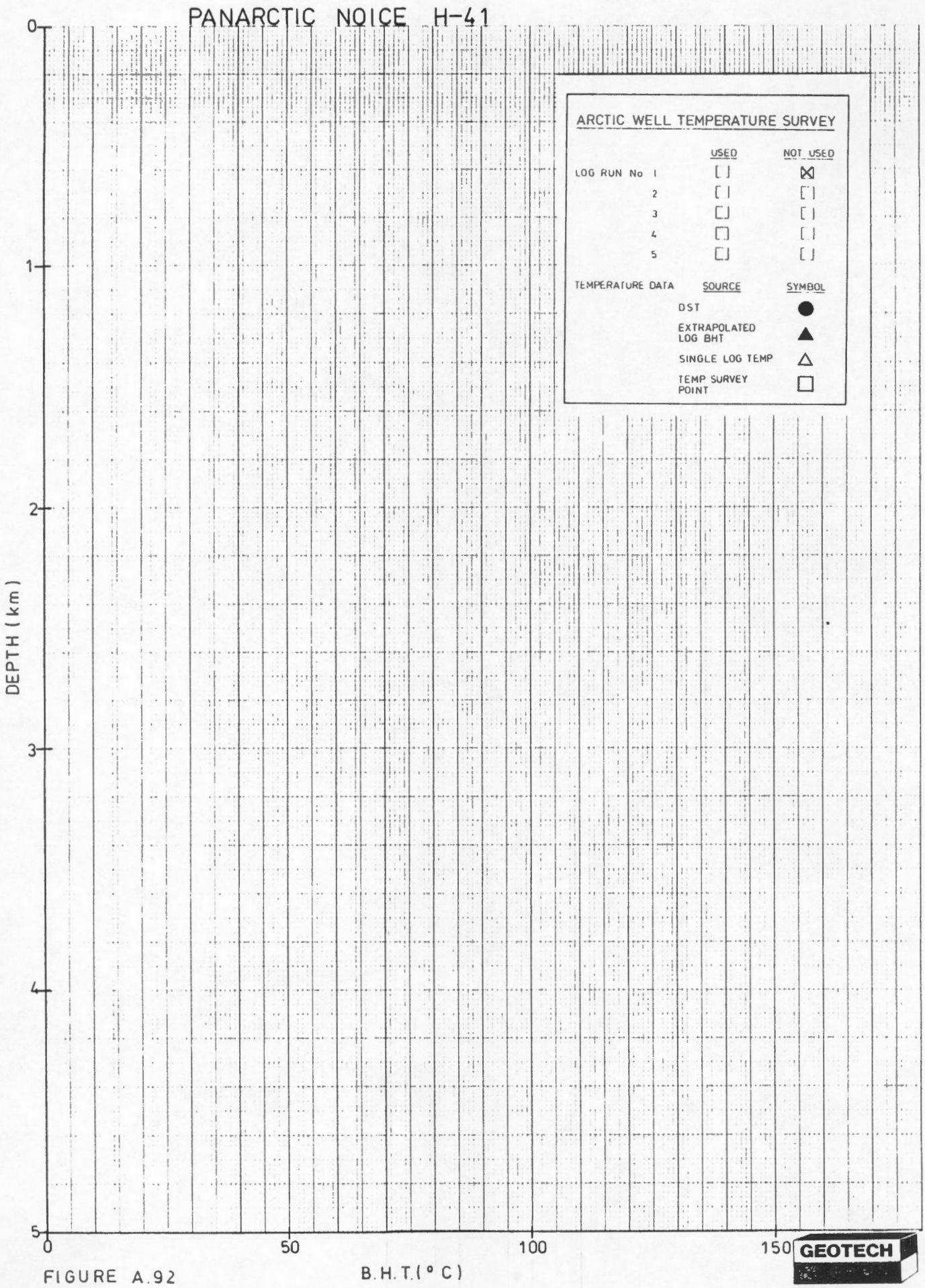

PANARCTIC NOICE H-41
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE A.92

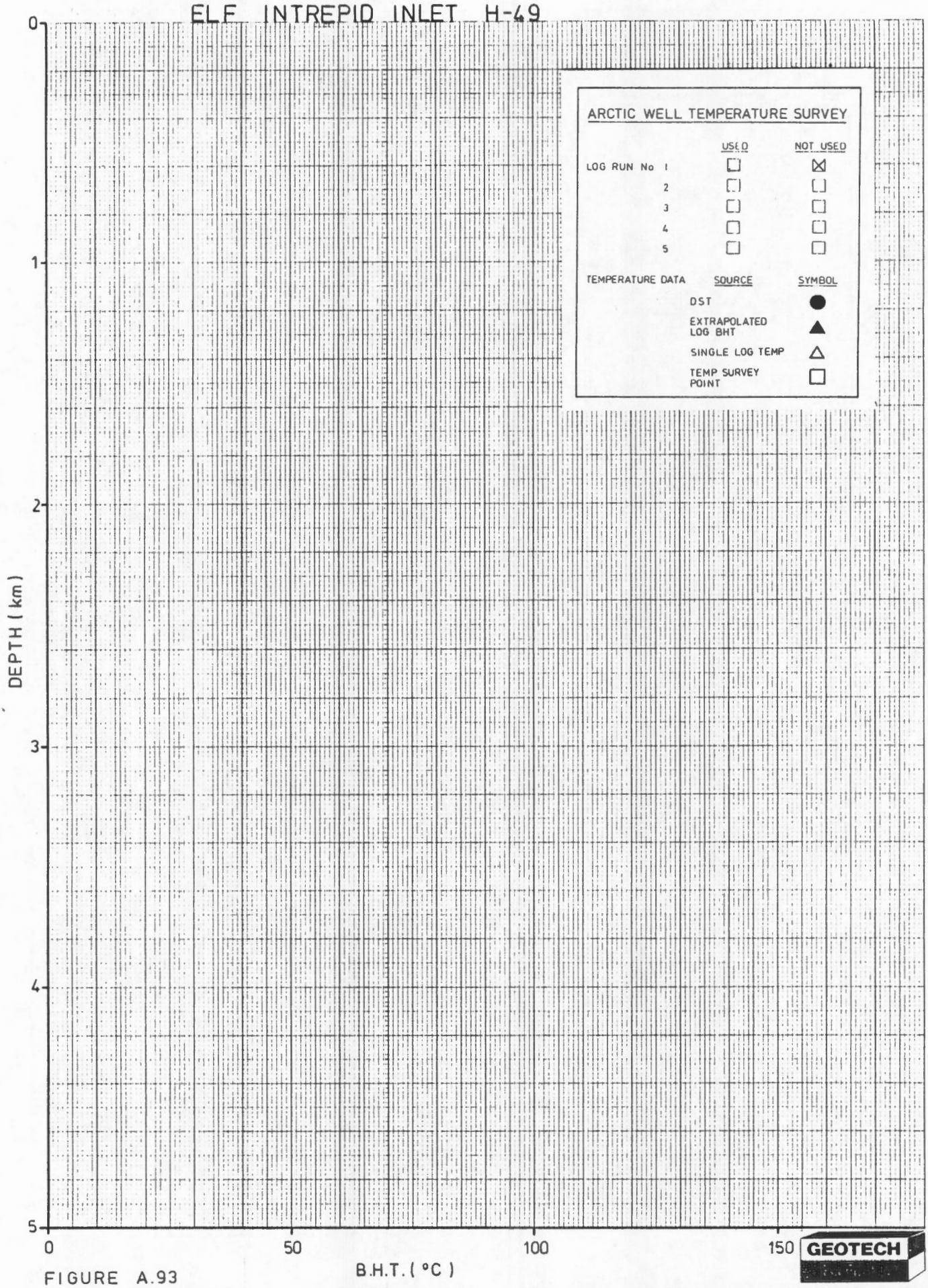

ELF INTREPID INLET H-49
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
GEOTECH

FIGURE A.93

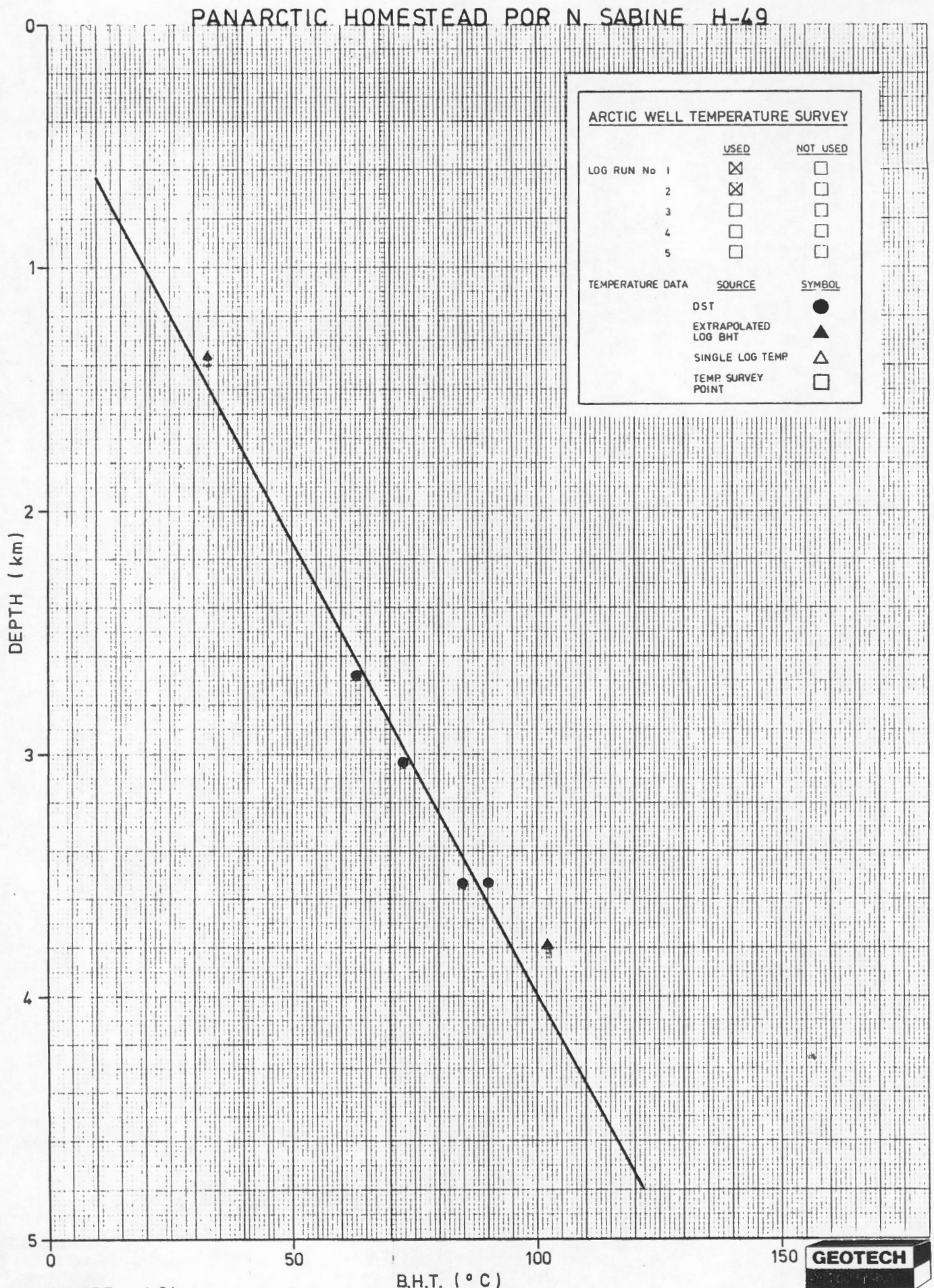
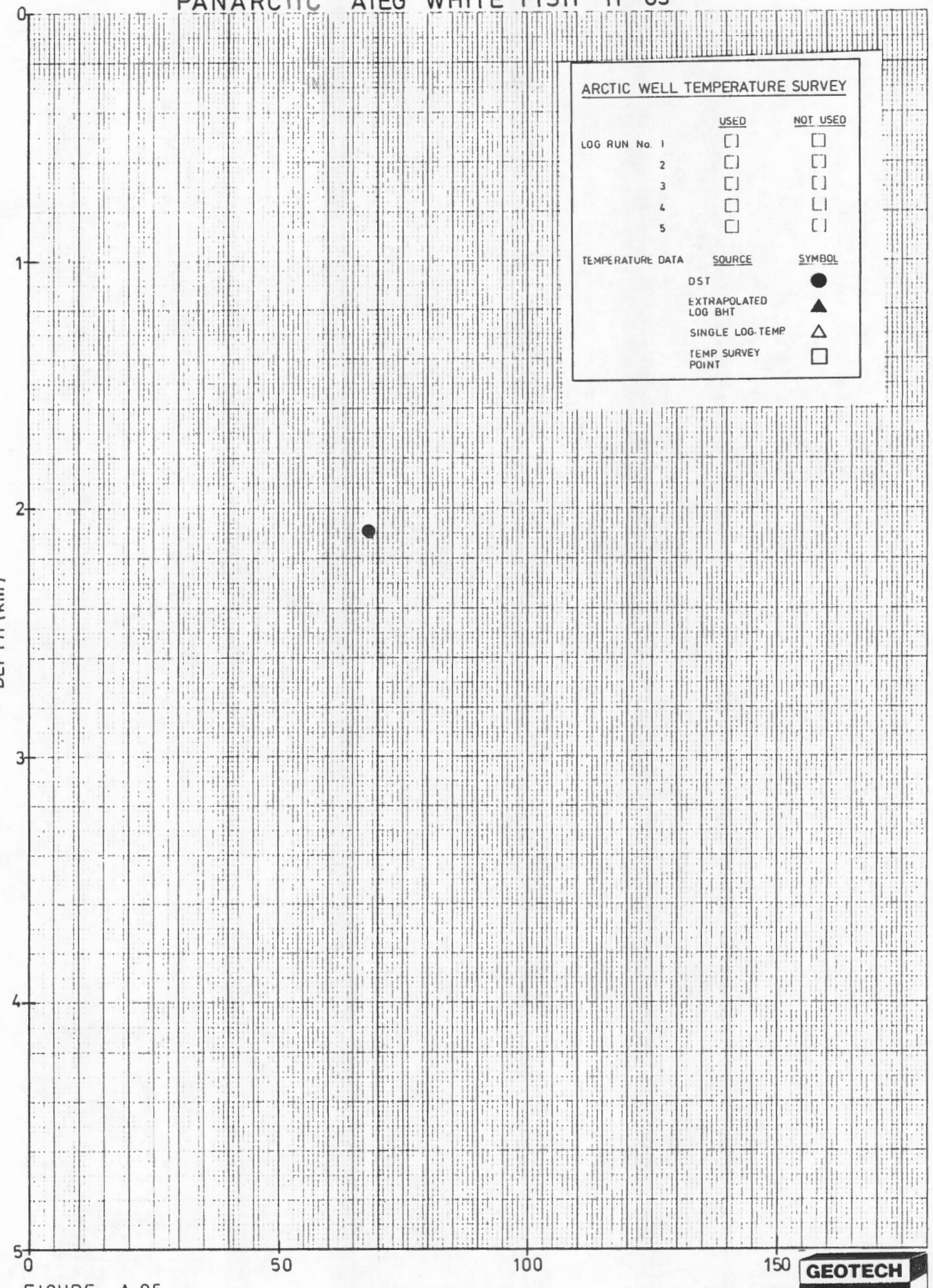

PANARCTIC HOMESTEAD POR N. SABINE H-49
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (° C)
GEOTECH

FIGURE A.94

PANARCTIC AIEG WHITE FISH H-63



46 1512

K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM.
KEUFFEL & ESSER CO MADE IN U.S.A.

FIGURE A.95

GEOTECH

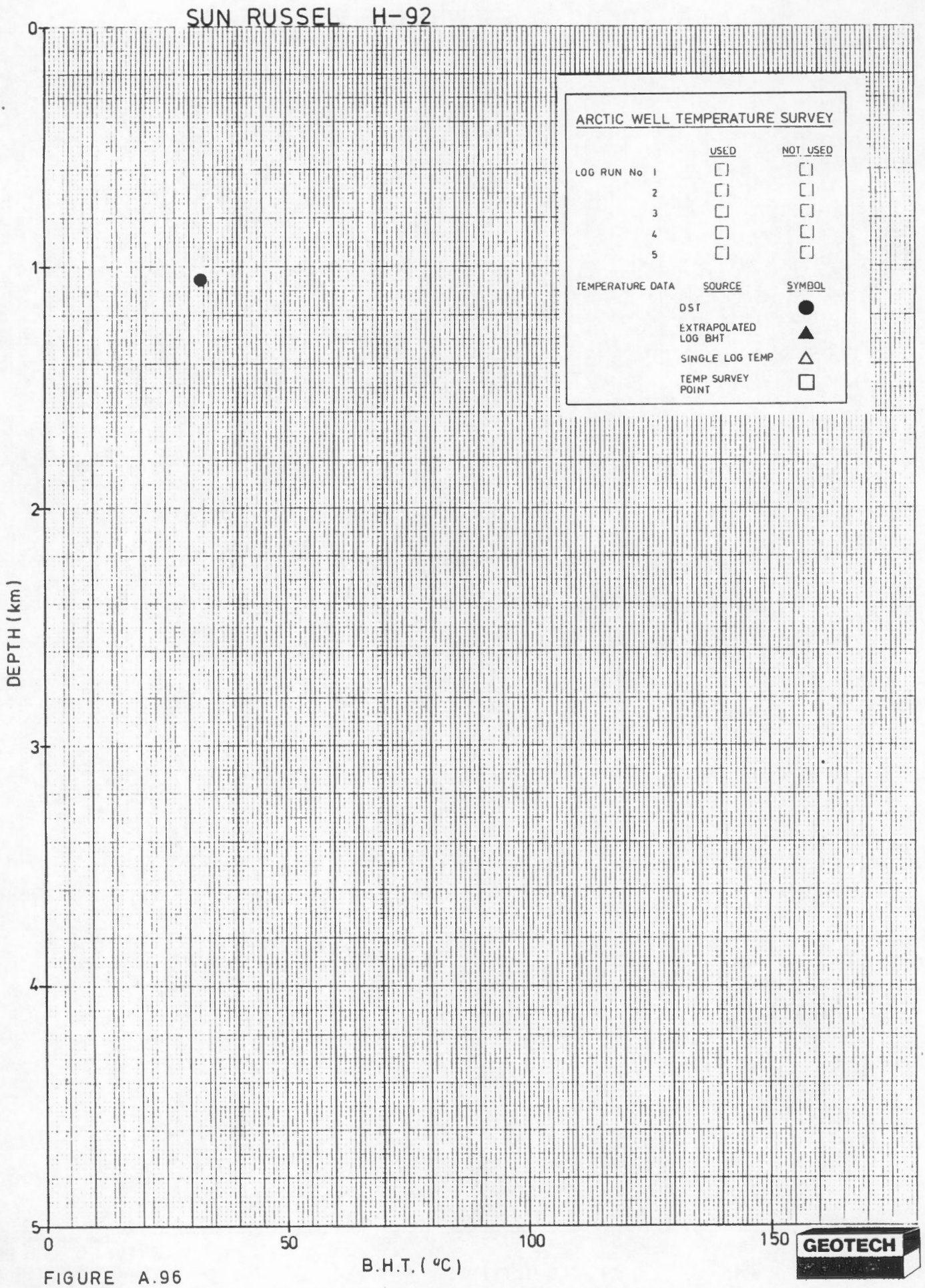
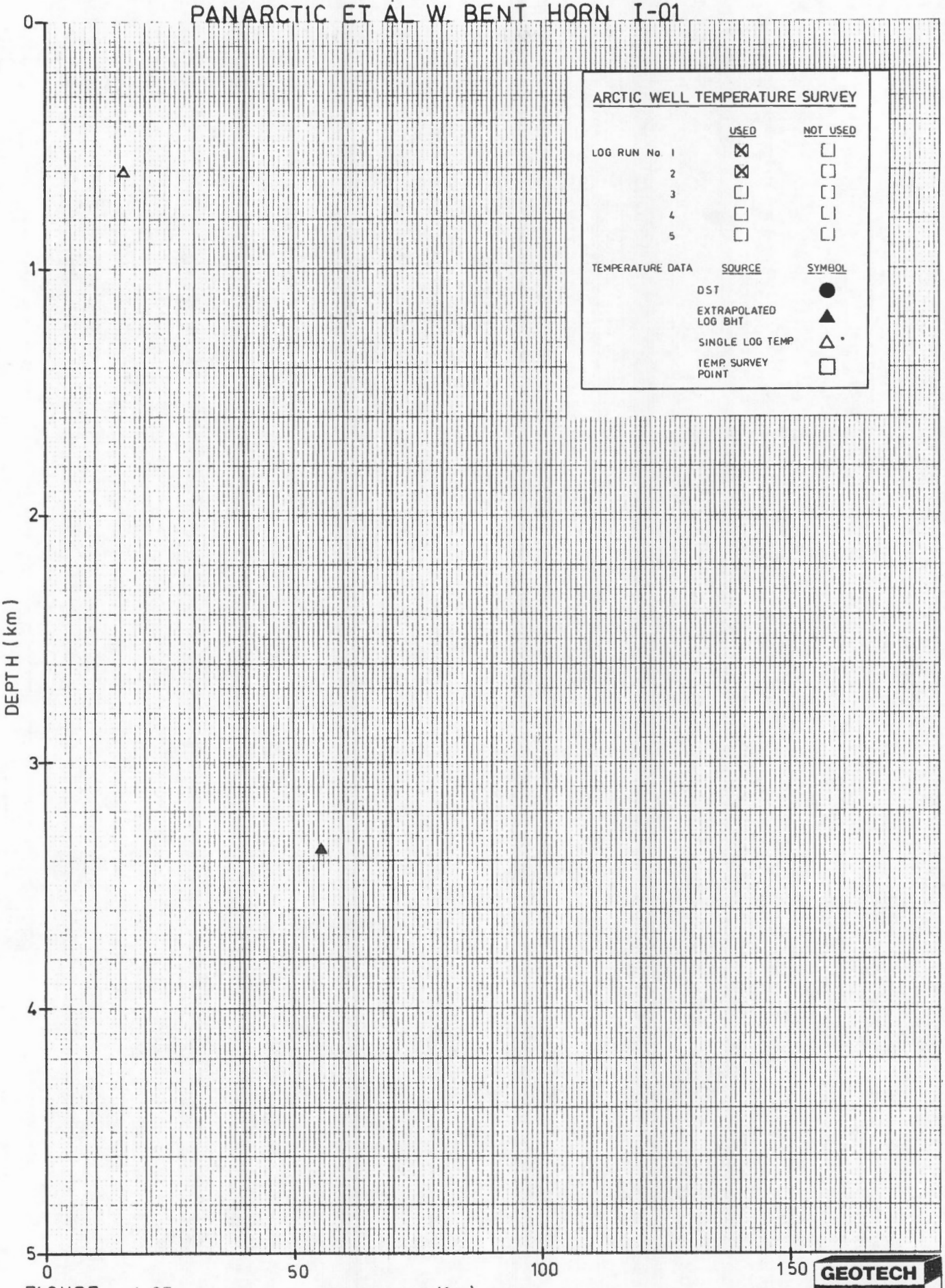


FIGURE A.96

46 1512
KE 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

PANARCTIC ET AL W. BENT HORN I-01



46 1512

FIGURE A.97

GEOTECH

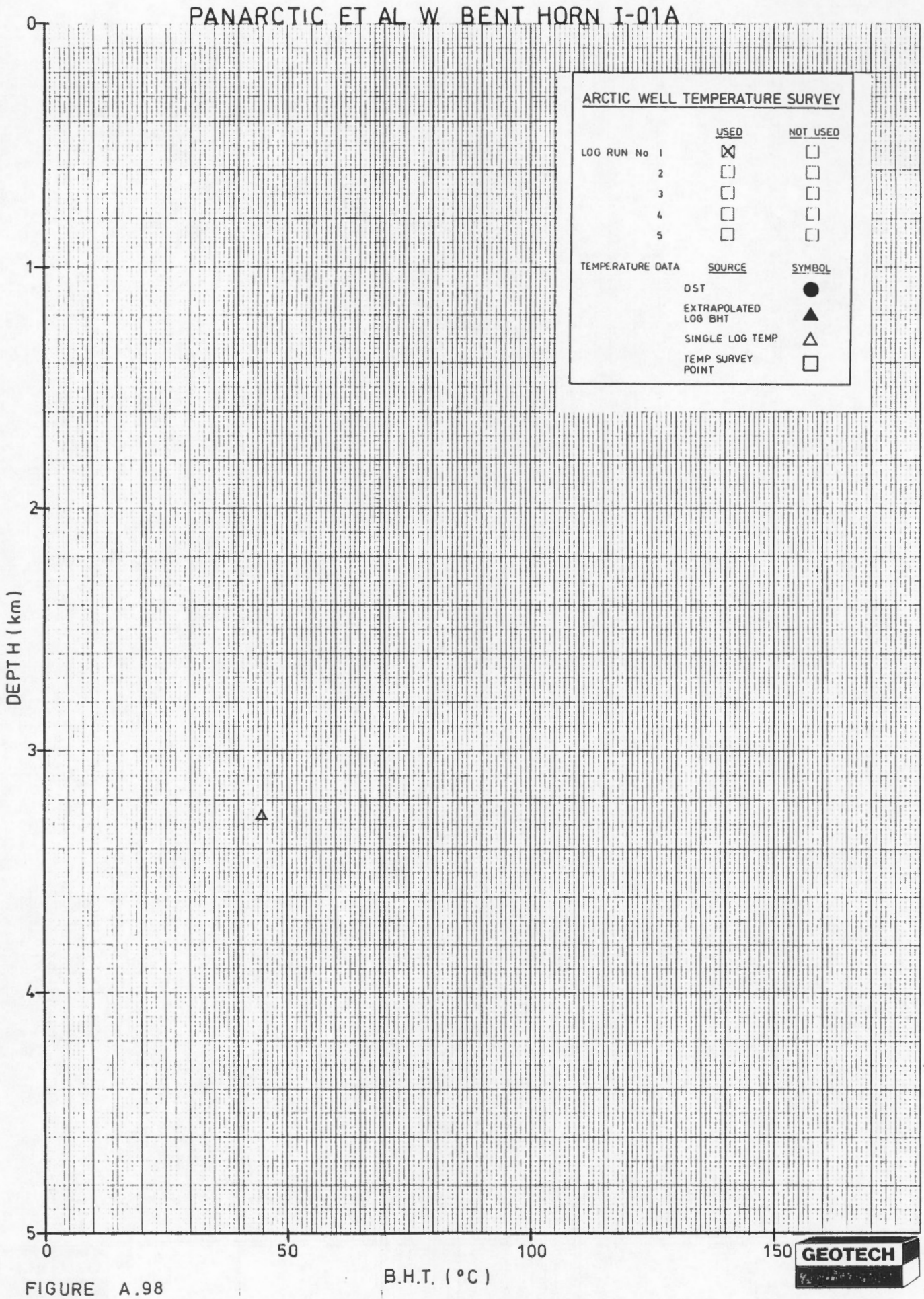


FIGURE A.98

46 1512
KE 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

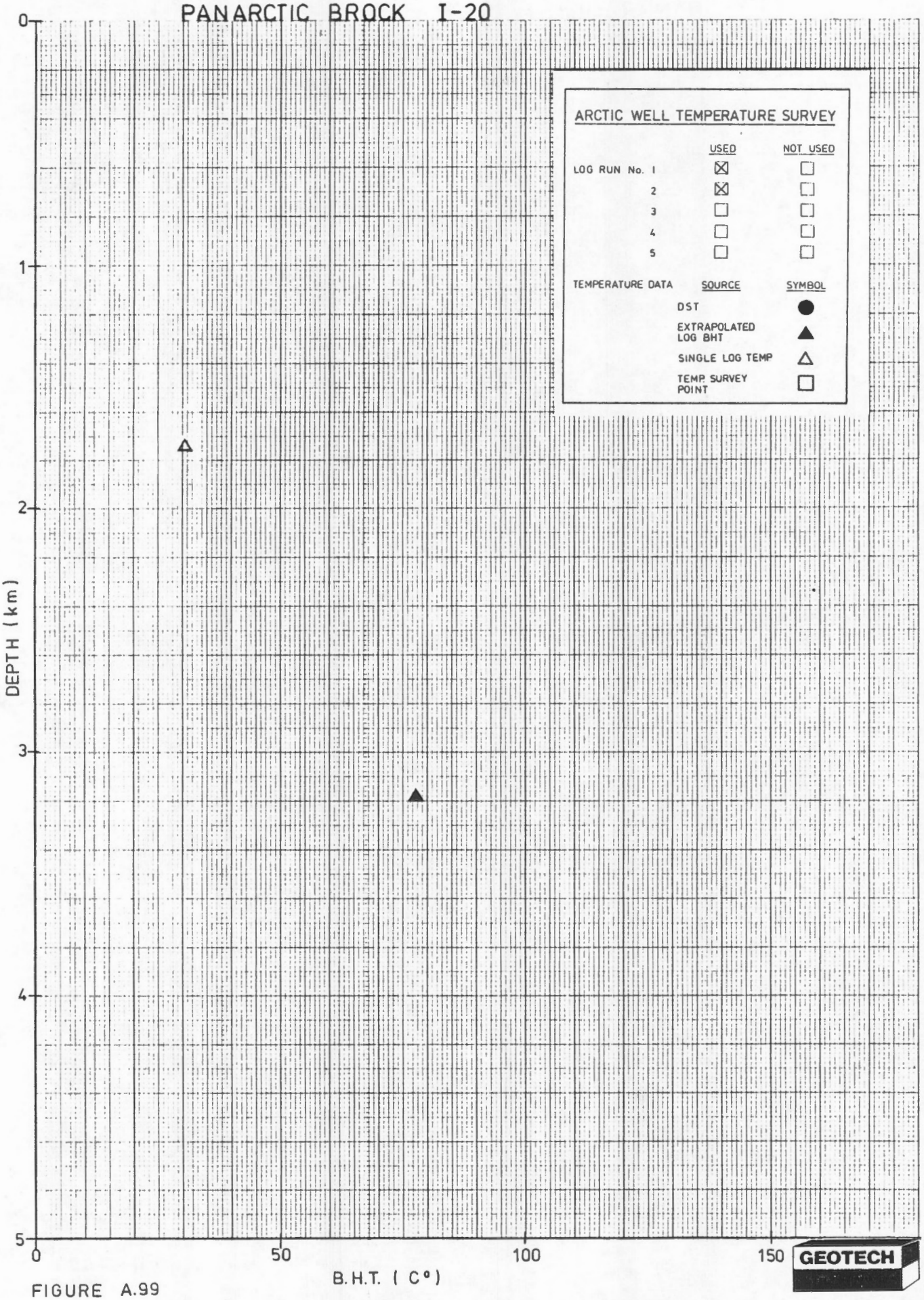
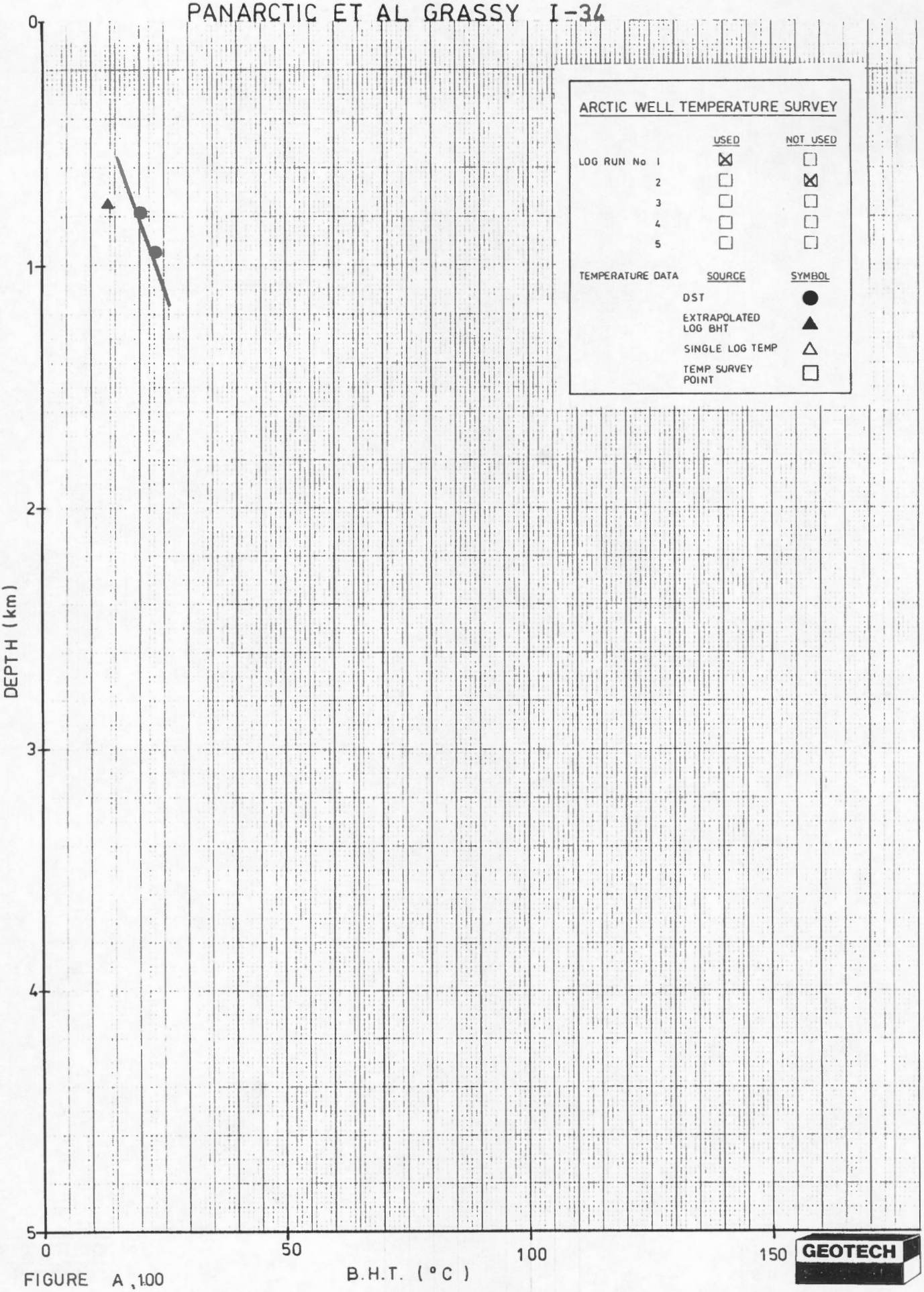

PANARCTIC BROCK I-20
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.99

PANARCTIC ET AL GRASSY I-34



4E 1512

FIGURE A ,100

GEOTECH

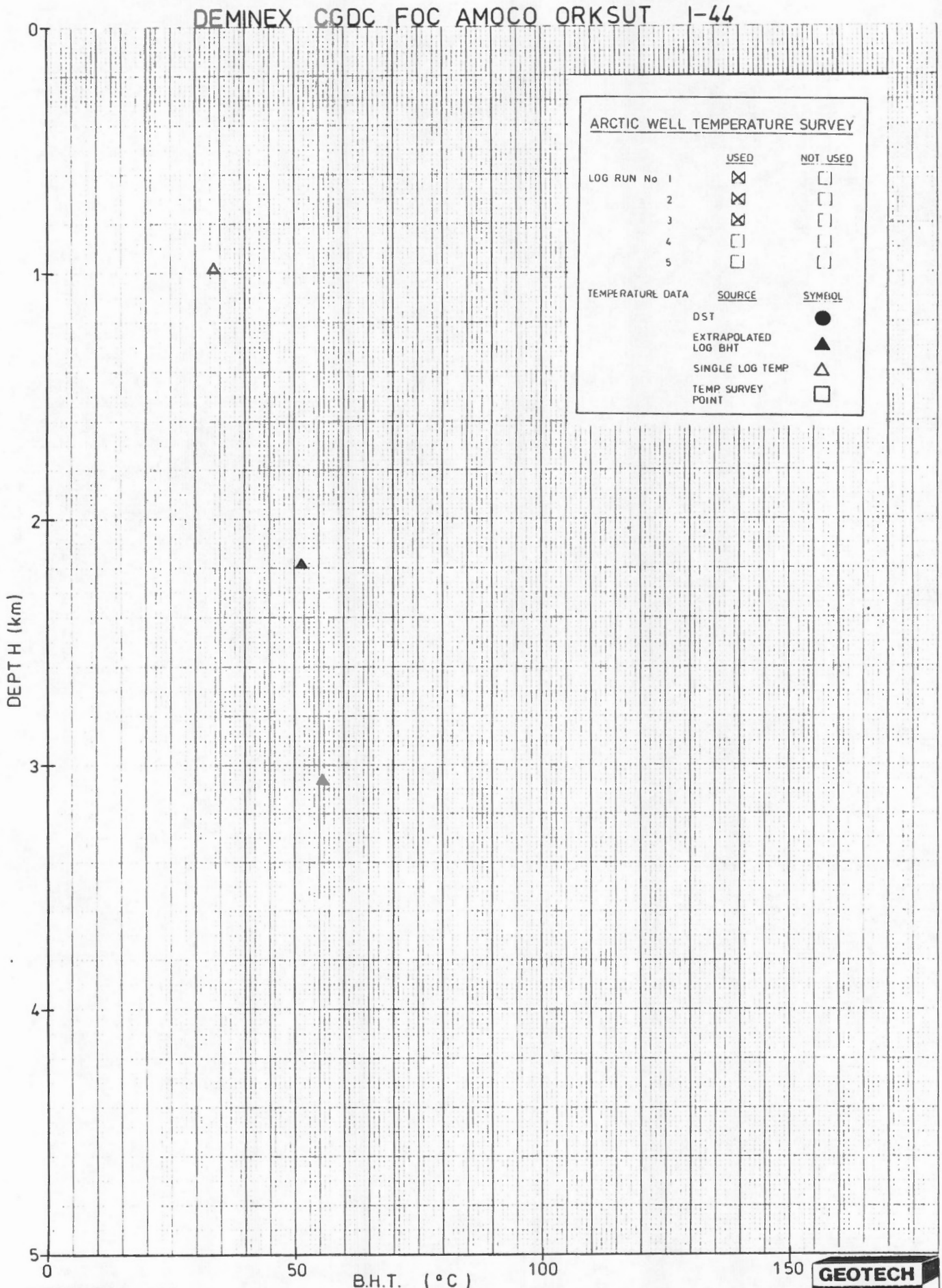

DEMINEX CGDC FOC AMOCO ORKSUT I-44
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A. 101

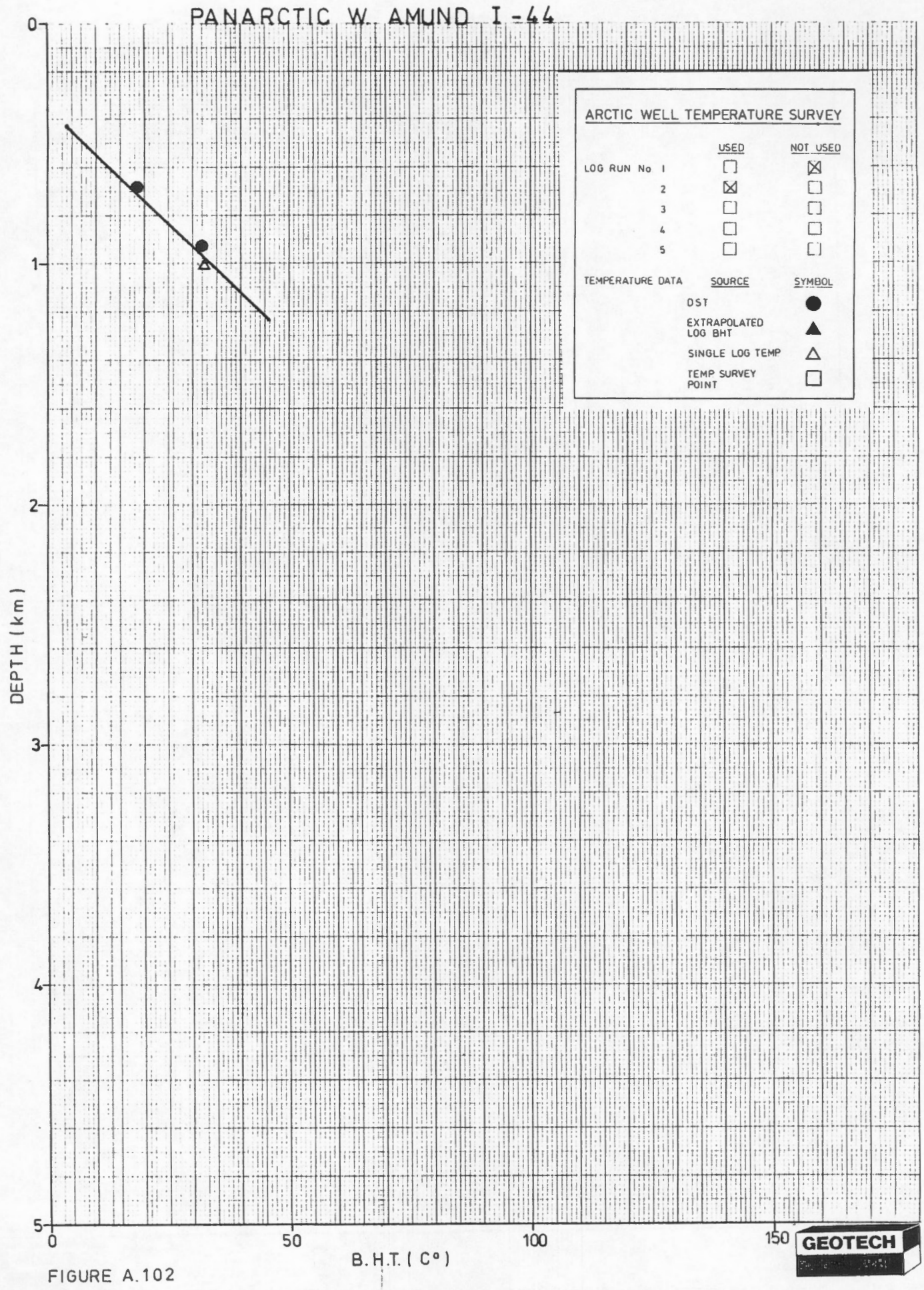

PANARCTIC W. AMUND I-44
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.102

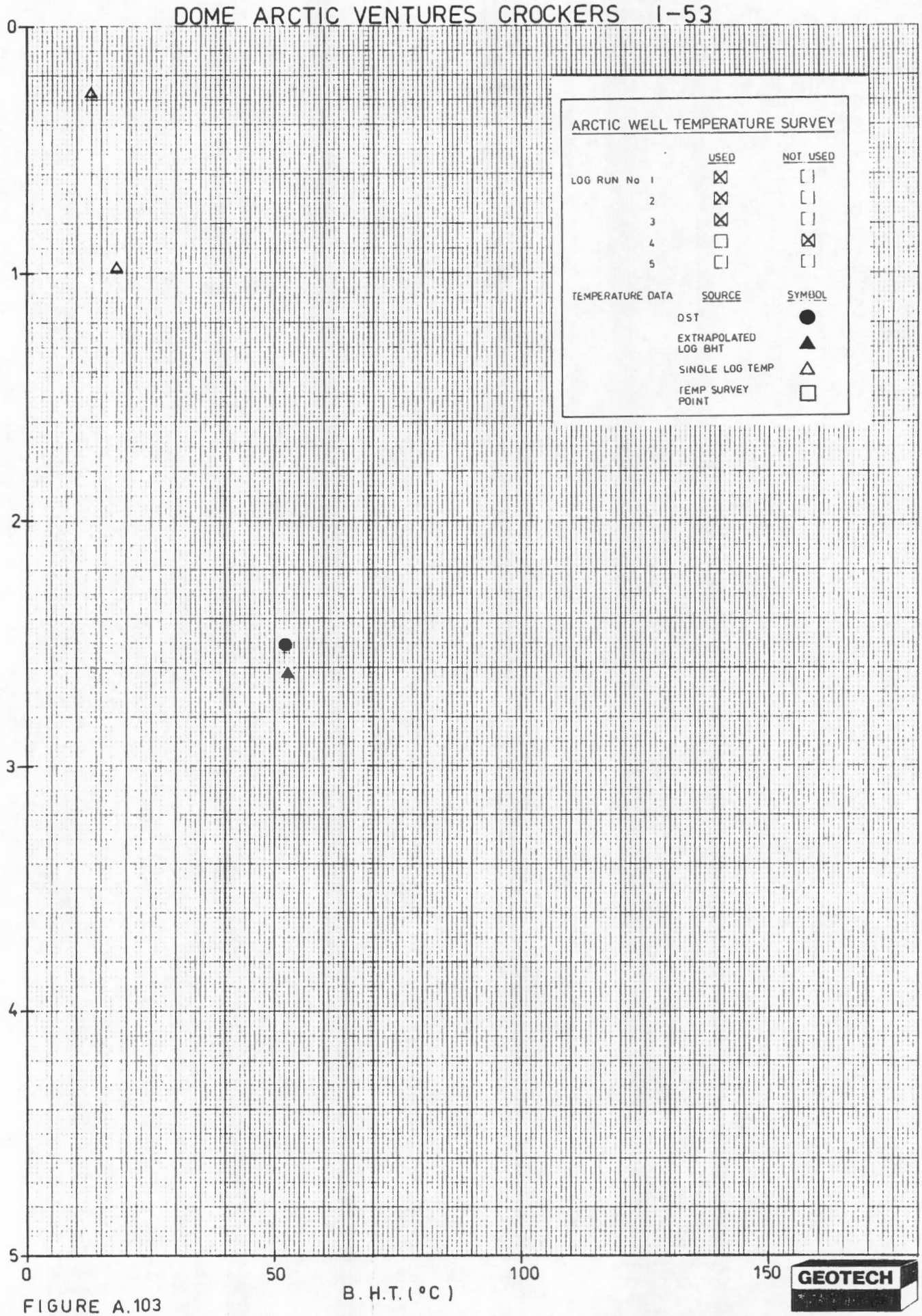

DOME ARCTIC VENTURES CROCKERS I-53
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
0
1
2
3
4
5
0
50
100
150
B. H.T. (°C)

FIGURE A.103

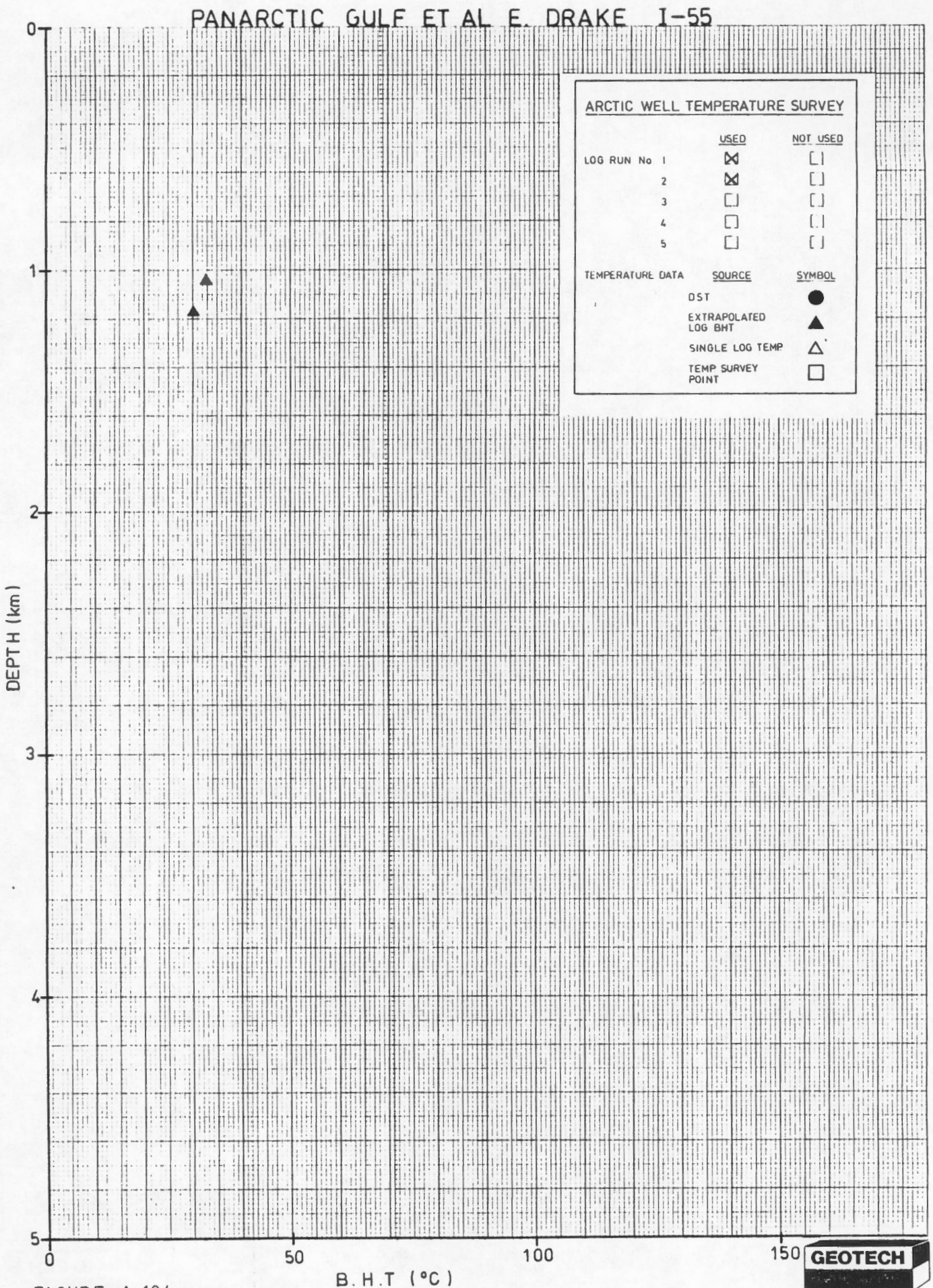

PANARCTIC GULF ET AL E. DRAKE I-55
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T (°C)
GEOTECH

FIGURE A.104

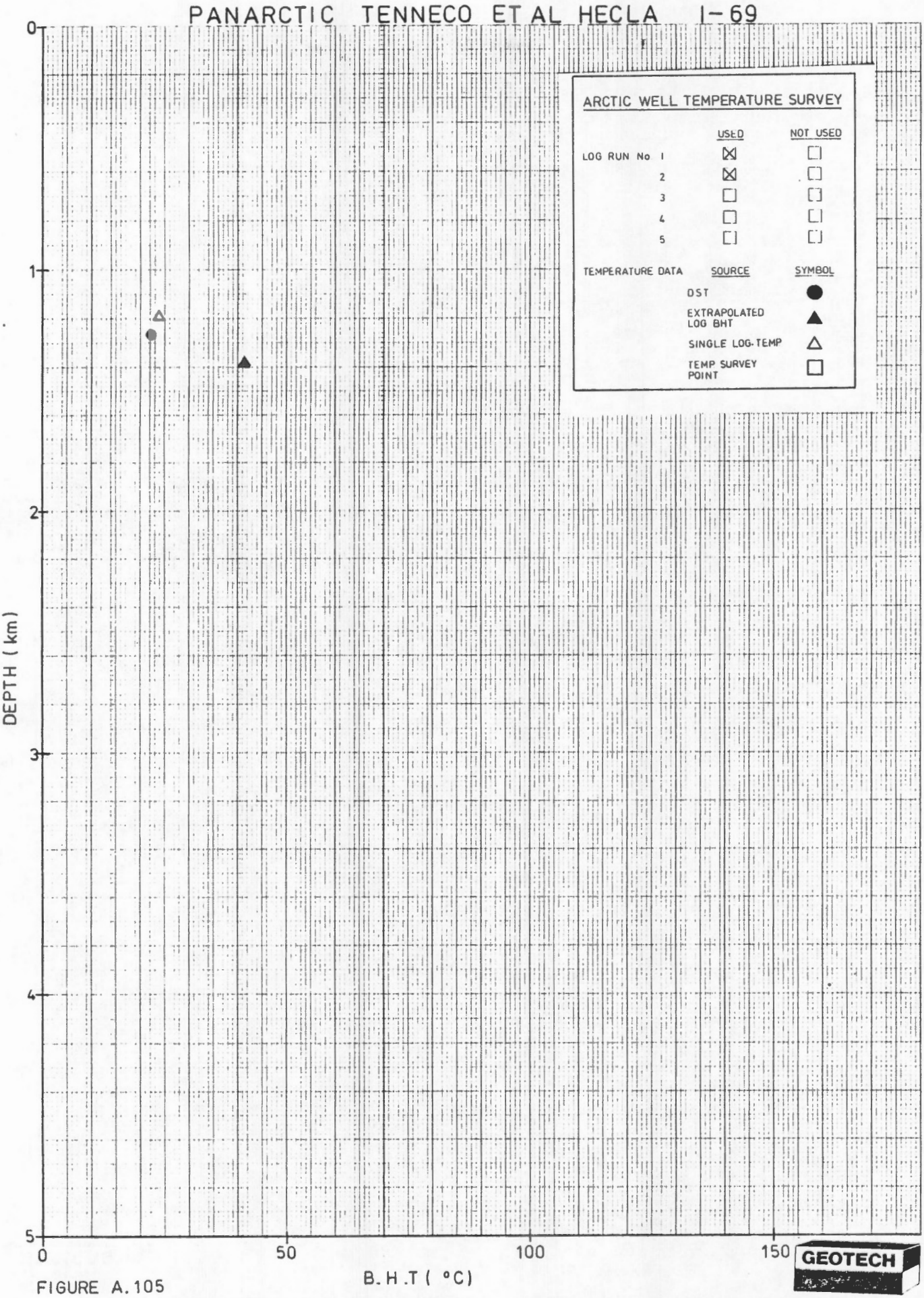


FIGURE A.105

46 1512
KE 10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

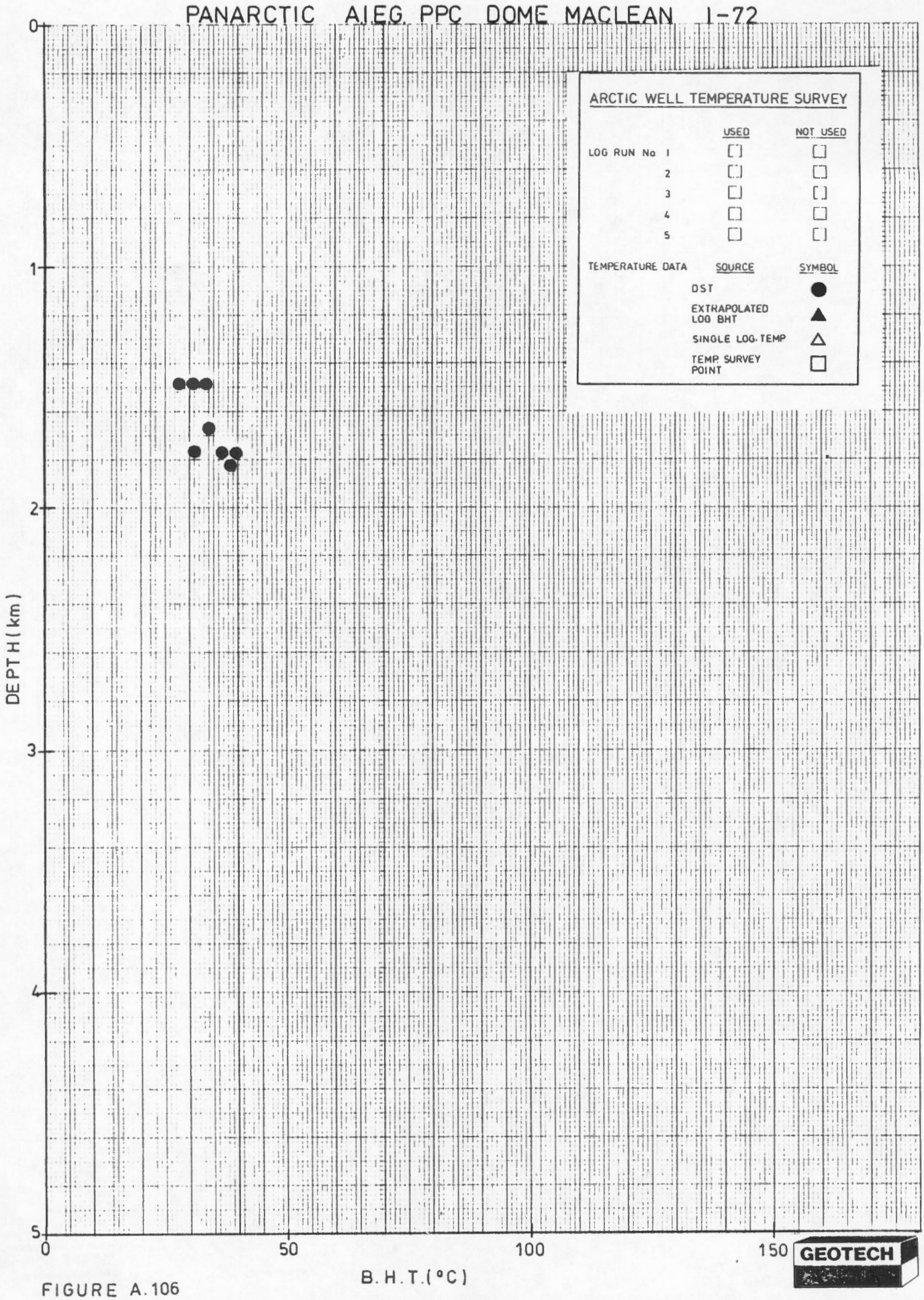


FIGURE A.106

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

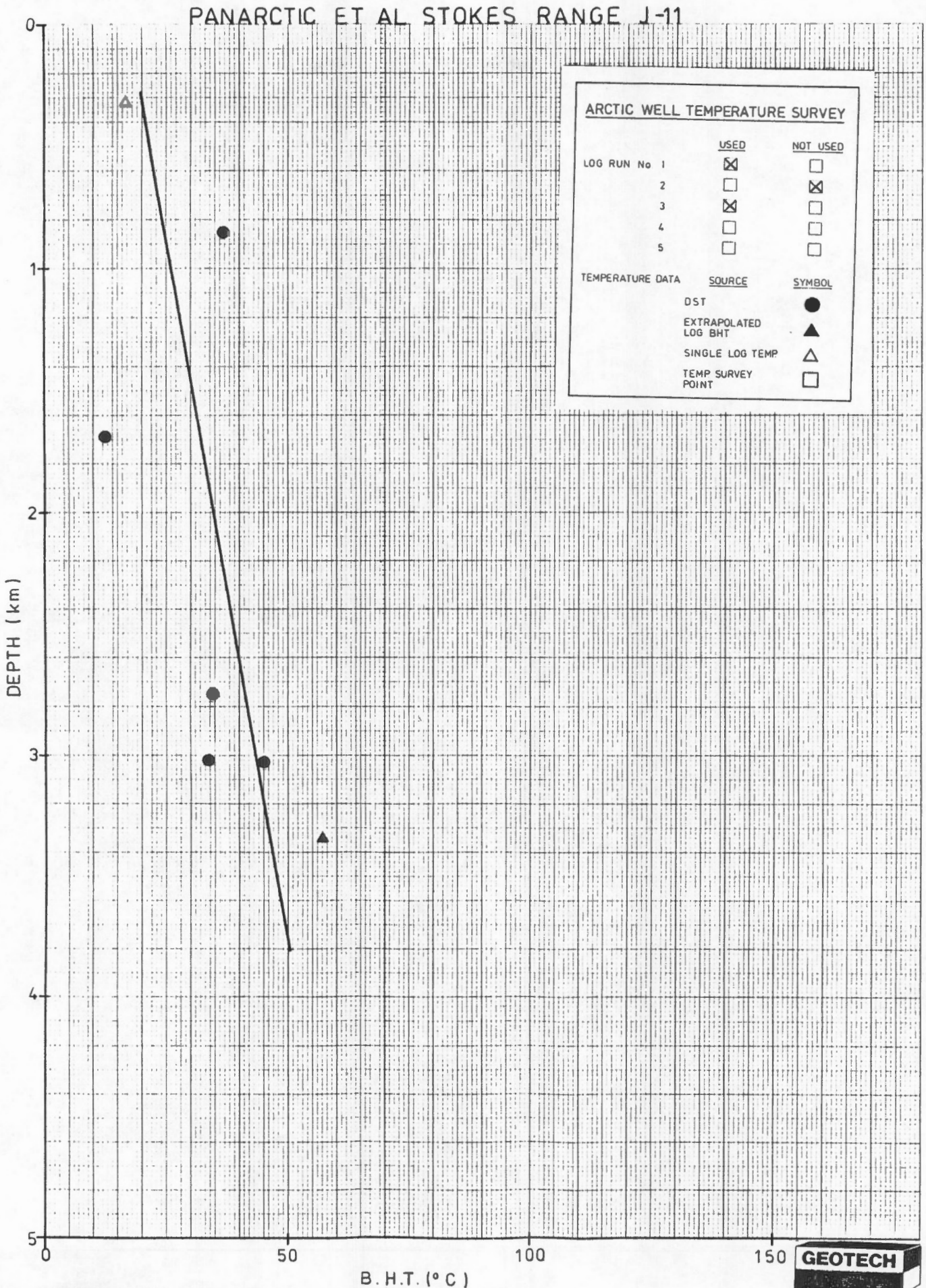

PANARCTIC ET AL STOKES RANGE J-11
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.107

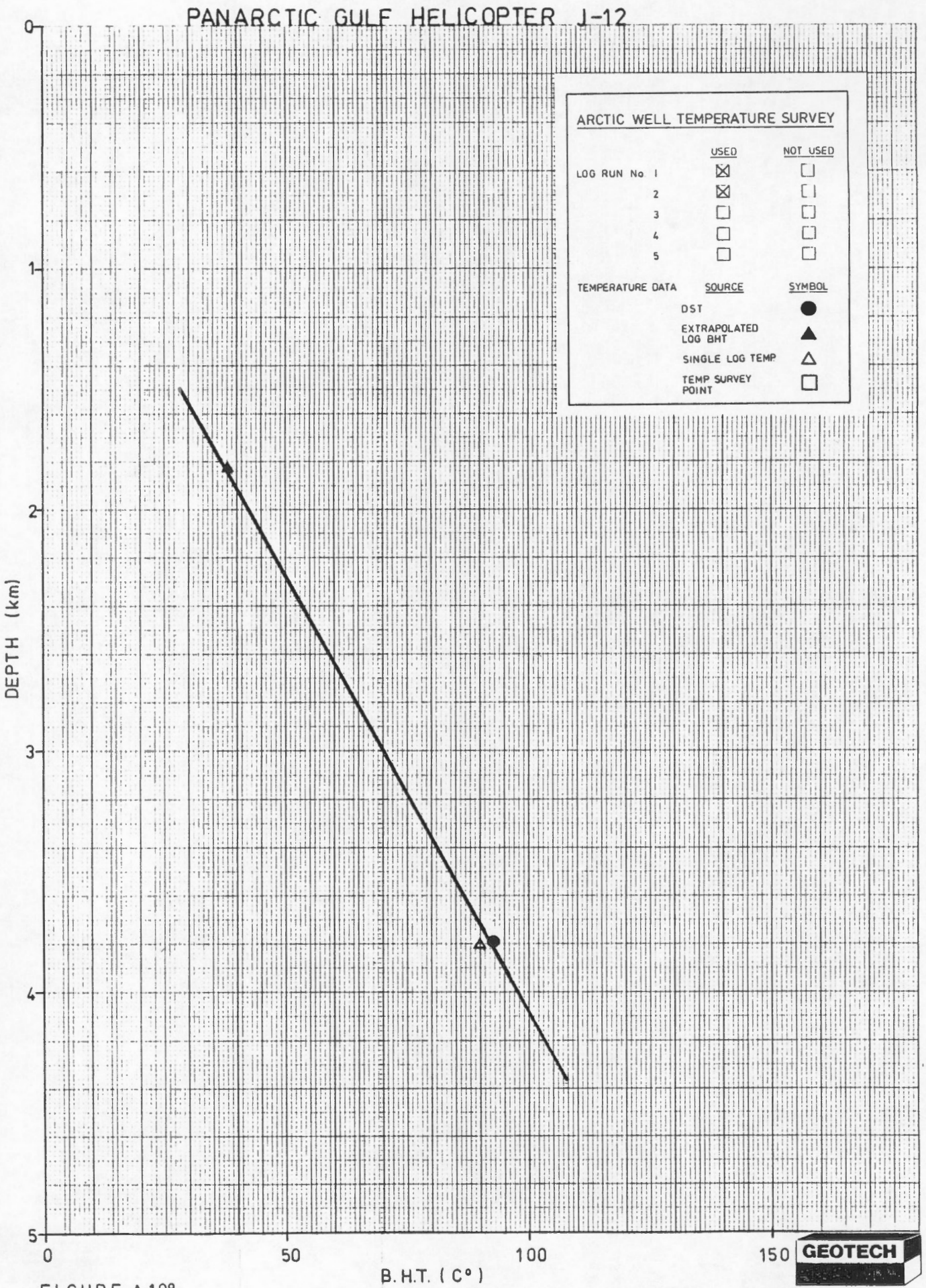

PANARCTIC GULF HELICOPTER J-12
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH
46 1512
K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO.

FIGURE A.108

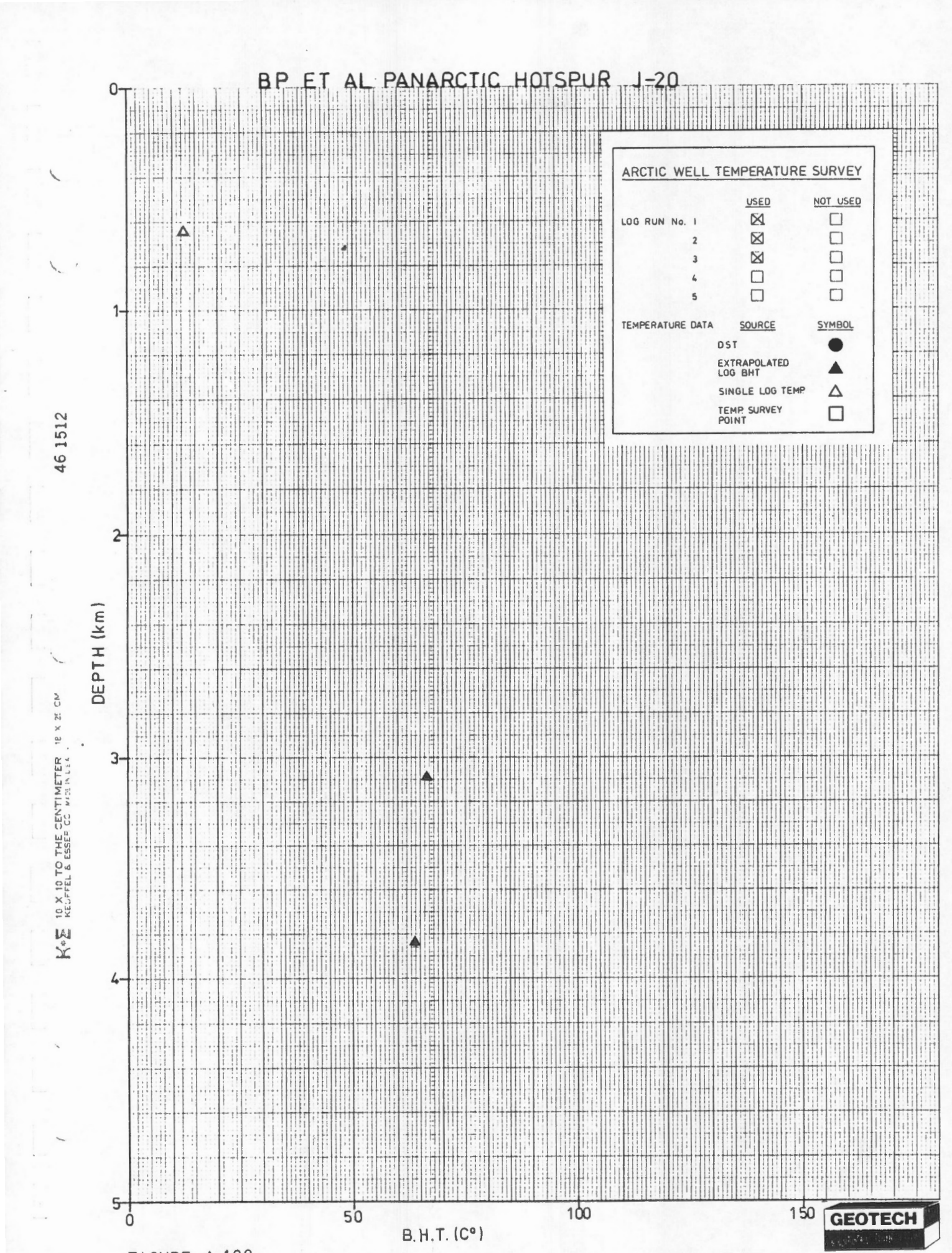

BP ET AL PANARCTIC HOTSPUR J-20
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO
GEOTECH

FIGURE A.109

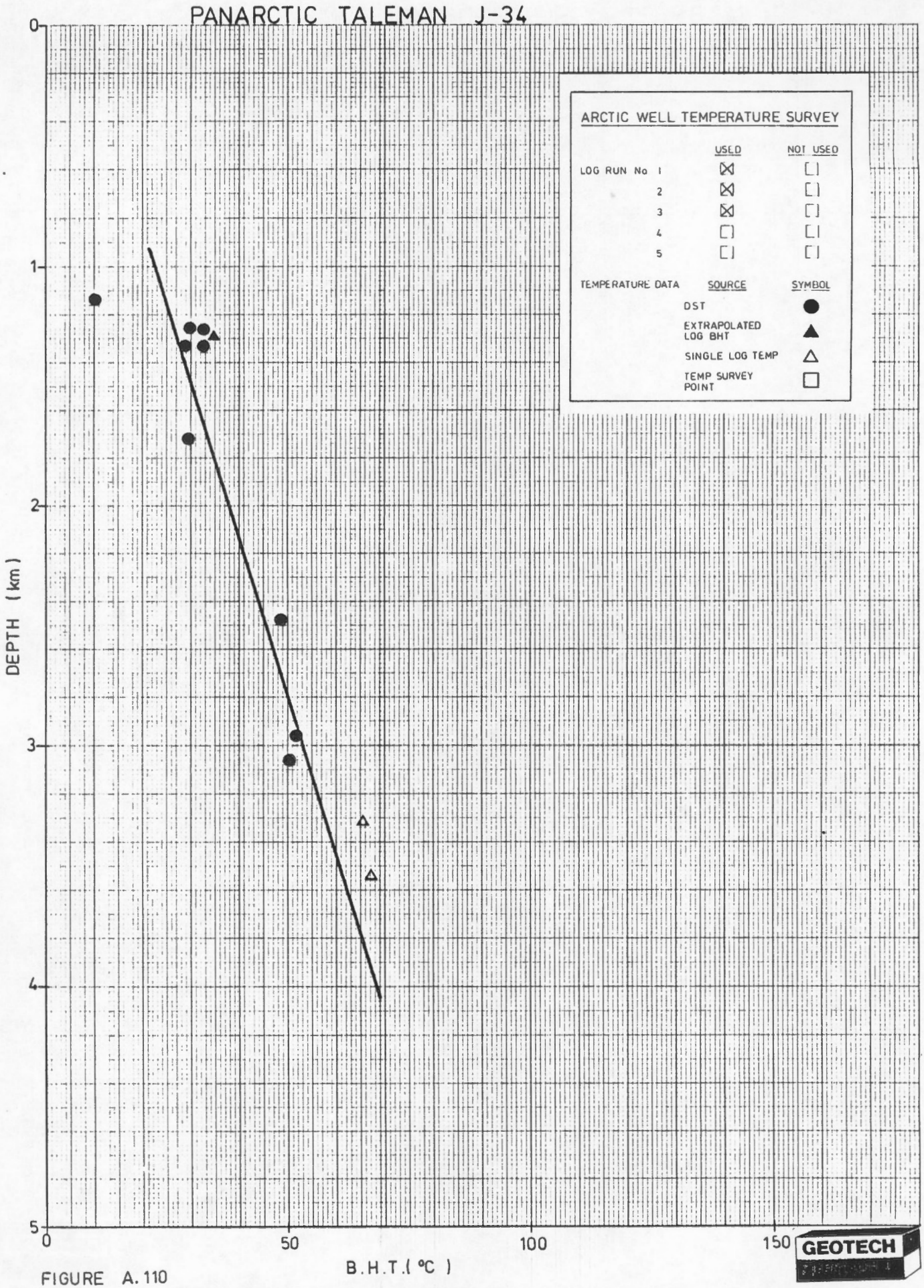


FIGURE A. 110

46 1512
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

DOMINION EXPLORERS CANSO ET AL
BATHURST CALEDONIAN RIVER J-34

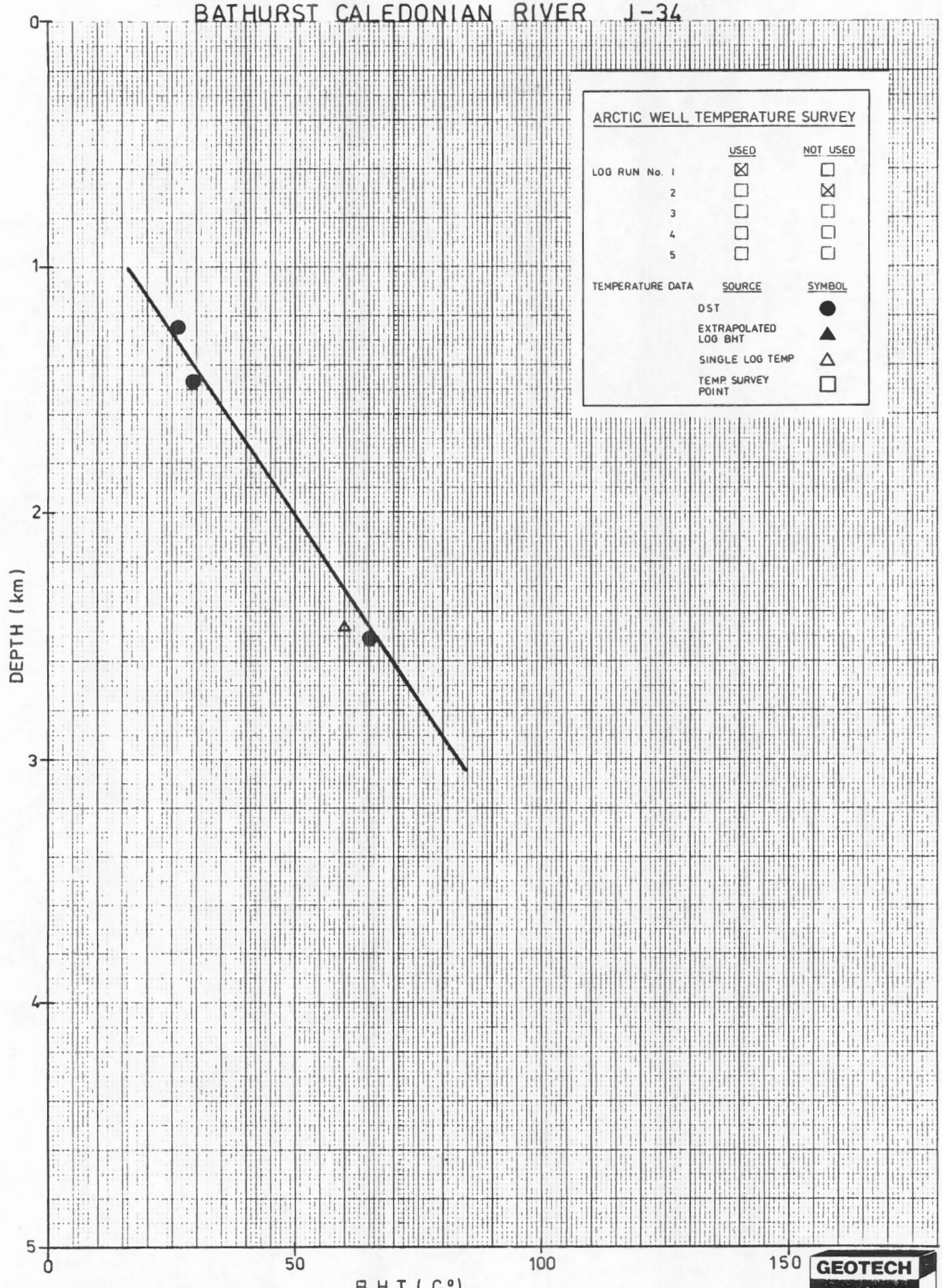


FIGURE A.111

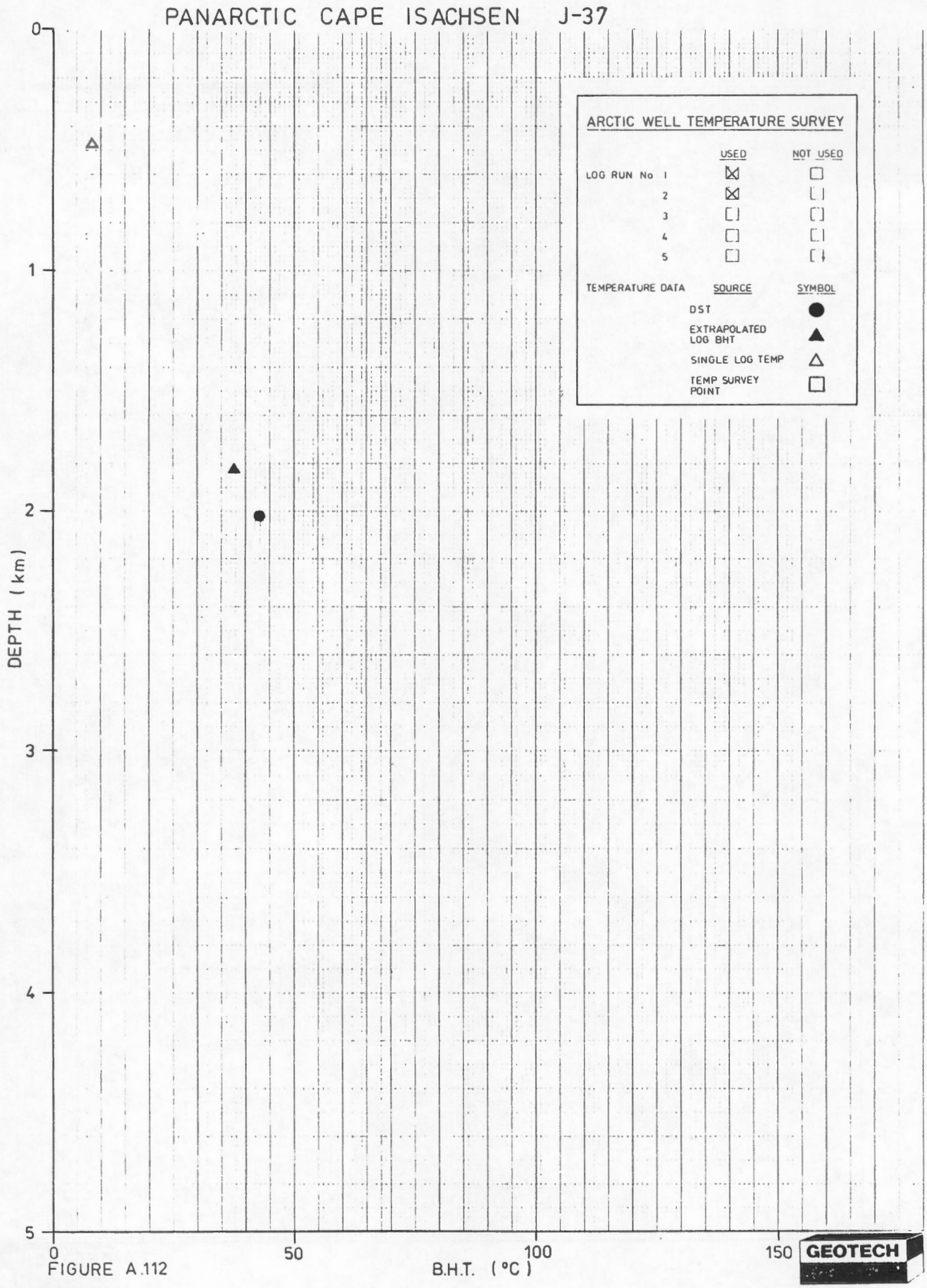

PANARCTIC CAPE ISACHSEN J-37
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.112

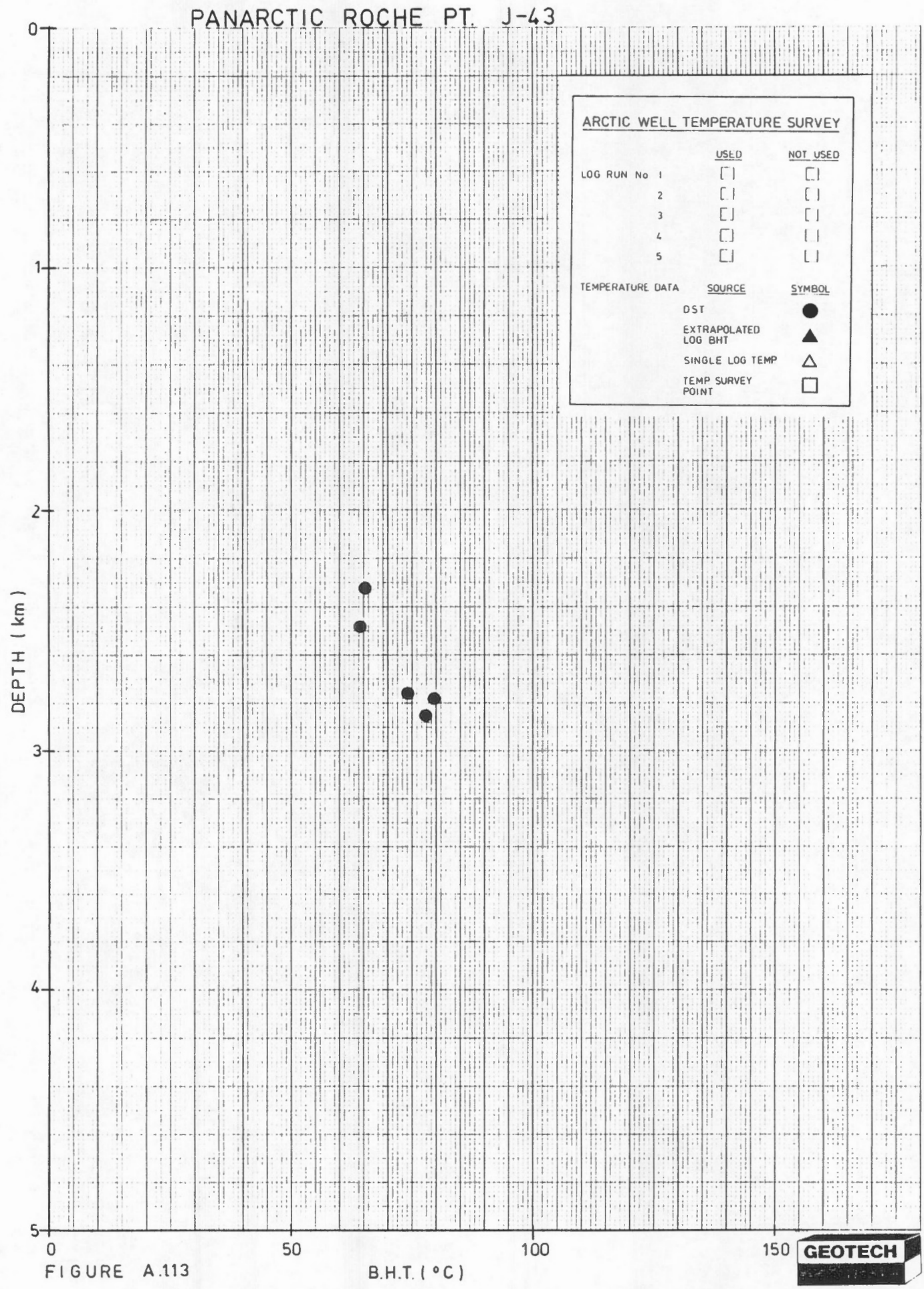


FIGURE A.113

46 1512

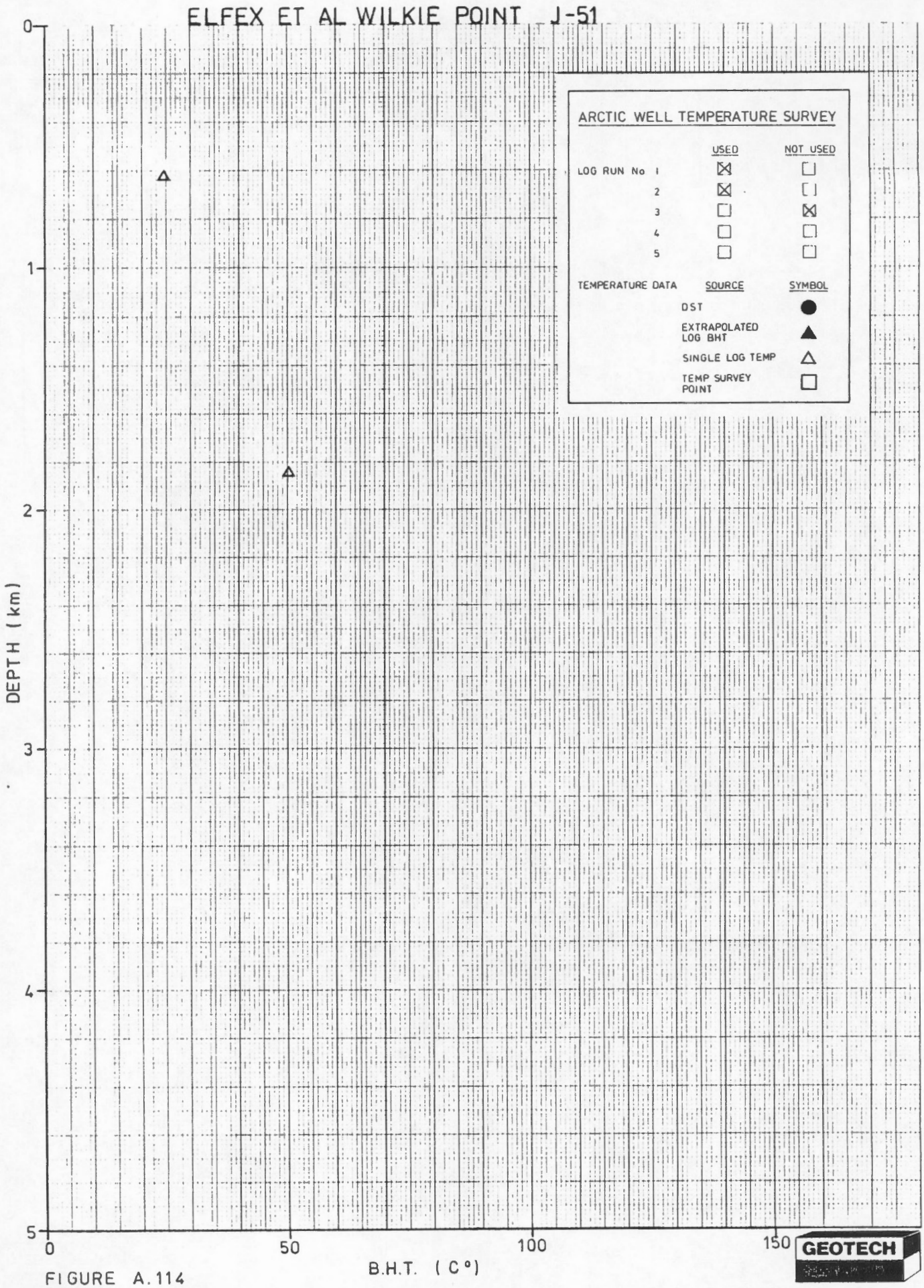


FIGURE A.114

46 1512

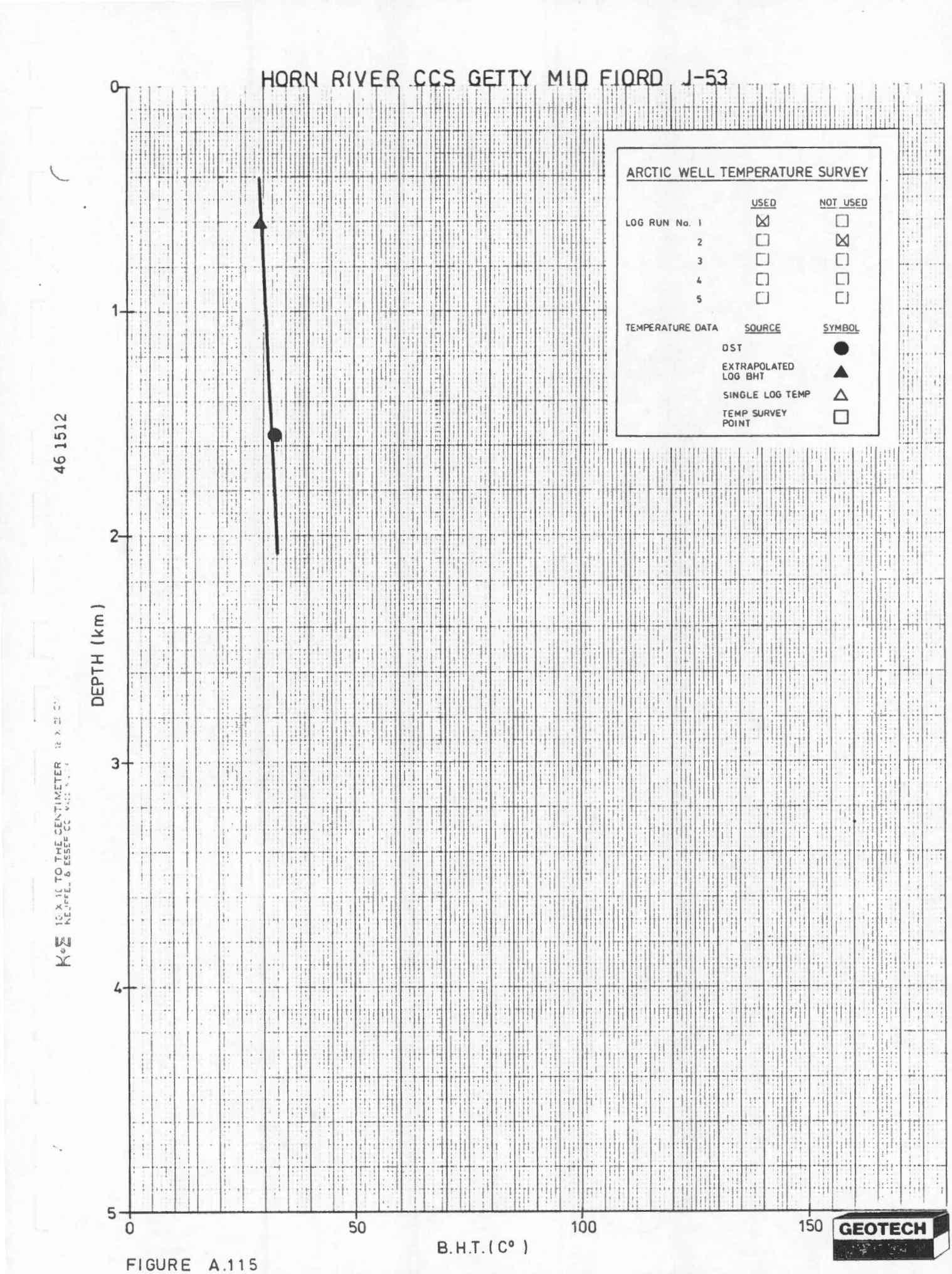

HORN RIVER CCS GETTY MID FIORD J-53
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE A.115

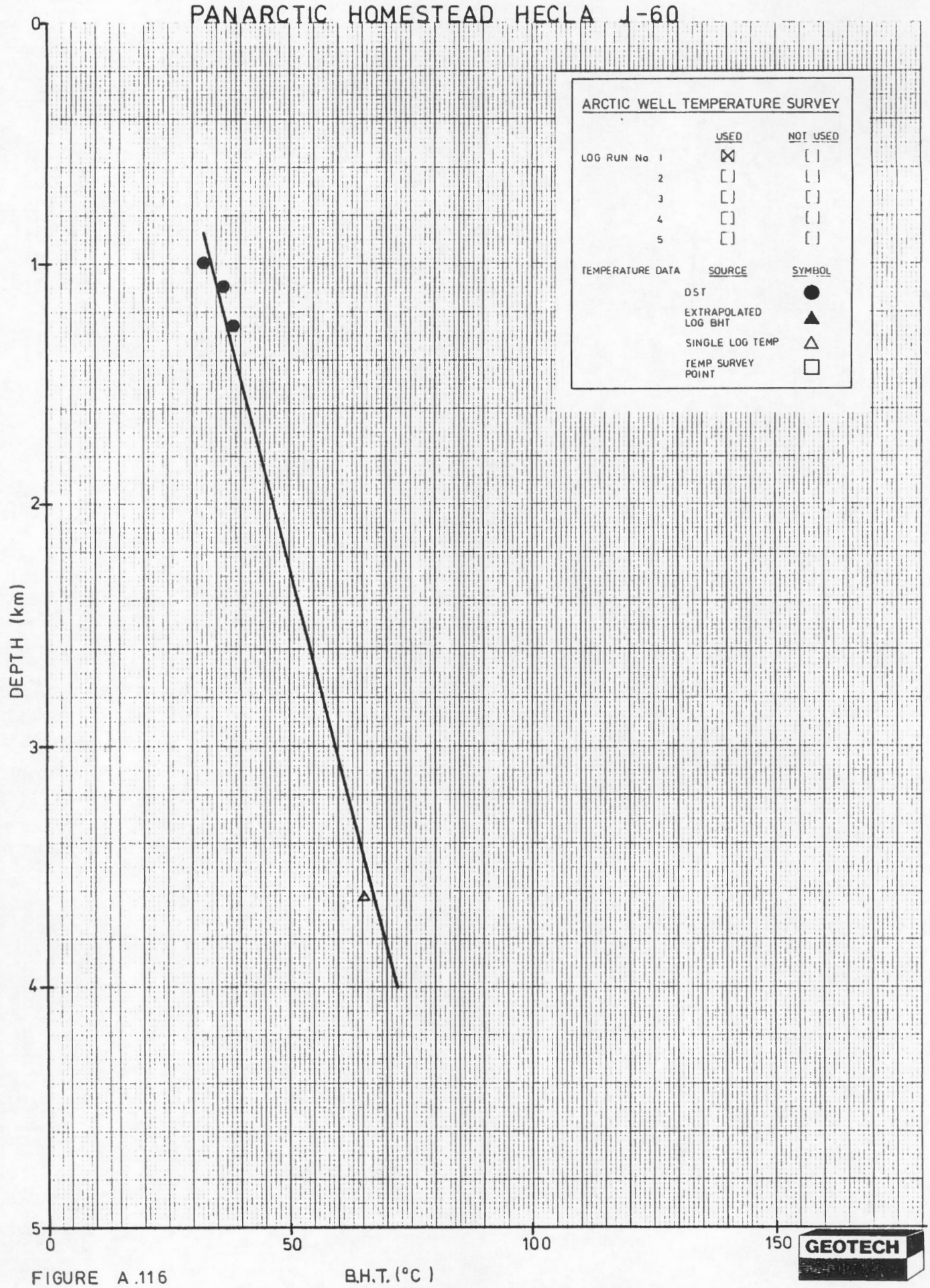


FIGURE A.116

46 1512

10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

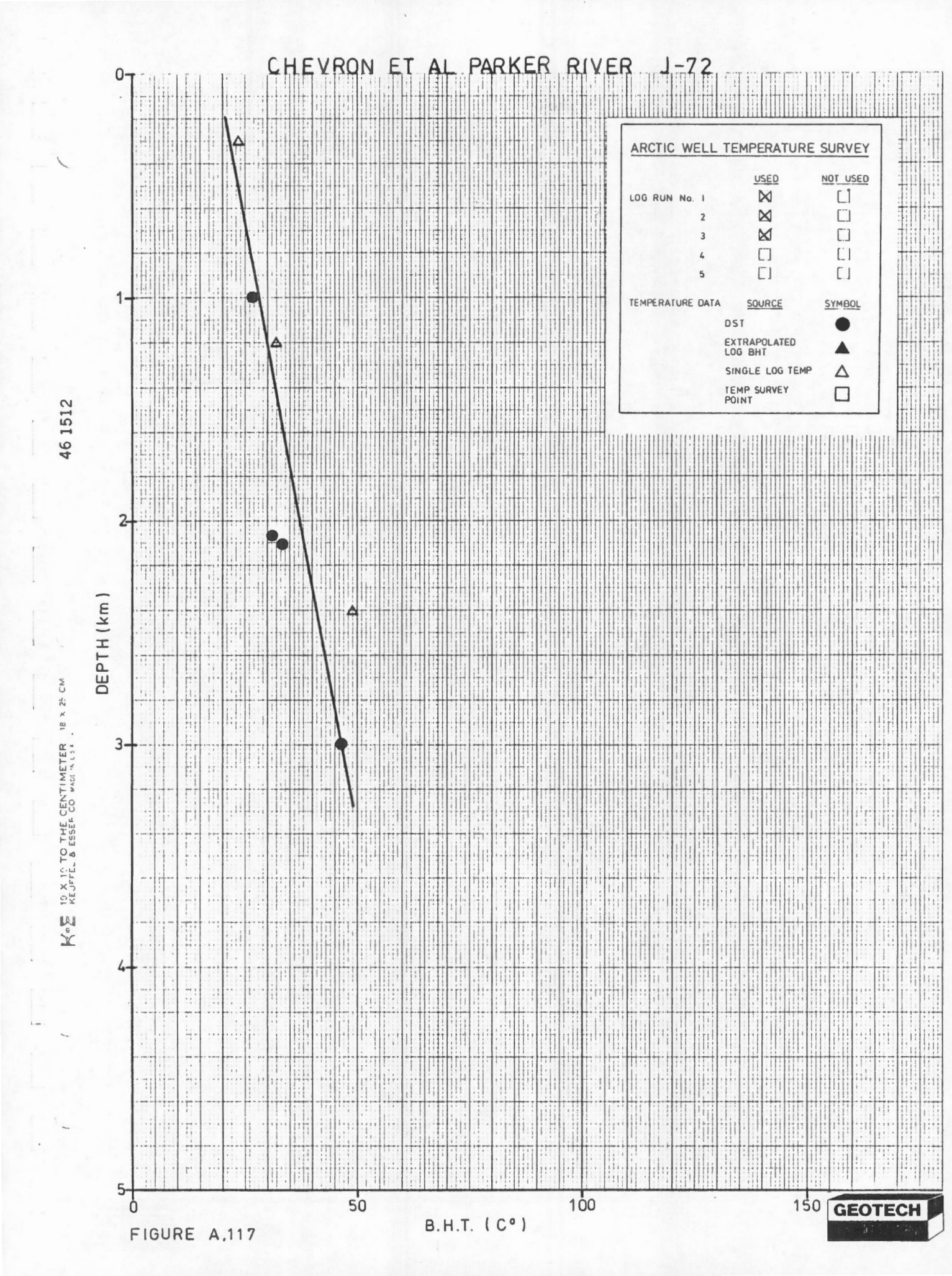

CHEVRON ET AL PARKER RIVER J-72
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
10 X 10 TO THE CENTIMETER 18 x 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE A,117

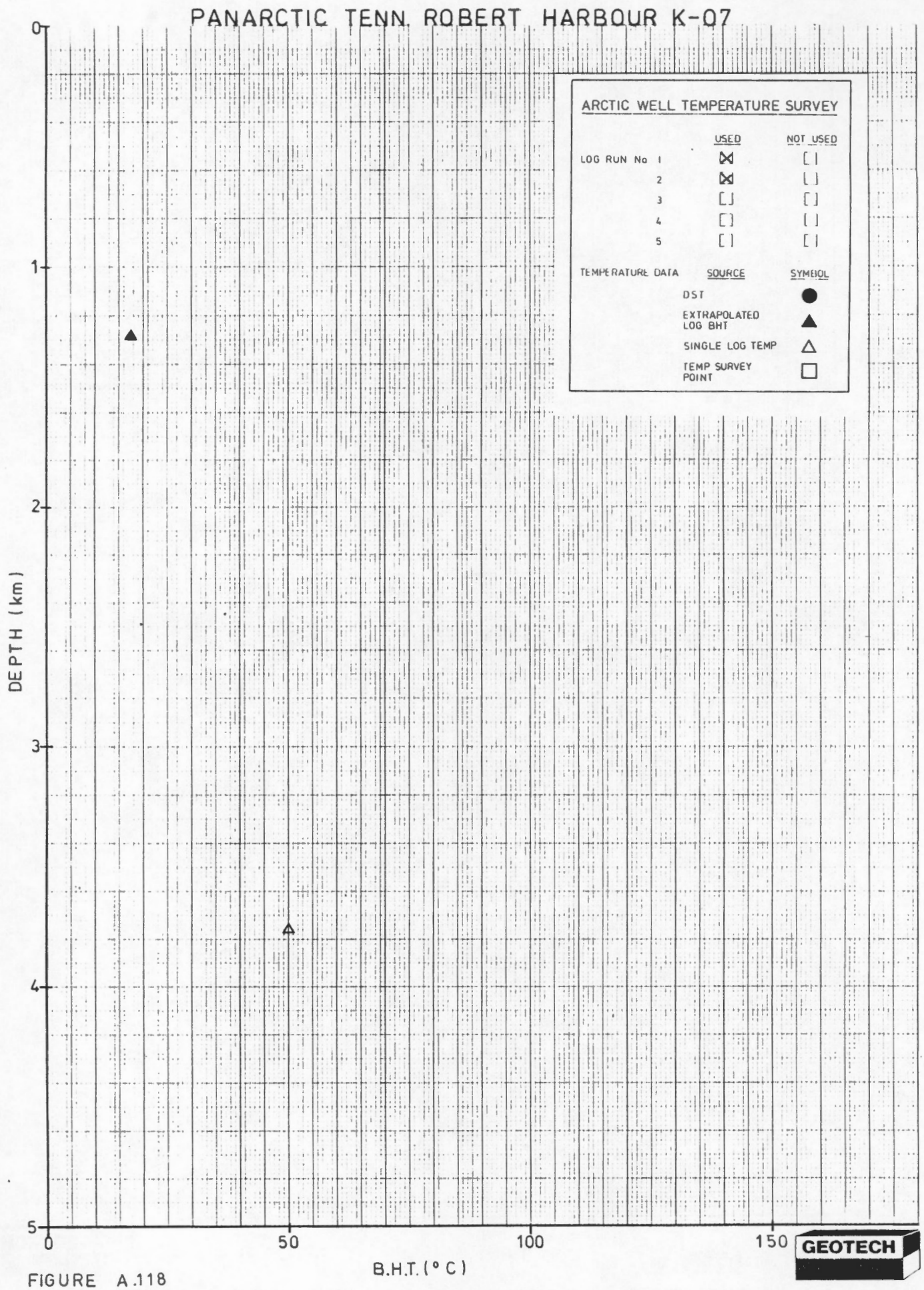


FIGURE A.118

46 1512

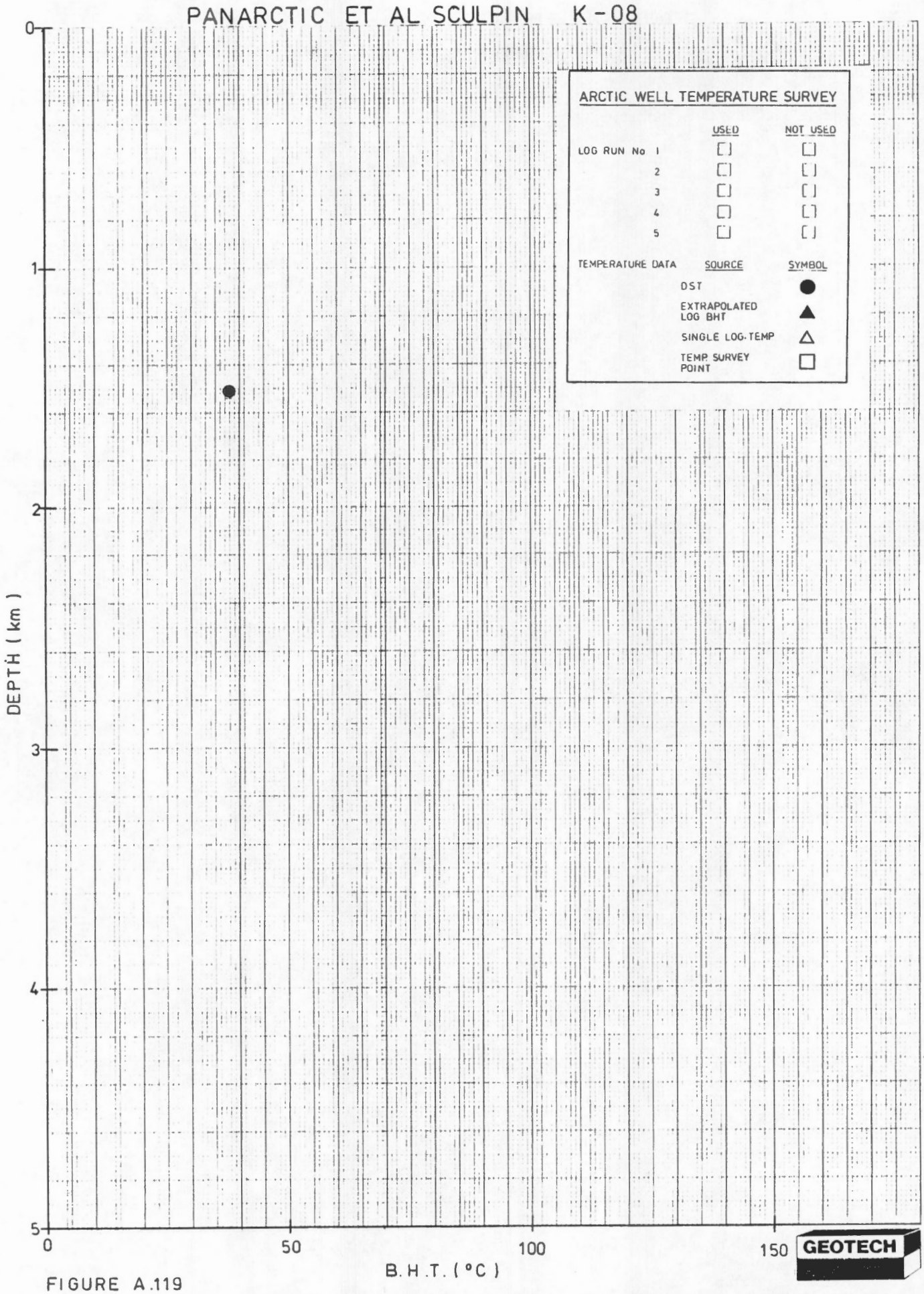


FIGURE A.119

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

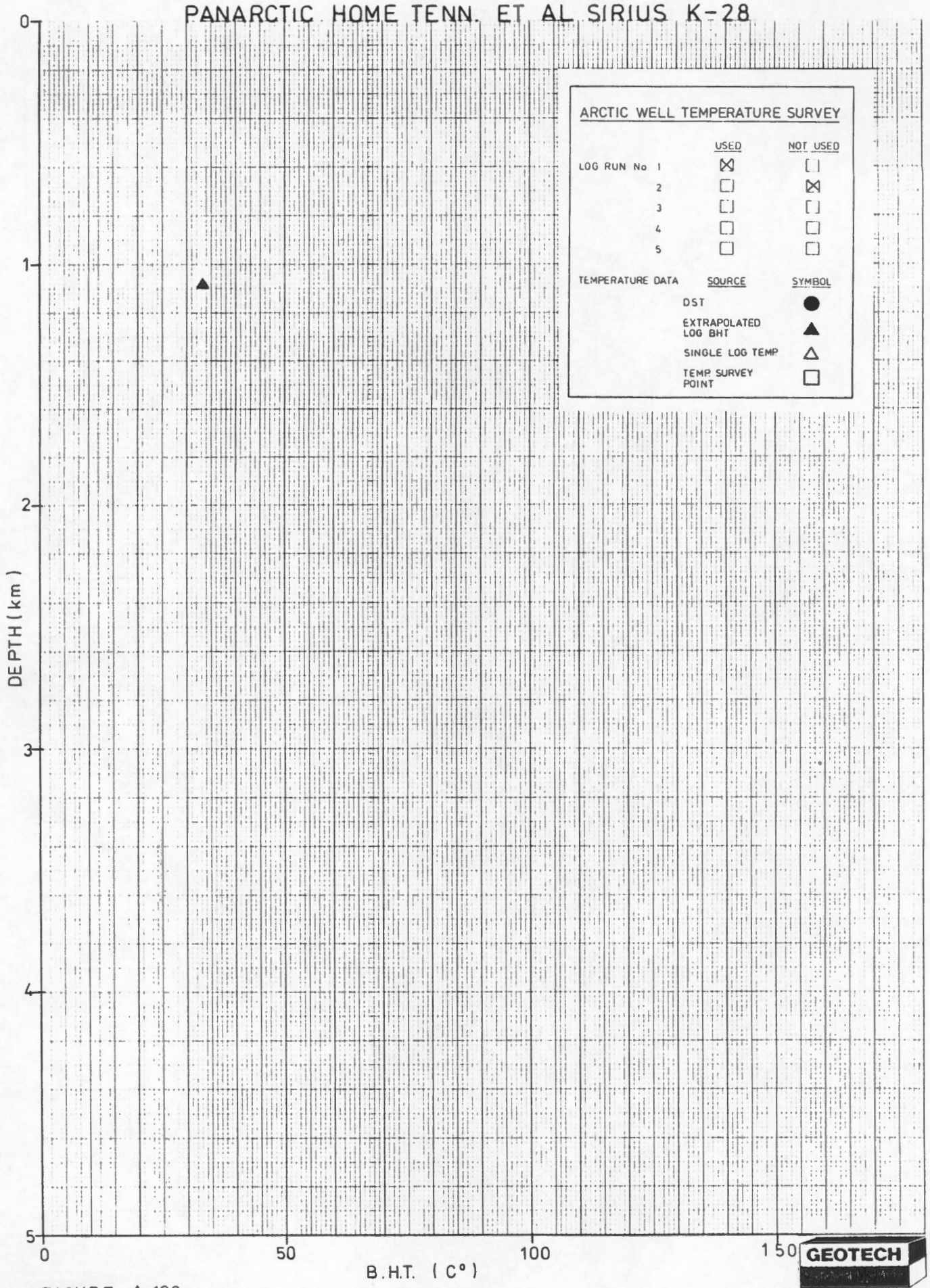

PANARCTIC HOME TENN. ET AL SIRIUS K-28
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.120

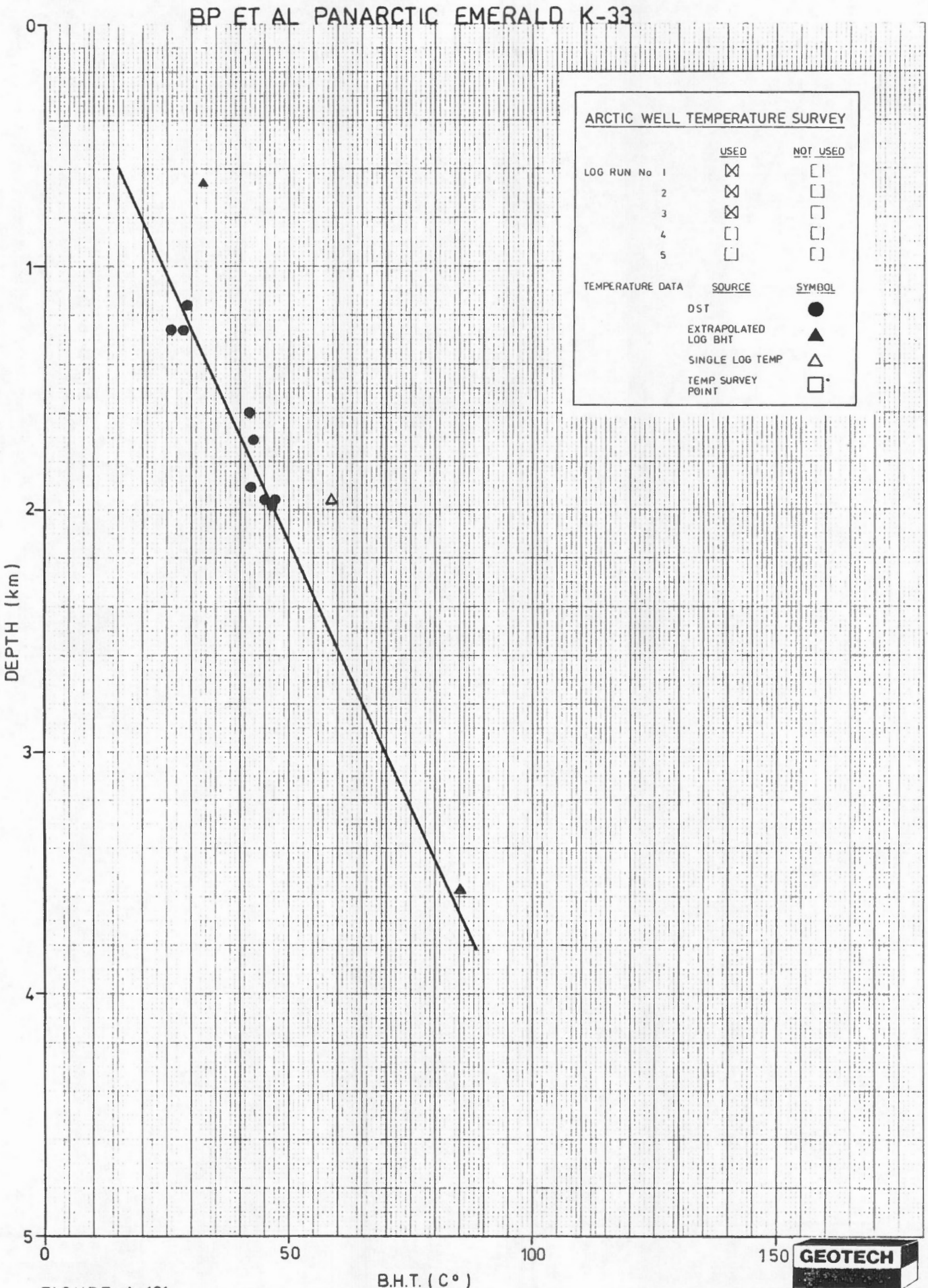

BP ET AL PANARCTIC EMERALD K-33
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.121

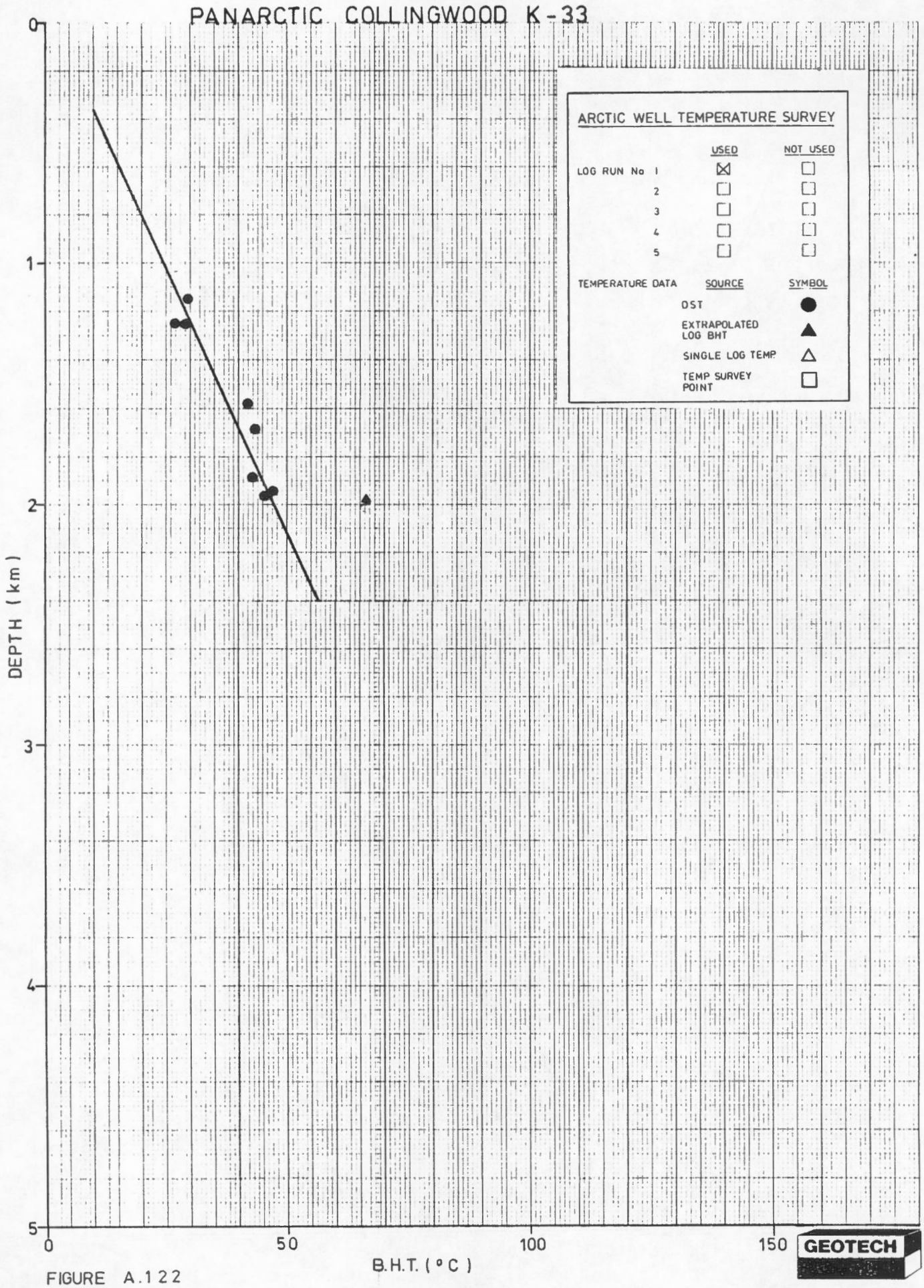


FIGURE A.122

46 1512

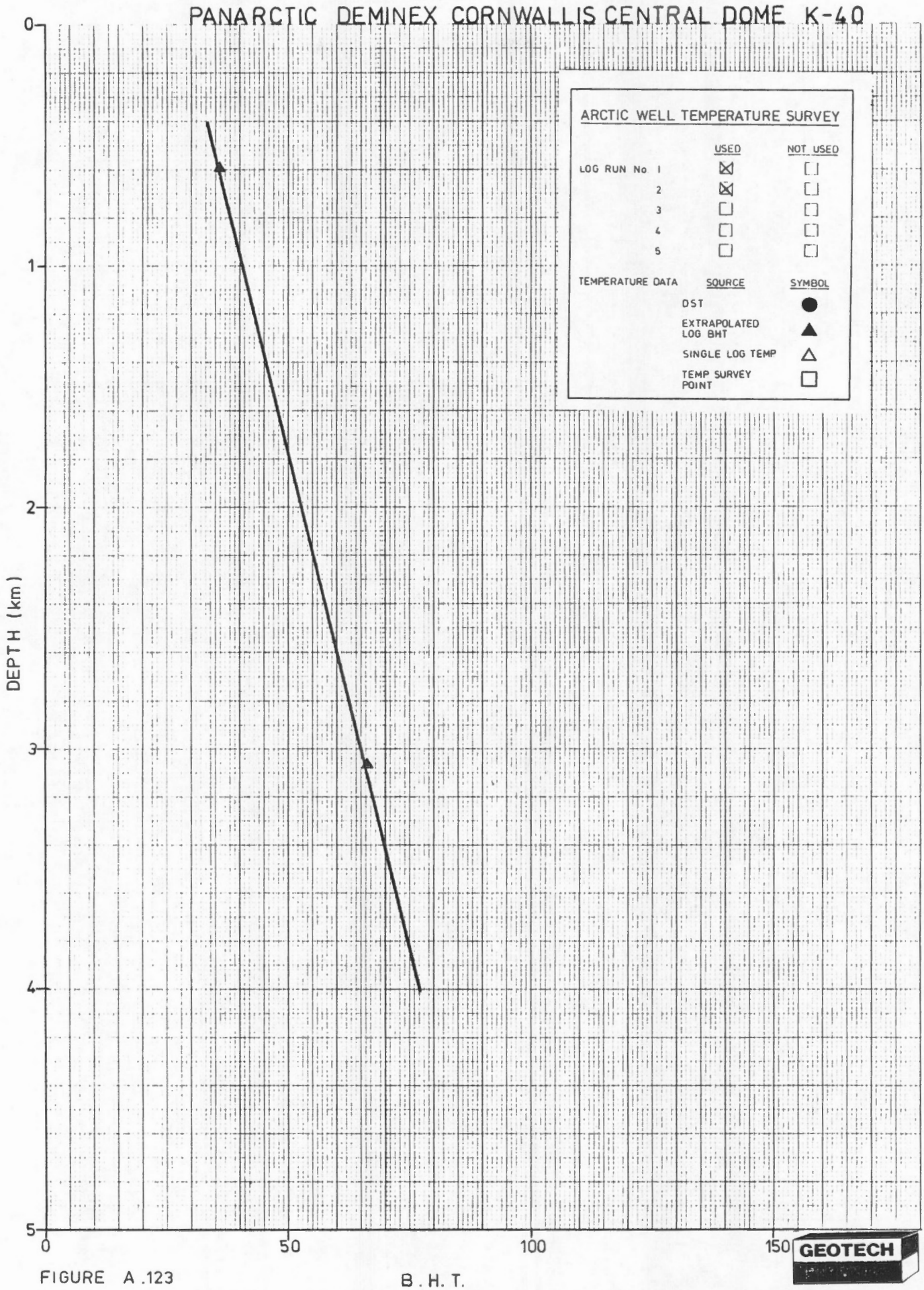

PANARCTIC DEMINEX CORNWALLIS CENTRAL DOME K-40
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B . H. T.
GEOTECH

FIGURE A .123

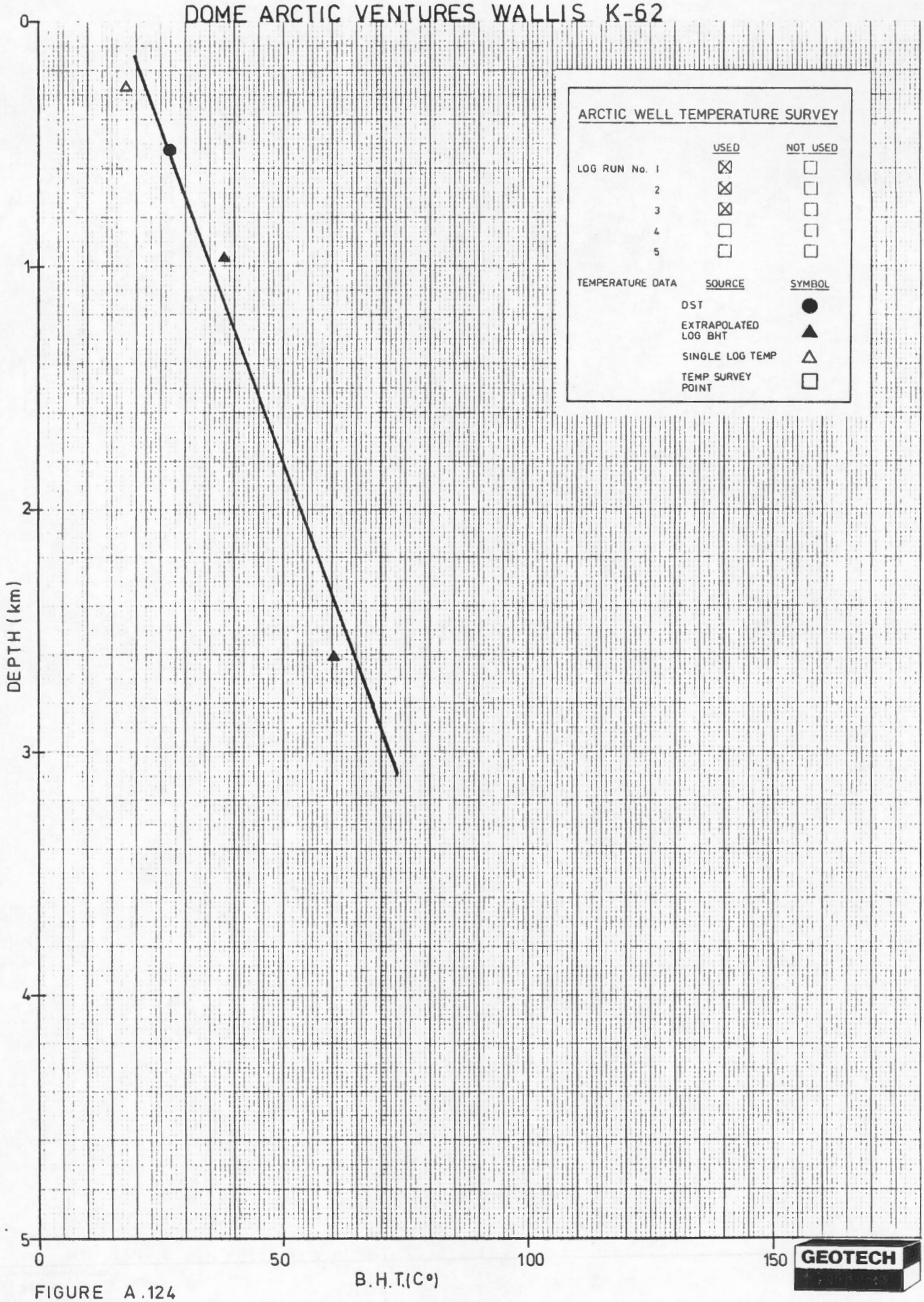
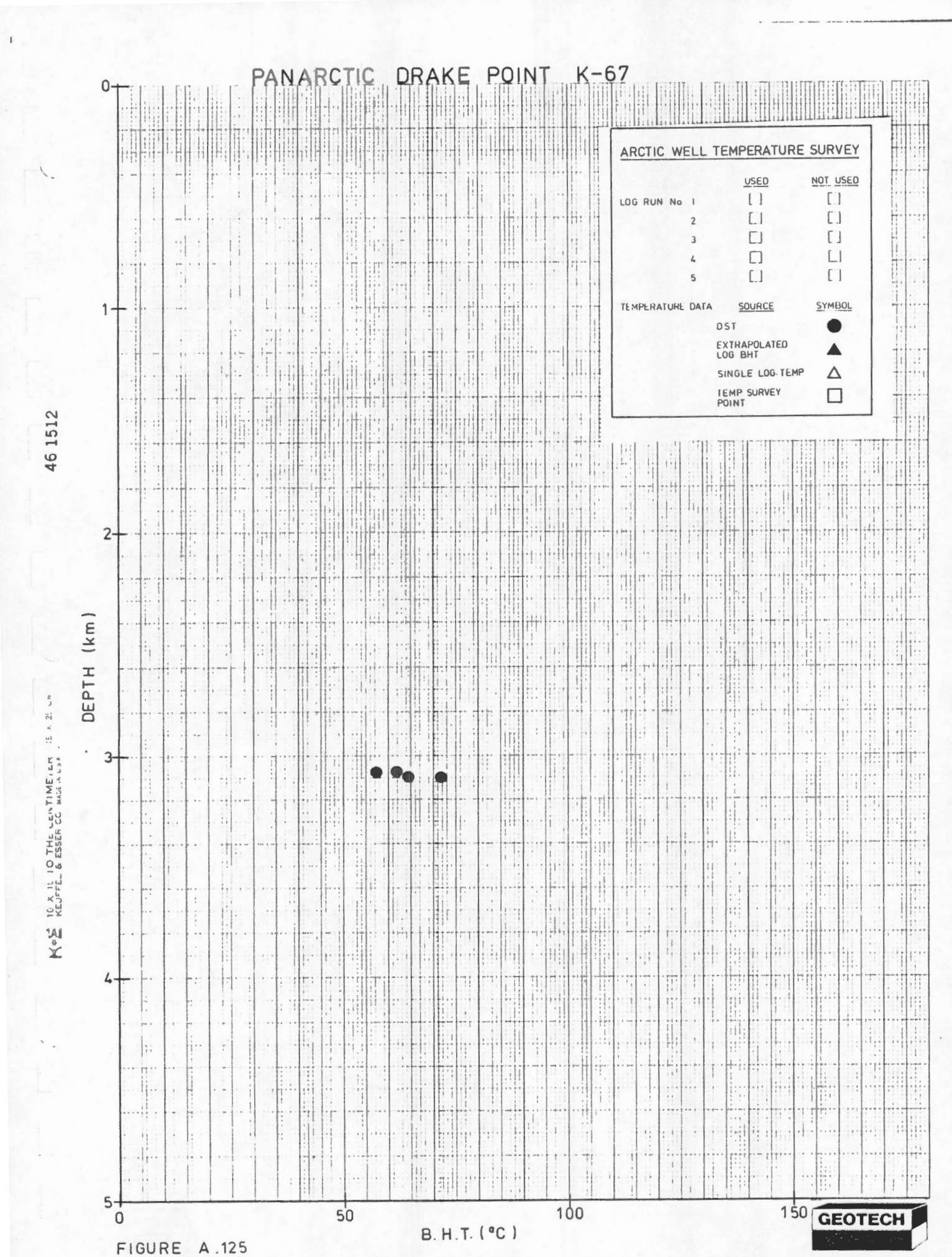


FIGURE A.124

46 1512



46 1512

FIGURE A.125

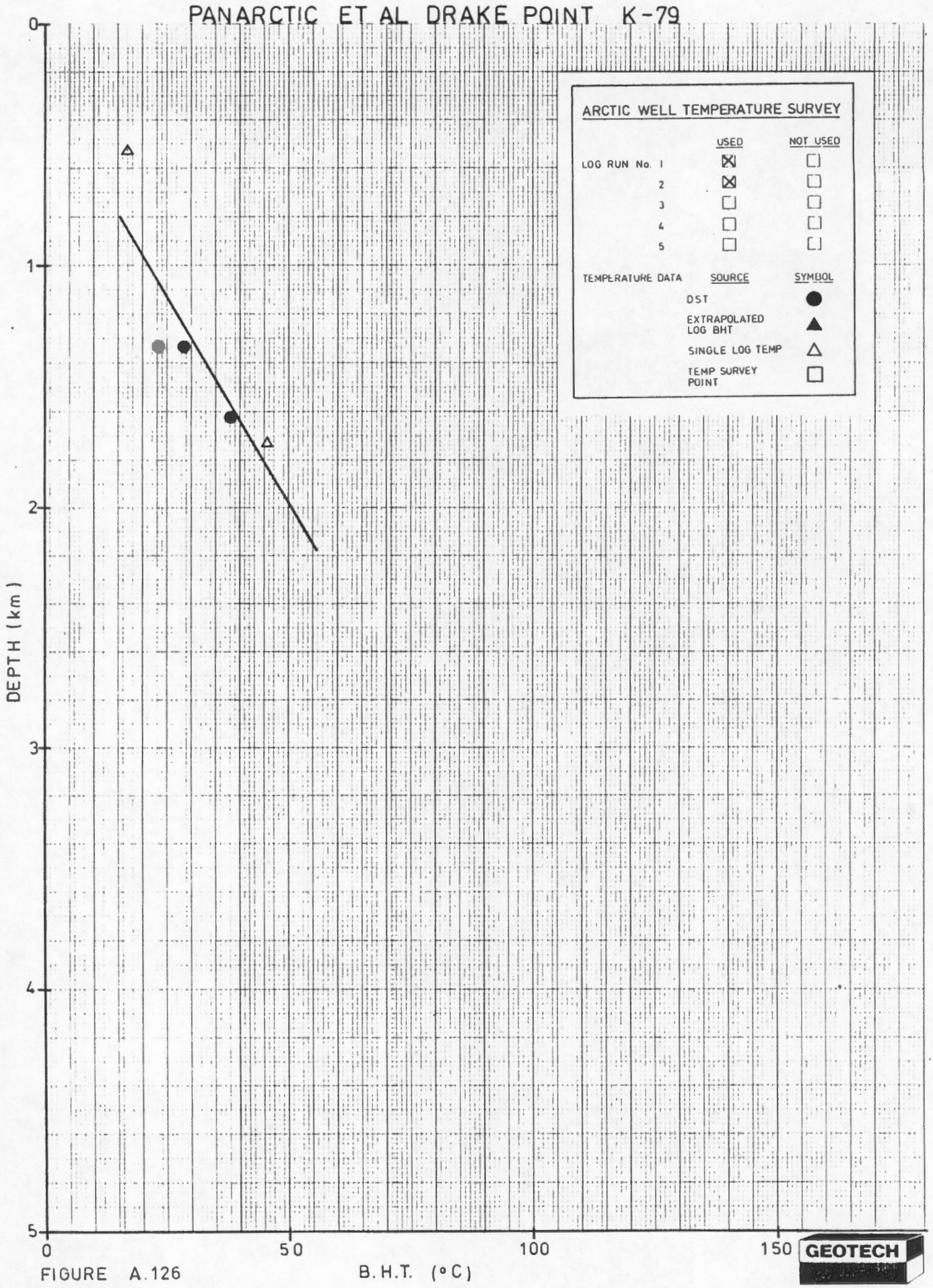

PANARCTIC ET AL DRAKE POINT K-79
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.126

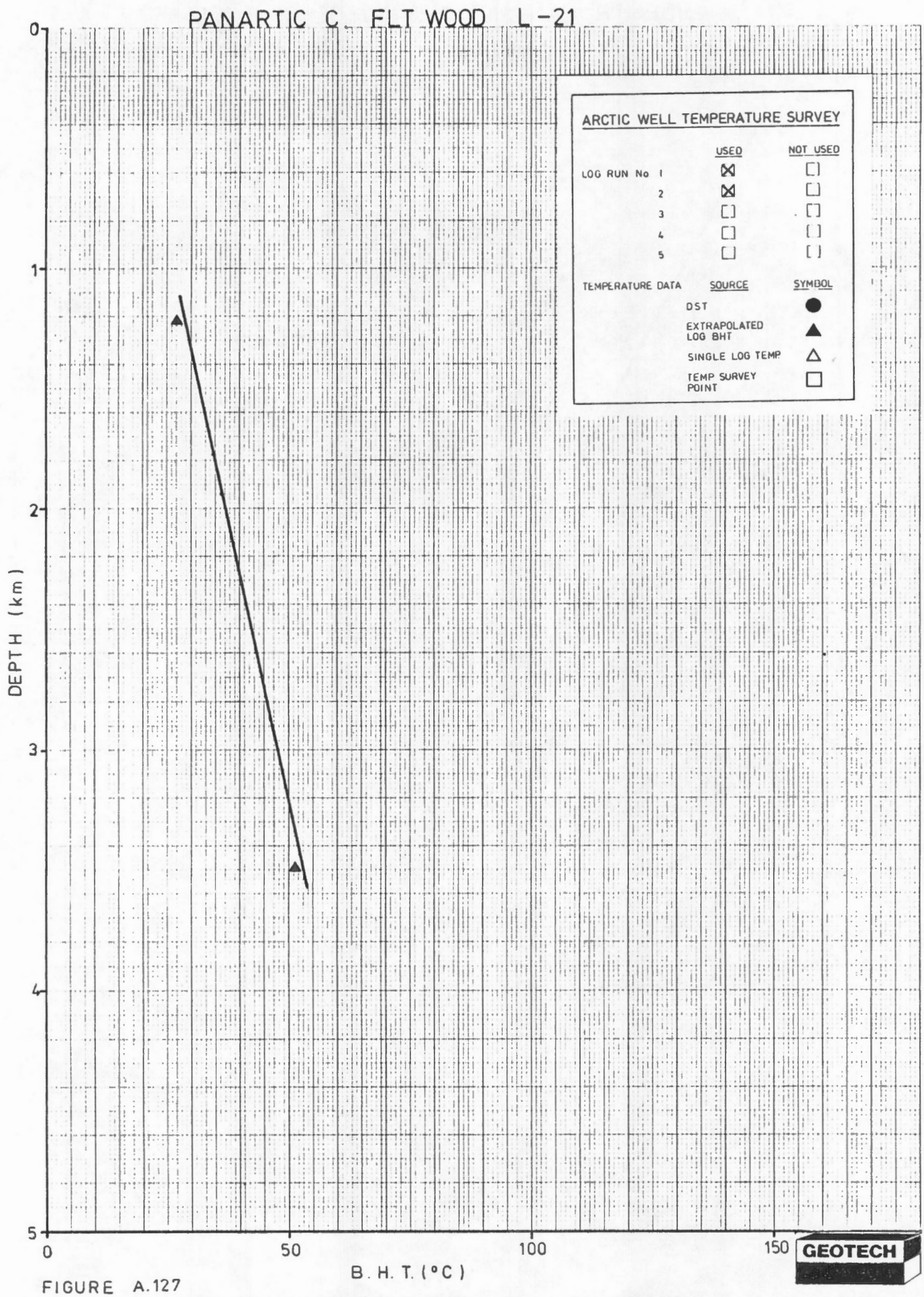


FIGURE A.127

46 1512

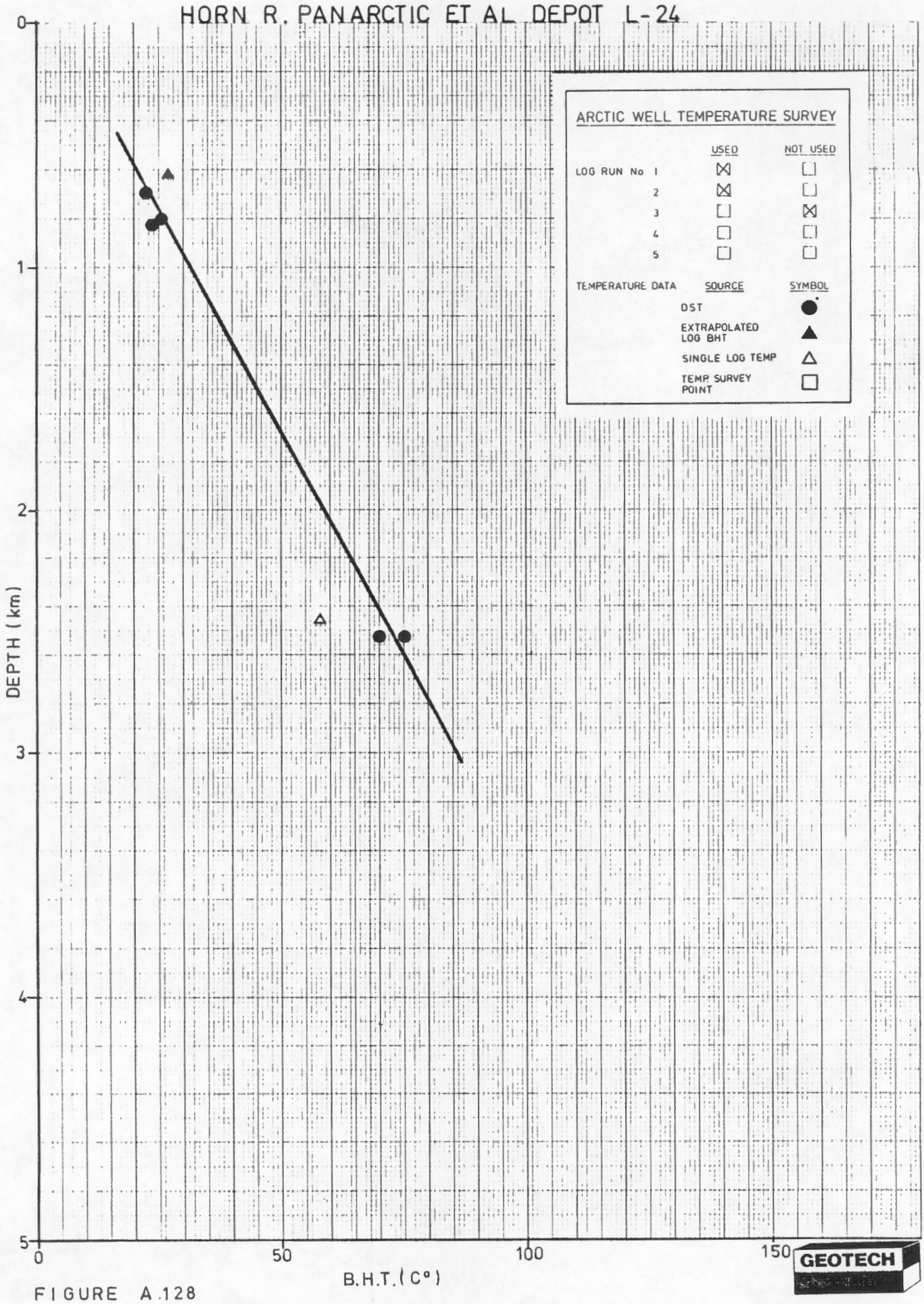

HORN R. PANARCTIC ET AL DEPOT L-24
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.128

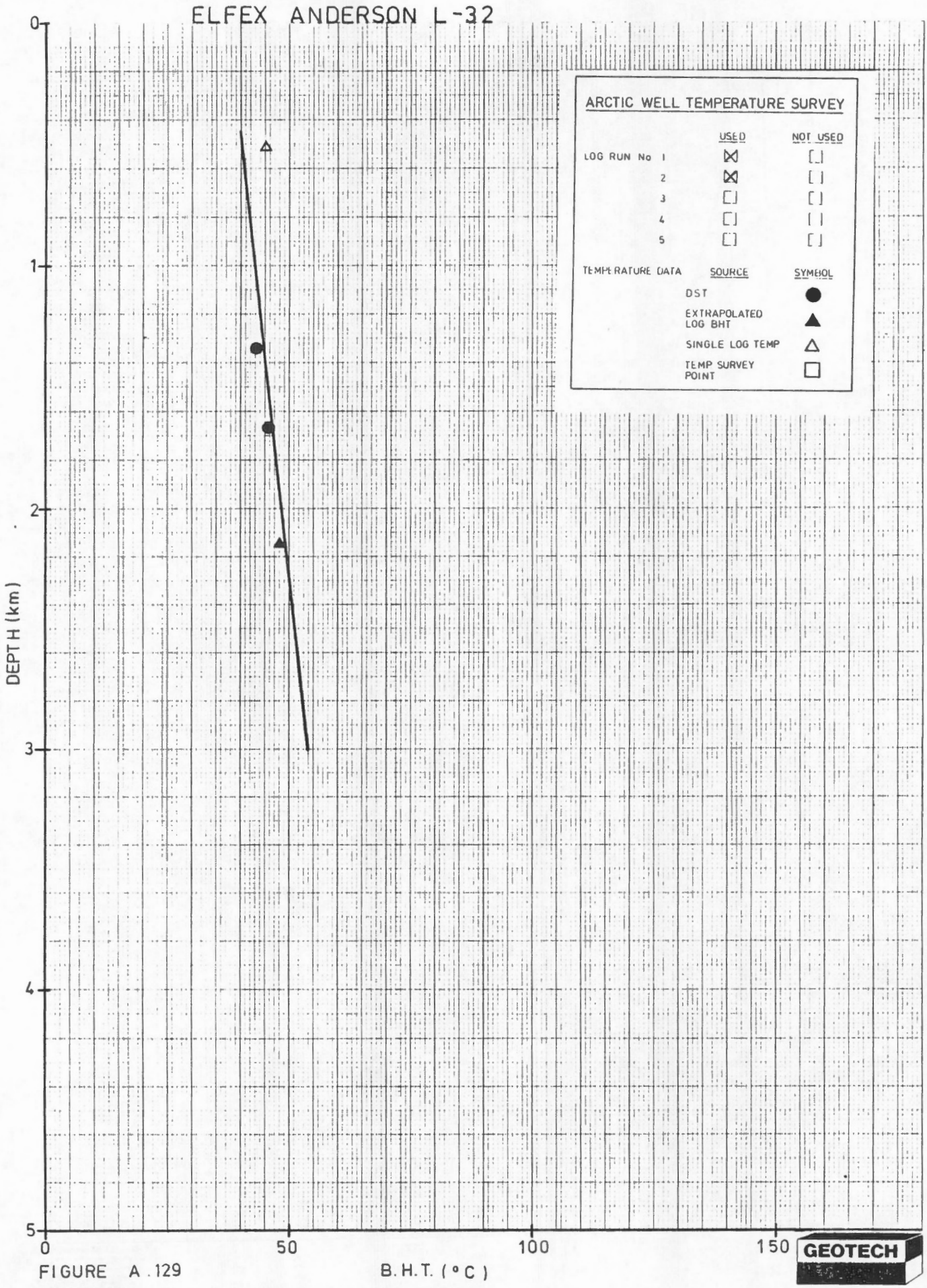

ELFEX ANDERSON L-32
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.129

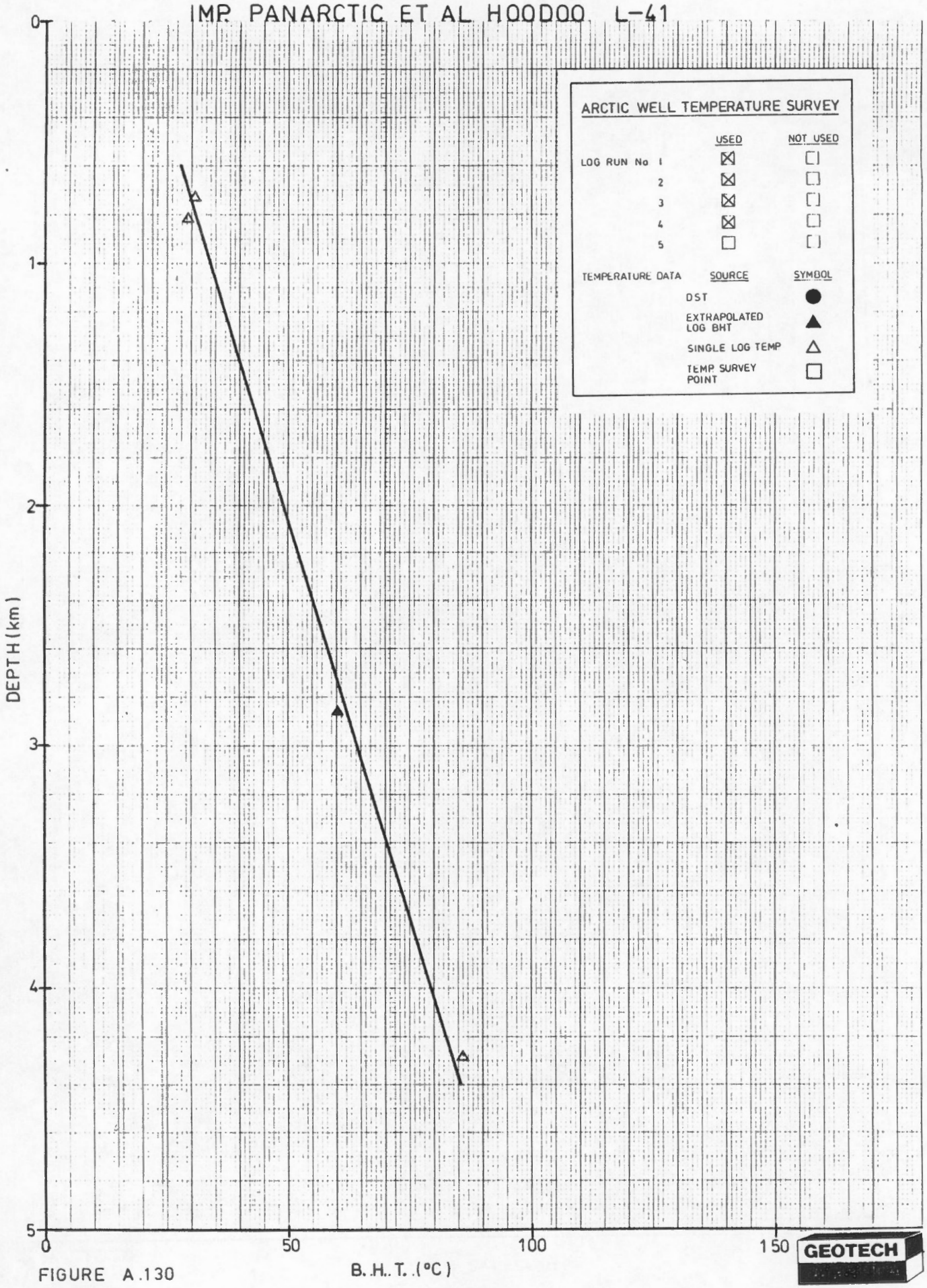
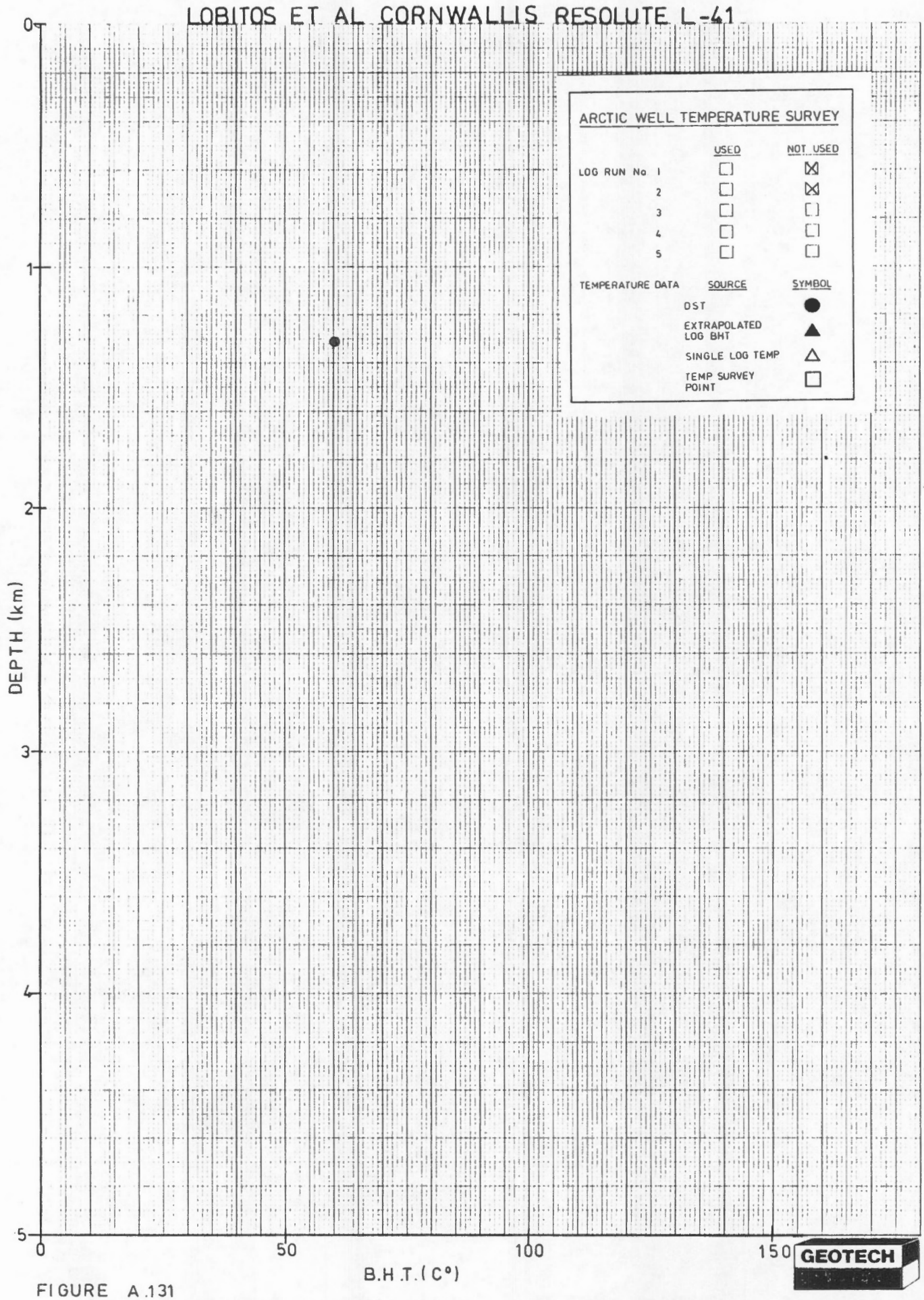


FIGURE A.130

46 1512



46 1512

FIGURE A.131

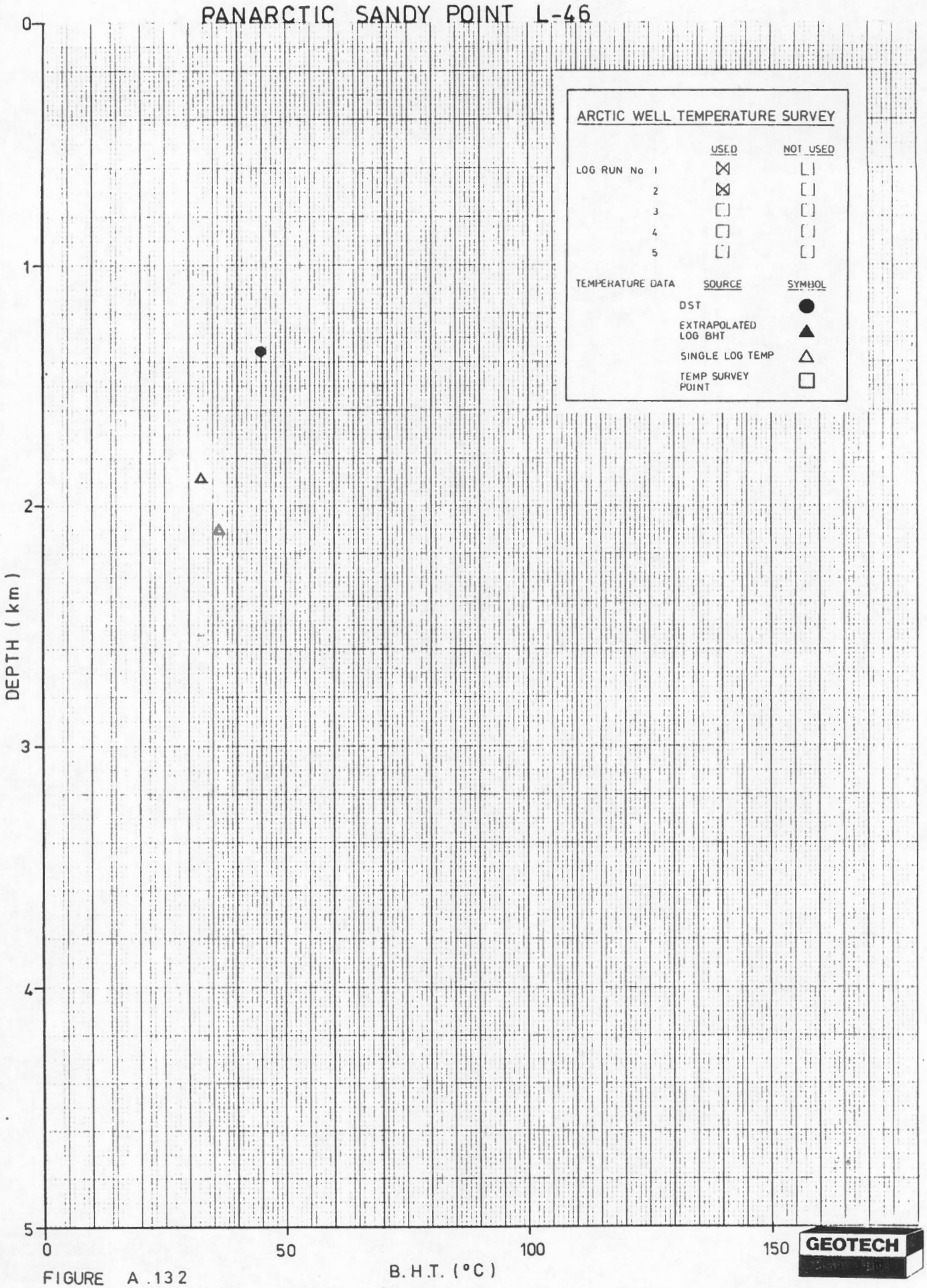

PANARCTIC SANDY POINT L-46
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (°C)
GEOTECH

FIGURE A .132

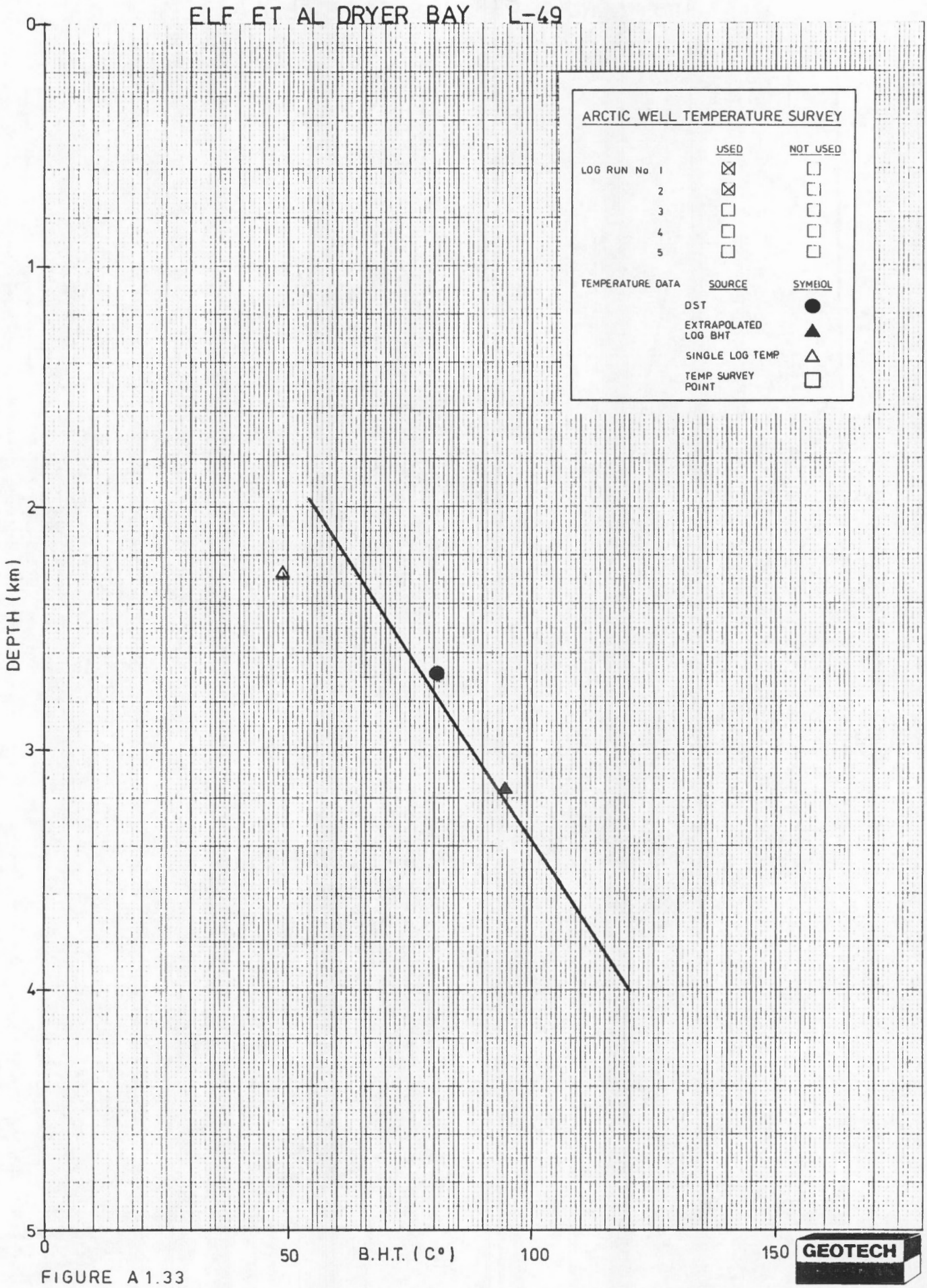


FIGURE A 1.33

46 1512

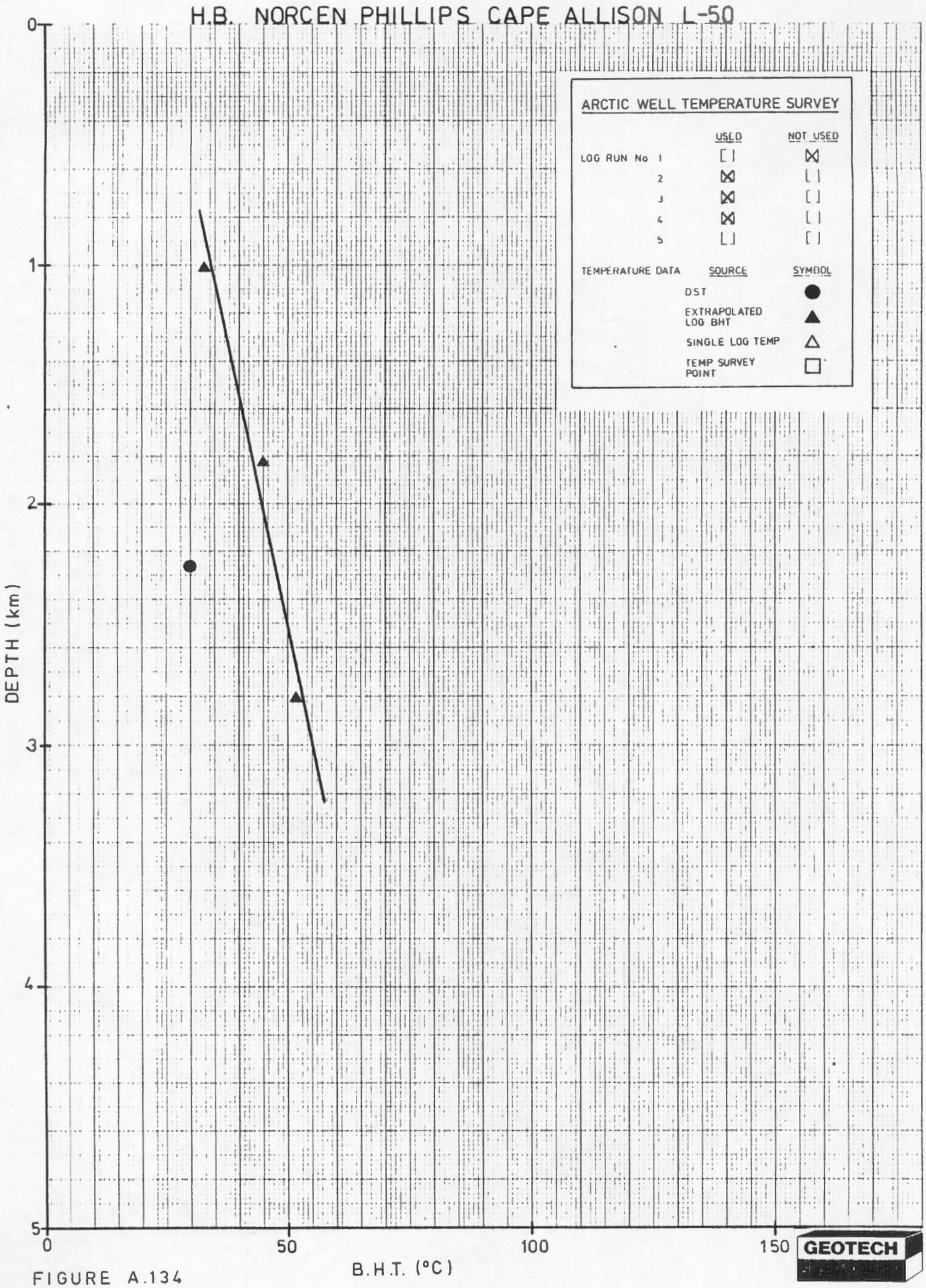
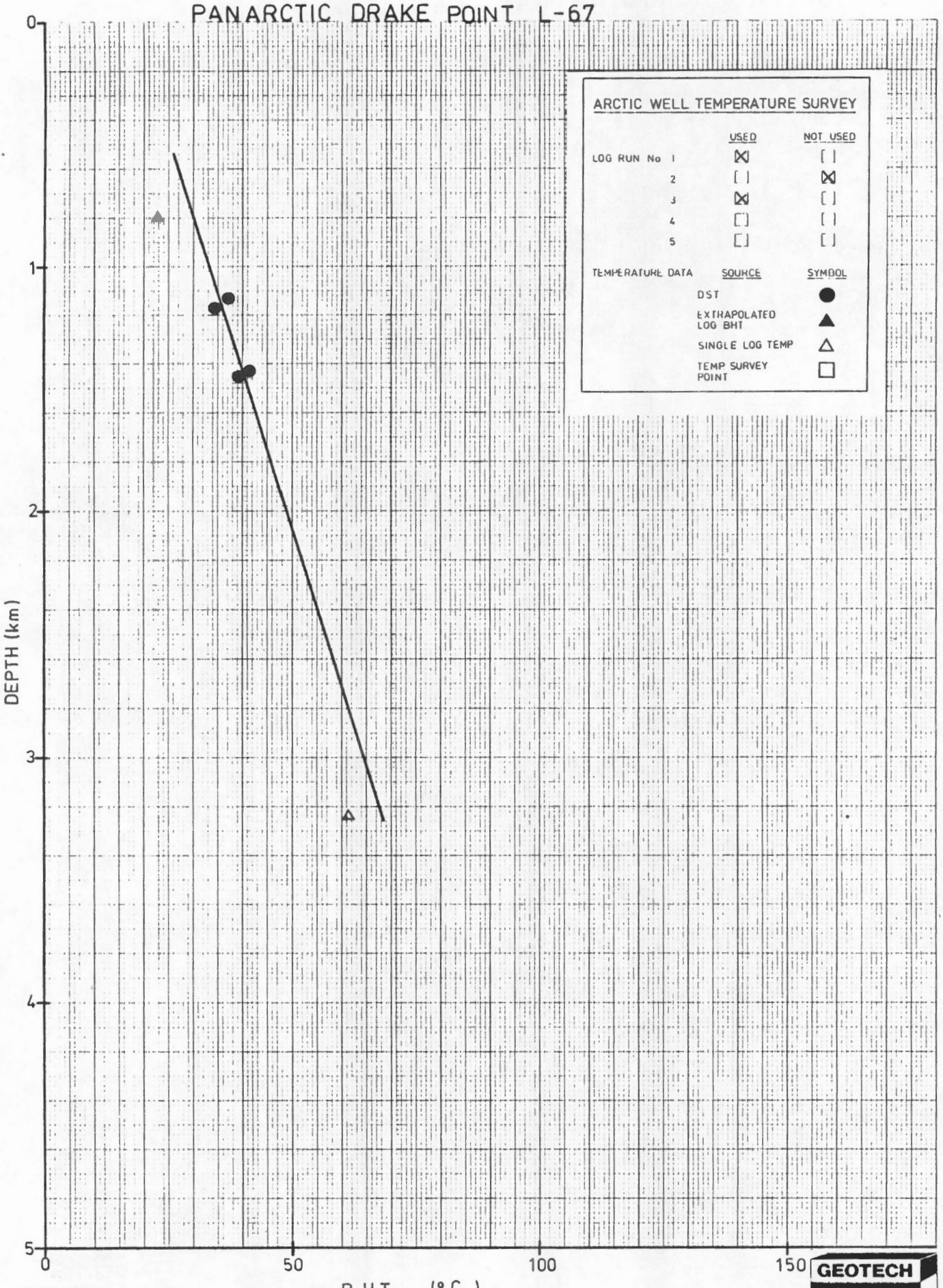


FIGURE A.134

46 1512

PANARCTIC DRAKE POINT L-67



46 1512

FIGURE A.135

GEOTECH

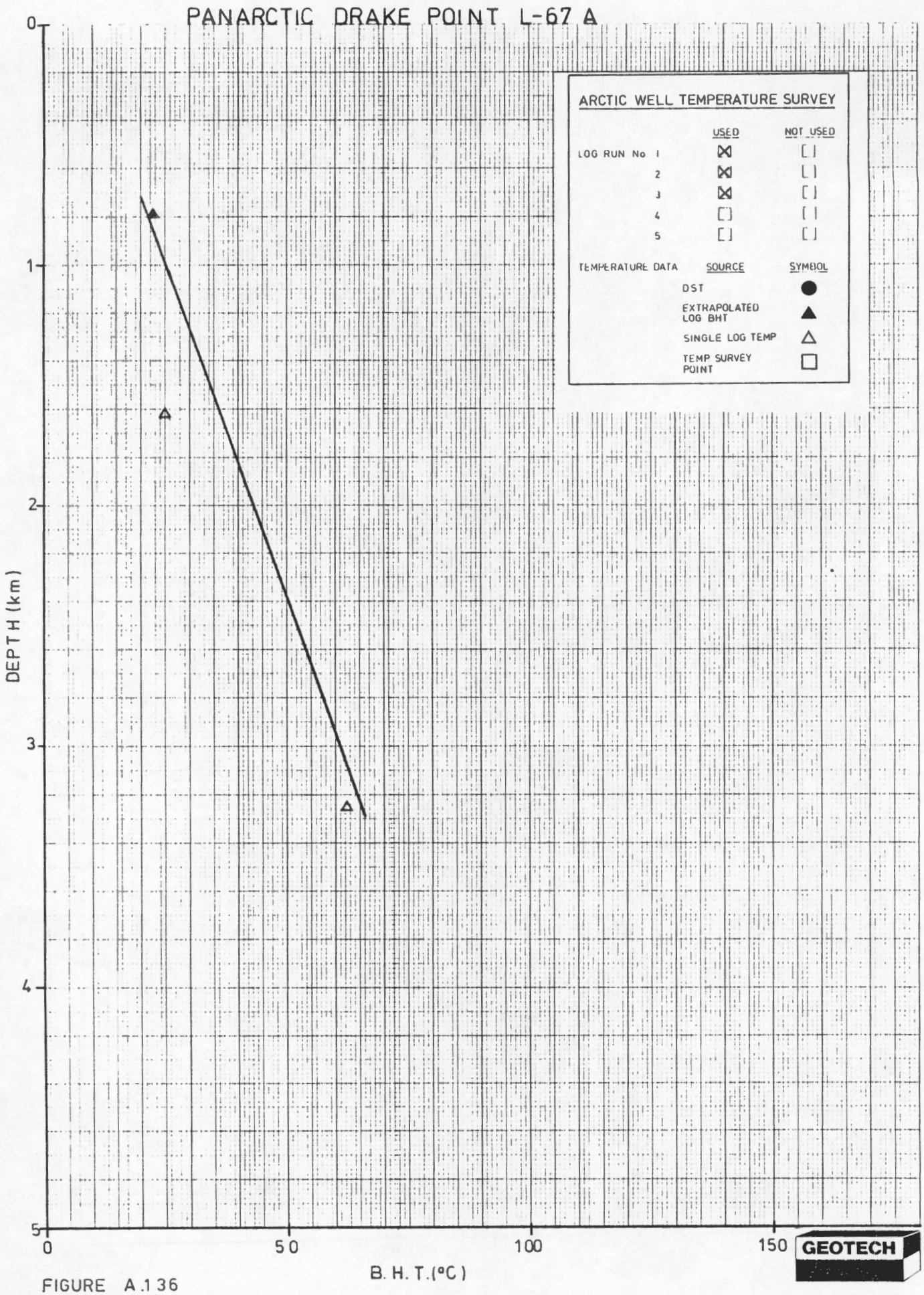


FIGURE A.136

46 1512

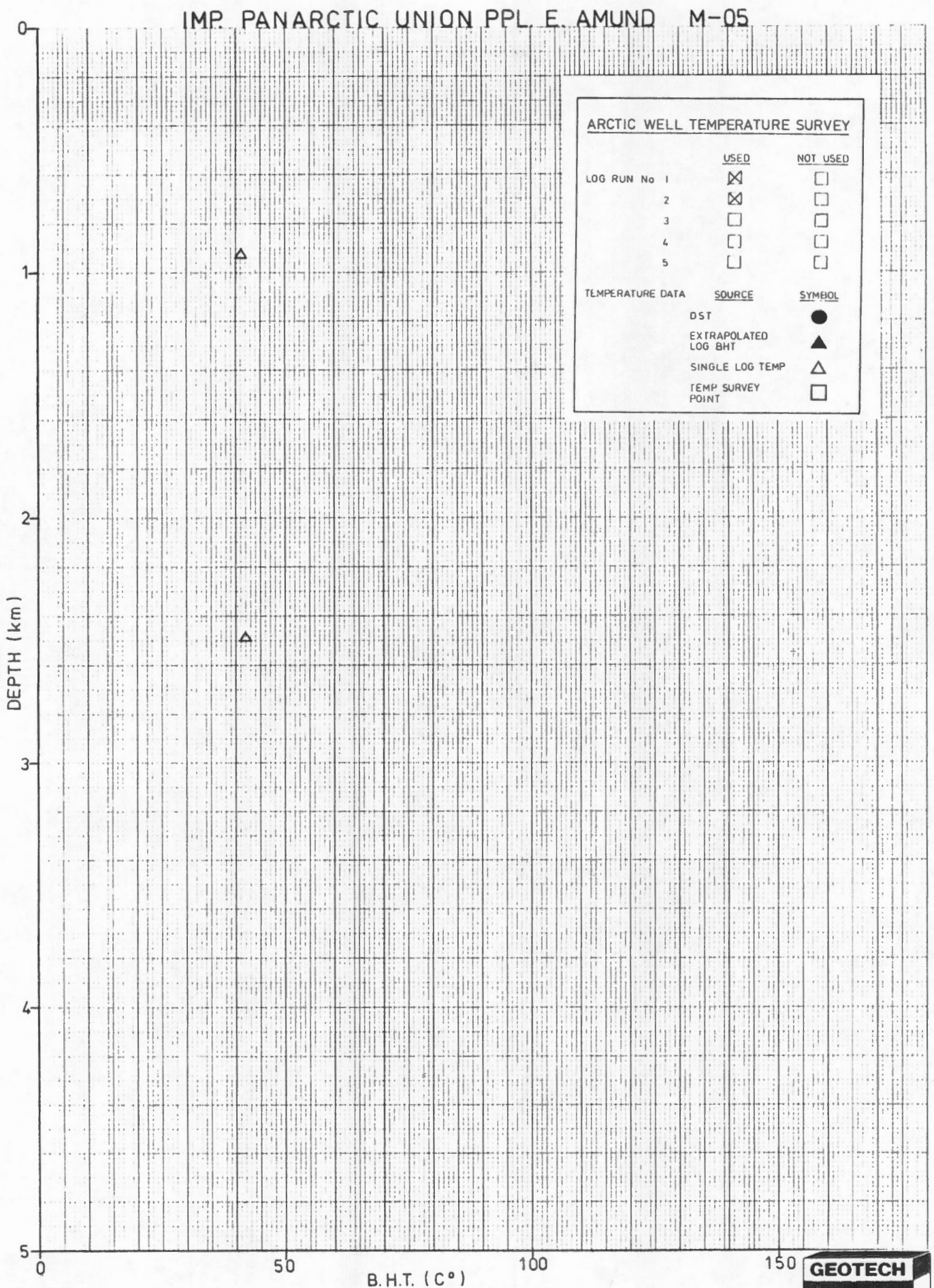

IMP. PANARCTIC UNION PPL. E. AMUND M-05
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE A.137

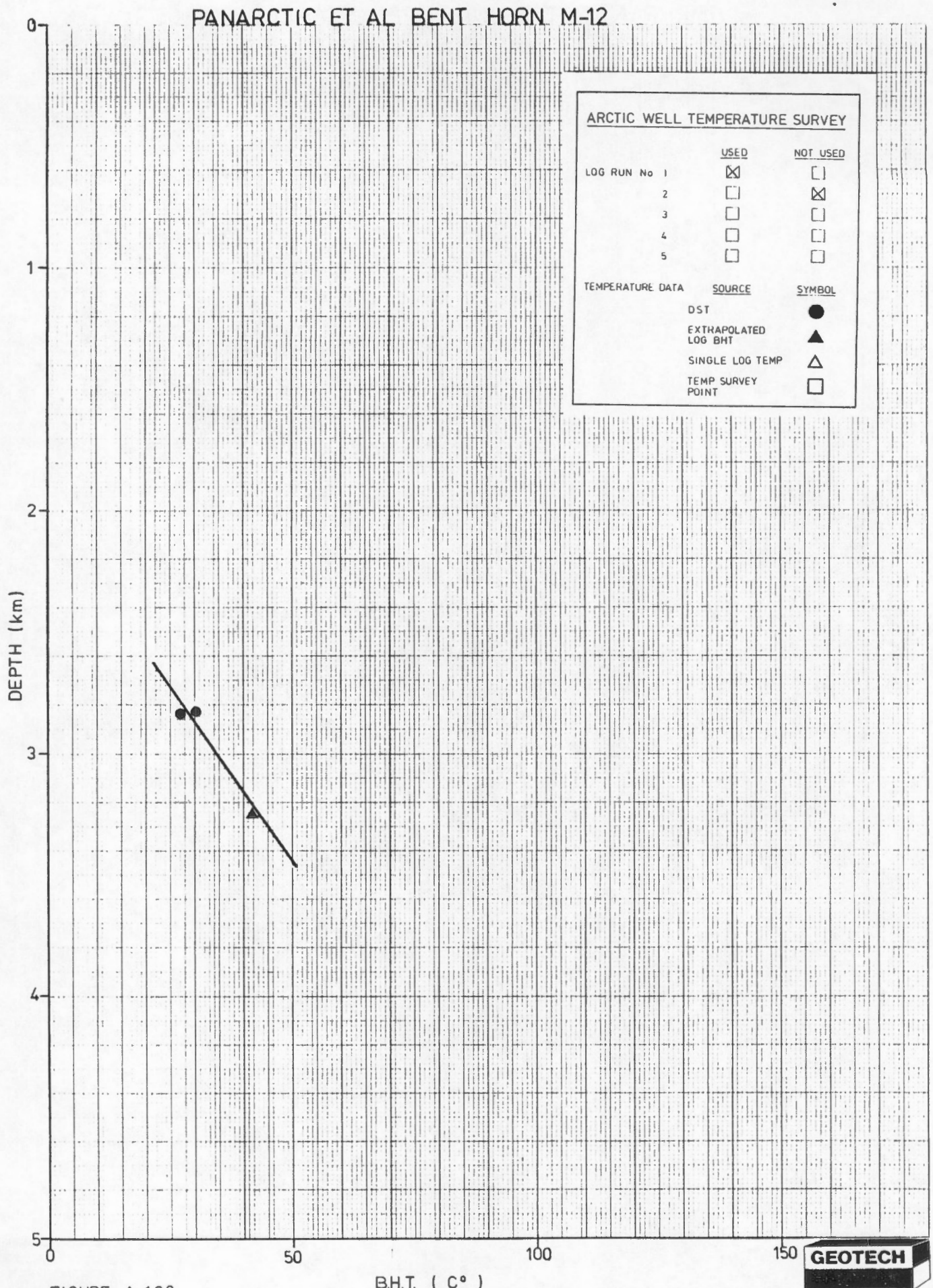

PANARCTIC ET AL BENT HORN M-12
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.138

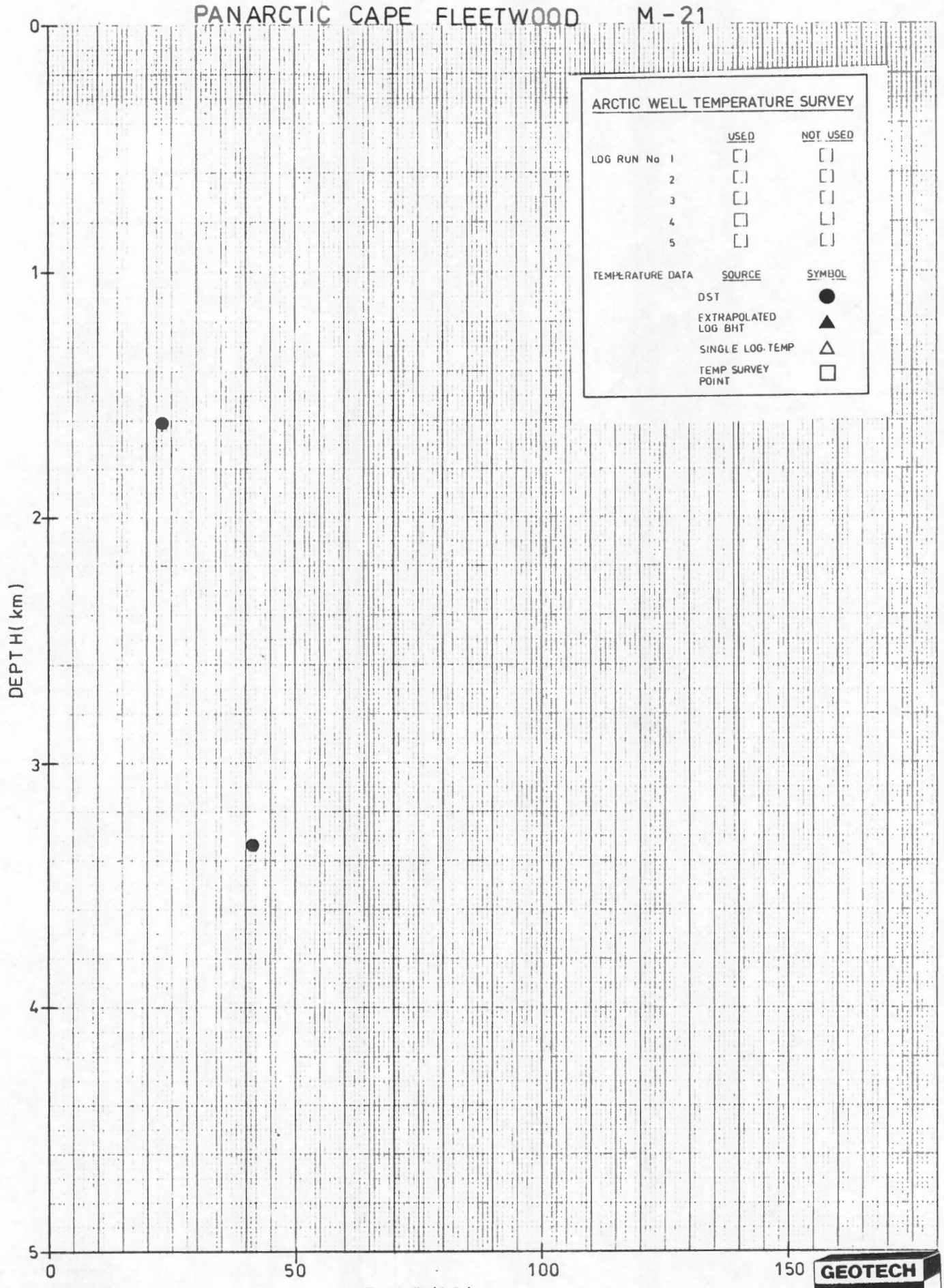

PANARCTIC CAPE FLEETWOOD M-21
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
GEOTECH

FIGURE A.139

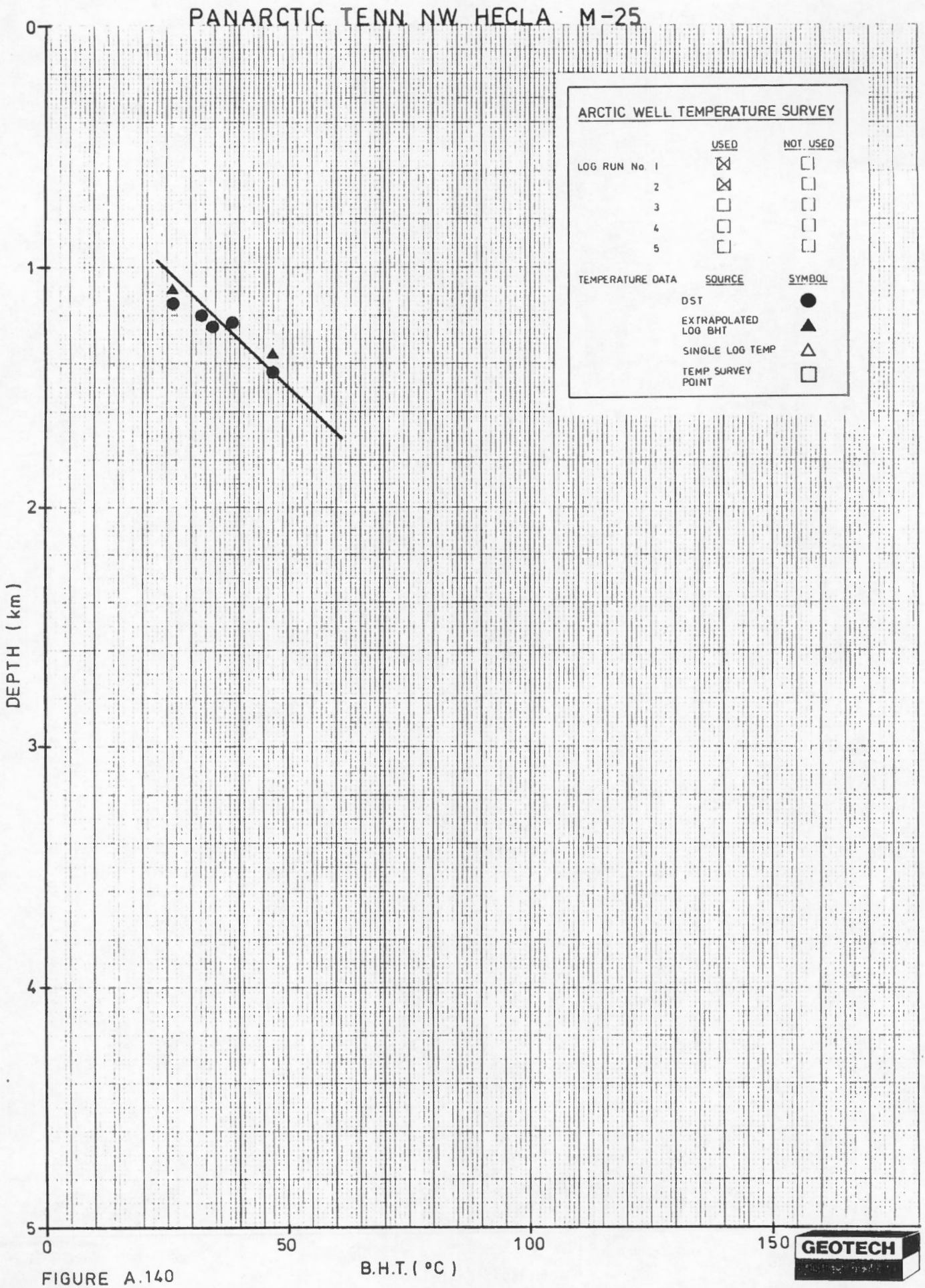


FIGURE A.140

46 1512

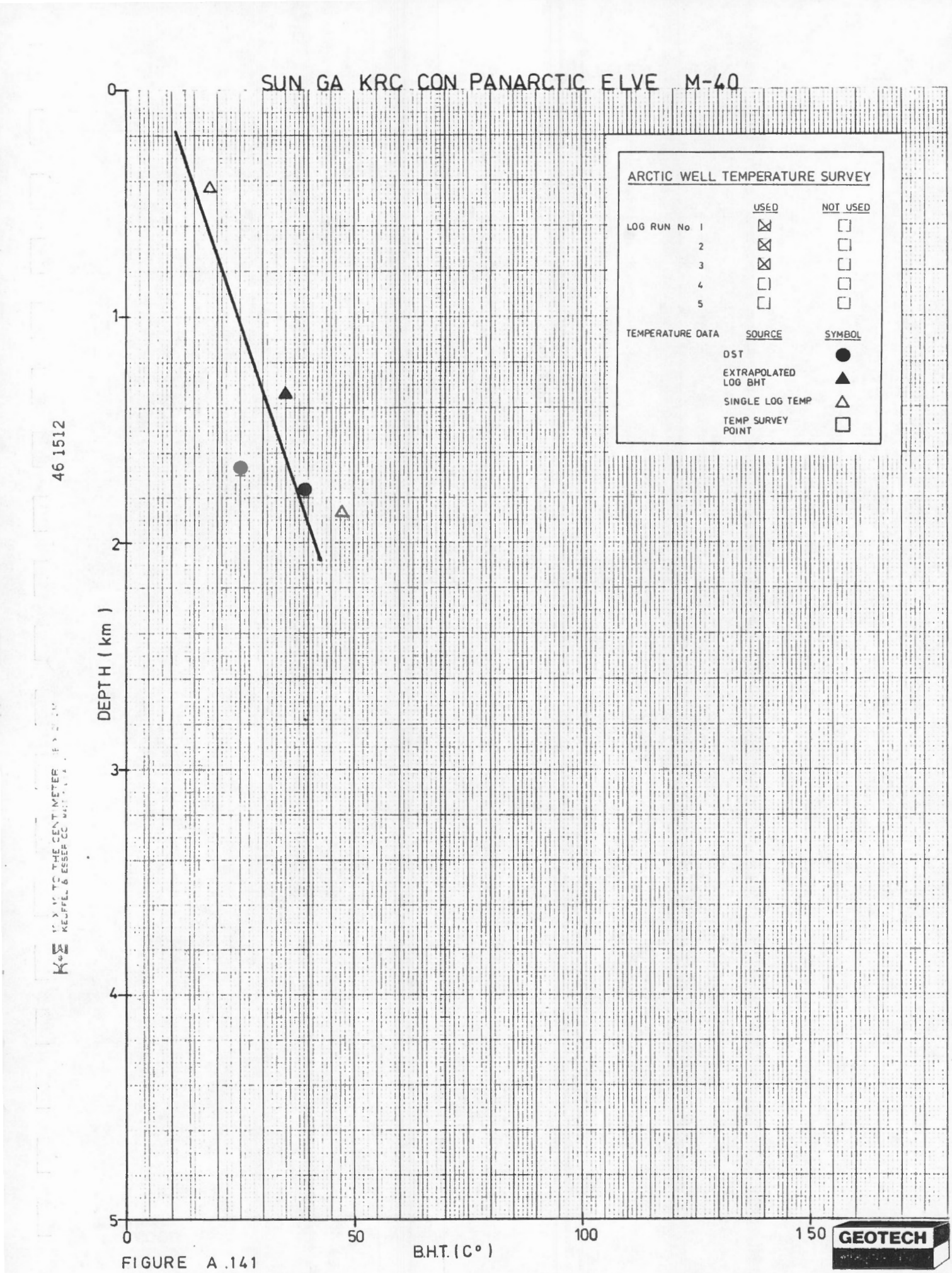

SUN GA KRC CON PANARCTIC ELVE M-40
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE A .141

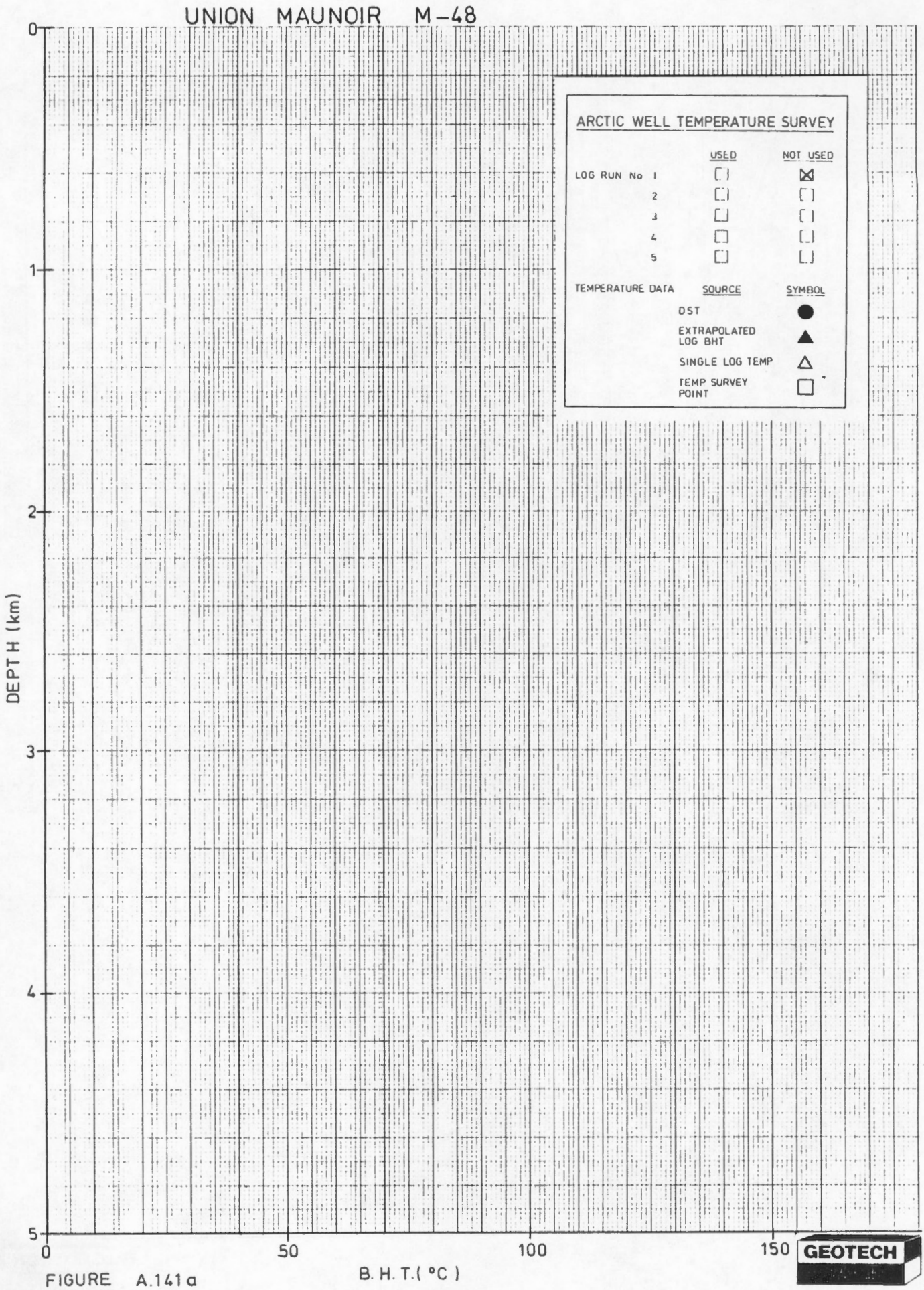


FIGURE A.141a

46 1512

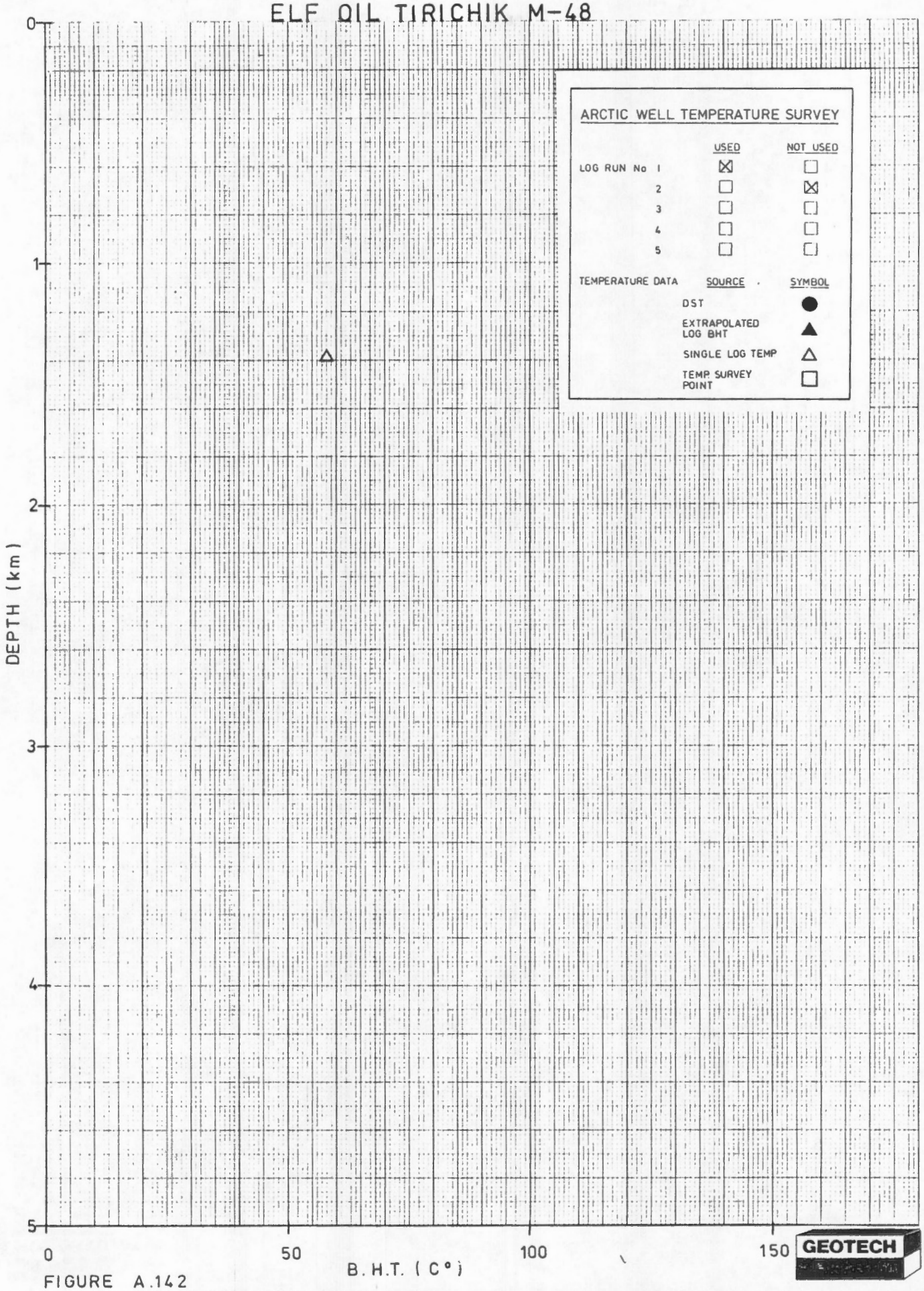


FIGURE A.142

46 1512

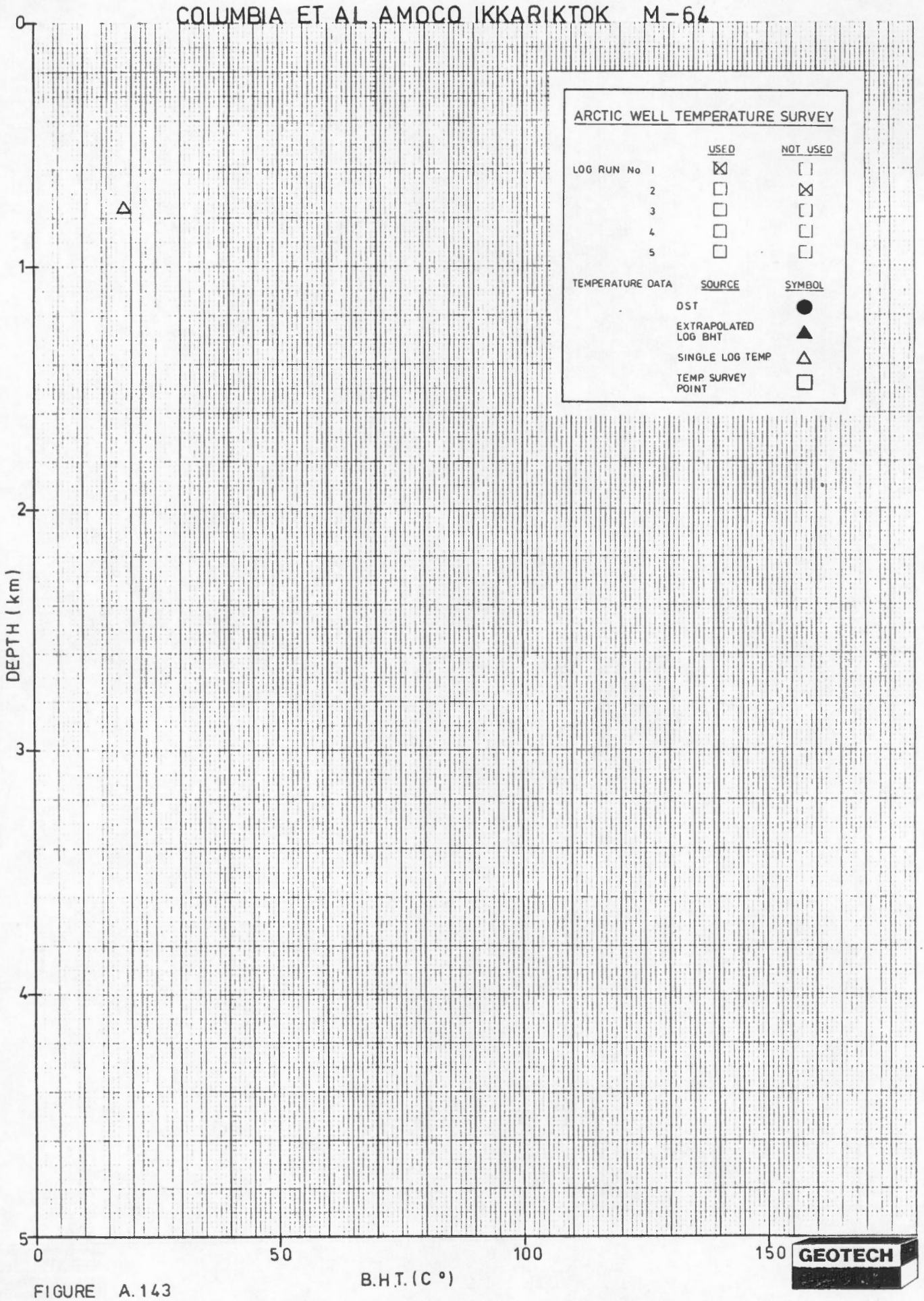


FIGURE A.143

46 1512

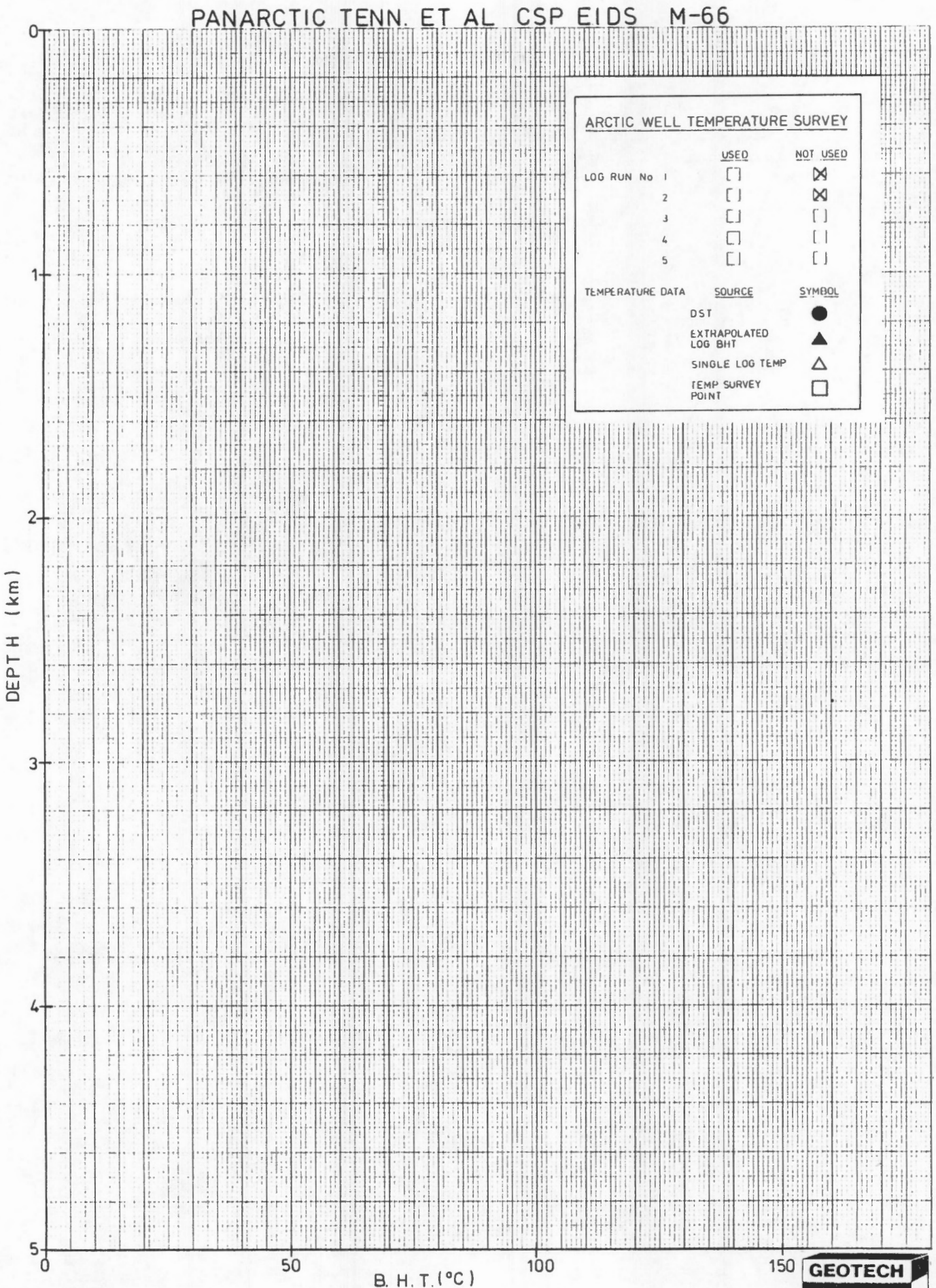

PANARCTIC TENN. ET AL CSP EIDS M-66
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (°C)
GEOTECH

FIGURE A.144

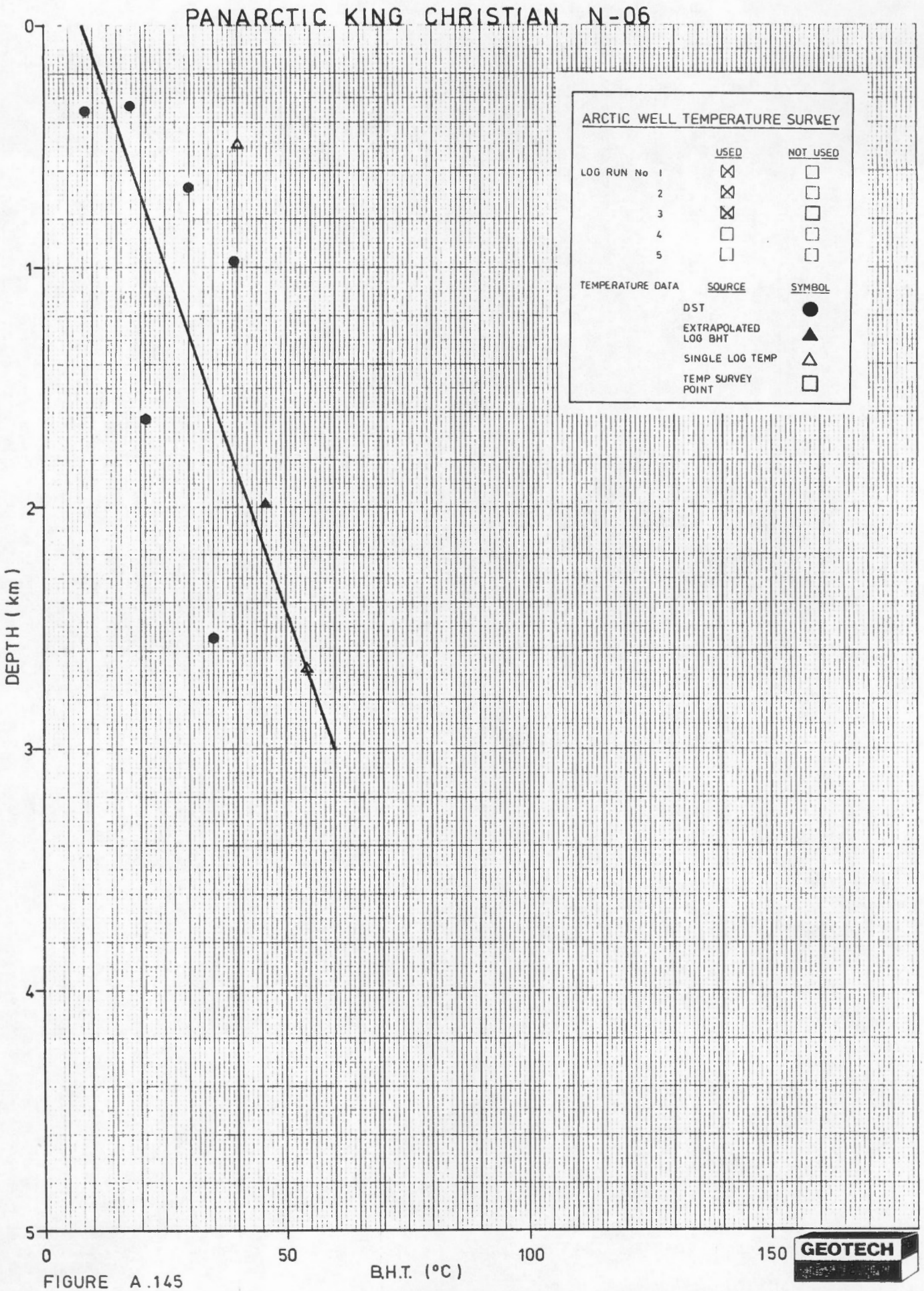


FIGURE A.145

46 1512
KE 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO.

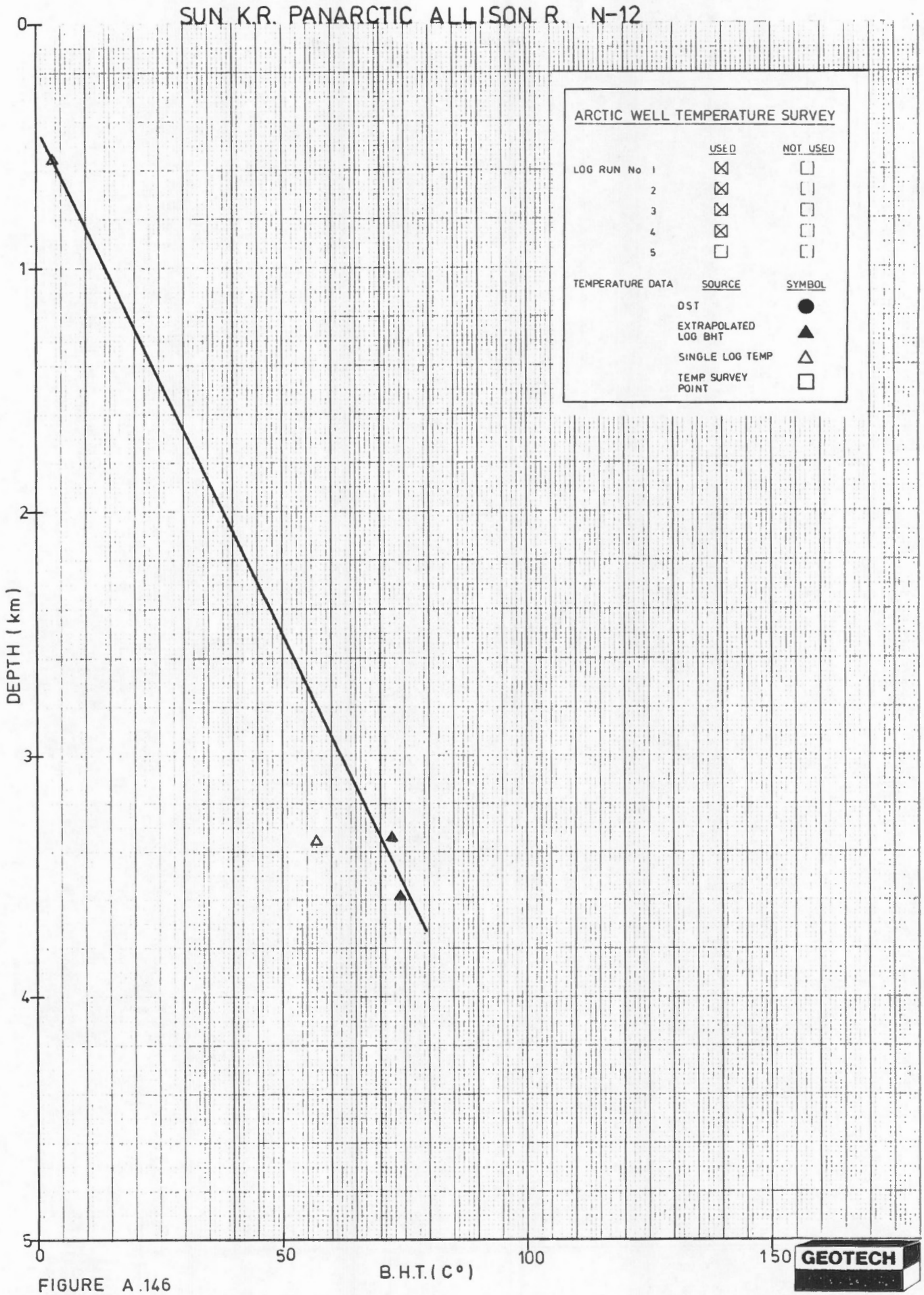

SUN K.R. PANARCTIC ALLISON R. N-12
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(C°)
GEOTECH

FIGURE A.146

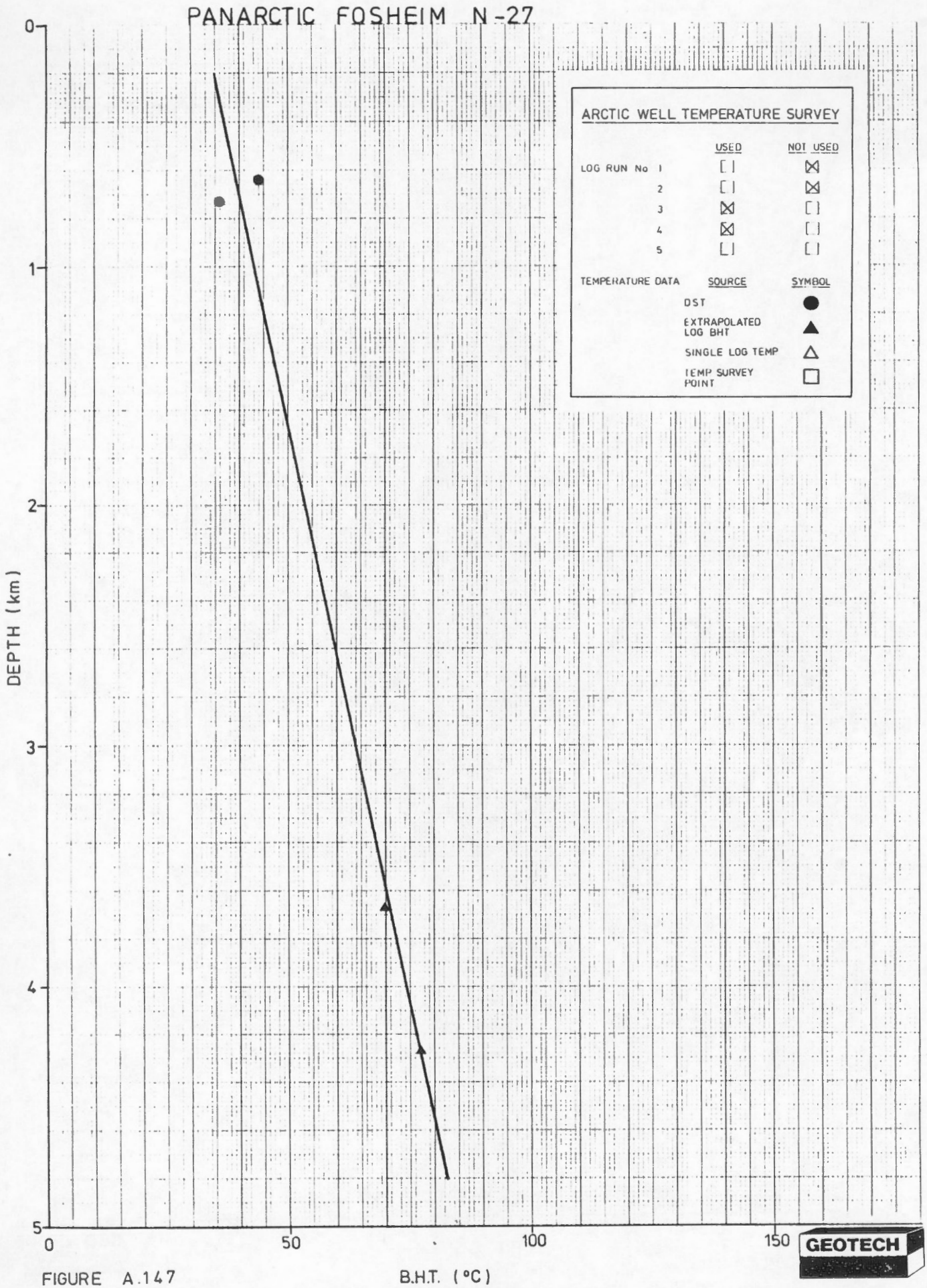


FIGURE A.147

46 1512

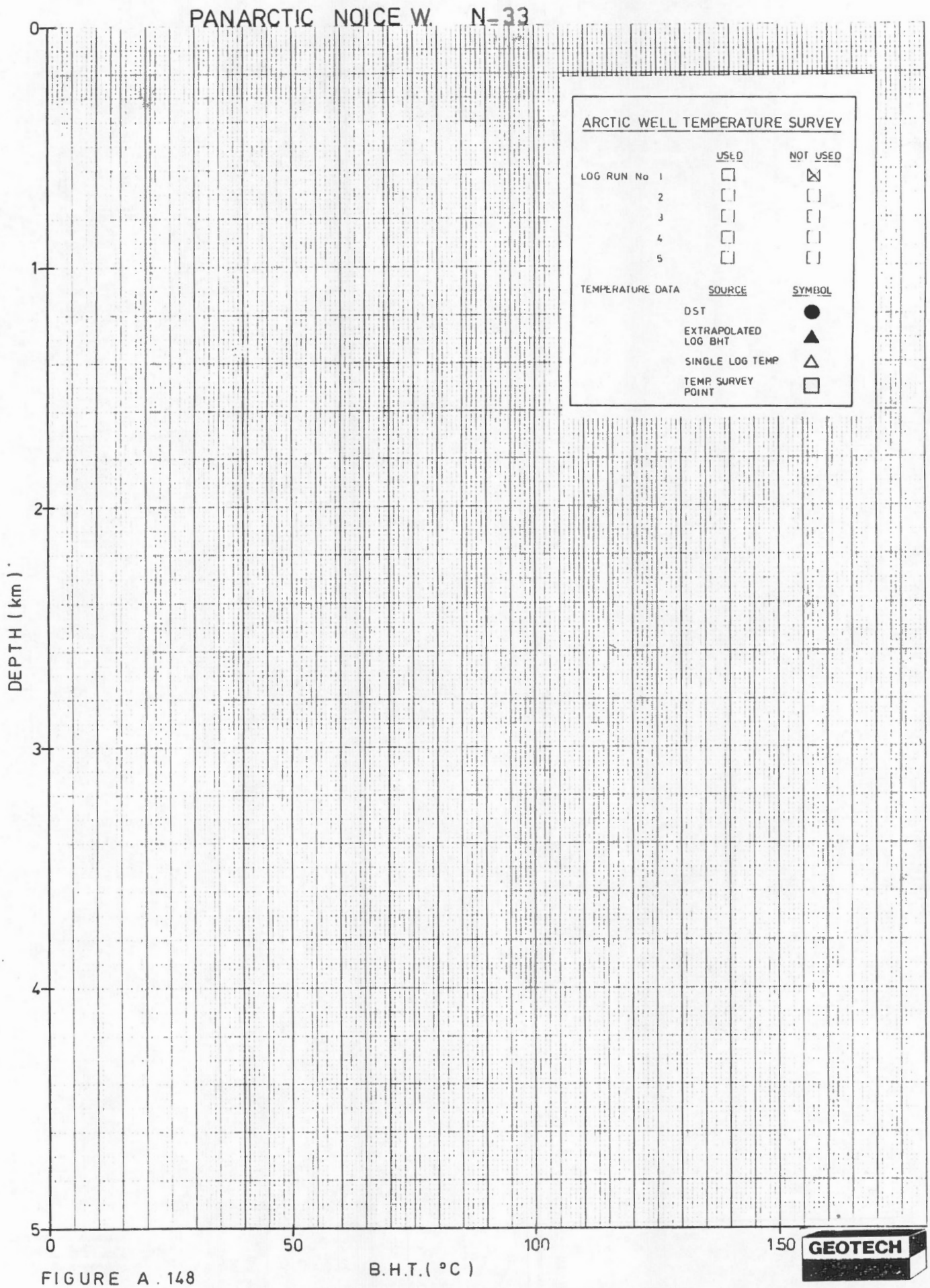

PANARCTIC NOICE W. N-33
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE A.148

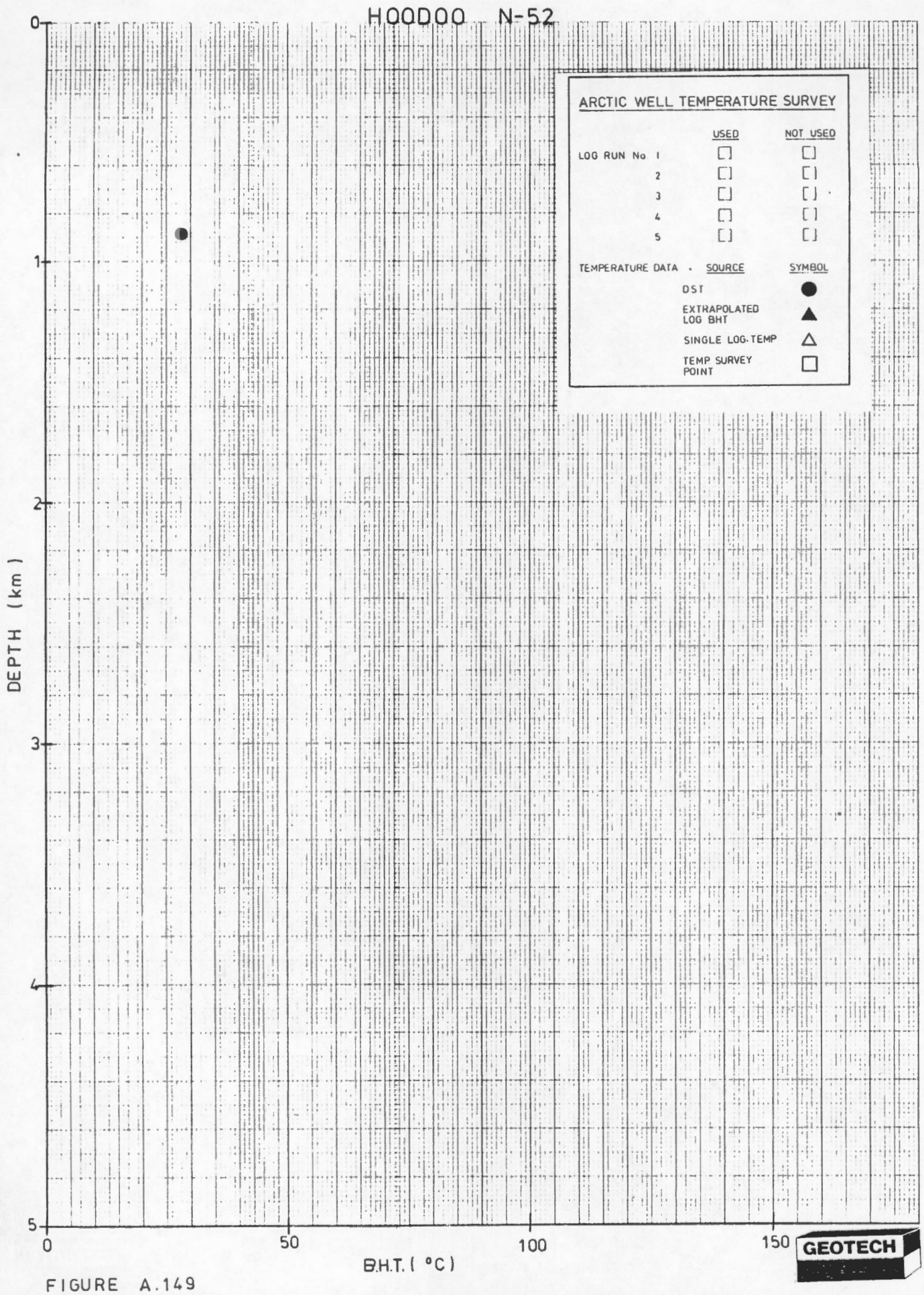

HOODOO N-52
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA - SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.149

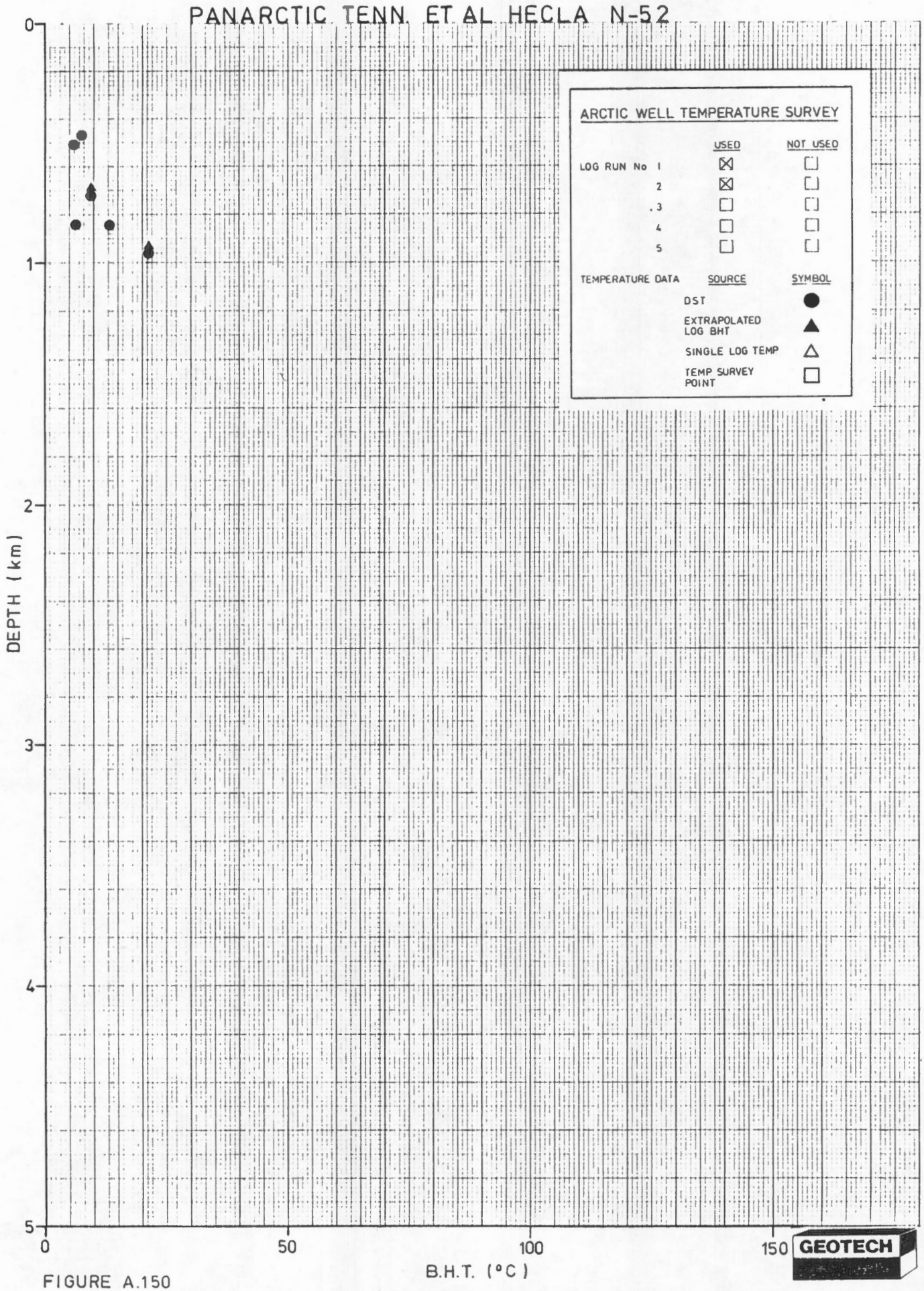

PANARCTIC TENN. ET AL HECLA N-52
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.150

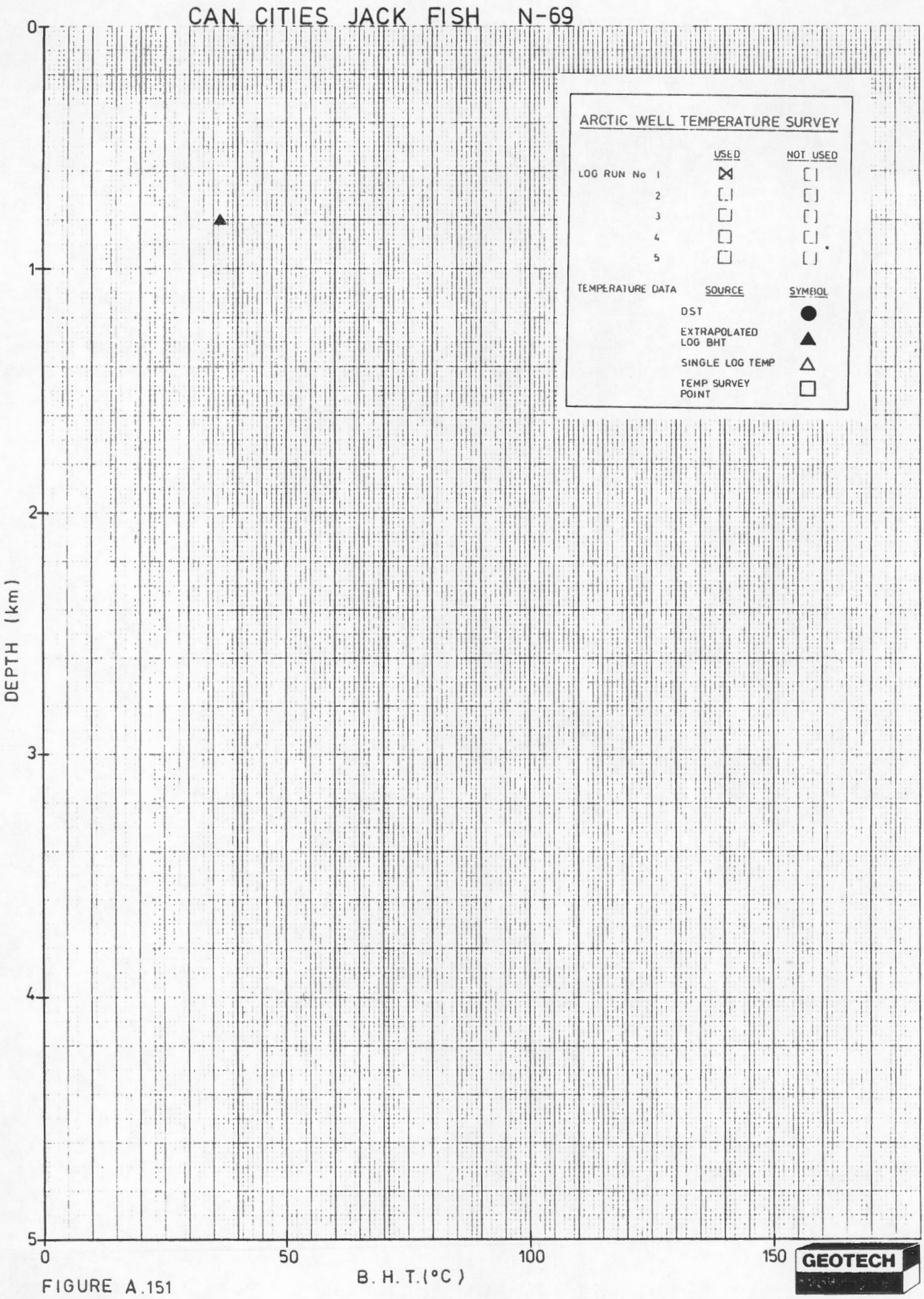

CAN. CITIES JACK FISH N-69
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (°C)
GEOTECH

FIGURE A.151

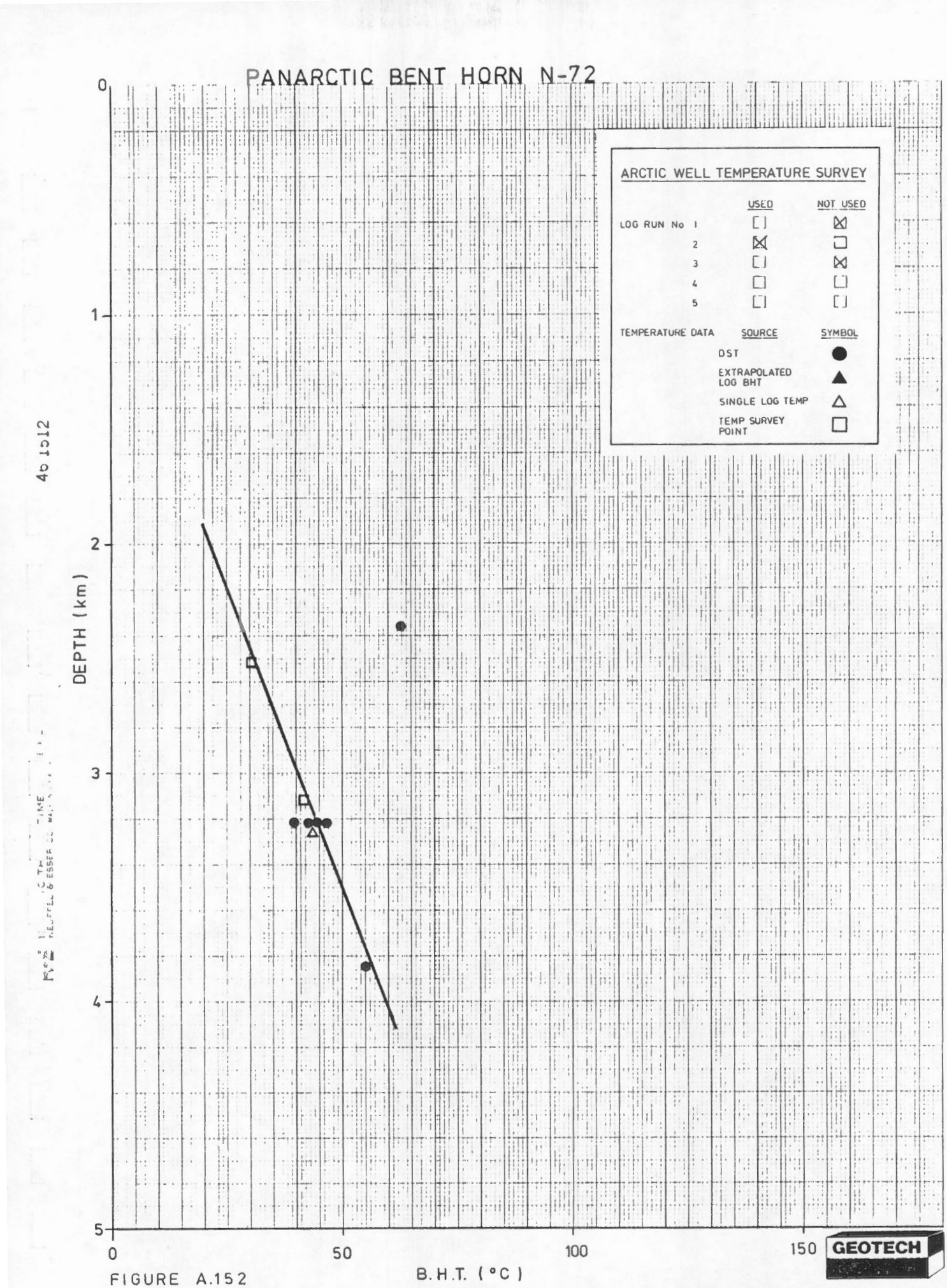

PANARCTIC BENT HORN N-72
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.152

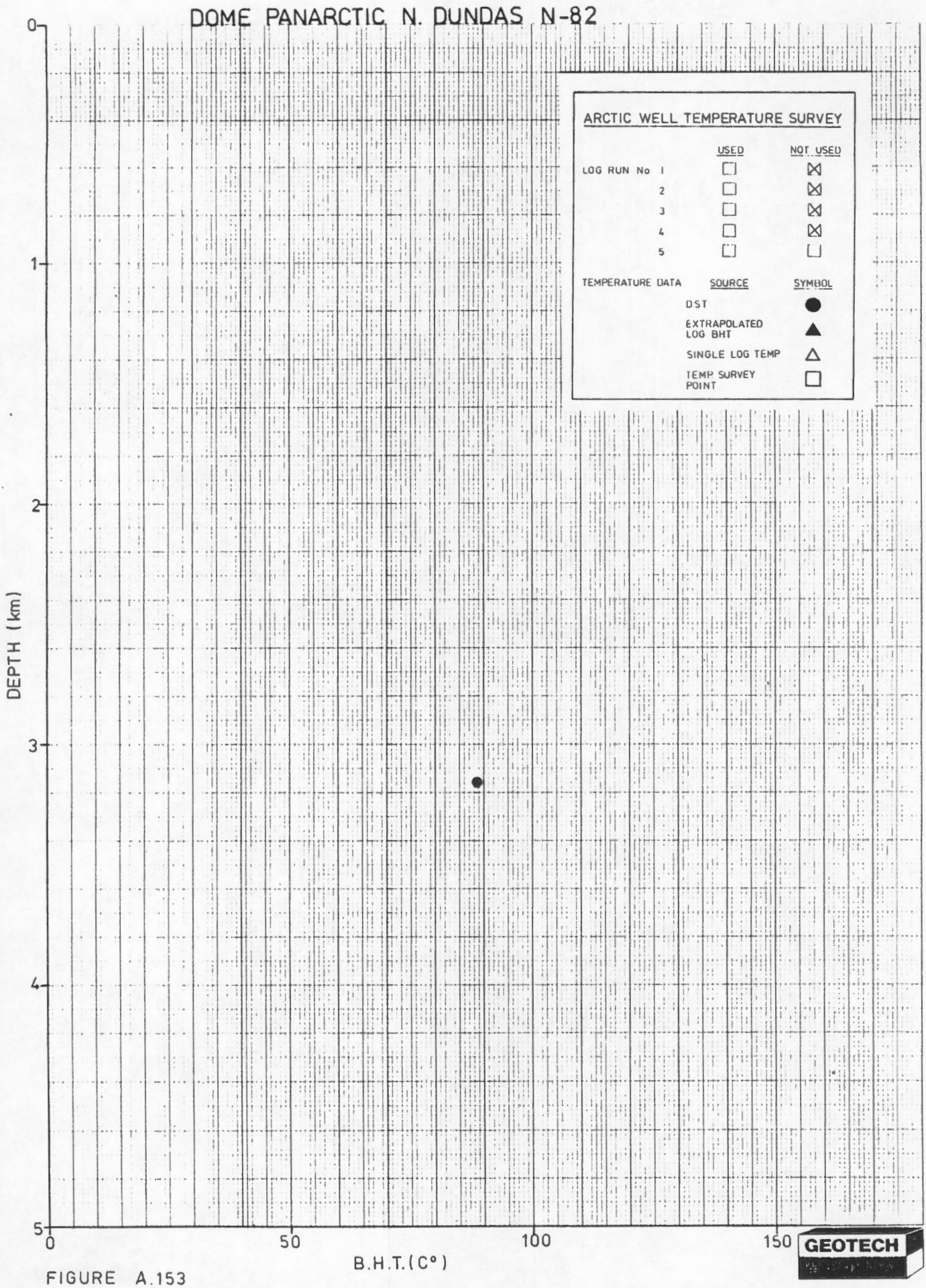


FIGURE A.153

46 1512

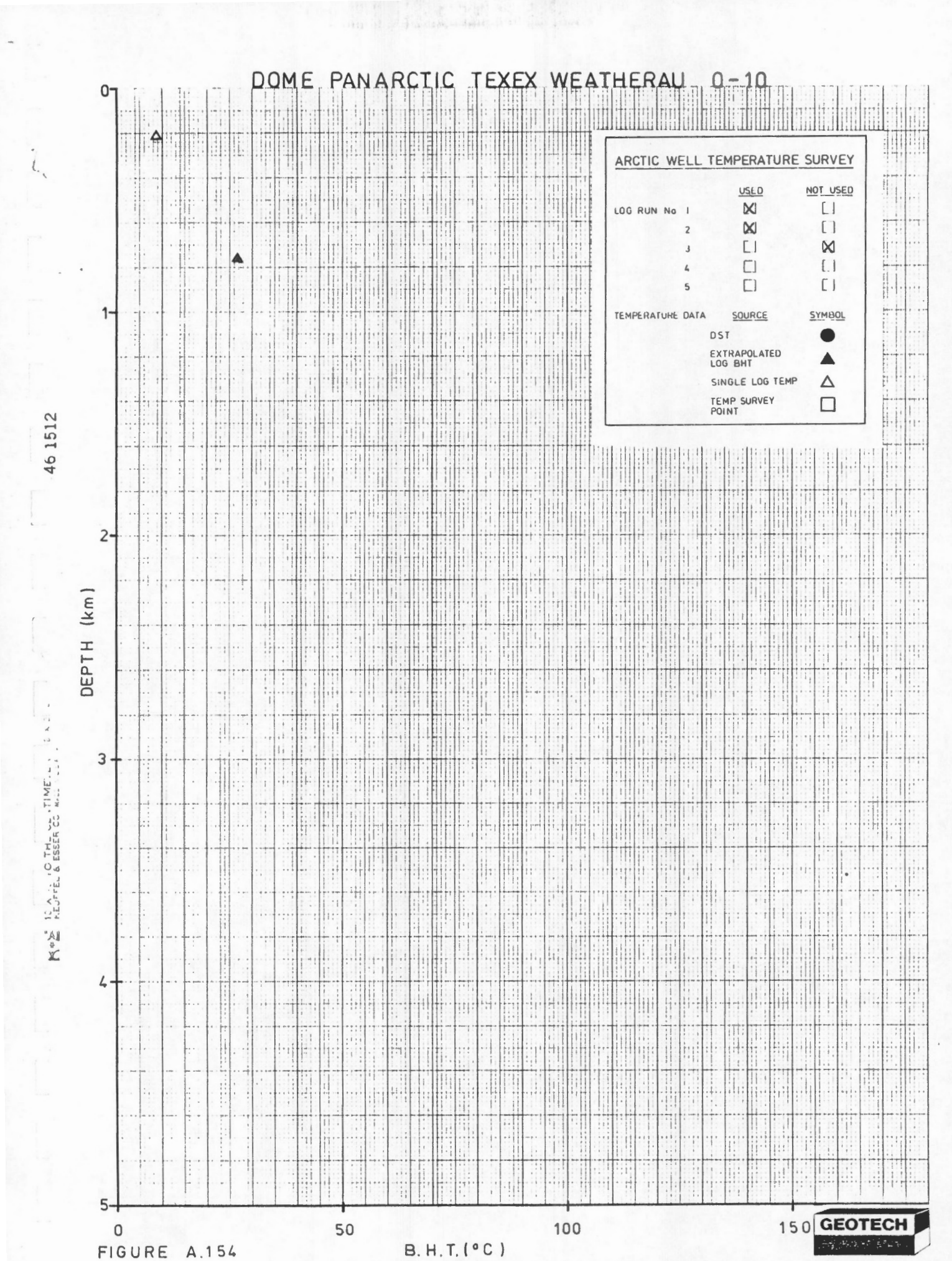

DOME PANARCTIC TEXEX WEATHERAU 0-10
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
46 1512
GEOTECH

FIGURE A.154

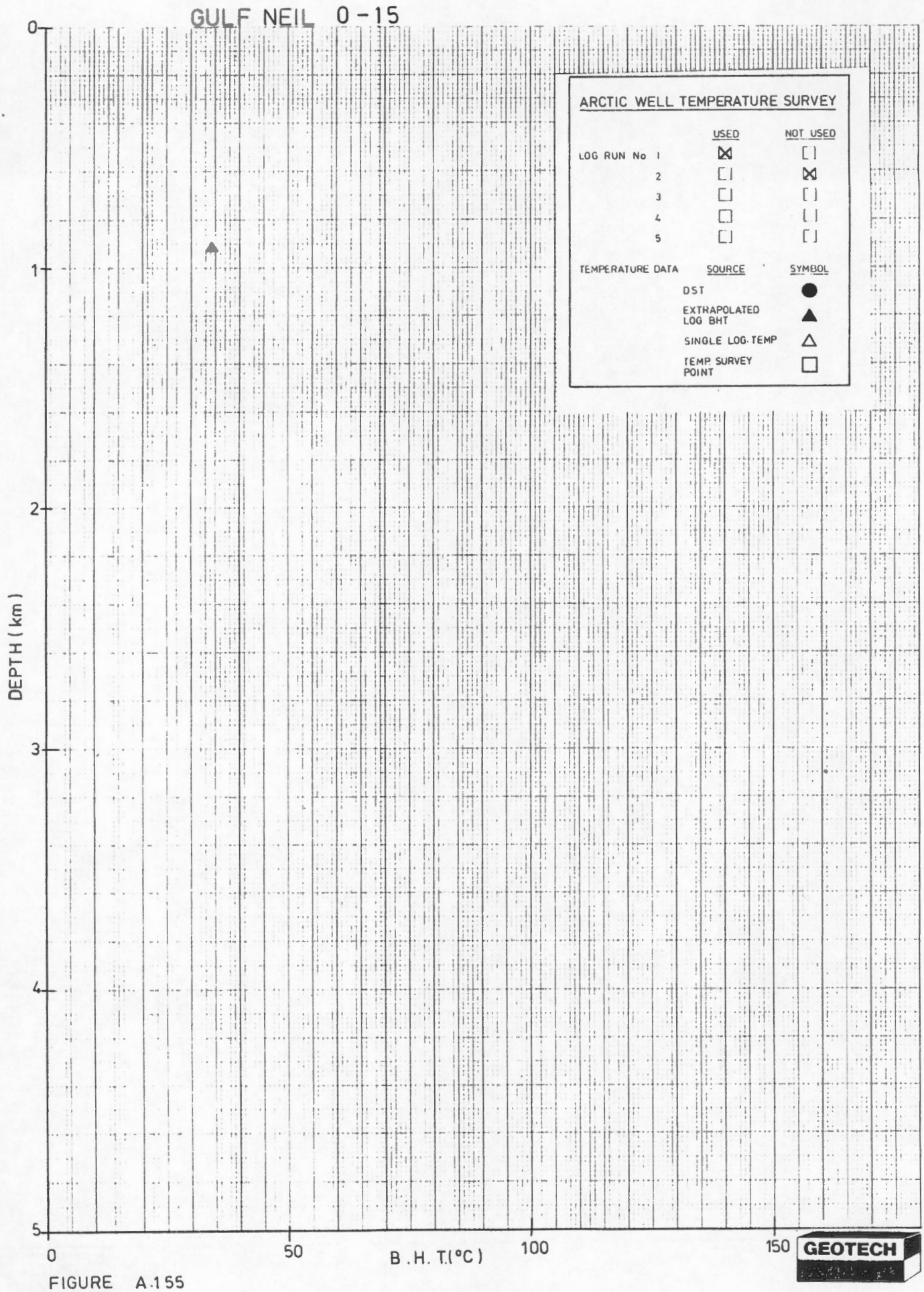


FIGURE A.155

46 1512
K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO

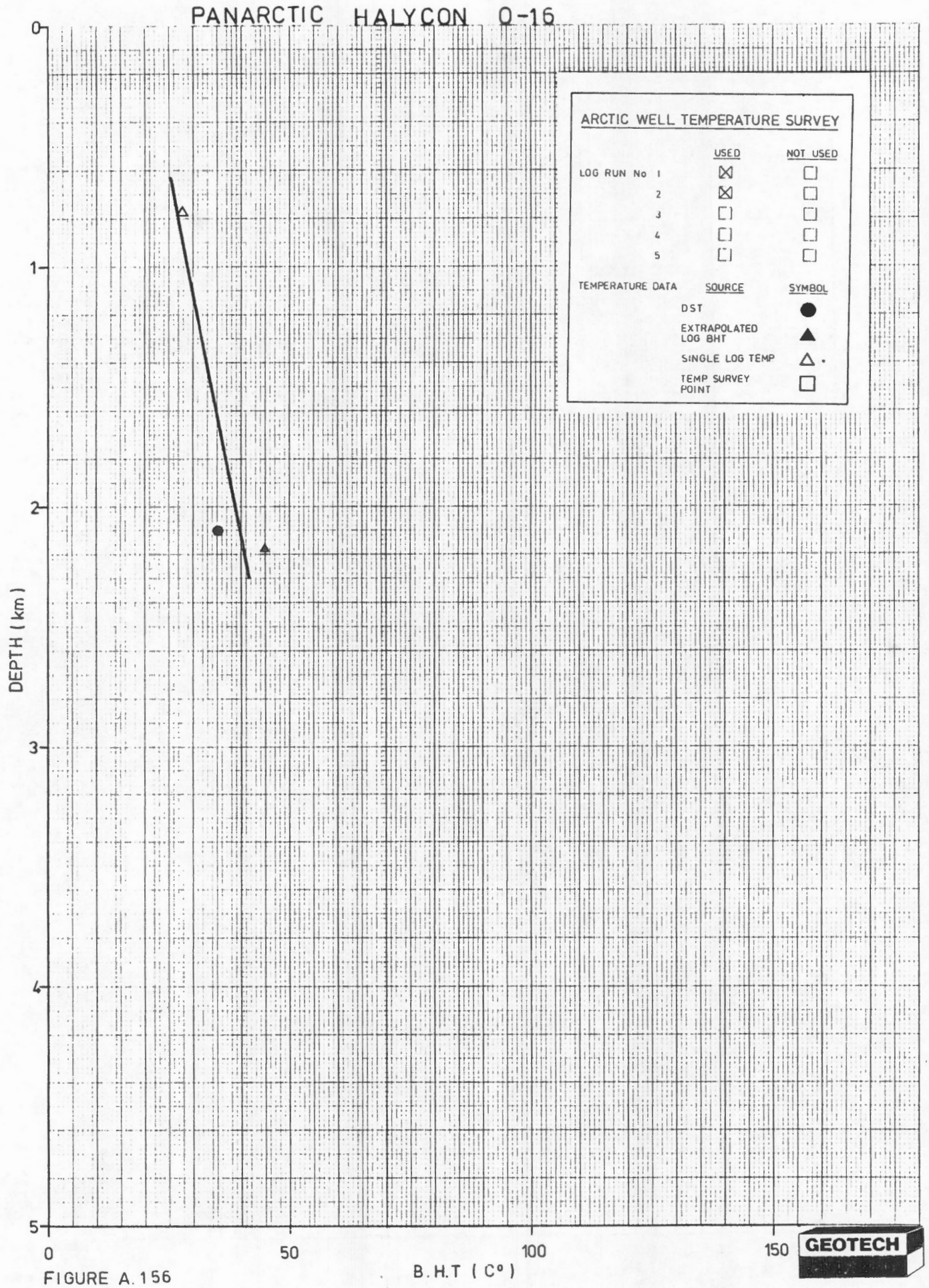

PANARCTIC HALYCON O-16
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T (C°)
GEOTECH

FIGURE A.156

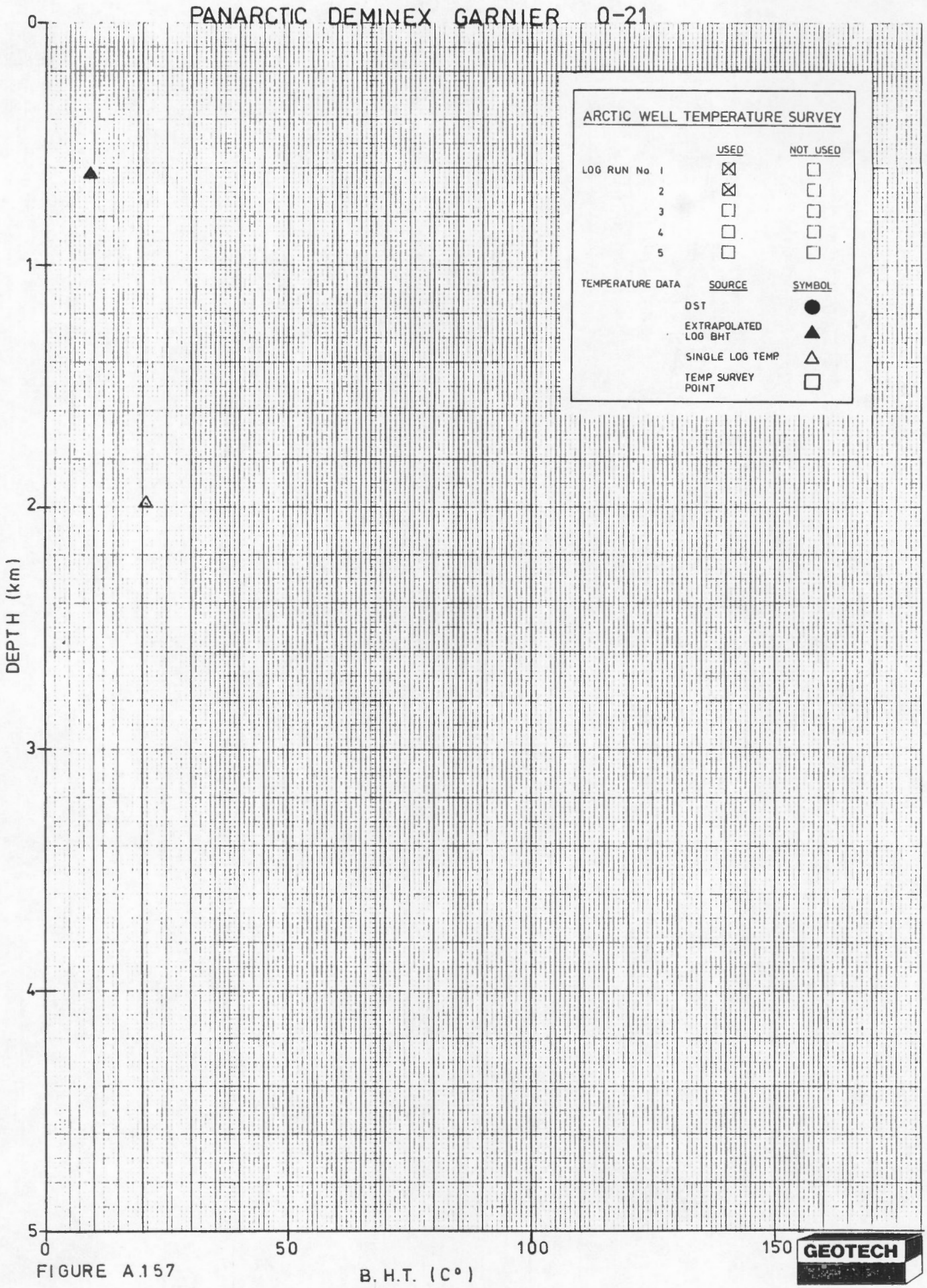

PANARCTIC DEMINEX GARNIER 0-21
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (C°)
46 1512

FIGURE A.157

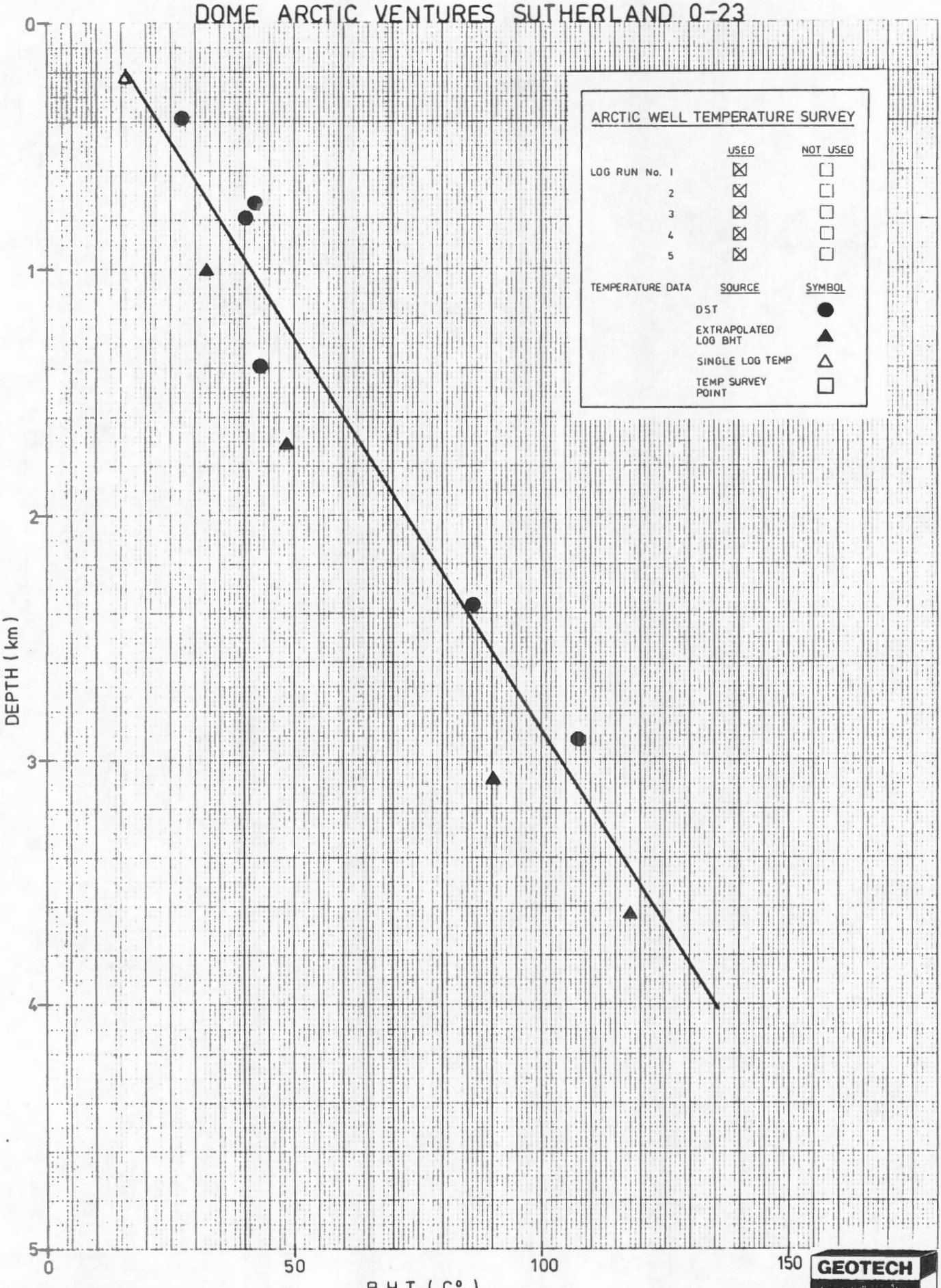

DOME ARCTIC VENTURES SUTHERLAND O-23
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE A.158

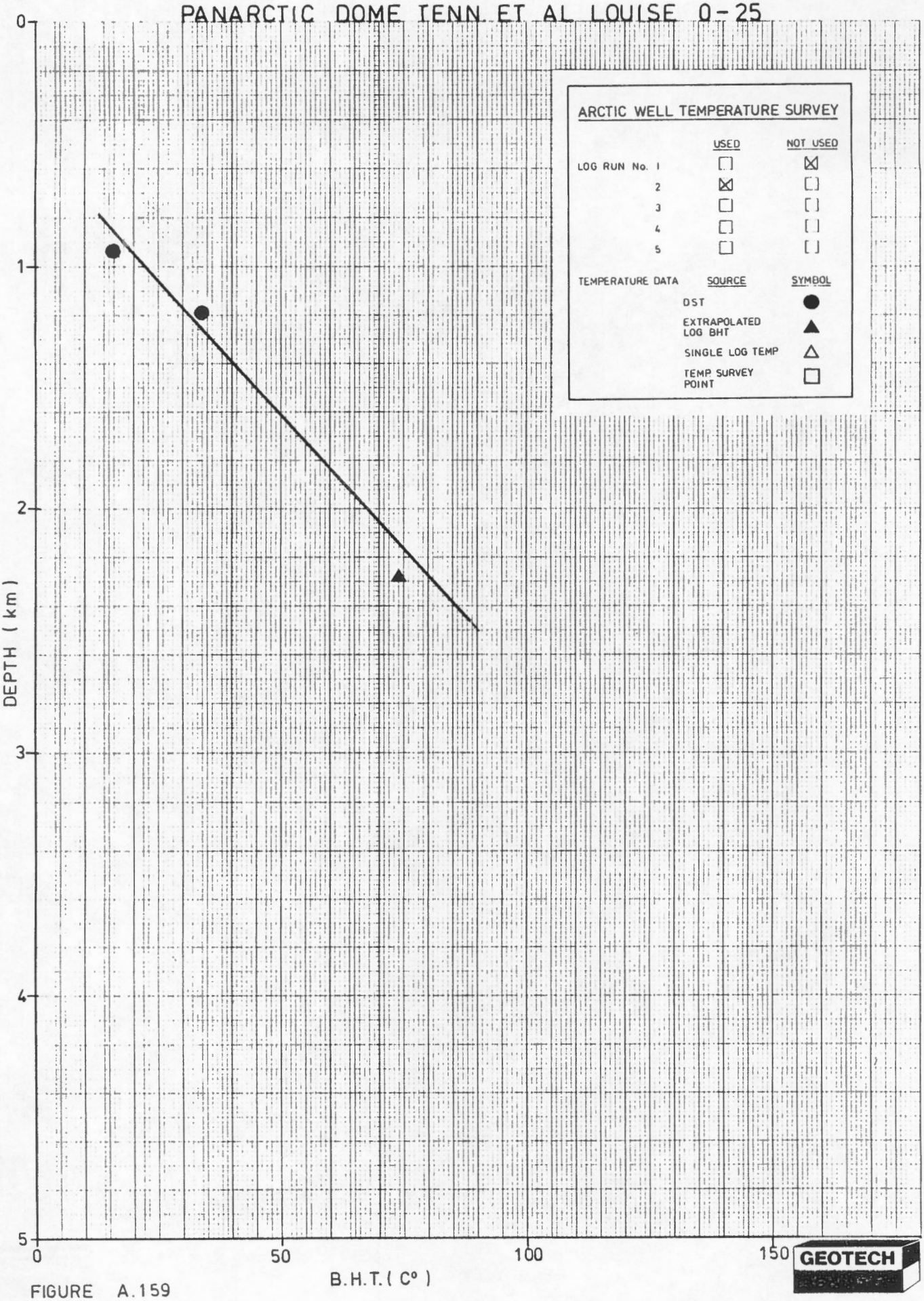

PANARCTIC DOME TENN ET AL LOUISE 0-25
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(C°)
GEOTECH

FIGURE A.159

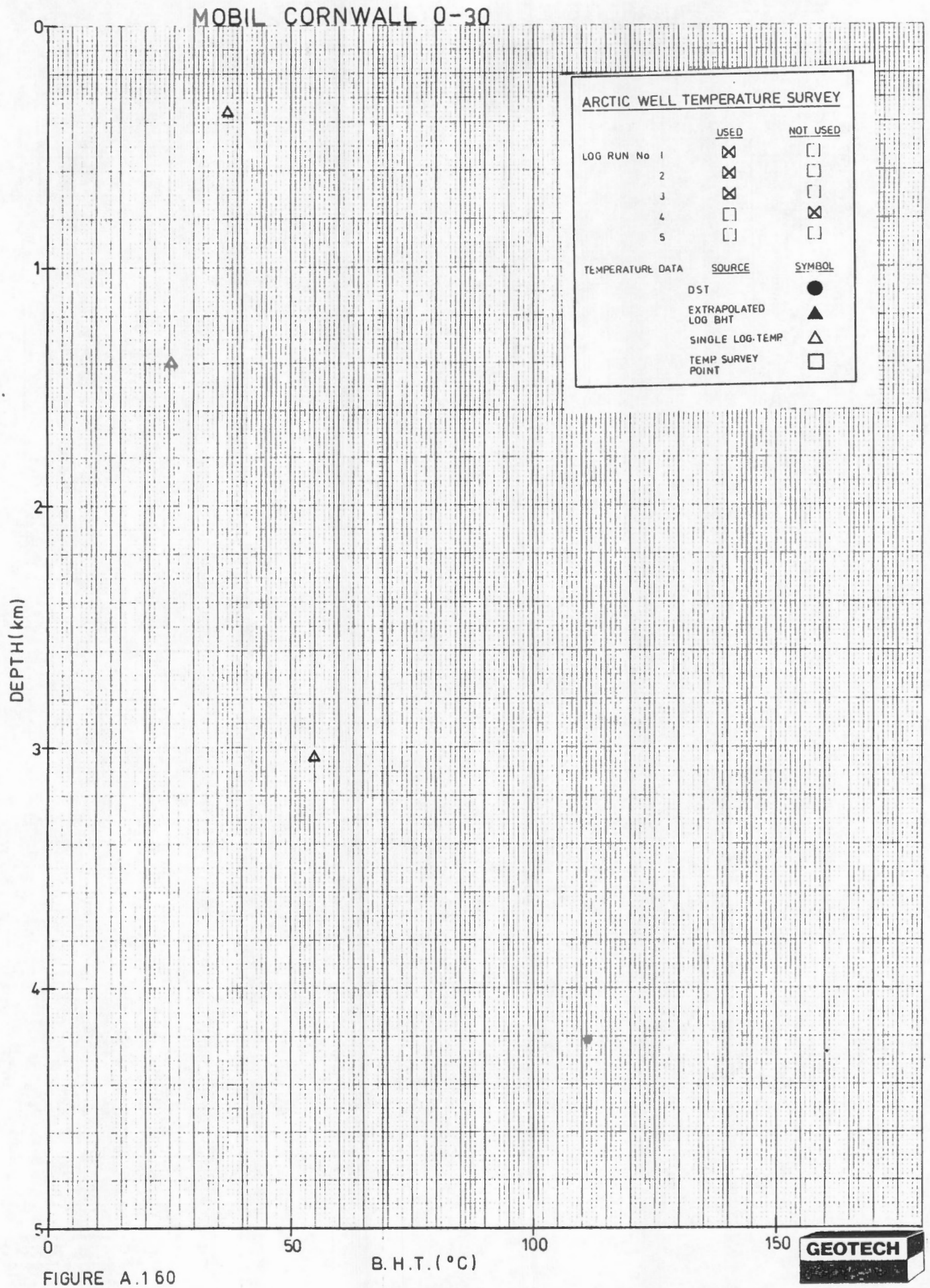


FIGURE A.160

46 1512
K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

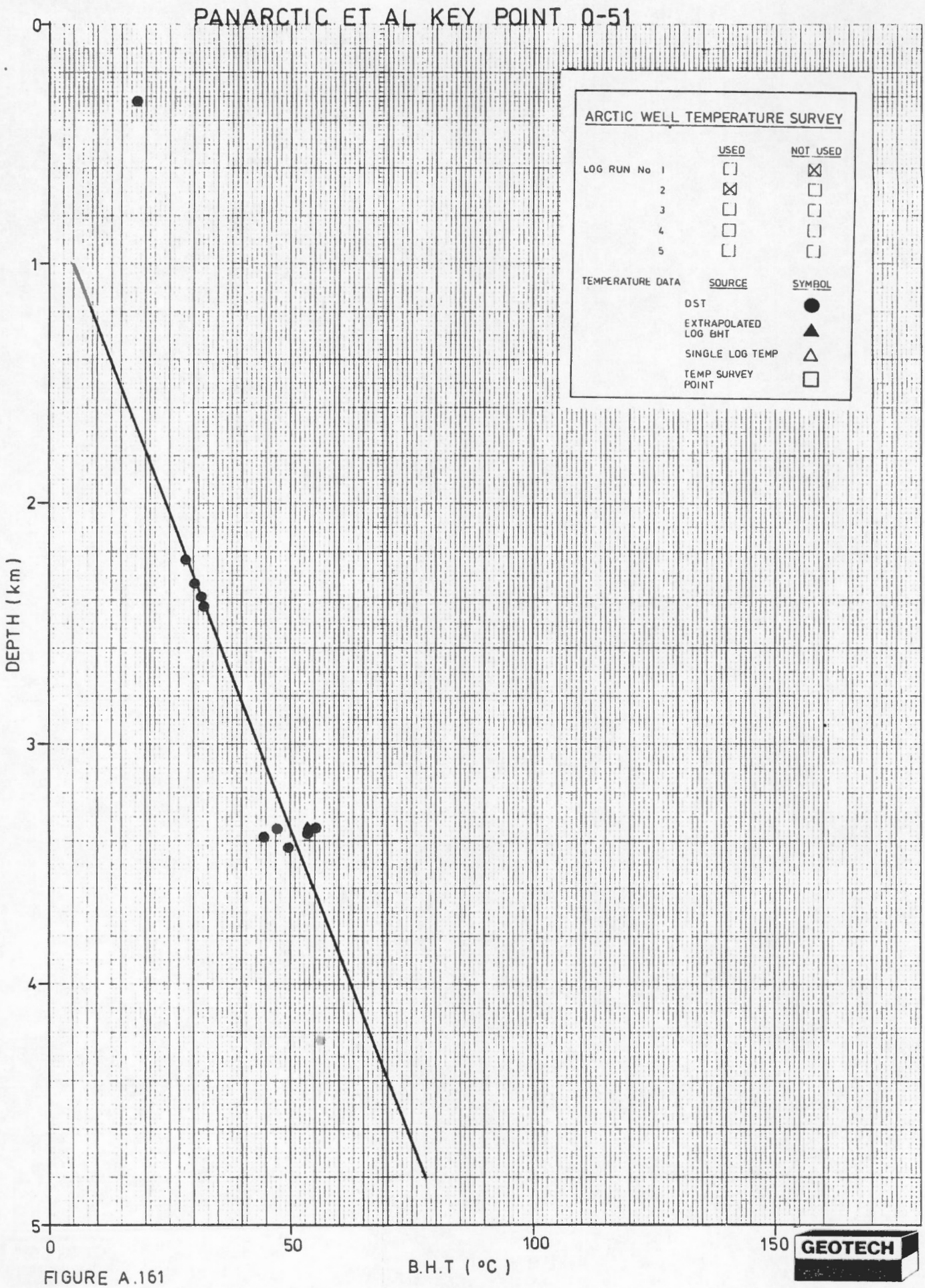


FIGURE A.161

46 1512

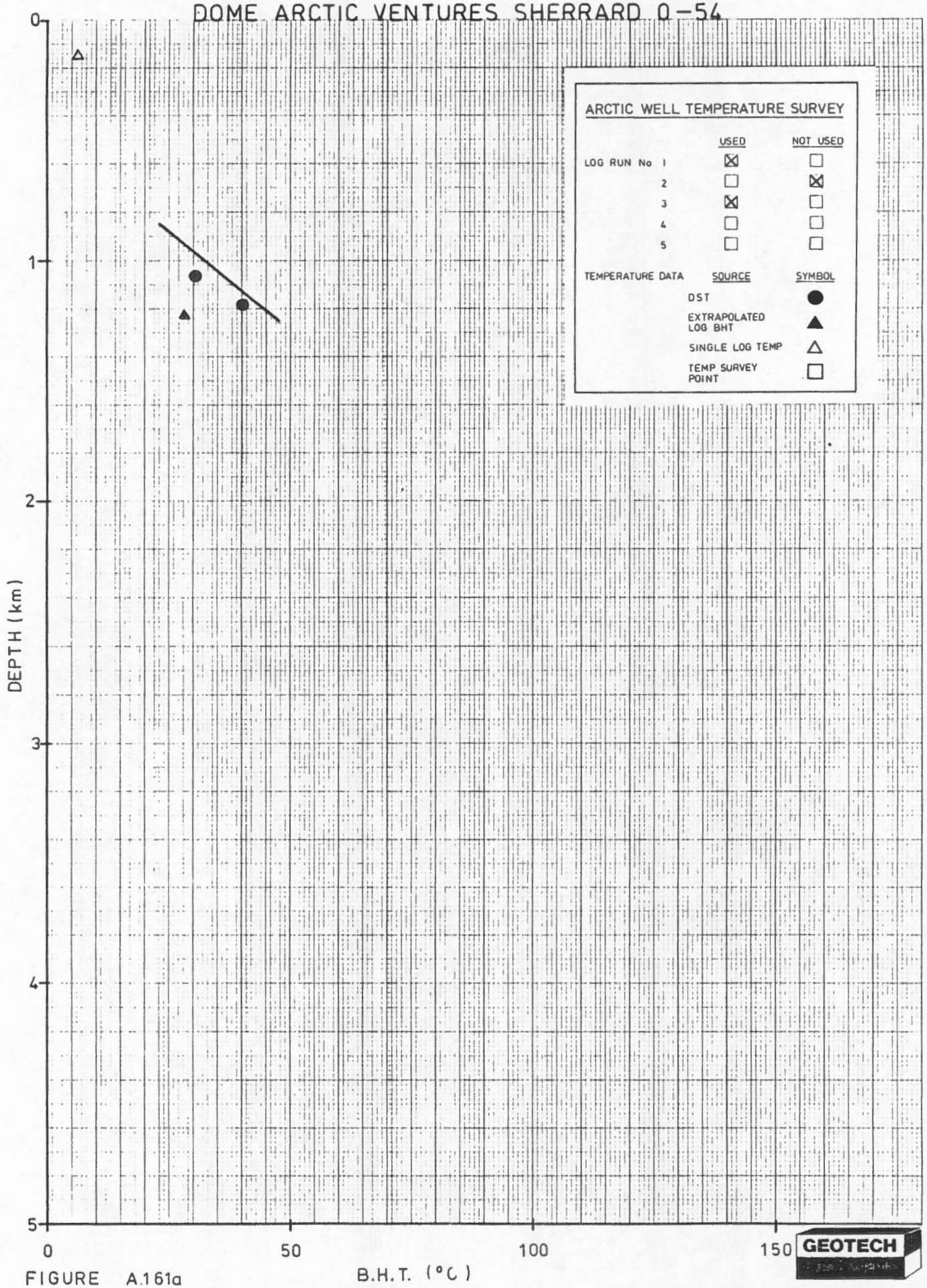
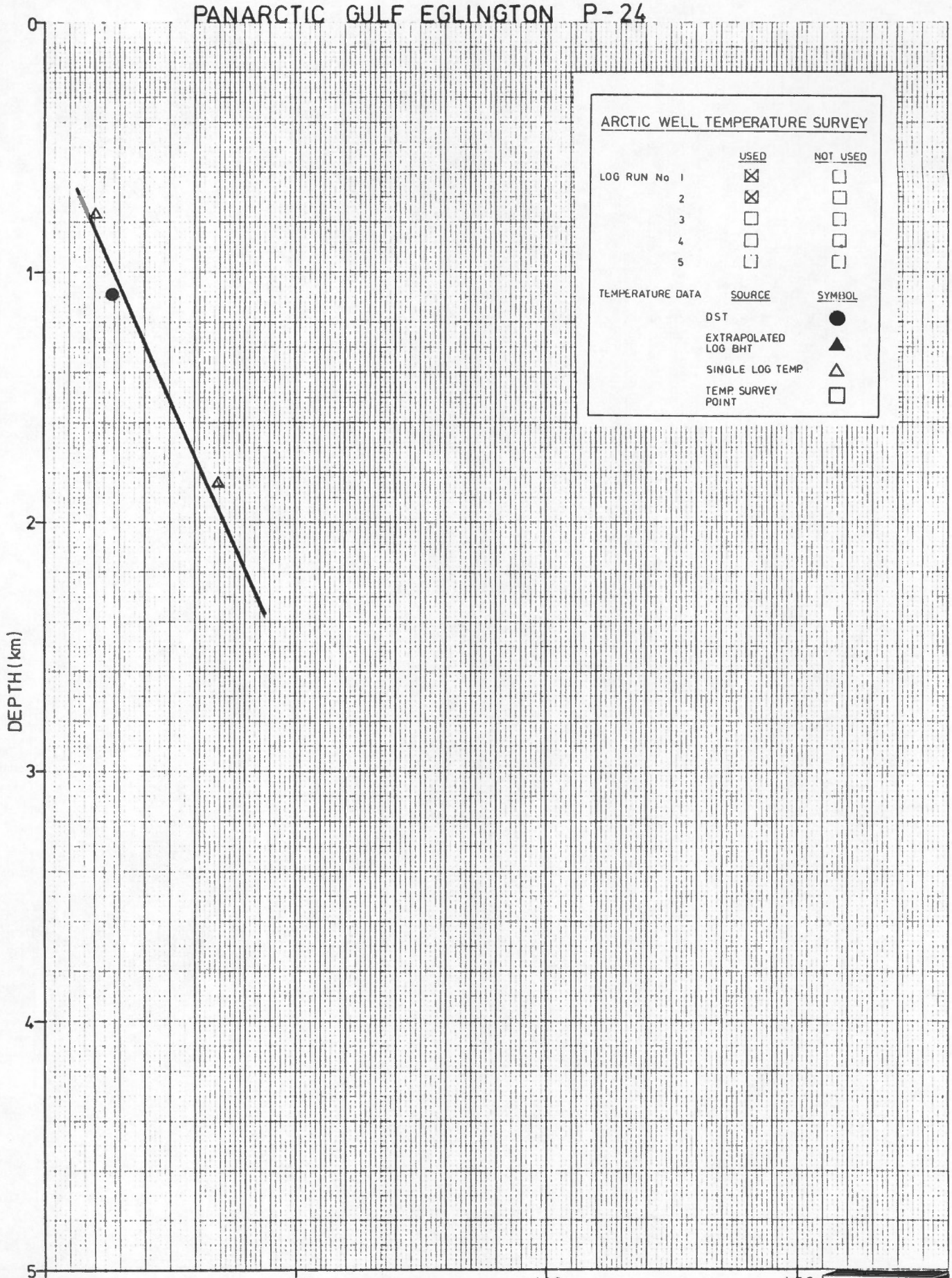


FIGURE A.161a

46 1512

PANARCTIC GULF EGLINGTON P-24



GEOTECH

FIGURE A.162

46 1512

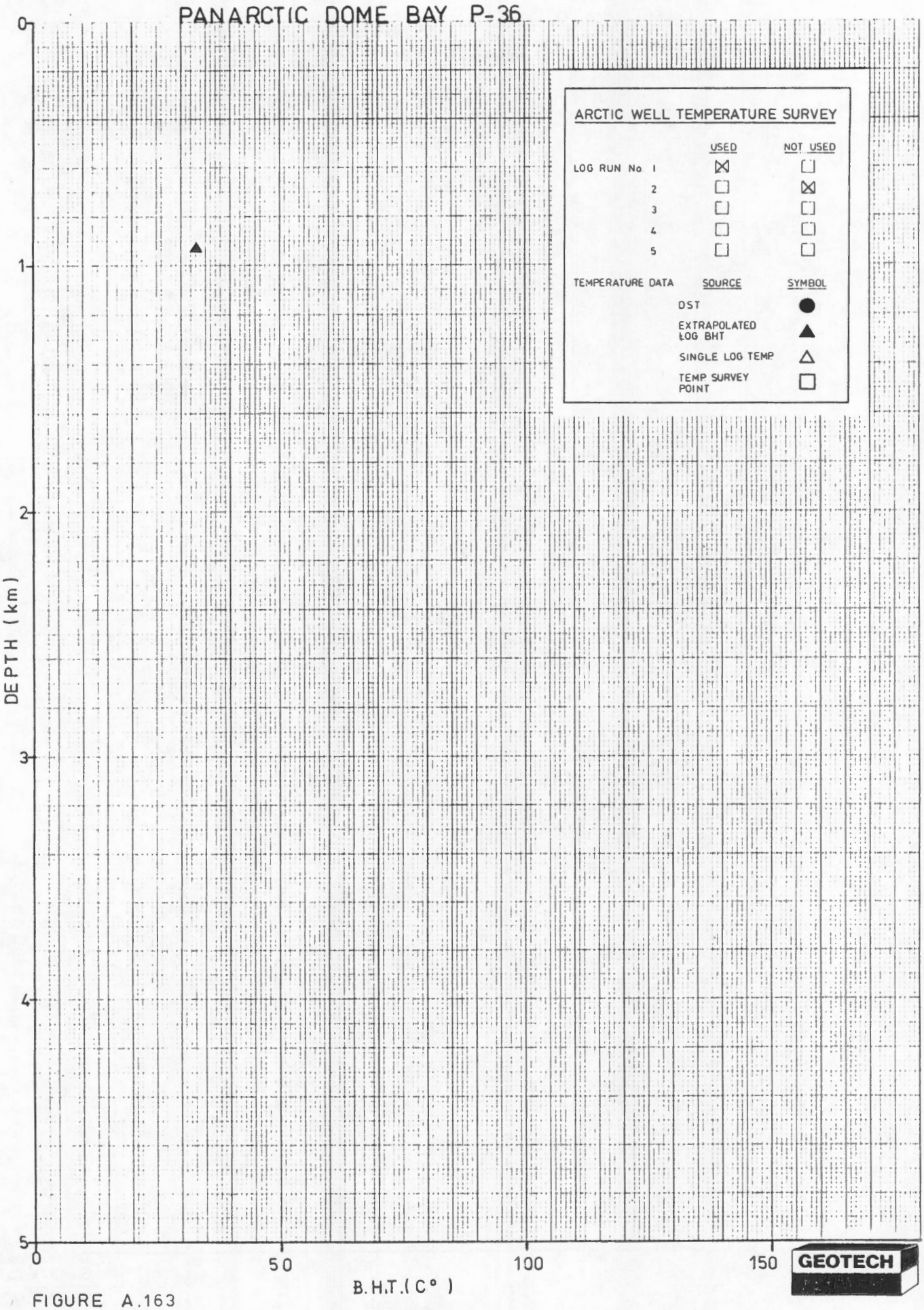

PANARCTIC DOME BAY P-36
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(C°)
GEOTECH

FIGURE A.163

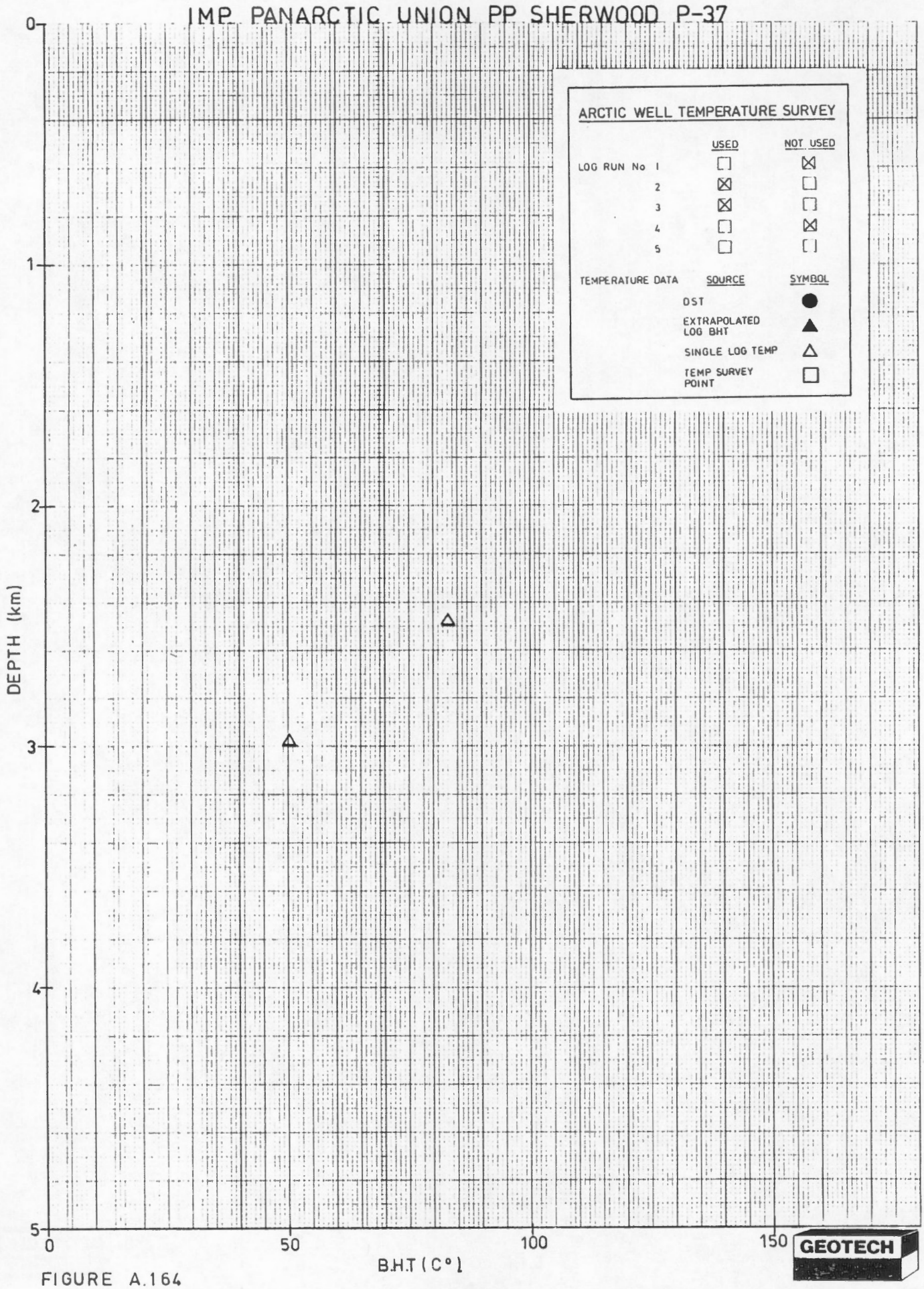


FIGURE A.164

46 1512

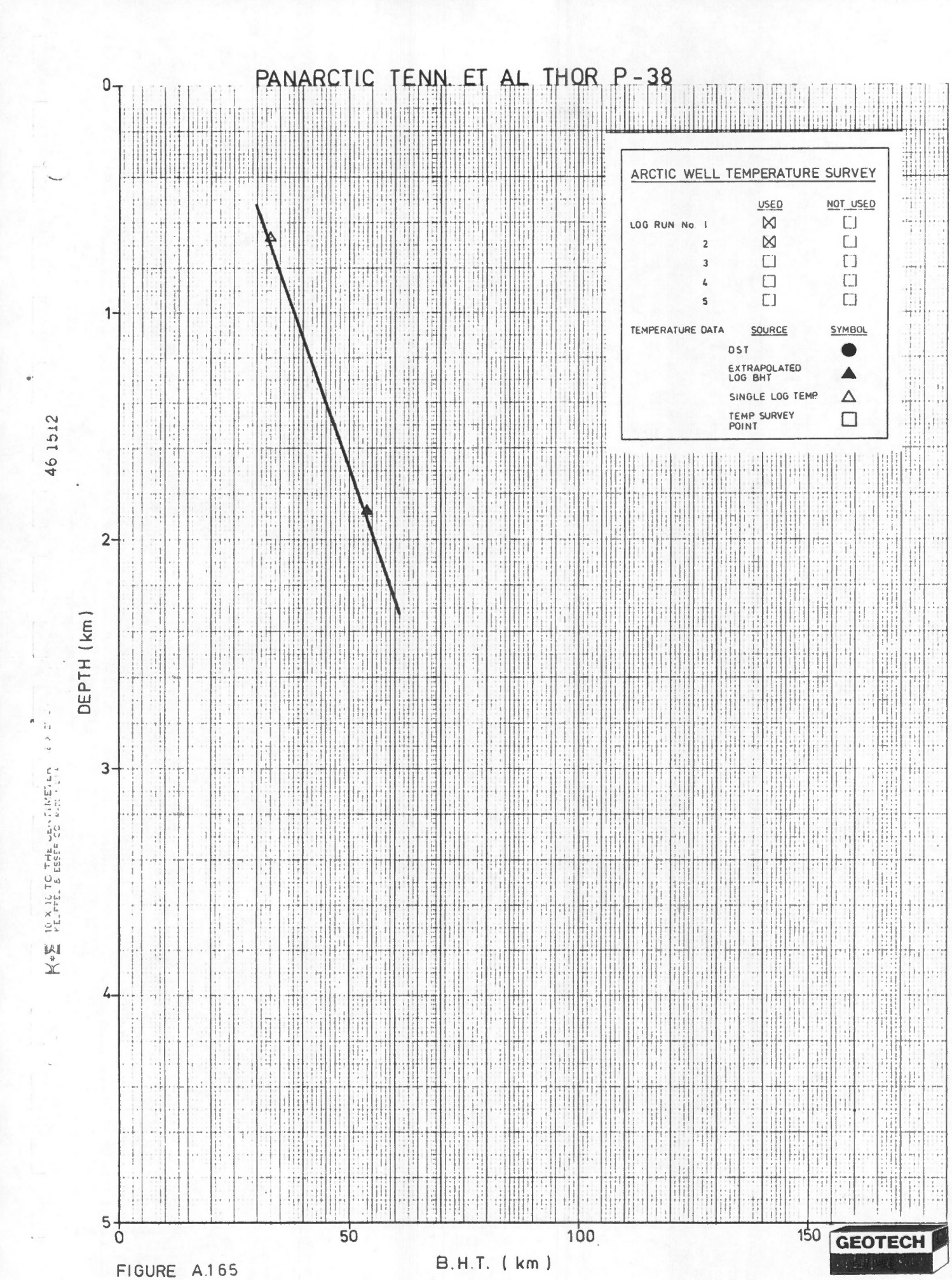

PANARCTIC TENN ET AL THOR P-38
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (km)
46 1512
GEOTECH

FIGURE A.165

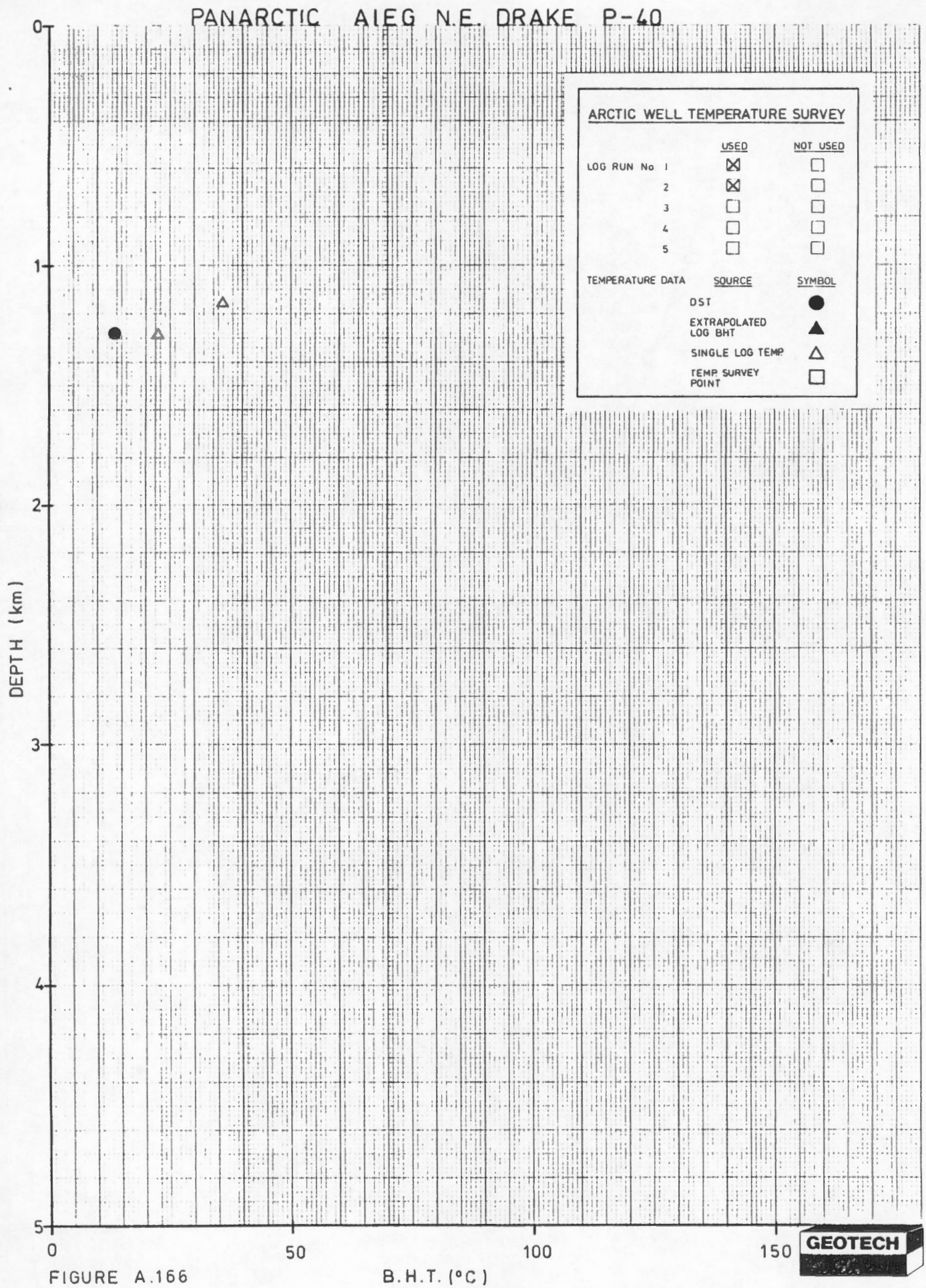

PANARCTIC AIEG N.E. DRAKE P-40
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE A.166

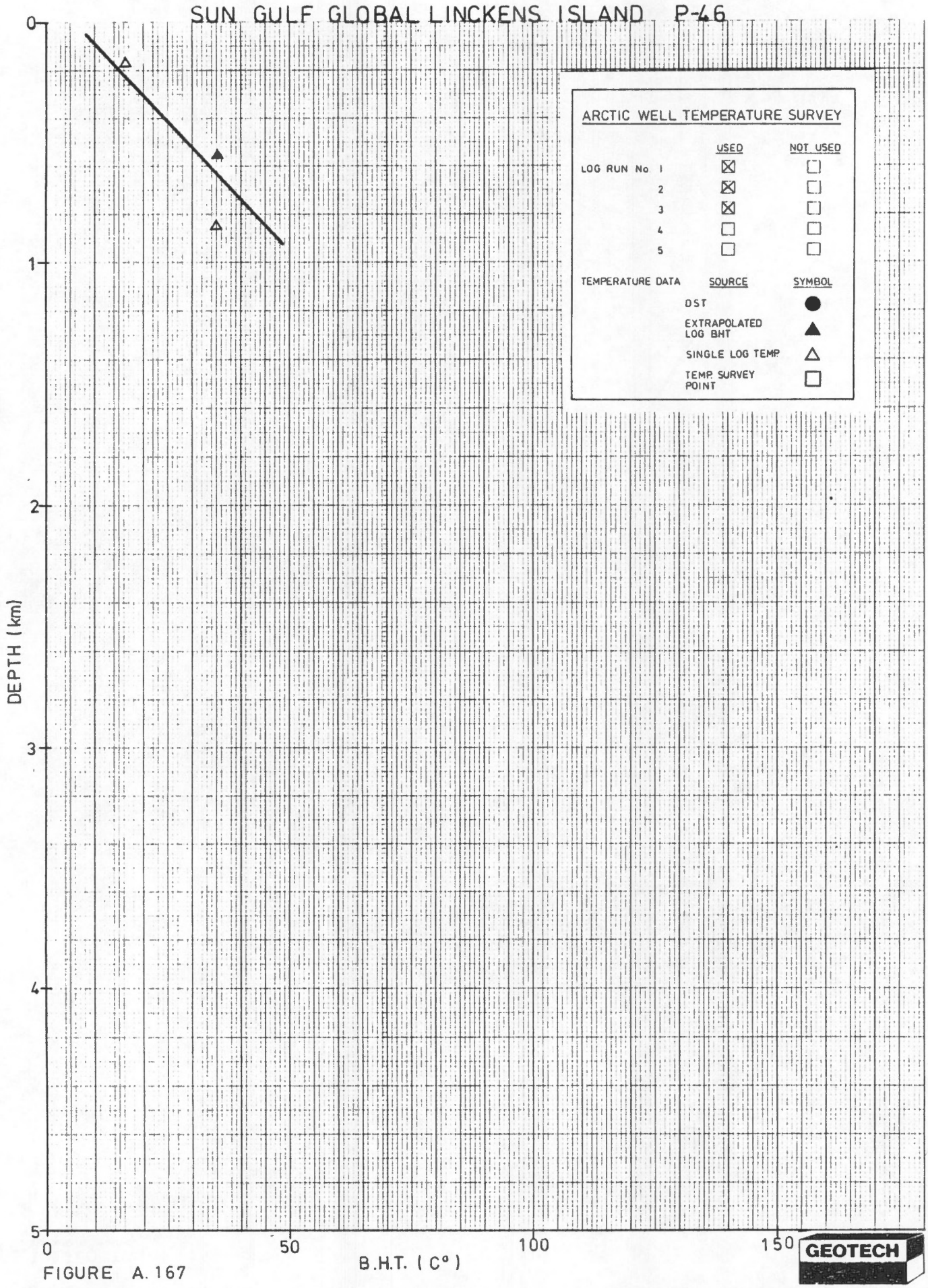

SUN GULF GLOBAL LINCKENS ISLAND P-46
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE A.167

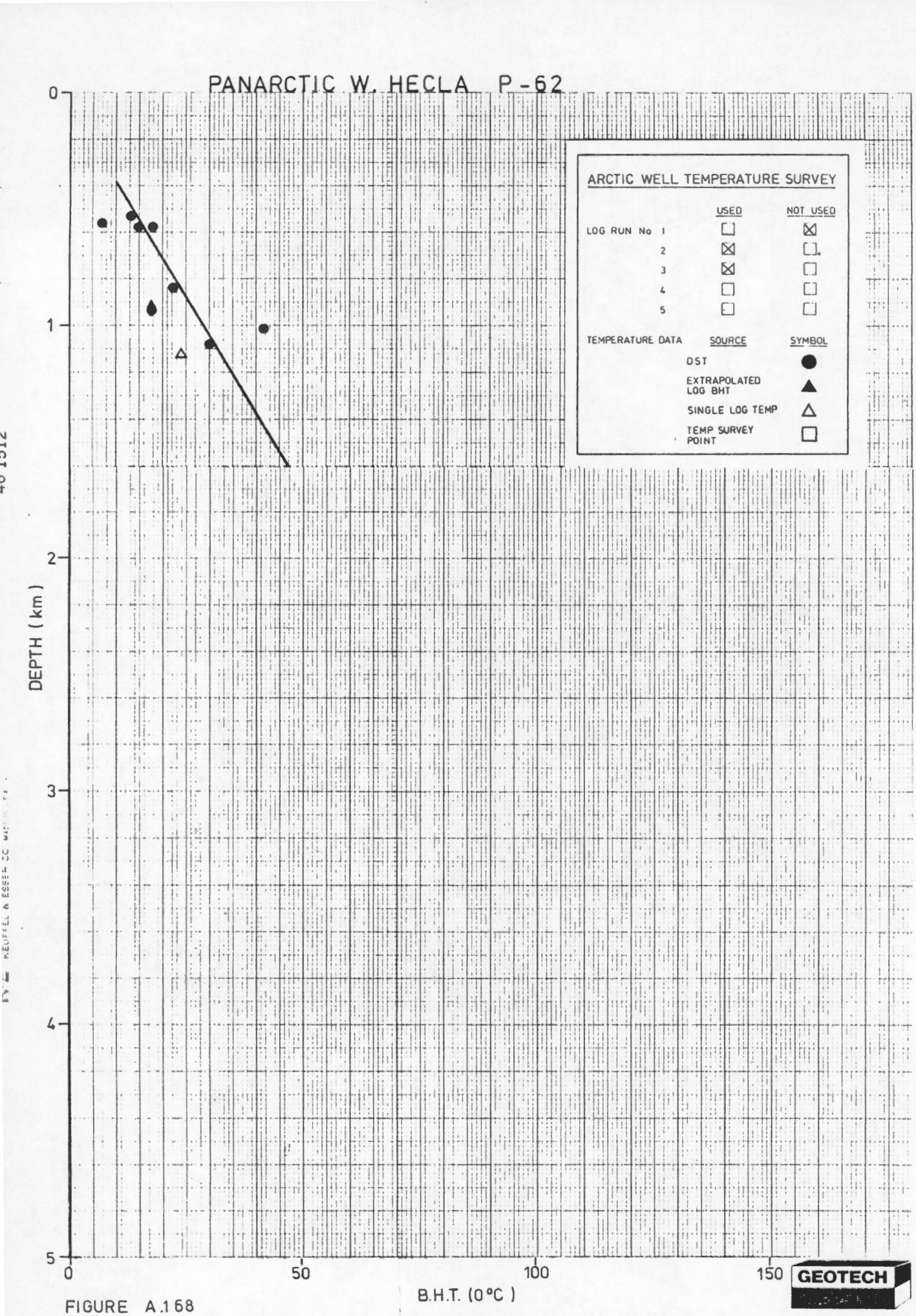

PANARCTIC W. HECLA P-62
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (0°C)
GEOTECH

FIGURE A.168

APPENDIX B

TEMPERATURE - DEPTH PLOTS

STUDY AREA 2

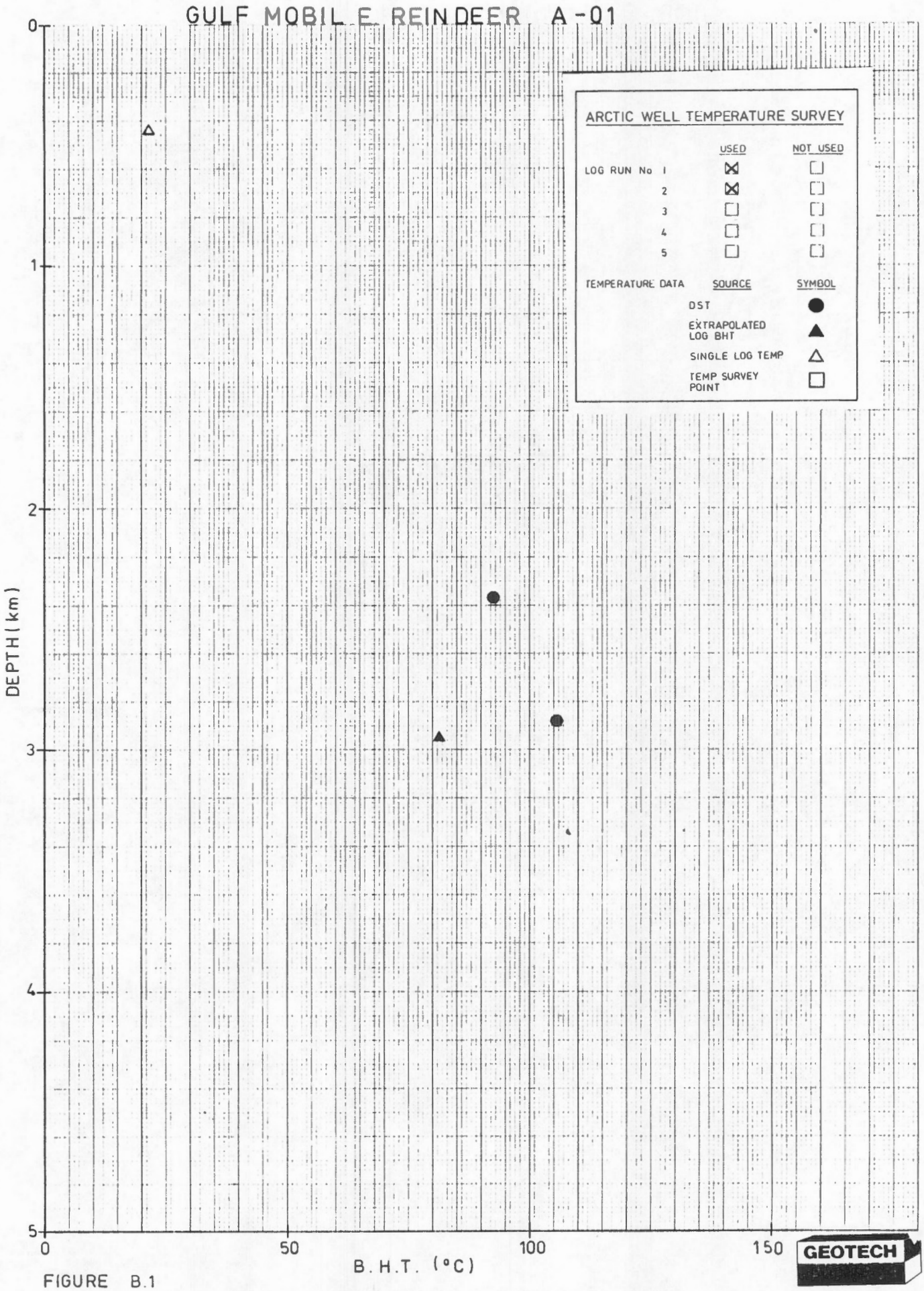


FIGURE B.1

46 1512
K+E 10 X 10 TO THE CENTIMETER

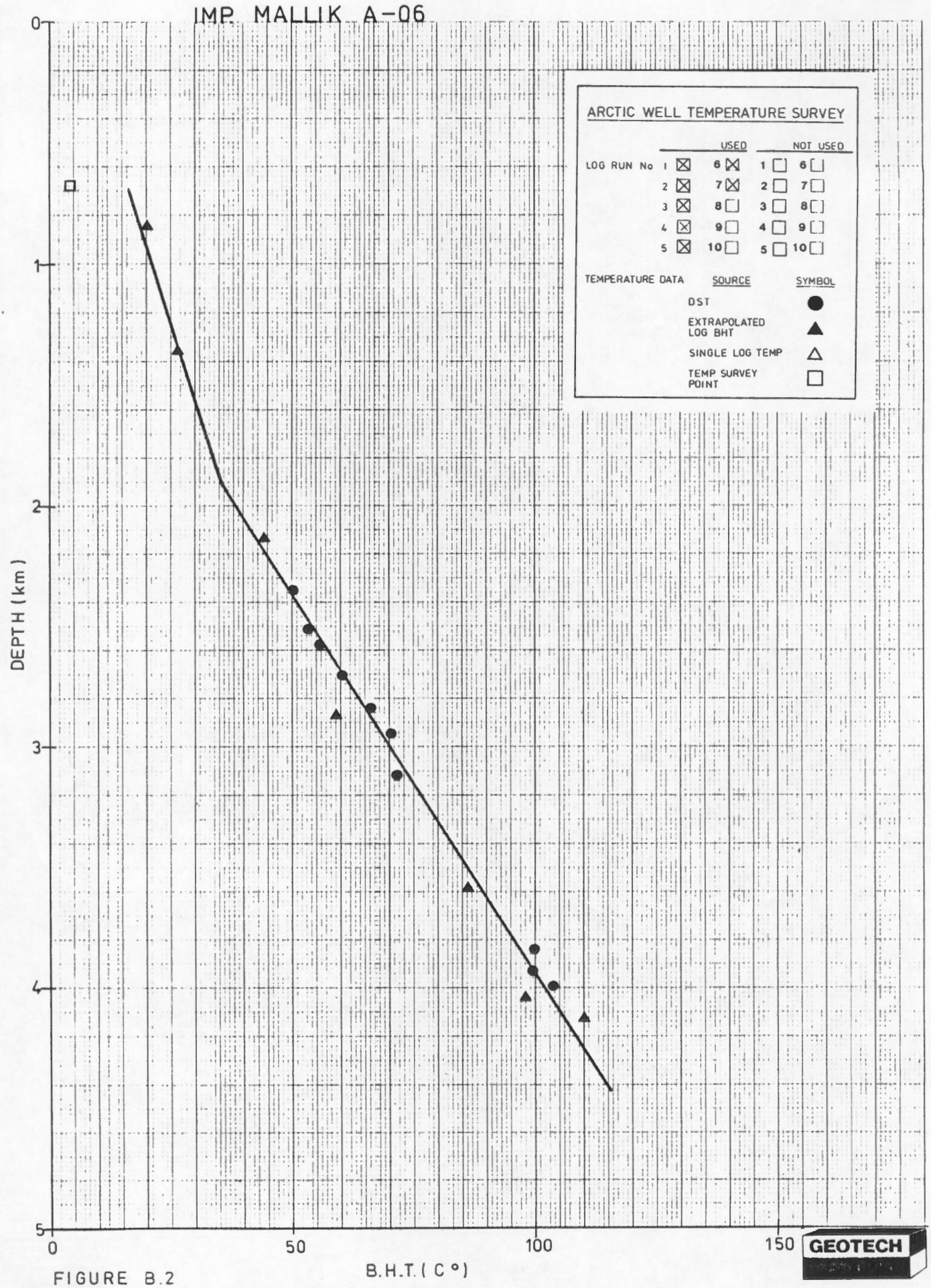


FIGURE B.2

46 1512

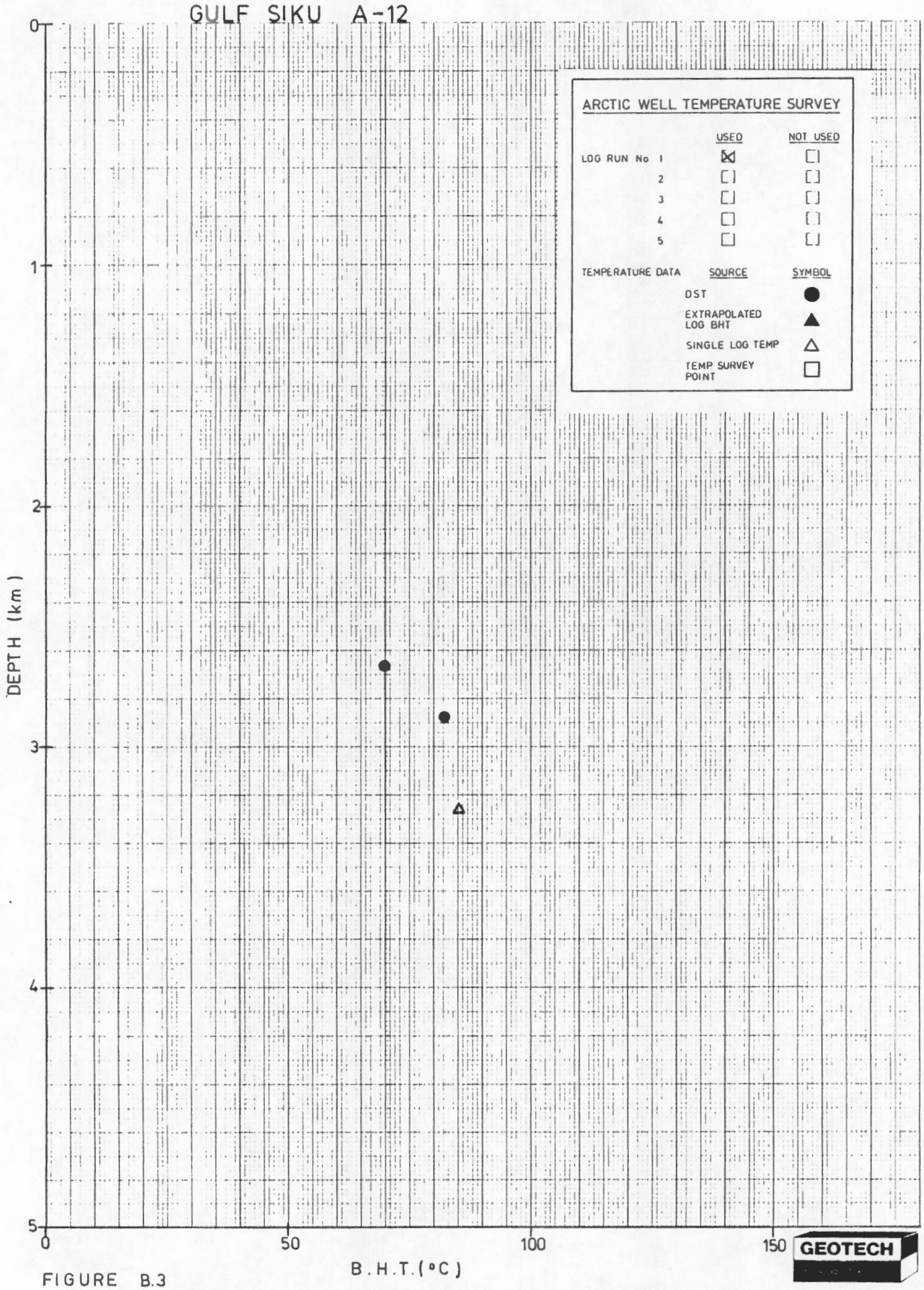

GULF SIKU A-12
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE B.3

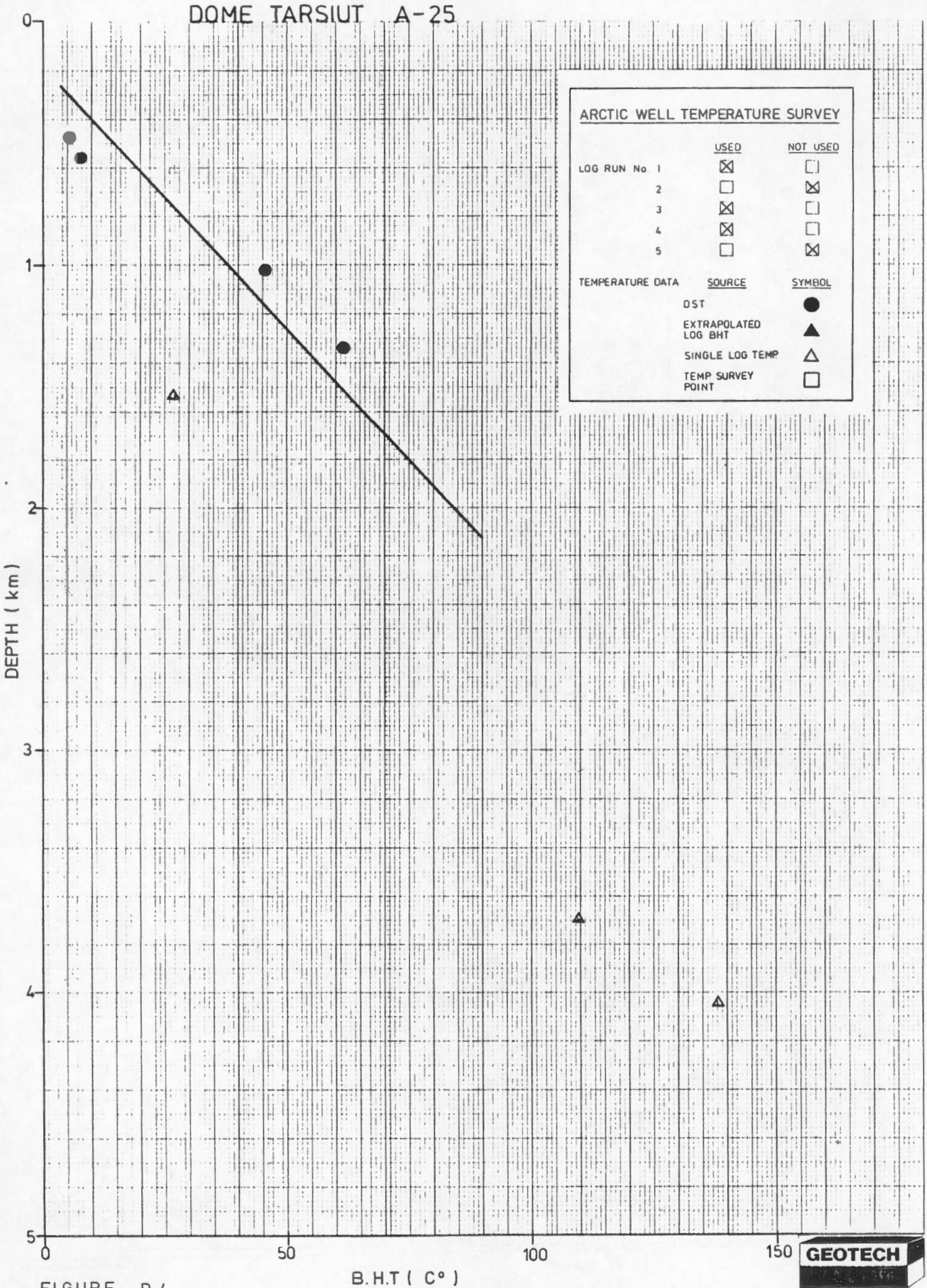

DOME TARSIUT A-25
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T (C°)
GEOTECH

FIGURE B.4

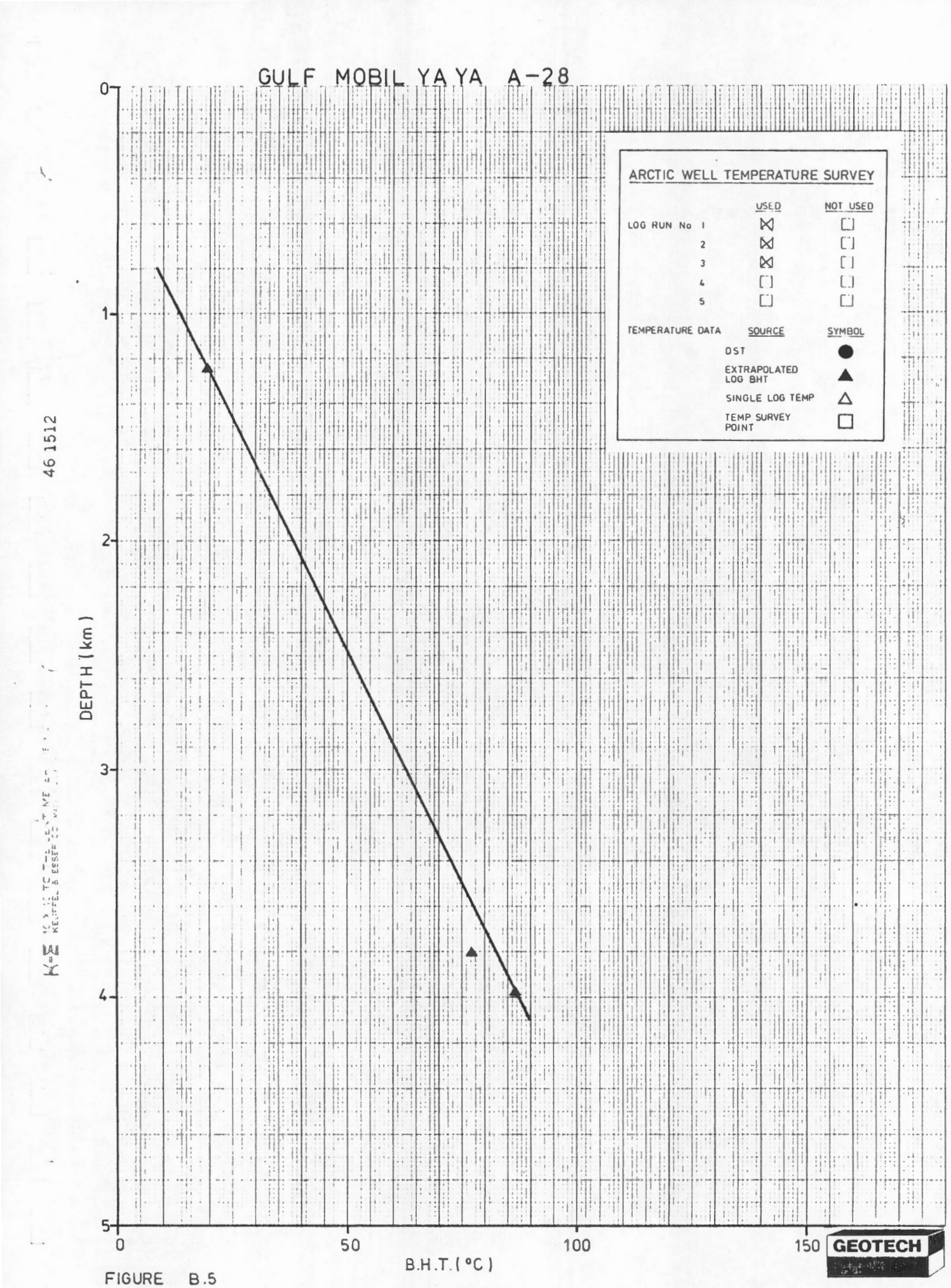

GULF MOBIL YA YA A-28
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.5

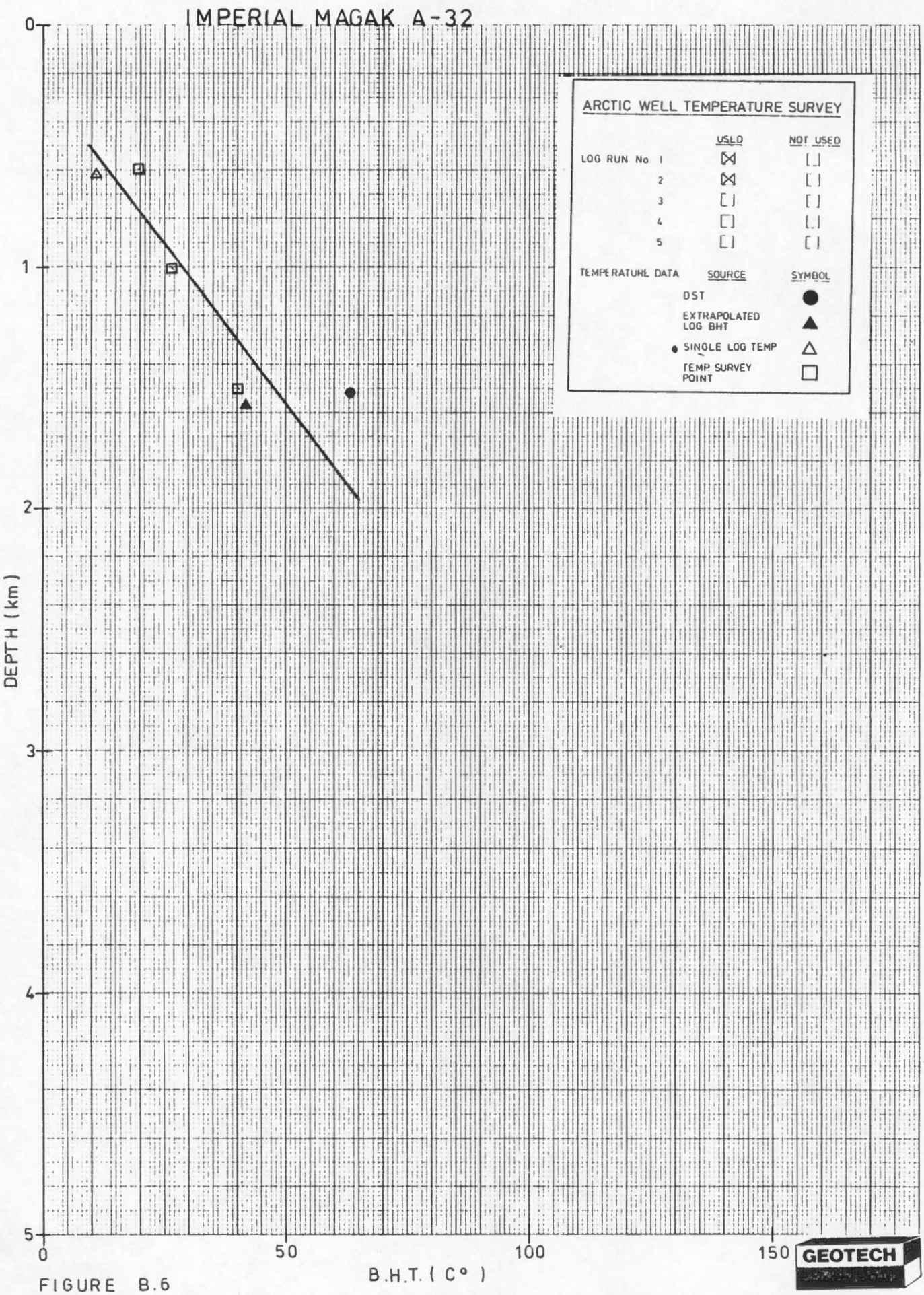


FIGURE B.6

46 1512
K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO MADE IN U.S.A.

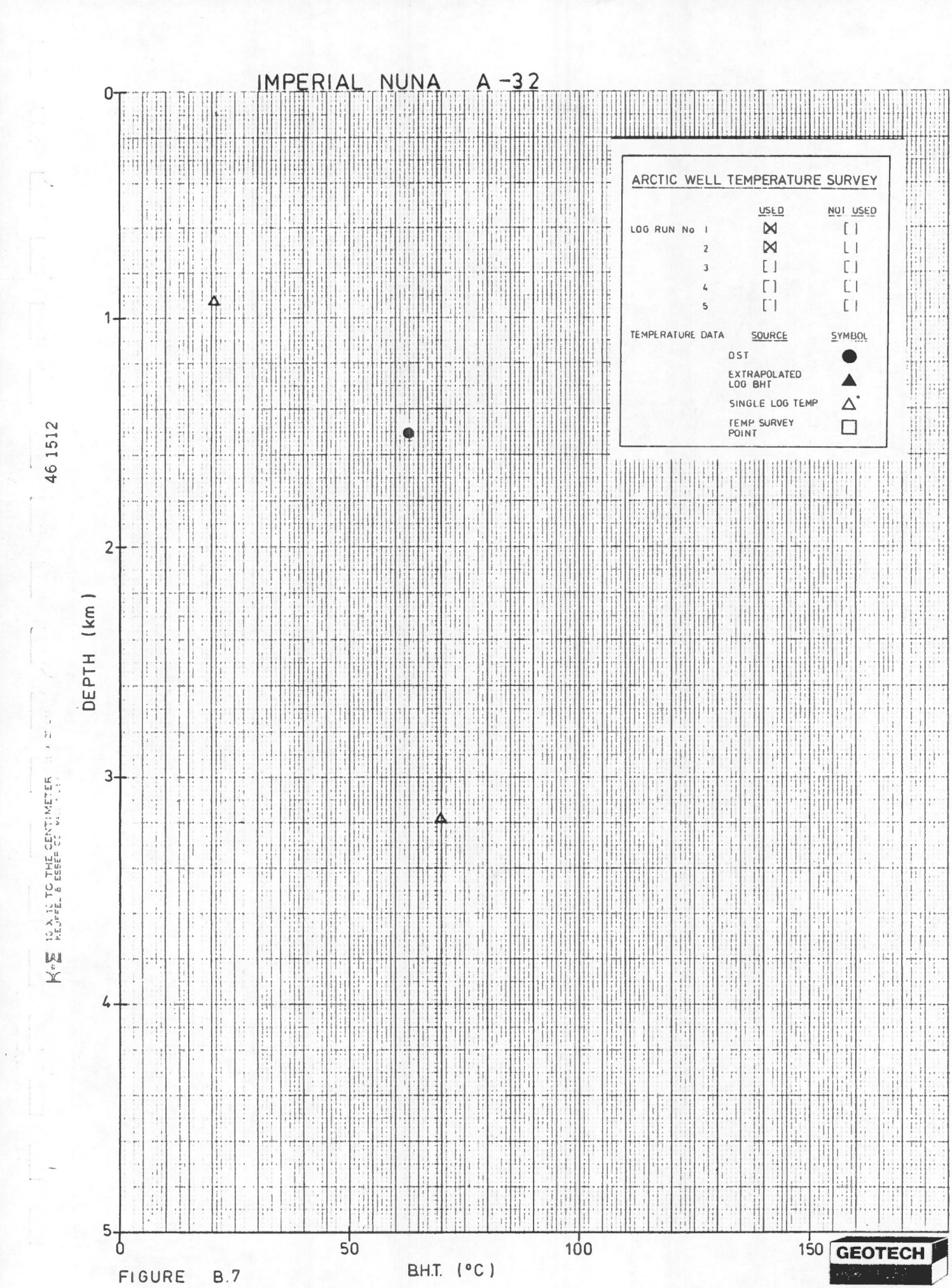

IMPERIAL NUNA A-32
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
GEOTECH

FIGURE B.7

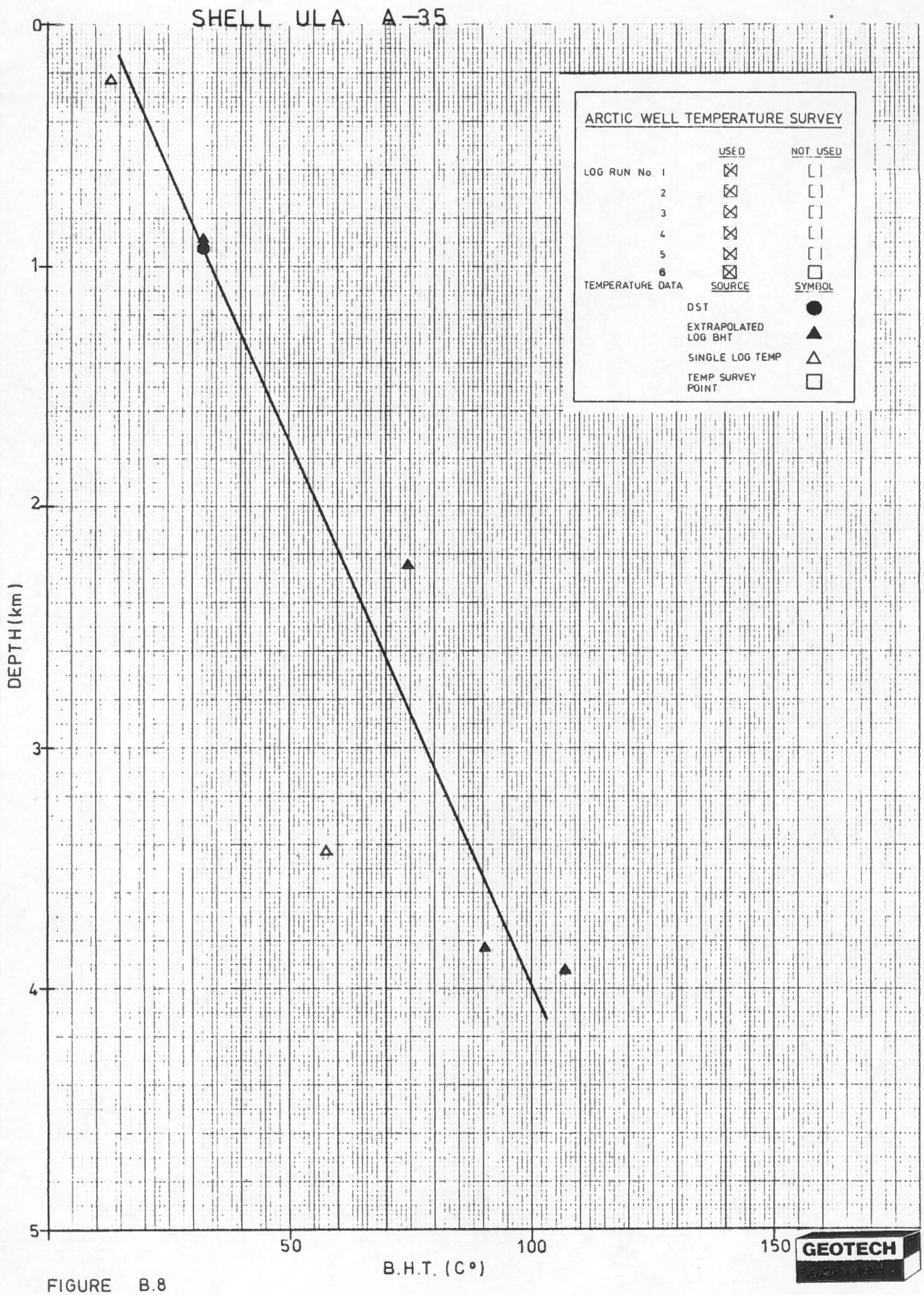

SHELL ULA A-35
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
6
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.8

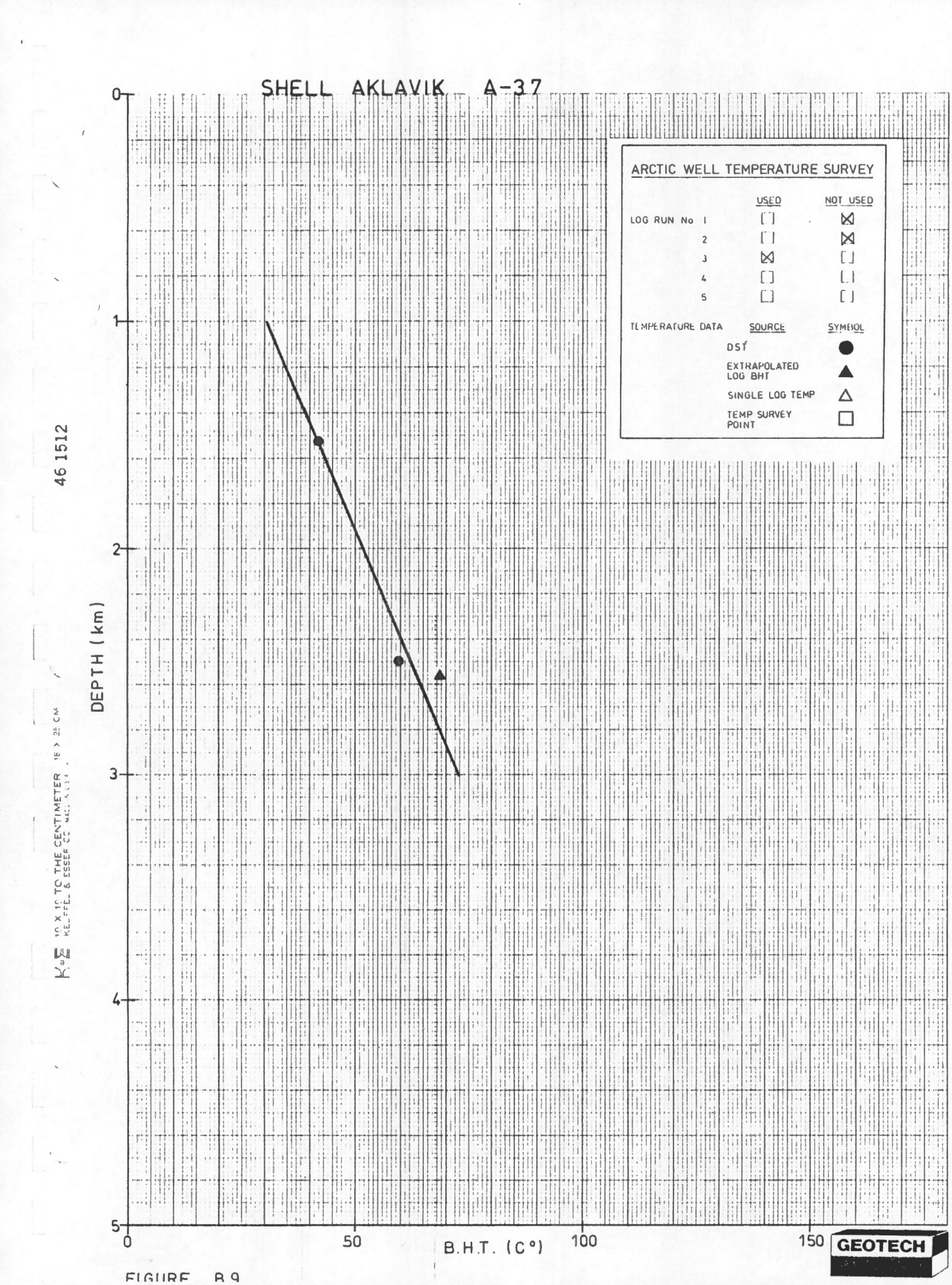

SHELL AKLAVIK A-37
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE B.9

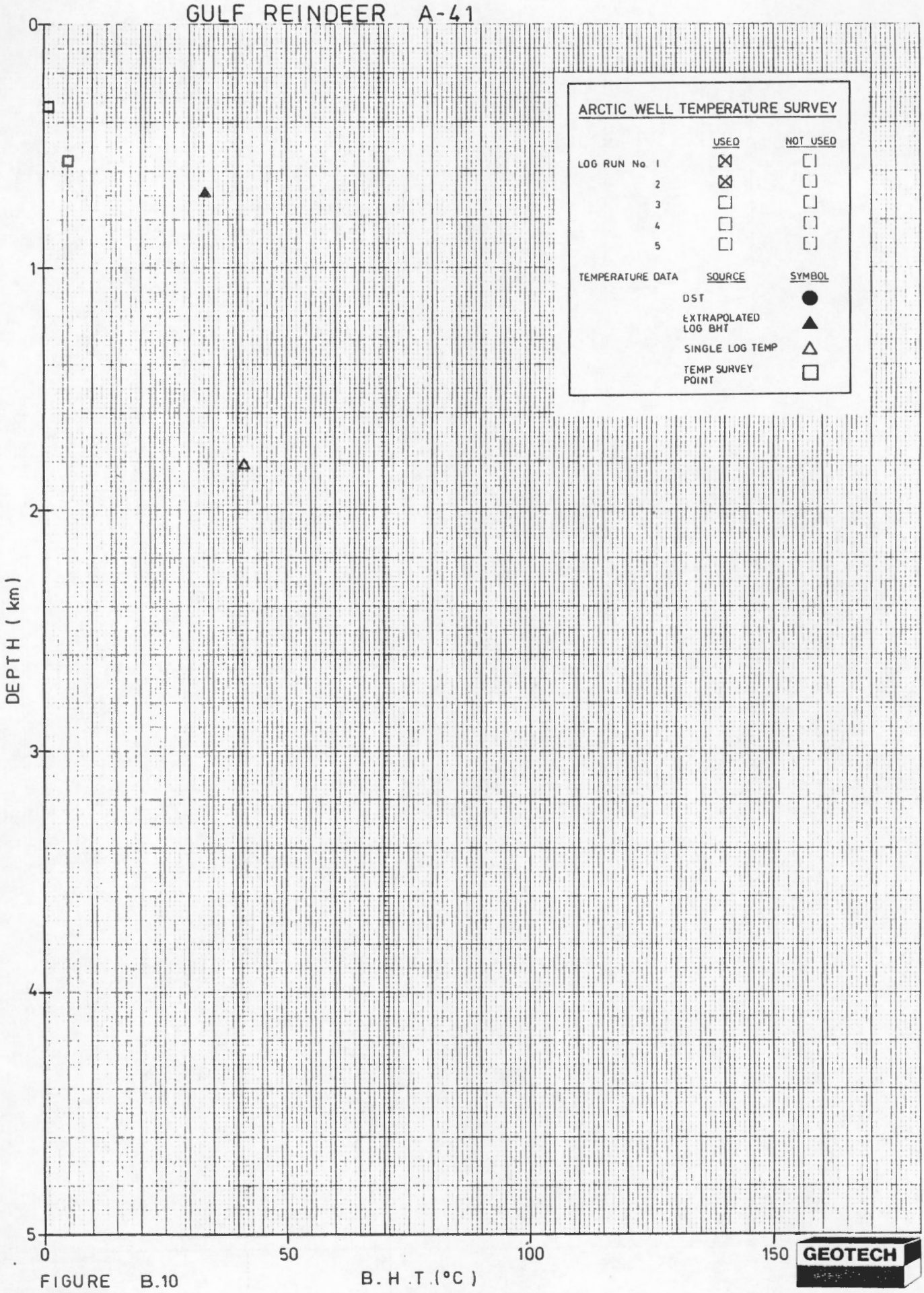


FIGURE B.10

45 1512

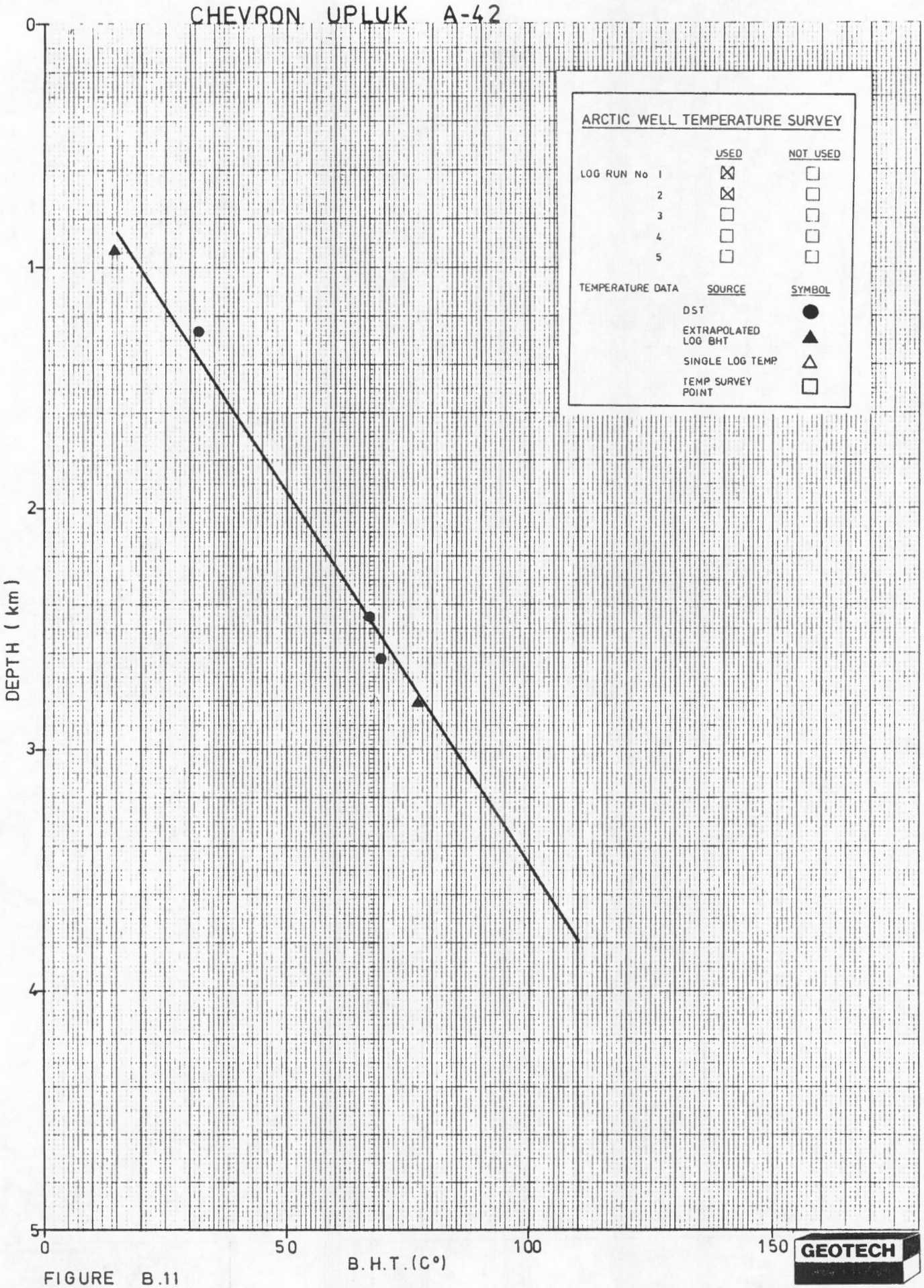

CHEVRON UPLUK A-42
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(C°)
GEOTECH

FIGURE B.11

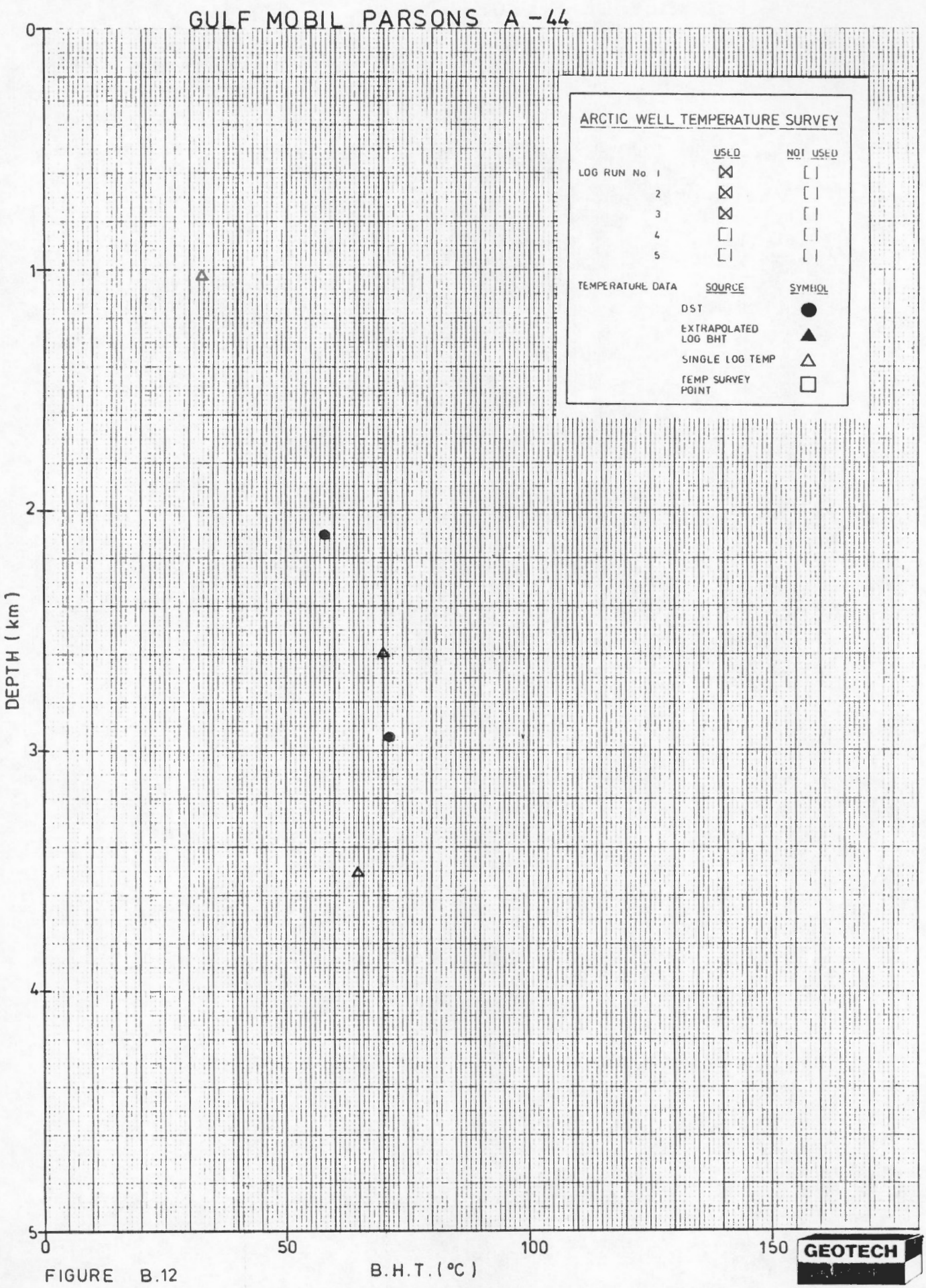


FIGURE B.12

46 1512
KEUFFEL & ESSER CO

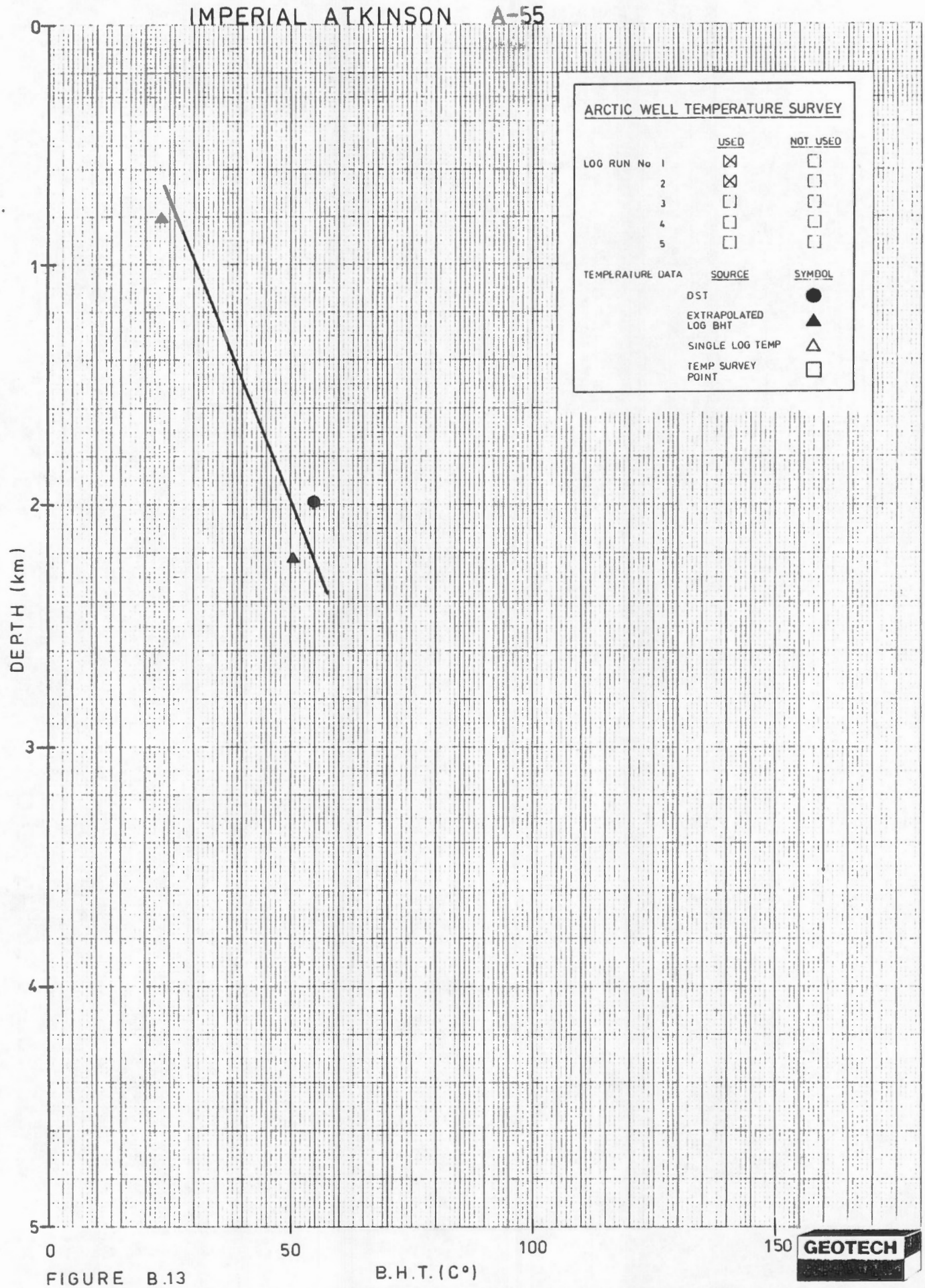

IMPERIAL ATKINSON A-55
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.13

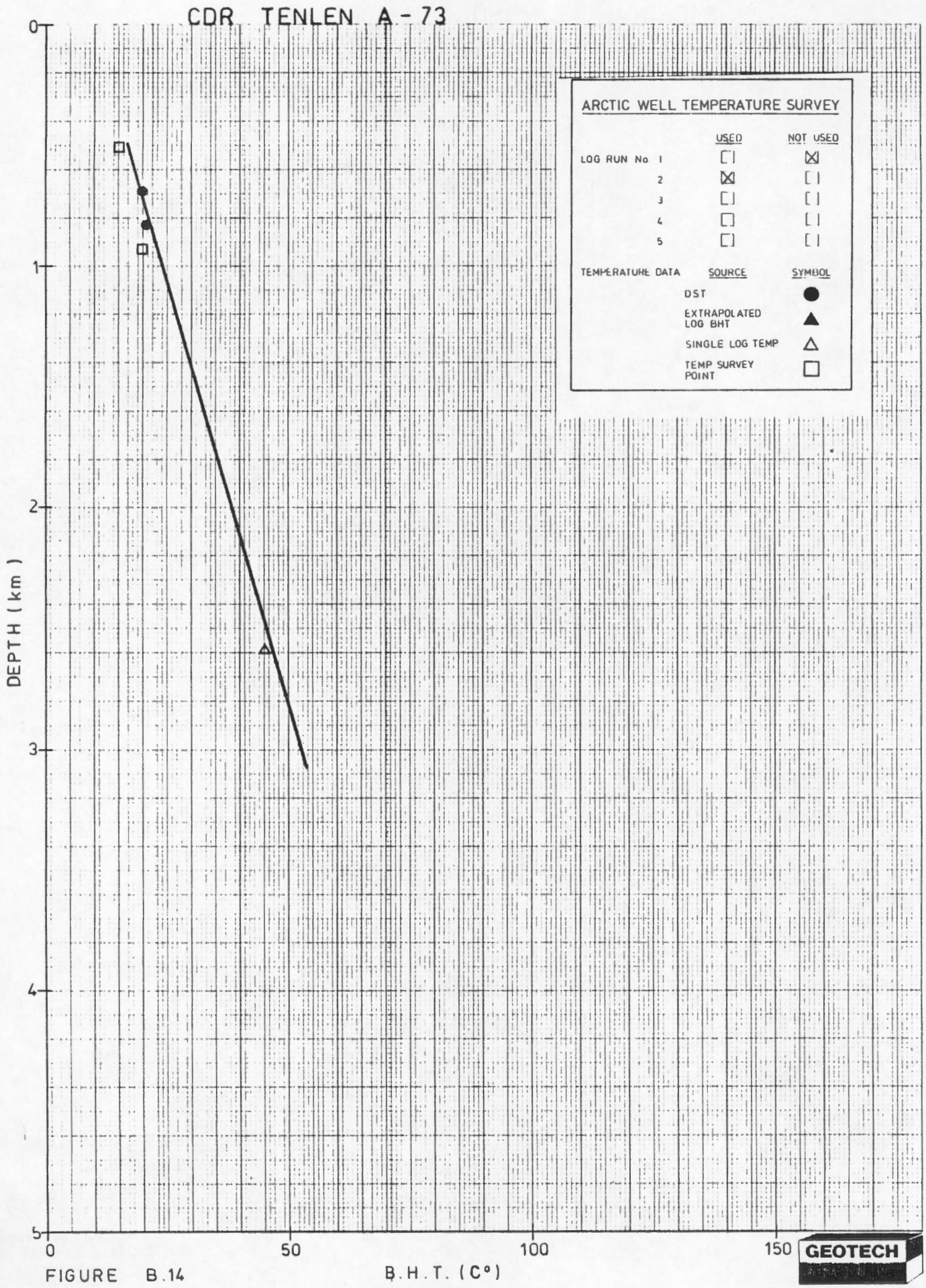


FIGURE B.14

46 1512

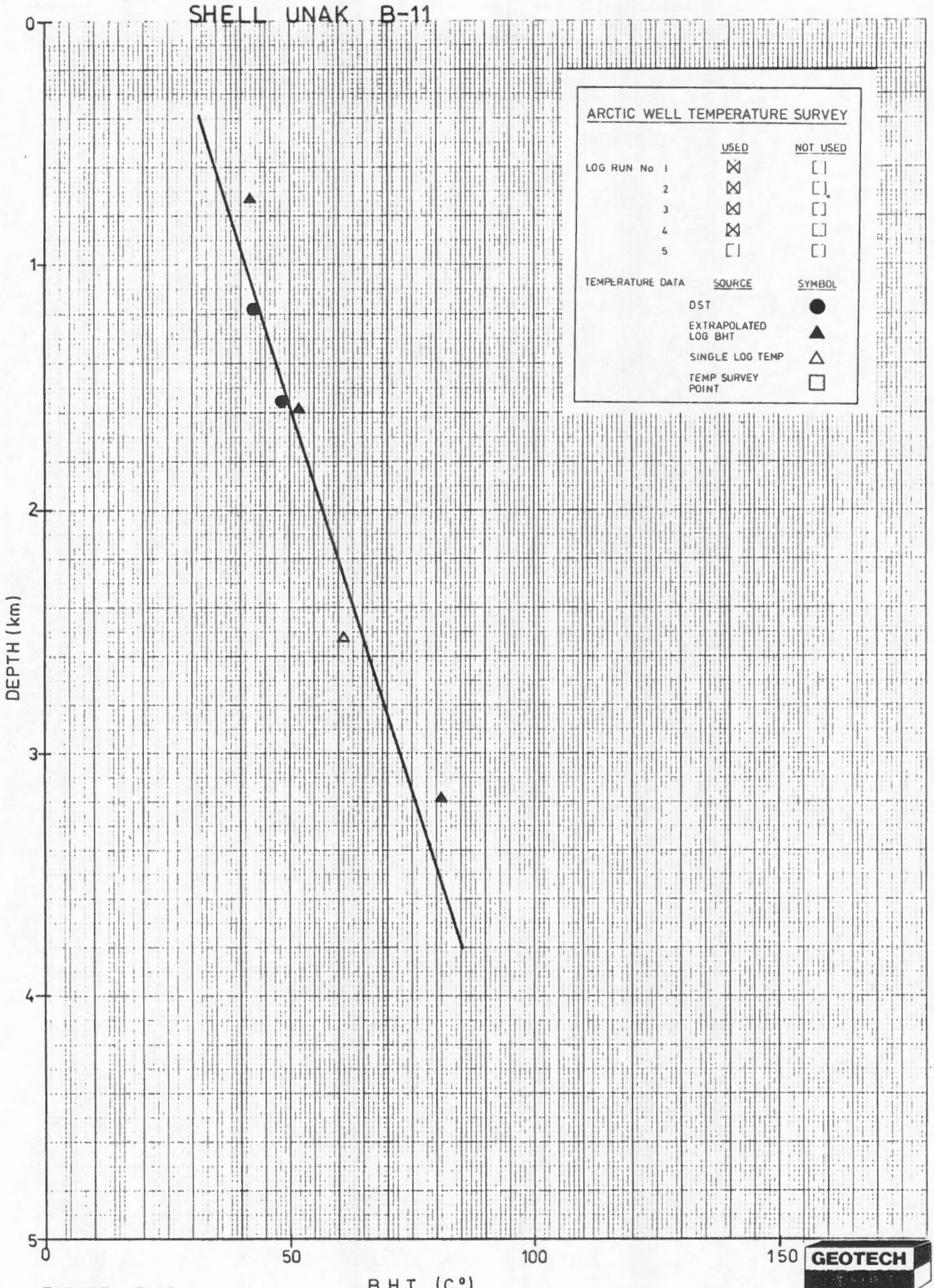

SHELL UNAK B-11
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.15

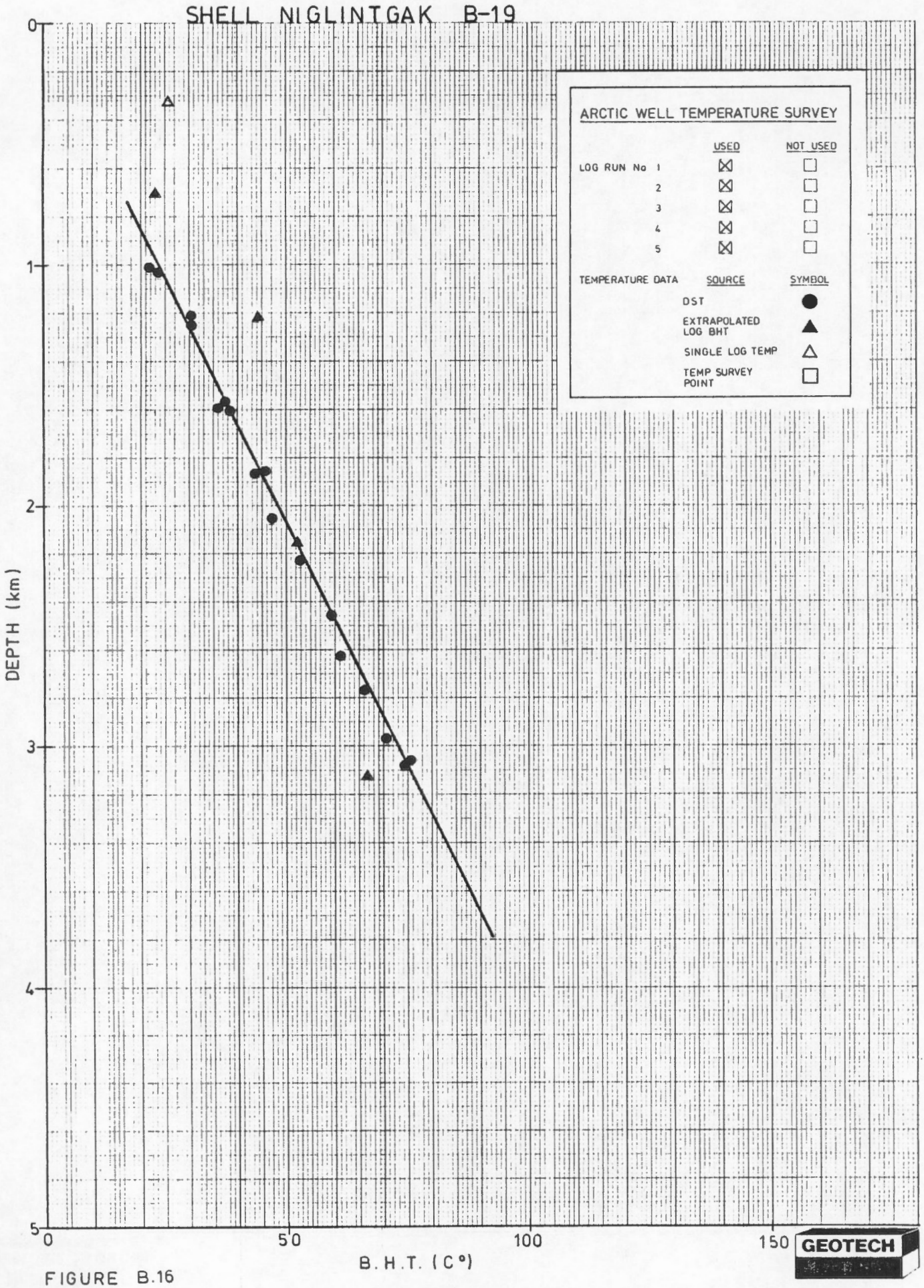


FIGURE B.16

46 1512

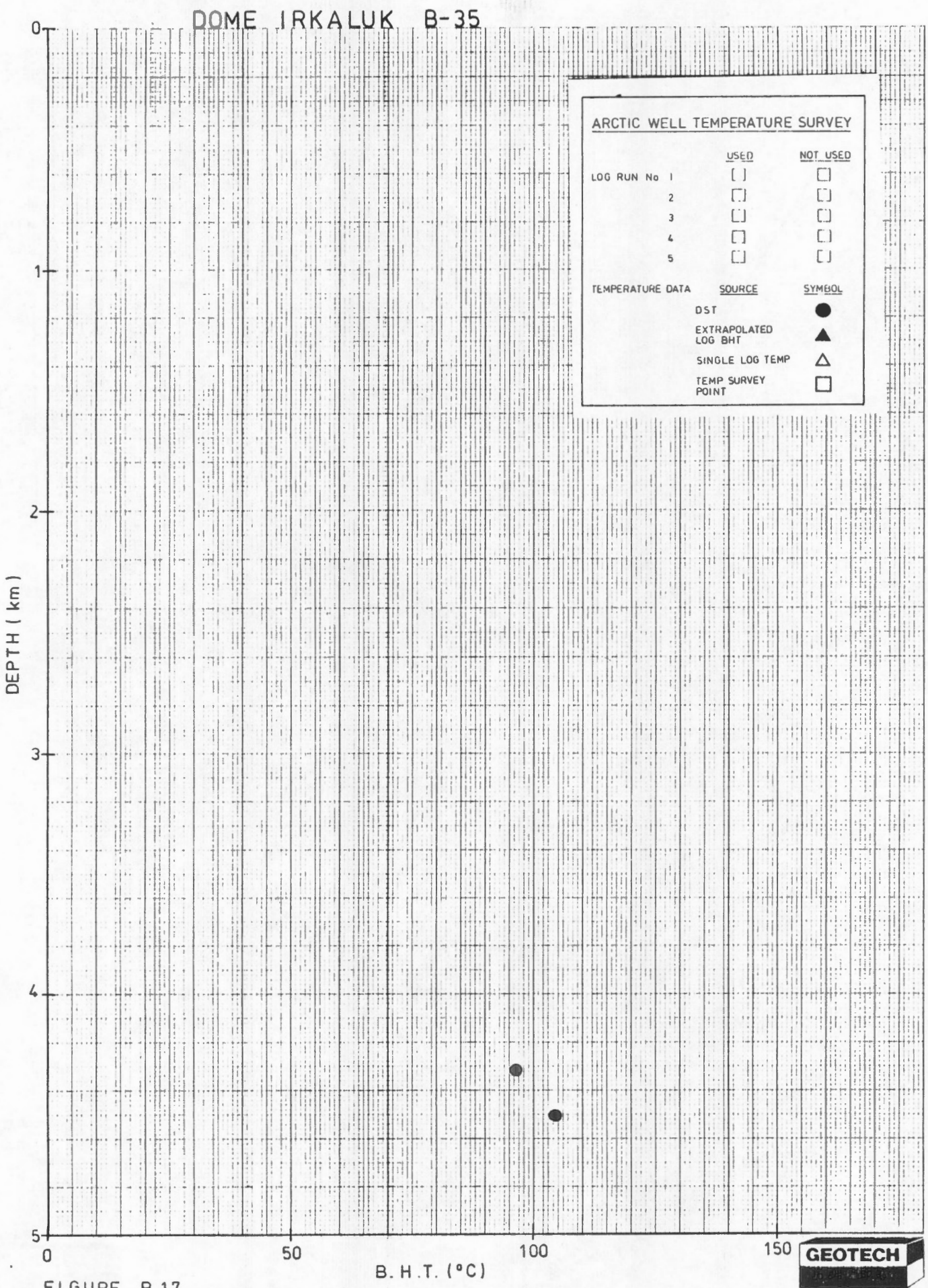

DOME IRKALUK B-35
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (°C)
GEOTECH

FIGURE B.17

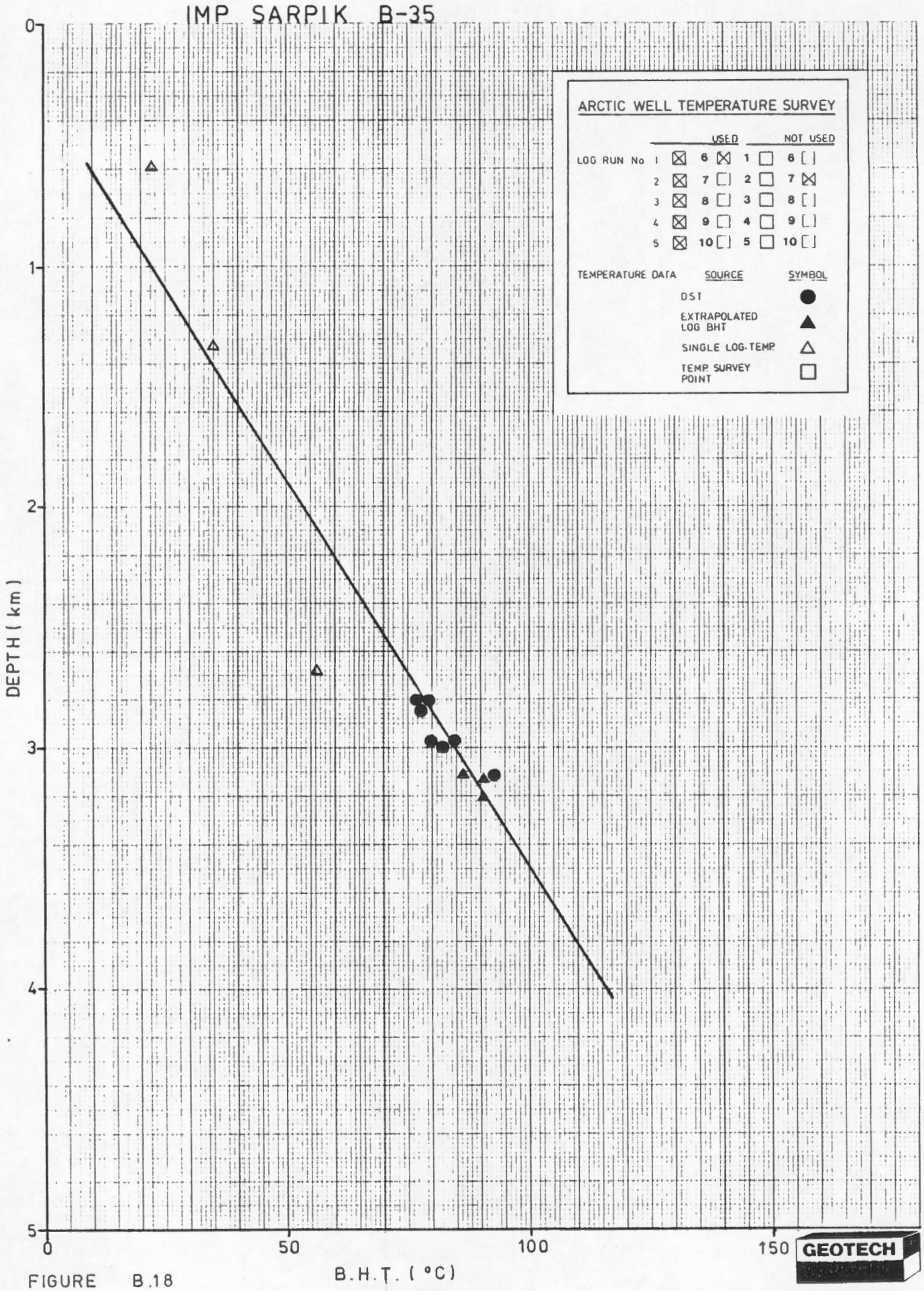

IMP SARPIK B-35
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1 6 1 6
2 7 2 7
3 8 3 8
4 9 4 9
5 10 5 10
TEMPERATURE DATA SOURCE SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.18

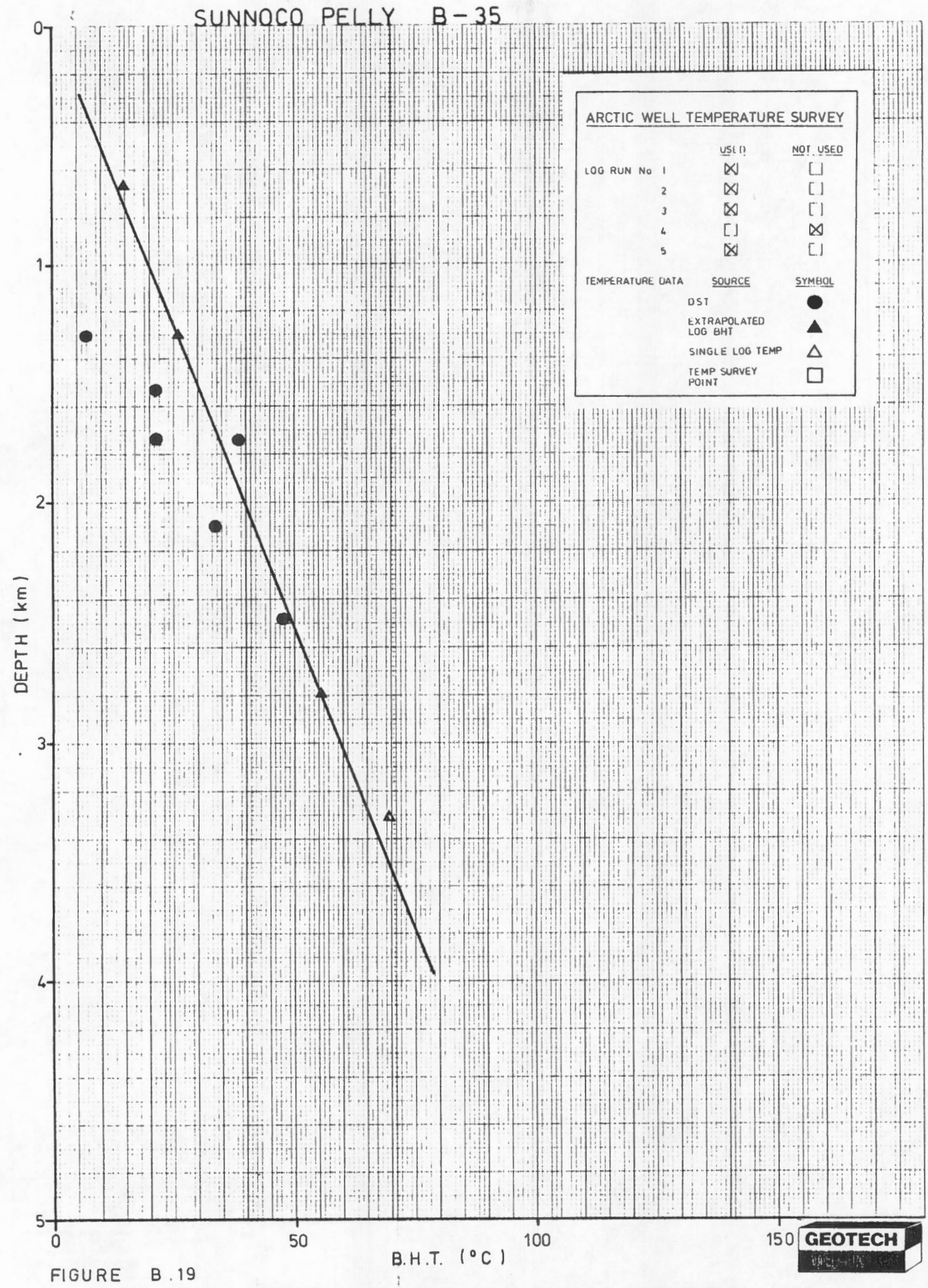

SUNNOCO PELLY B-35
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.19

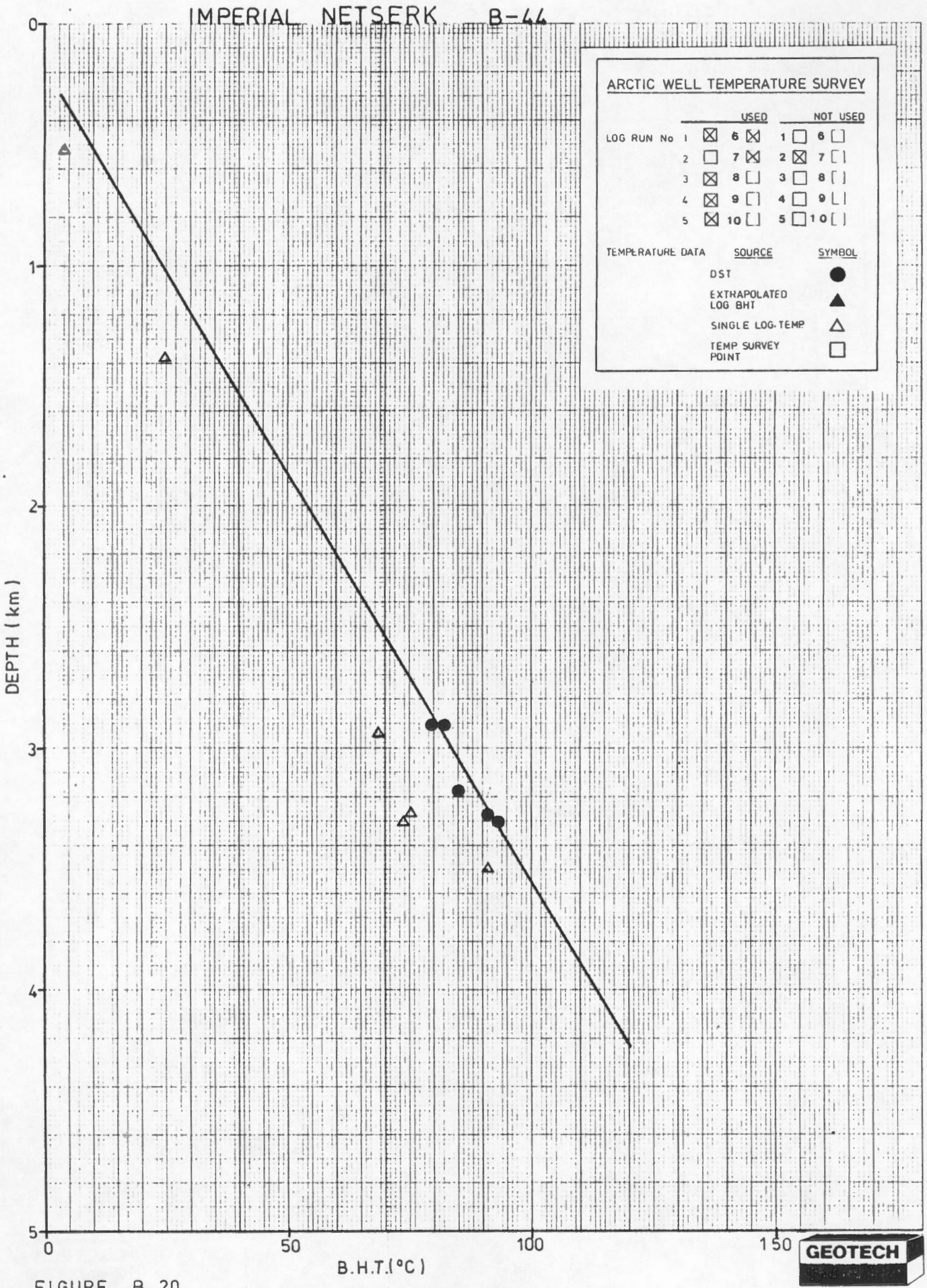

IMPERIAL NETSERK B-44
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1 6 1 6
2 7 2 7
3 8 3 8
4 9 4 9
5 10 5 10
TEMPERATURE DATA SOURCE SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP.
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE B.20

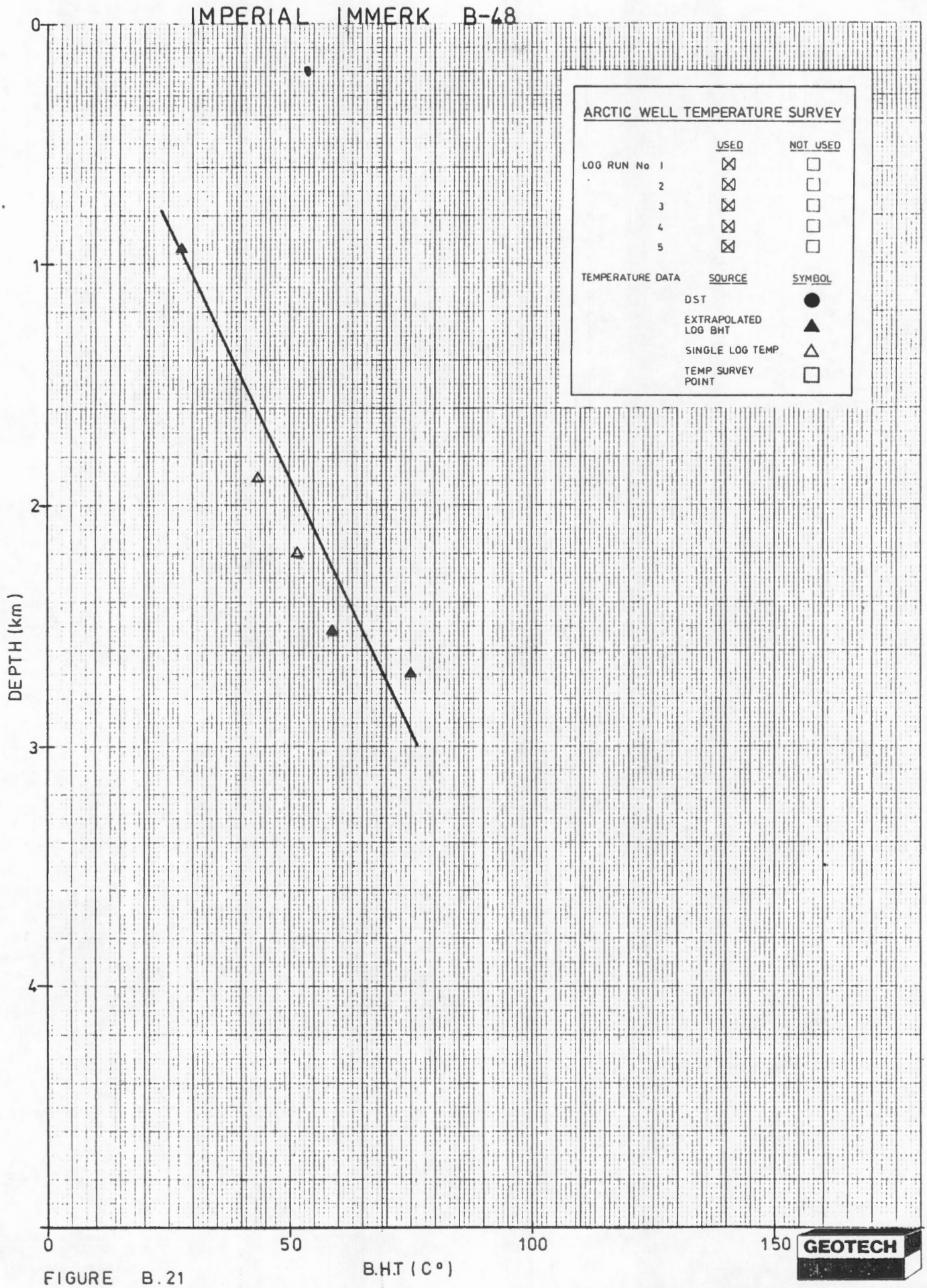

IMPERIAL IMMERK B-48
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
0
50
100
150
B.H.T (C°)
GEOTECH

FIGURE B.21

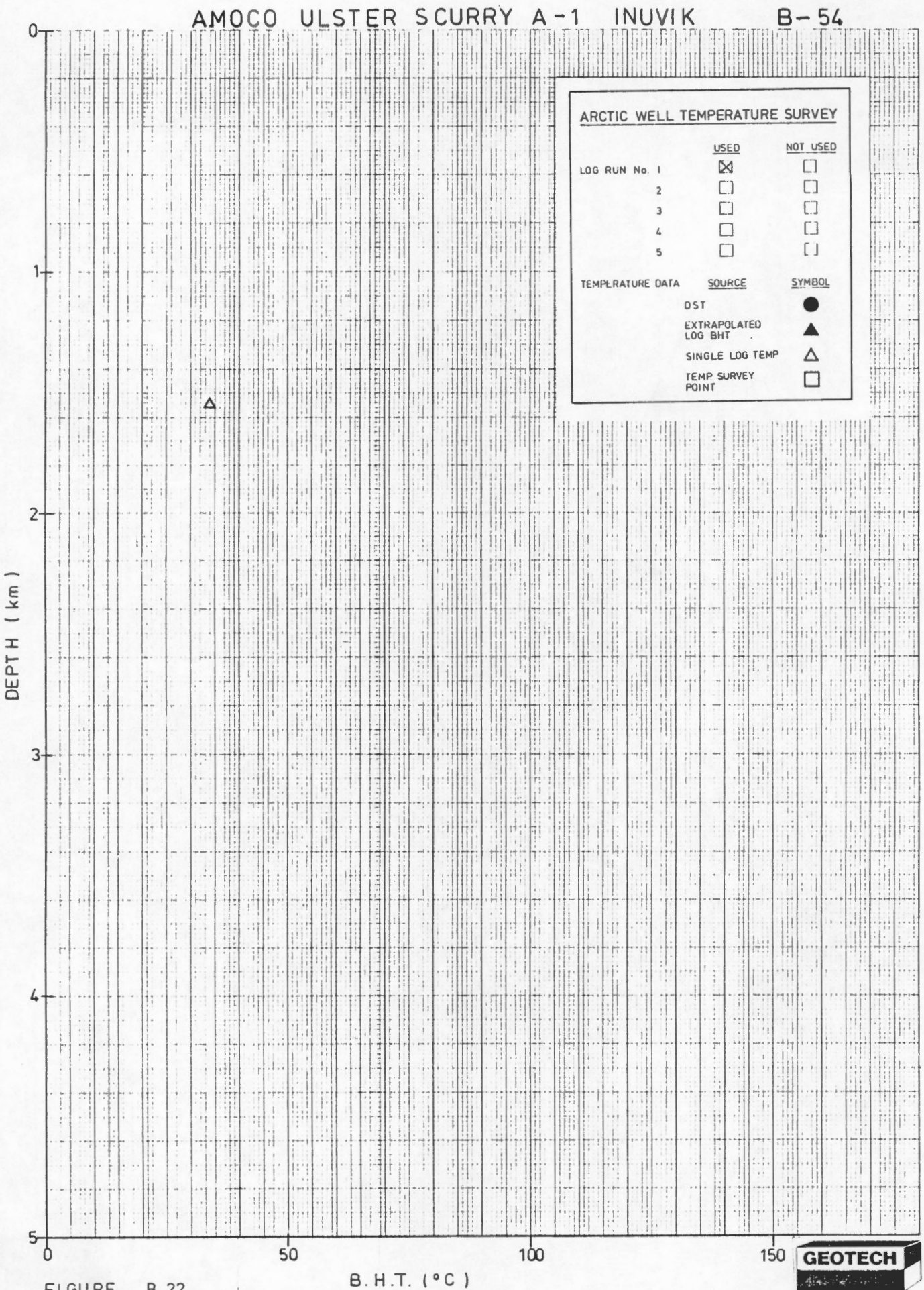


FIGURE B. 22

46 1512
K+E

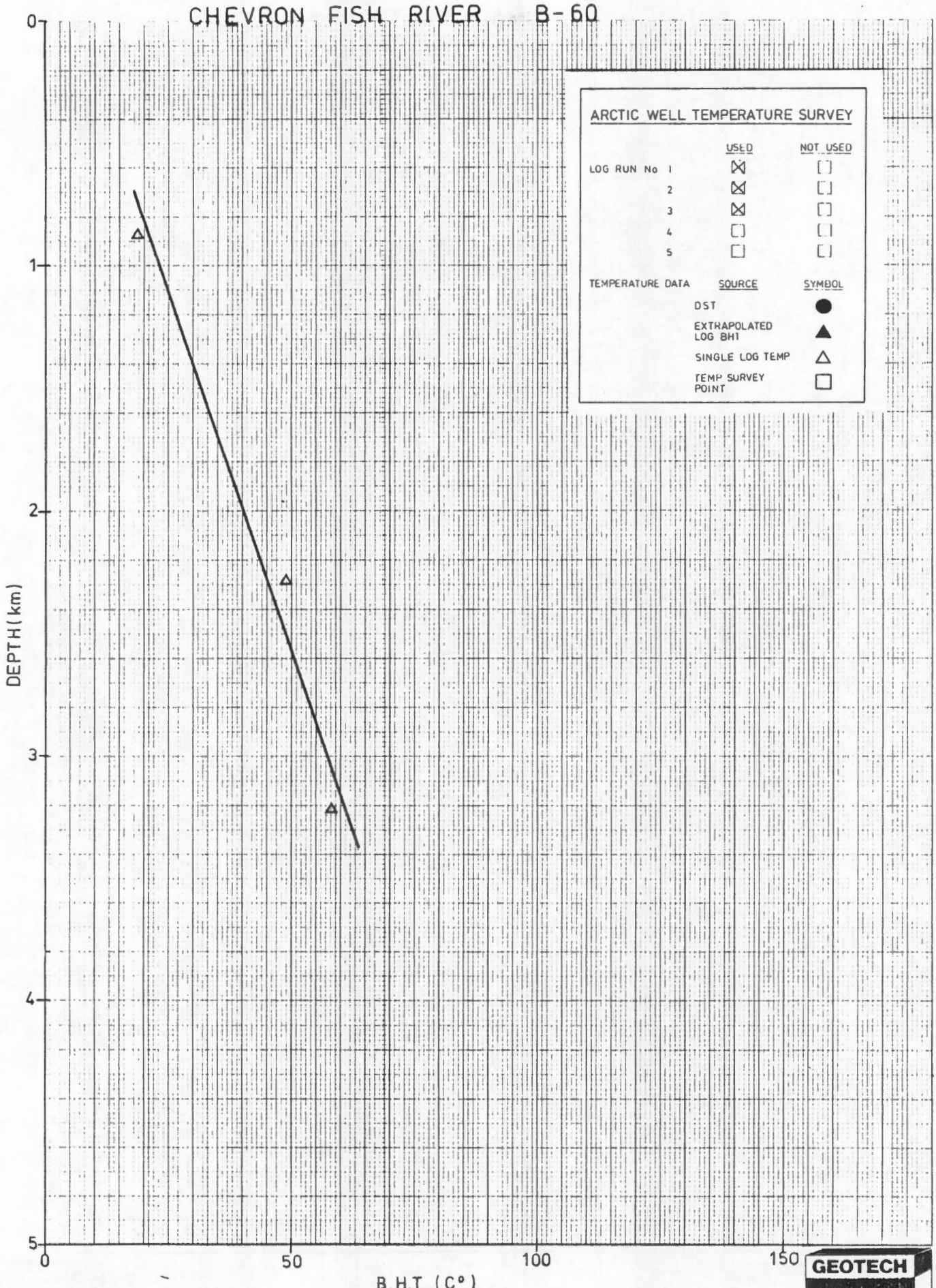

CHEVRON FISH RIVER B-60
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T (C°)
GEOTECH

FIGURE B.23

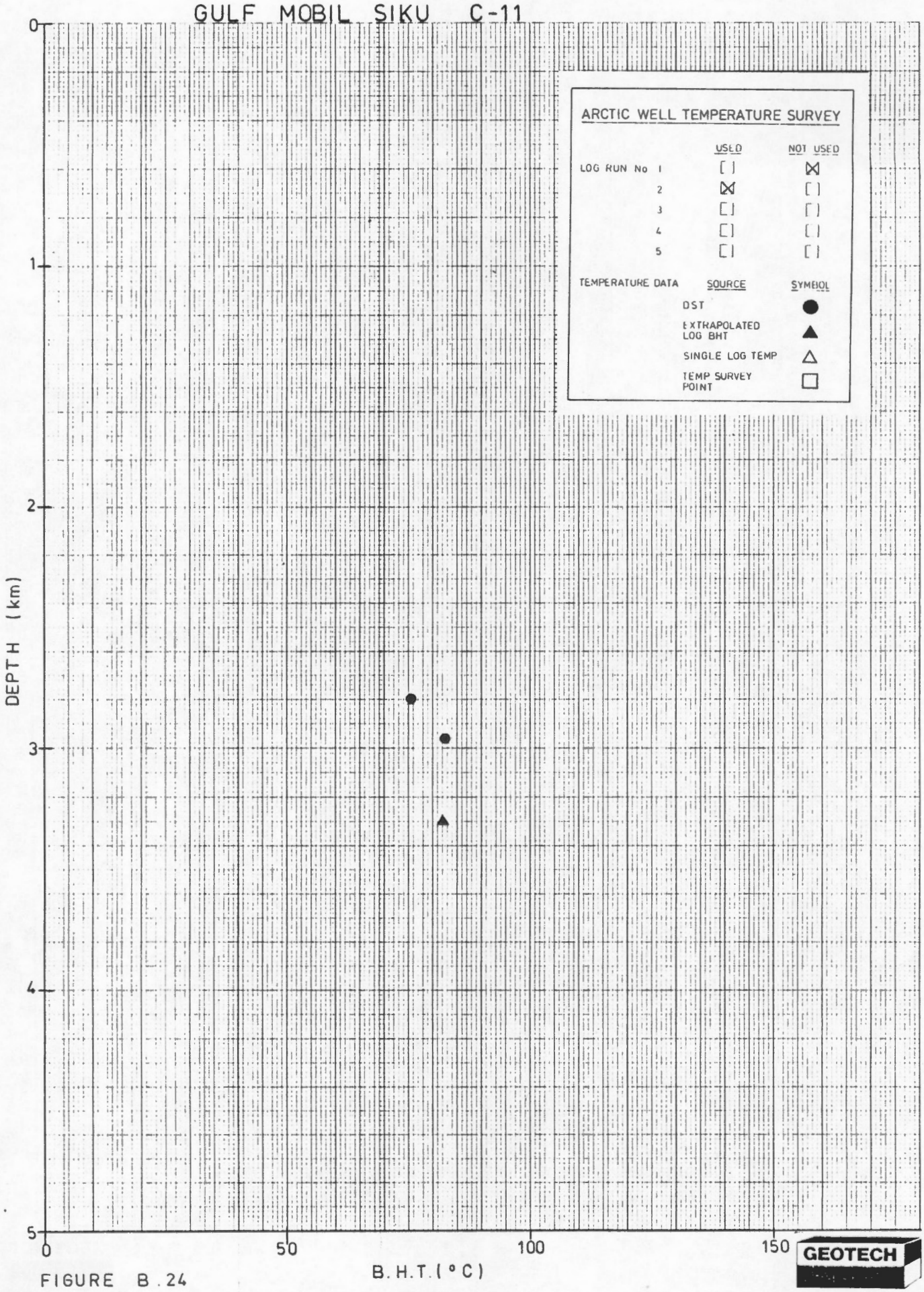


FIGURE B.24

46 1512
K+E KEUFFEL & ESSER CO.

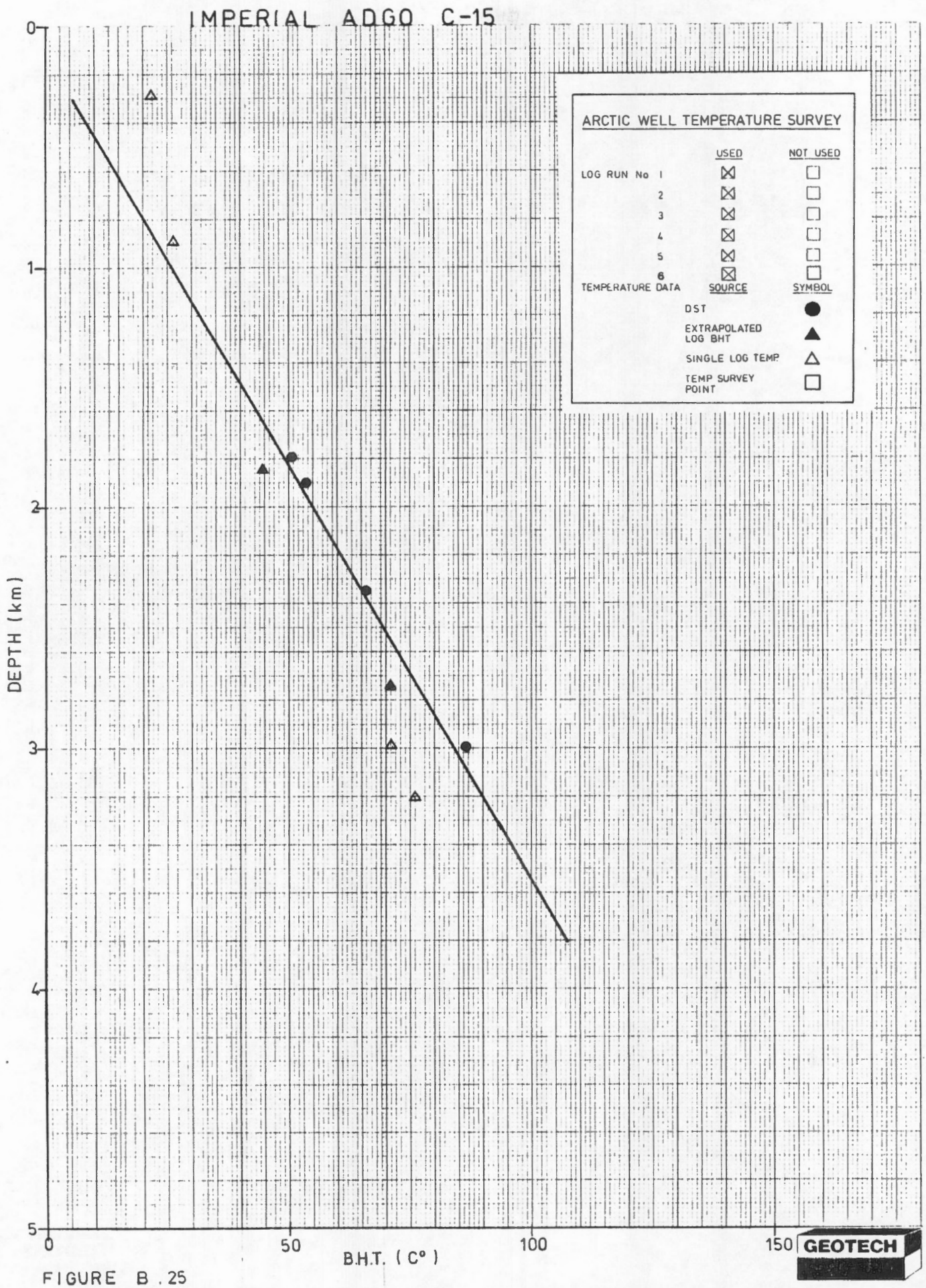

IMPERIAL ADGO C-15
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
6
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B . 25

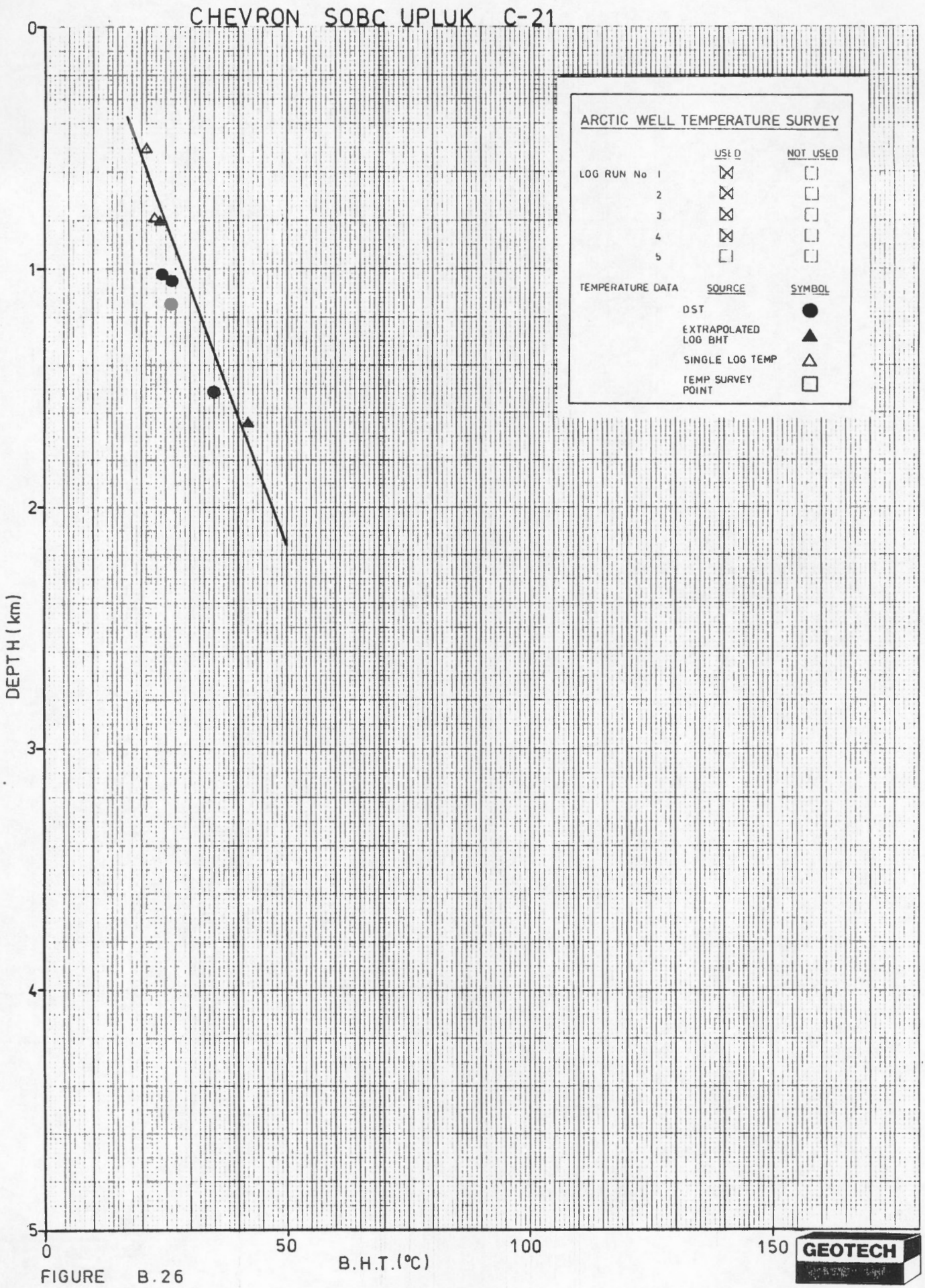


FIGURE B.26

46 1512

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO.

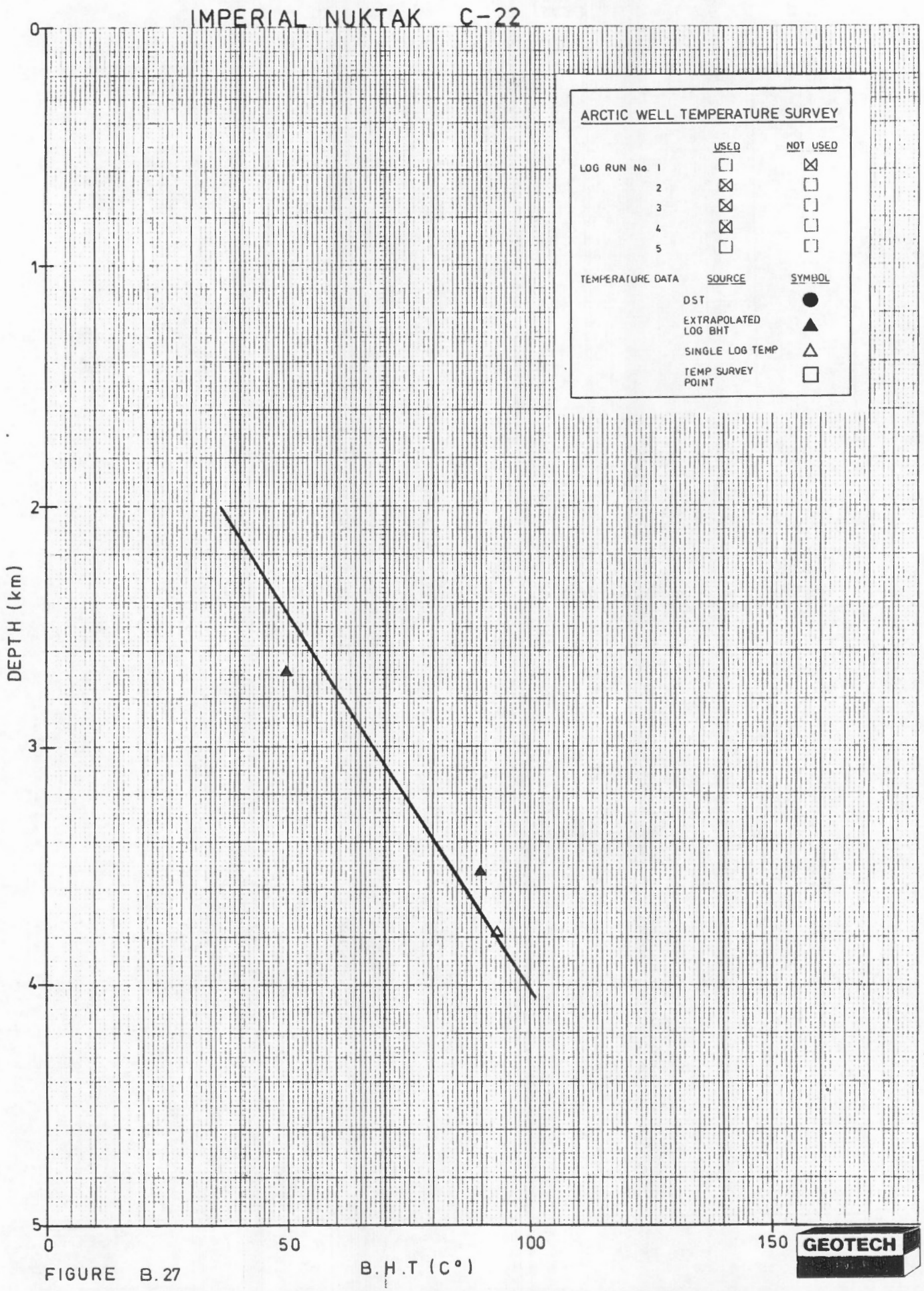


FIGURE B.27

46 1512
KE 10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

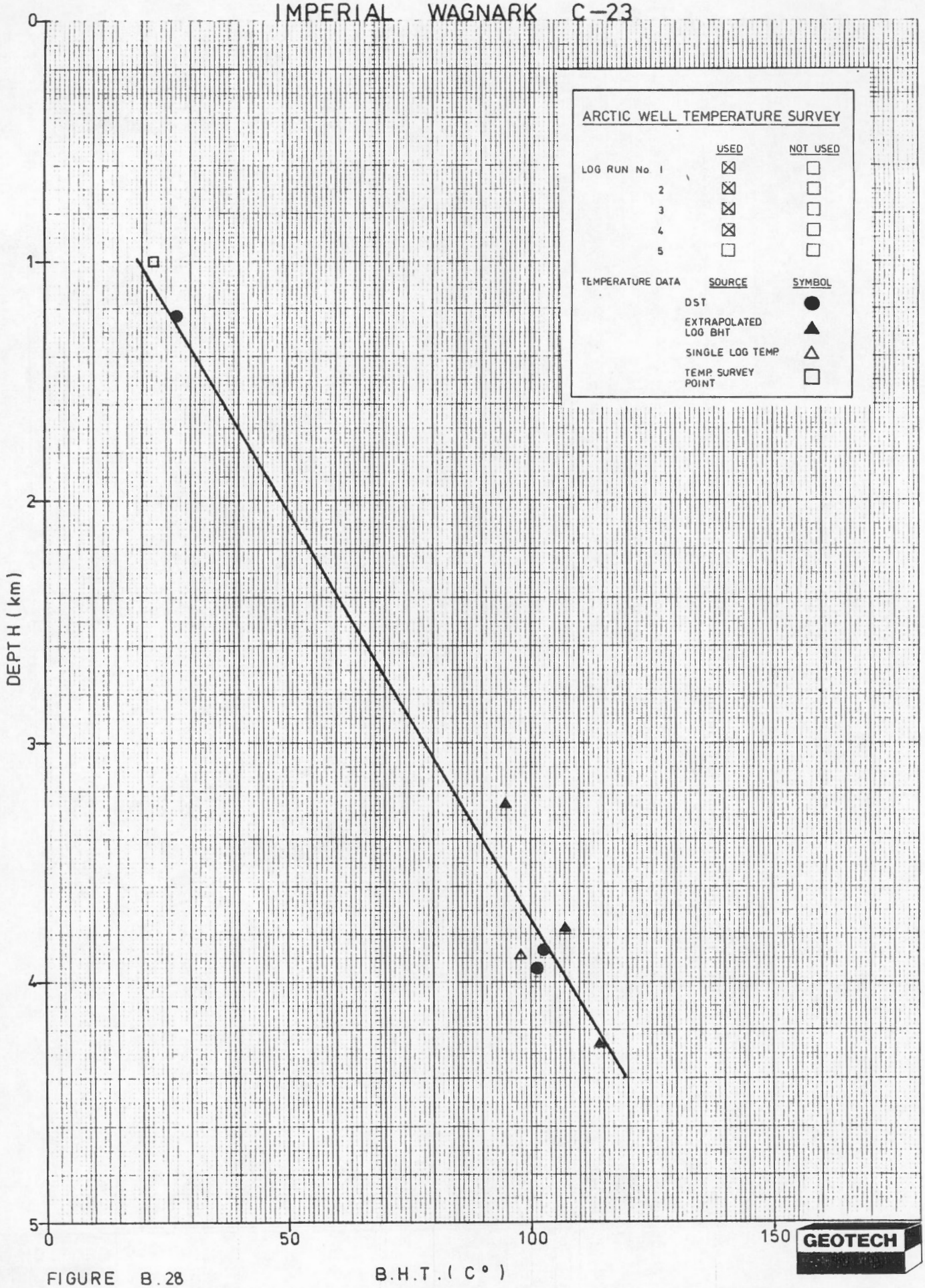

IMPERIAL WAGNARK C-23
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.28

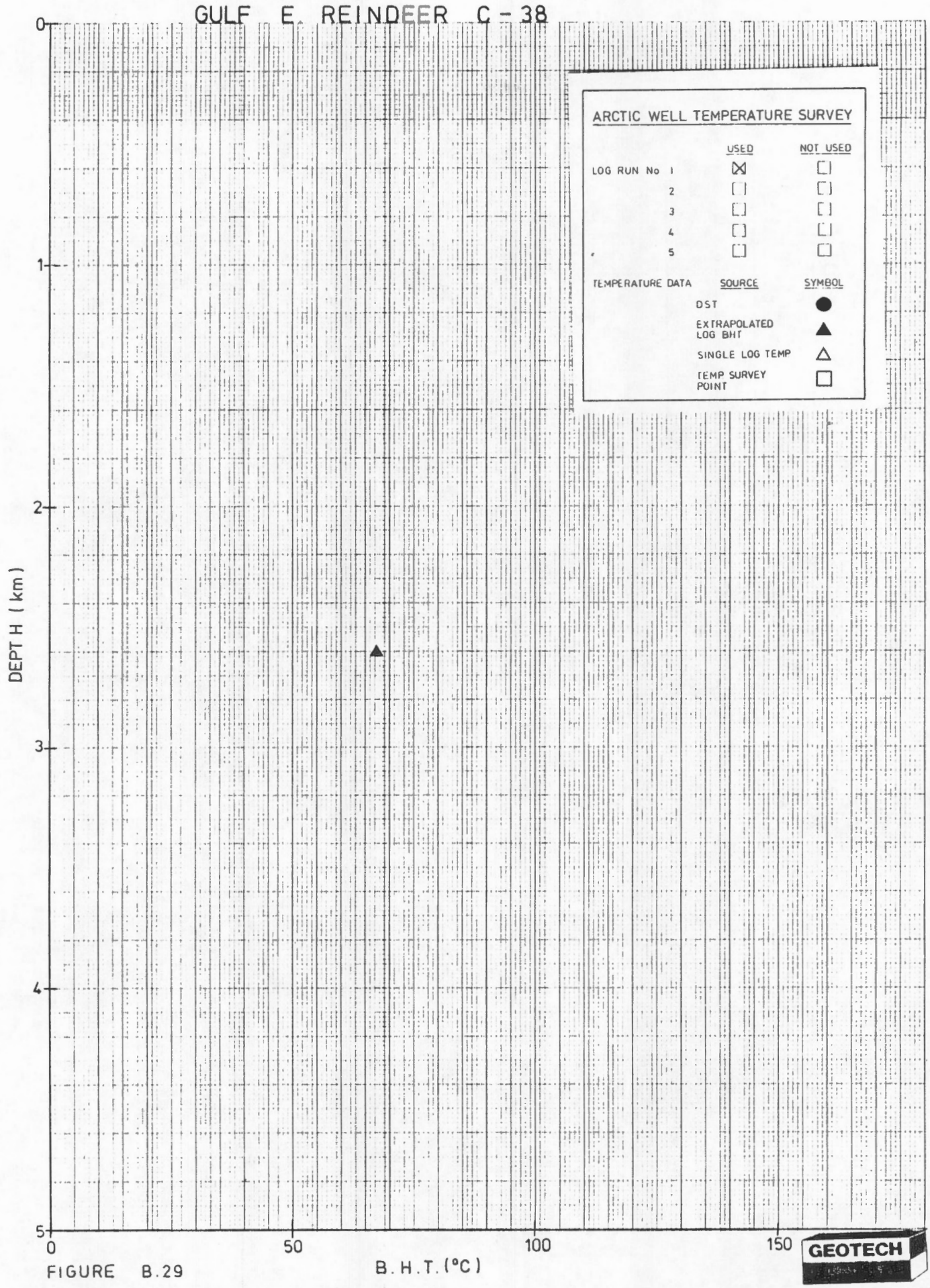


FIGURE B.29

46 1512

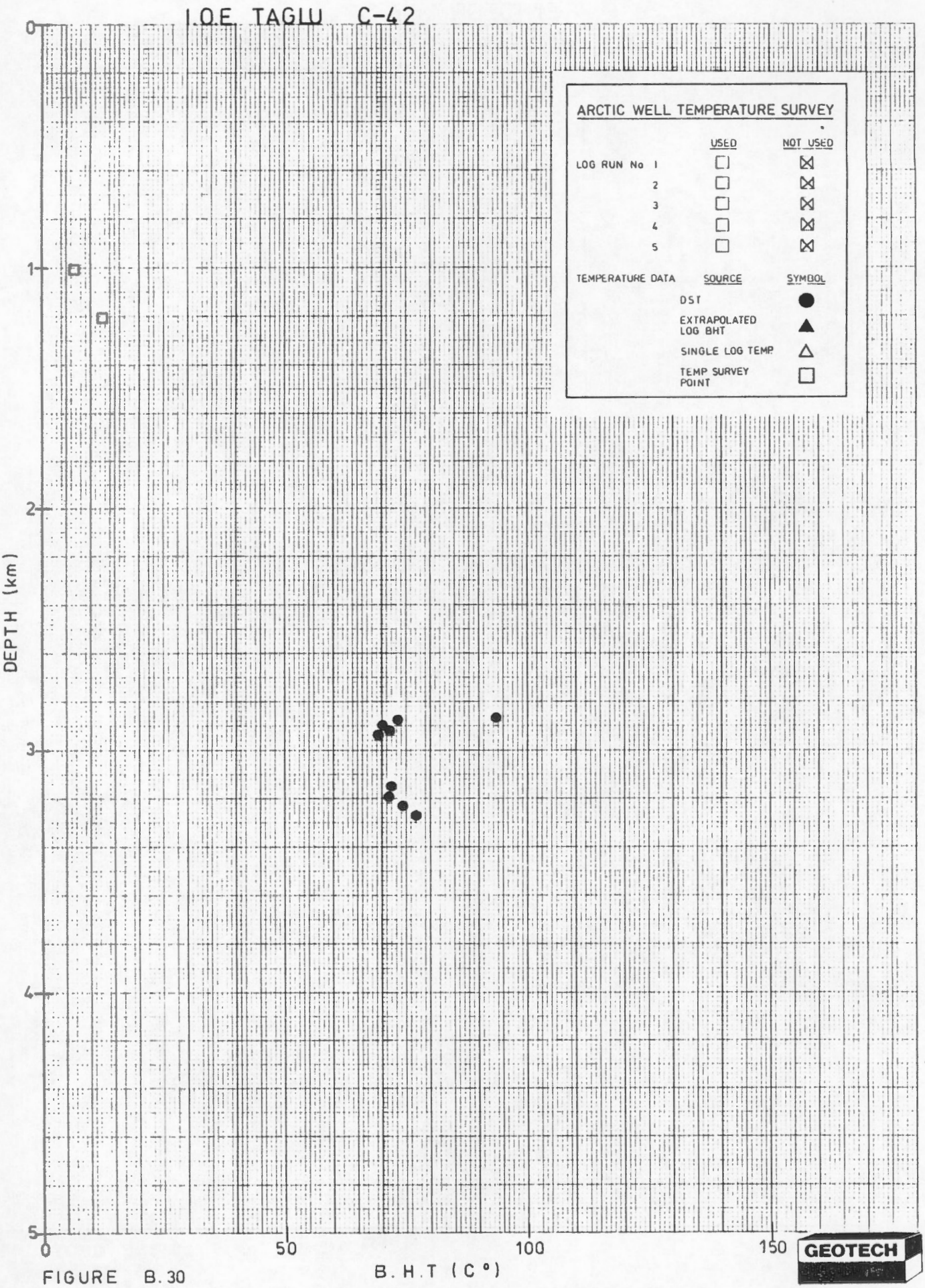


FIGURE B.30

46 1512

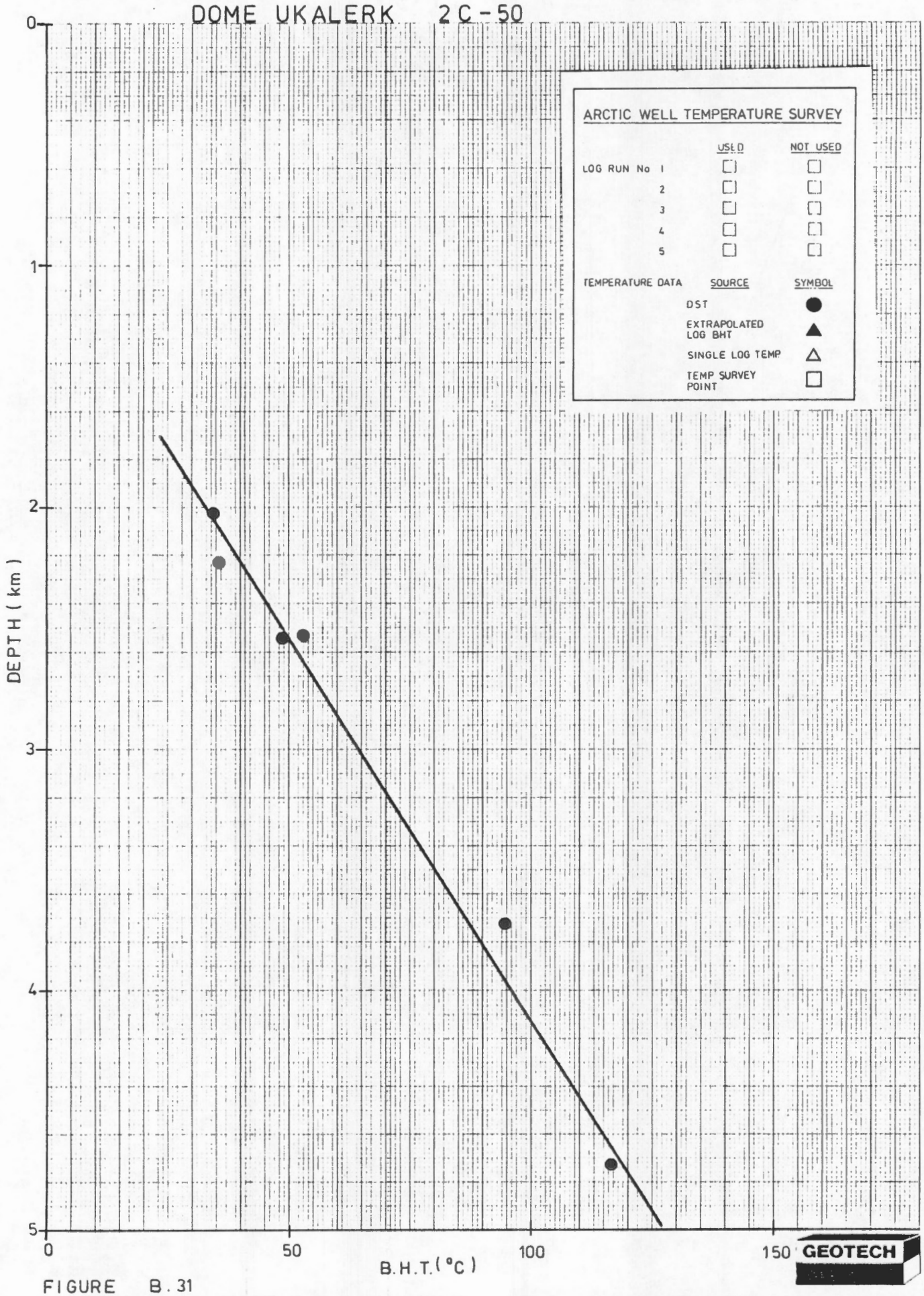

DOME UKALERK 2C-50
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.31

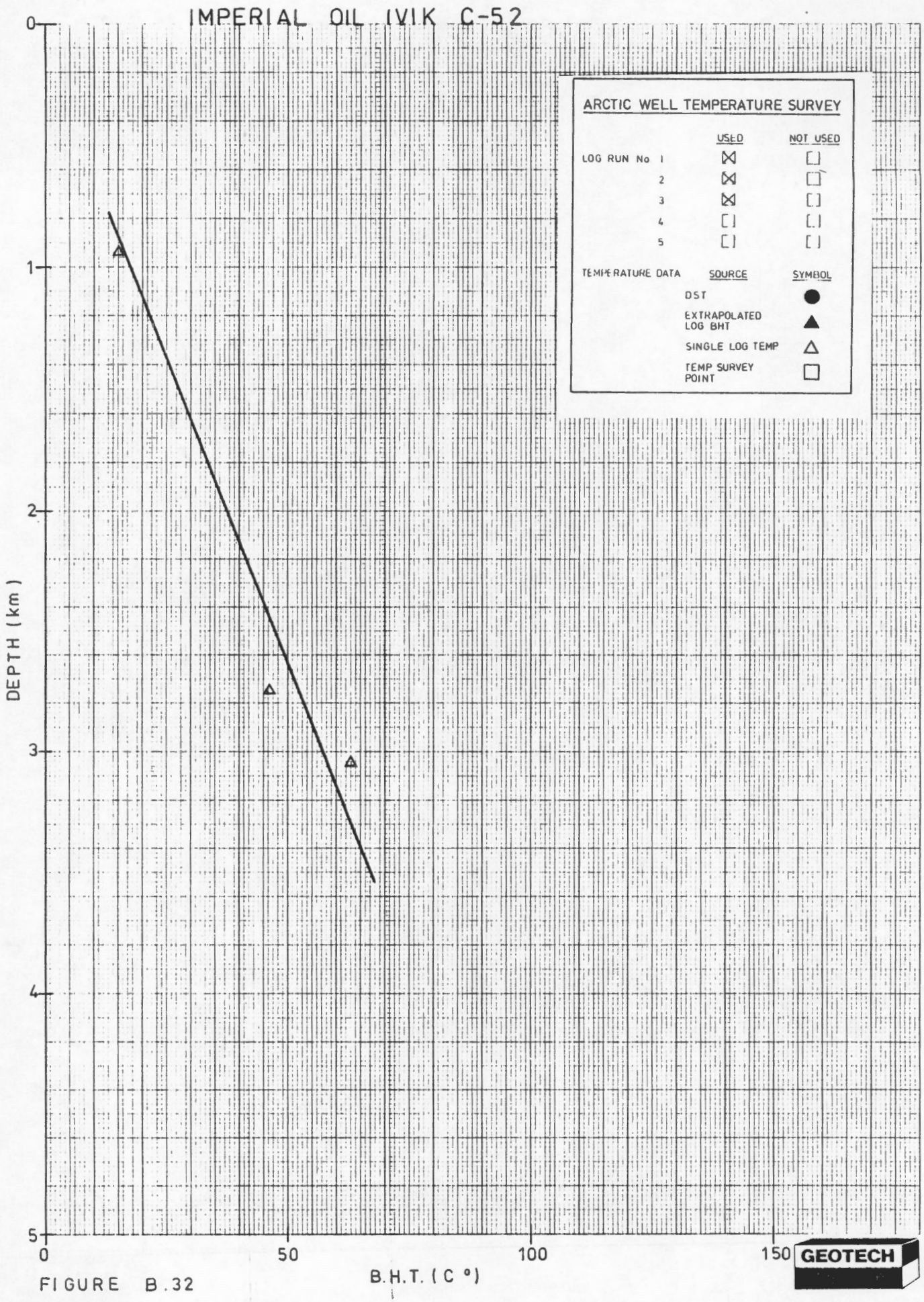


FIGURE B.32

46 1512
KEUFFEL & ESSER CO

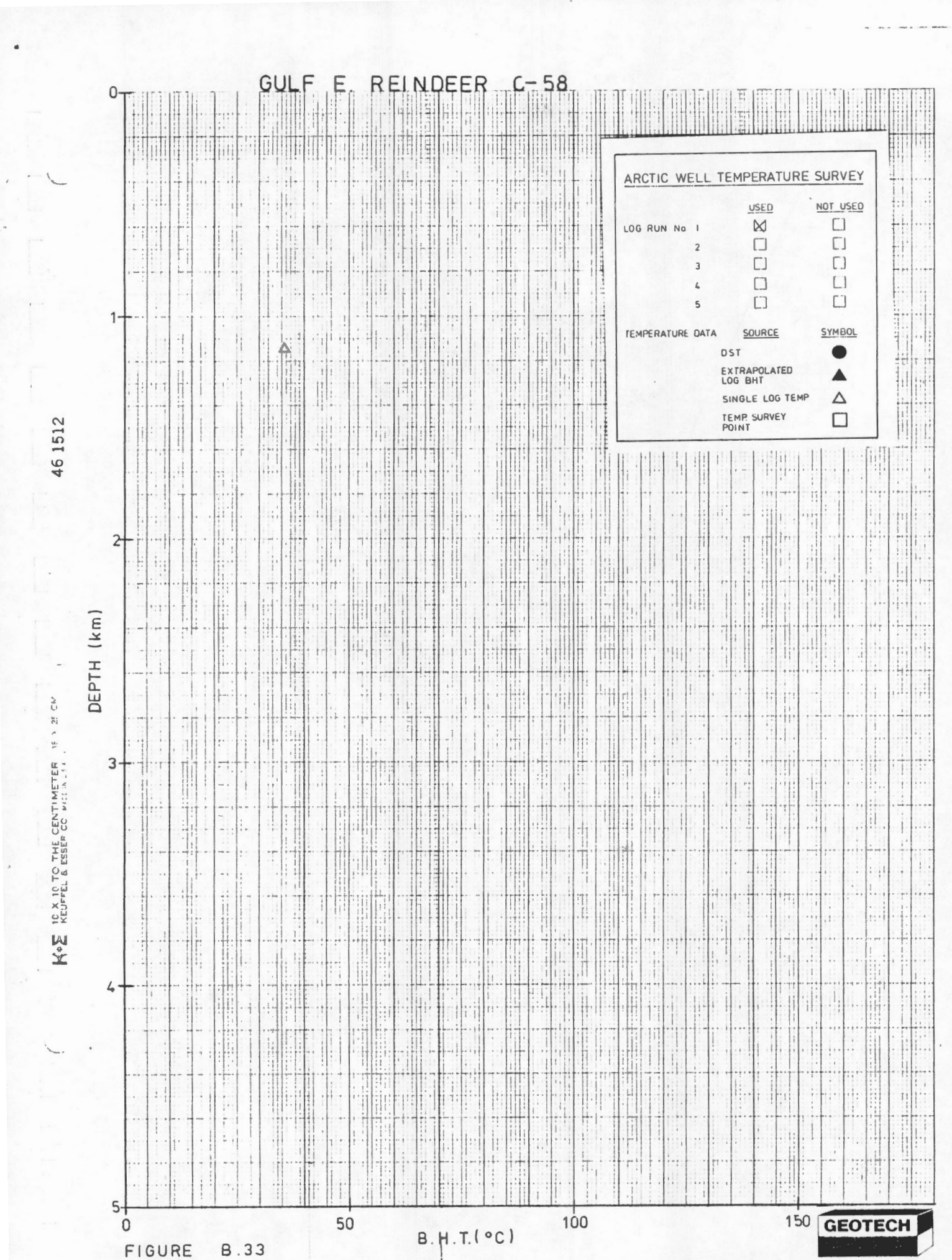

GULF E. REINDEER C-58
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH
46 1512
K+E 10 X 10 TO THE CENTIMETER

FIGURE B.33

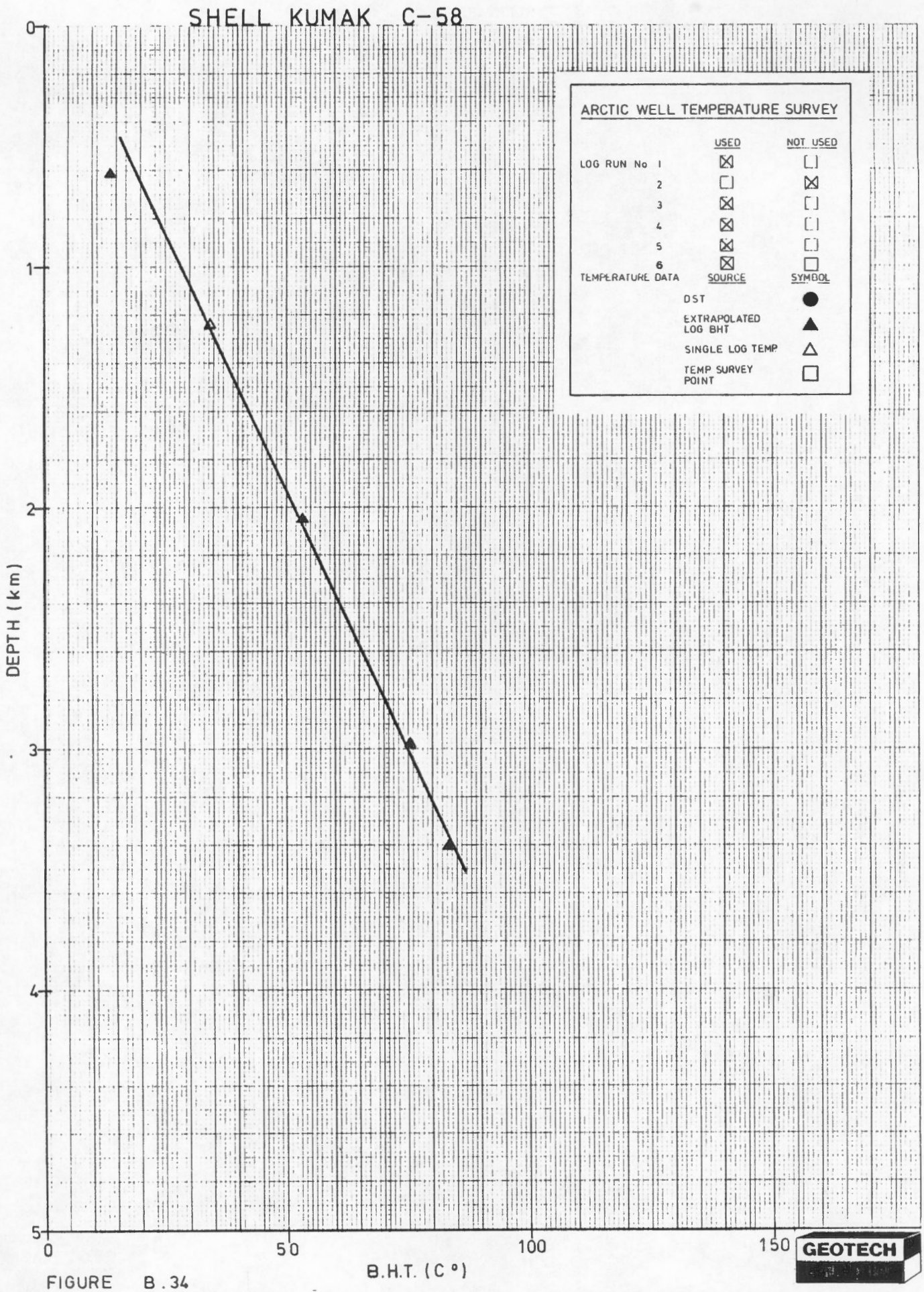

SHELL KUMAK C-58
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
6
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.34

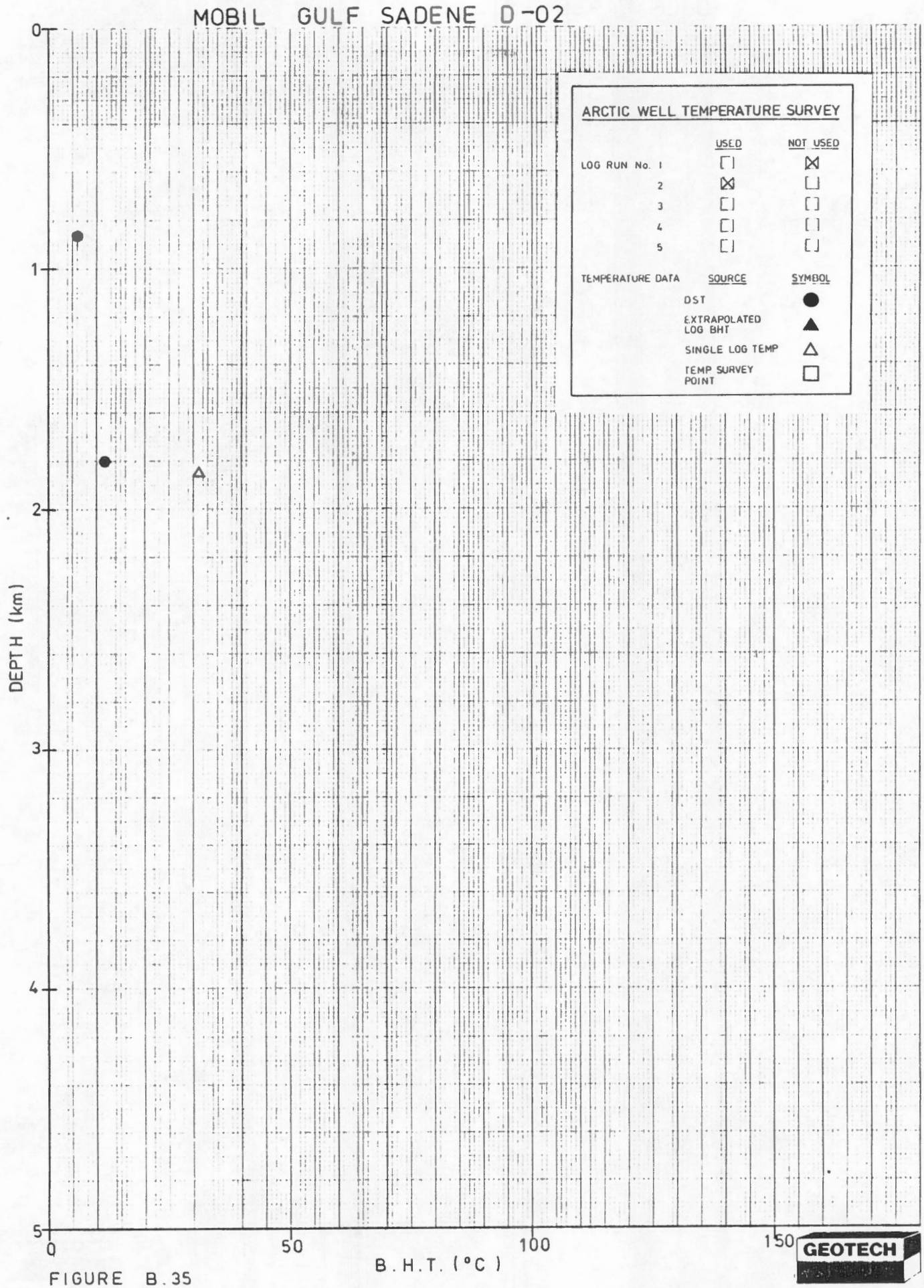

MOBIL GULF SADENE D-02
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.35

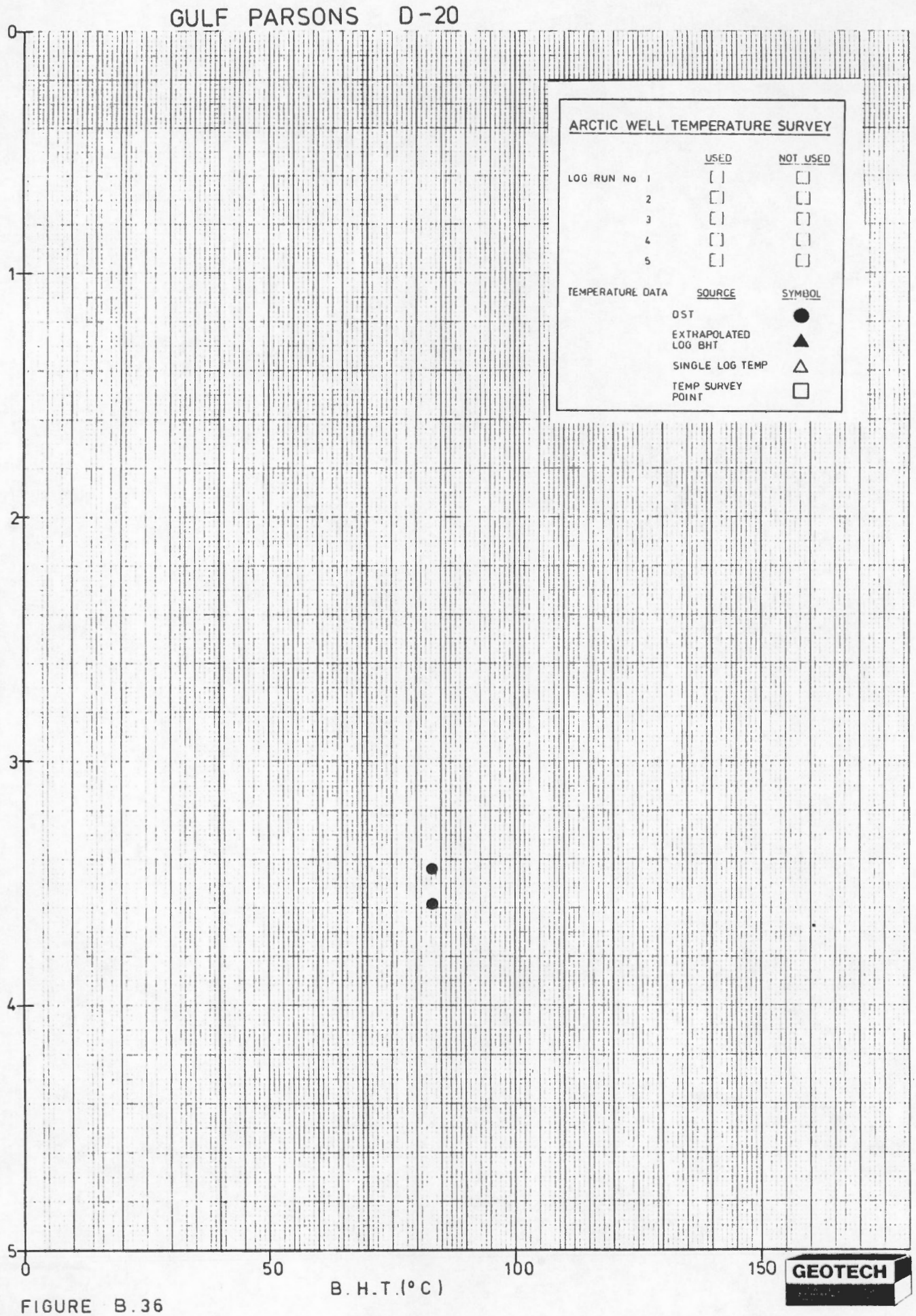

GULF PARSONS D-20
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE B.36

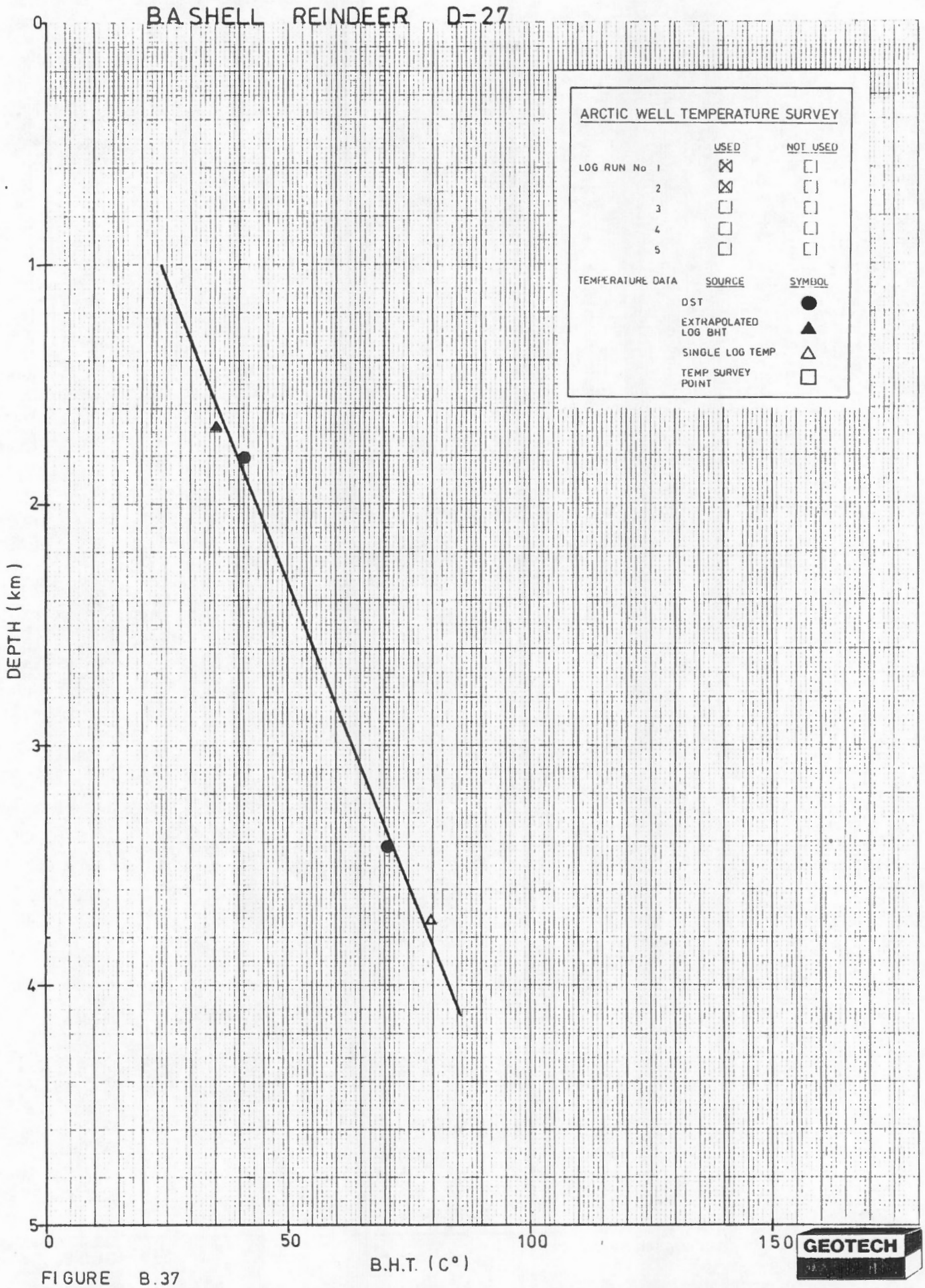


FIGURE B.37

46 1512

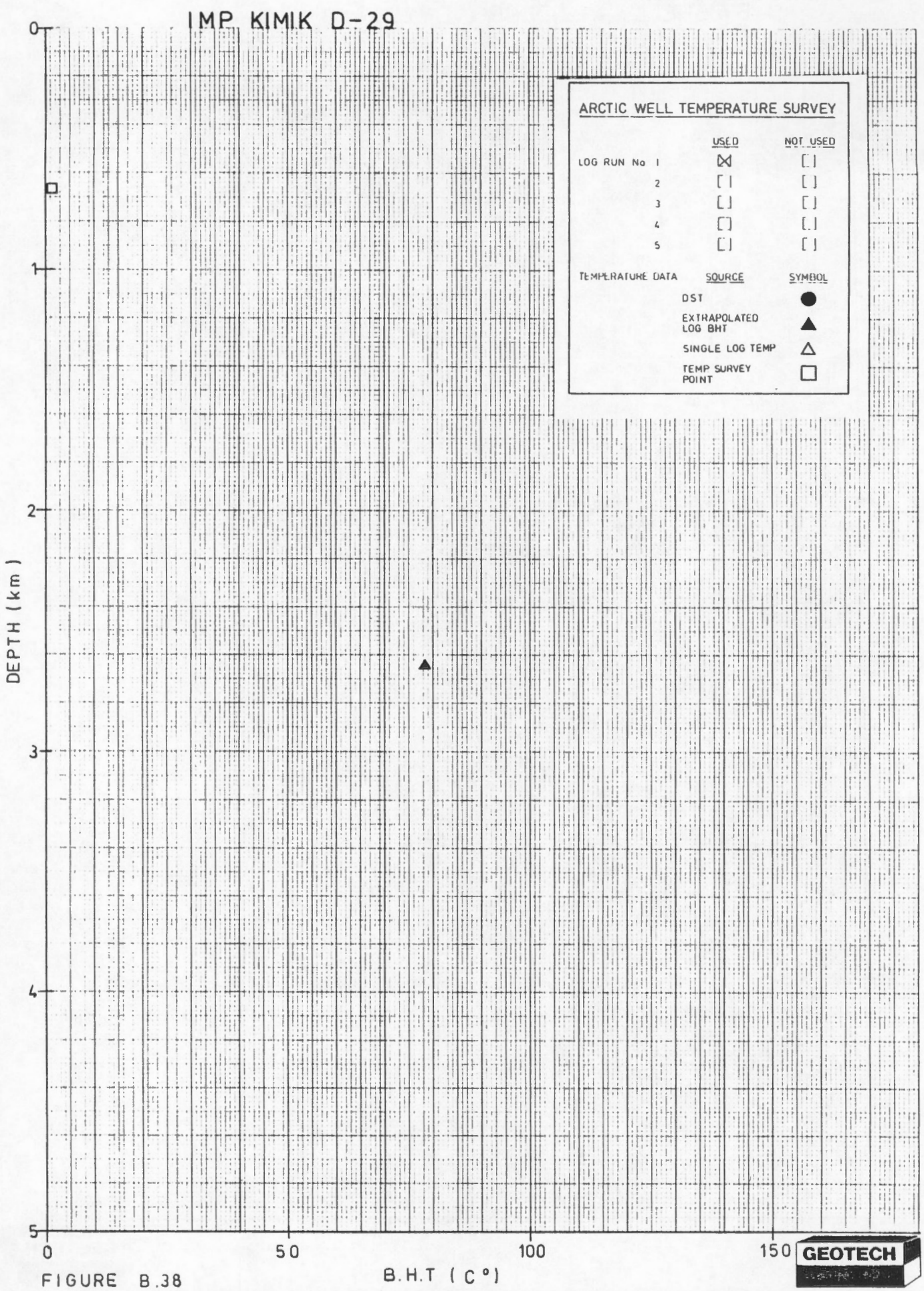


FIGURE B.38

46 1512

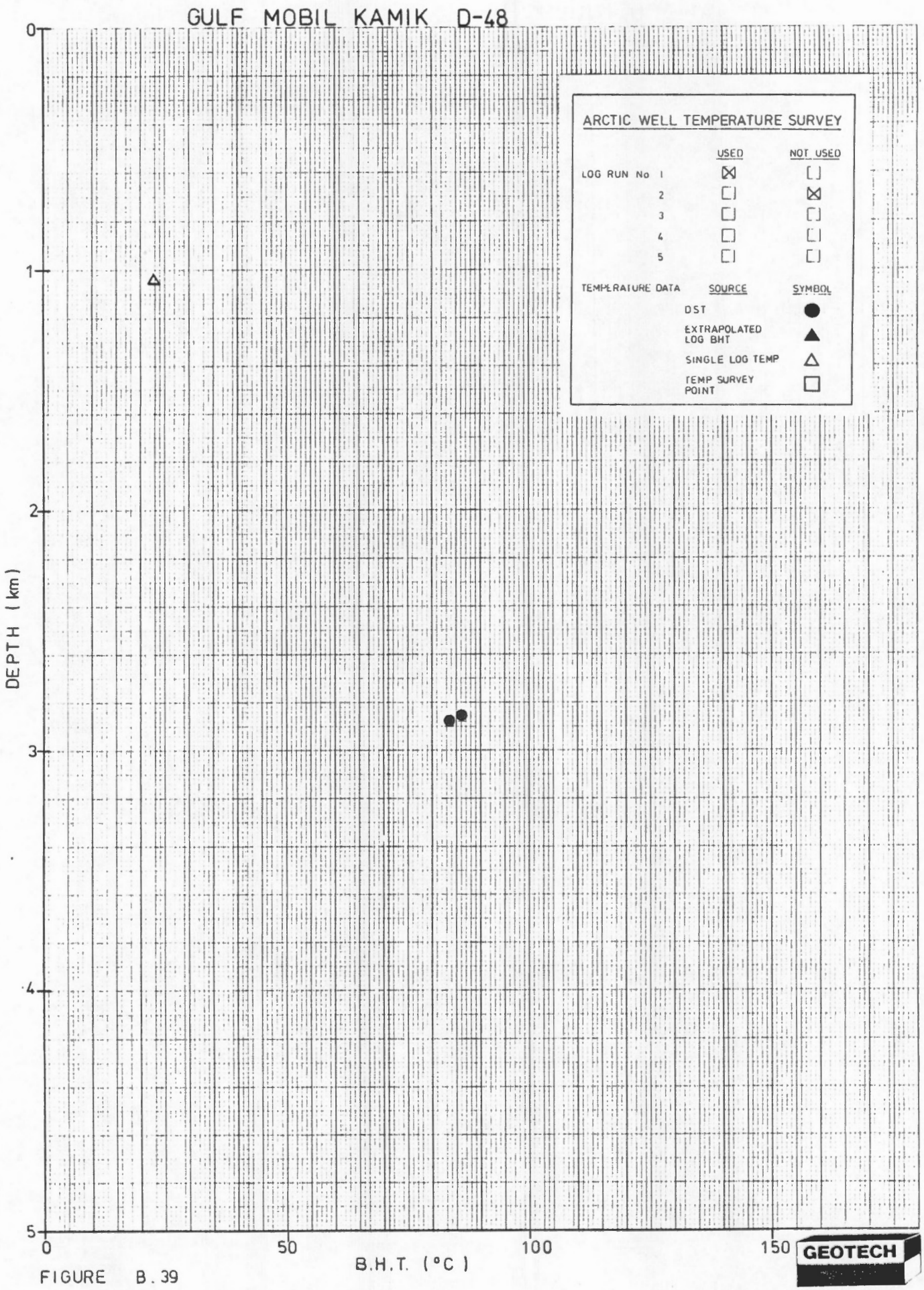

GULF MOBIL KAMIK D-48
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.39

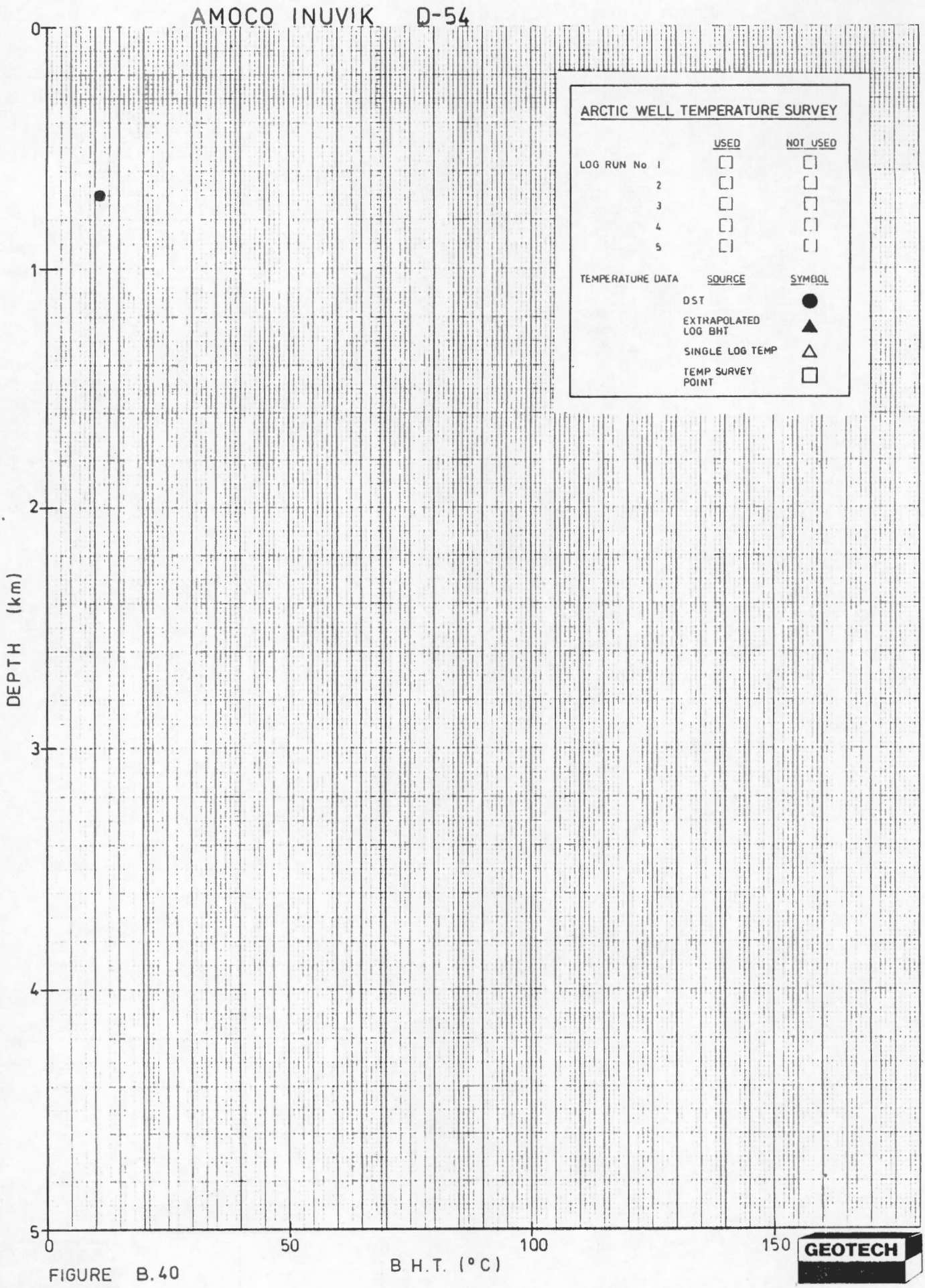


FIGURE B.40

46 1512

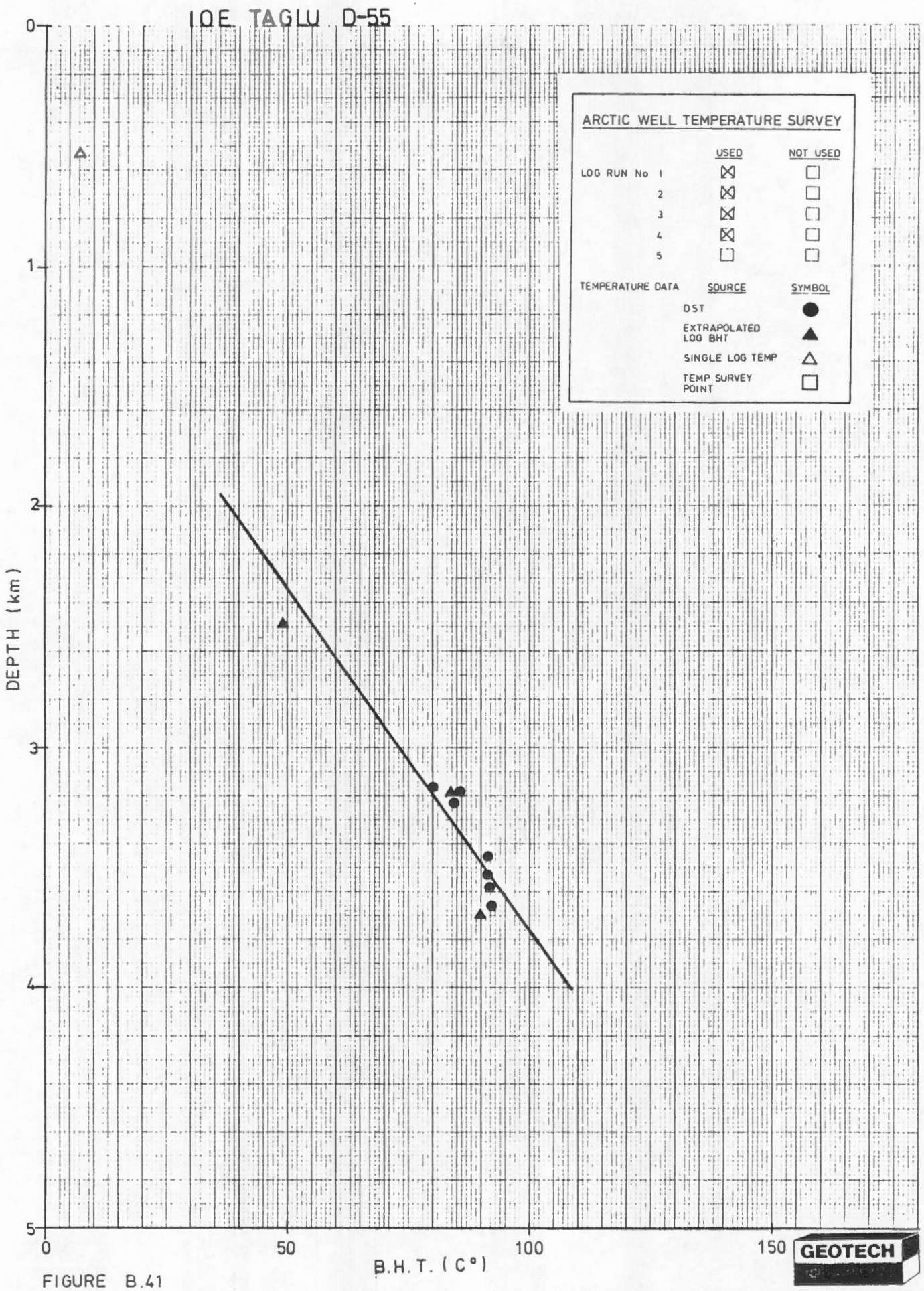


FIGURE B.41

46 1512

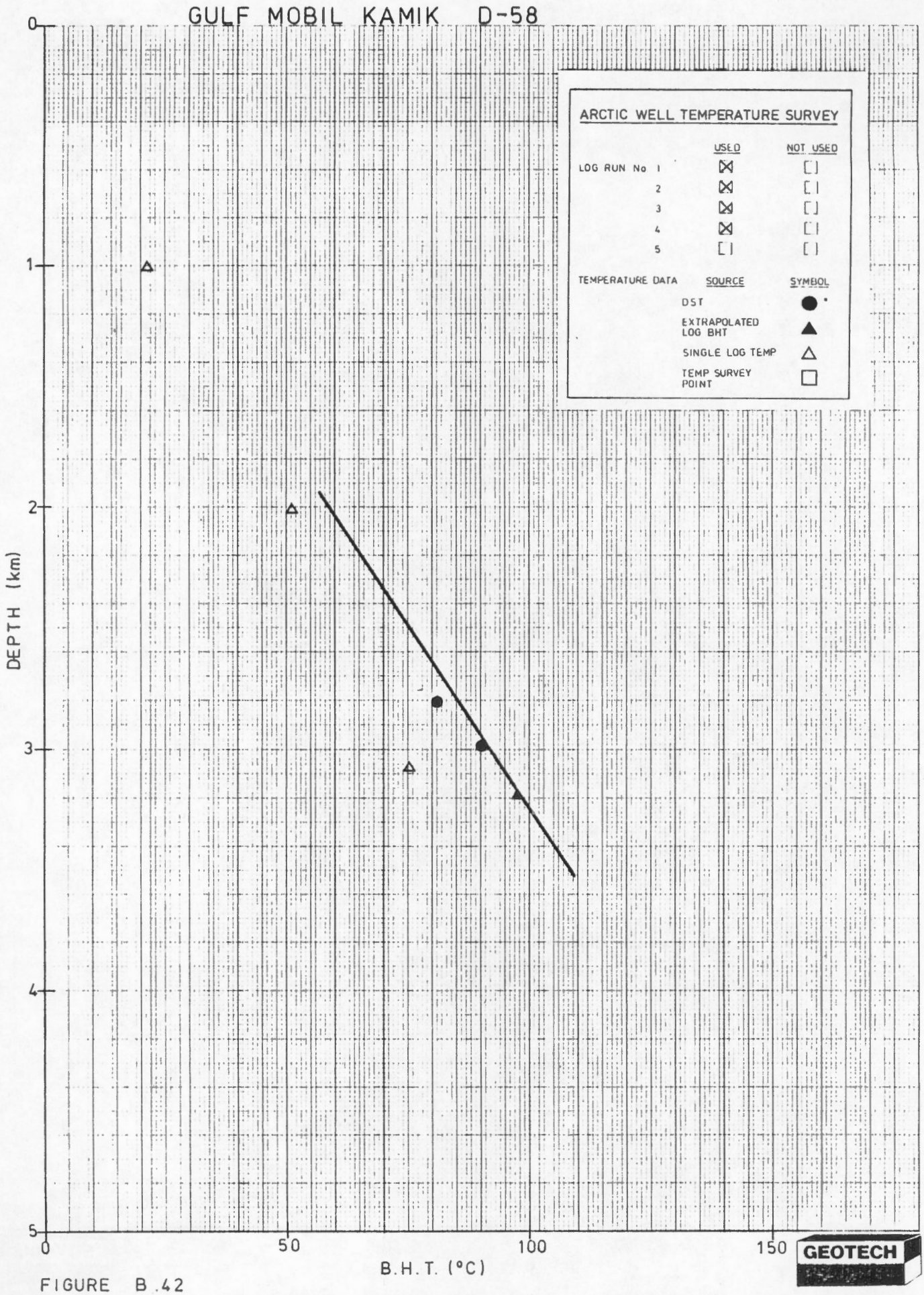

GULF MOBIL KAMIK D-58
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.42

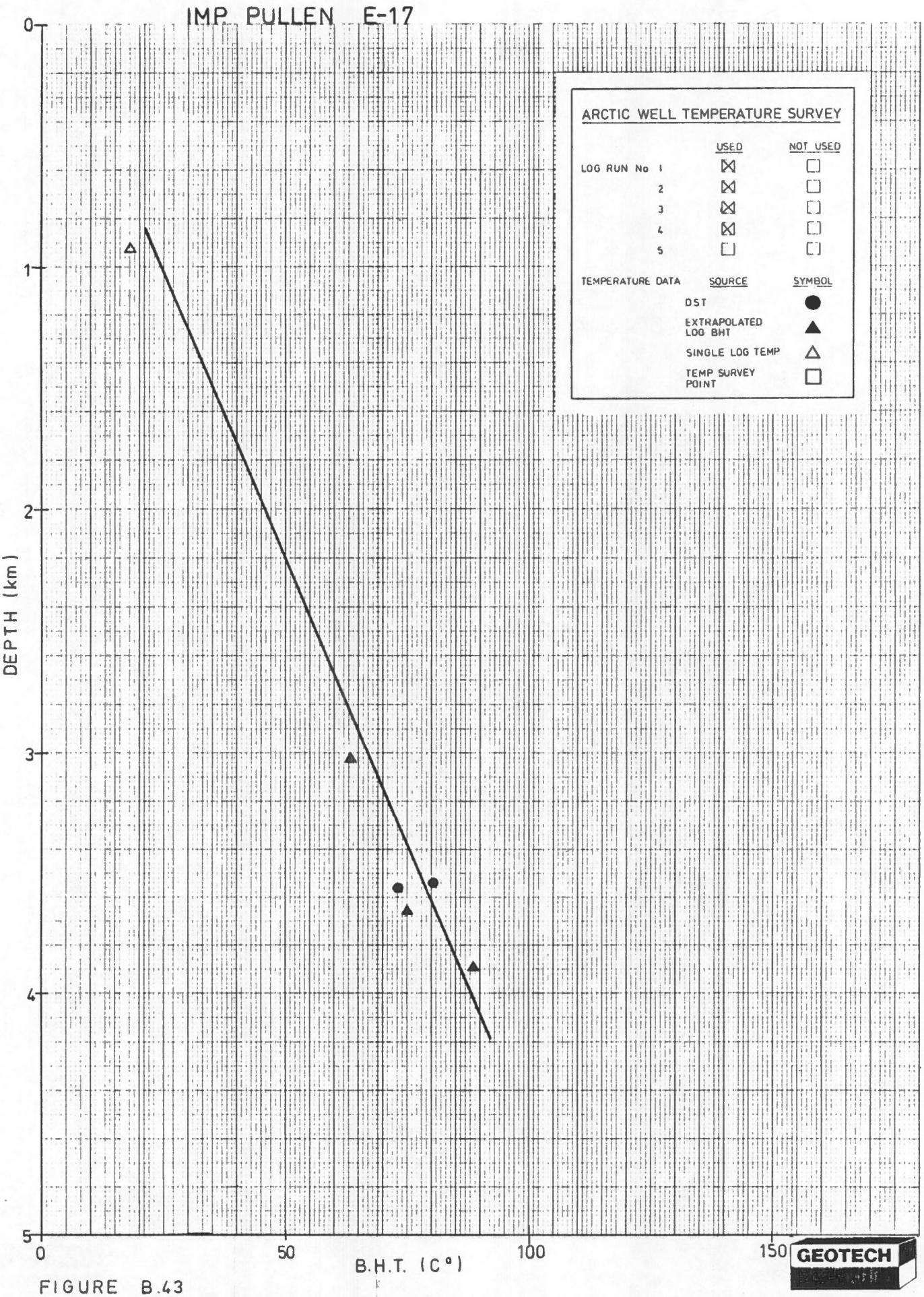

IMP PULLEN E-17
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE B.43

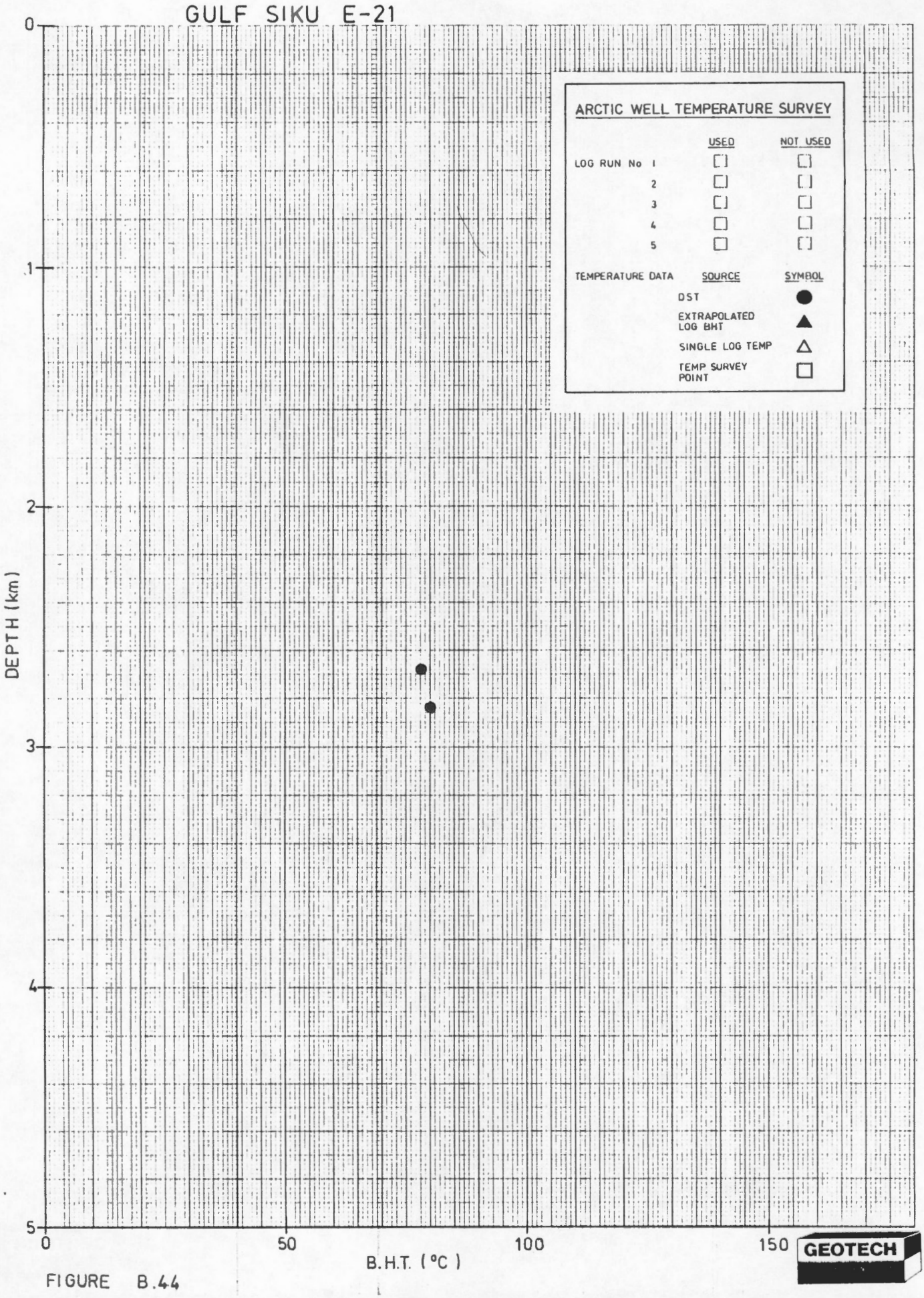

GULF SIKU E-21
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
K+E
GEOTECH

FIGURE B.44

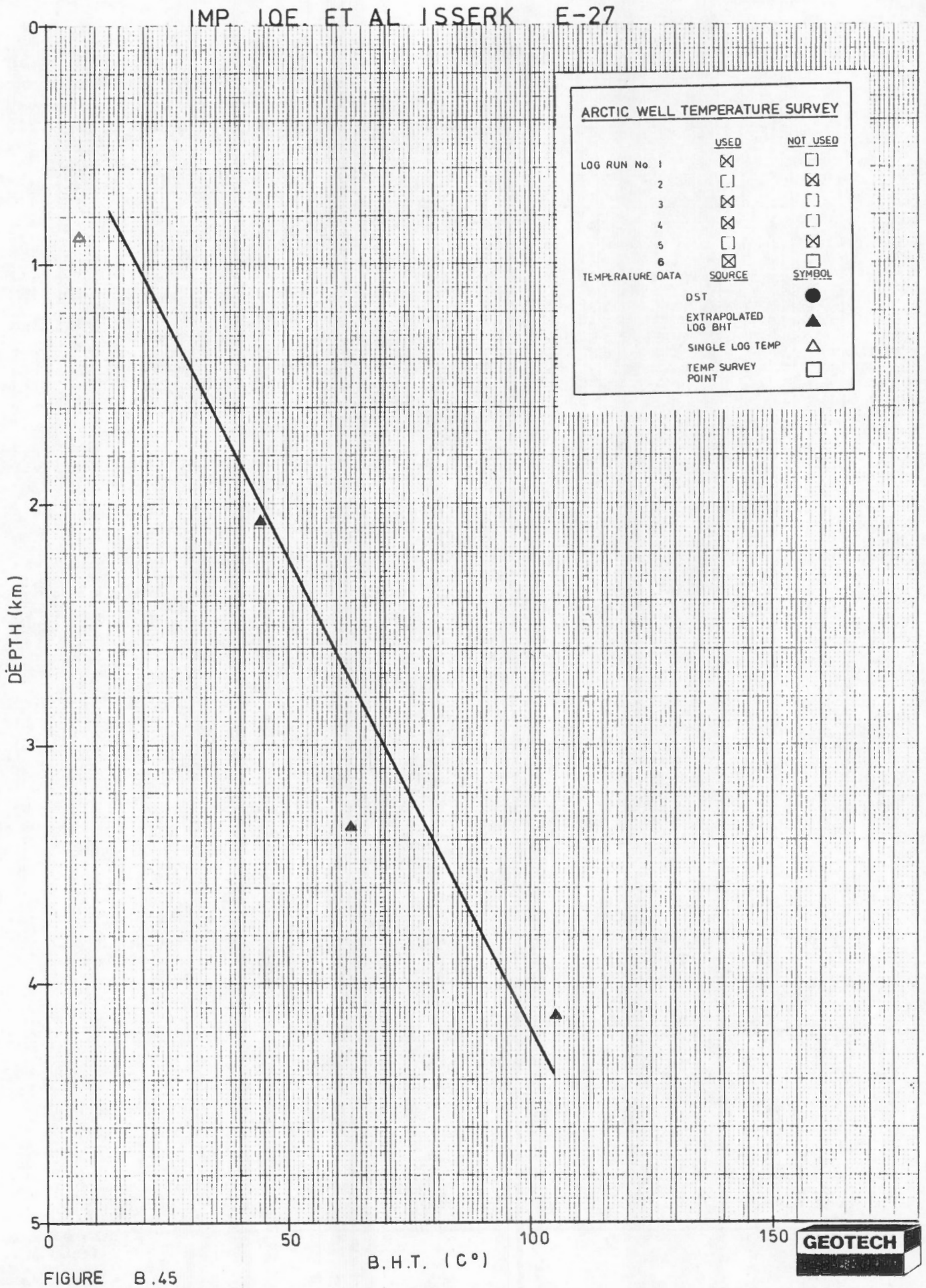

IMP. IOE. ET AL ISSERK E-27
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
6
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.45

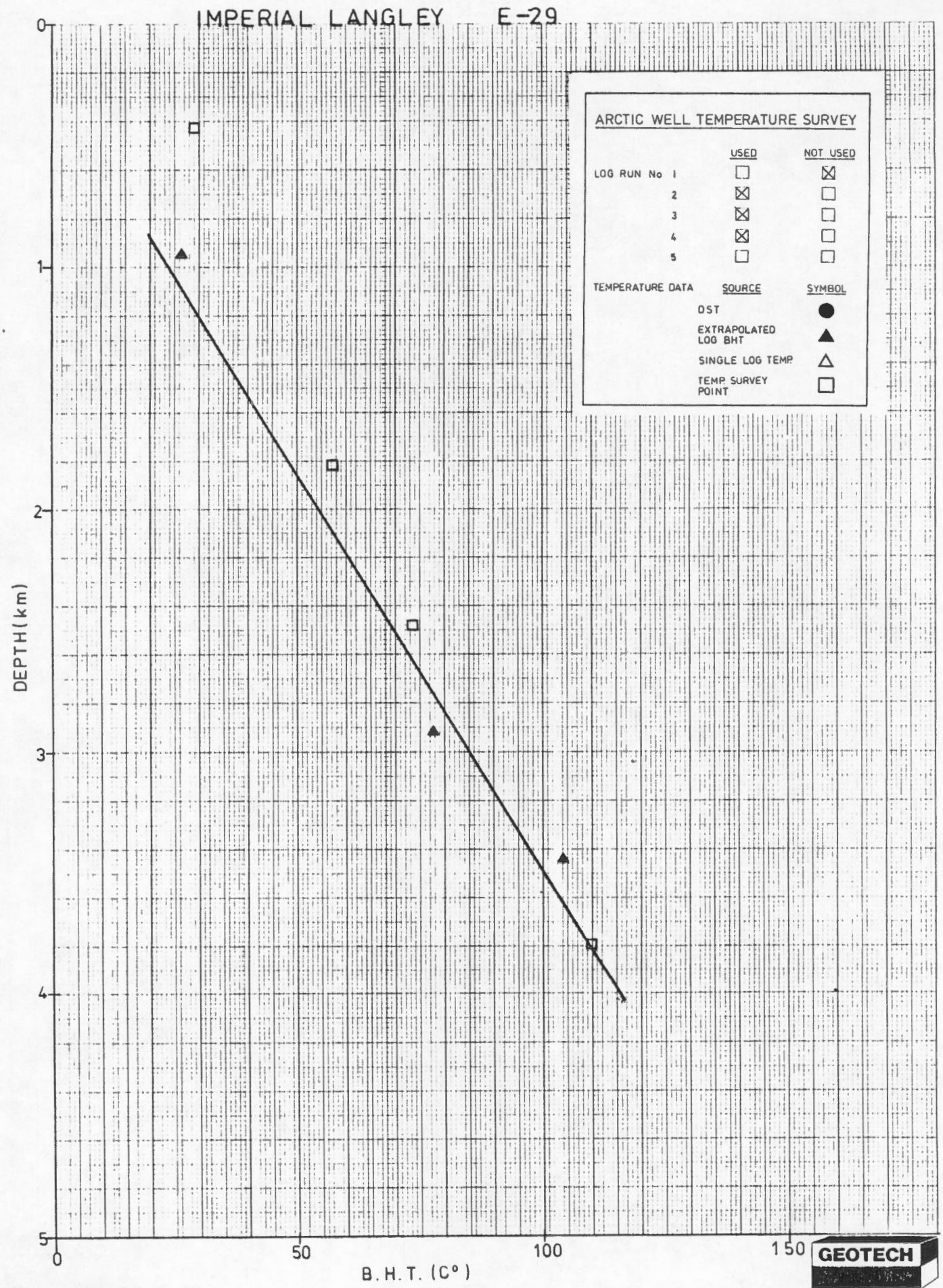


FIGURE B.46

46 1512

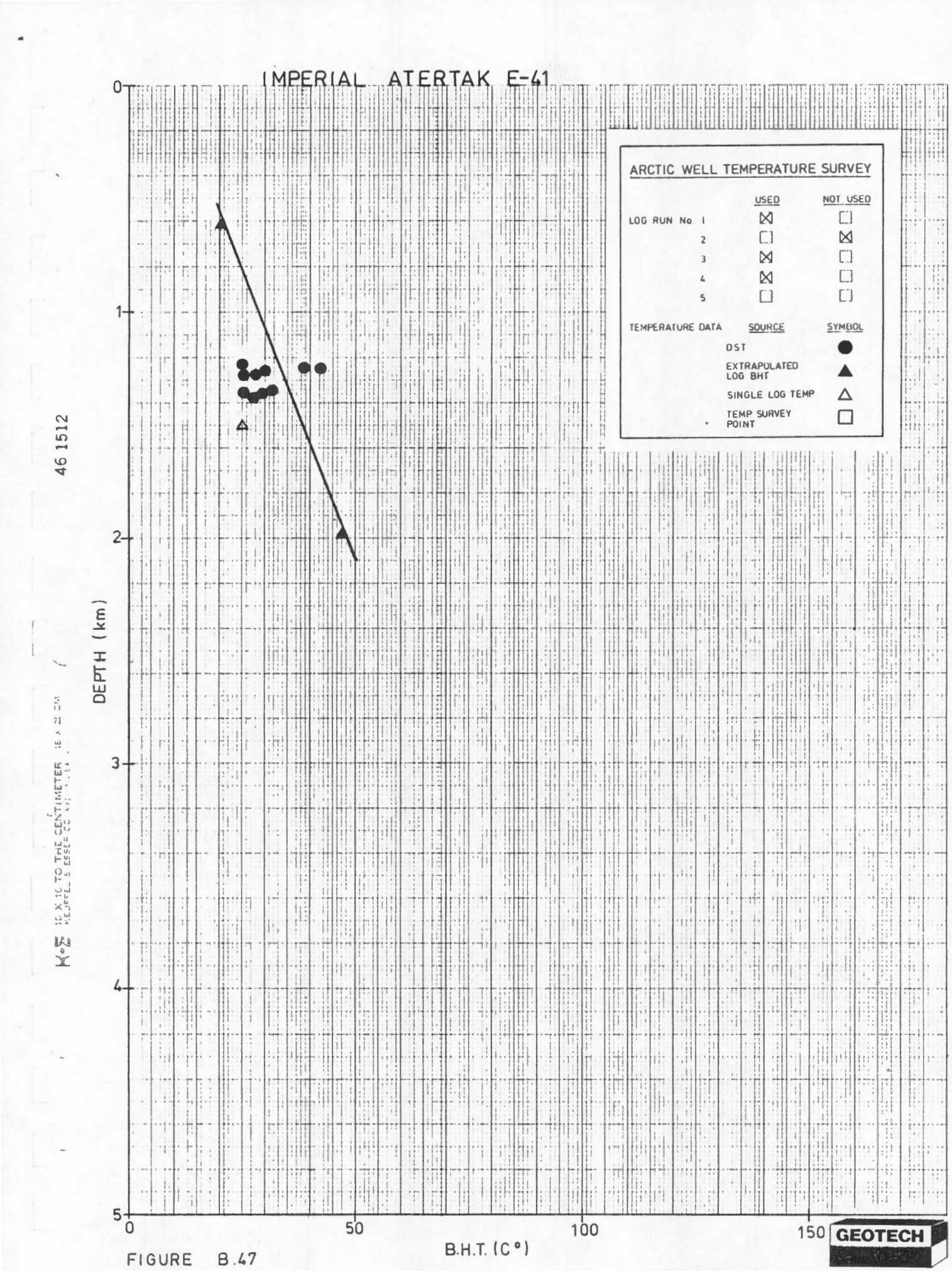

IMPERIAL ATERTAK E-41
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE B.47

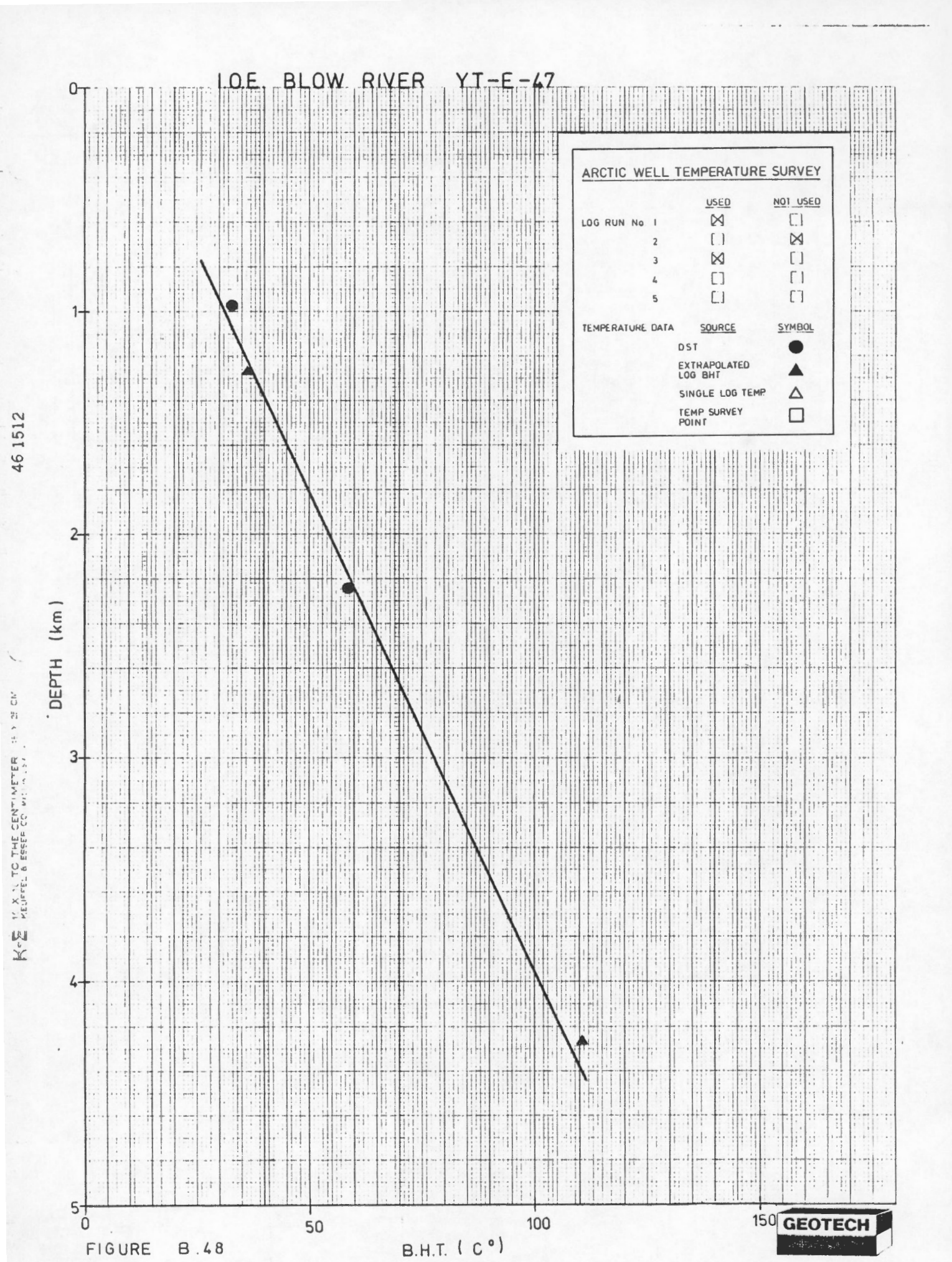


FIGURE B.48

46 1512

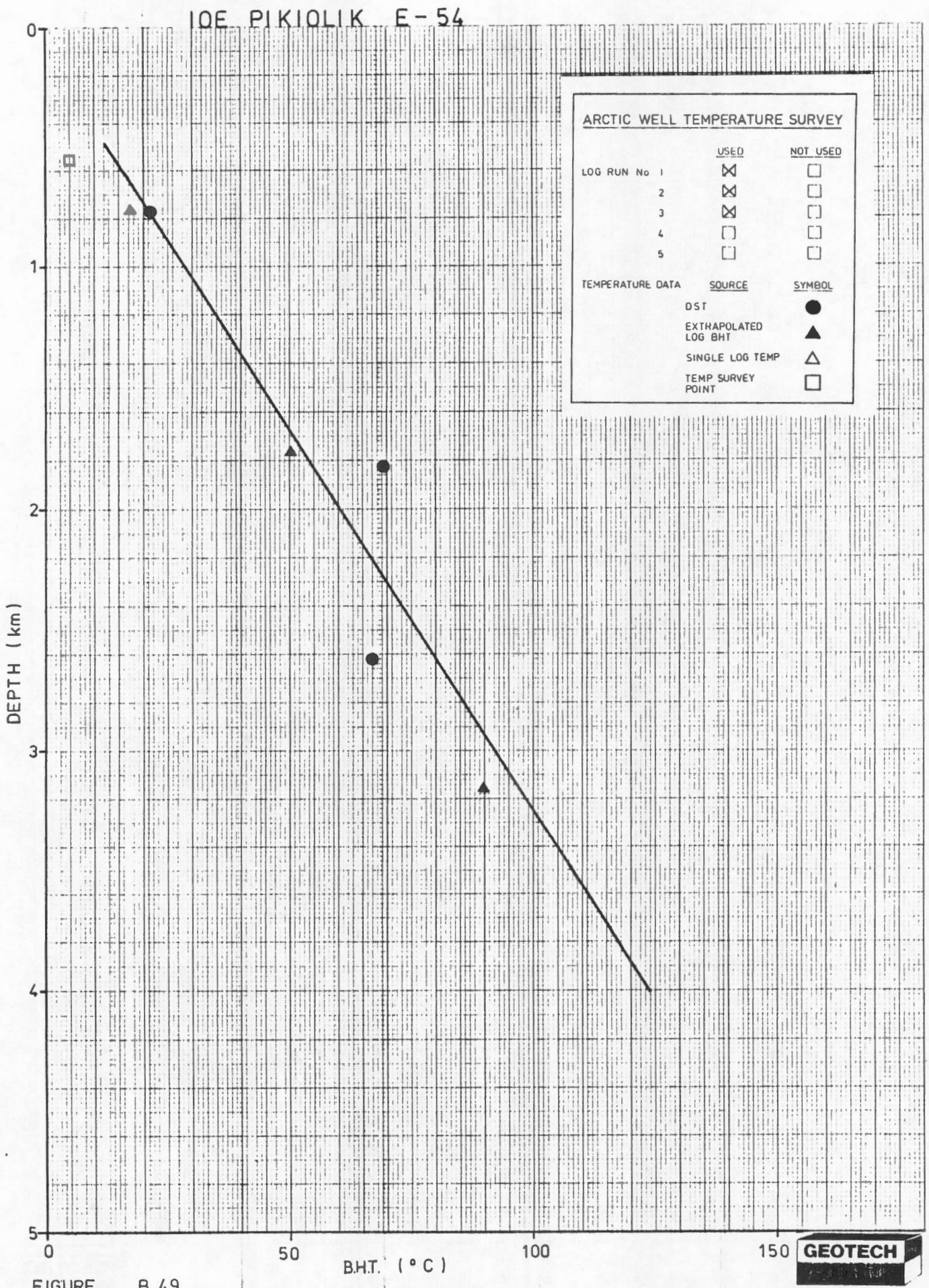

IOE PIKIOLIK E-54
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.49

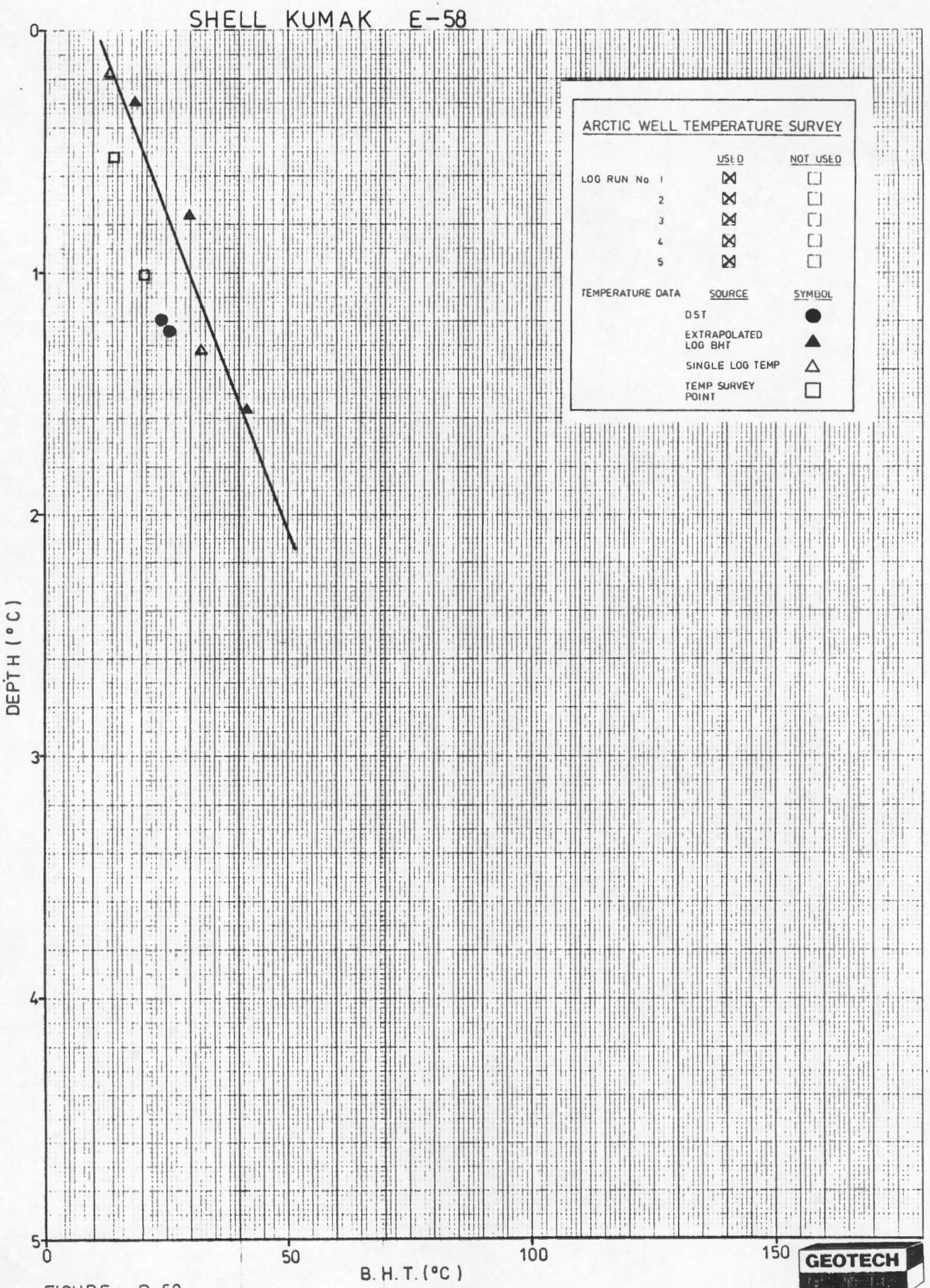

SHELL KUMAK E-58
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (°C)
0
1
2
3
4
5
0
50
100
150
B. H. T. (°C)
GEOTECH

FIGURE B.50

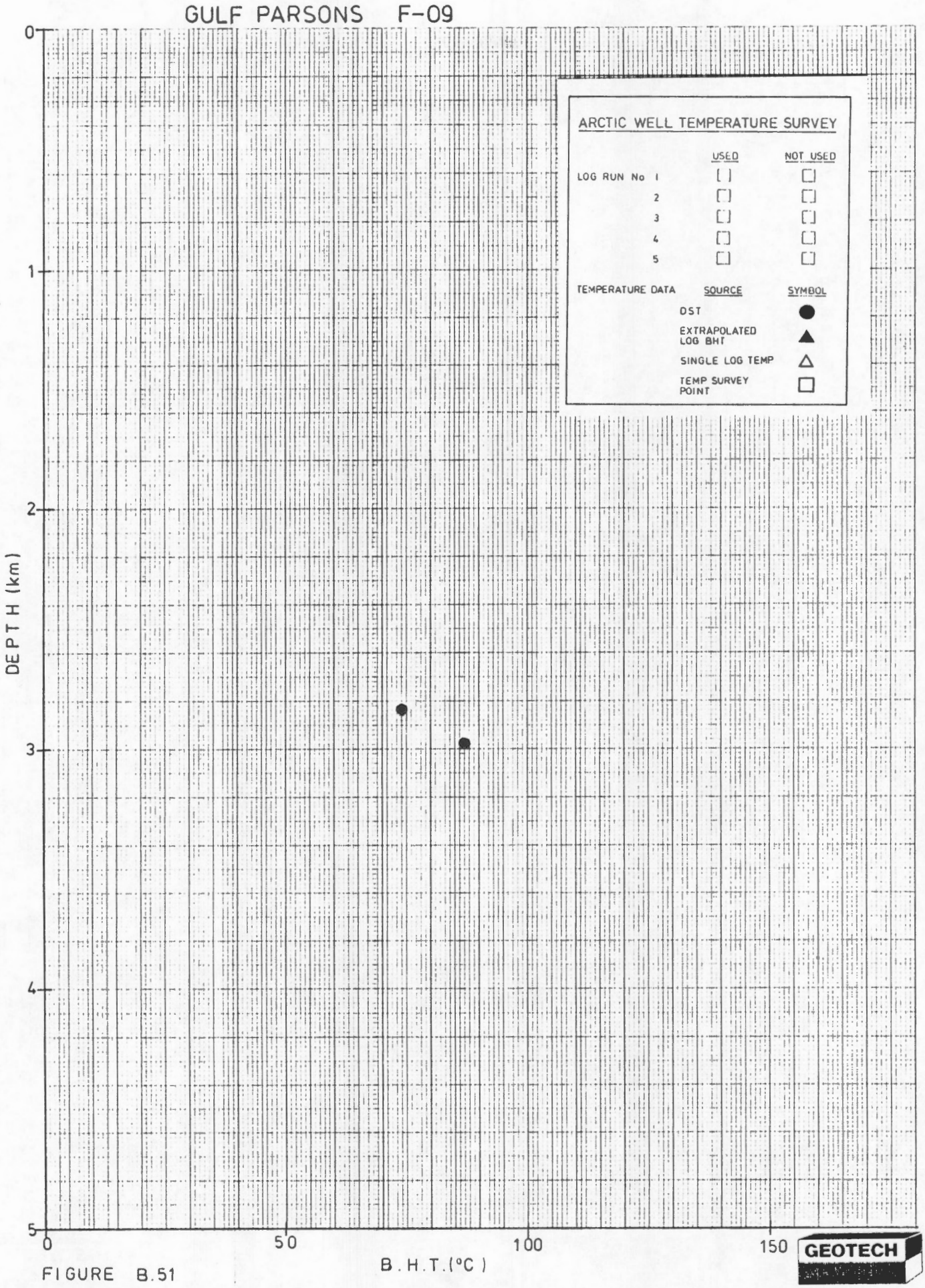

GULF PARSONS F-09
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
46 1512
GEOTECH

FIGURE B.51

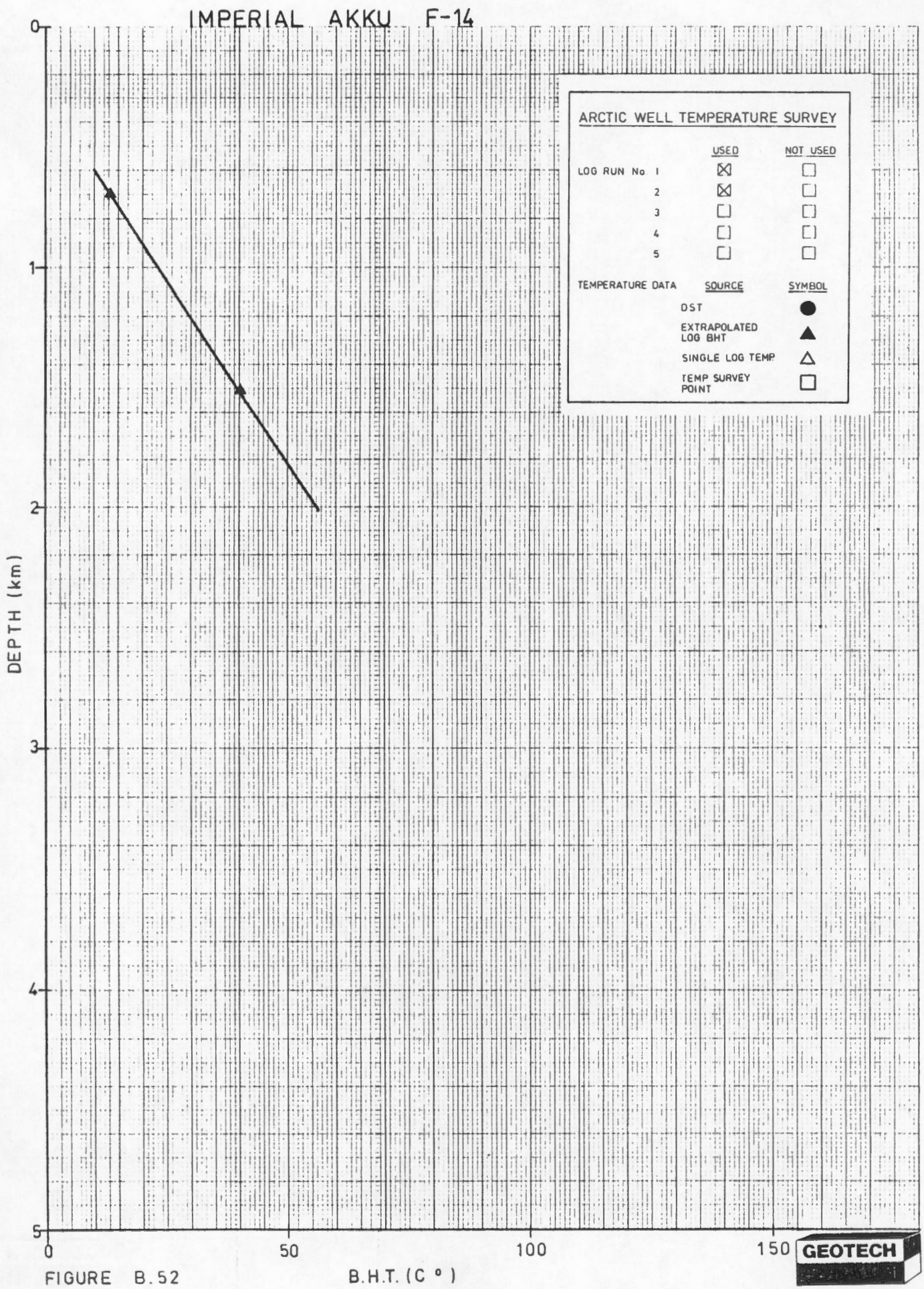


FIGURE B.52

46 1512

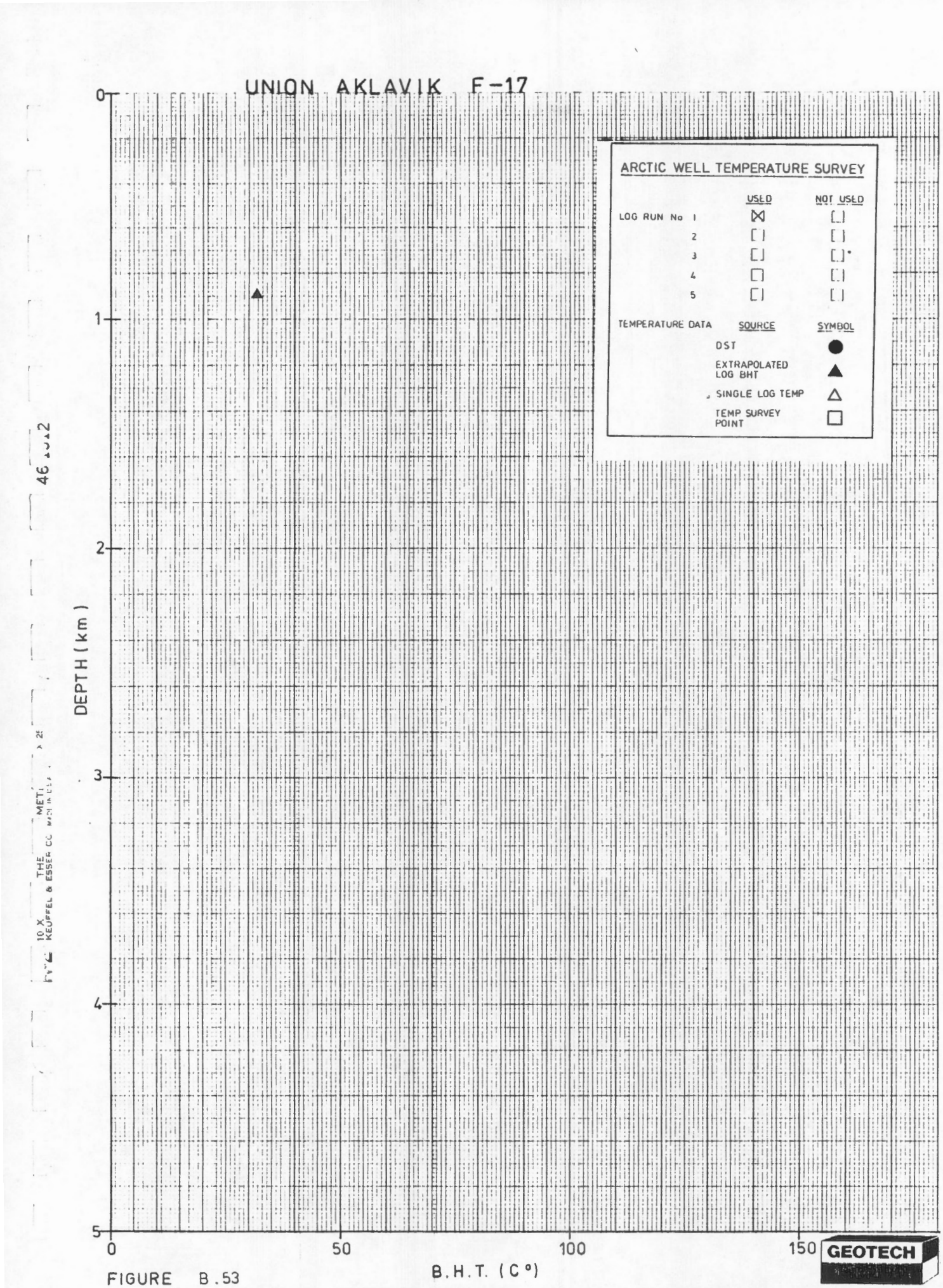

UNION AKLAVIK F-17
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.53

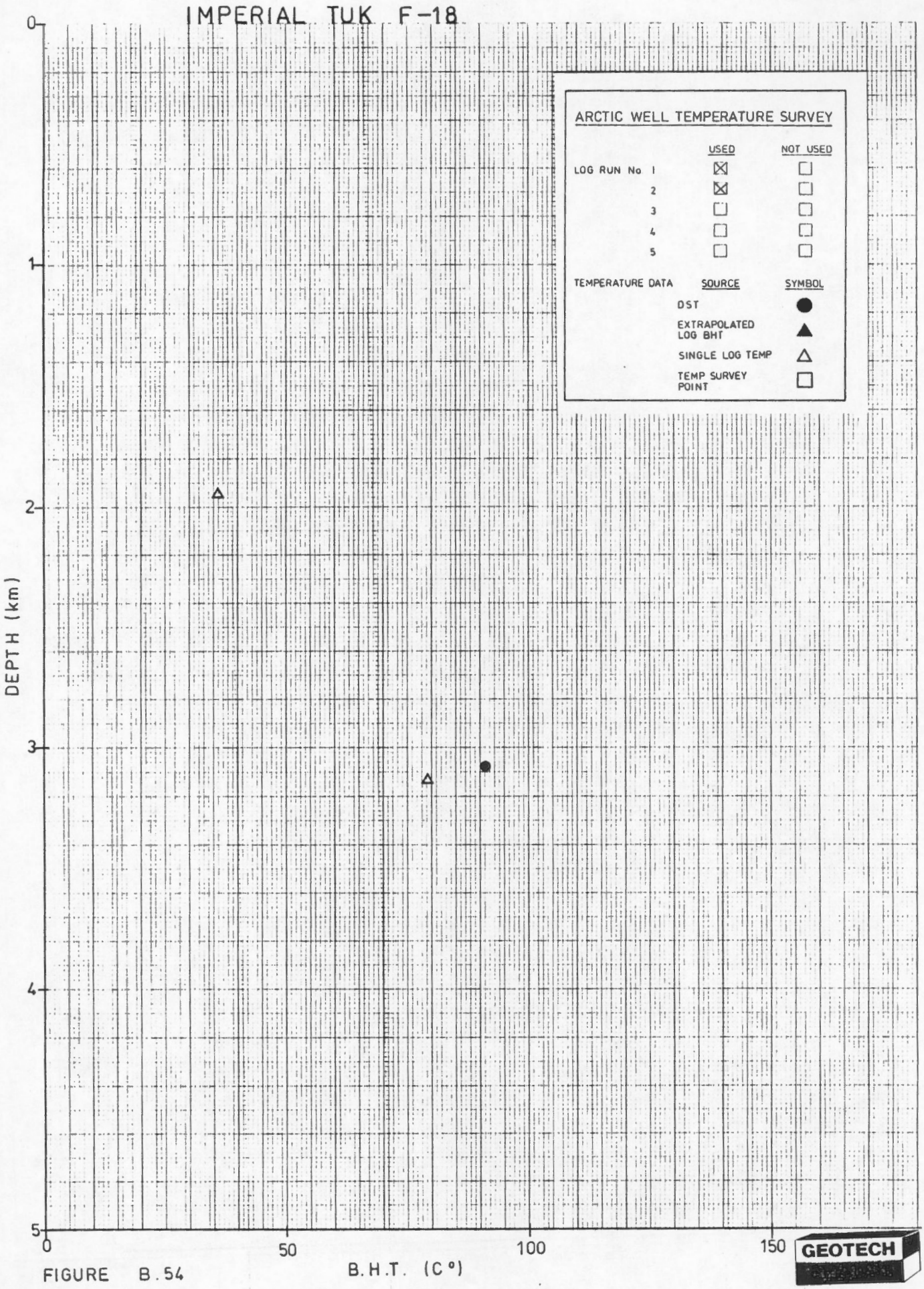


FIGURE B.54

46 1512

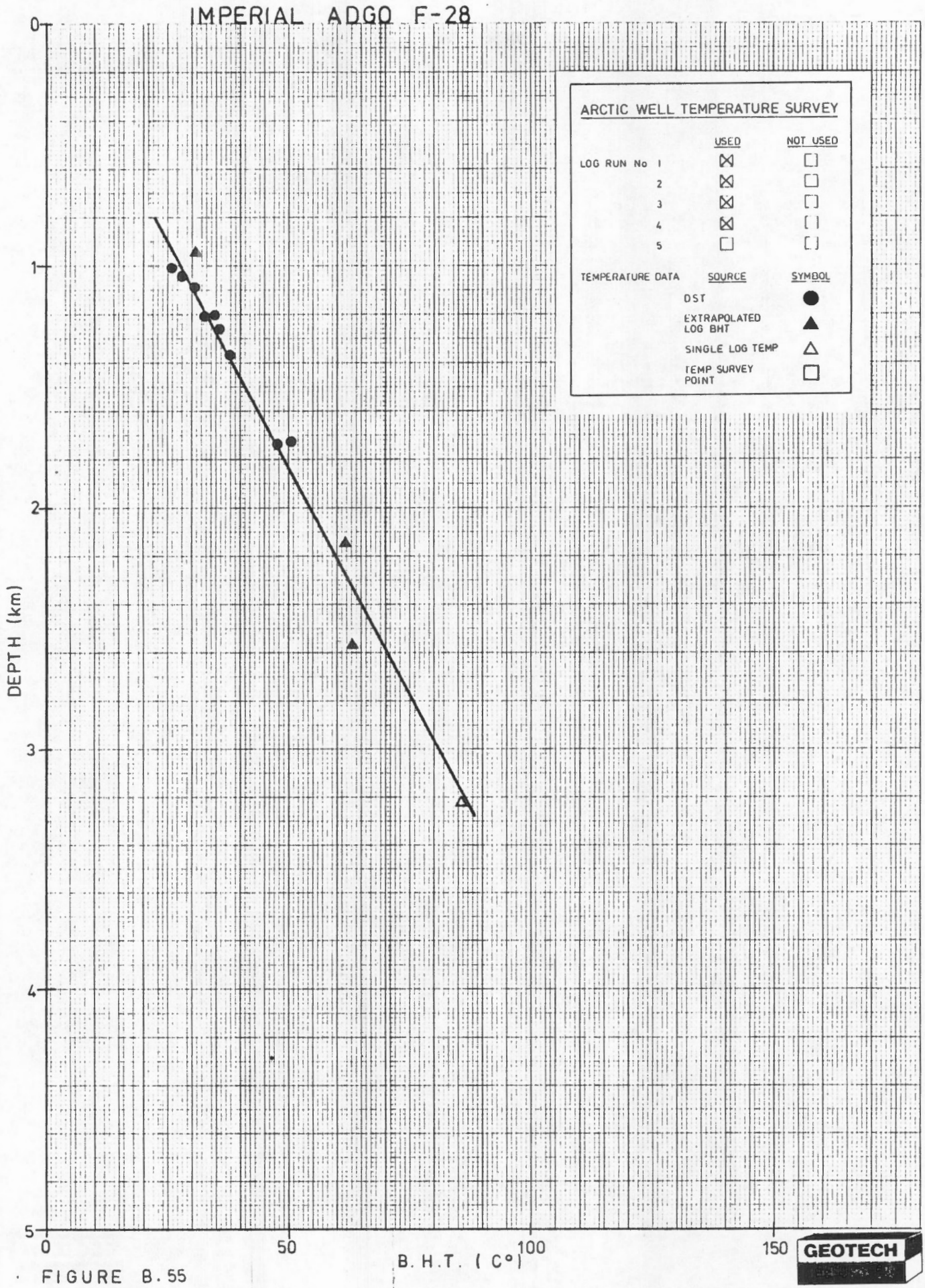

IMPERIAL ADGO F-28
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.55

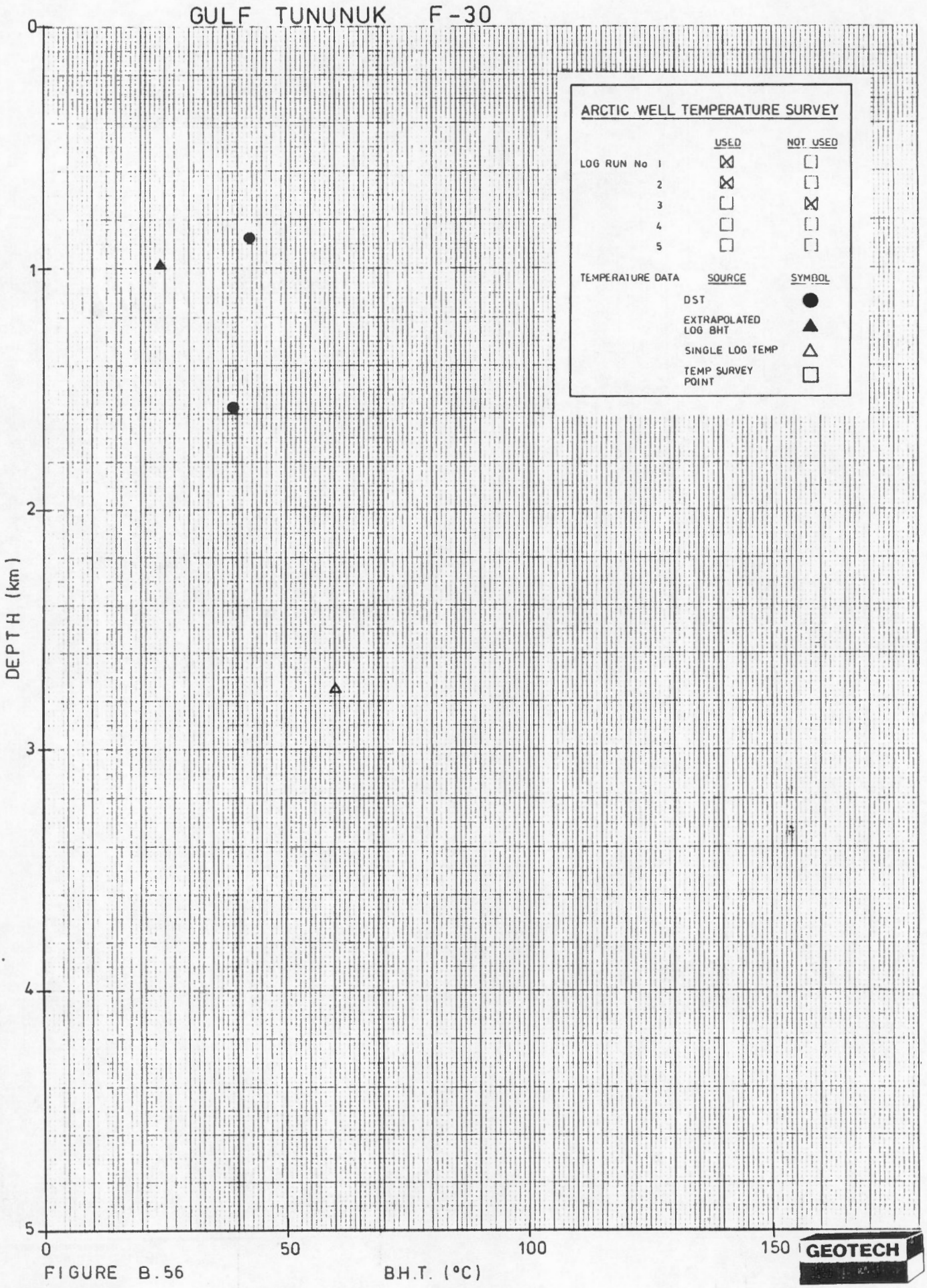

GULF TUNUNUK F-30
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.56

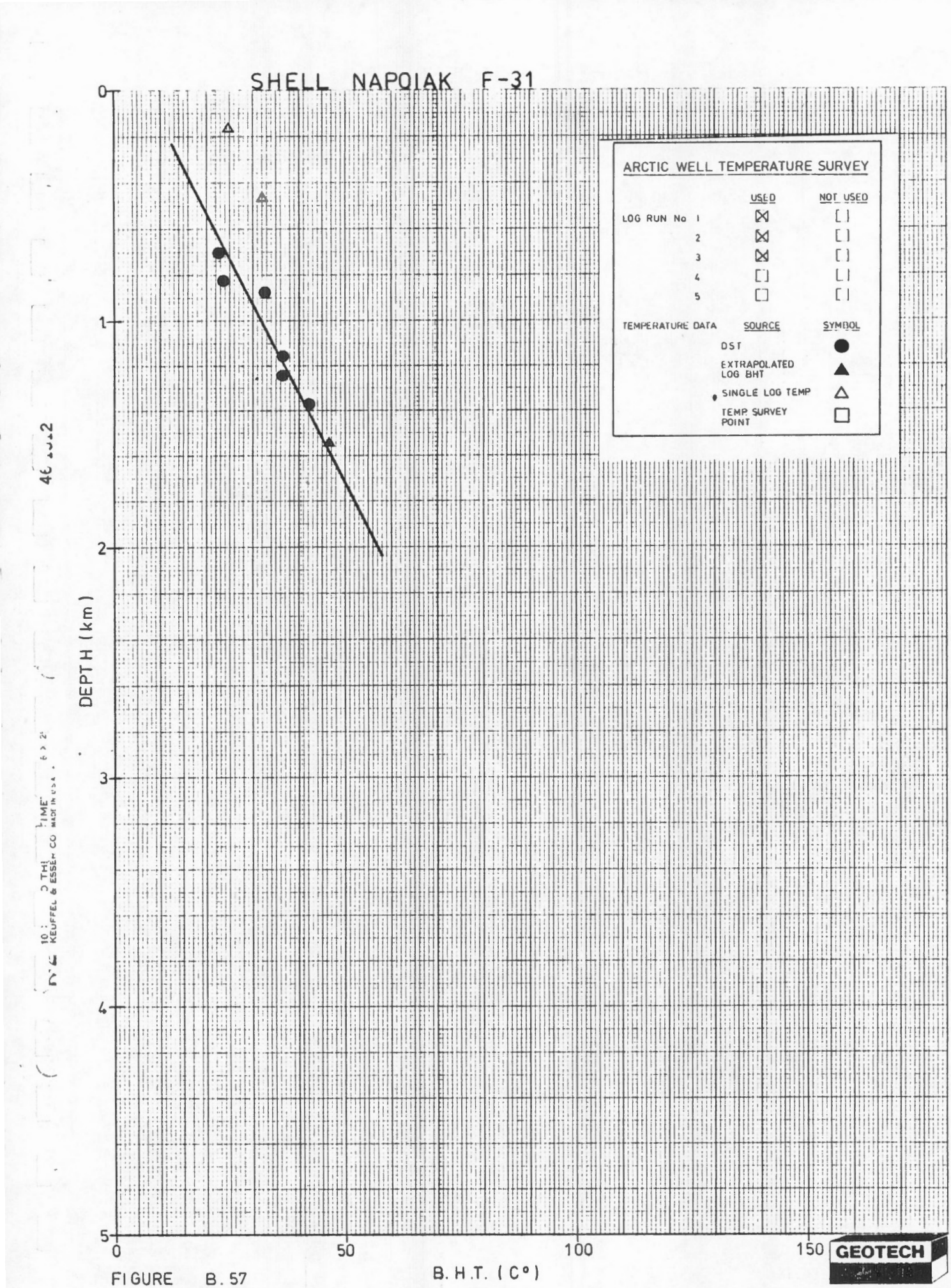

SHELL NAPOIAK F-31
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (C°)
GEOTECH

FIGURE B. 57

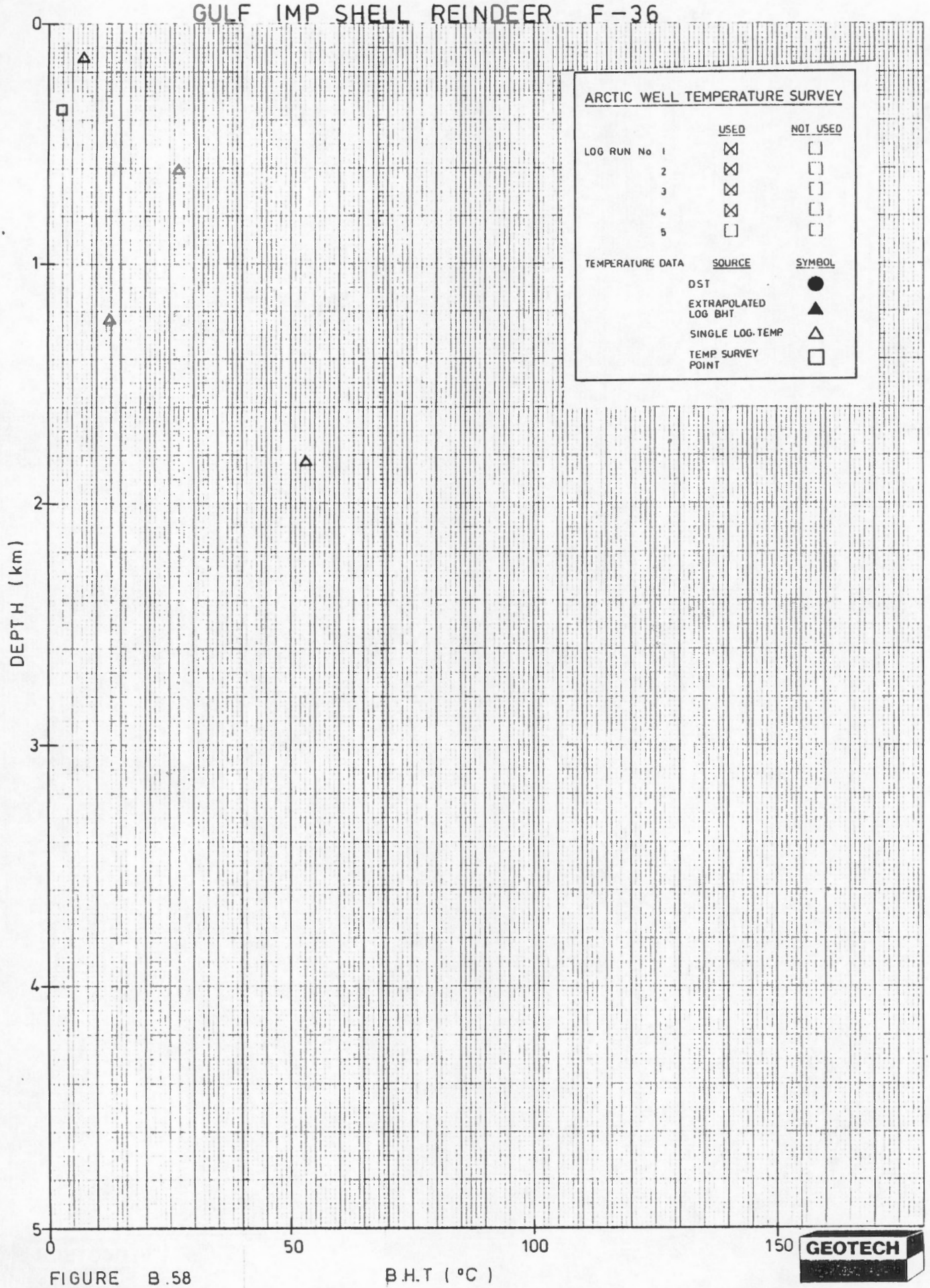


FIGURE B.58

4b 1512

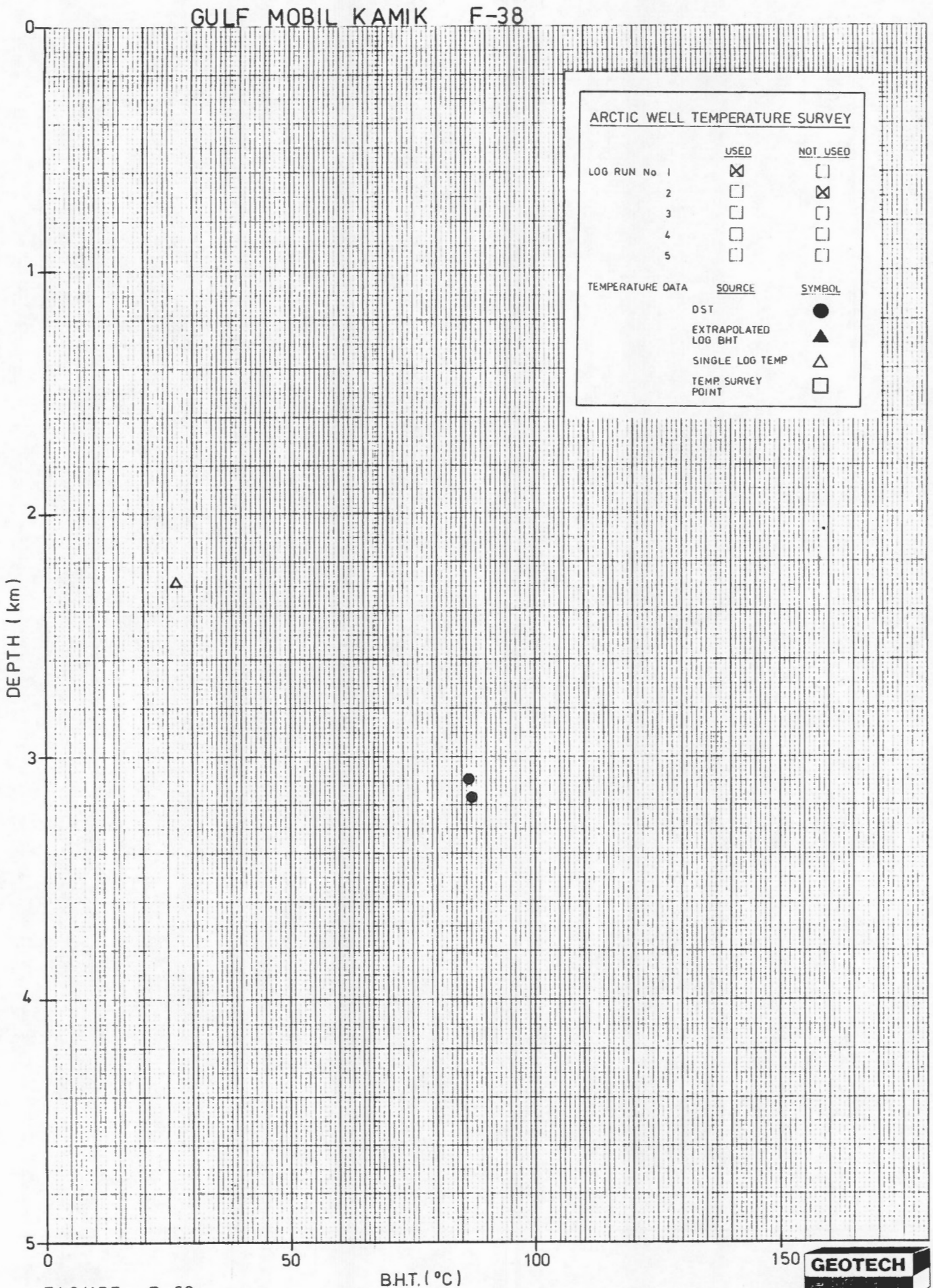

GULF MOBIL KAMIK F-38
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.59

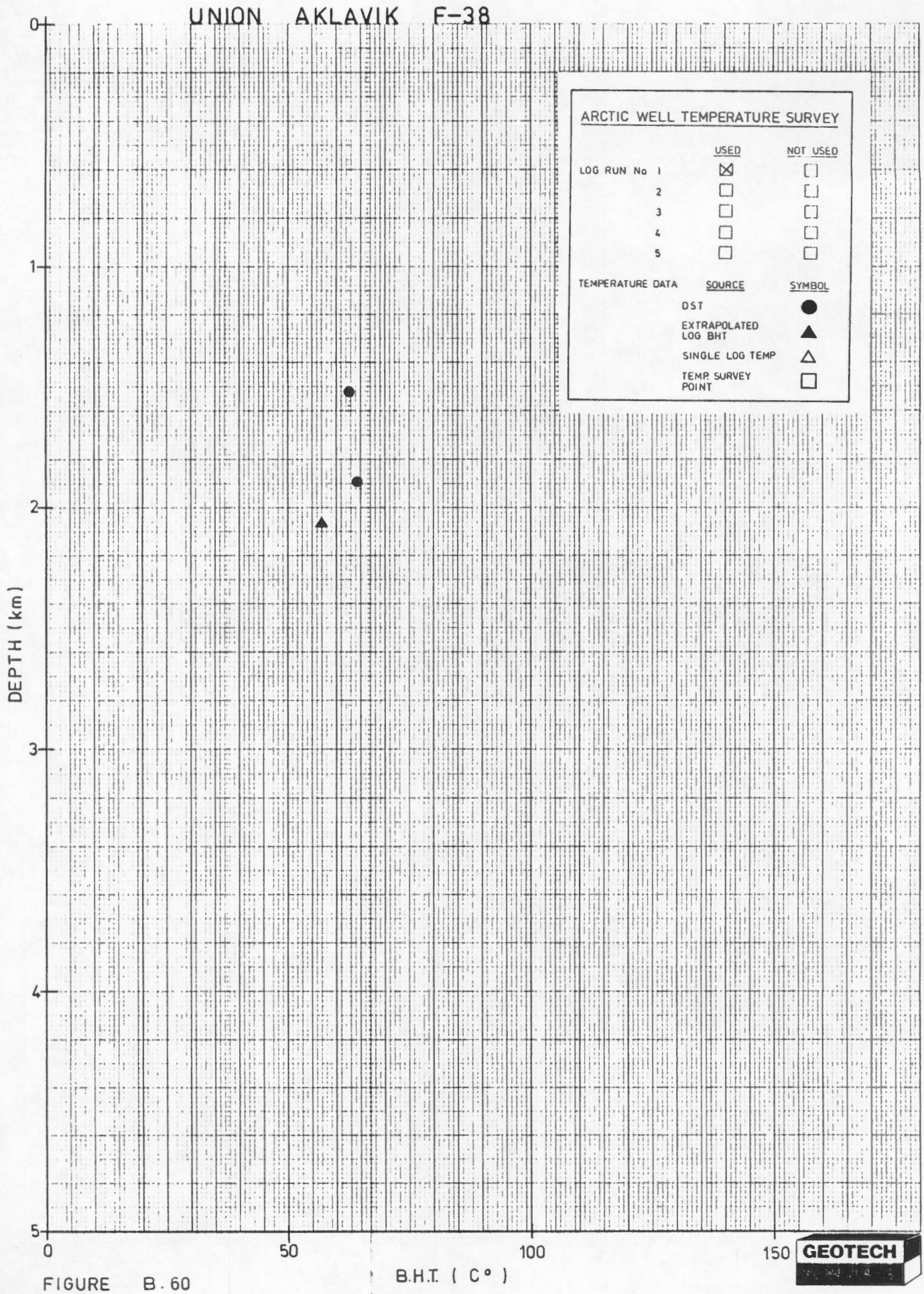


FIGURE B.60

46 1512

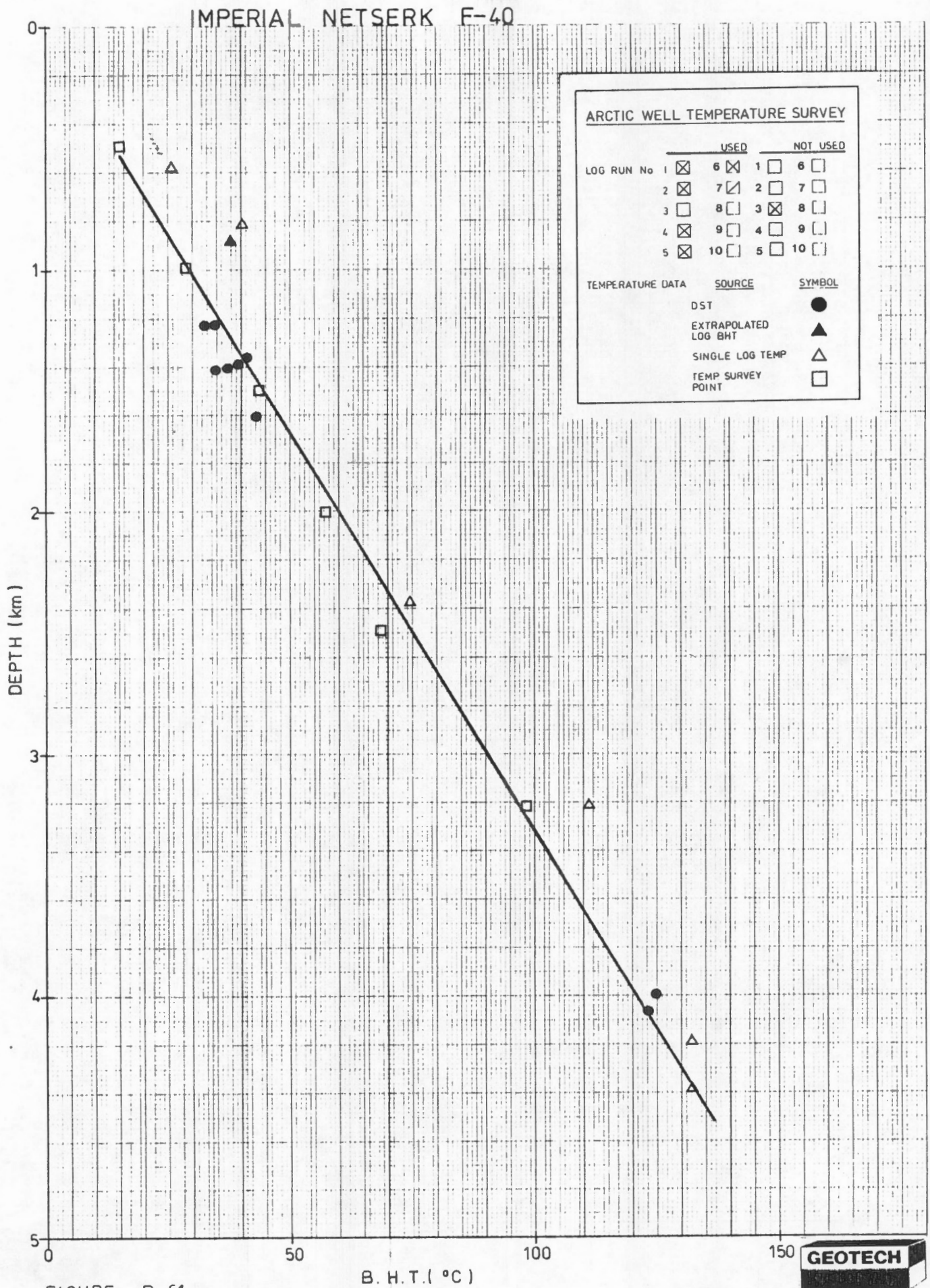

IMPERIAL NETSERK F-40
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1 6 1 6
2 7 2 7
3 8 3 8
4 9 4 9
5 10 5 10
TEMPERATURE DATA SOURCE SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (°C)
46 1512
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B. 61

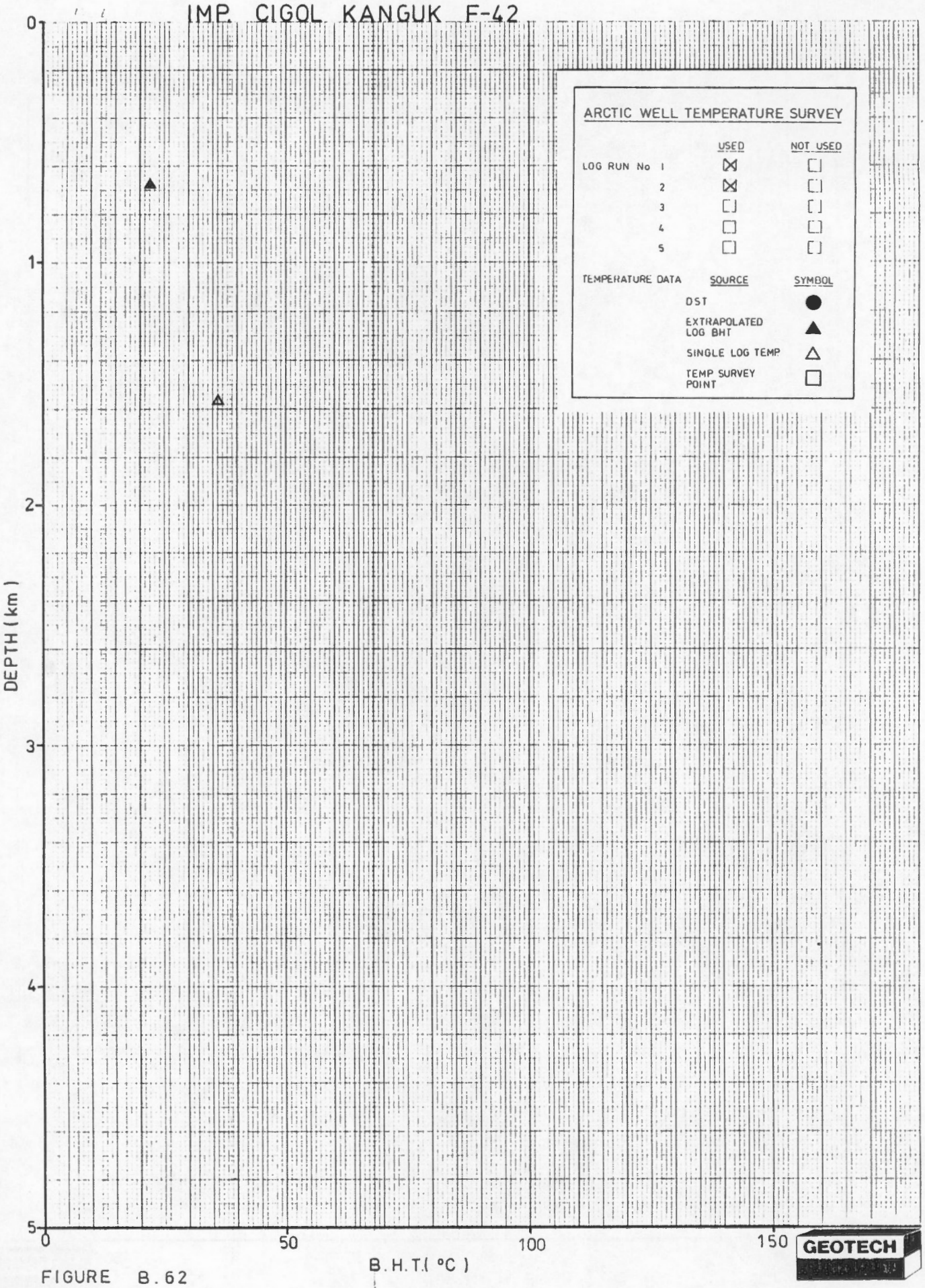

IMP. CIGOL KANGUK F-42
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE B.62

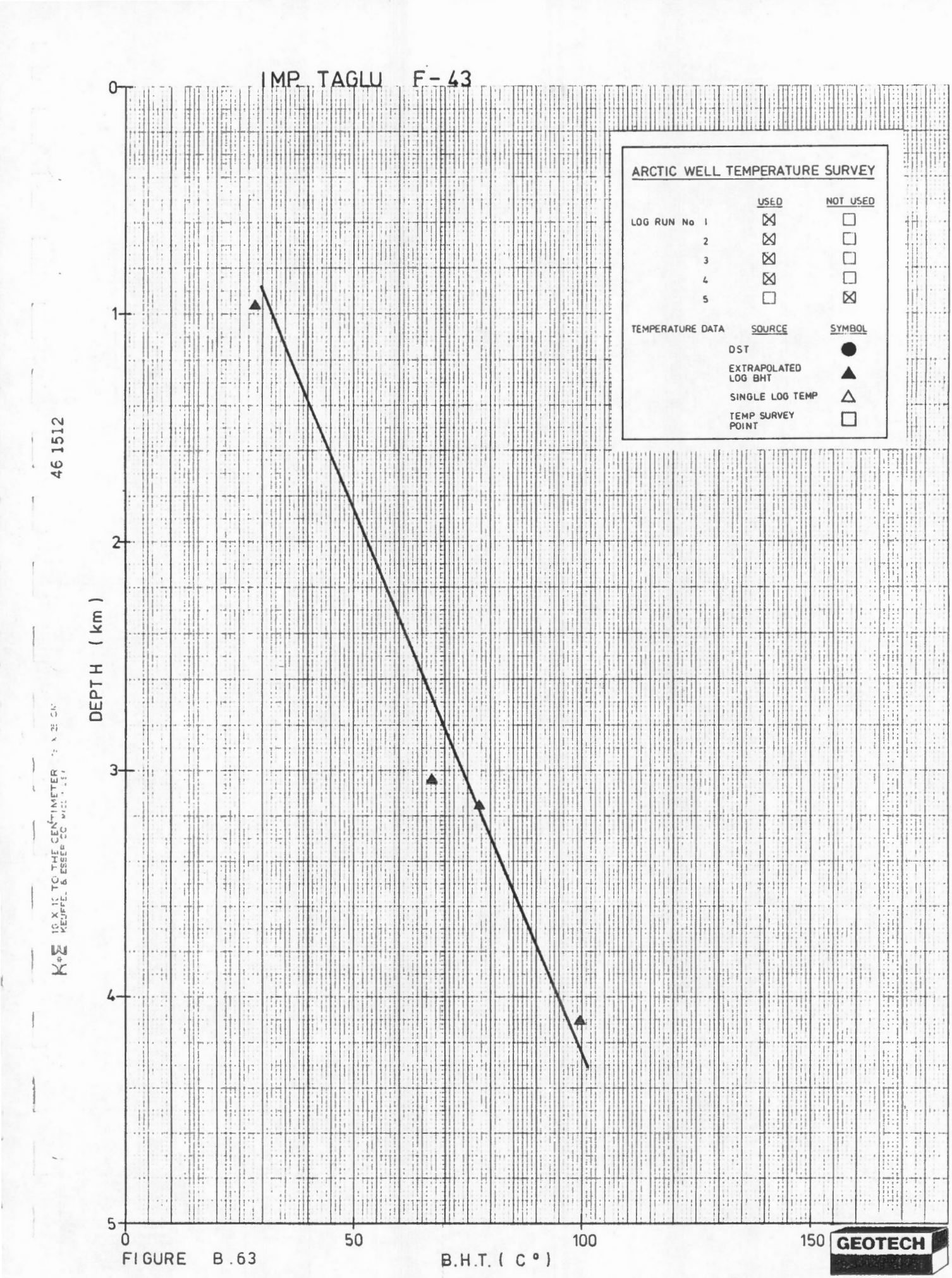

IMP. TAGLU F-43
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE B.63

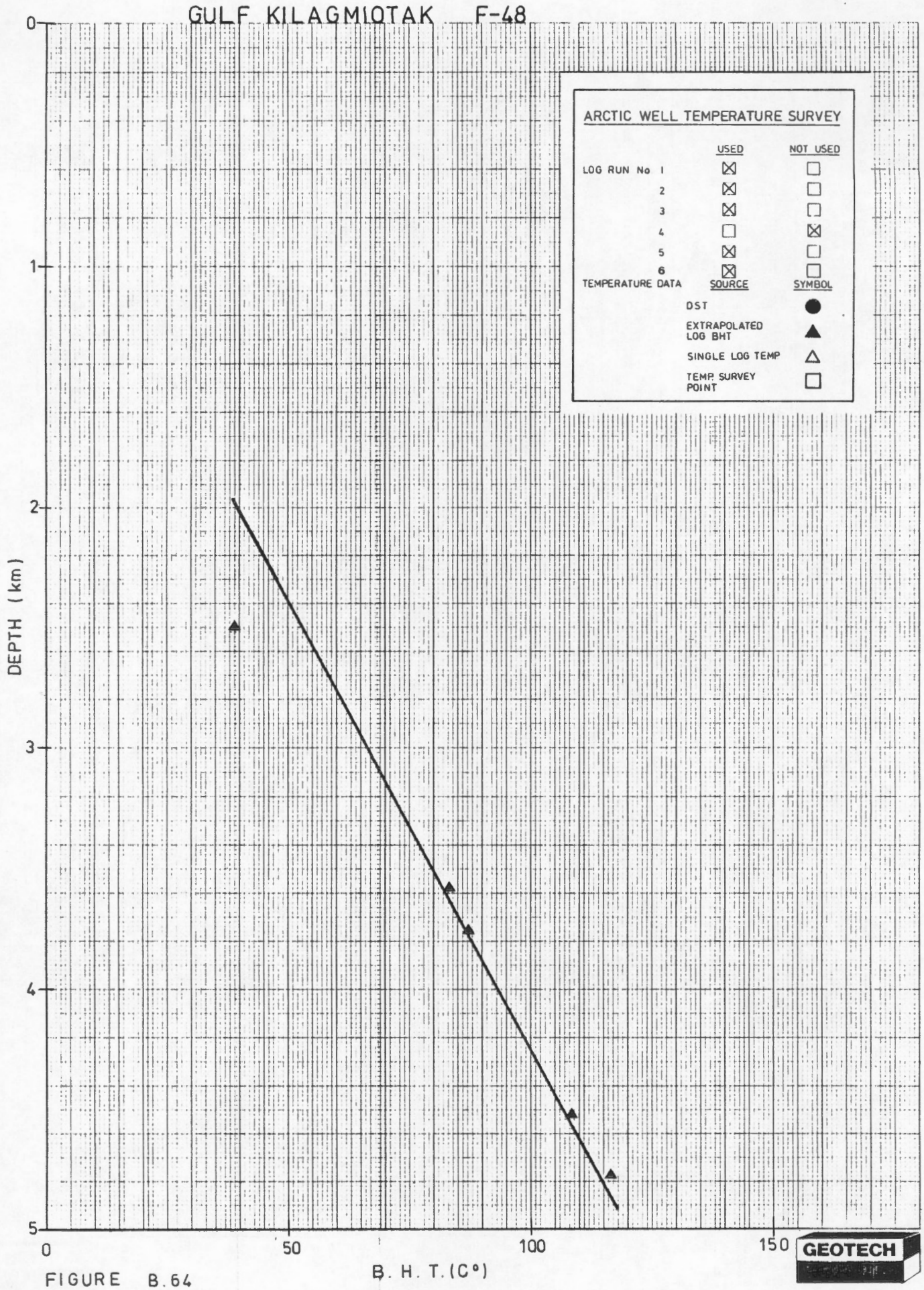


FIGURE B.64

46 1512

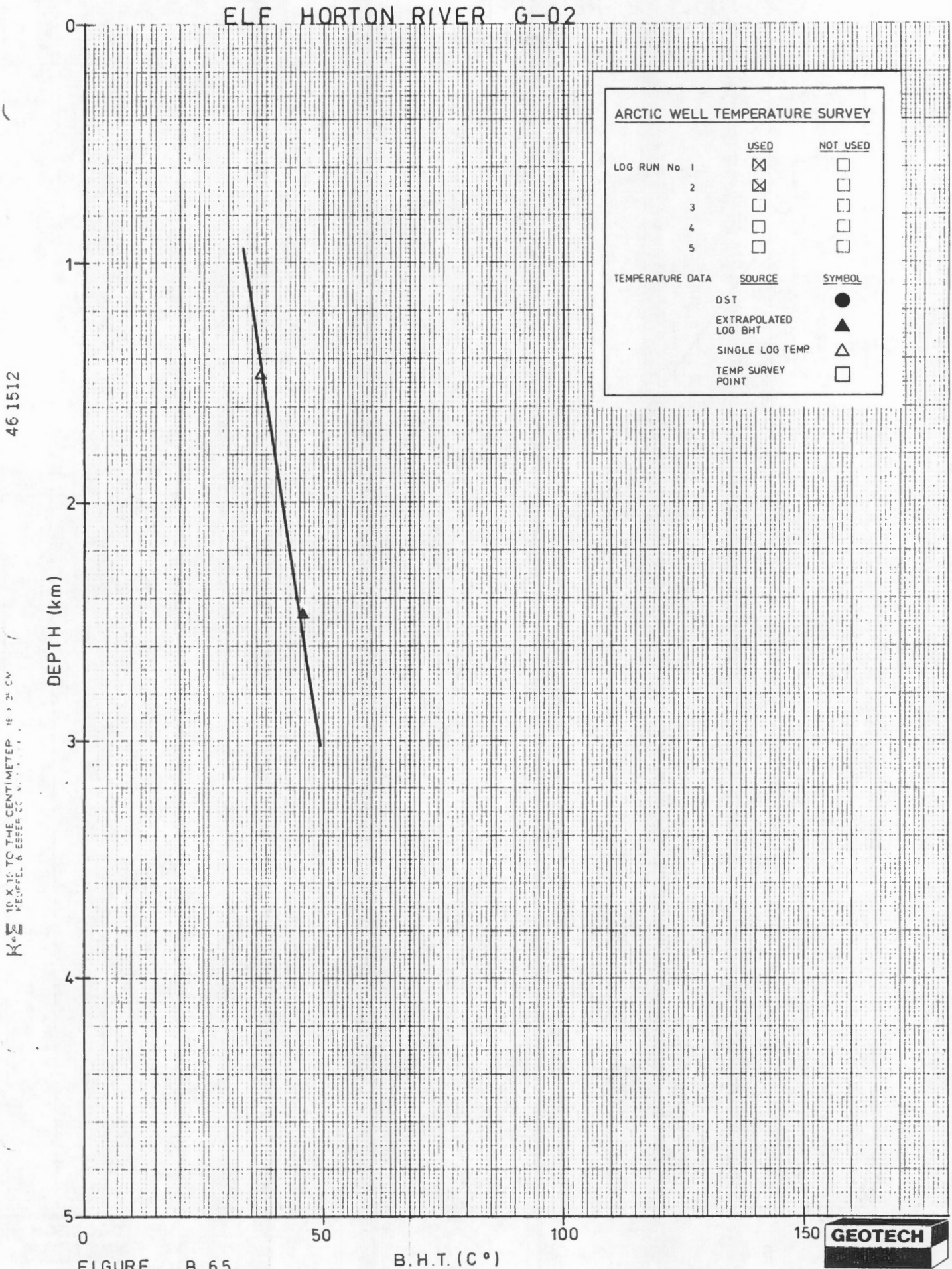

ELF HORTON RIVER G-02
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE B.65

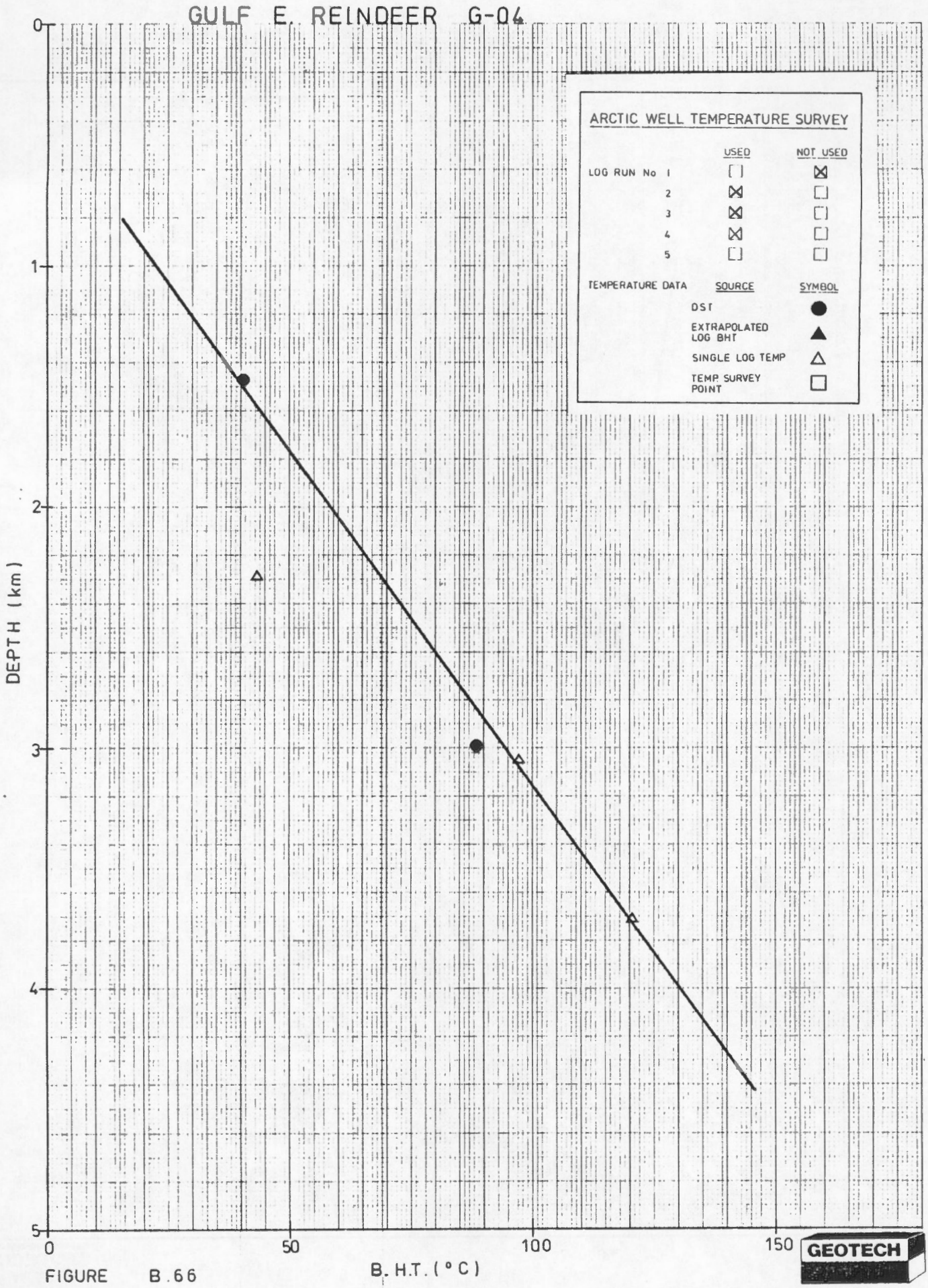


FIGURE B.66

46 1512
K+E 10 X 15 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

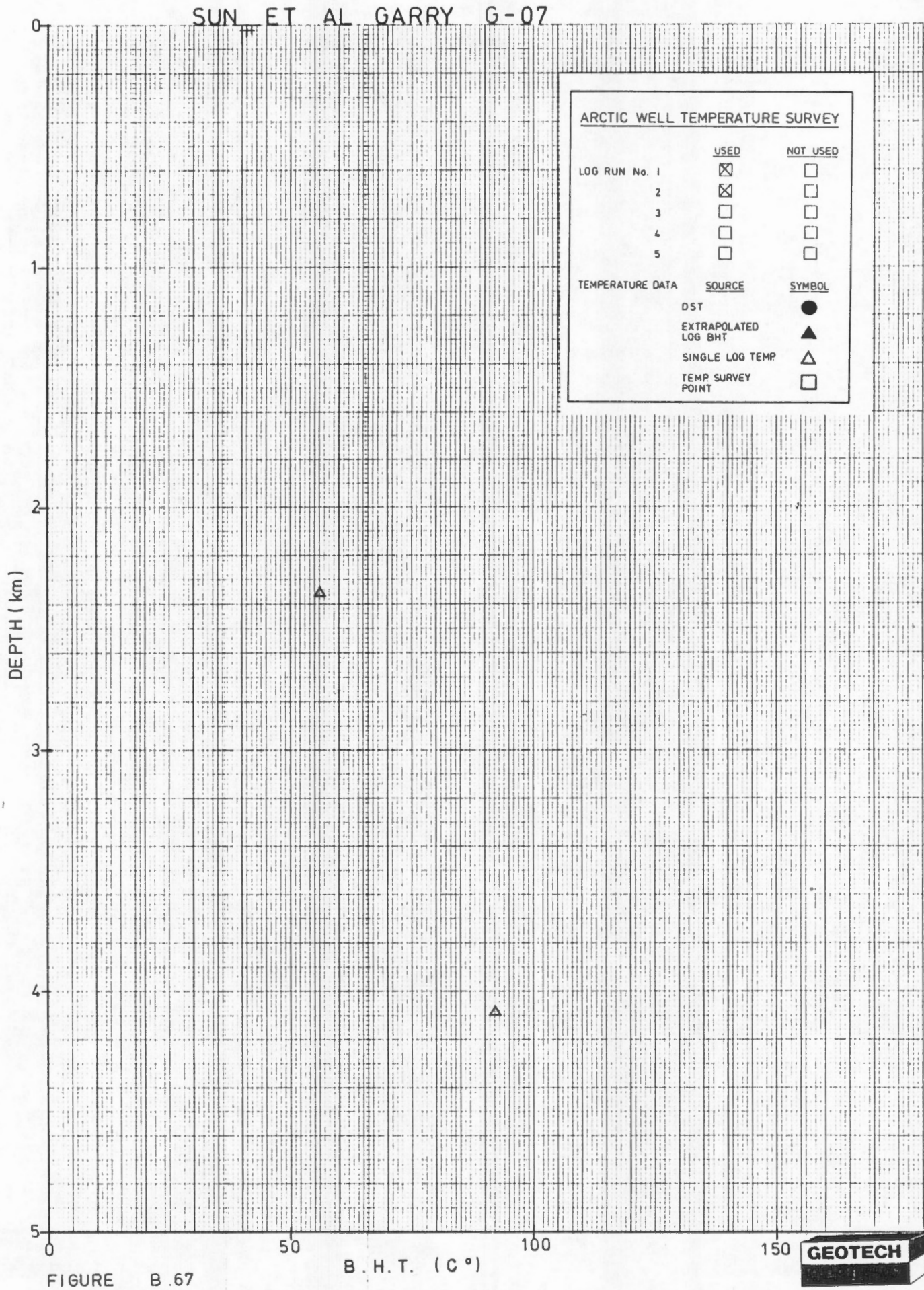

SUN ET AL GARRY G-07
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
GEOTECH

FIGURE B.67

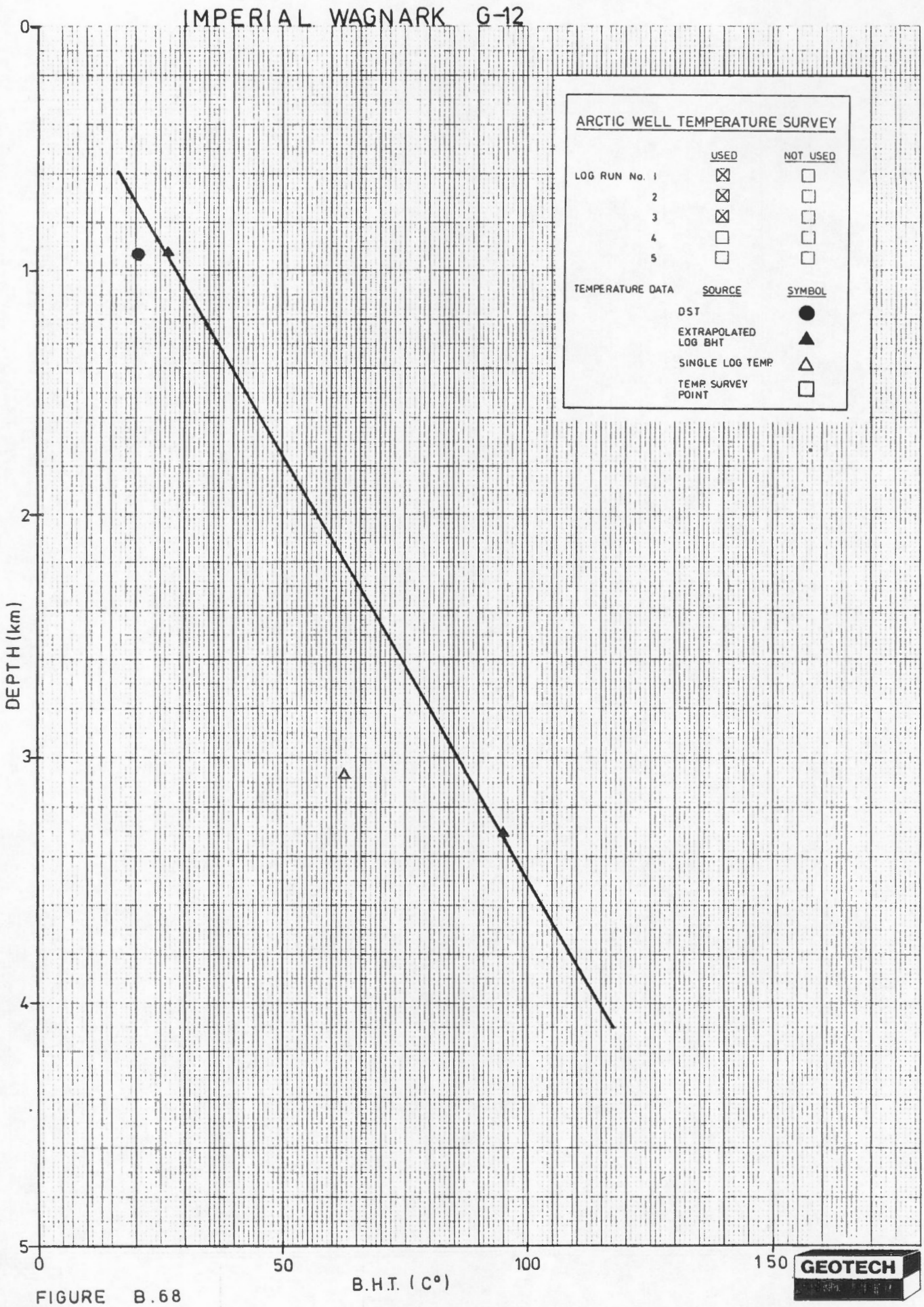


FIGURE B.68

46 1512

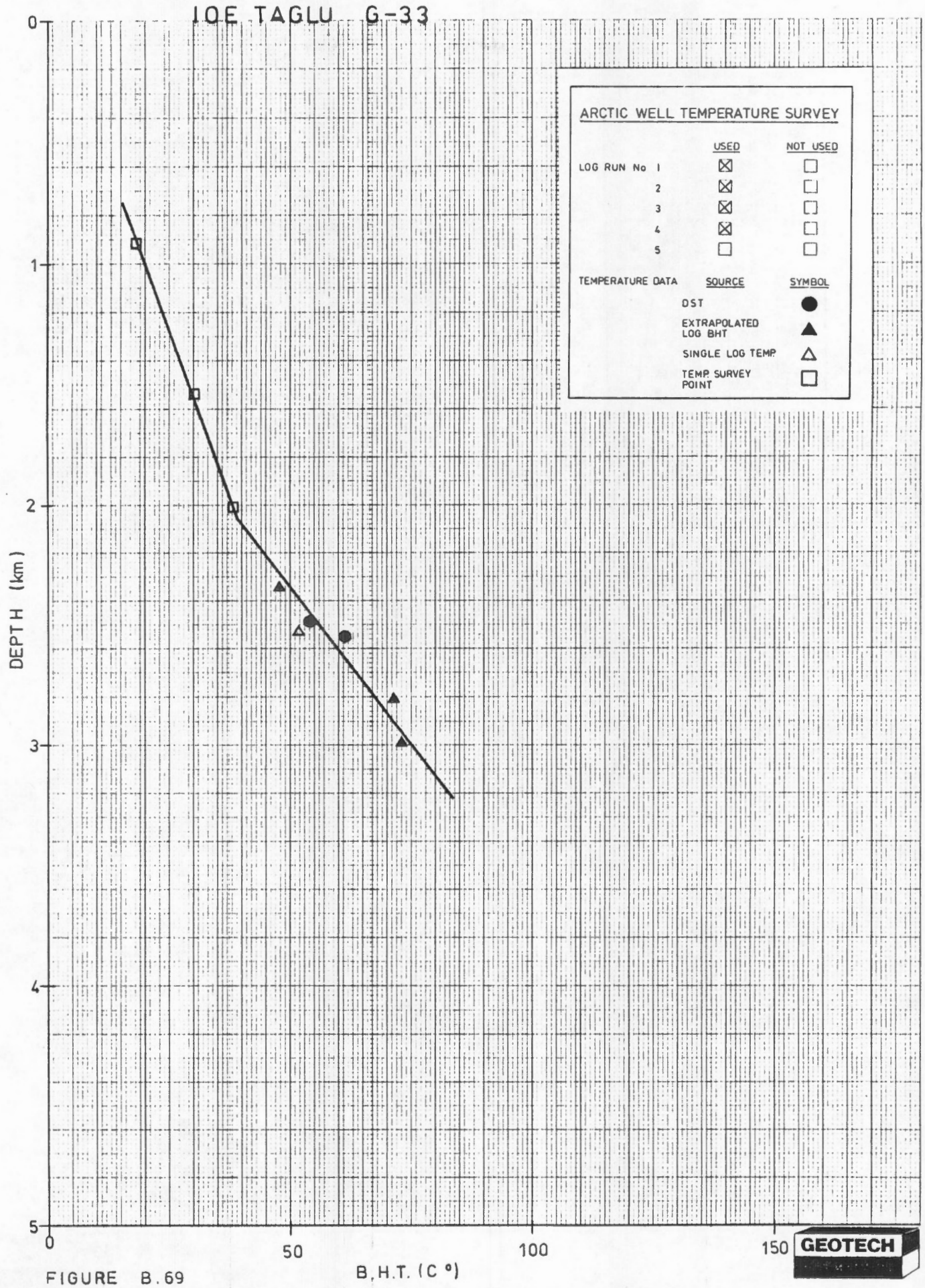


FIGURE B.69

46 1512

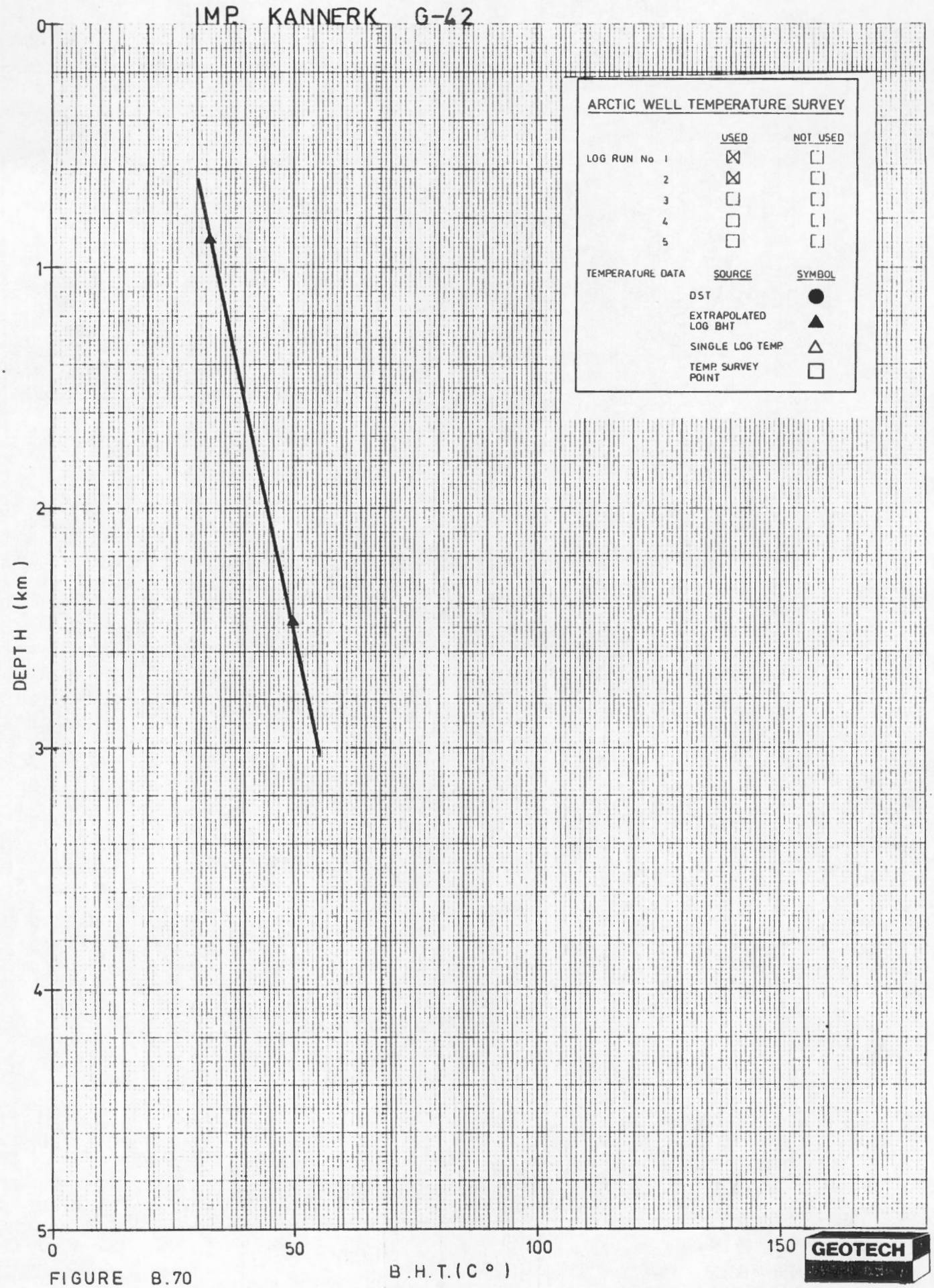
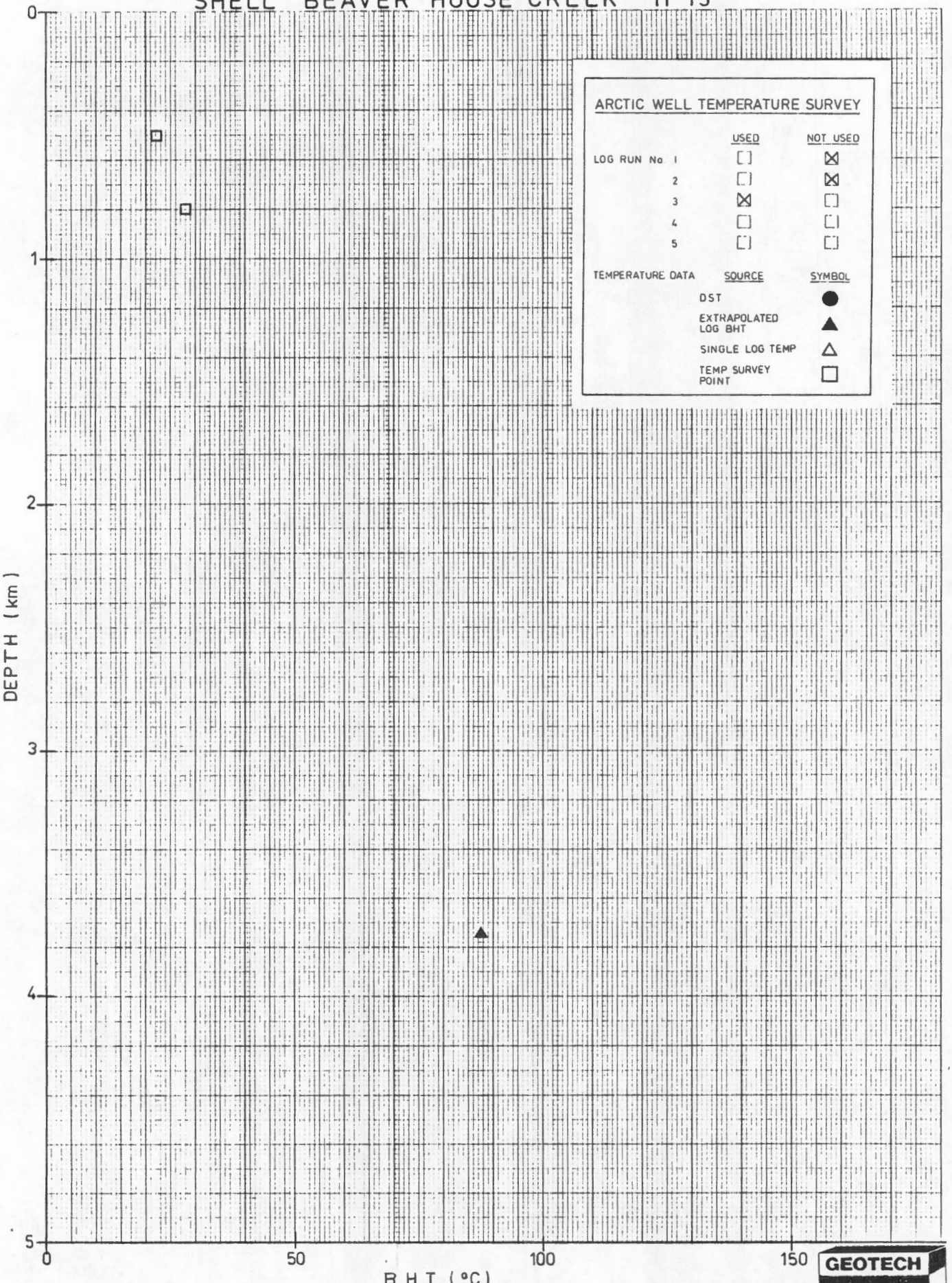


FIGURE B.70

46 1512

SHELL BEAVER HOUSE CREEK H-13



46 1512

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

FIGURE B.71

GEOTECH

ELF IMP AMAGUK H-16

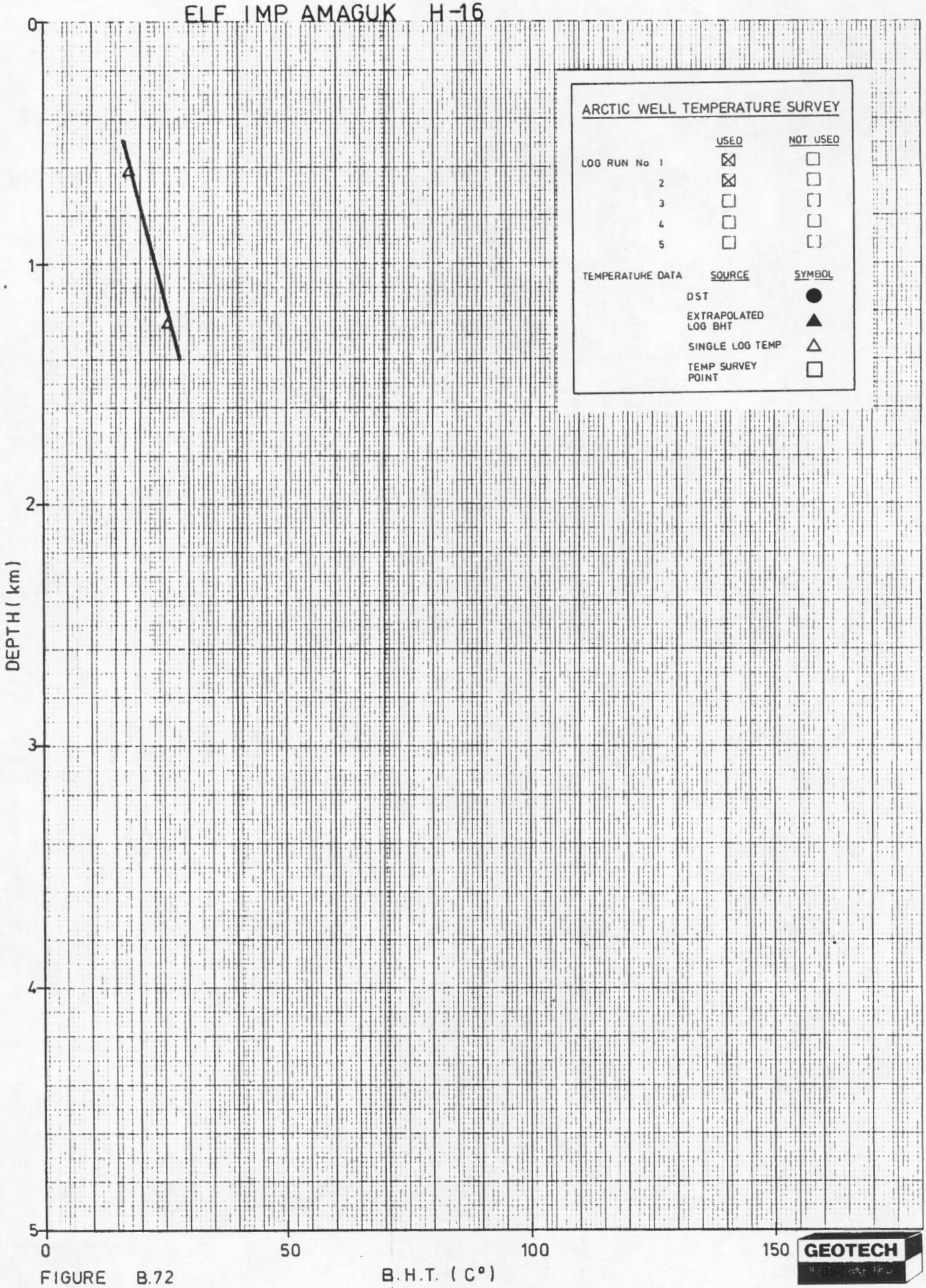


FIGURE B.72

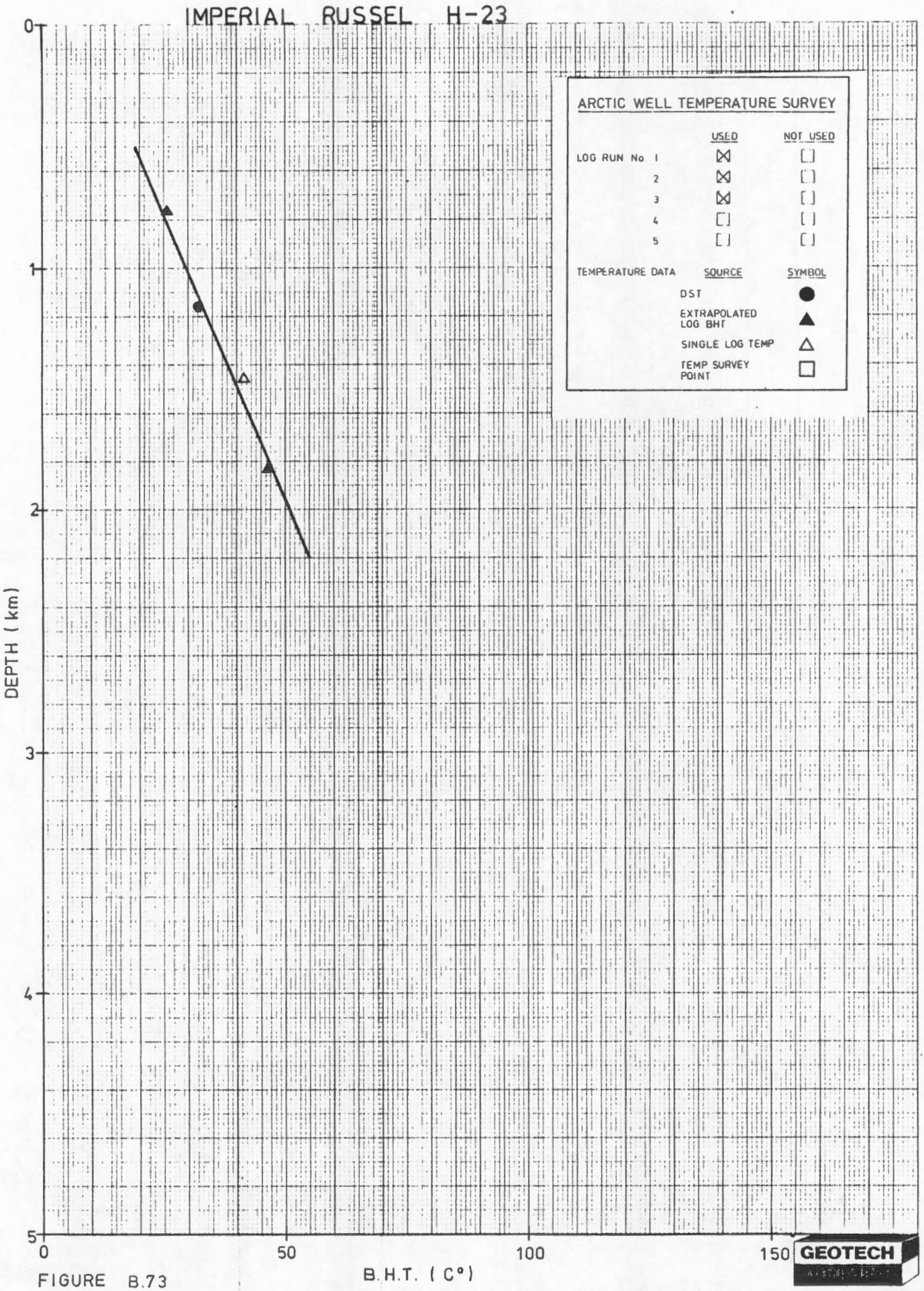

IMPERIAL RUSSEL H-23
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.73

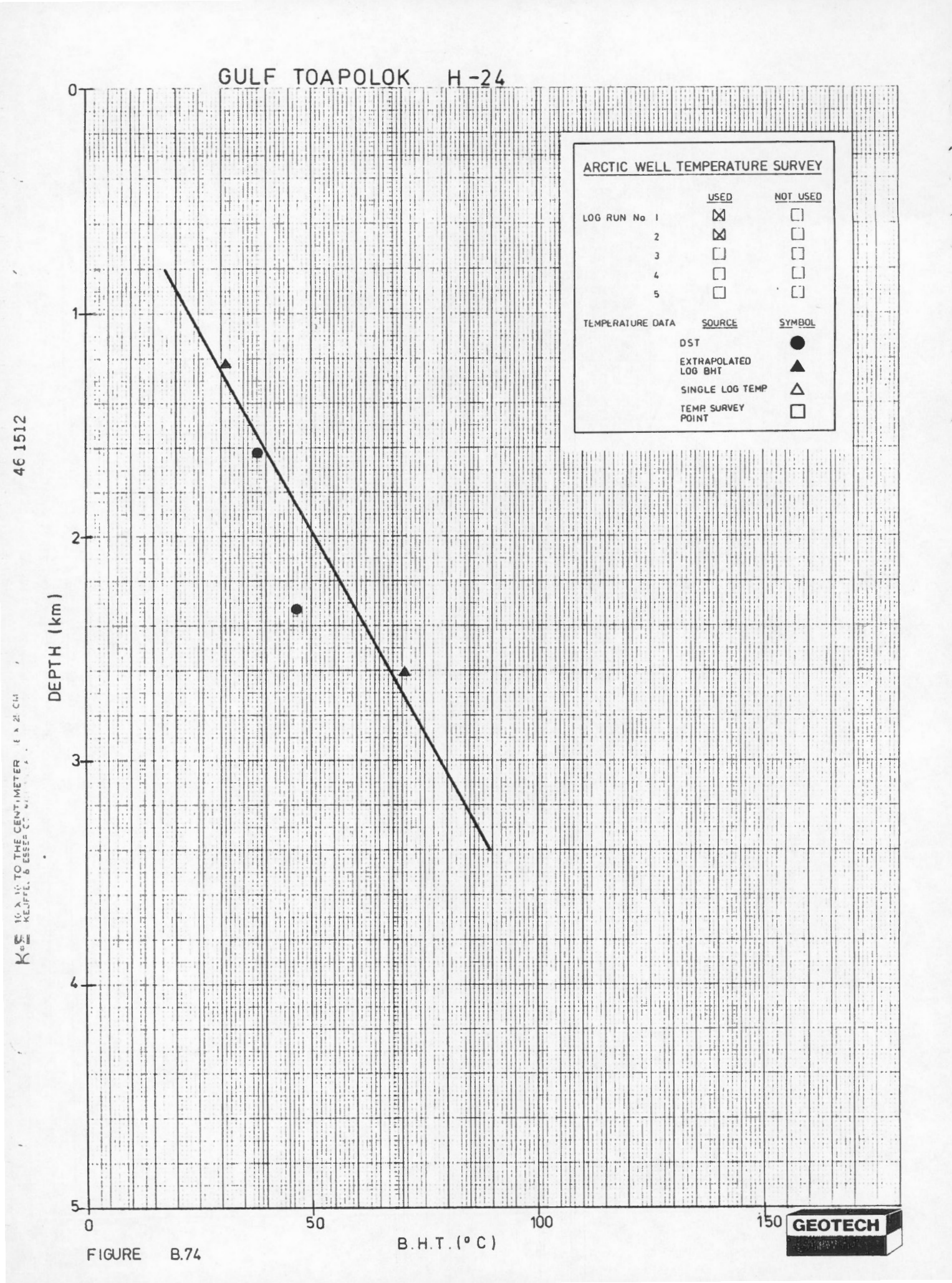

GULF TOAPOLOK H-24
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (° C)
GEOTECH

FIGURE B.74

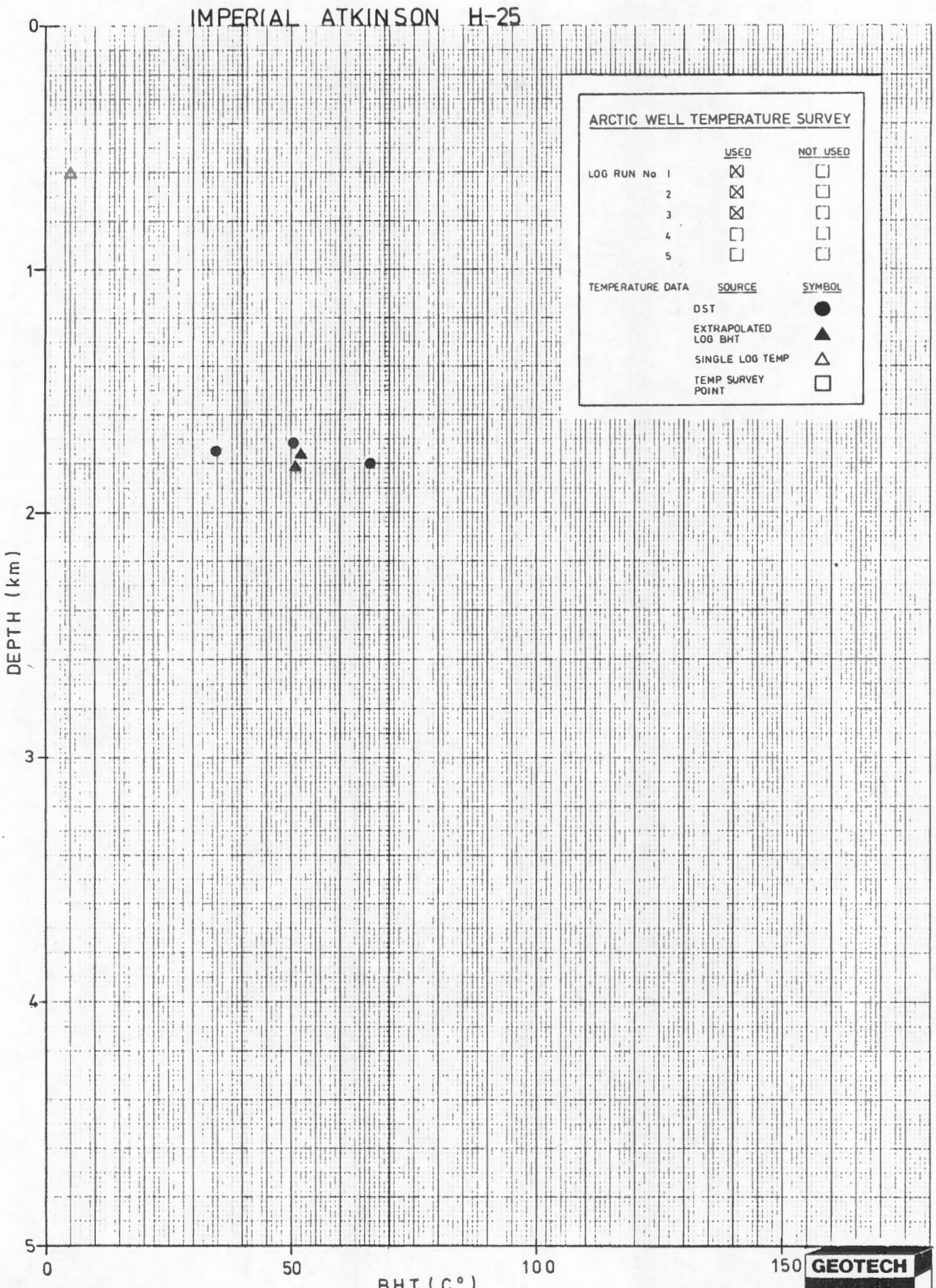


FIGURE B.75

GEOTECH

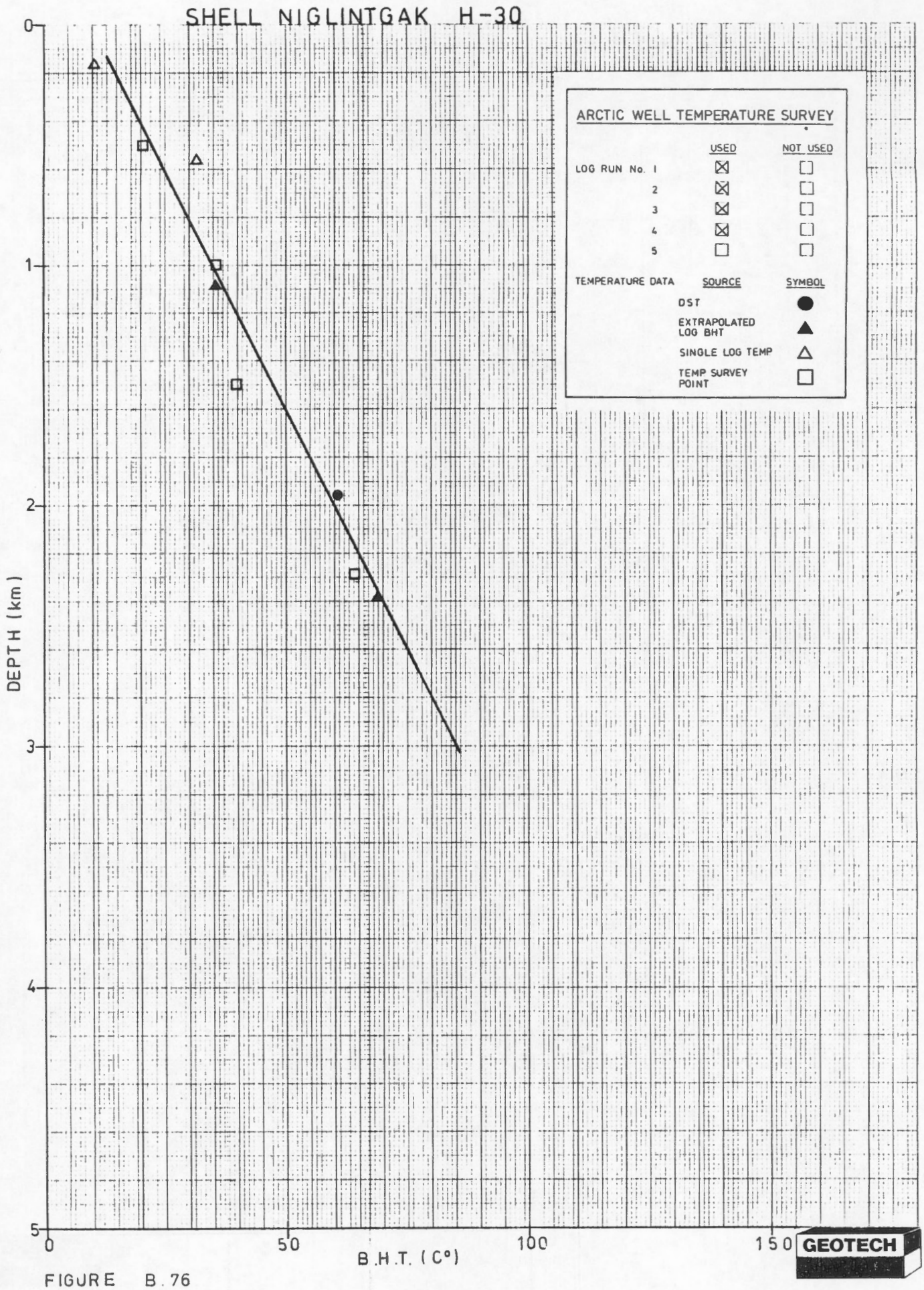


FIGURE B.76

46 1512

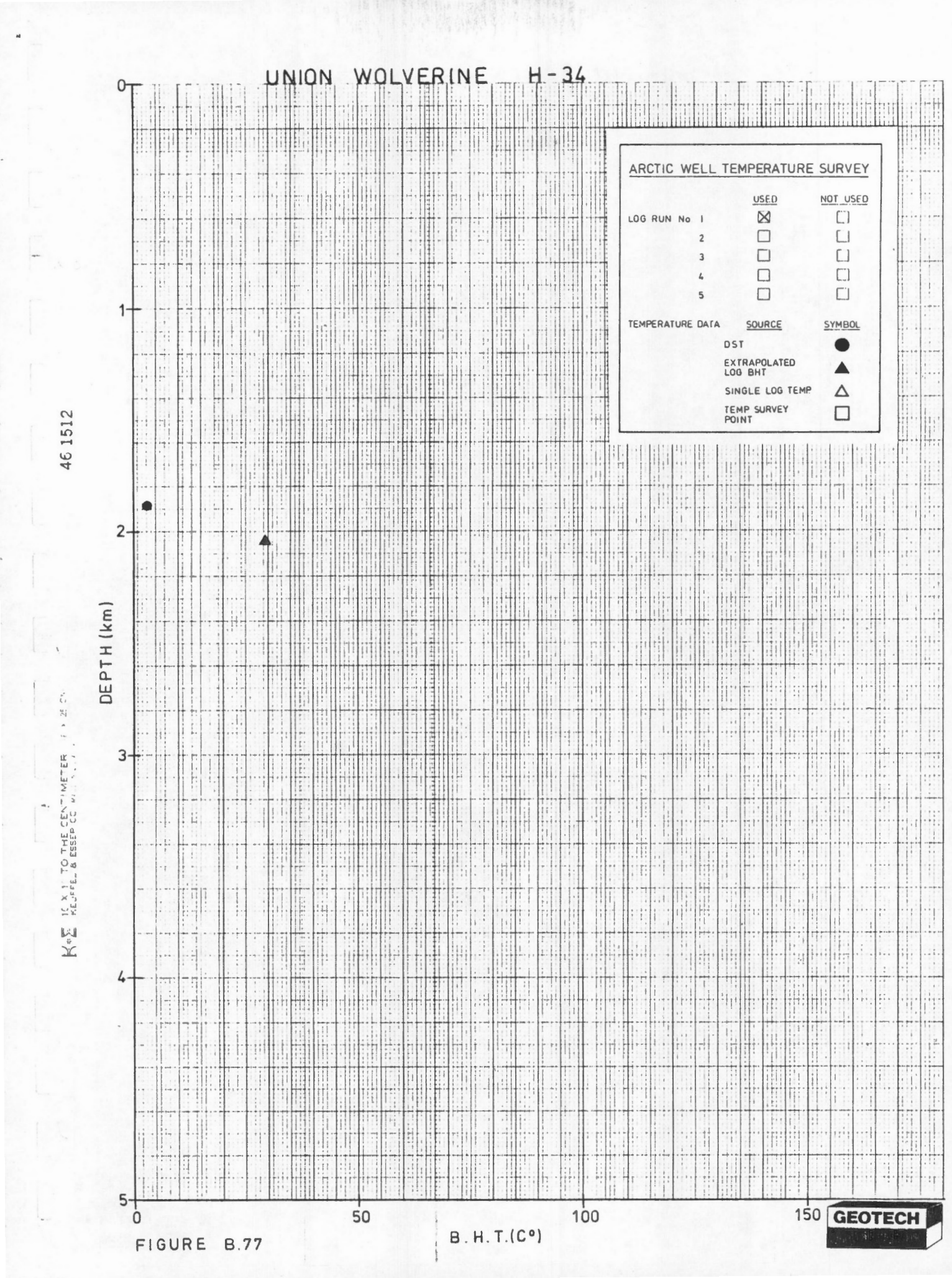

UNION WOLVERINE H-34
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(C°)
46 1512
GEOTECH

FIGURE B.77

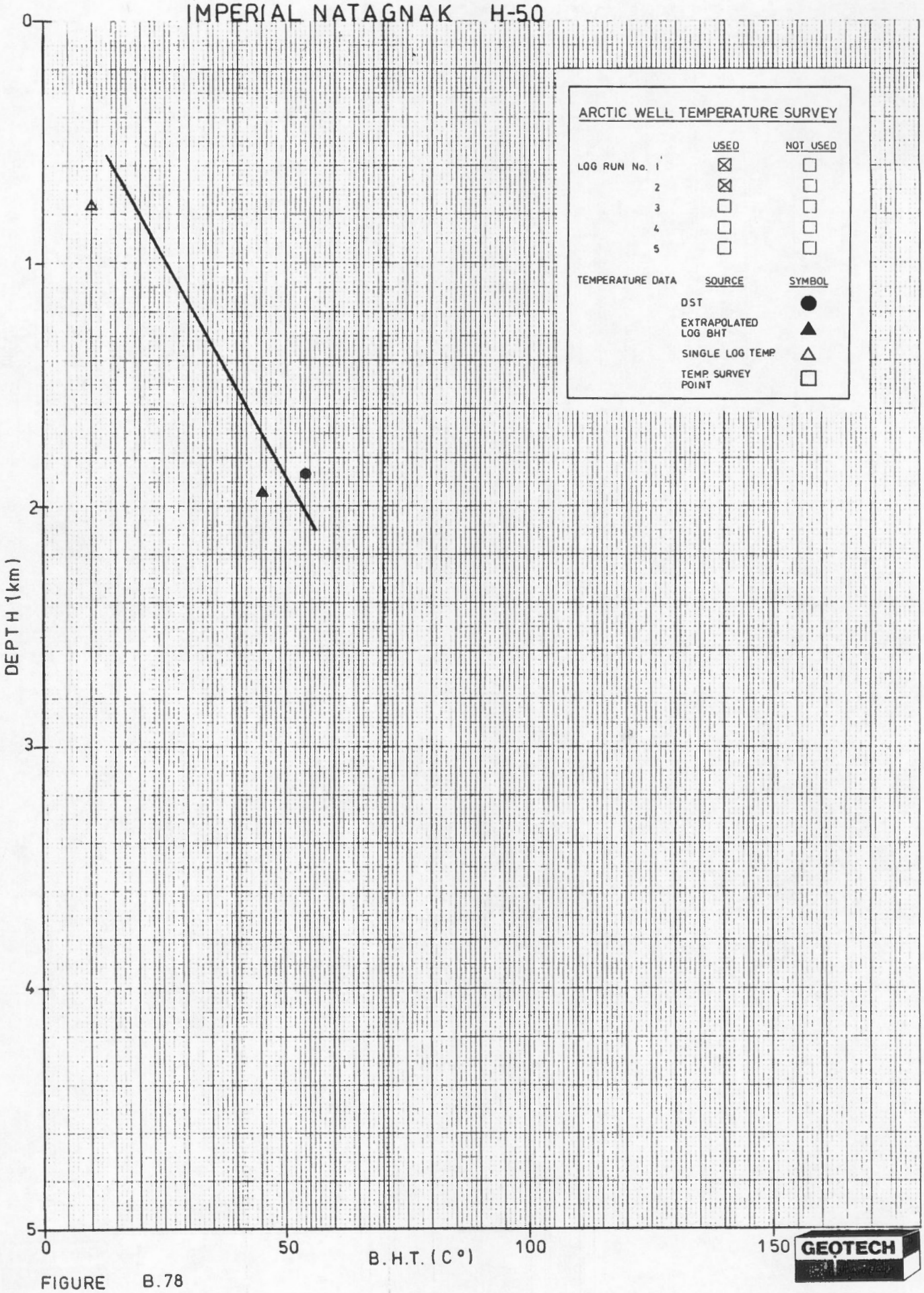

IMPERIAL NATAGNAK H-50
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.78

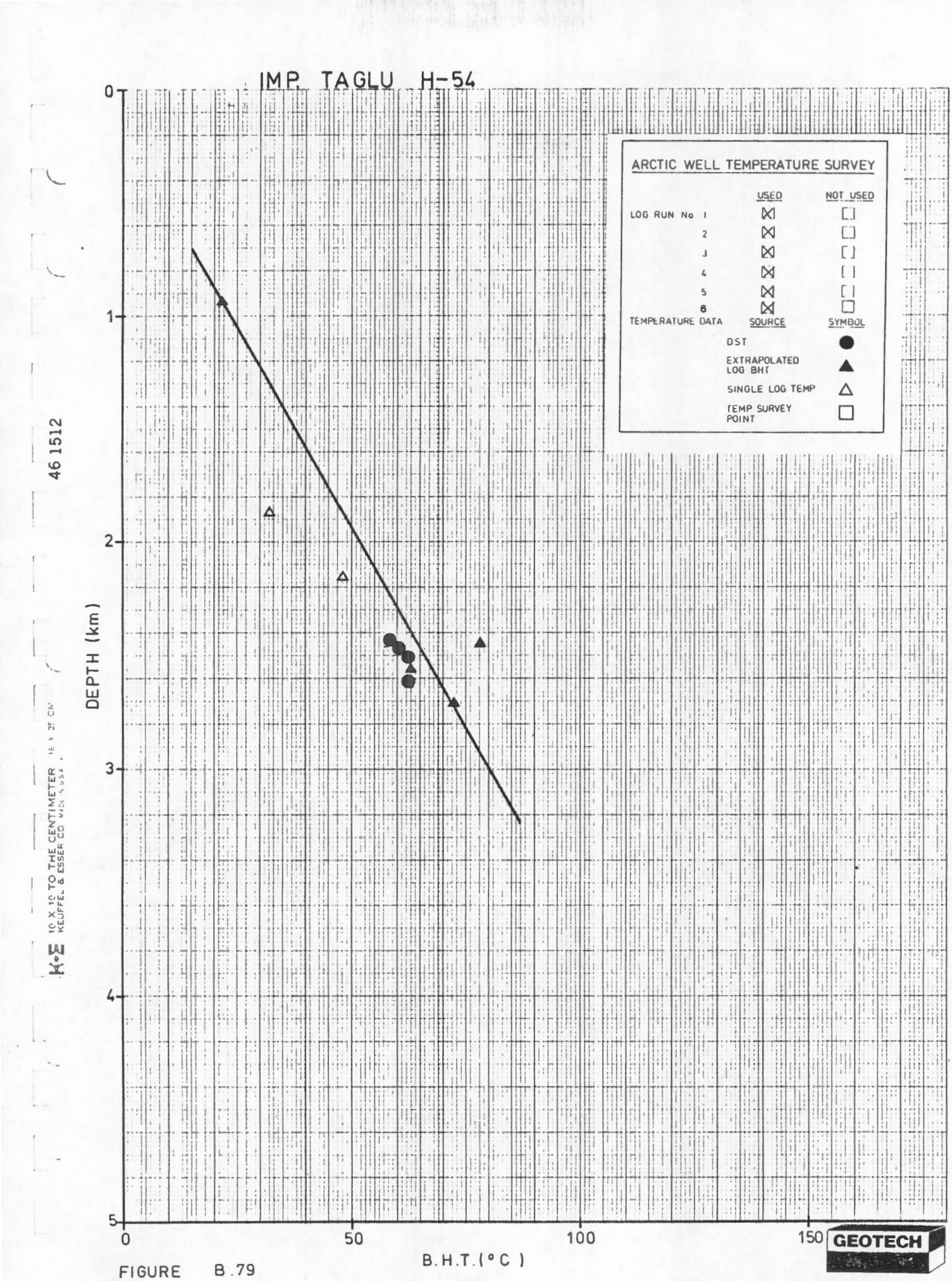

IMP. TAGLU H-54
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
6
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
46 1512
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO
GEOTECH

FIGURE B.79

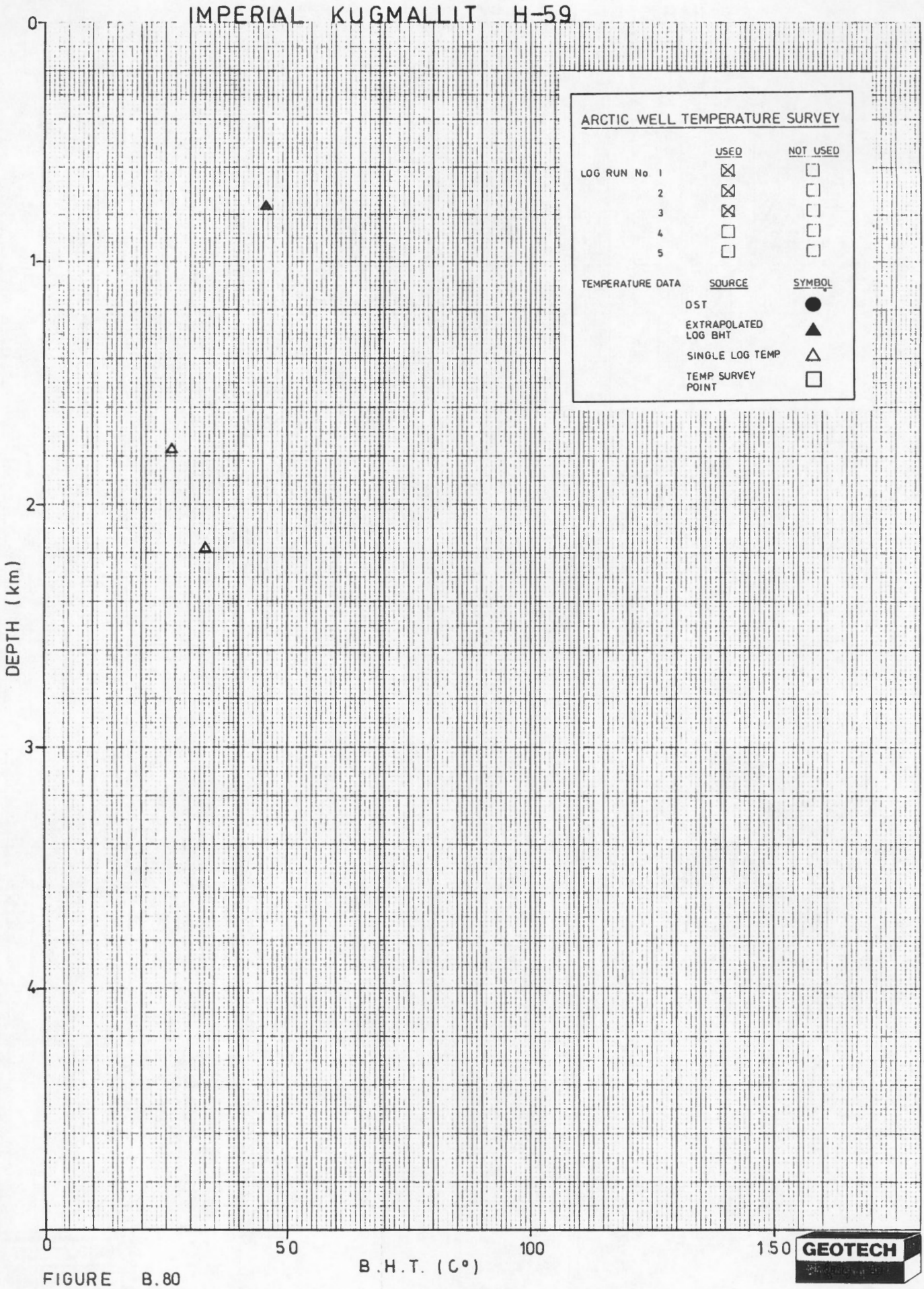

IMPERIAL KUGMALLIT H-59
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.80

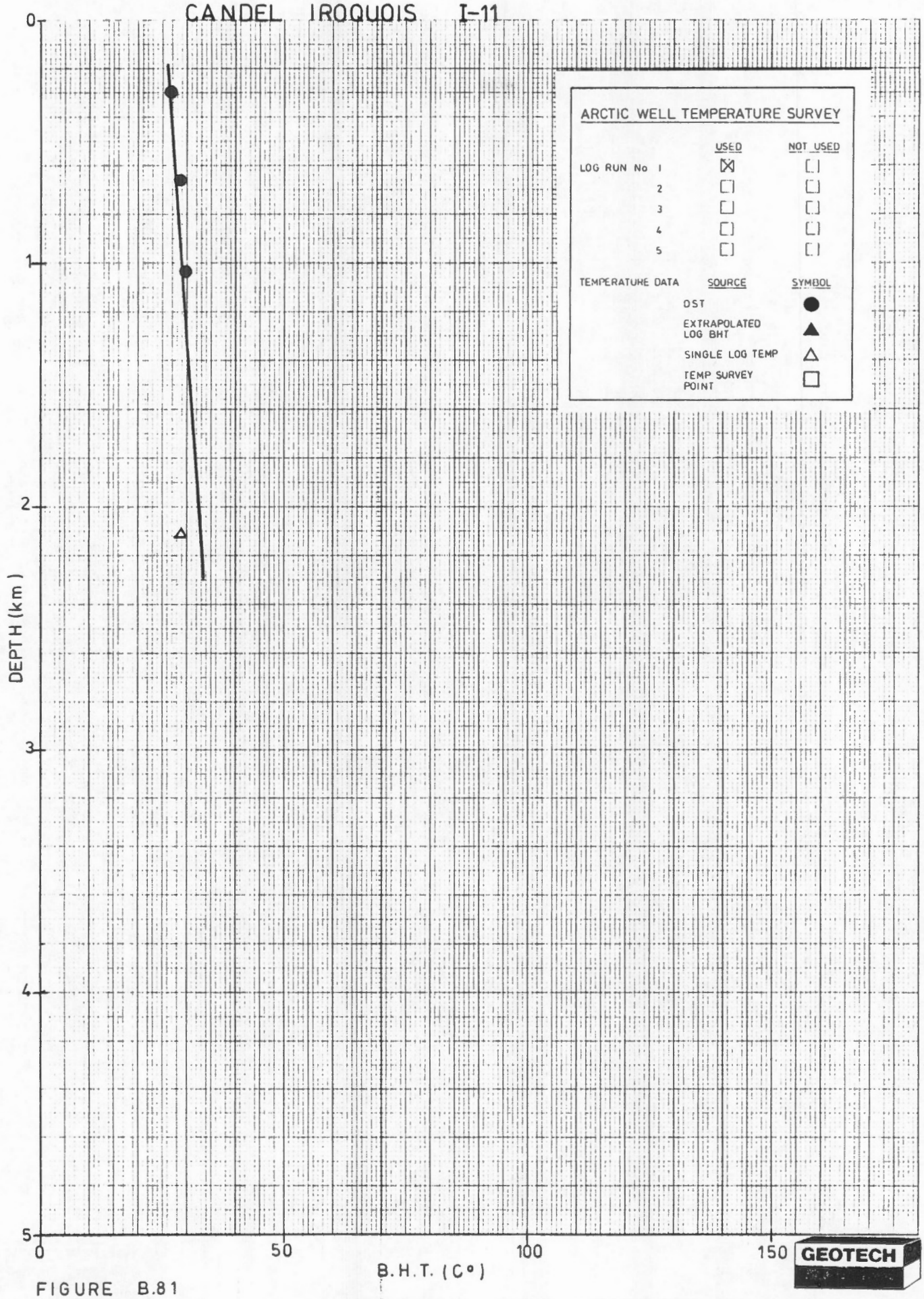

CANDEL IROQUOIS I-11
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.81

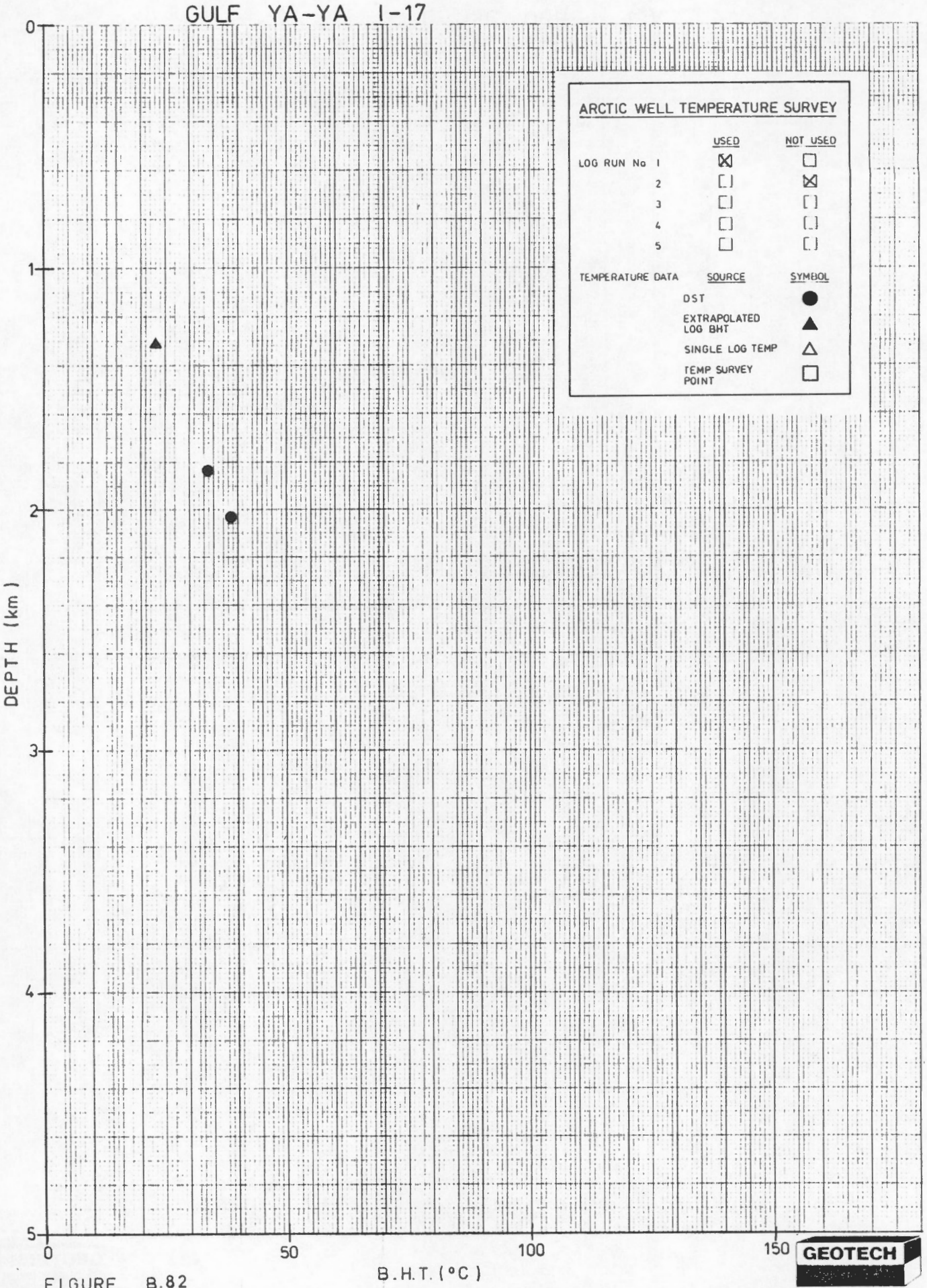


FIGURE B.82

46 1512

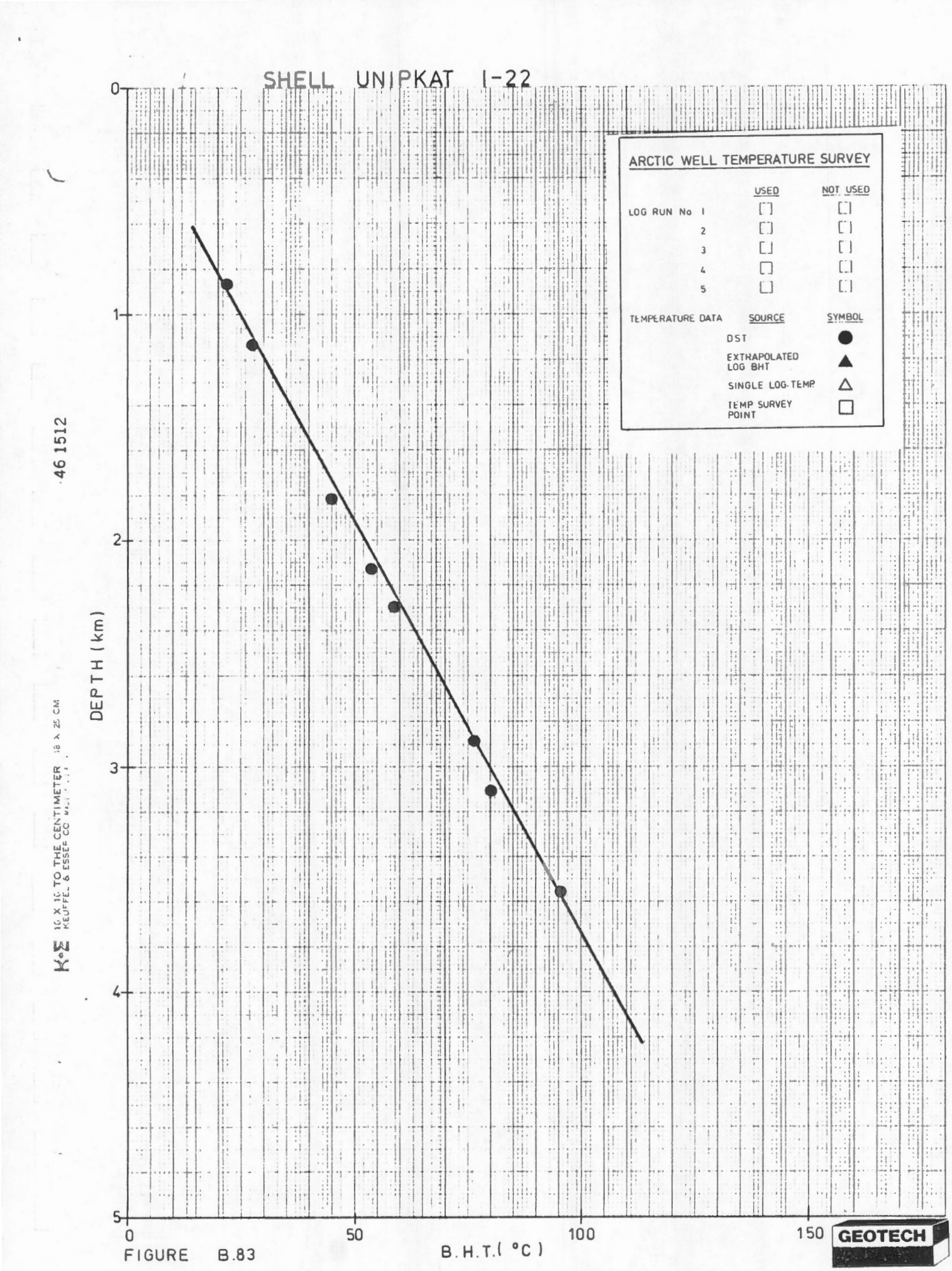

SHELL UNIPKAT 1-22
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
46 1512
KE 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO
GEOTECH

FIGURE B.83

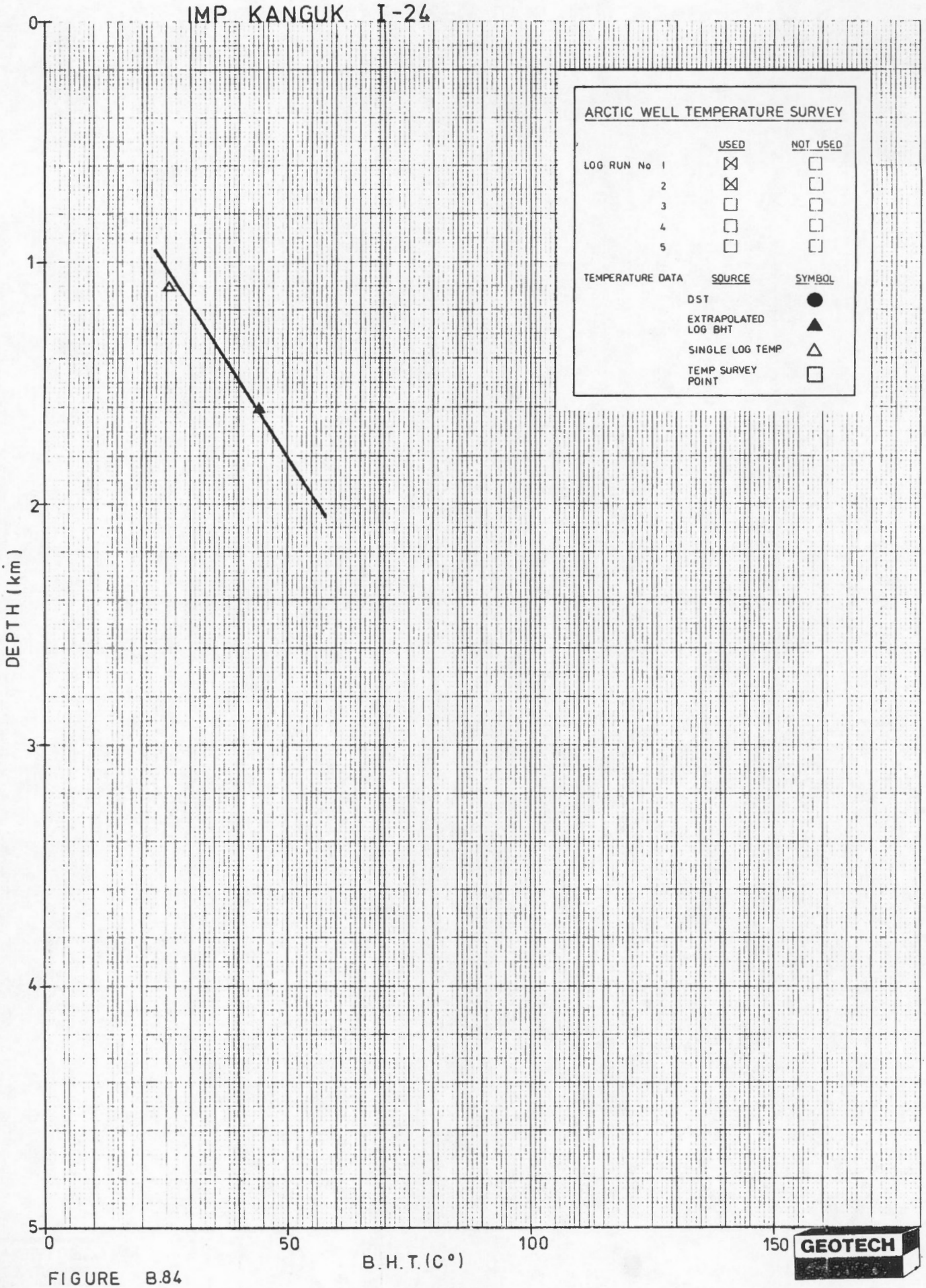


FIGURE B.84

46 1512

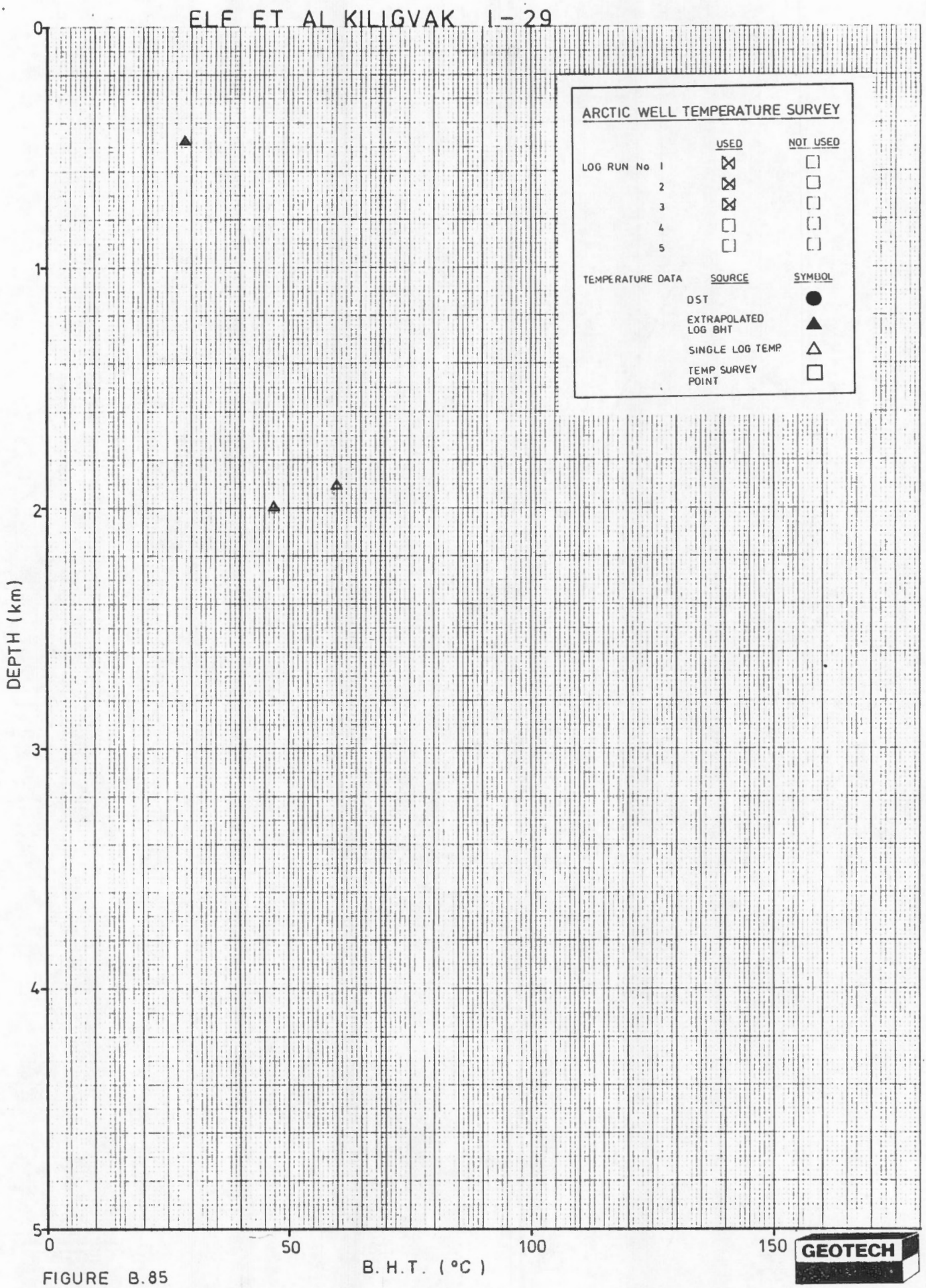

ELF ET AL KILIGVAK I-29
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (°C)
GEOTECH

FIGURE B.85

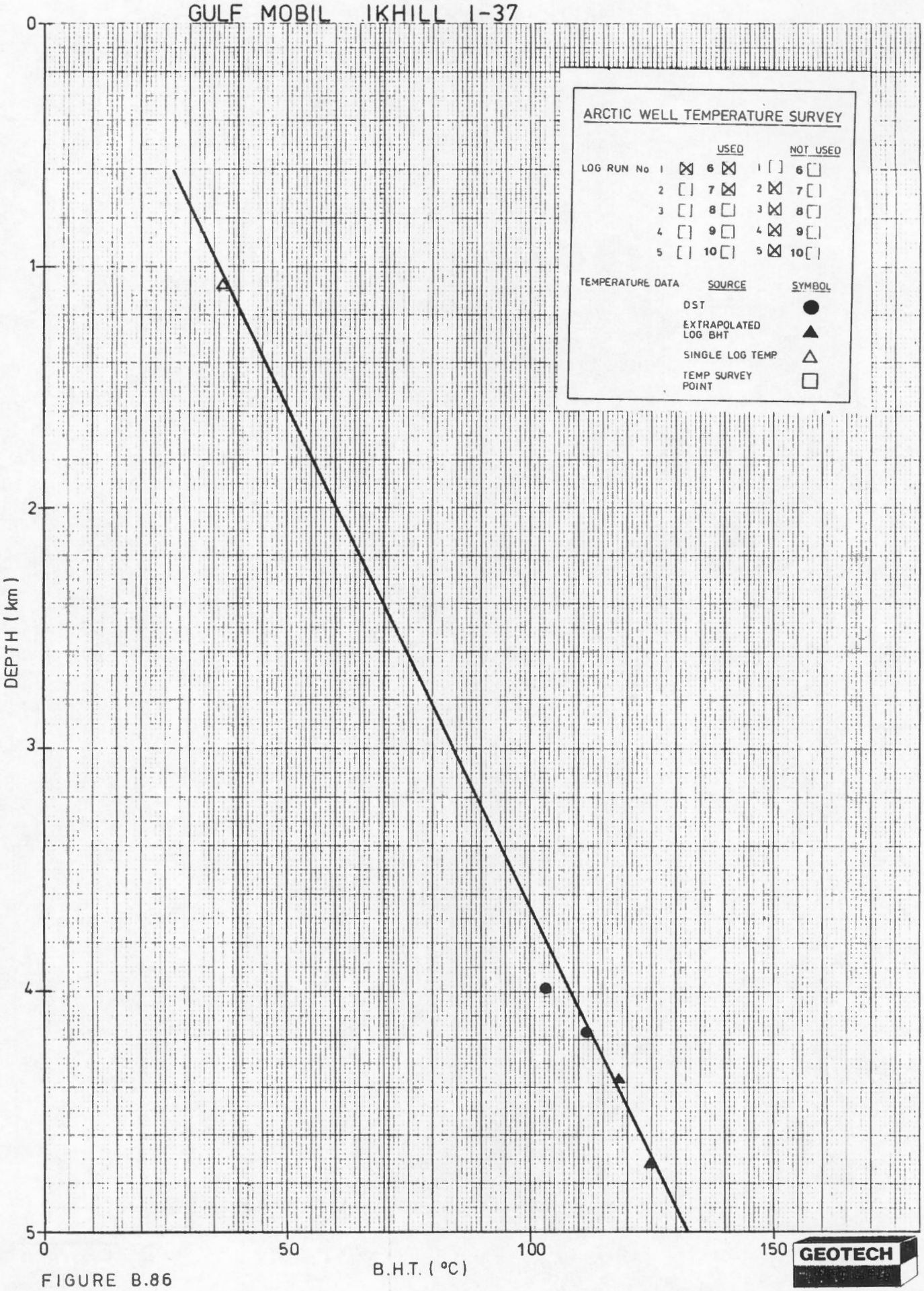


FIGURE B.86

46 1512

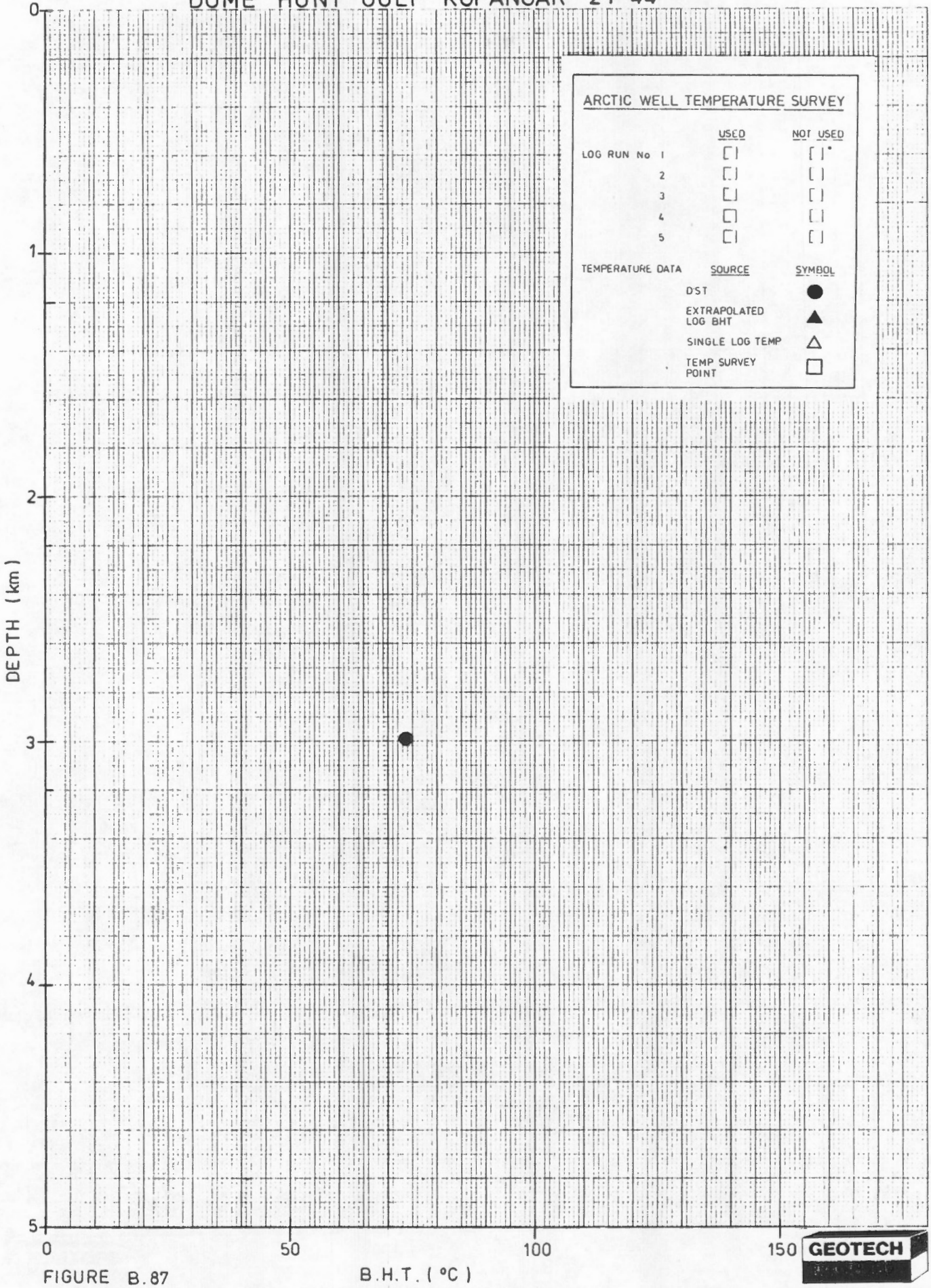


FIGURE B.87

46 1512

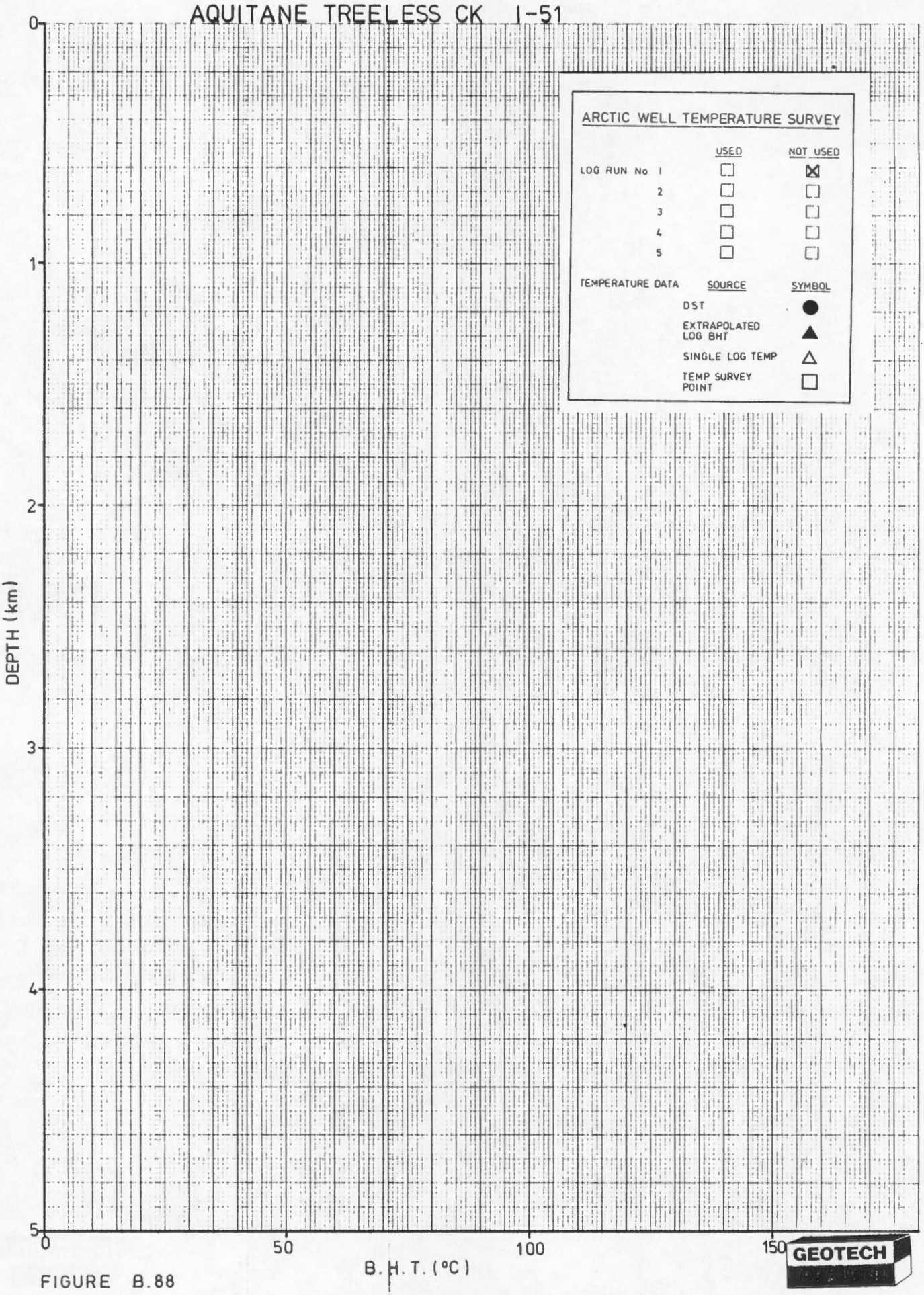

AQUITANE TREELESS CK I-51
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.88

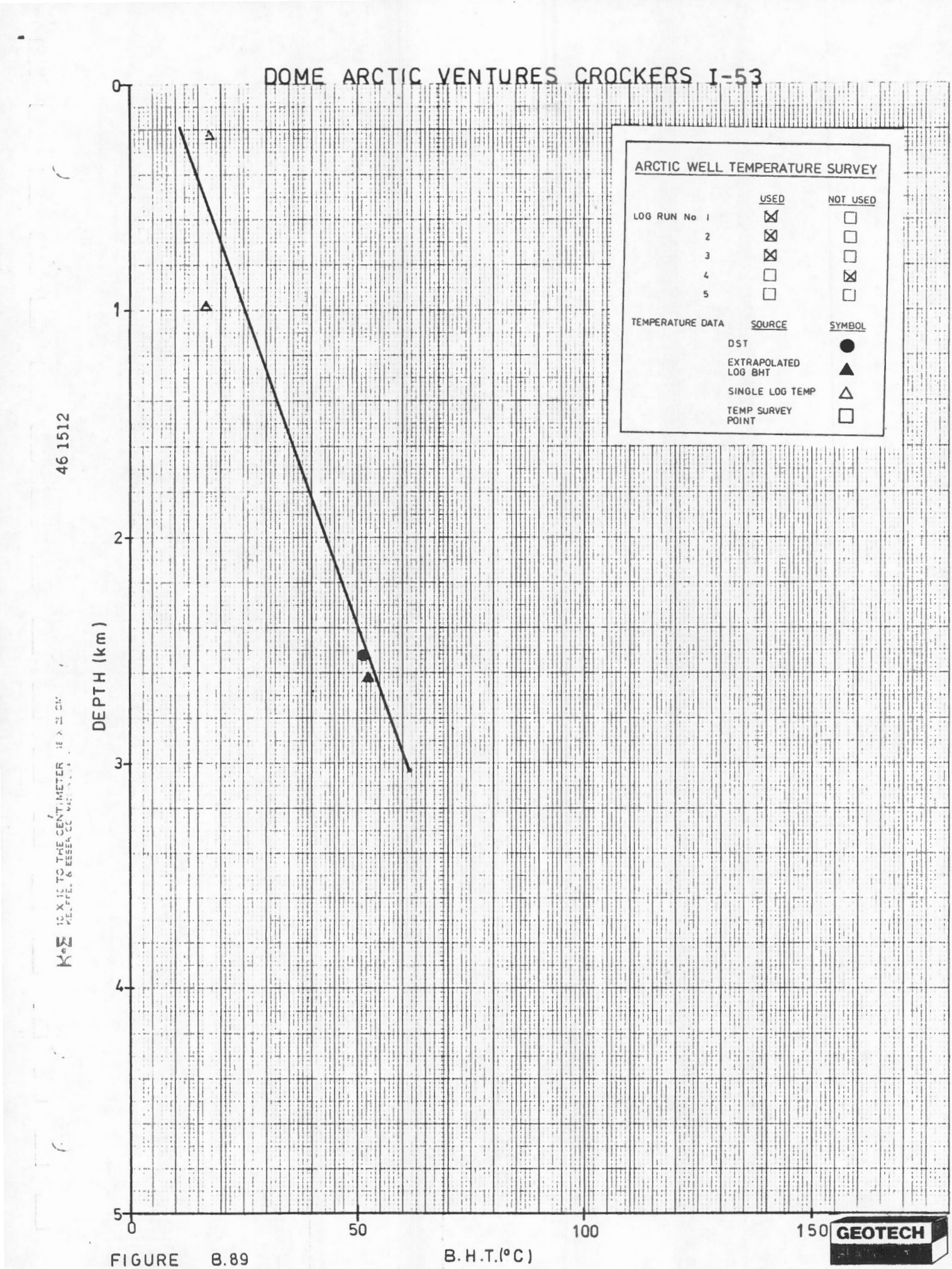

DOME ARCTIC VENTURES CROCKERS I-53
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
46 1512
GEOTECH

FIGURE B.89

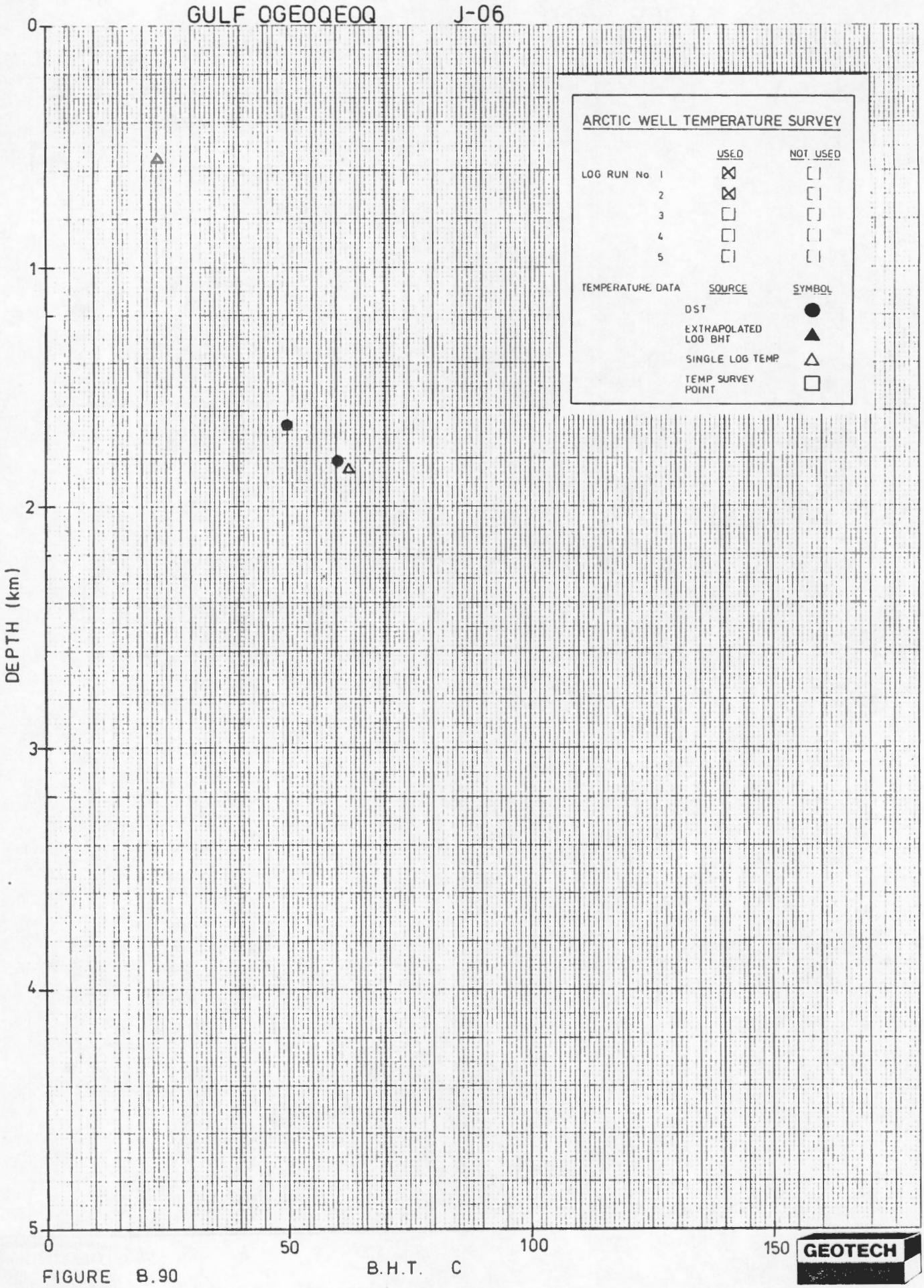


FIGURE B.90

46 1512

K&E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

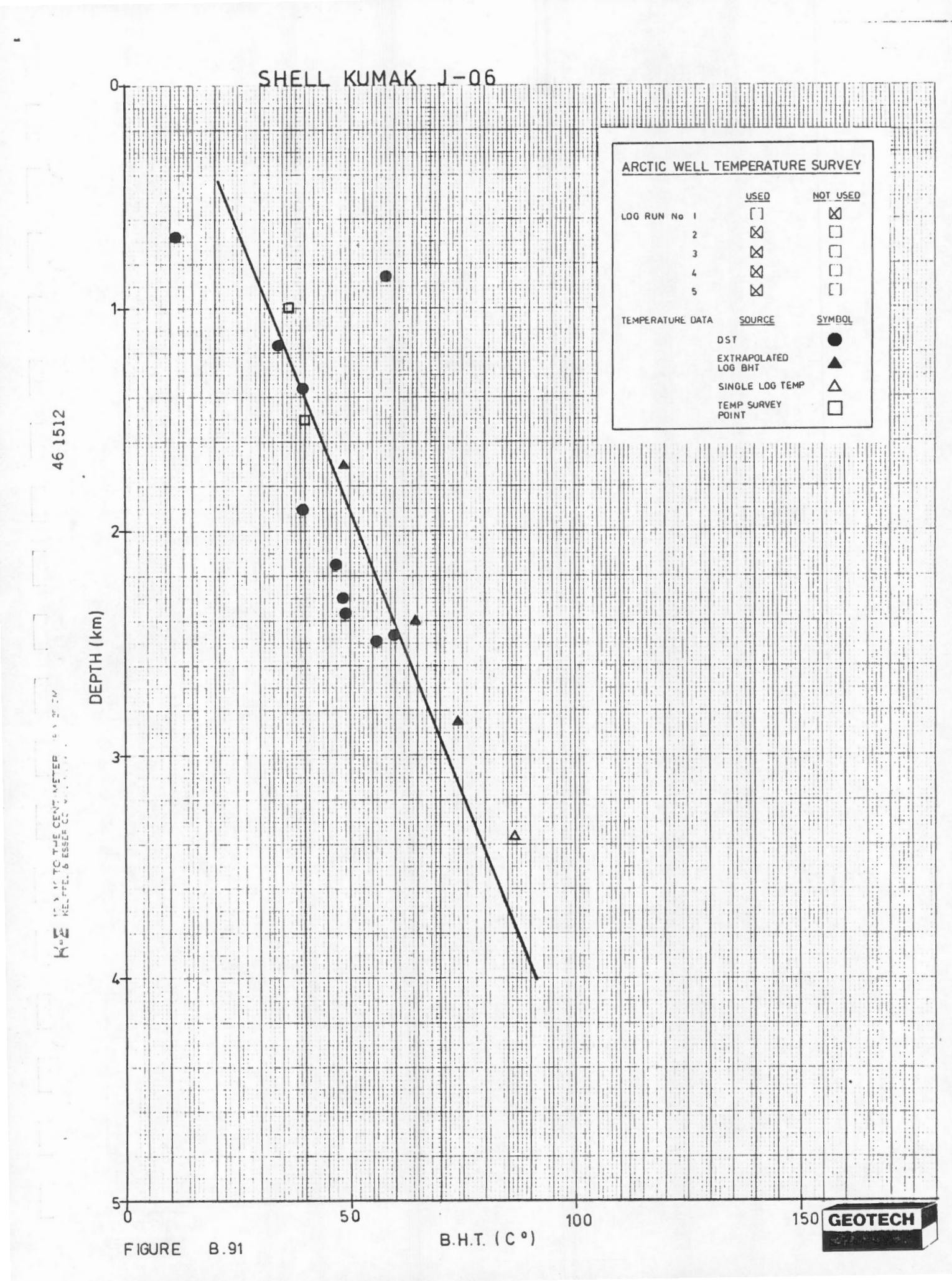

SHELL KUMAK J-06
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.91

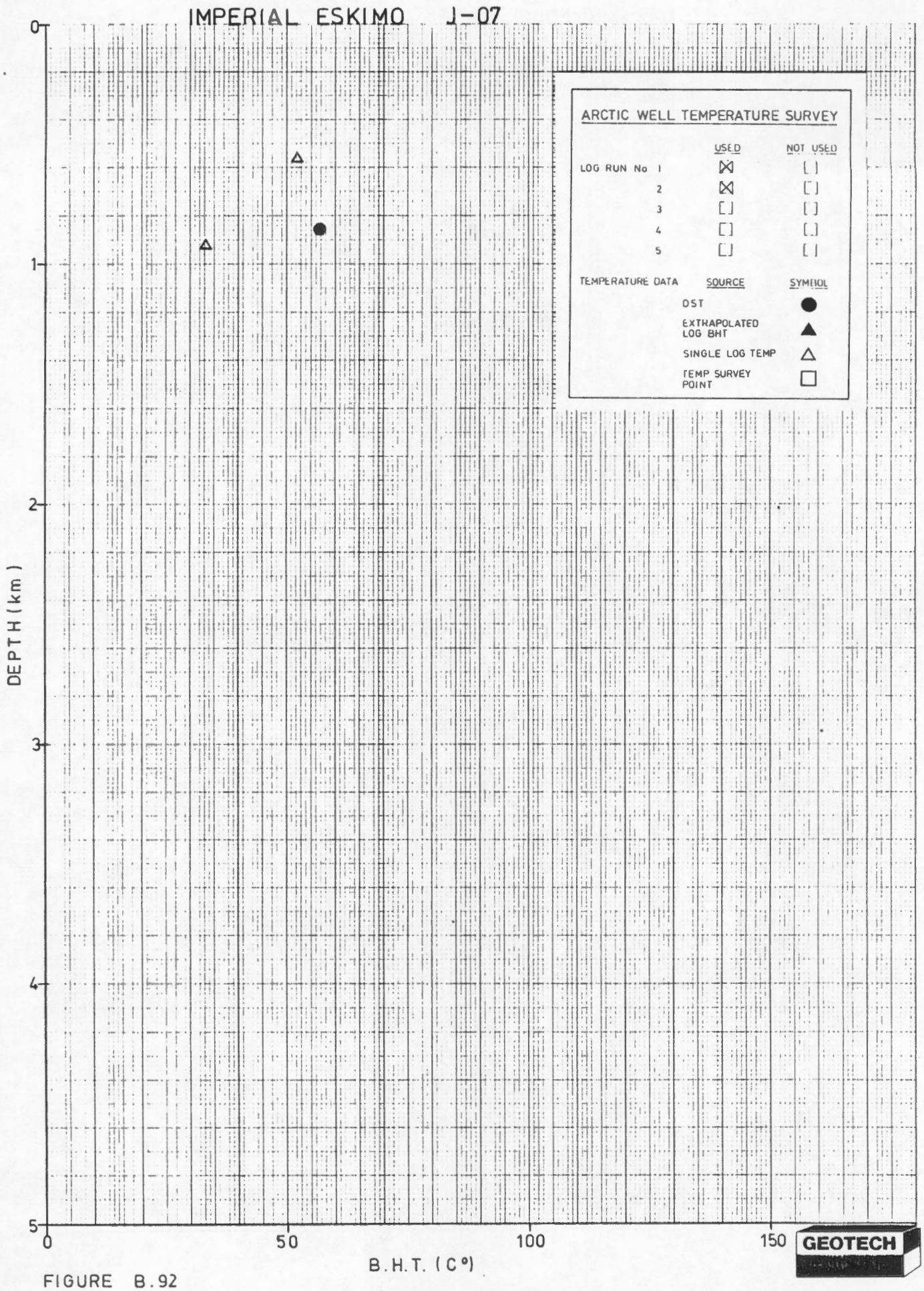


FIGURE B.92

46 1512

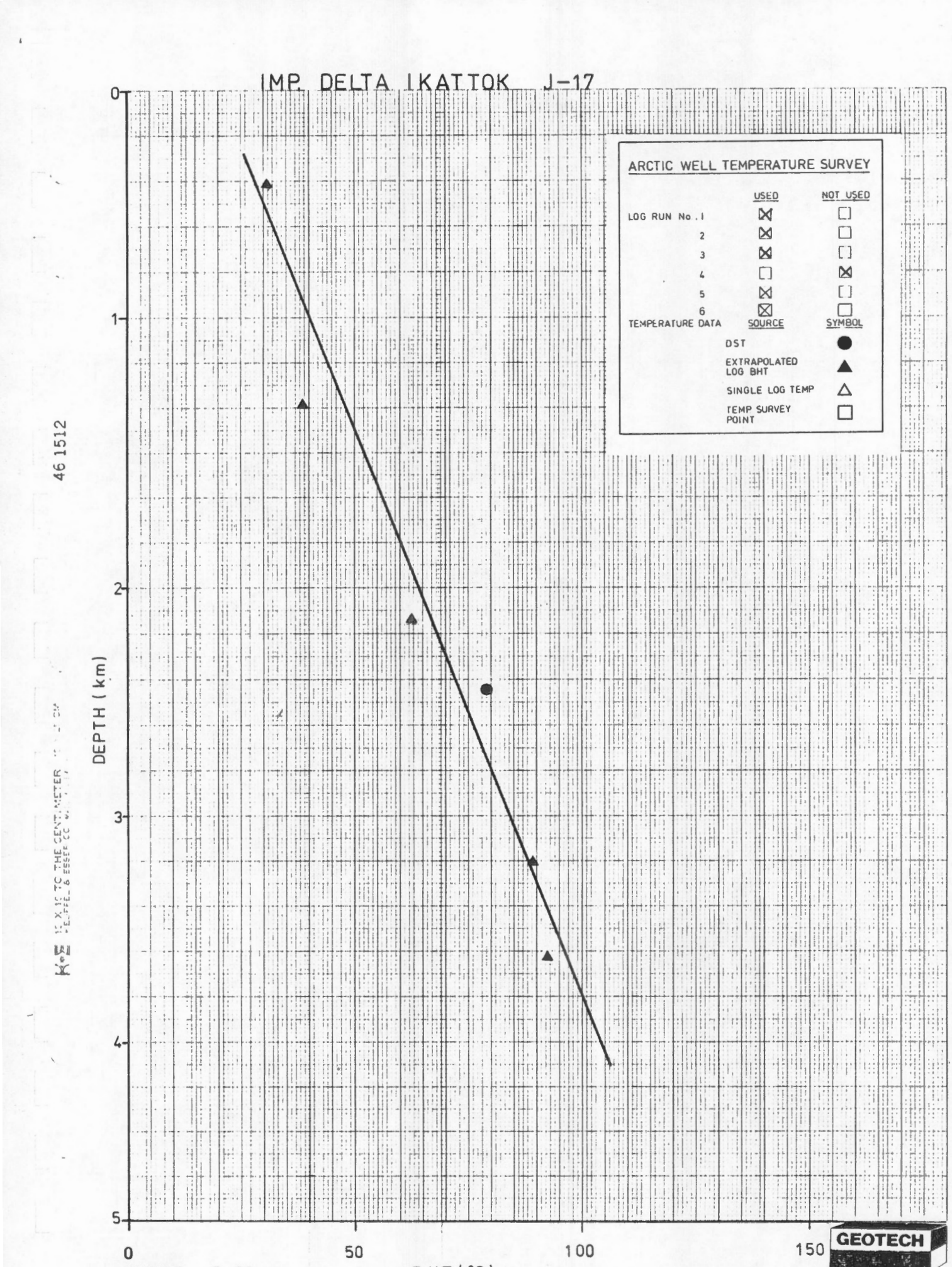

IMP. DELTA ISKATTOK J-17
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
6
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
GEOTECH

FIGURE B.93

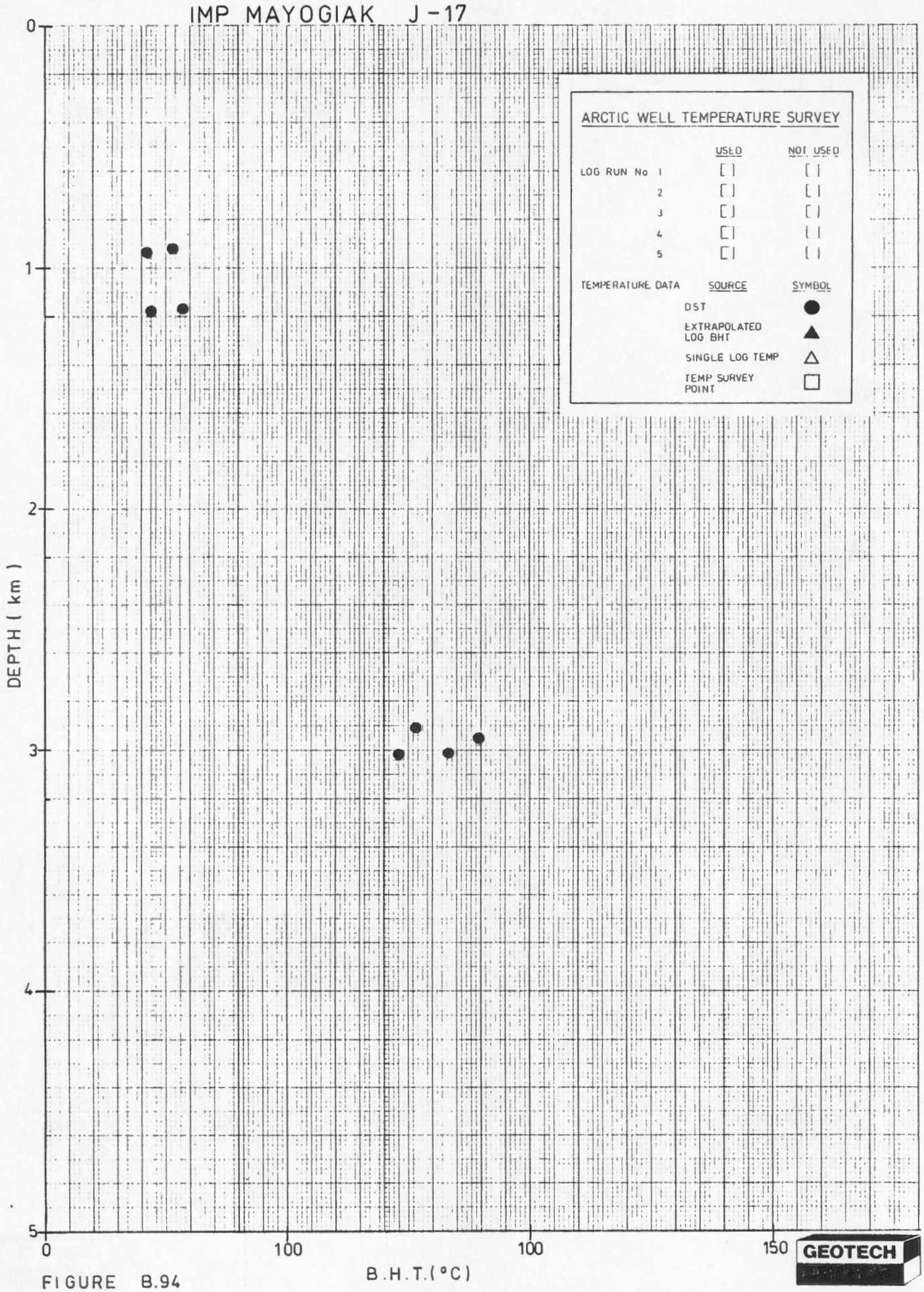


FIGURE B.94

46 1512

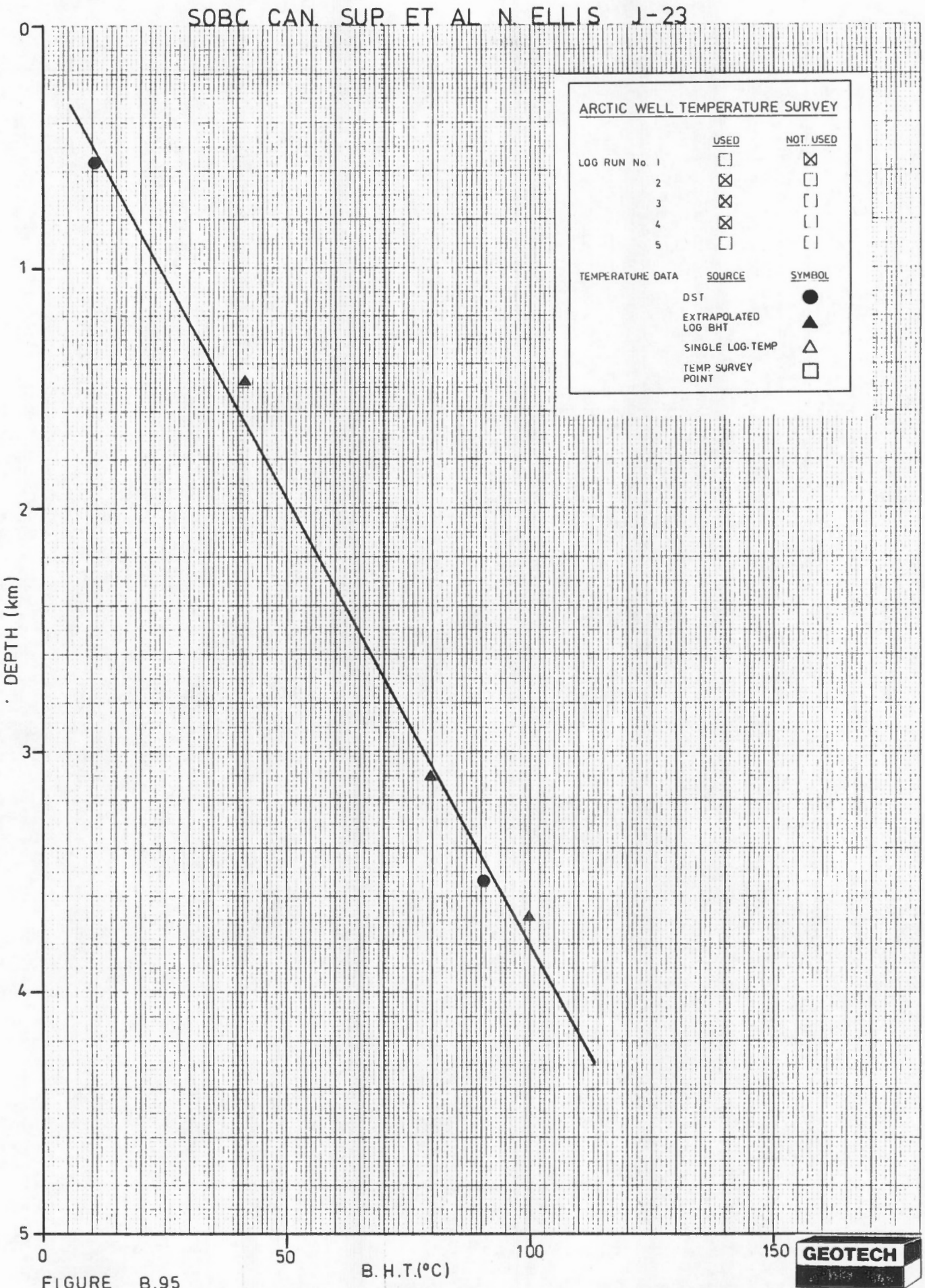

SOBC CAN. SUP. ET AL N. ELLIS J-23
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE B.95

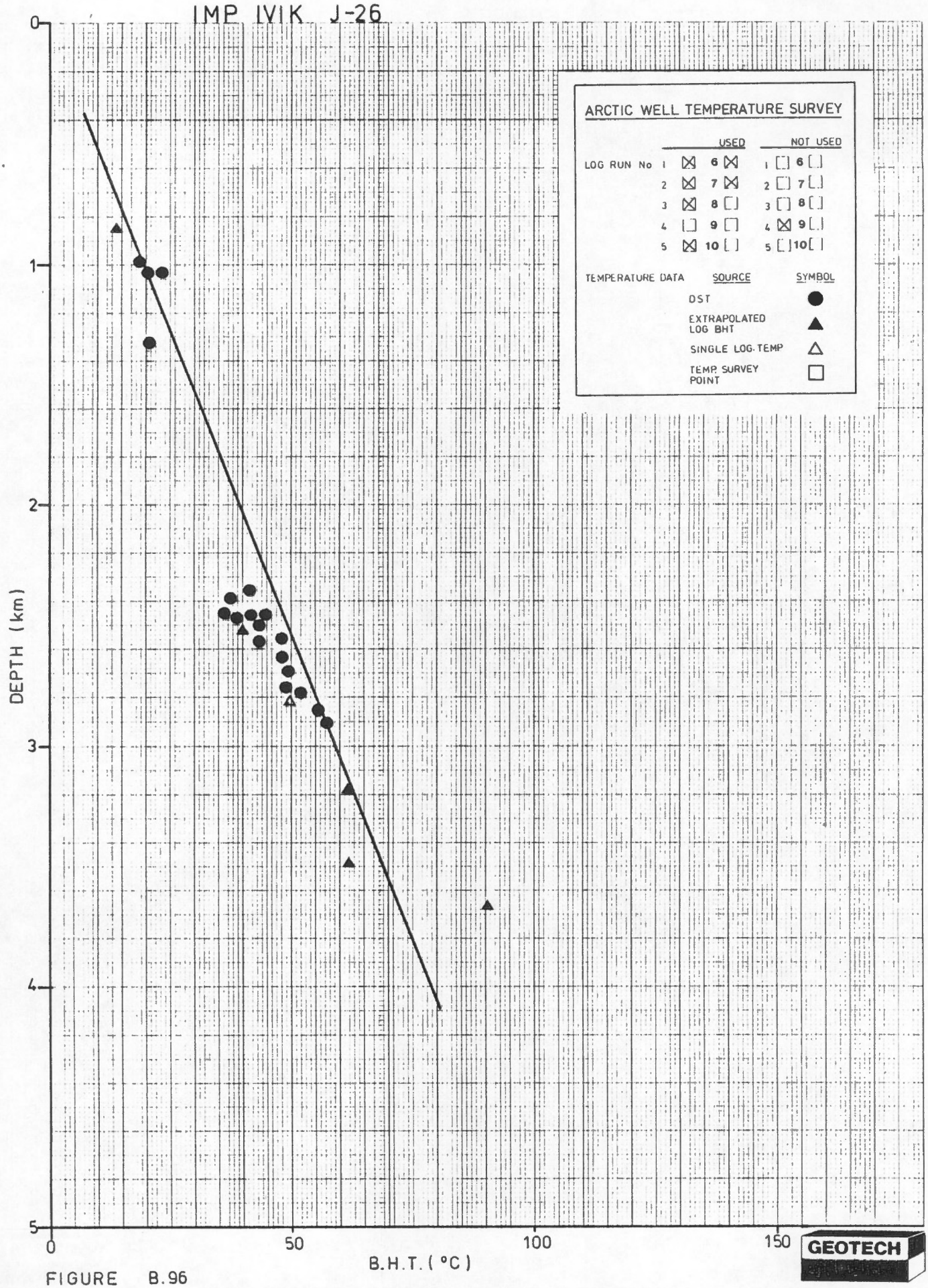

IMP IVIK J-26
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
B.H.T. (°C)
0
1
2
3
4
5
50
100
150
GEOTECH

FIGURE B.96

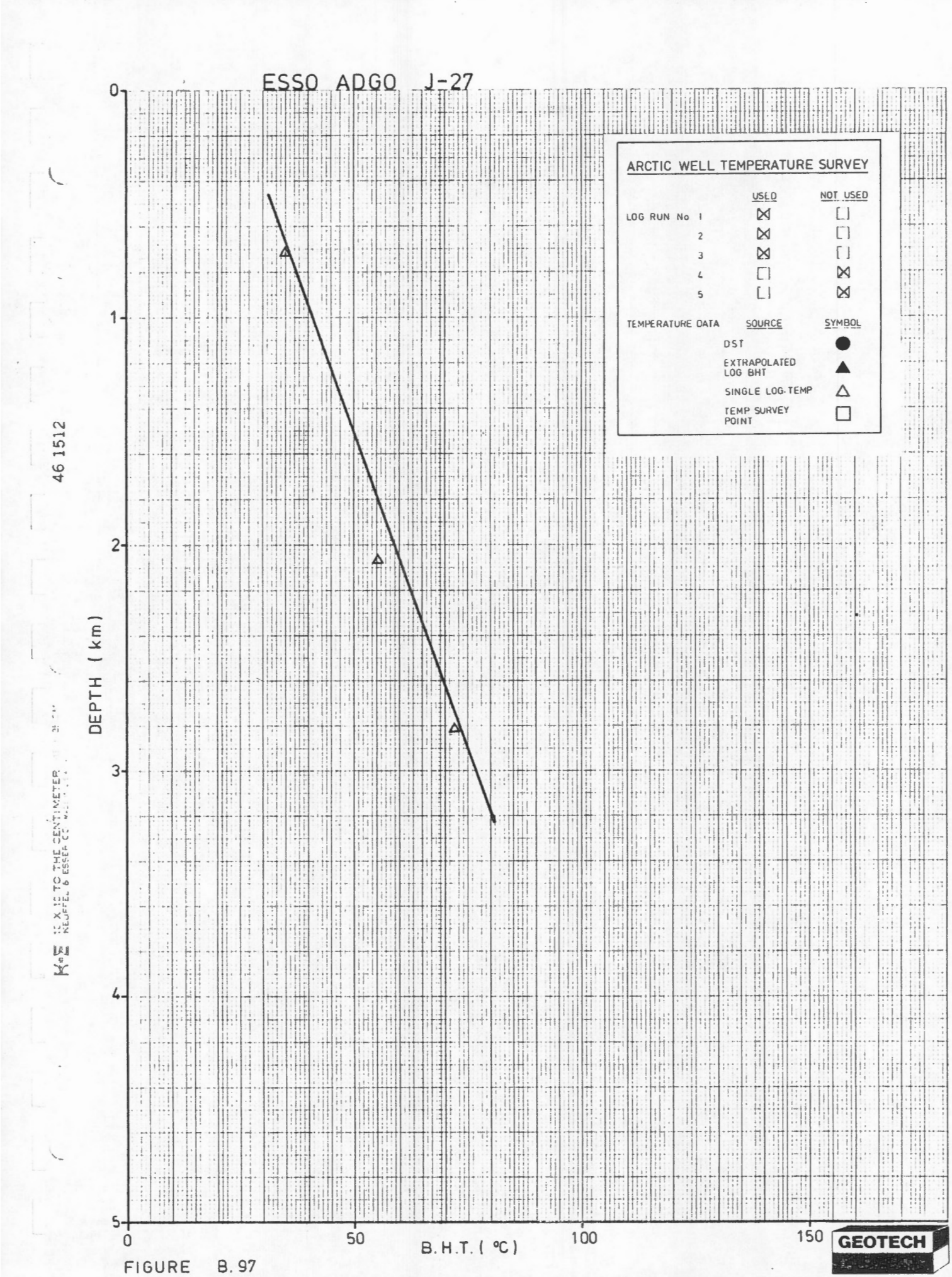

ESSO ADGO J-27
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
KE
GEOTECH

FIGURE B. 97

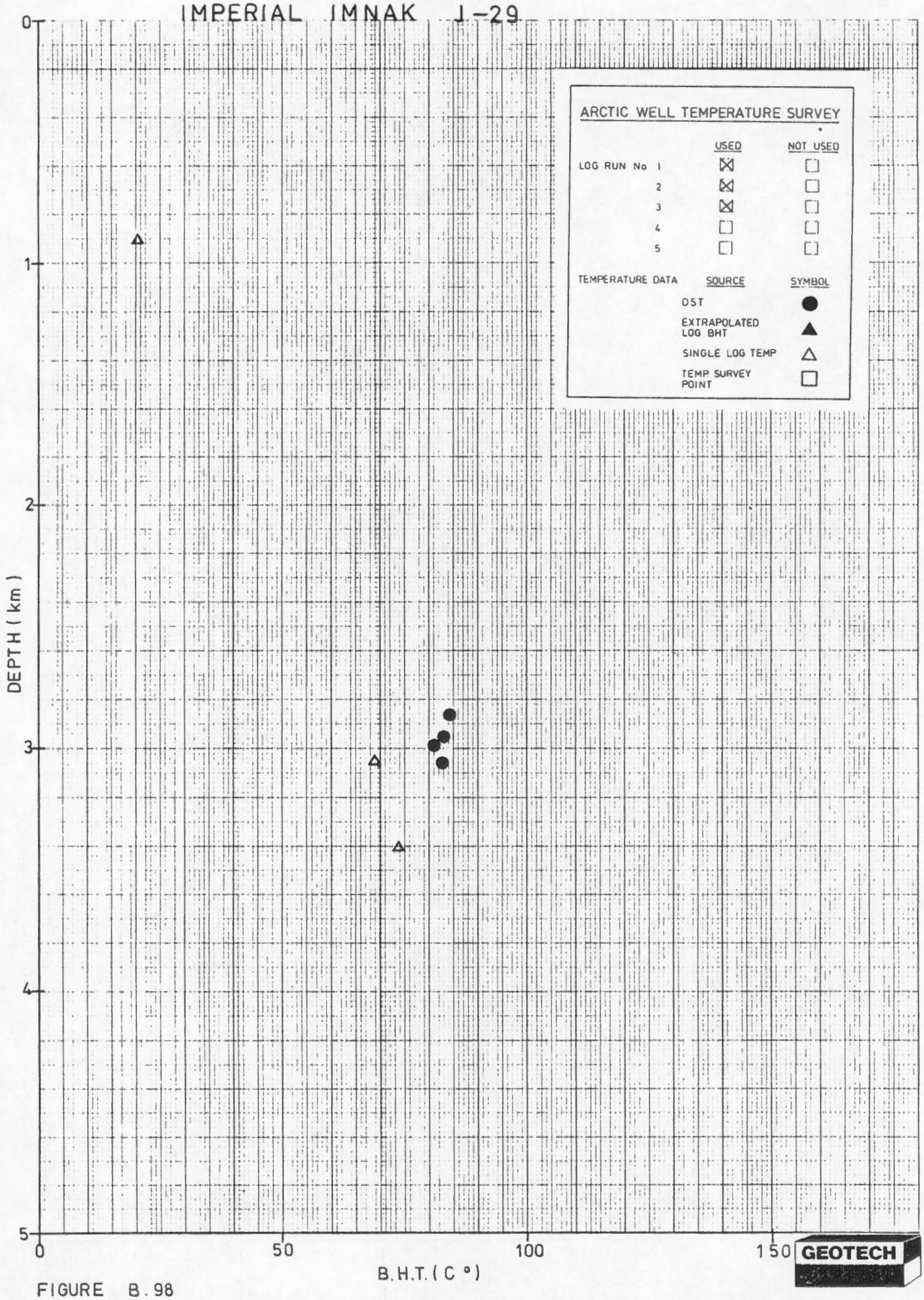


FIGURE B.98

46 1512
K&E 10 X 10 TO THE CENTIMETER 18 x 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

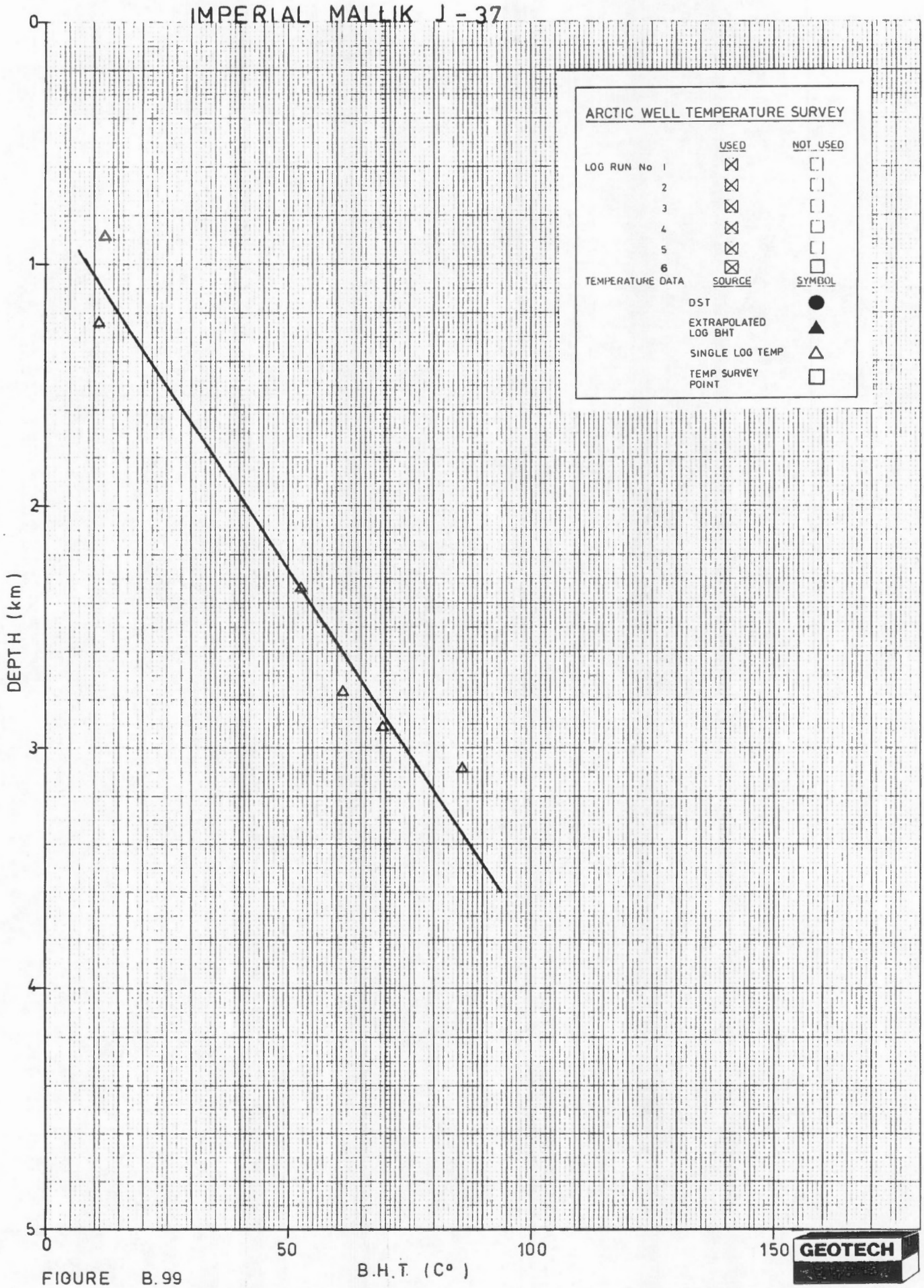

IMPERIAL MALLIK J-37
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
6
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.99

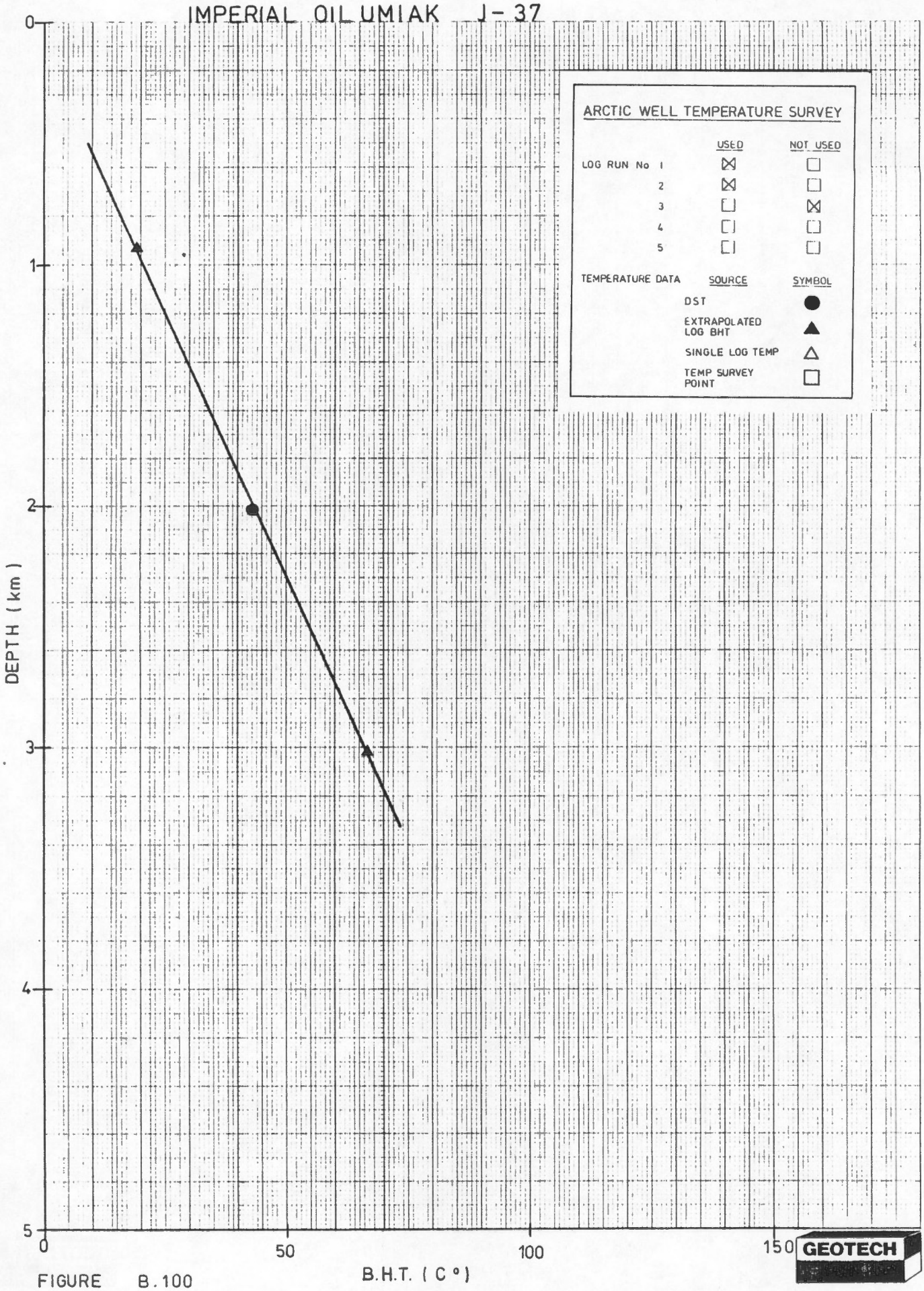


FIGURE B.100

46 1512
K+E 10 X 10 TO THE CENTIMETER

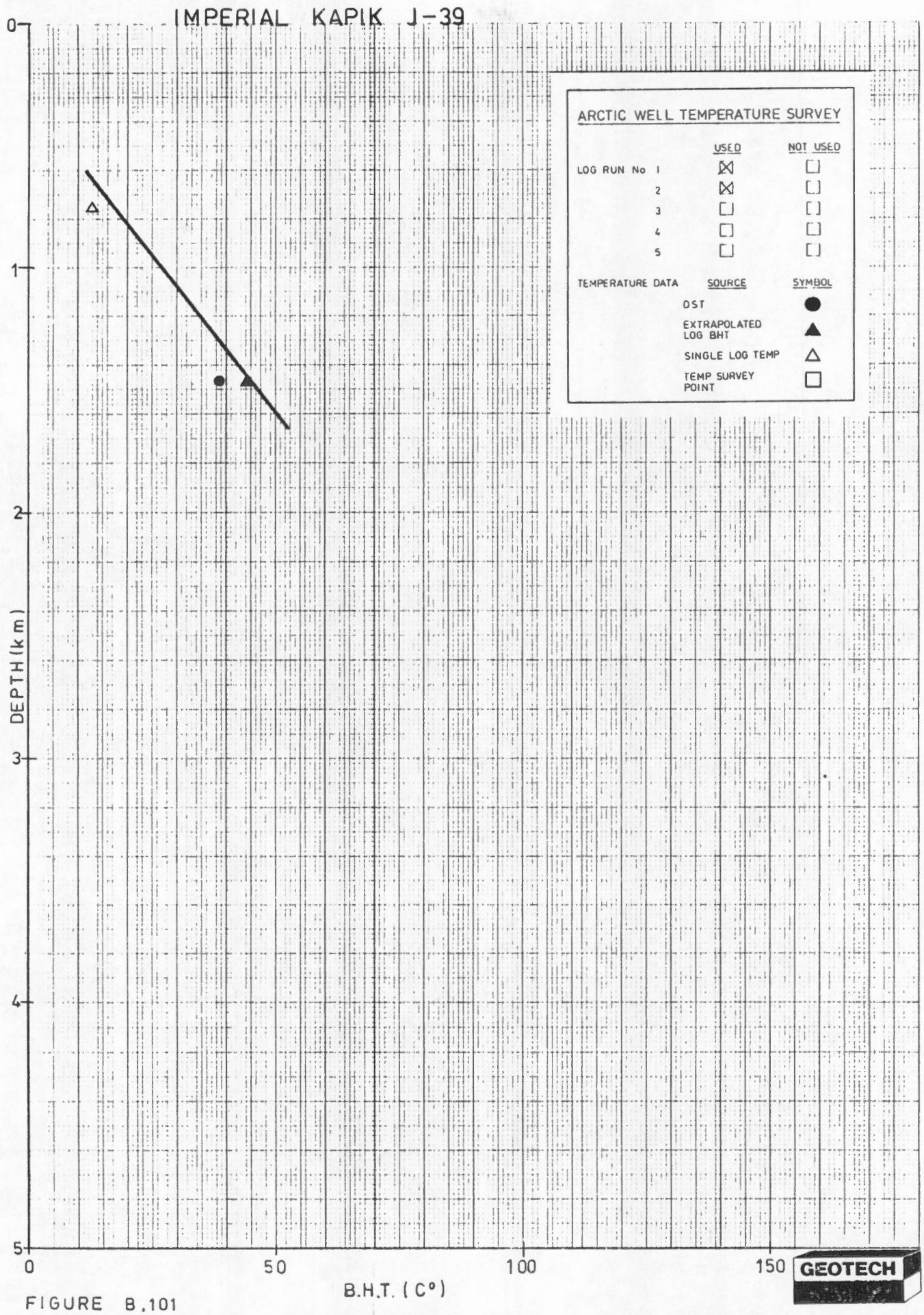

IMPERIAL KAPIK J-39
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.101

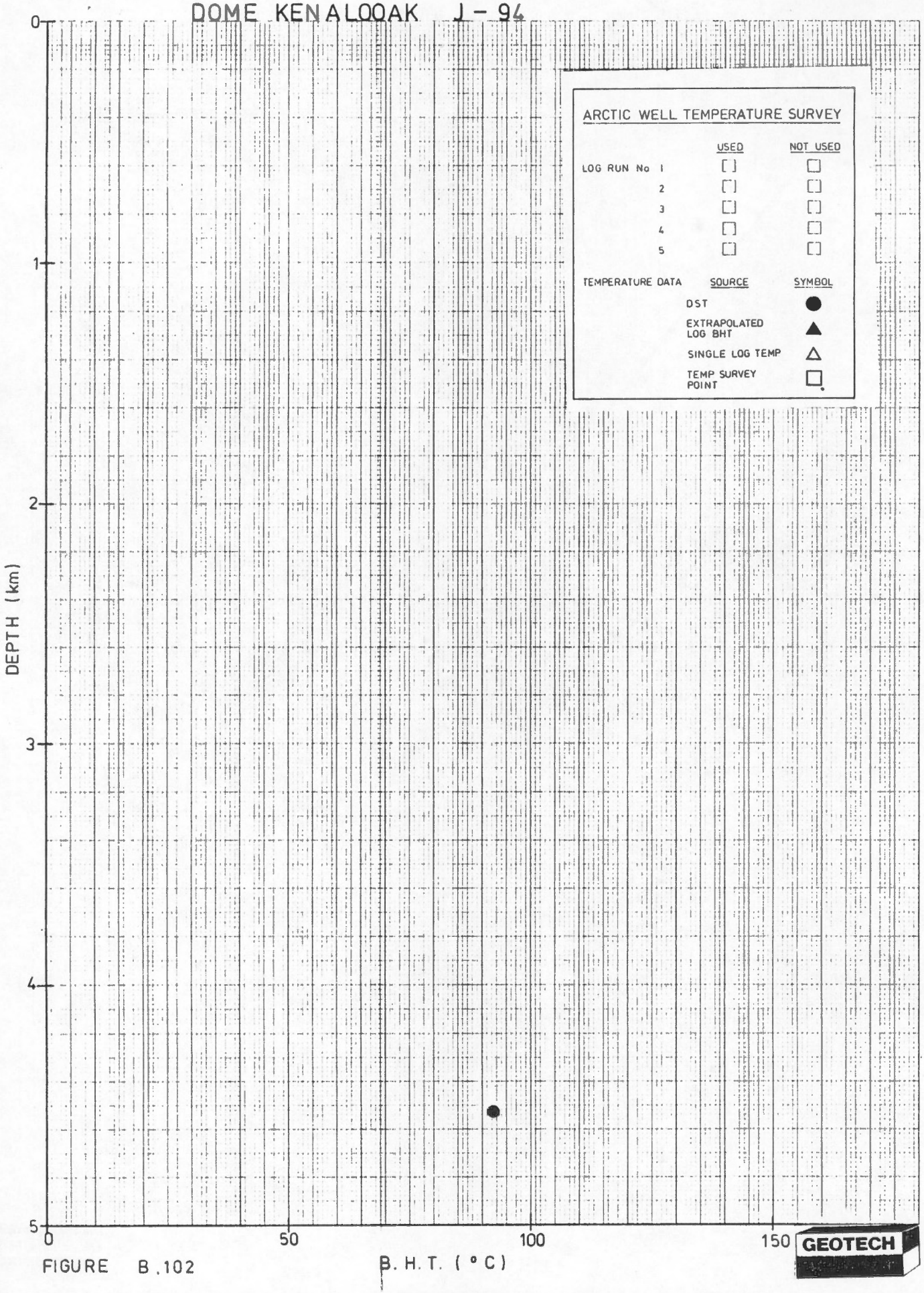


FIGURE B.102

46 1512
K&E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

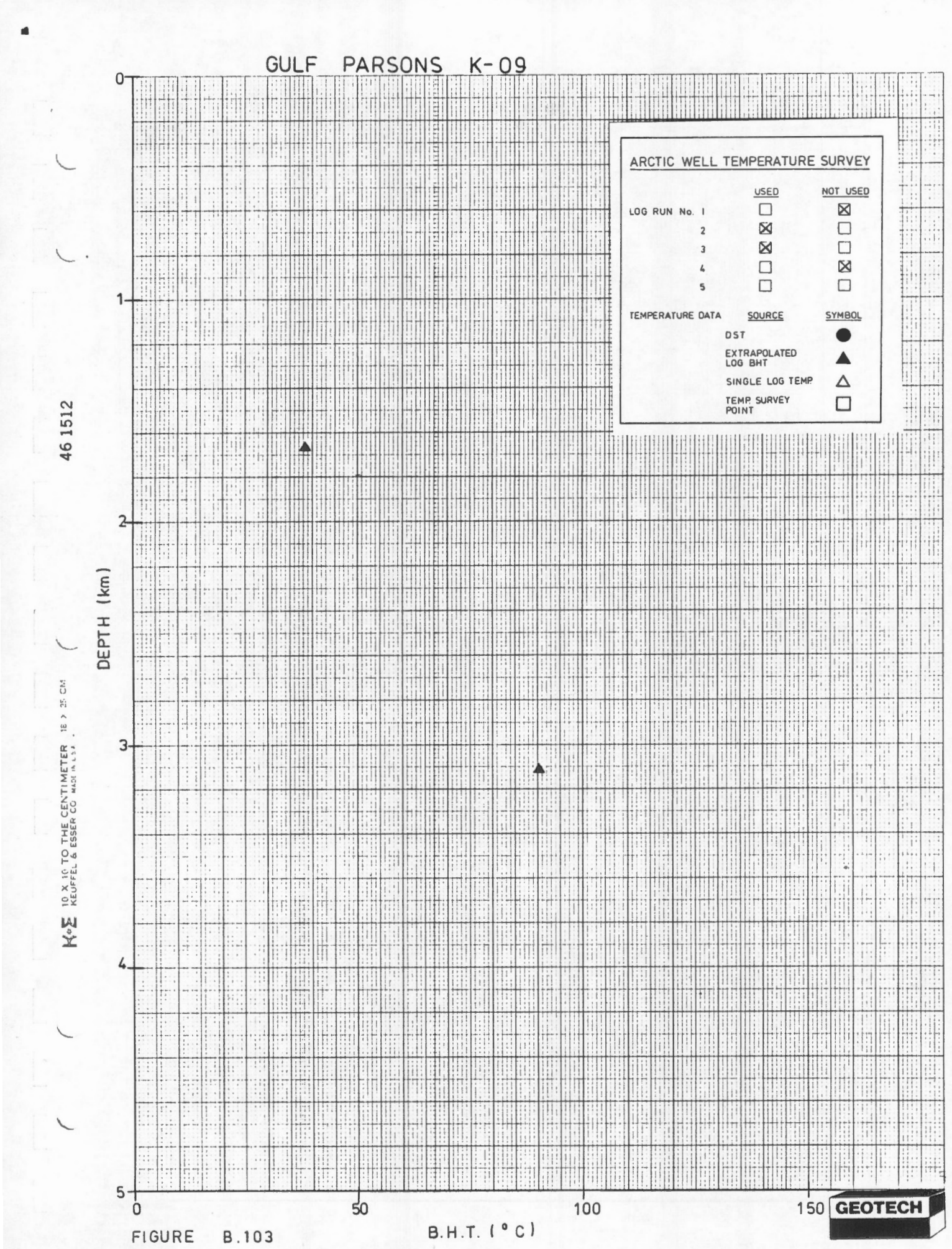

GULF PARSONS K-09
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B.103

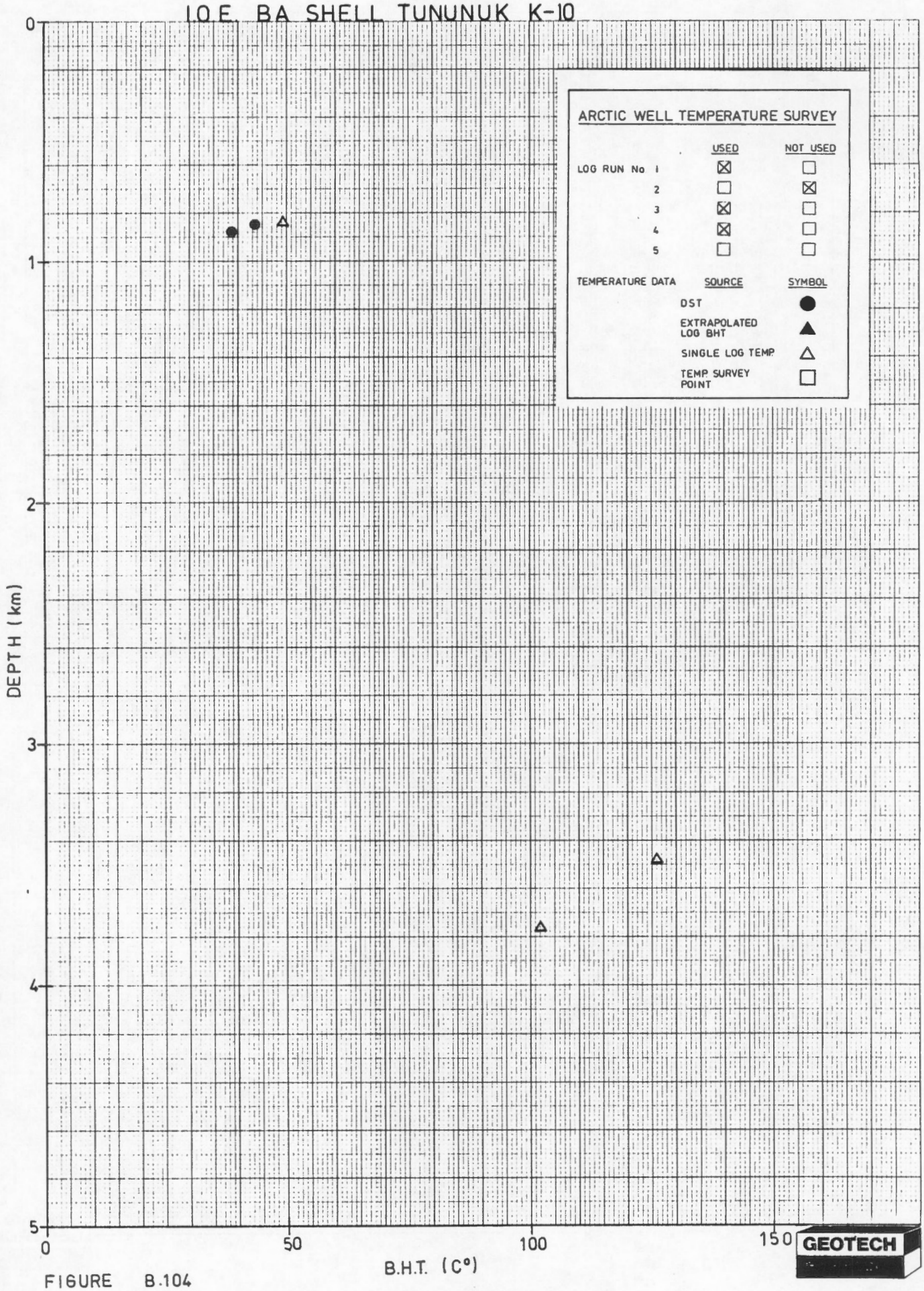


FIGURE B.104

46 1512
KEUFFEL & ESSER CO MADE IN U.S.A. 10 X 10 TO THE CENTIMETER 18 X 25 CM.

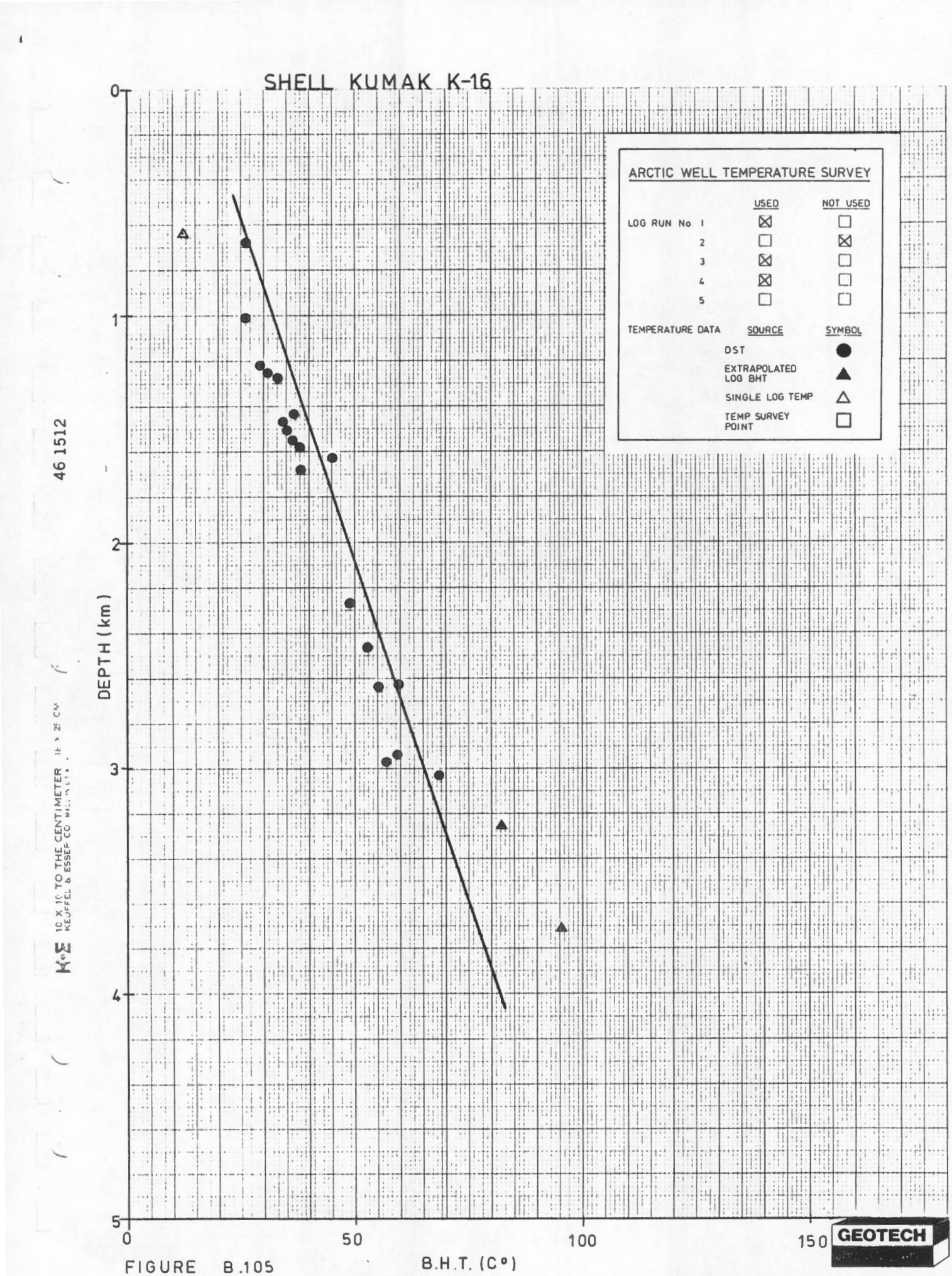

SHELL KUMAK K-16
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH
46 1512
KEUFFEL & ESSER CO

FIGURE B.105

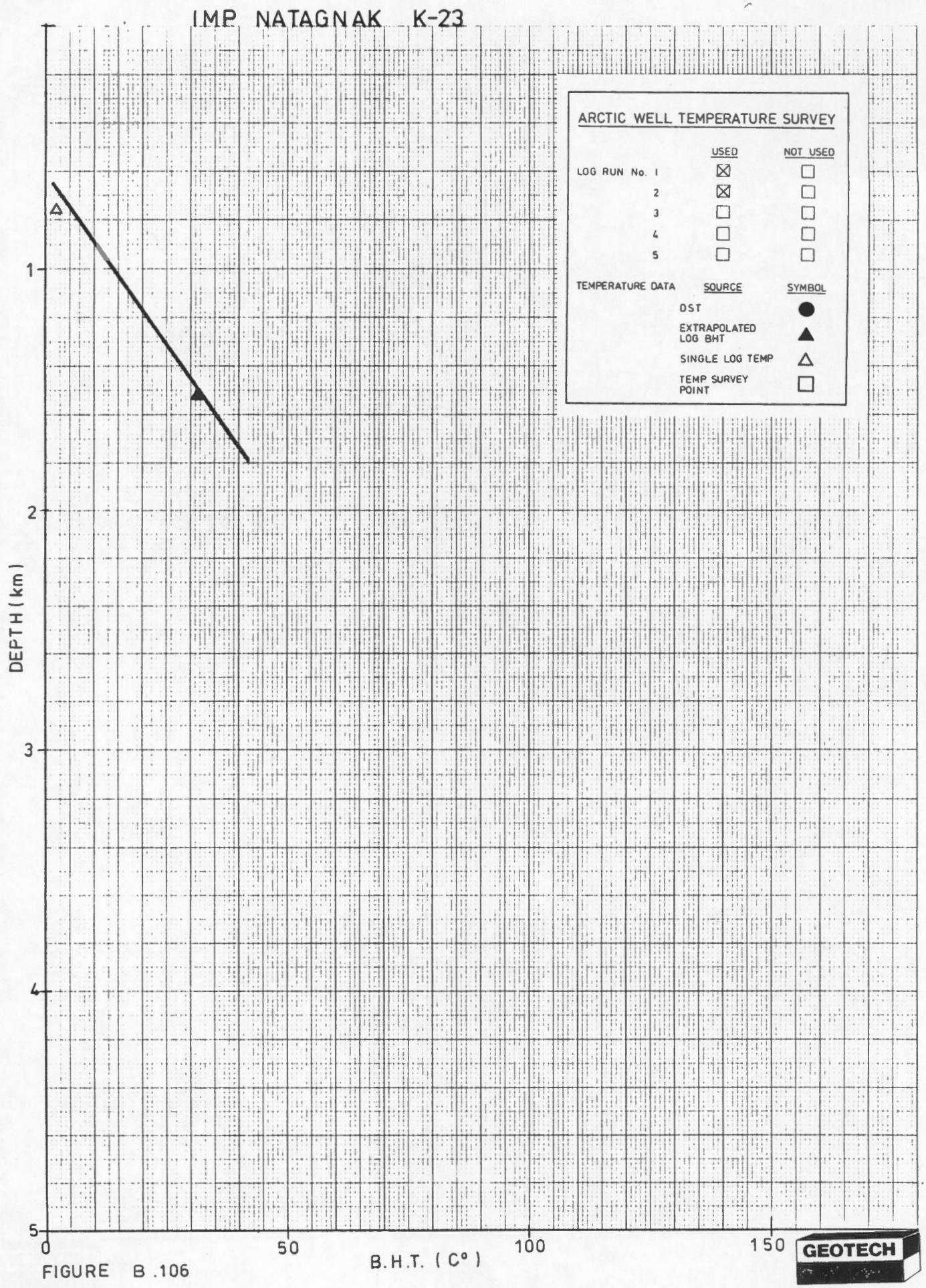


FIGURE B .106

46 1512

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

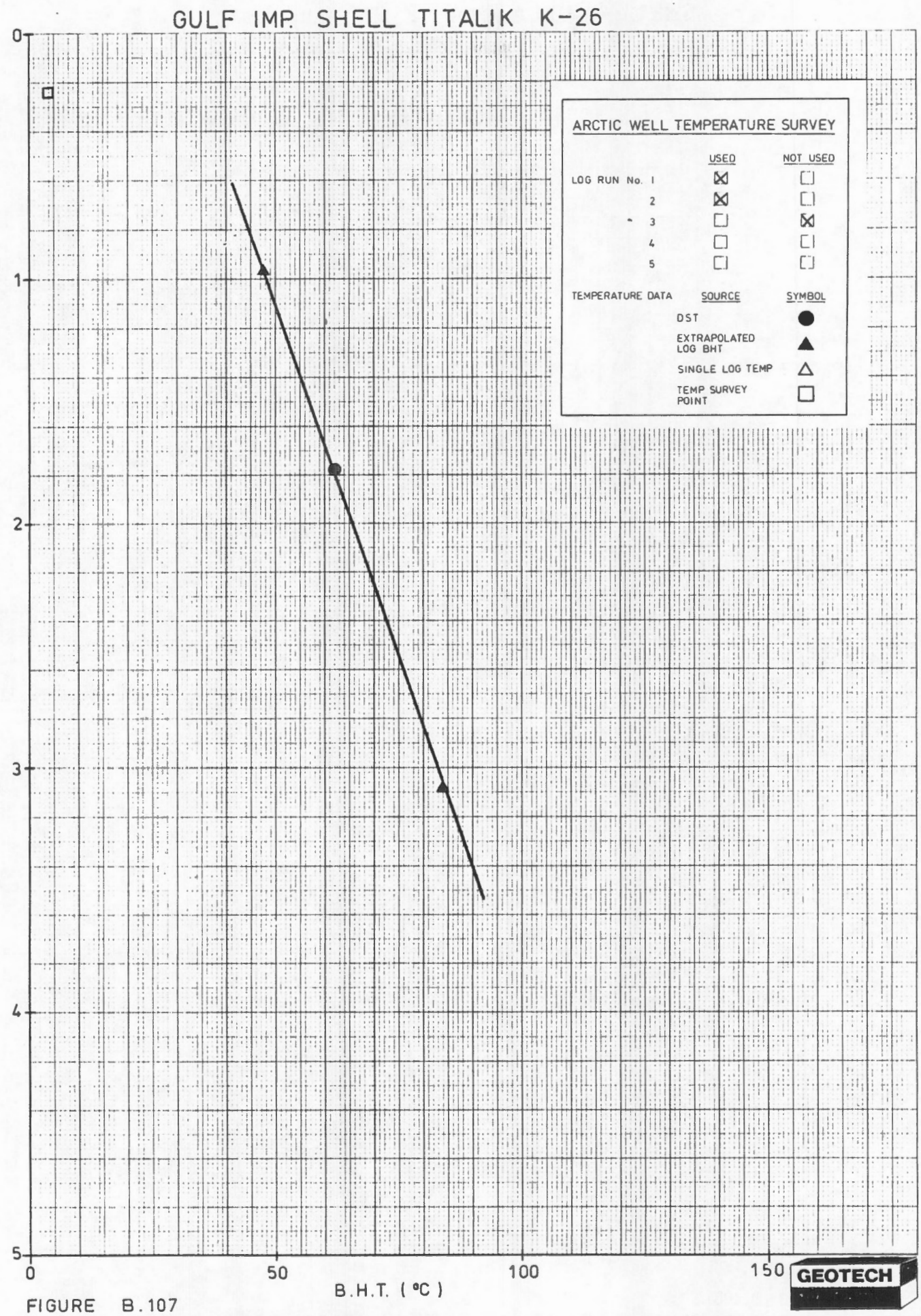


FIGURE B.107

46 1512
KE 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

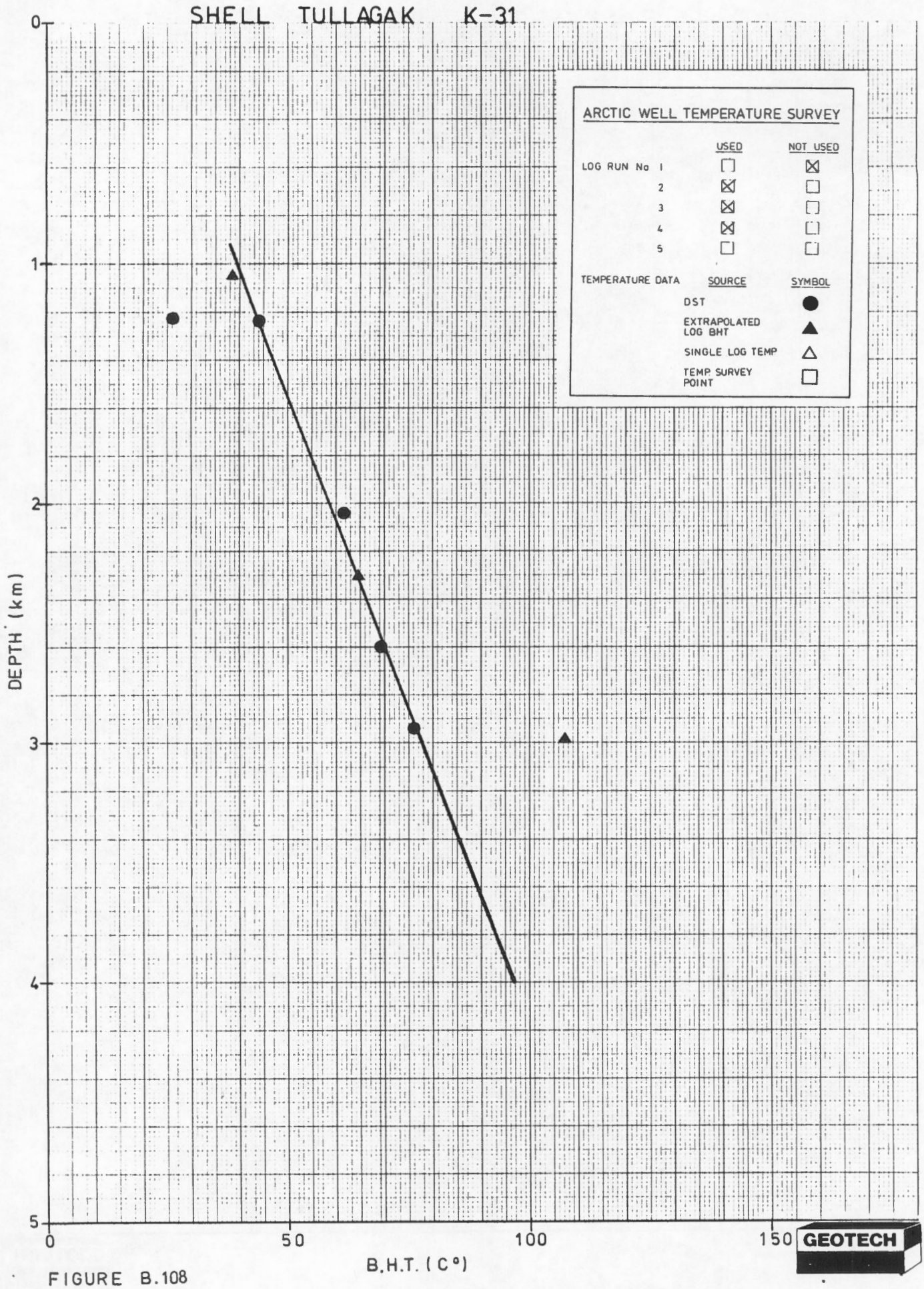


FIGURE B.108

46 1512
10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN USA

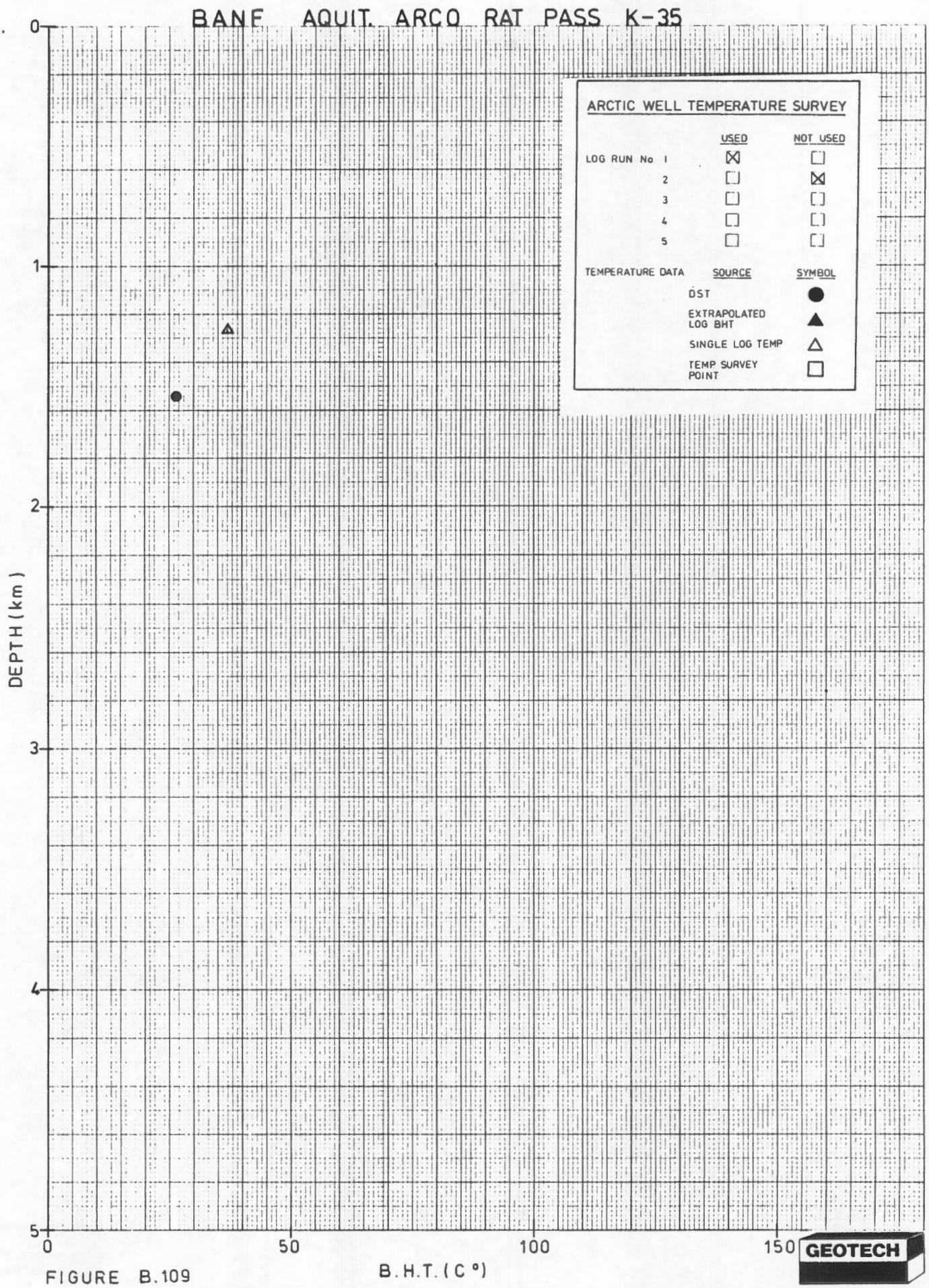


FIGURE B.109

46 1512
K&E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

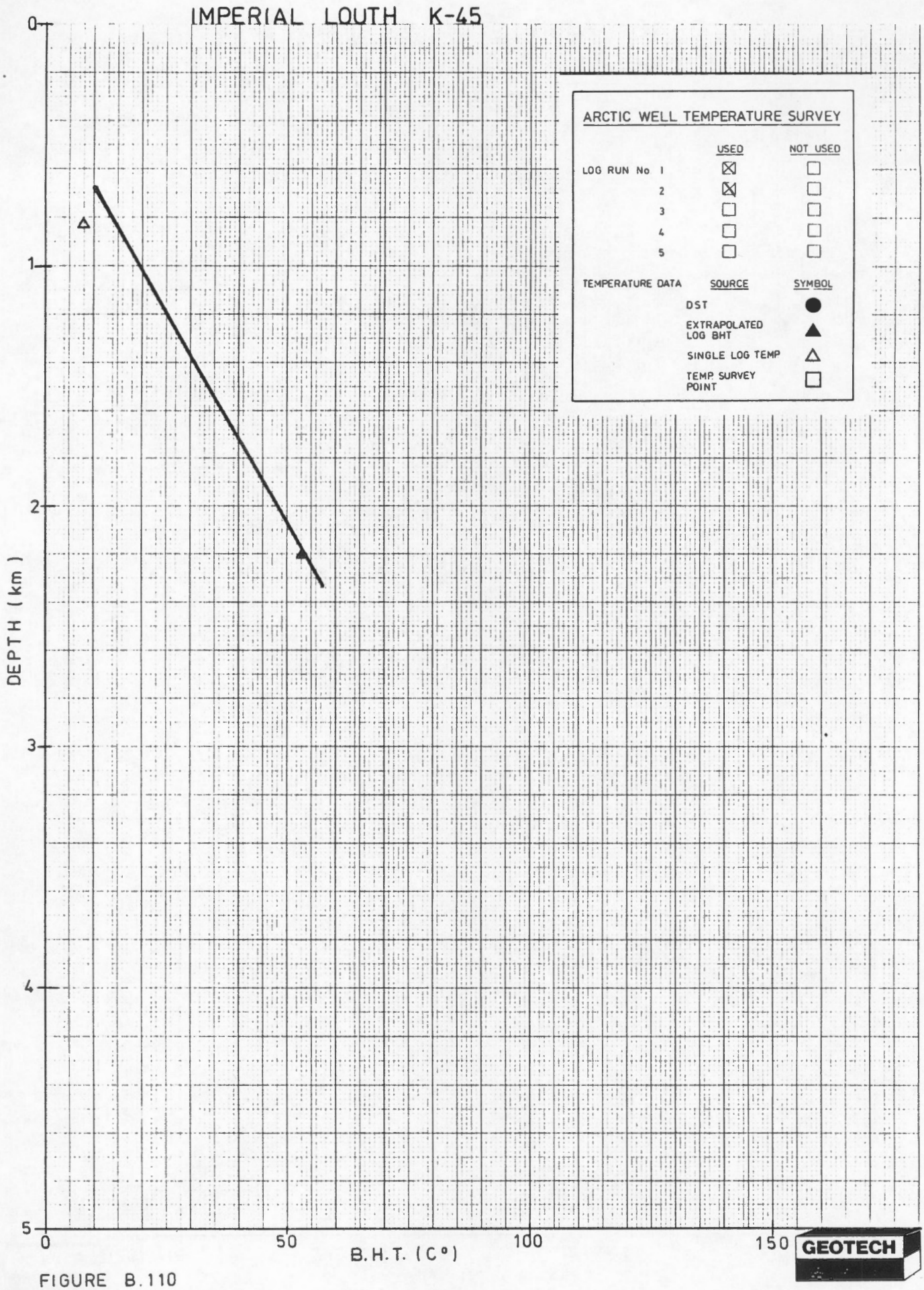


FIGURE B.110

46 1512
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

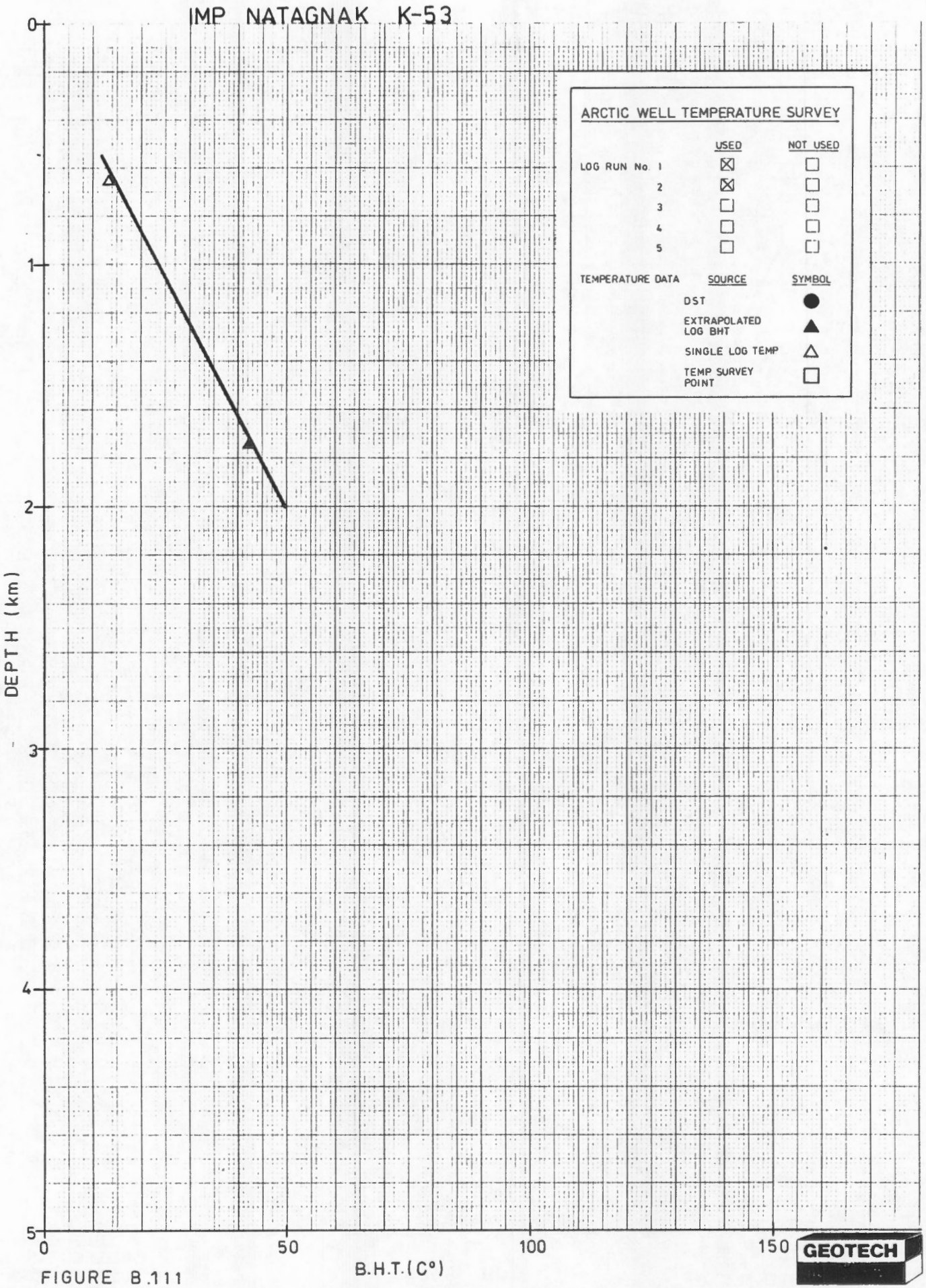


FIGURE B.111

GEOTECH

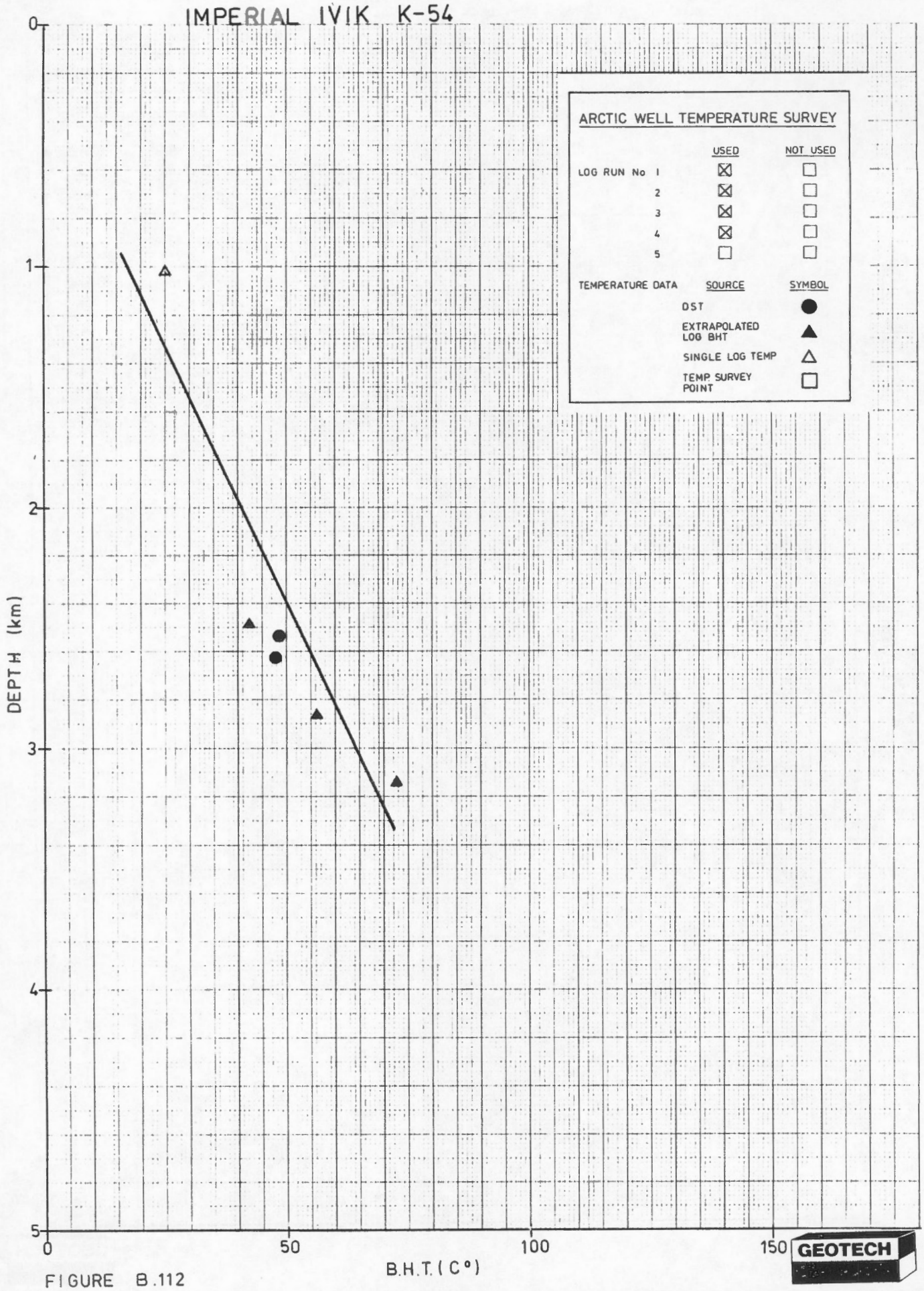


FIGURE B.112

46 1512

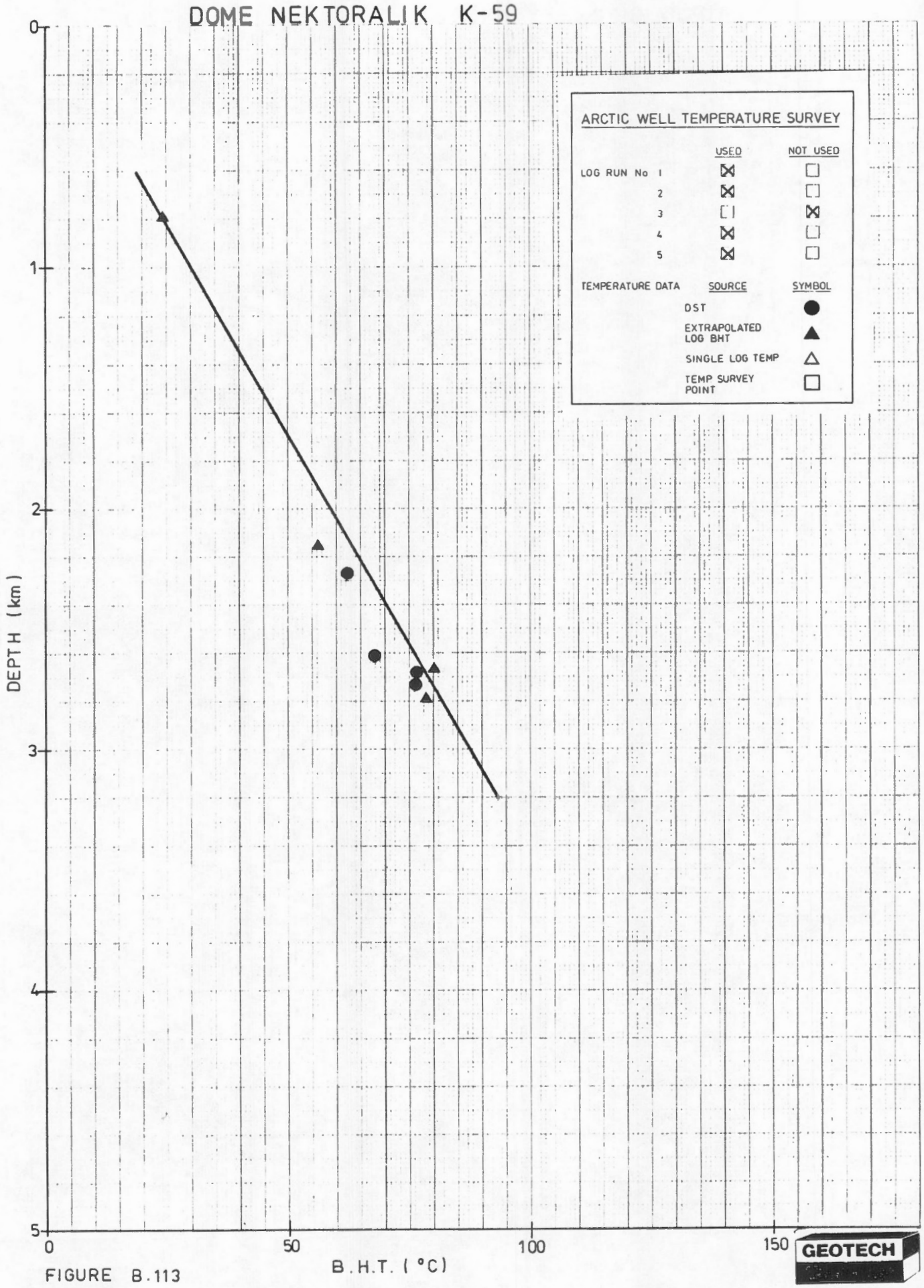


FIGURE B.113

46 1512
K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

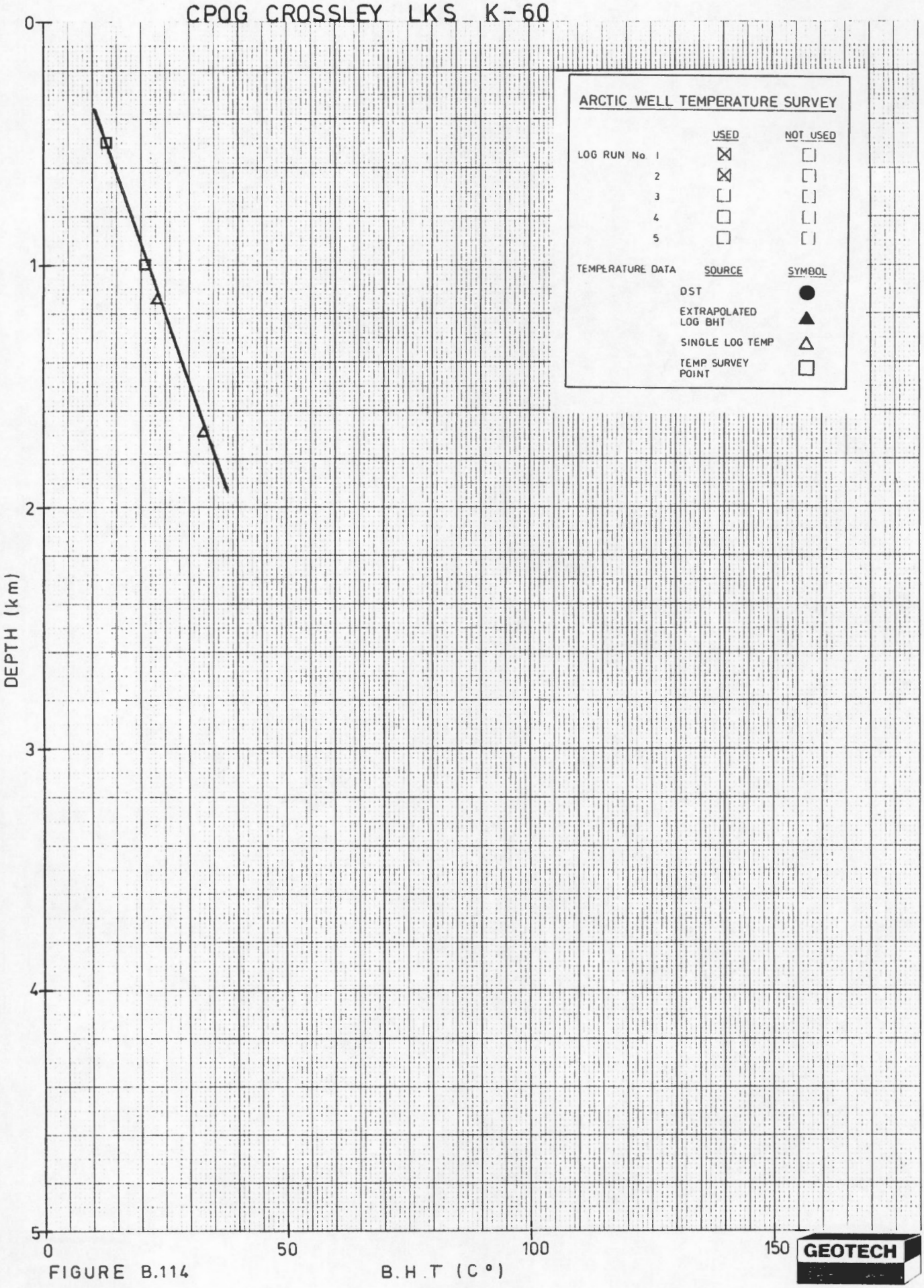


FIGURE B.114

KEUFFEL & ESSER CO MADE IN U.S.A.

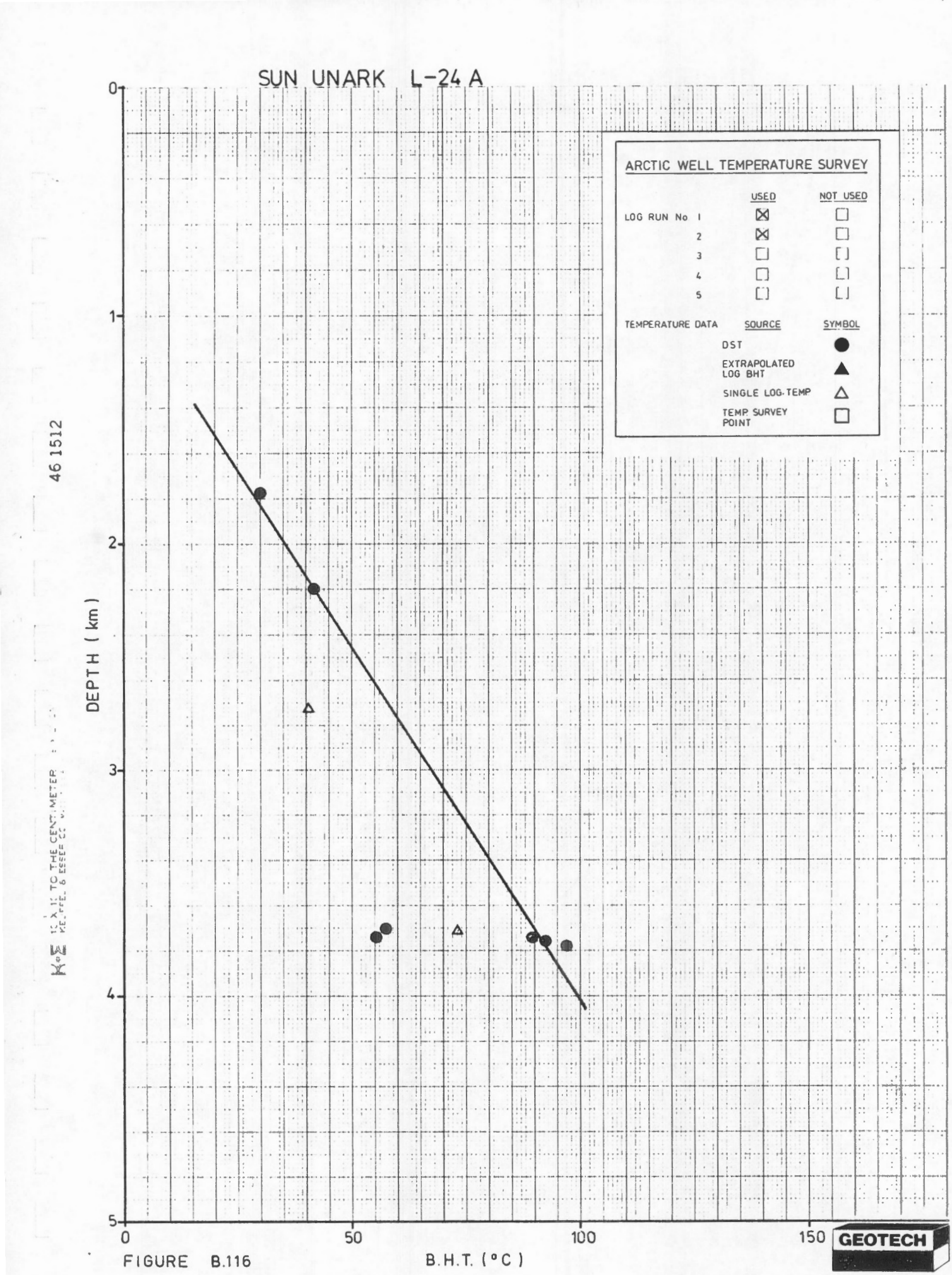

SUN UNARK L-24 A
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH
46 1512

FIGURE B.116

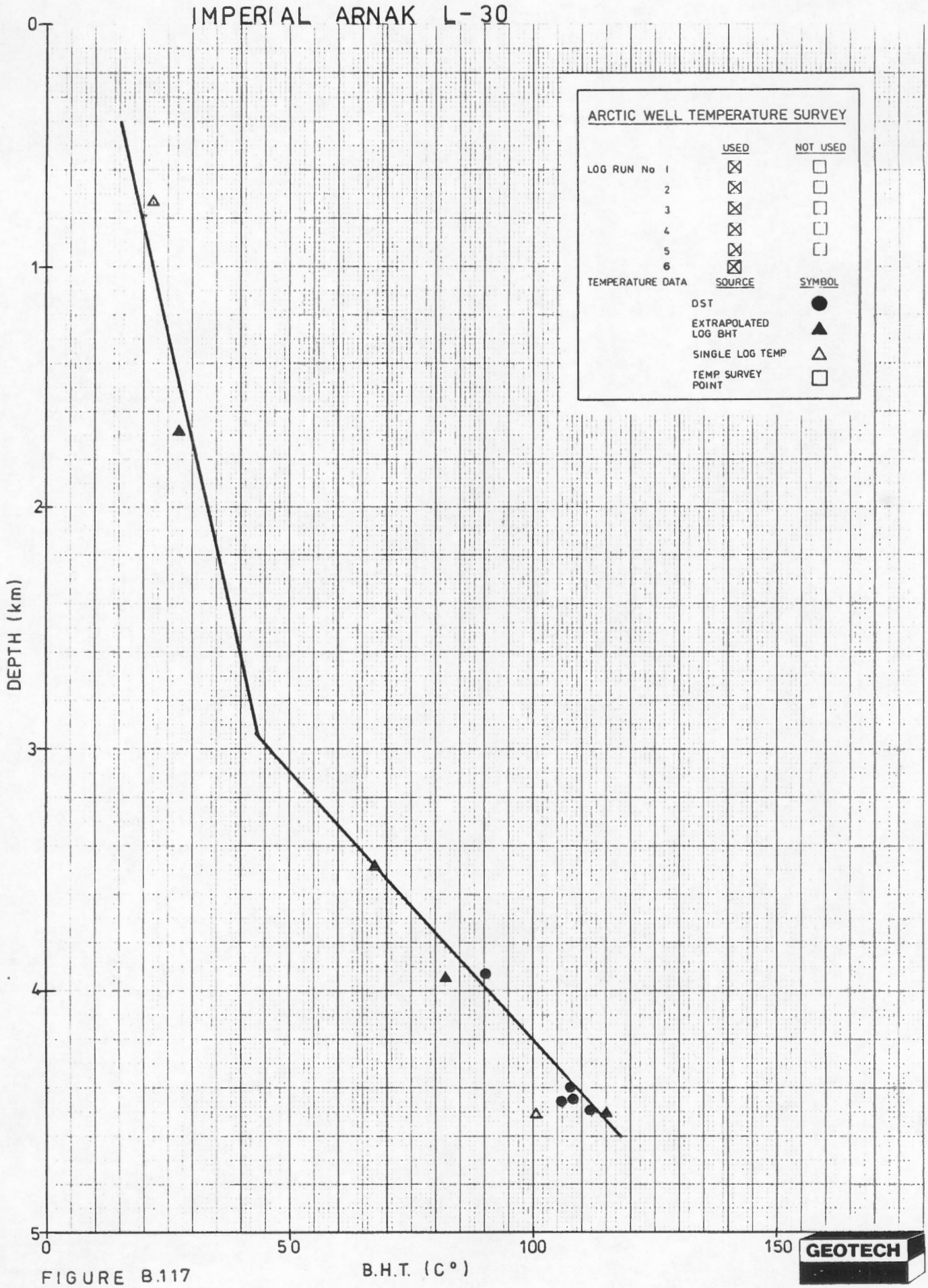


FIGURE B.117

46 1512

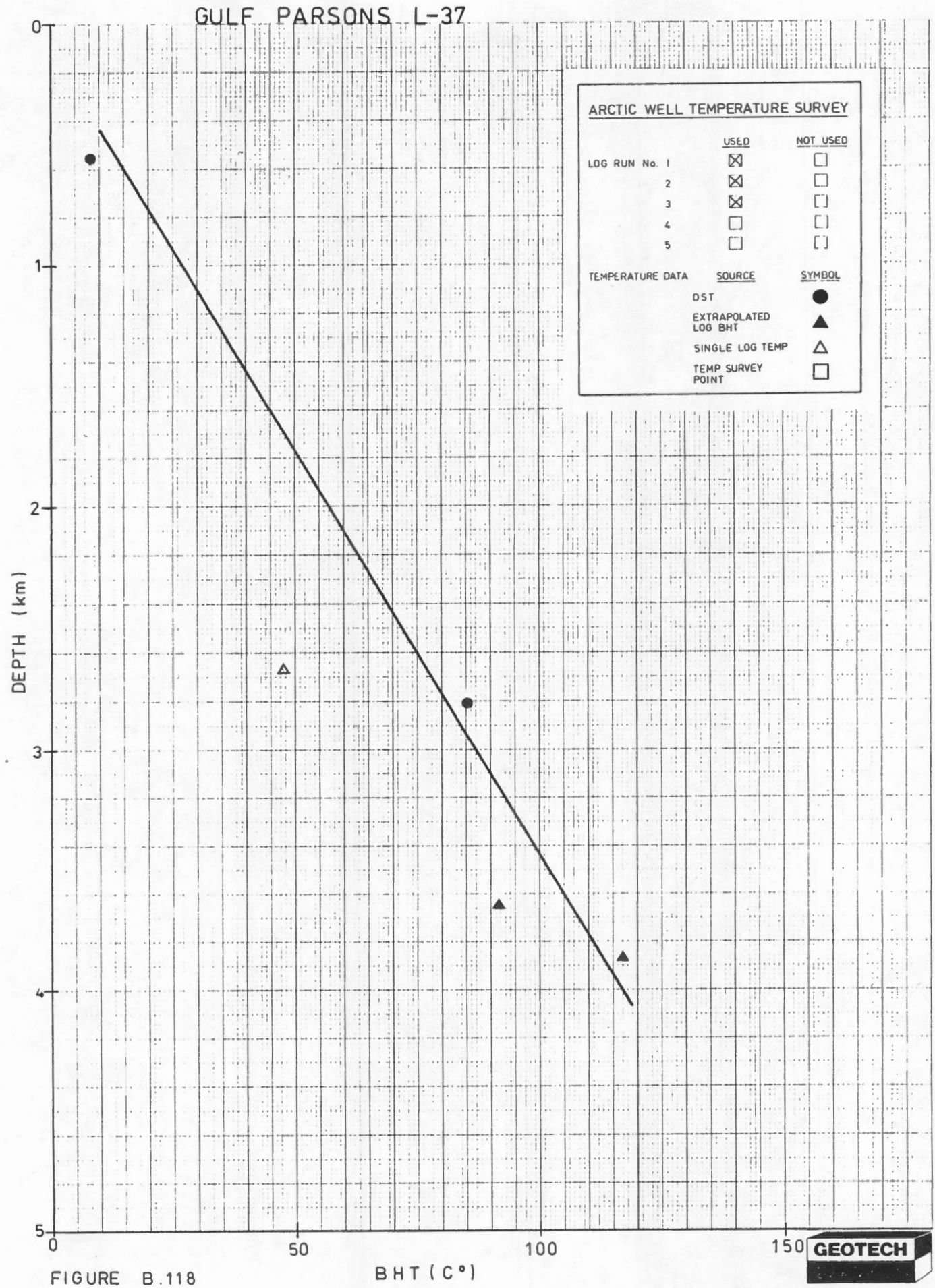


FIGURE B.118

46 1512

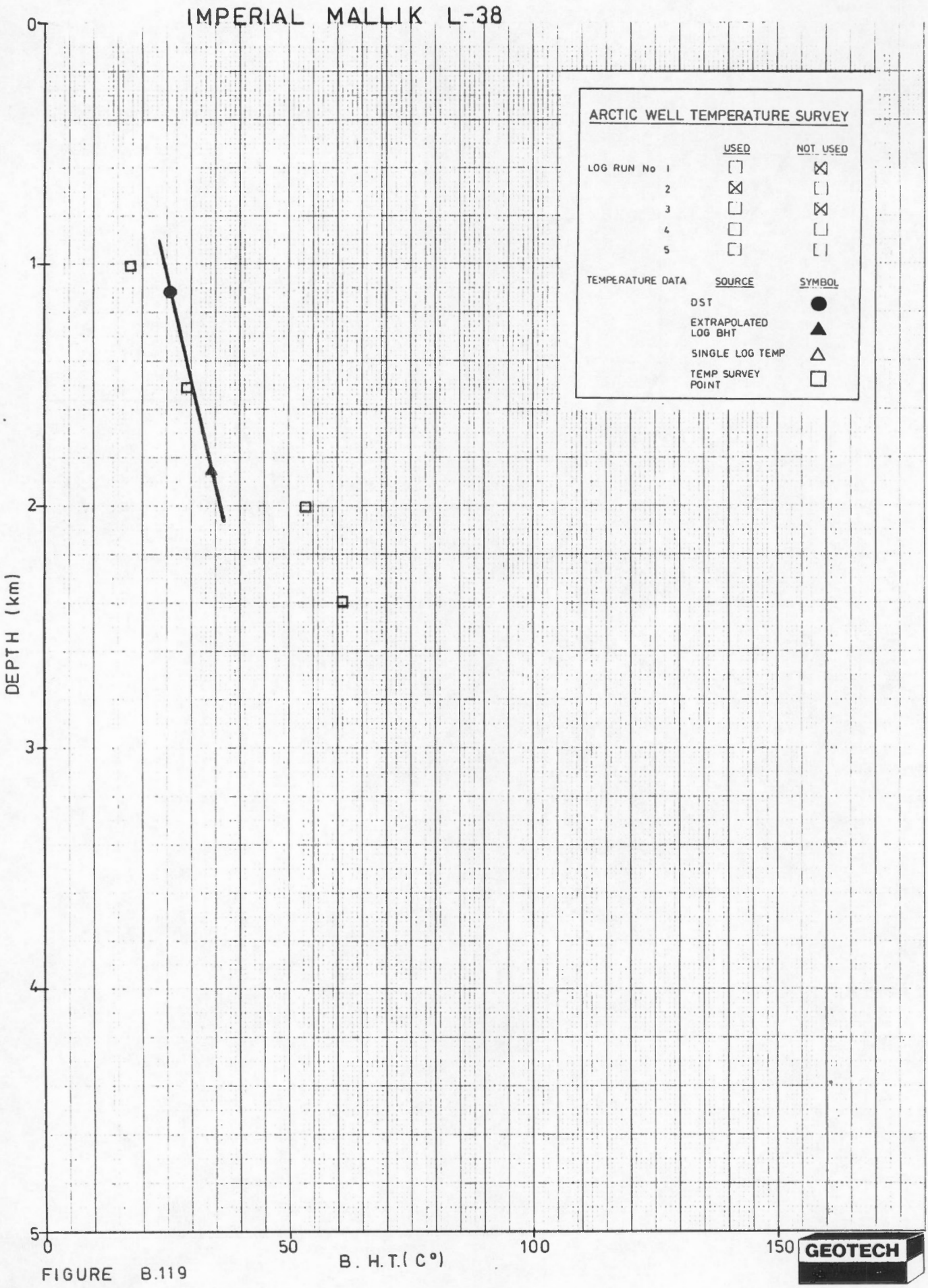


FIGURE B.119

46 1512

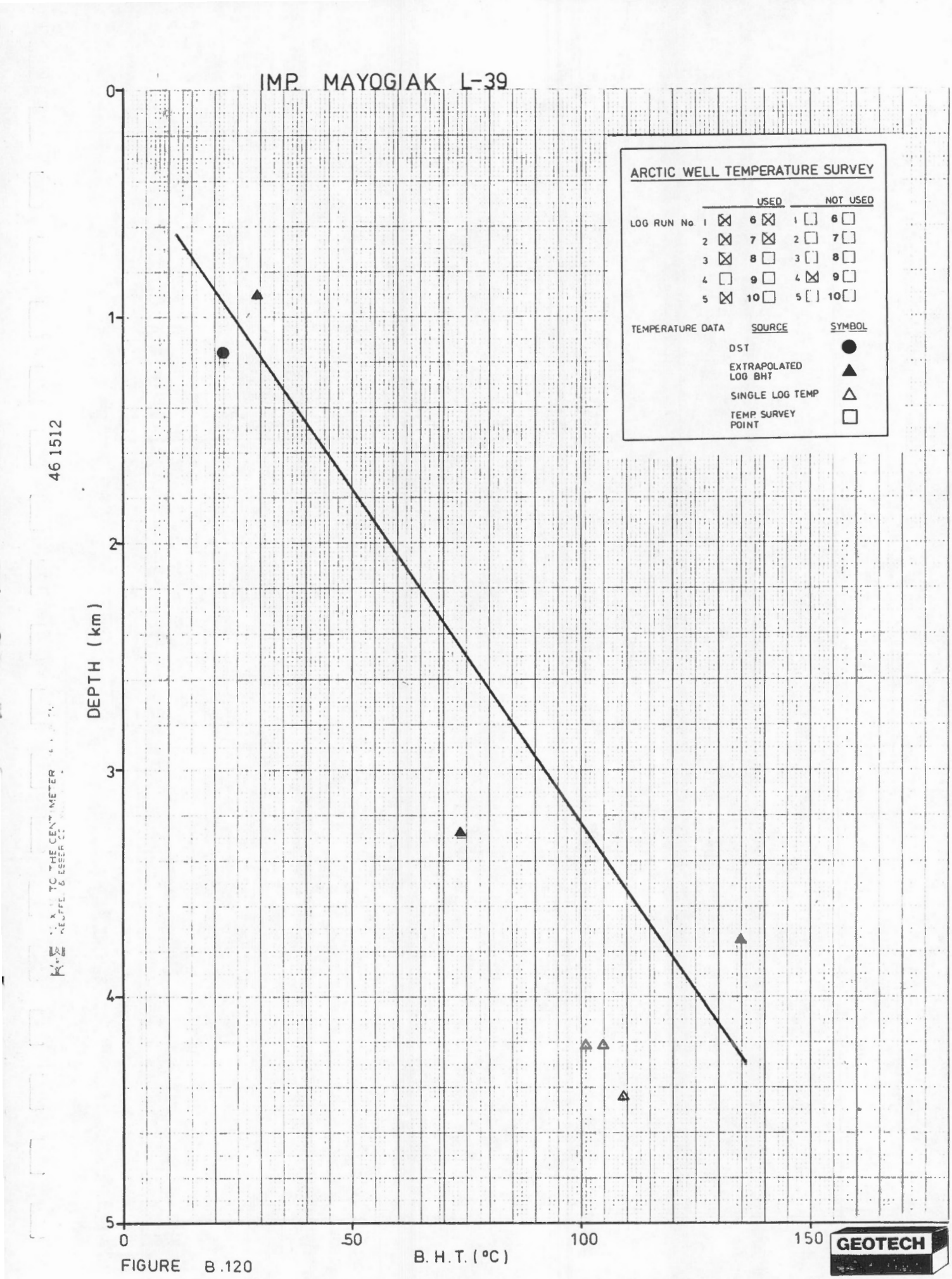

IMP. MAYOGIAK L-39
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No.
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
B.H.T. (°C)
0
1
2
3
4
5
50
100
150
GEOTECH

FIGURE B.120

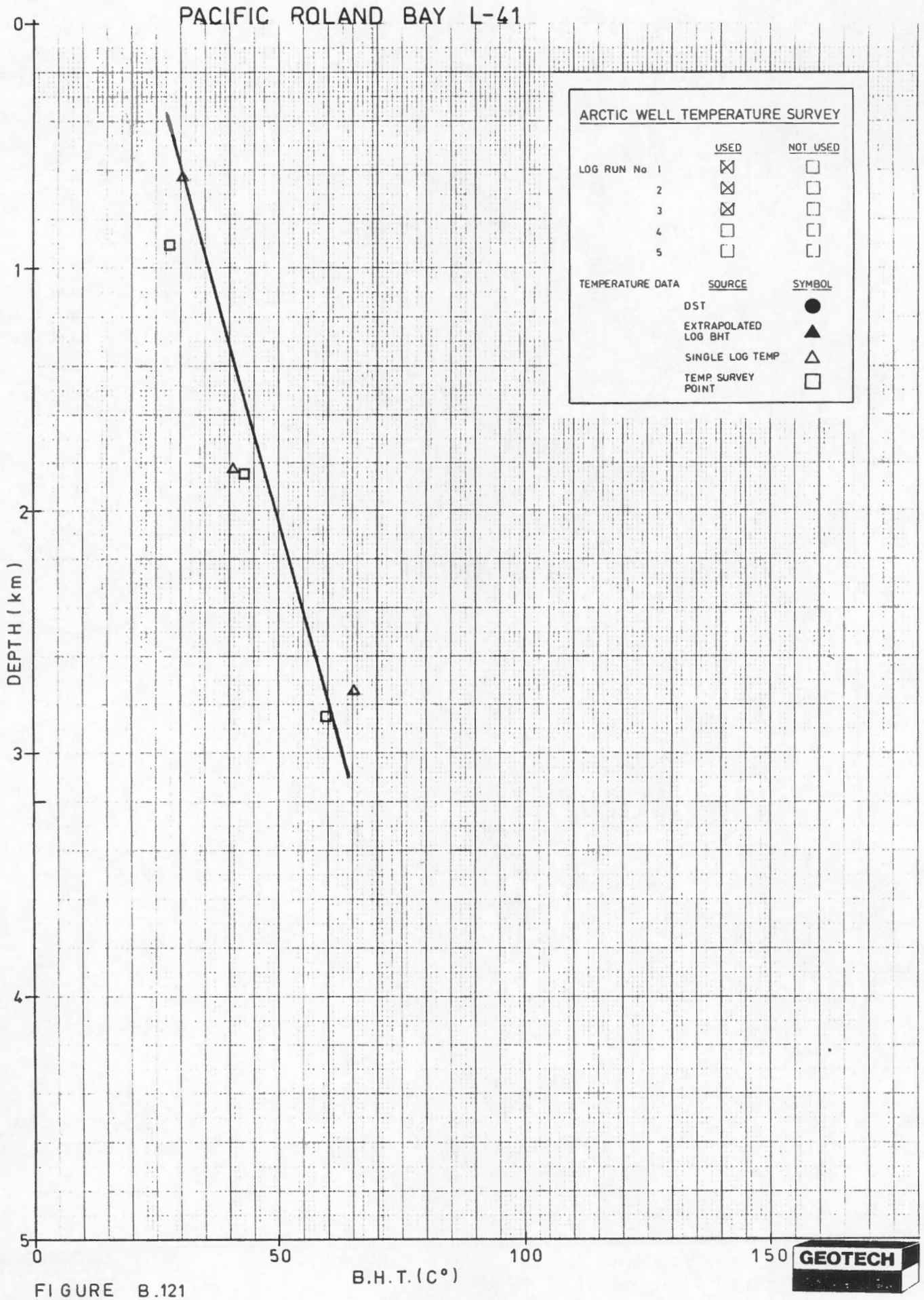


FIGURE B.121

46 1512

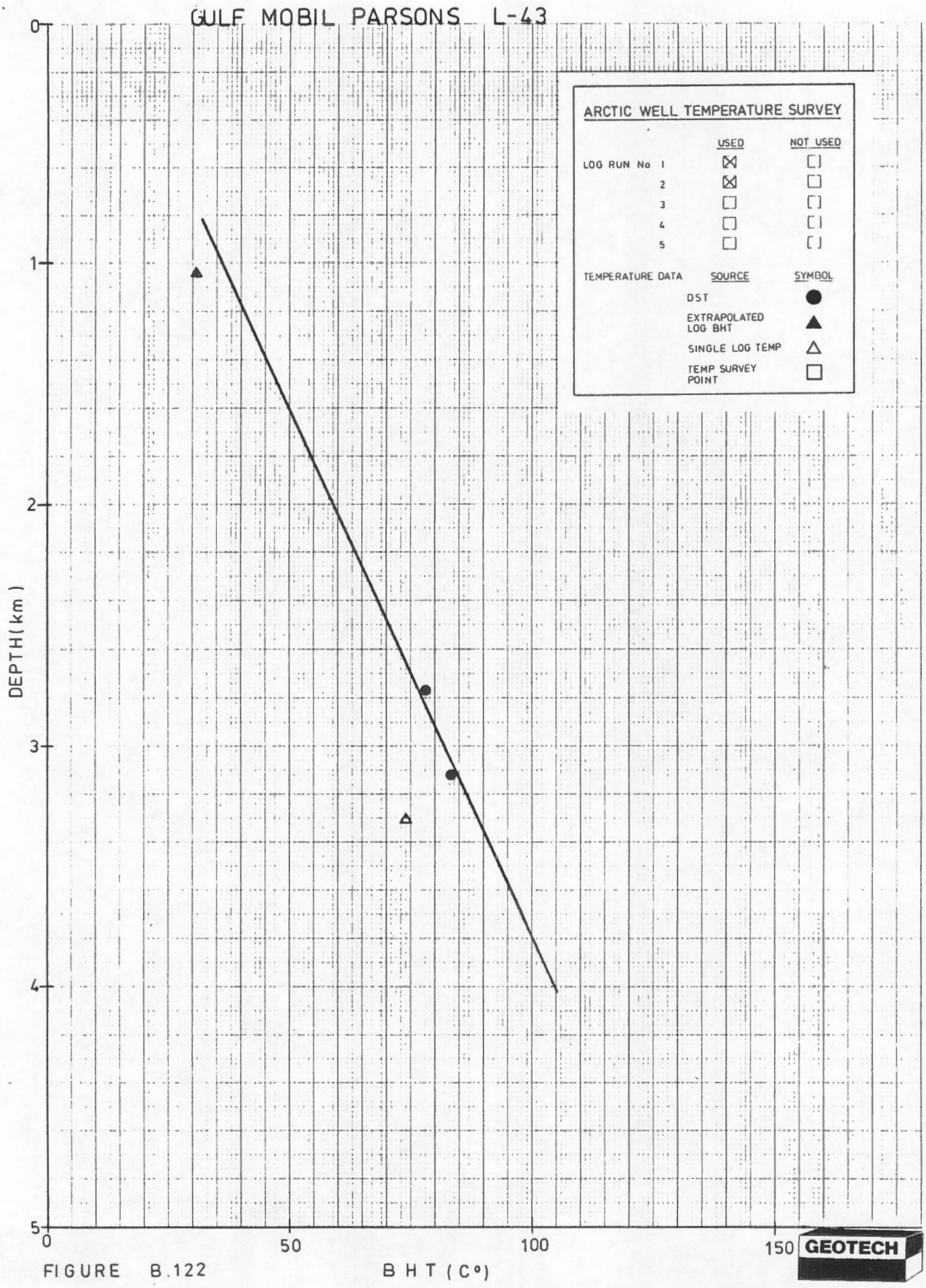

GULF MOBIL PARSONS L-43
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B H T (C°)
46 1512
GEOTECH

FIGURE B.122

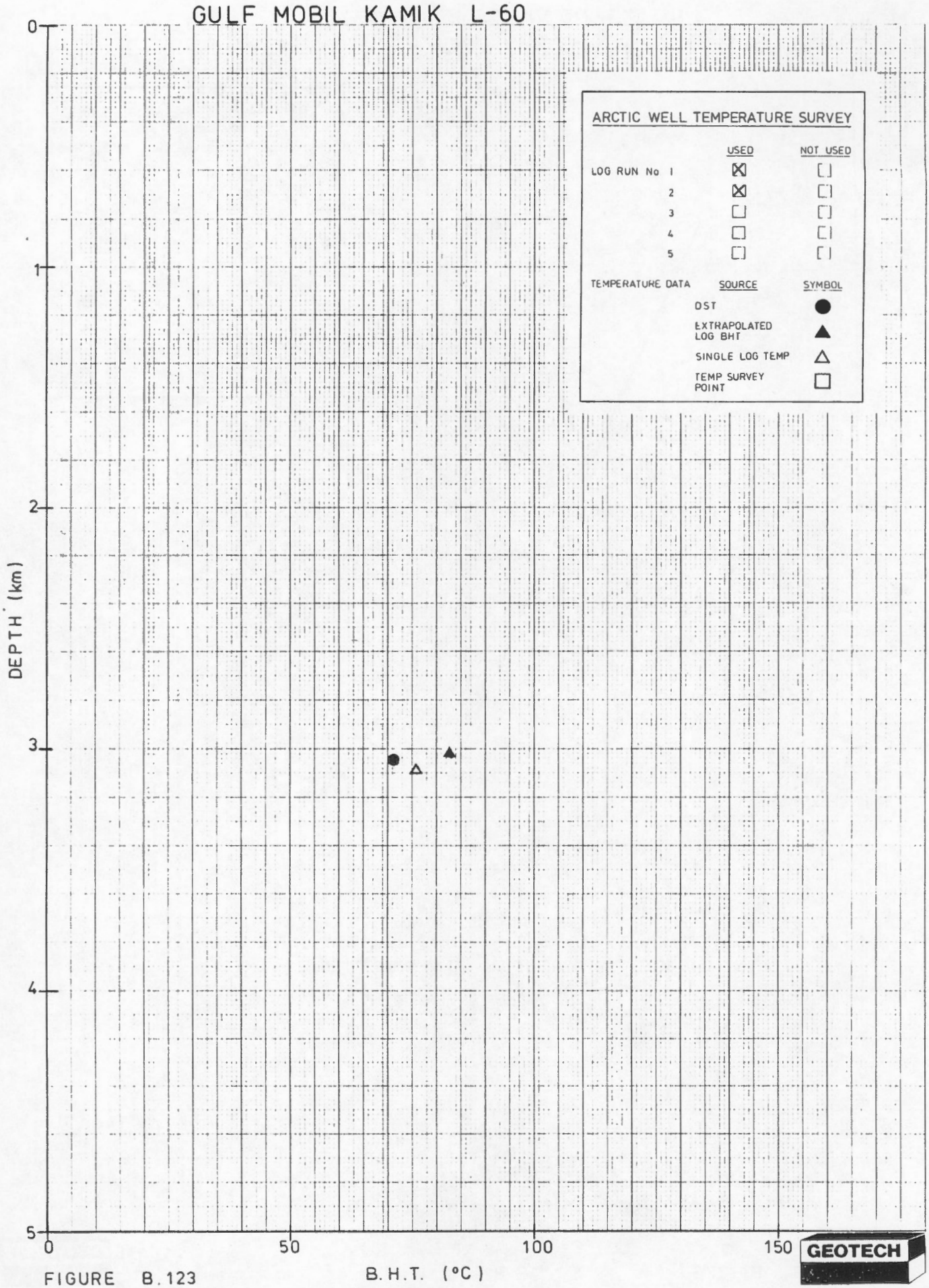


FIGURE B.123

46 1512
KEUFFEL & ESSER CO.

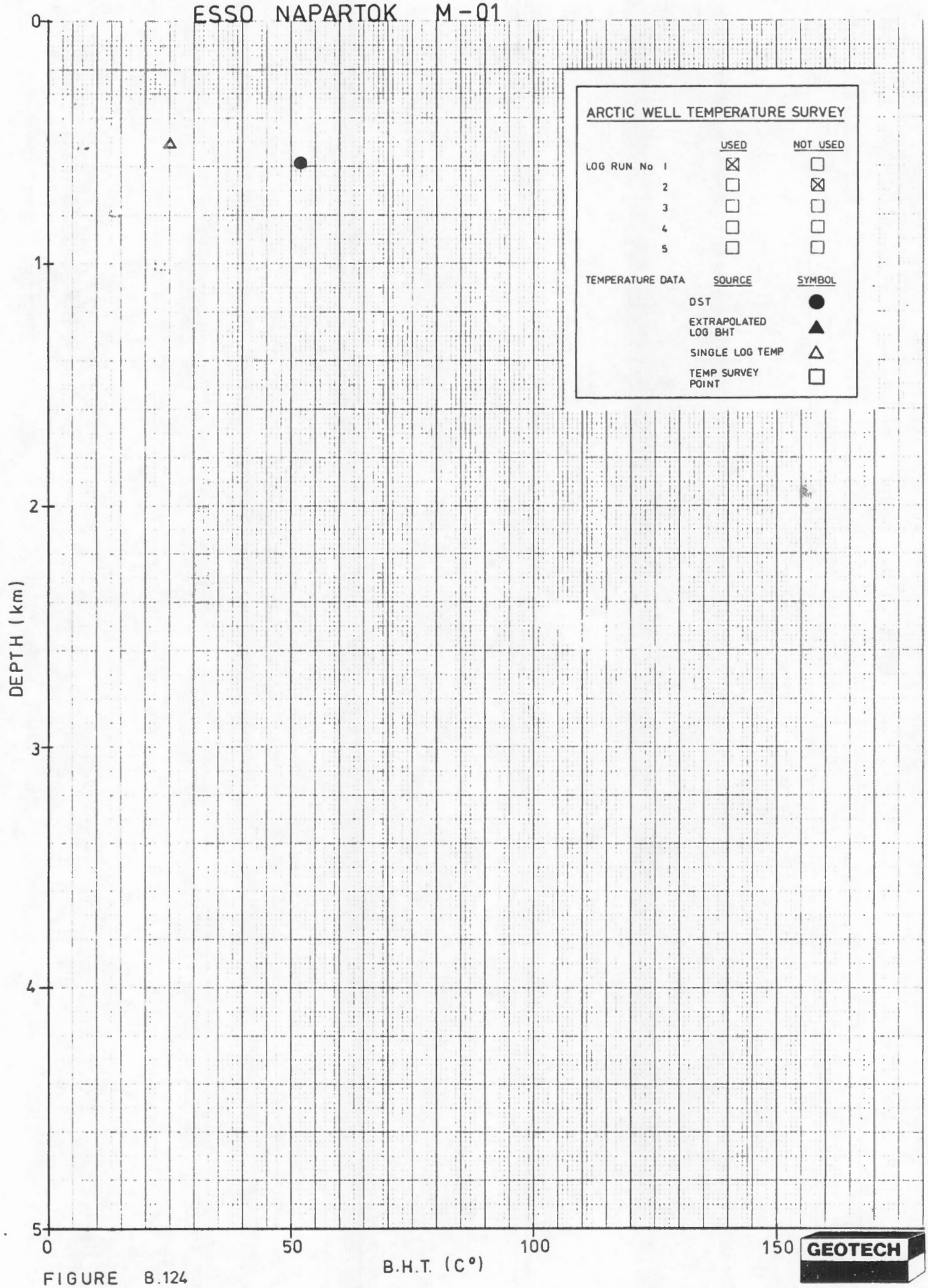

ESSO NAPARTOK M-01
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
GEOTECH

FIGURE B.124

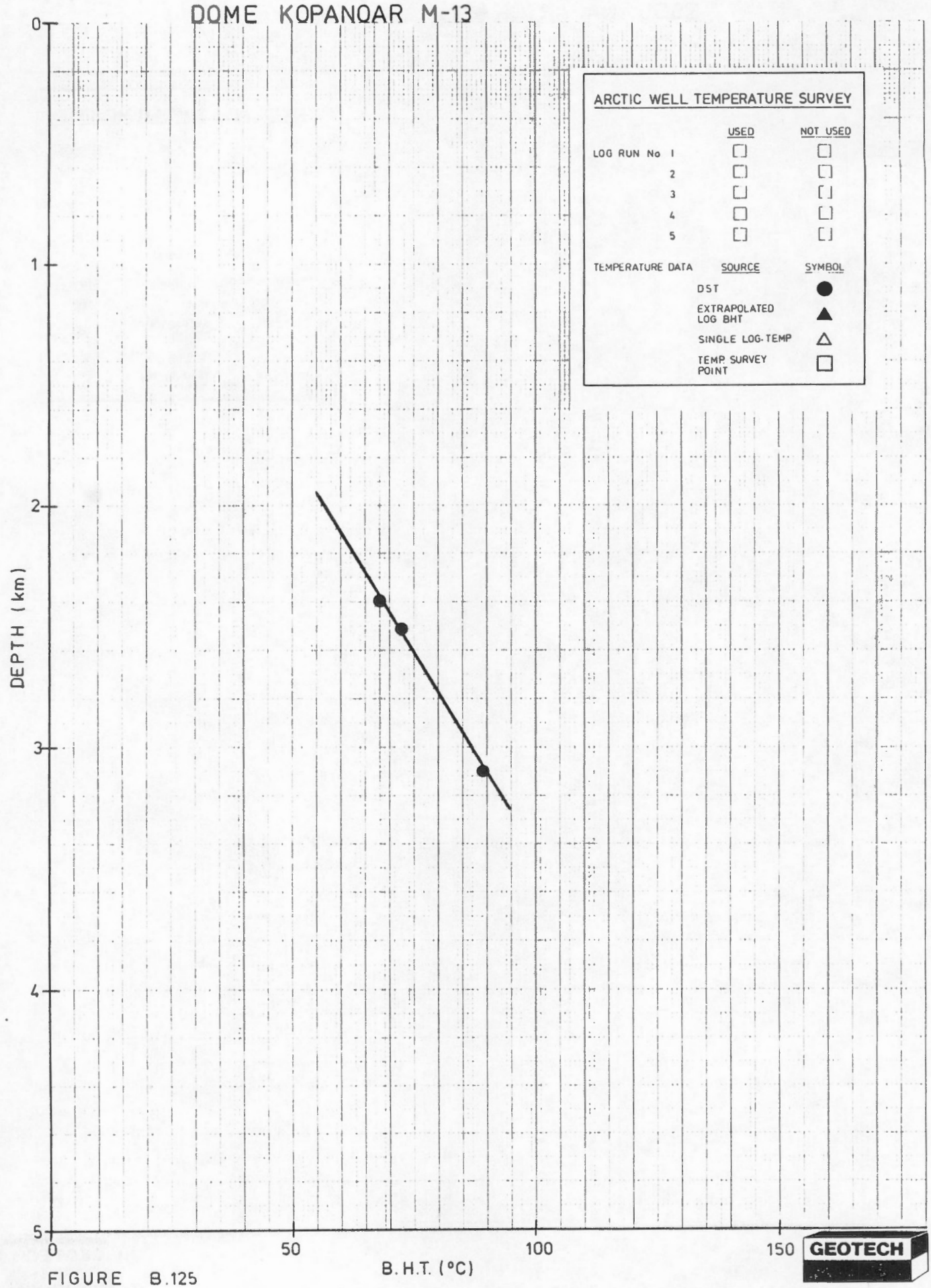


FIGURE B.125

46 1512
K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO.

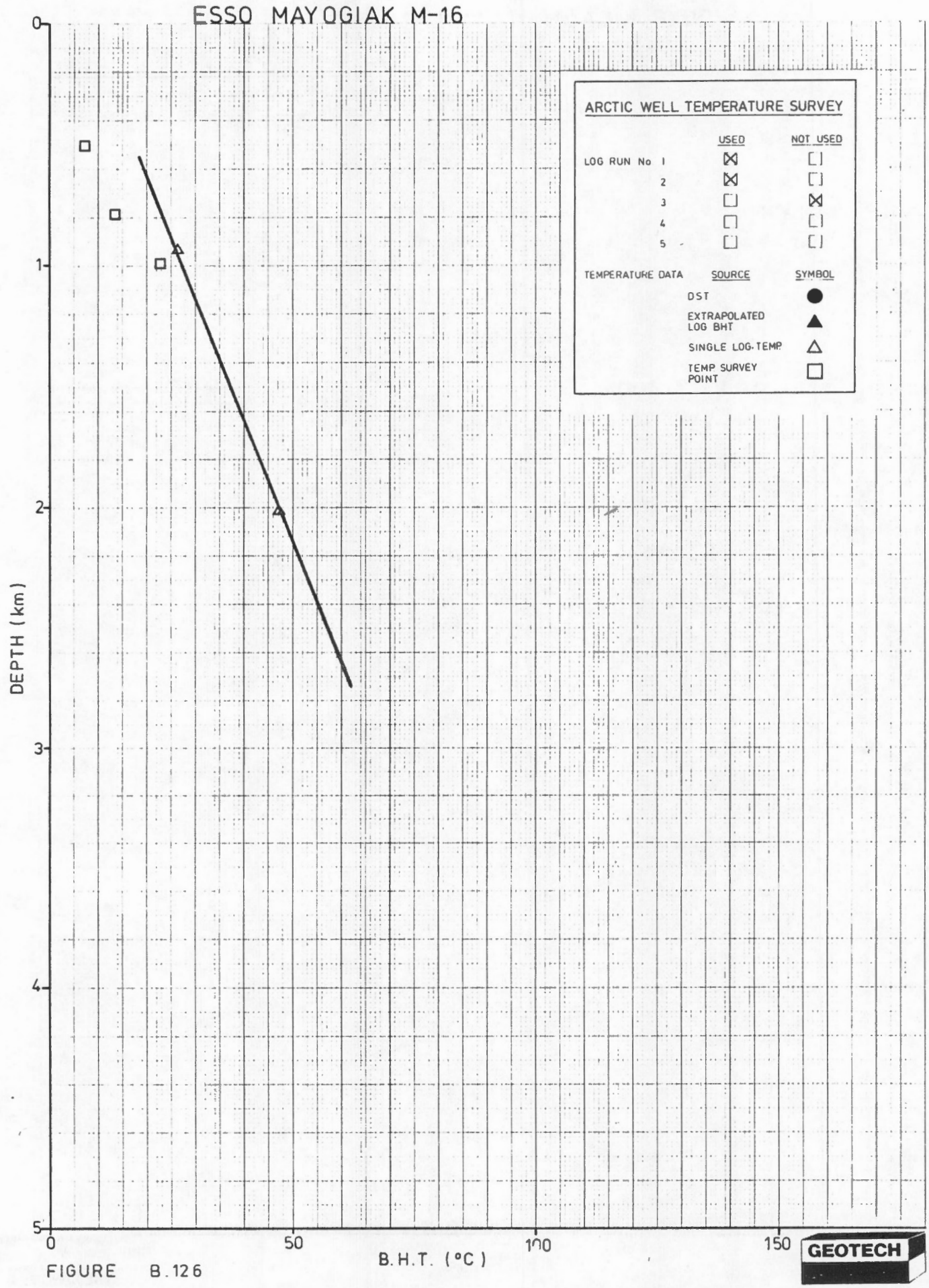

ESSO MAYOGIAK M-16
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG-TEMP.
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
GEOTECH

FIGURE B.126

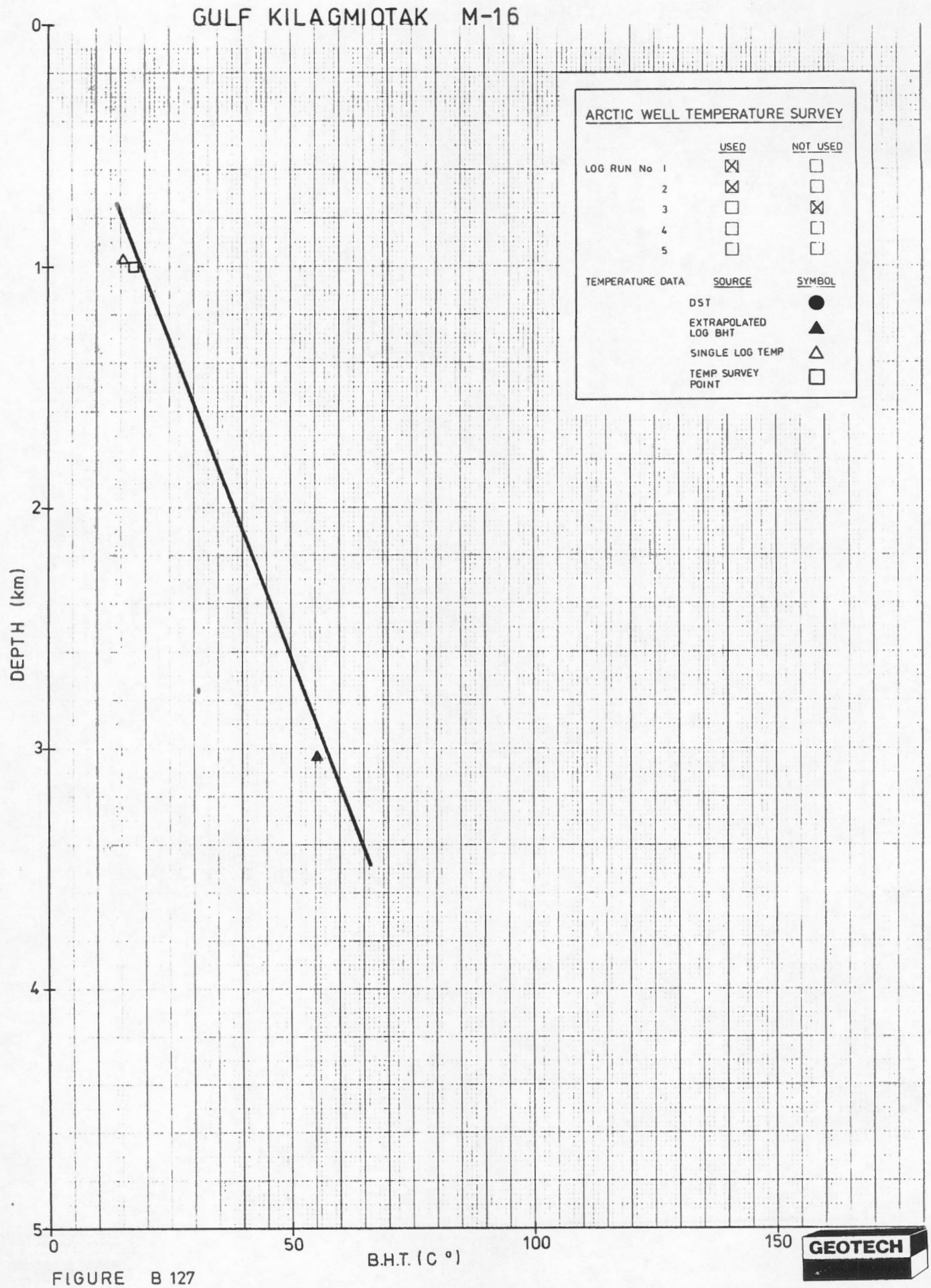


FIGURE B 127

46 1512

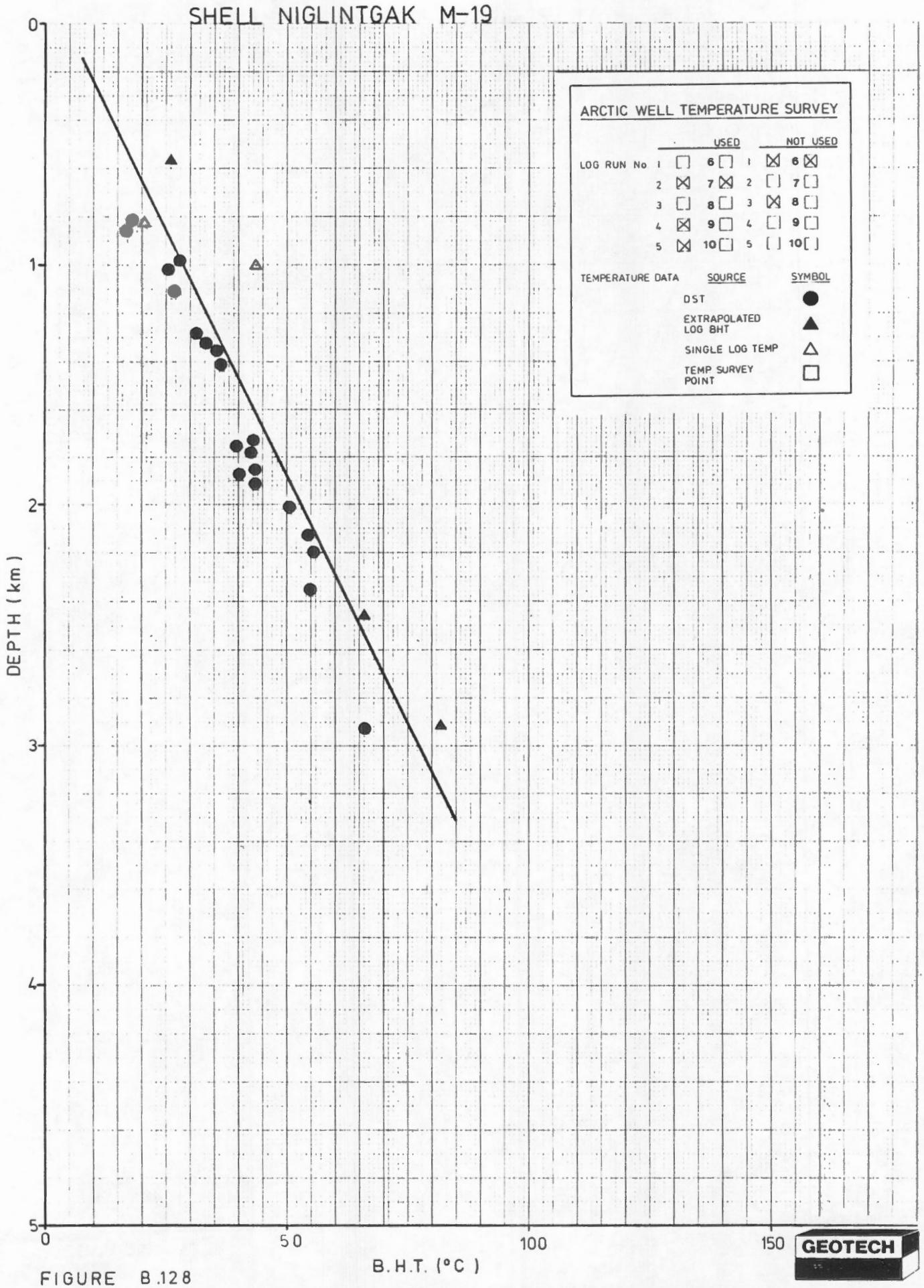
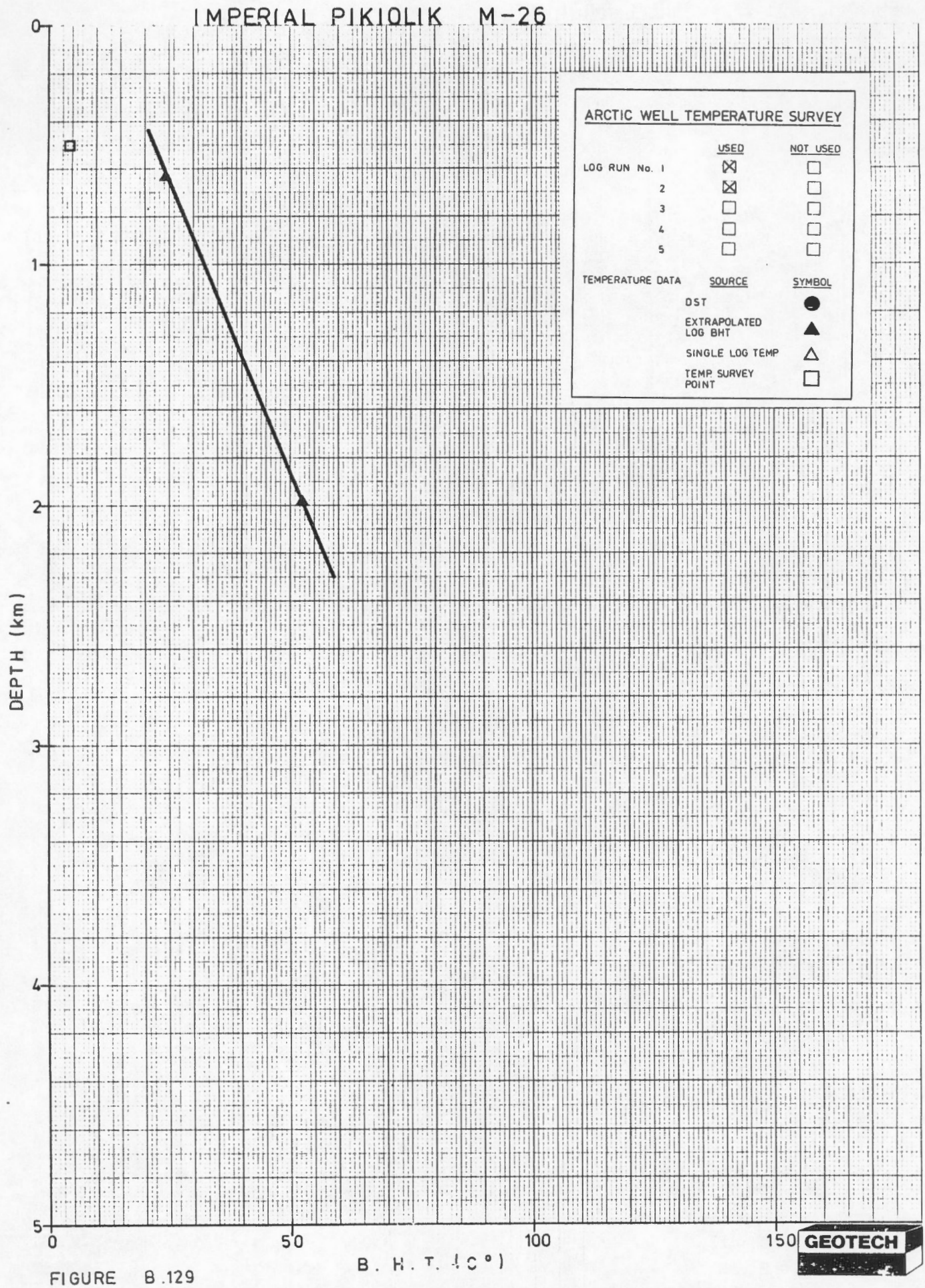

SHELL NIGLINTGAK M-19
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
B.H.T. (°C)
0
1
2
3
4
5
50
100
150
GEOTECH

FIGURE B.128



46 1512

K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

FIGURE B.129

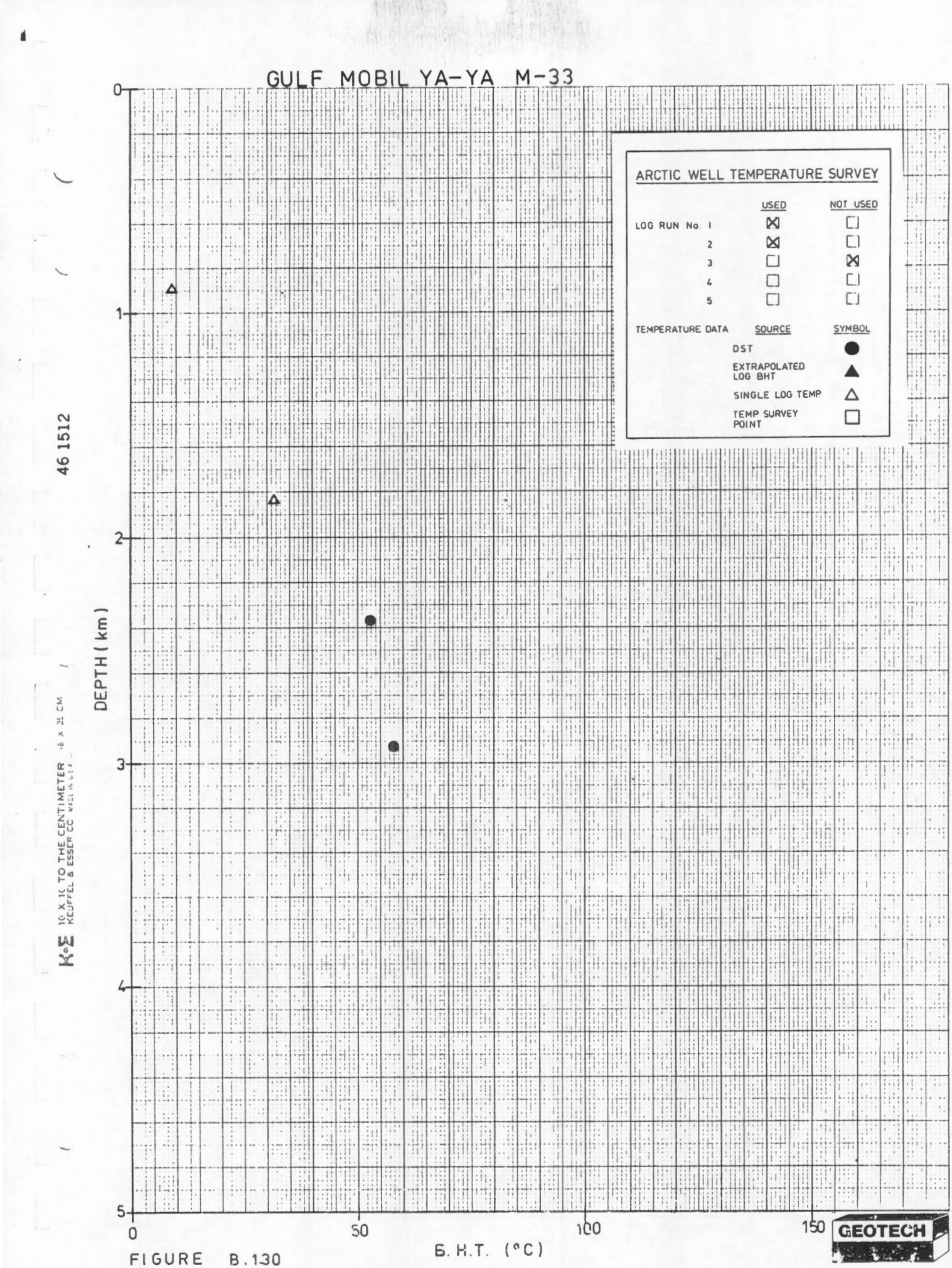

GULF MOBIL YA-YA M-33
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
KE 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO
GEOTECH

FIGURE B.130

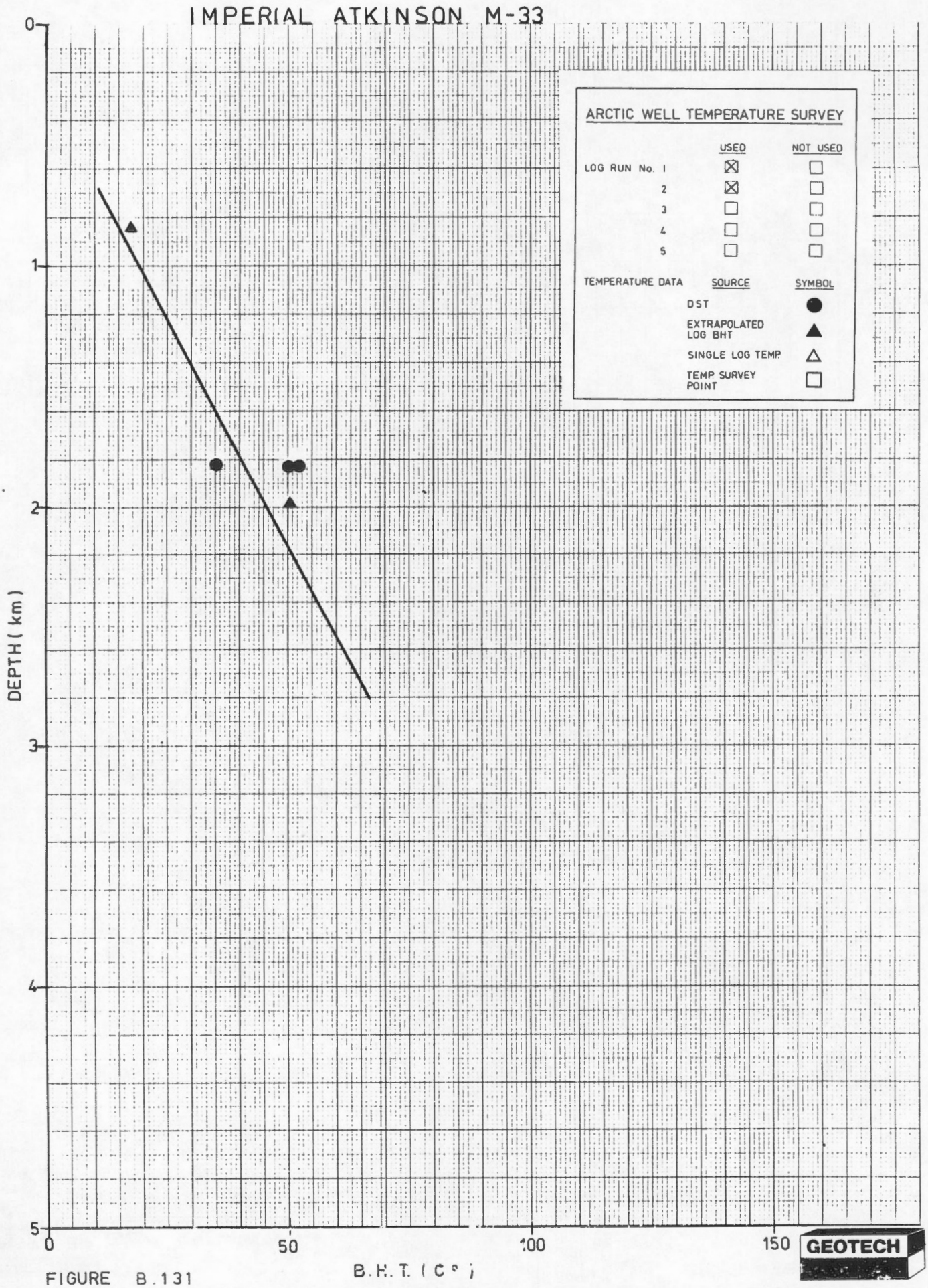


FIGURE B.131

46 1512

K&E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

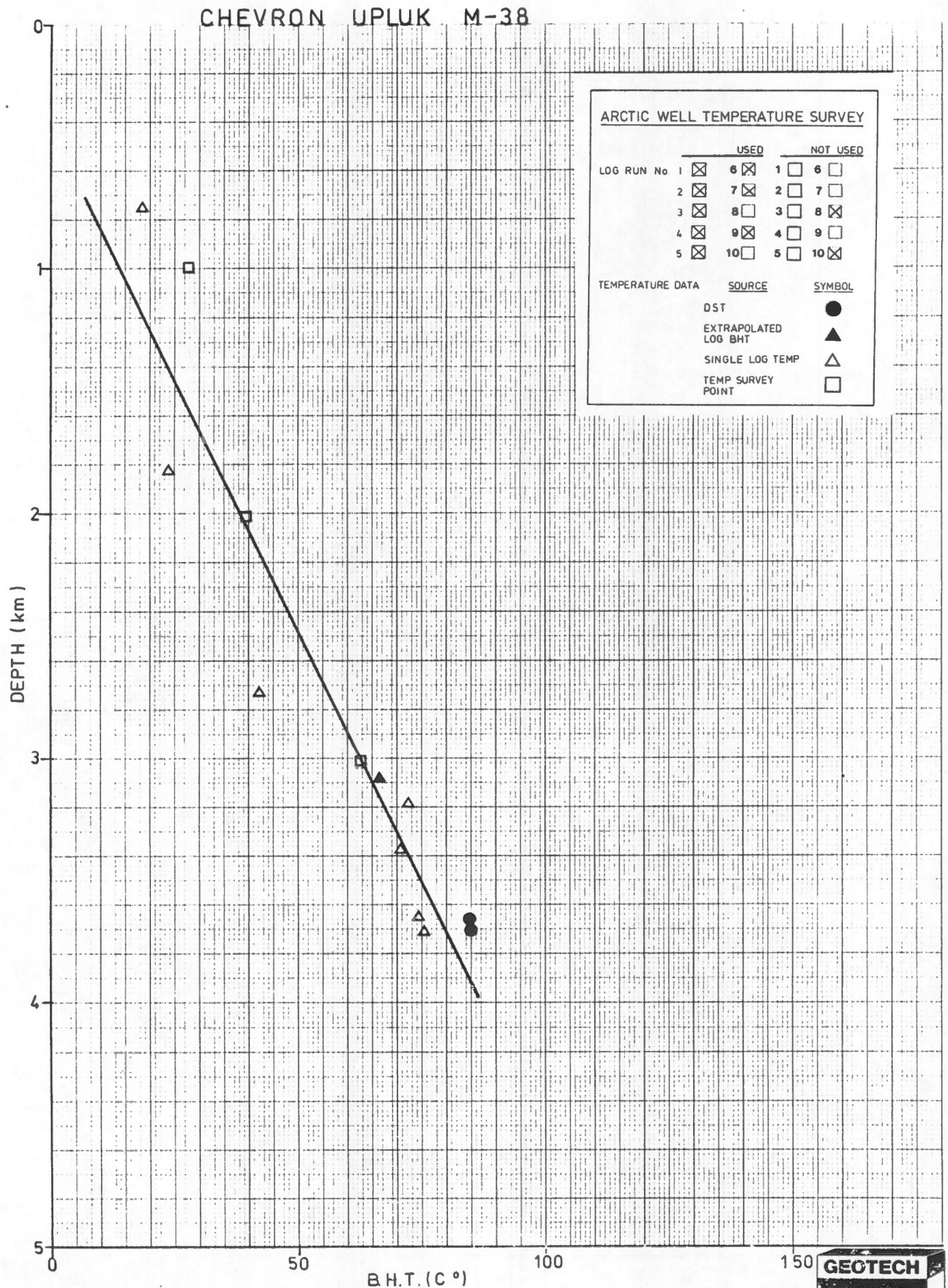

CHEVRON UPLUK M-38
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1 6 1 6
2 7 2 7
3 8 3 8
4 9 4 9
5 10 5 10
TEMPERATURE DATA SOURCE SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)

FIGURE B.132

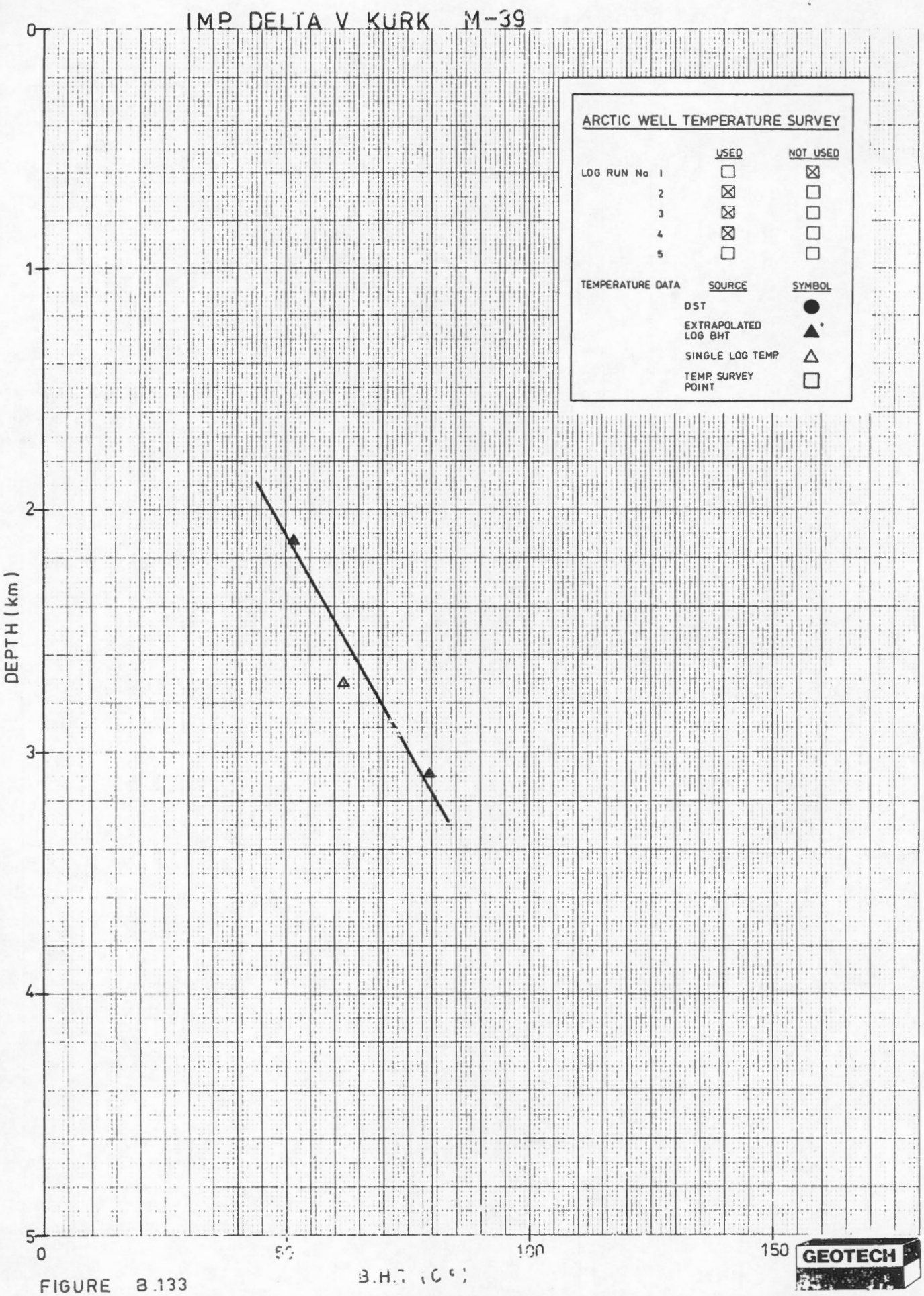

IMP DELTA V KURK M-39
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO.
GEOTECH

FIGURE 8.133

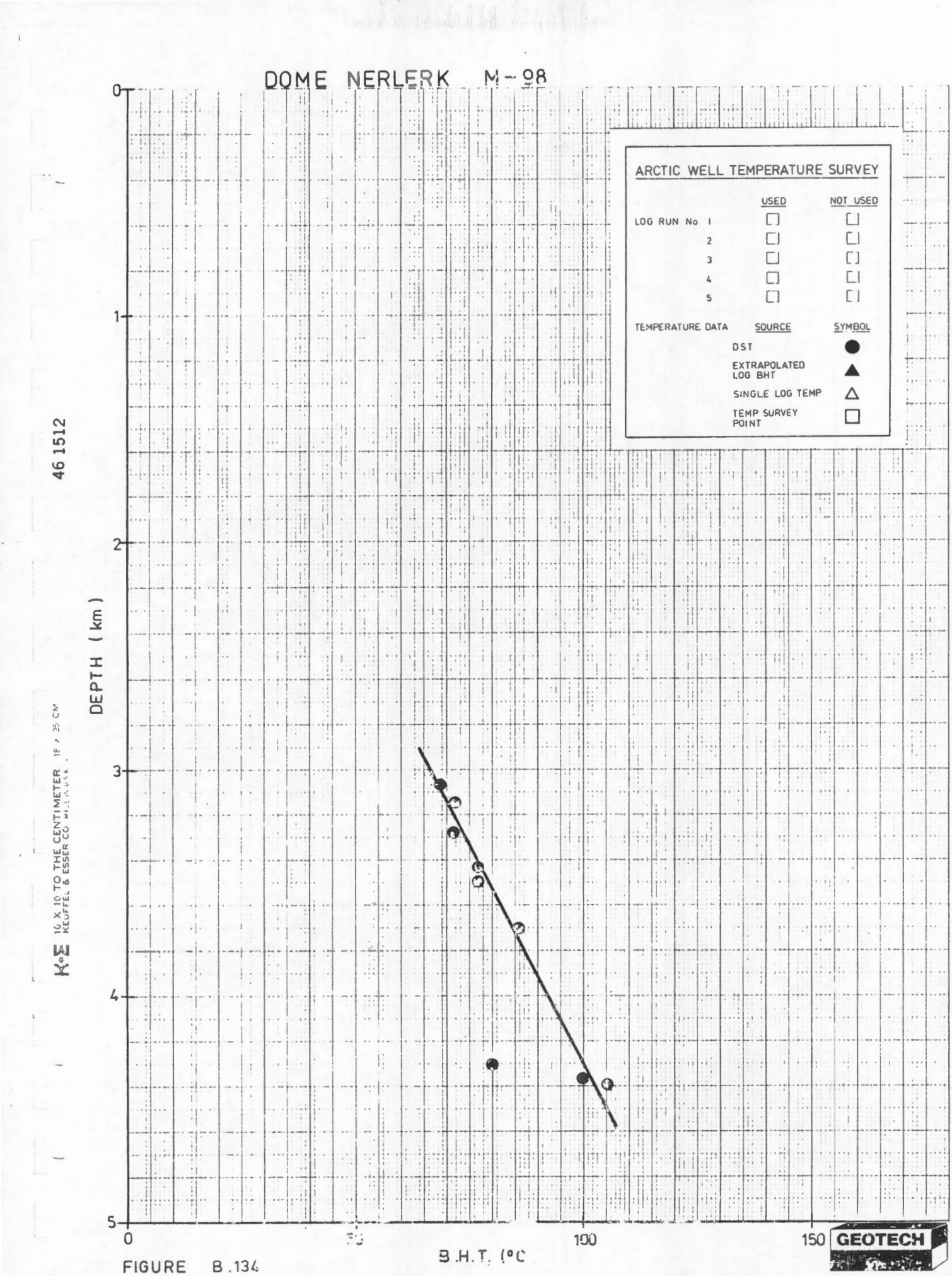

DOME NERLERK M-98
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C
46 1512
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO
GEOTECH

FIGURE B.134

CPOG KUGALUK N-02

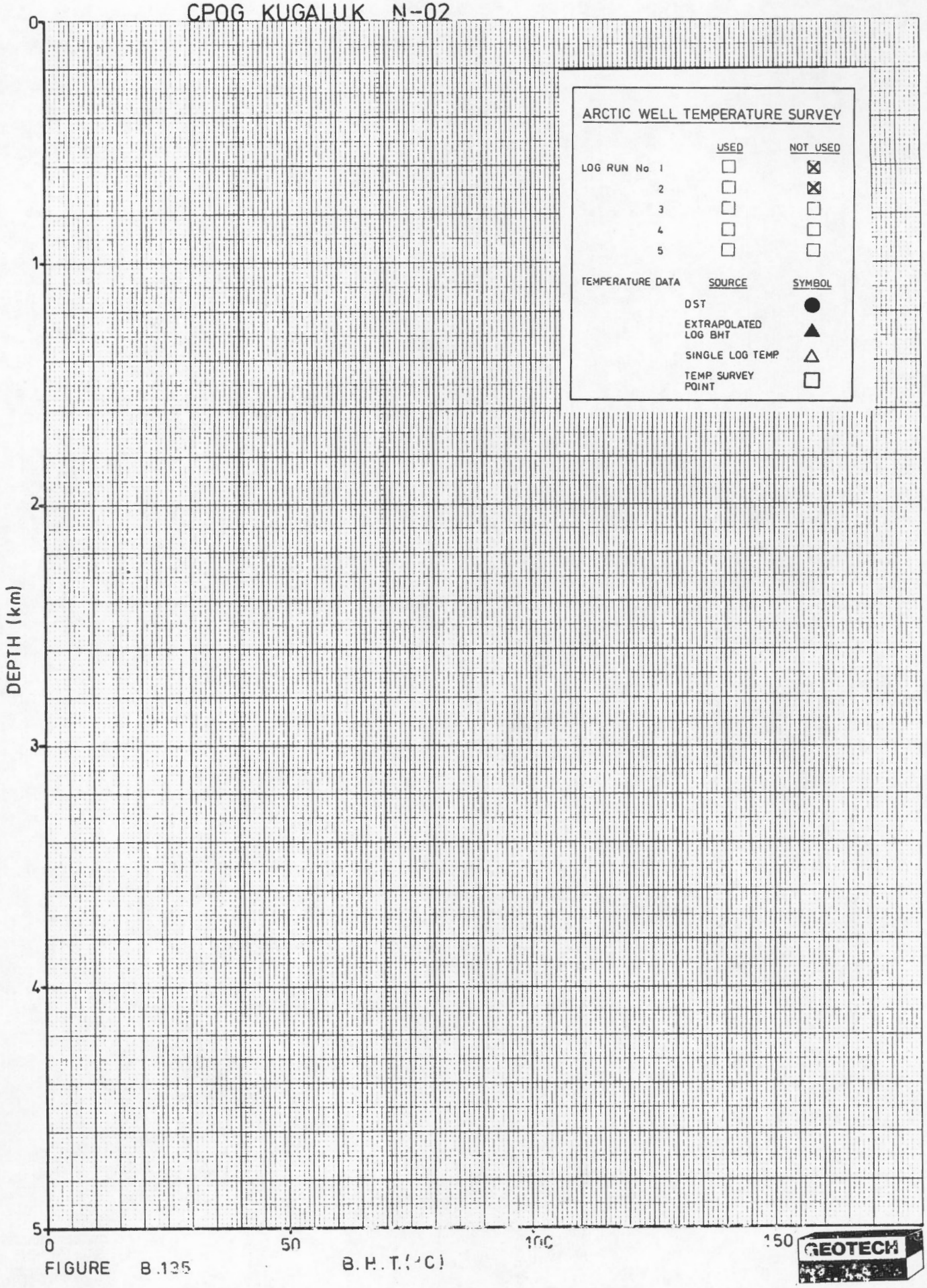


FIGURE B.135

GEOTECH

46 1512

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

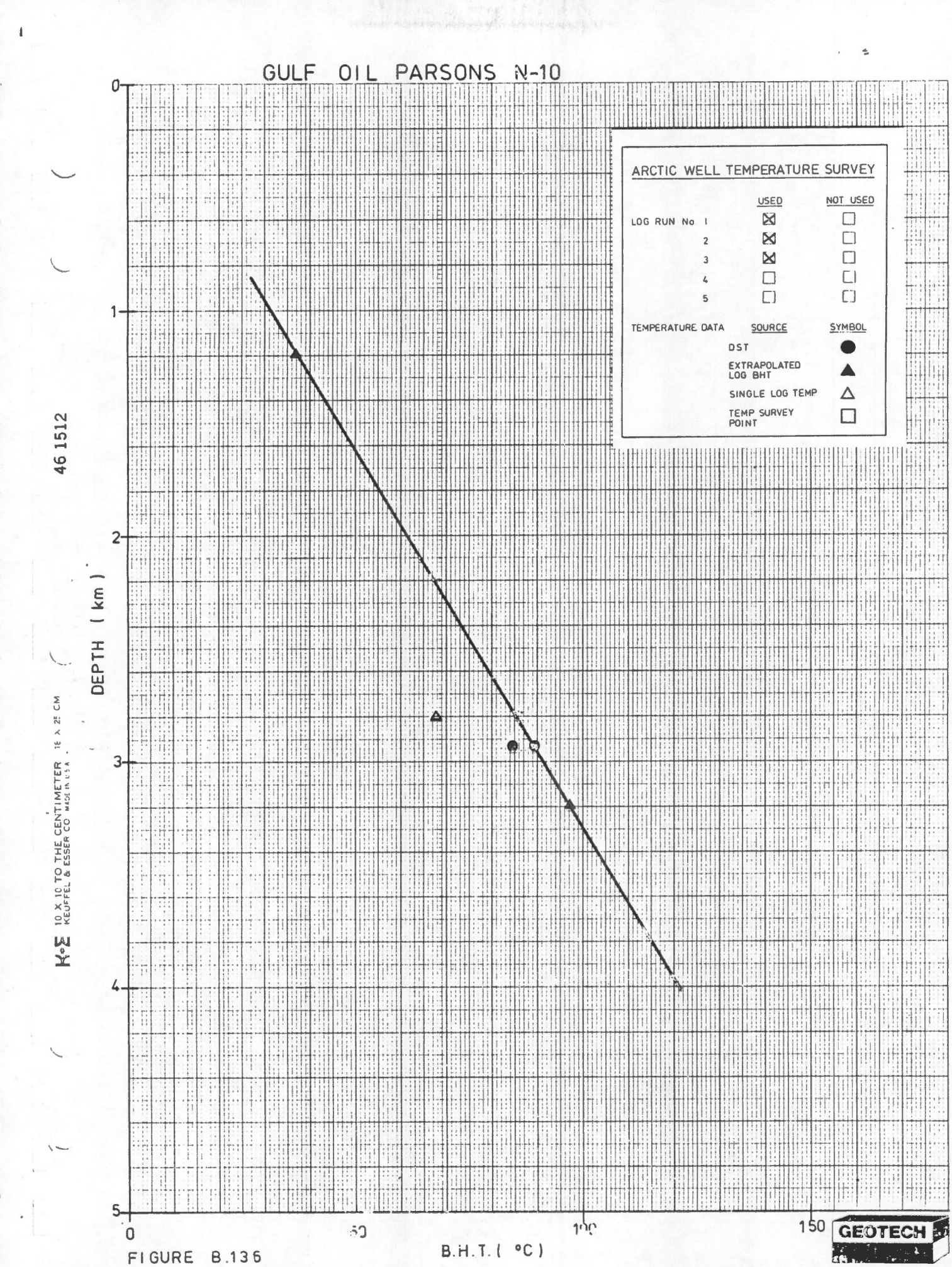

GULF OIL PARSONS N-10
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B.136

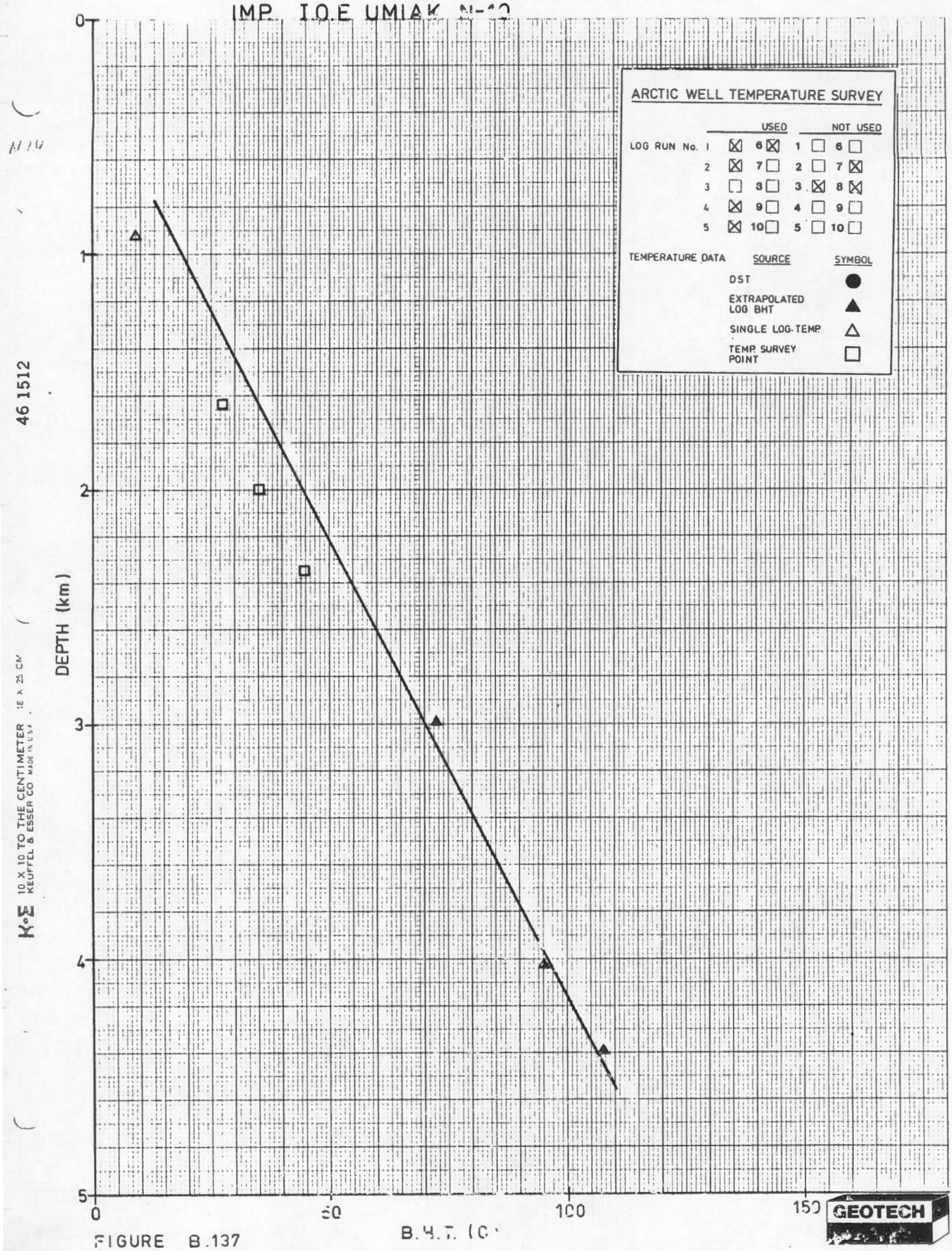

IMP. I.O.E UMIAK N-10
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1 6 1 6
2 7 2 7
3 3 3 8
4 9 4 9
5 10 5 10
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C)
46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
GEOTECH

FIGURE B.137

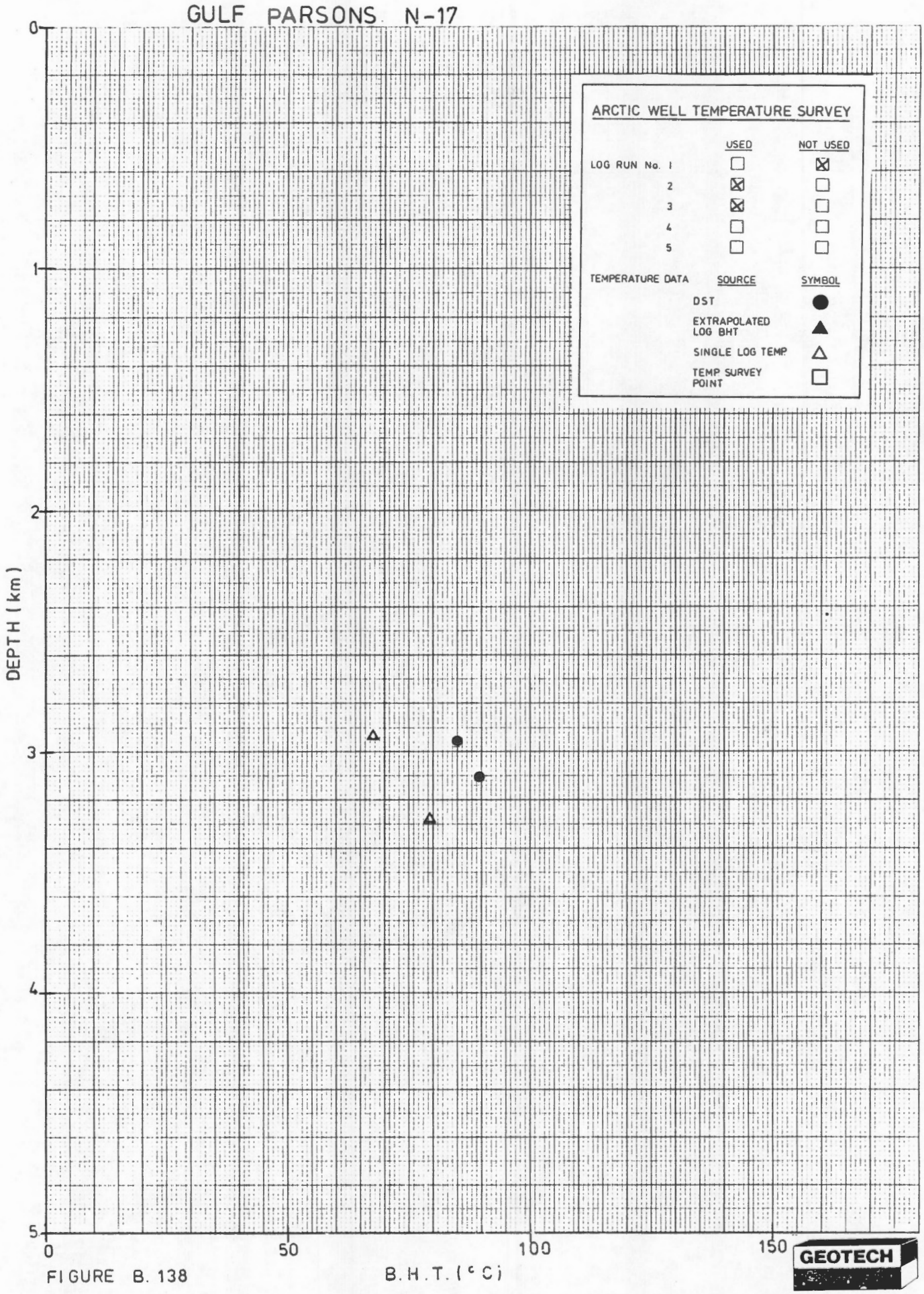


FIGURE B. 138

GEOTECH

46 1512

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO MADE IN USA

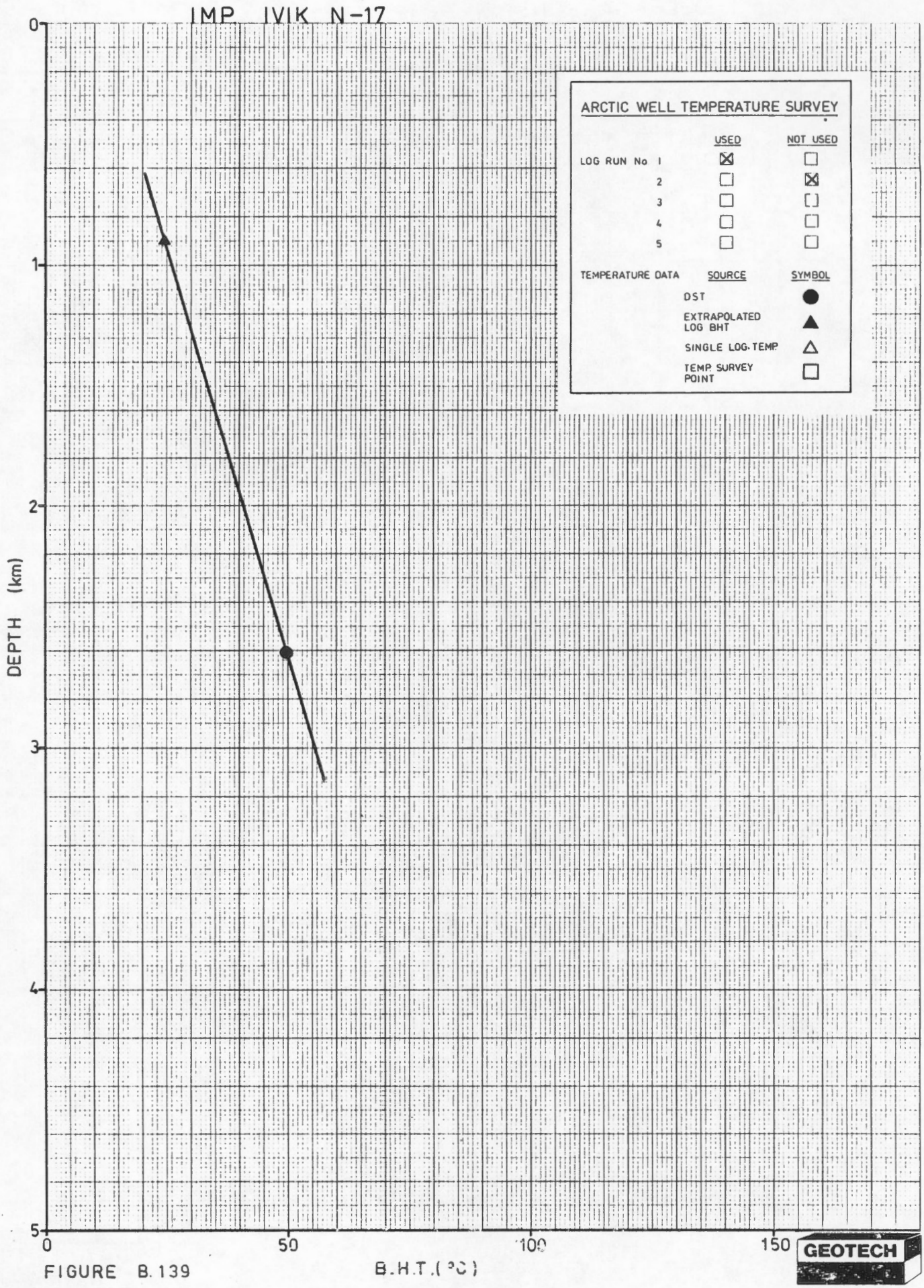


FIGURE B.139

46 1512
KE 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

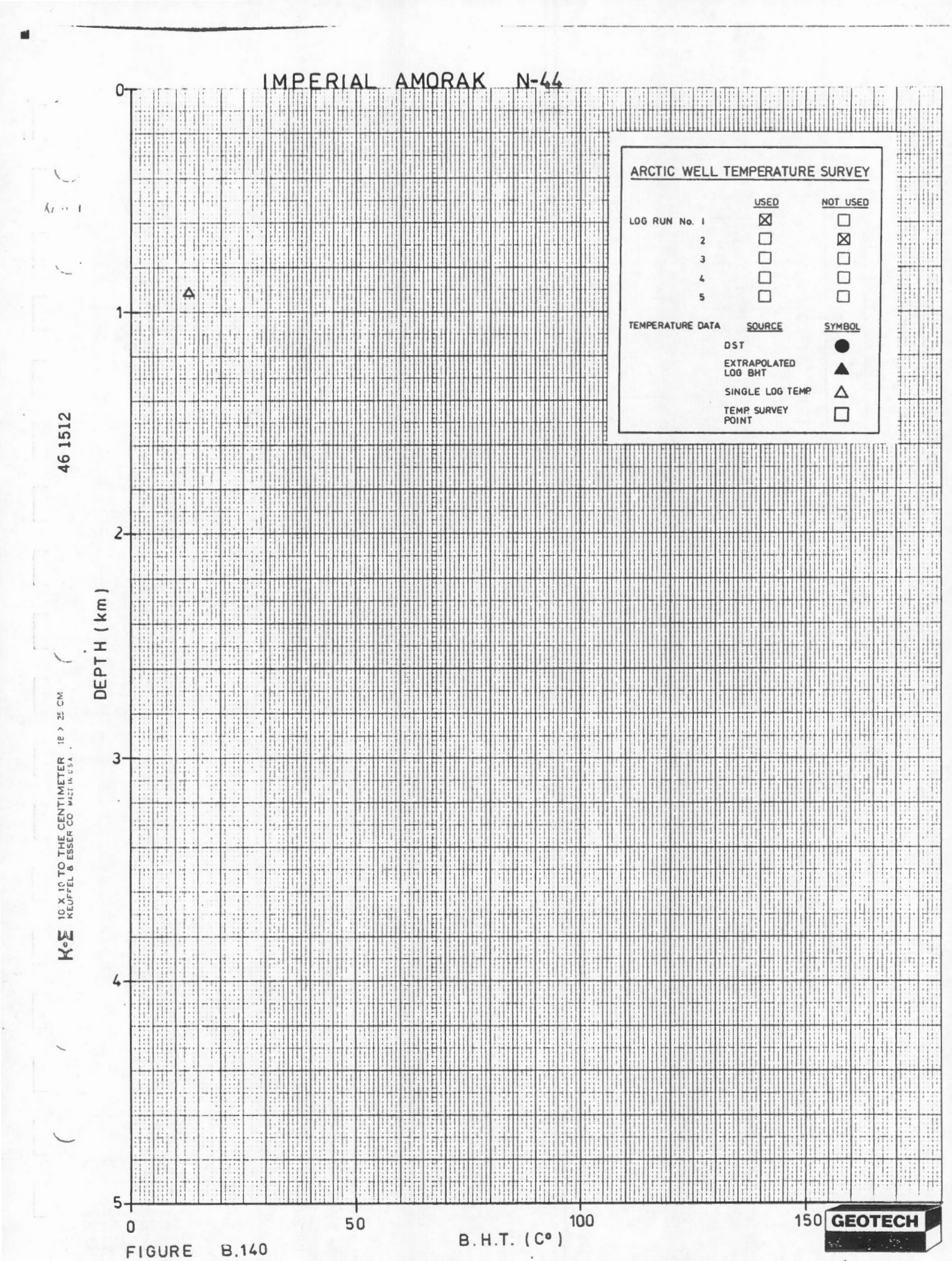

IMPERIAL AMORAK N-44
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
10 X 10 TO THE CENTIMETER 18 X 25 CM.
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B.140

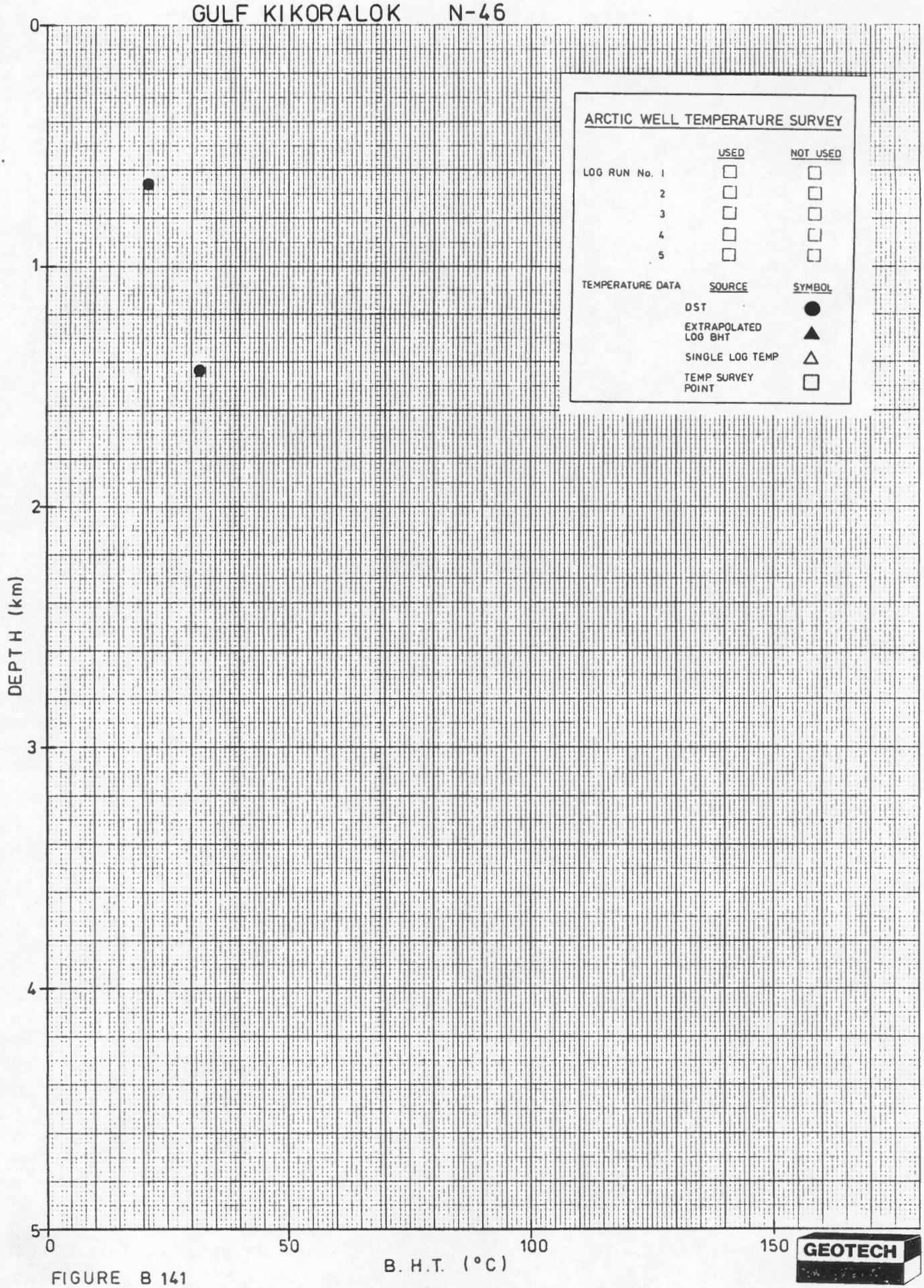

GULF KIKORALOK N-46
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (°C)
46 1512
10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B 141

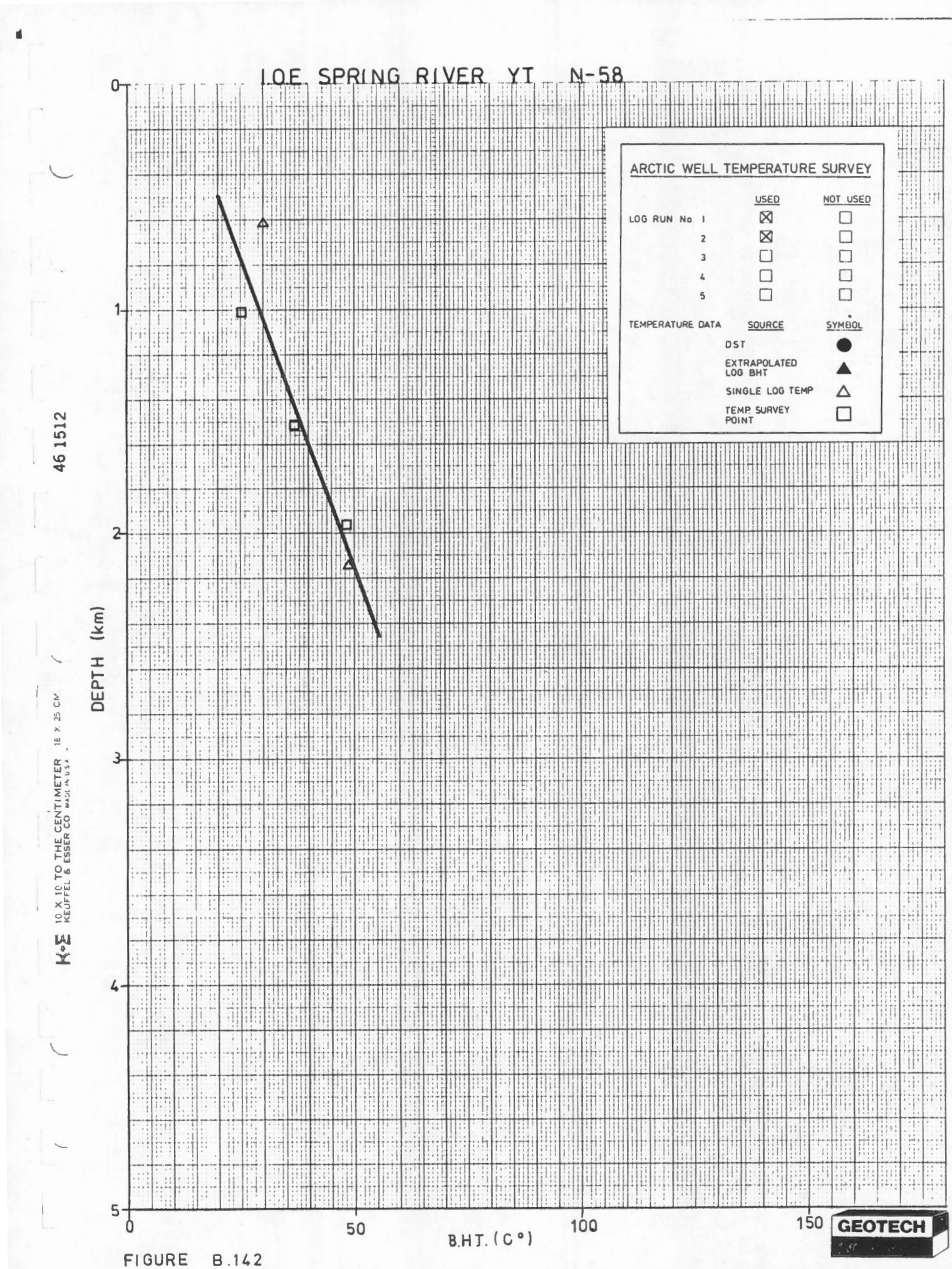

ICE SPRING RIVER YT N-58
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B.142

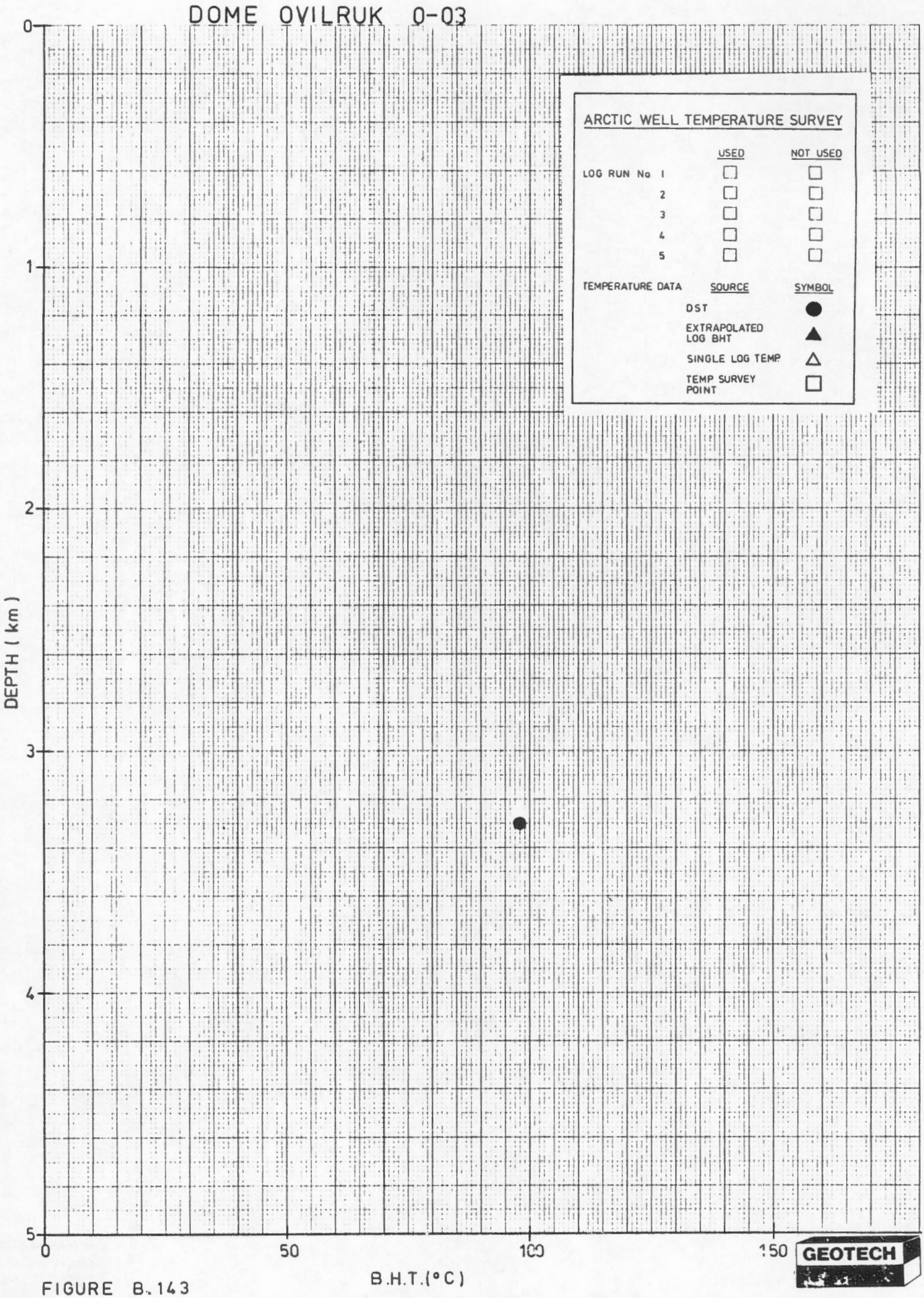


FIGURE B.143

46 1512

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

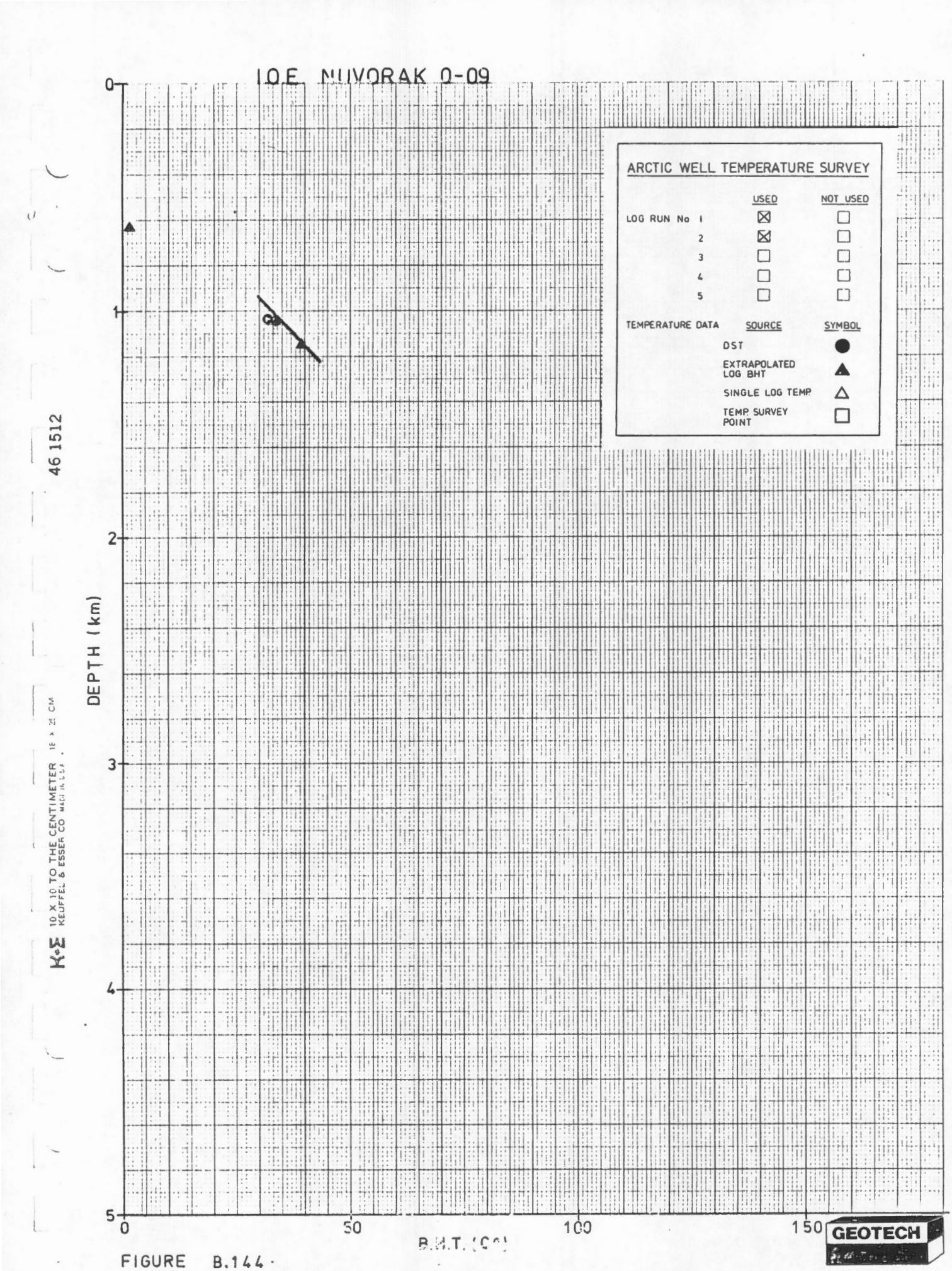

IOE NUVORAK 0-09
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO
GEOTECH

FIGURE B.144 -

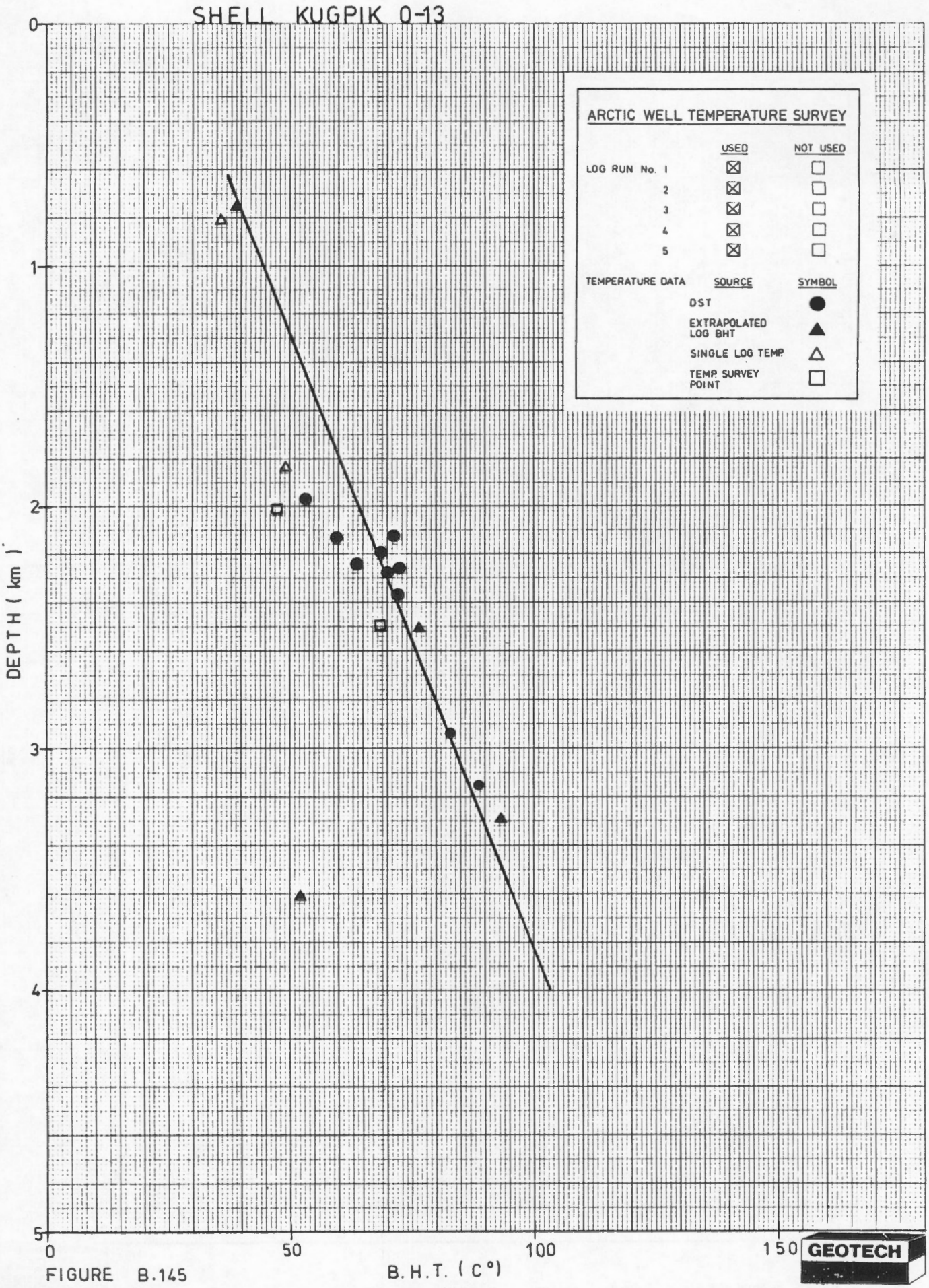


FIGURE B.145

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM.
KEUFFEL & ESSER CO MADE IN U.S.A.

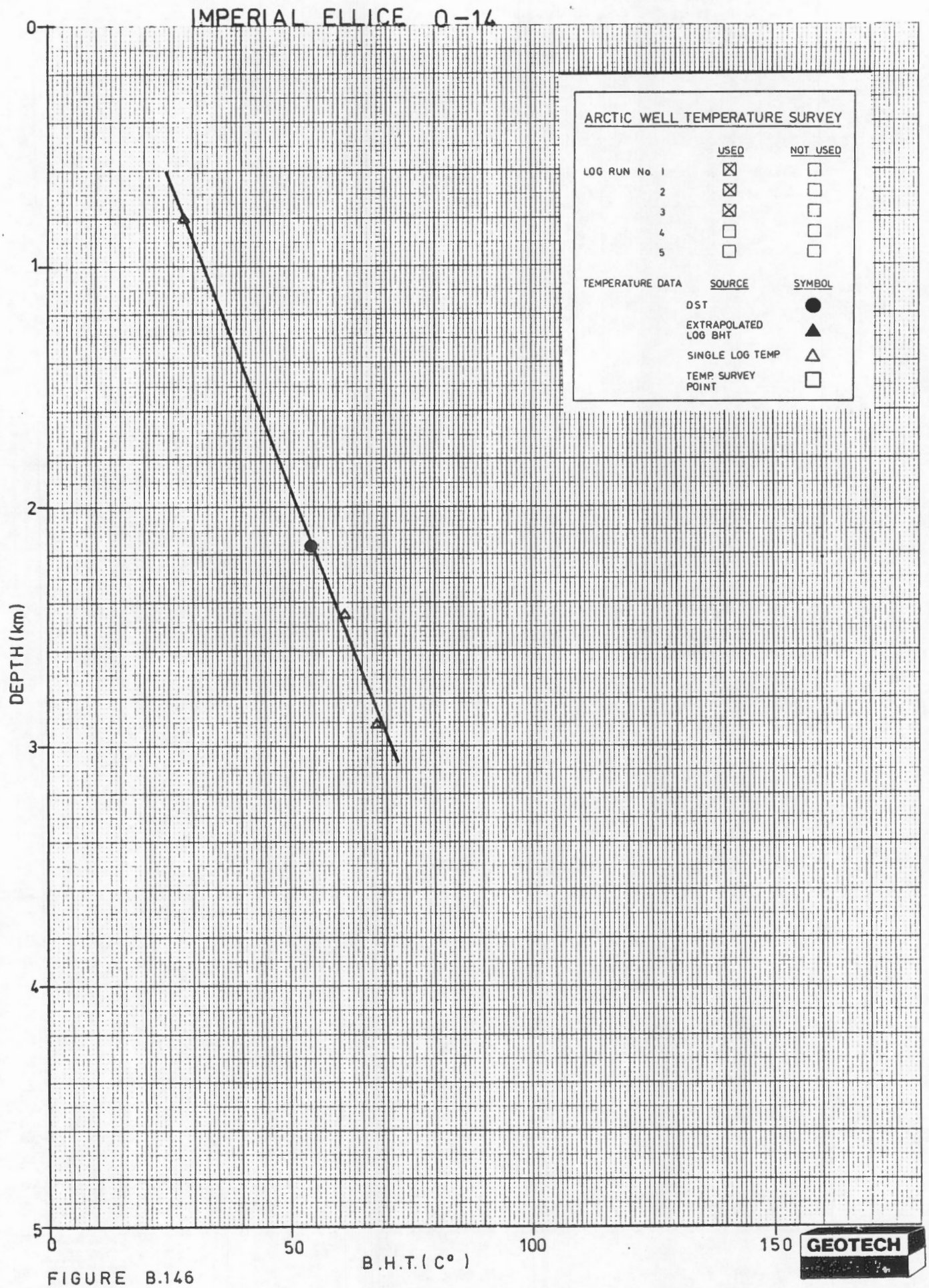


FIGURE B.146

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1512

DOME KOAKOAK O-22

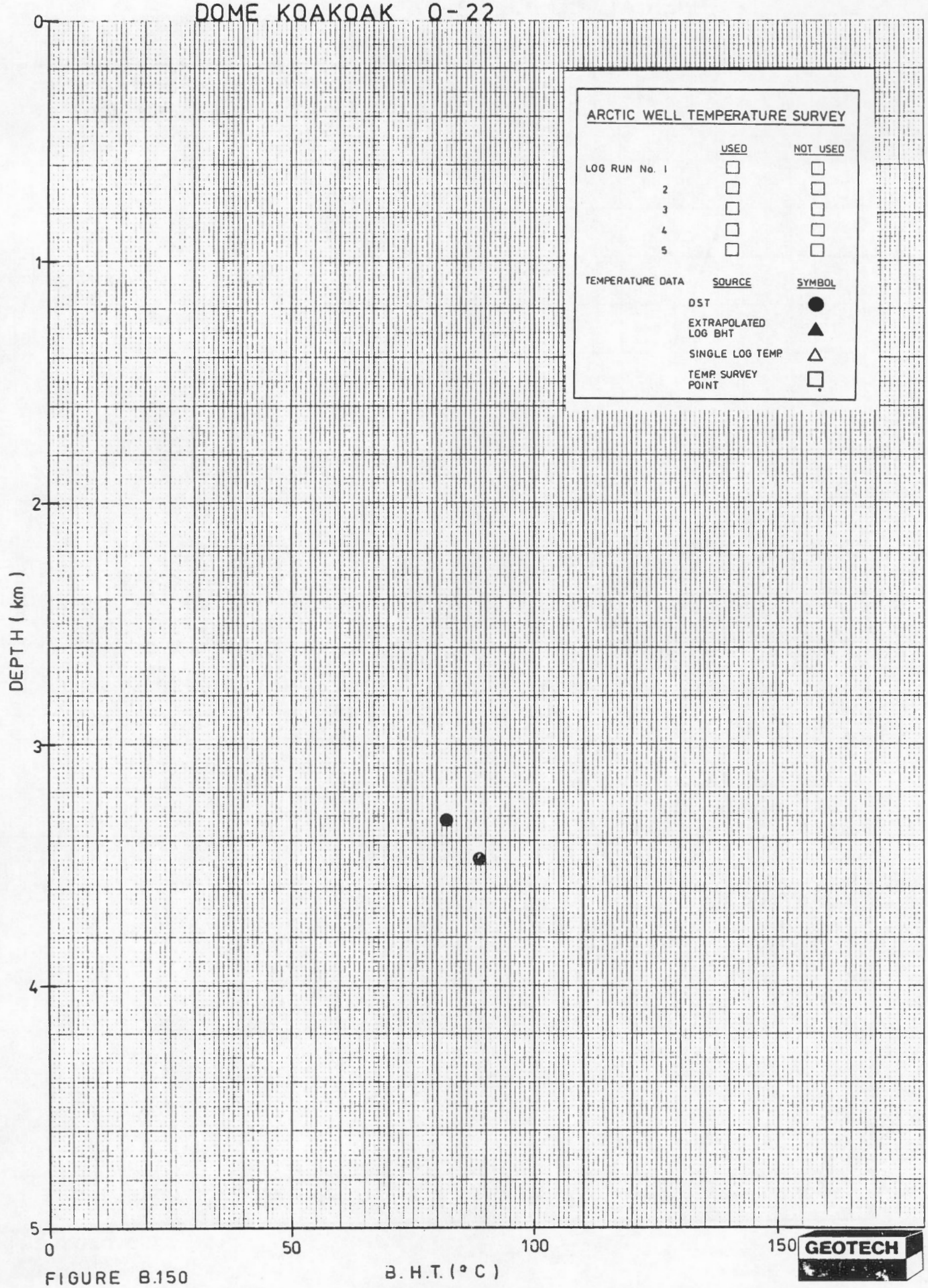


FIGURE B.150

GEOTECH

46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

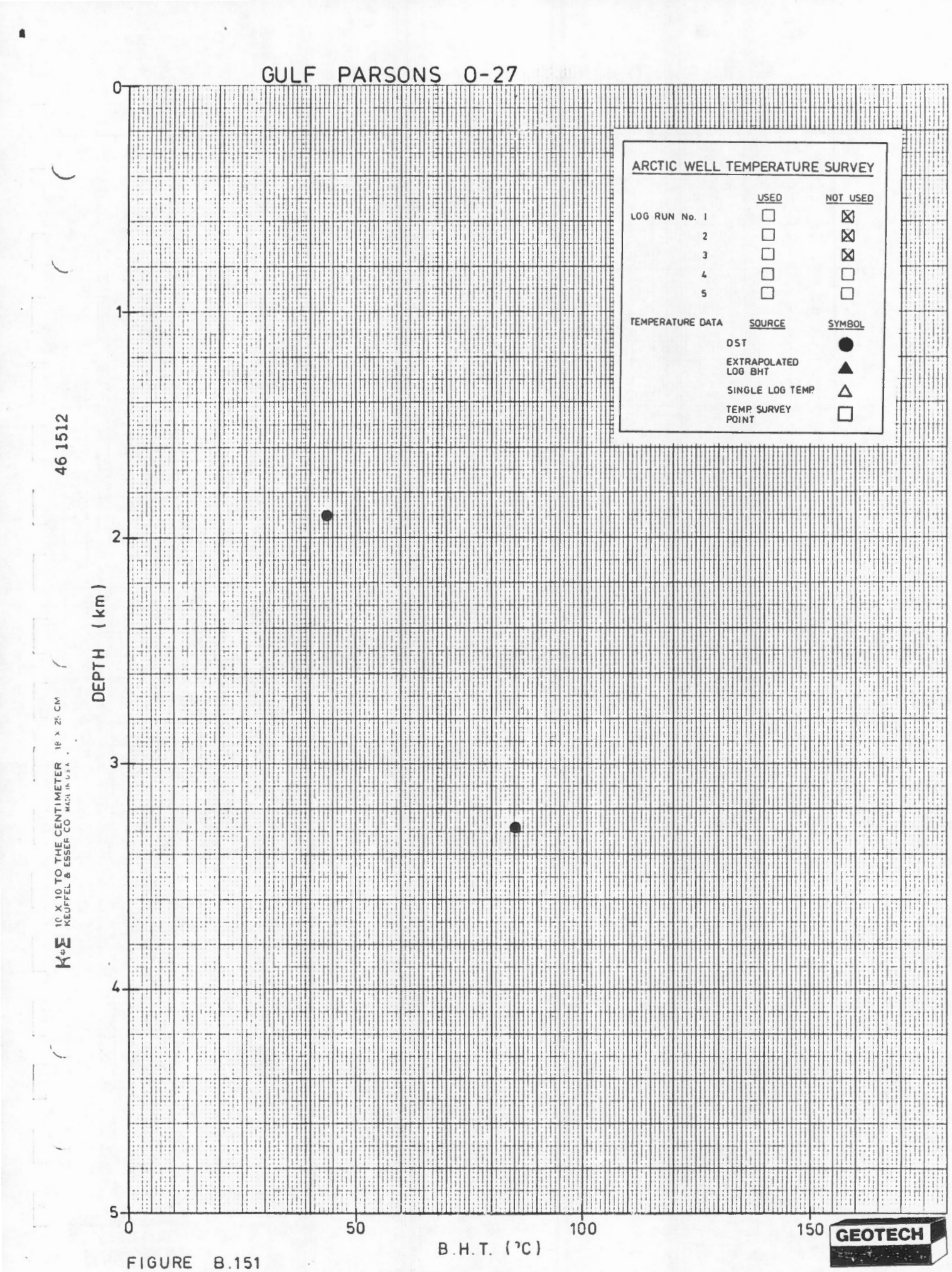

GULF PARSONS O-27
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP. SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (°C)
46 1512
10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B.151

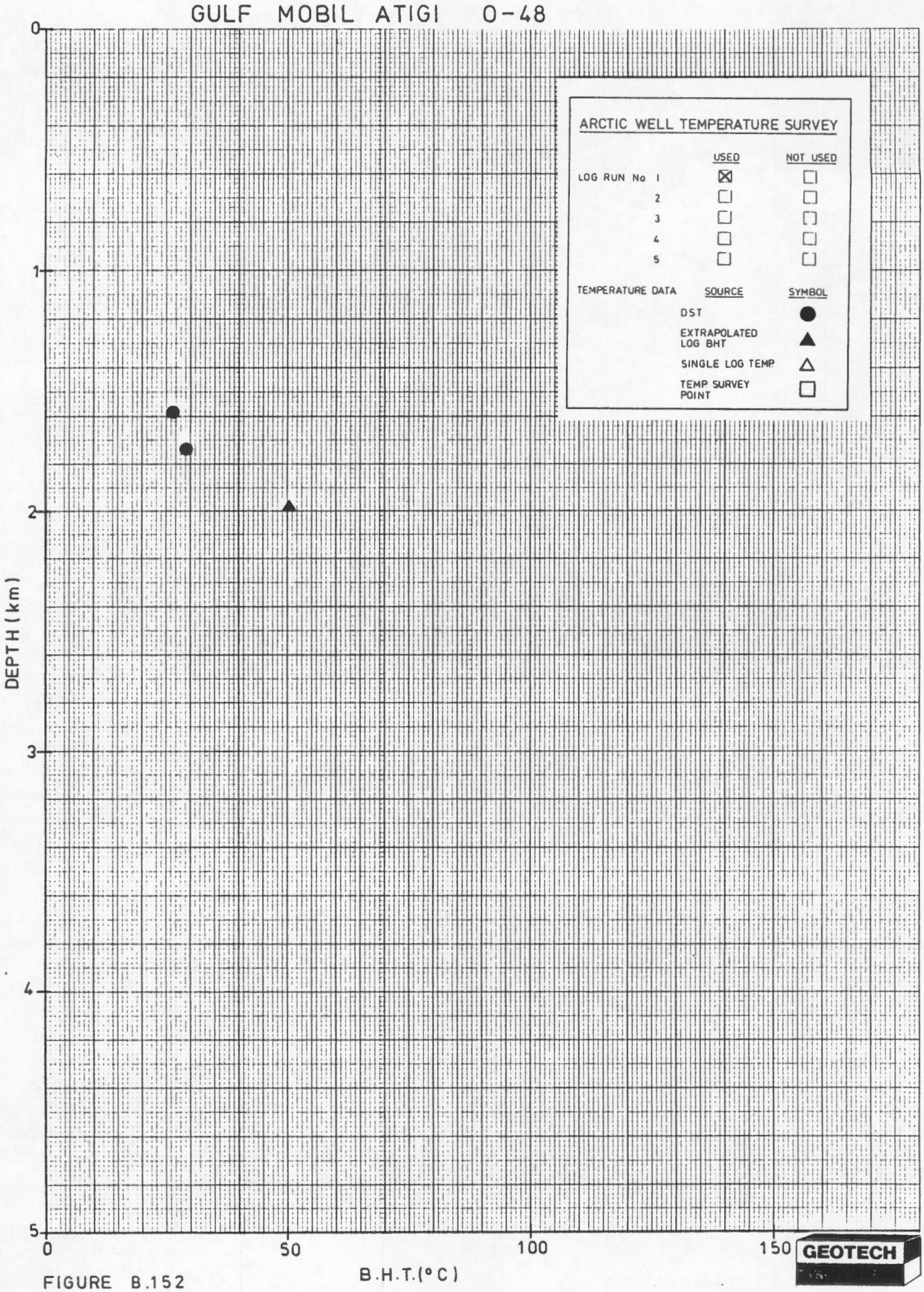

GULF MOBIL ATIGI O-48
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP.
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
GEOTECH

FIGURE B.152

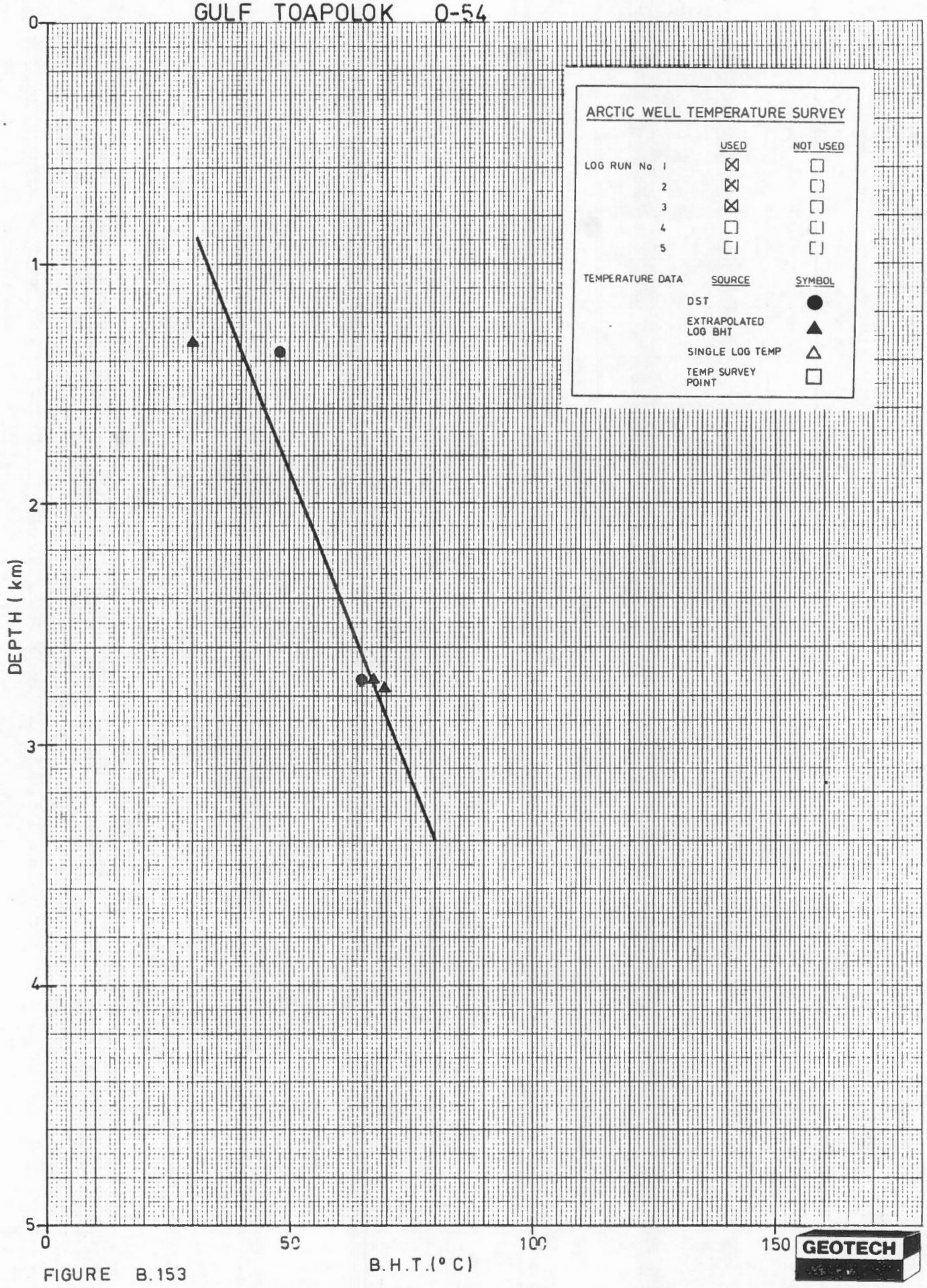

GULF TOAPOLOK O-54
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(° C)
GEOTECH

FIGURE B.153

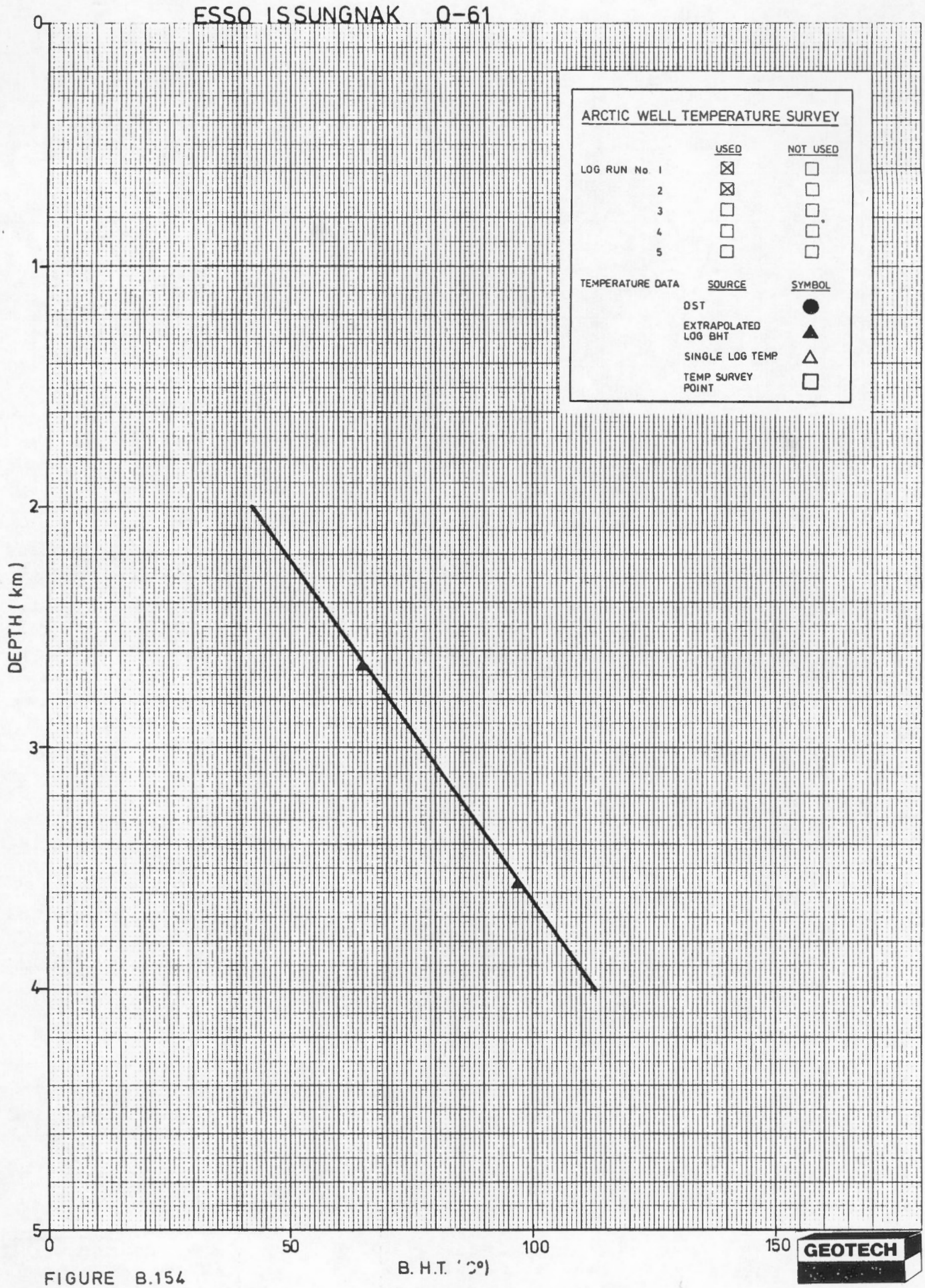


FIGURE B.154

46 1512
K+E 10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

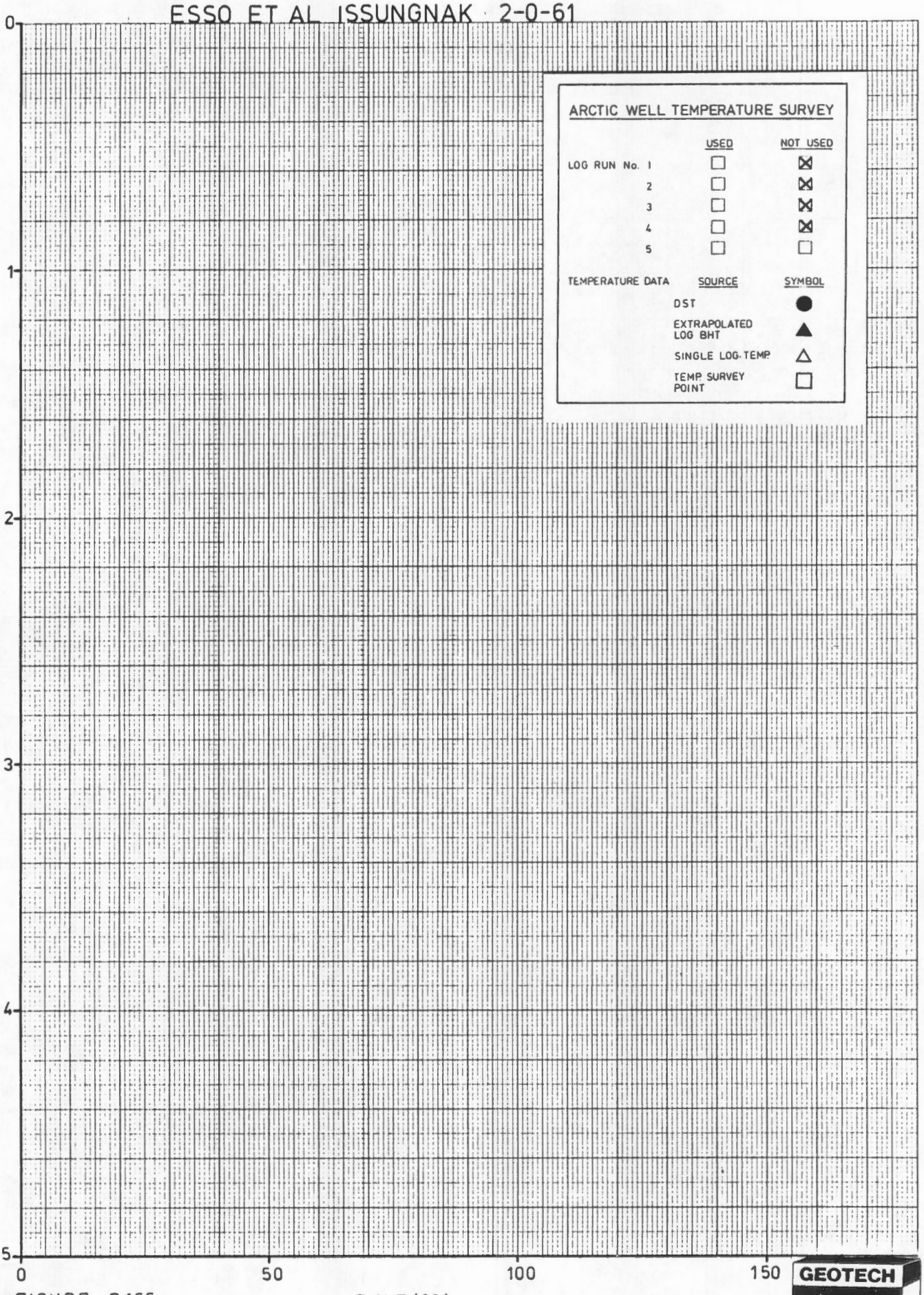
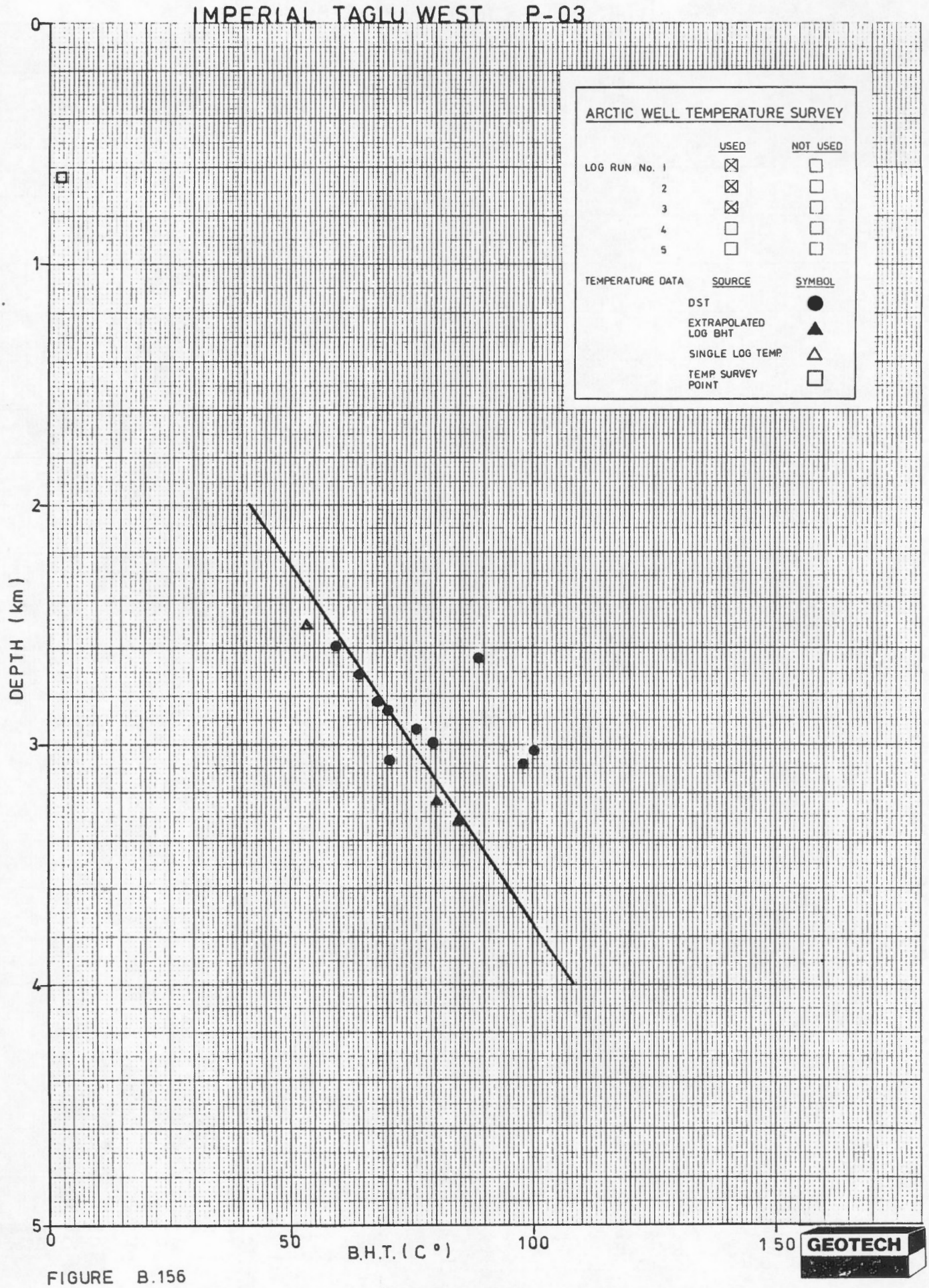

ESSO ET AL ISSUNGNAK 2-0-61
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T.(°C)
46 1512
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B.155



46 1512

10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

FIGURE B.156

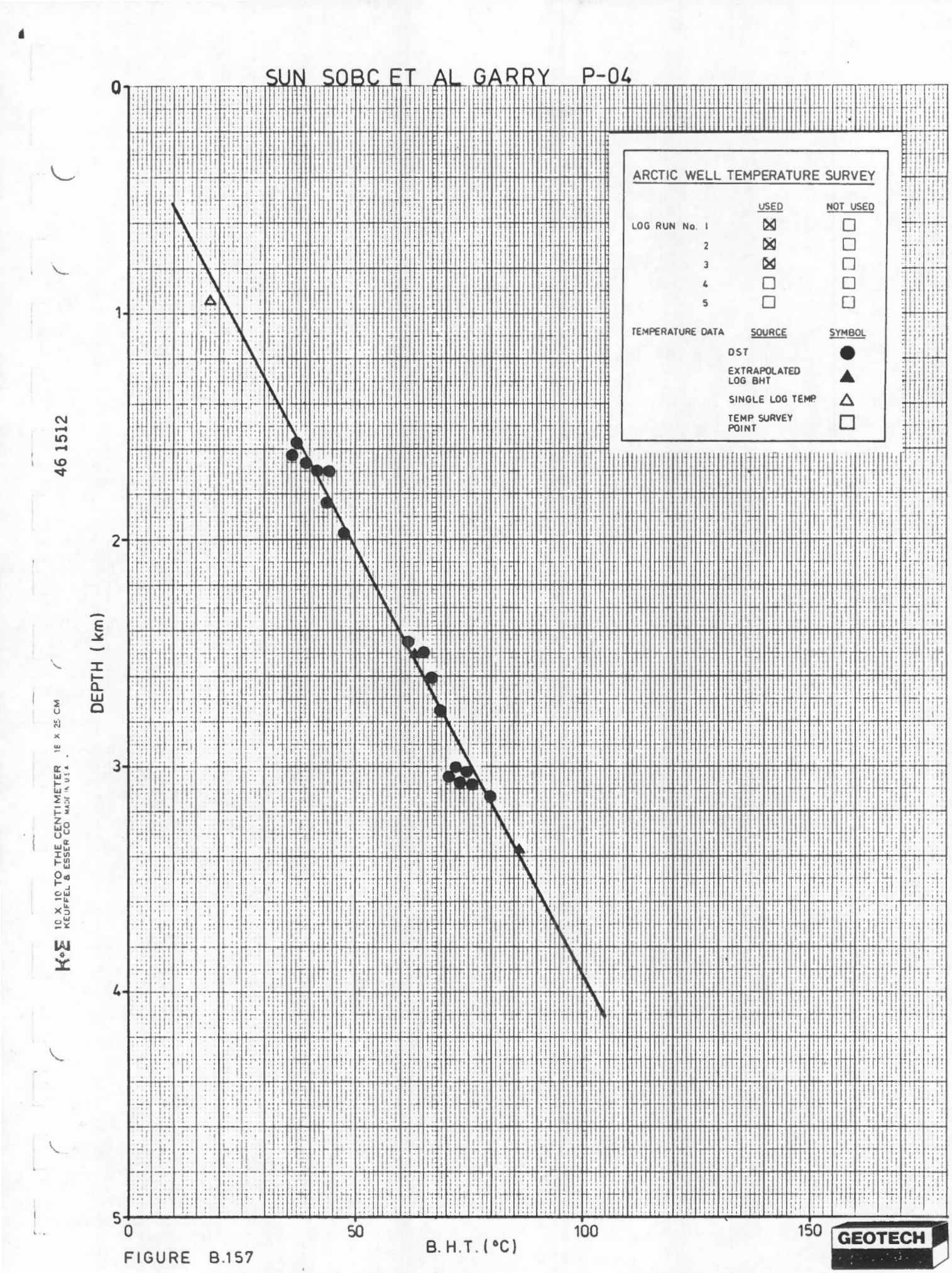

SUN SOBC ET AL GARRY P-04
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B. H. T. (°C)
46 1512
10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B.157

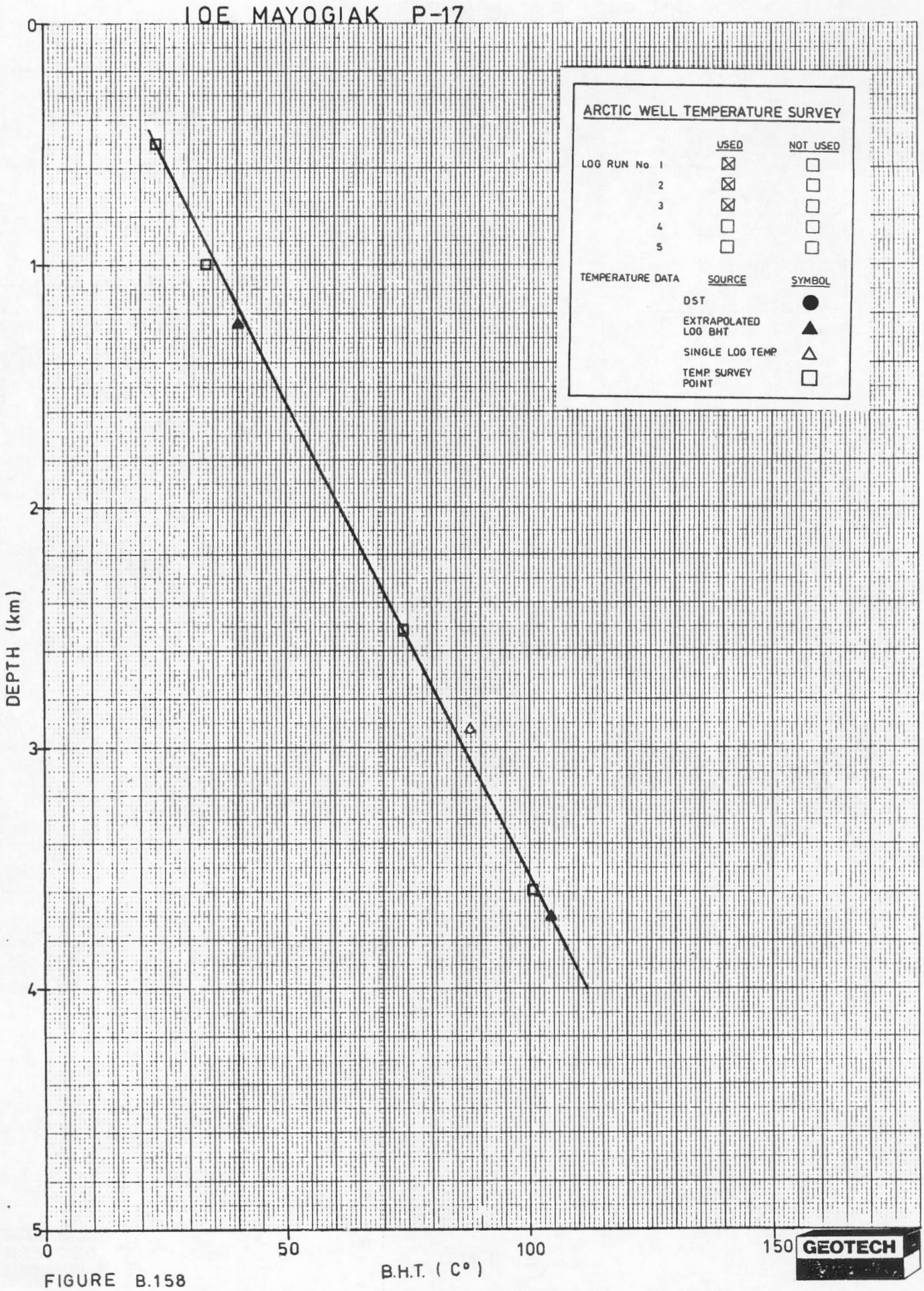


FIGURE B.158

46 1512
10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

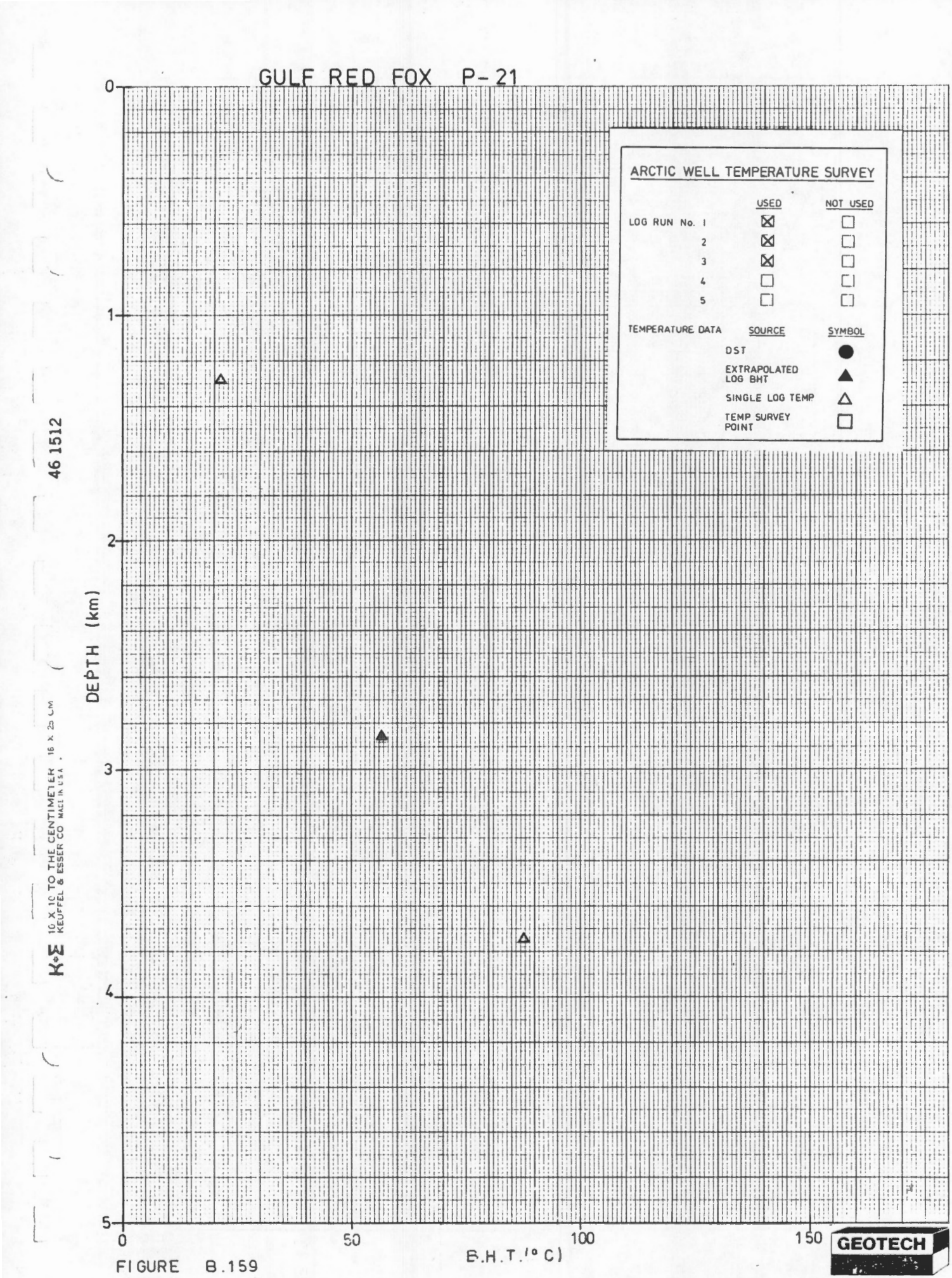
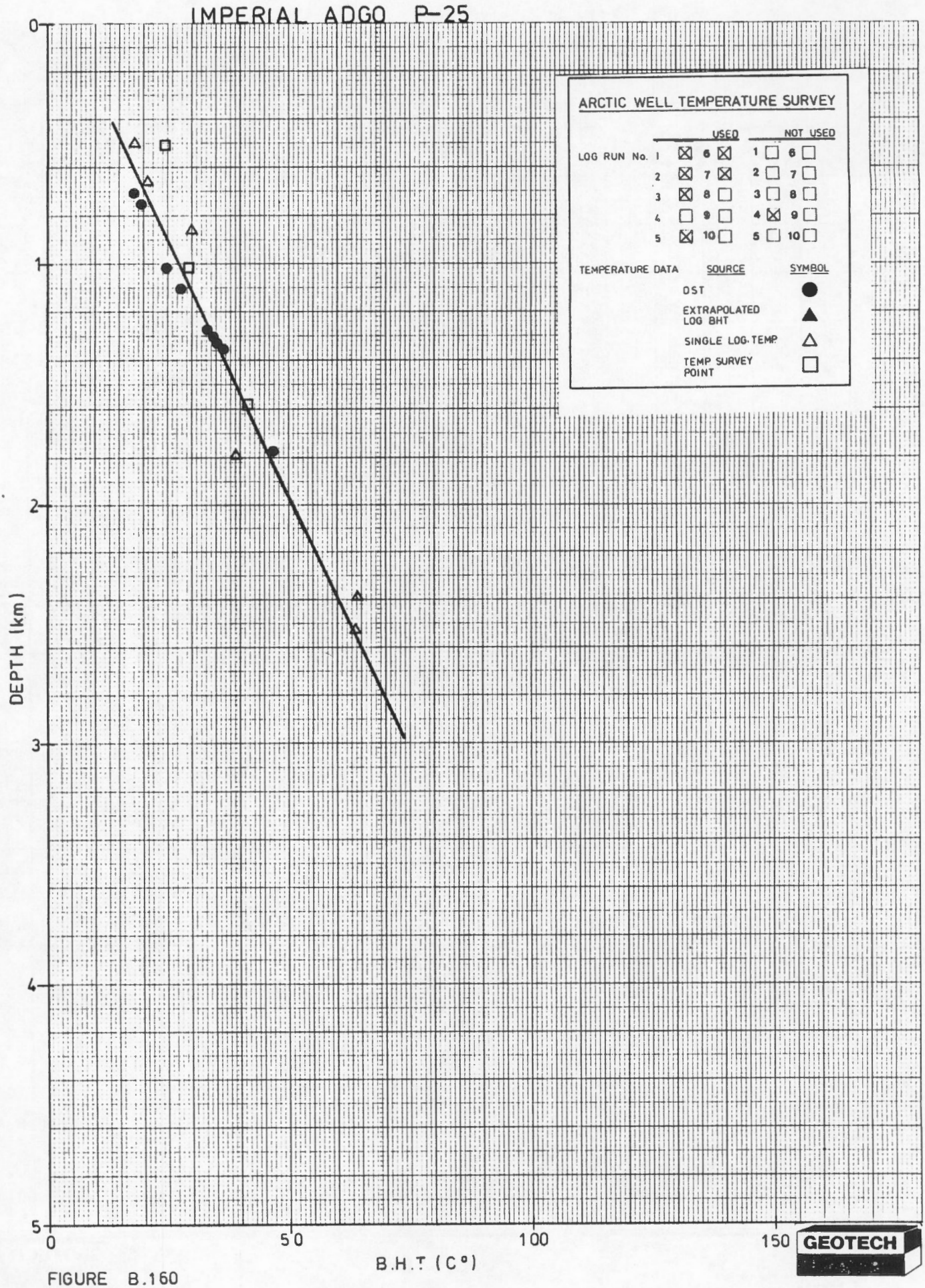

GULF RED FOX P-21
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (° C)
46 1512
K+E 10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B.159



46 1512

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.

FIGURE B.160

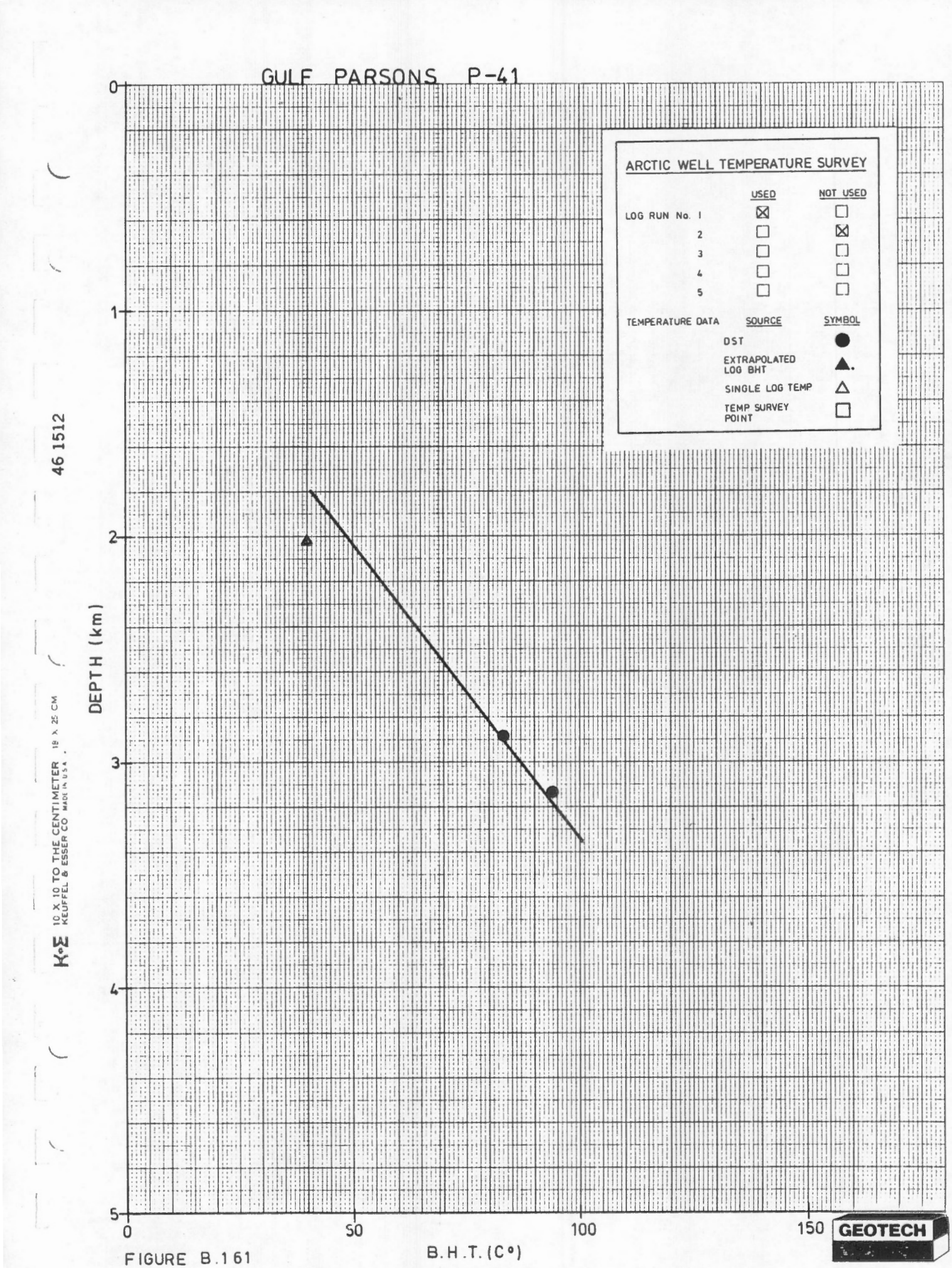

GULF PARSONS P-41
ARCTIC WELL TEMPERATURE SURVEY
USED
NOT USED
LOG RUN No. 1
2
3
4
5
TEMPERATURE DATA
SOURCE
SYMBOL
DST
EXTRAPOLATED LOG BHT
SINGLE LOG TEMP
TEMP SURVEY POINT
DEPTH (km)
0
1
2
3
4
5
0
50
100
150
B.H.T. (C°)
46 1512
K&E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO MADE IN U.S.A.
GEOTECH

FIGURE B.161

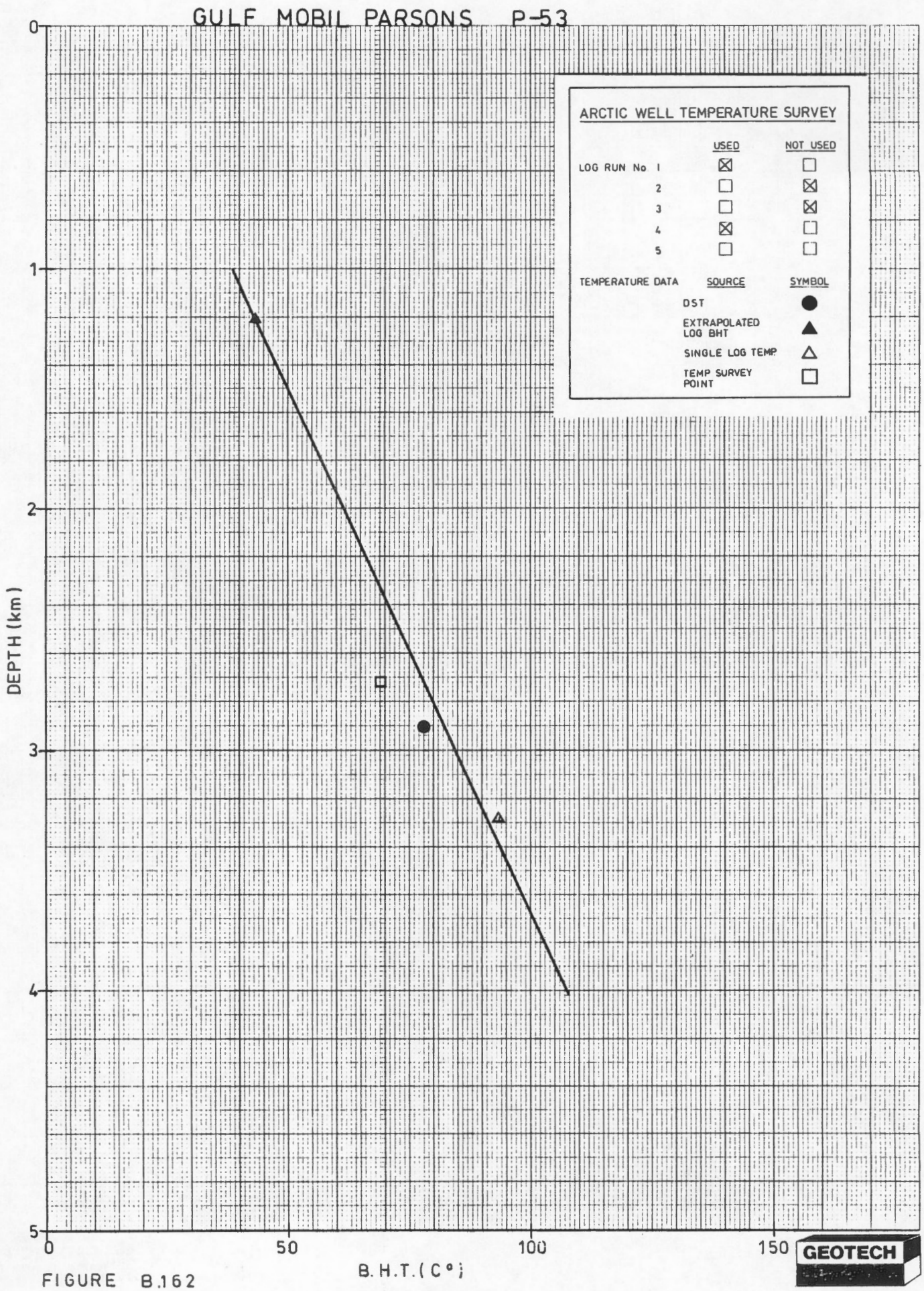


FIGURE B.162

46 1512
K+E 10 X 10 TO THE CENTIMETER 16 X 25 CM
KEUFFEL & ESSER CO MADE IN USA

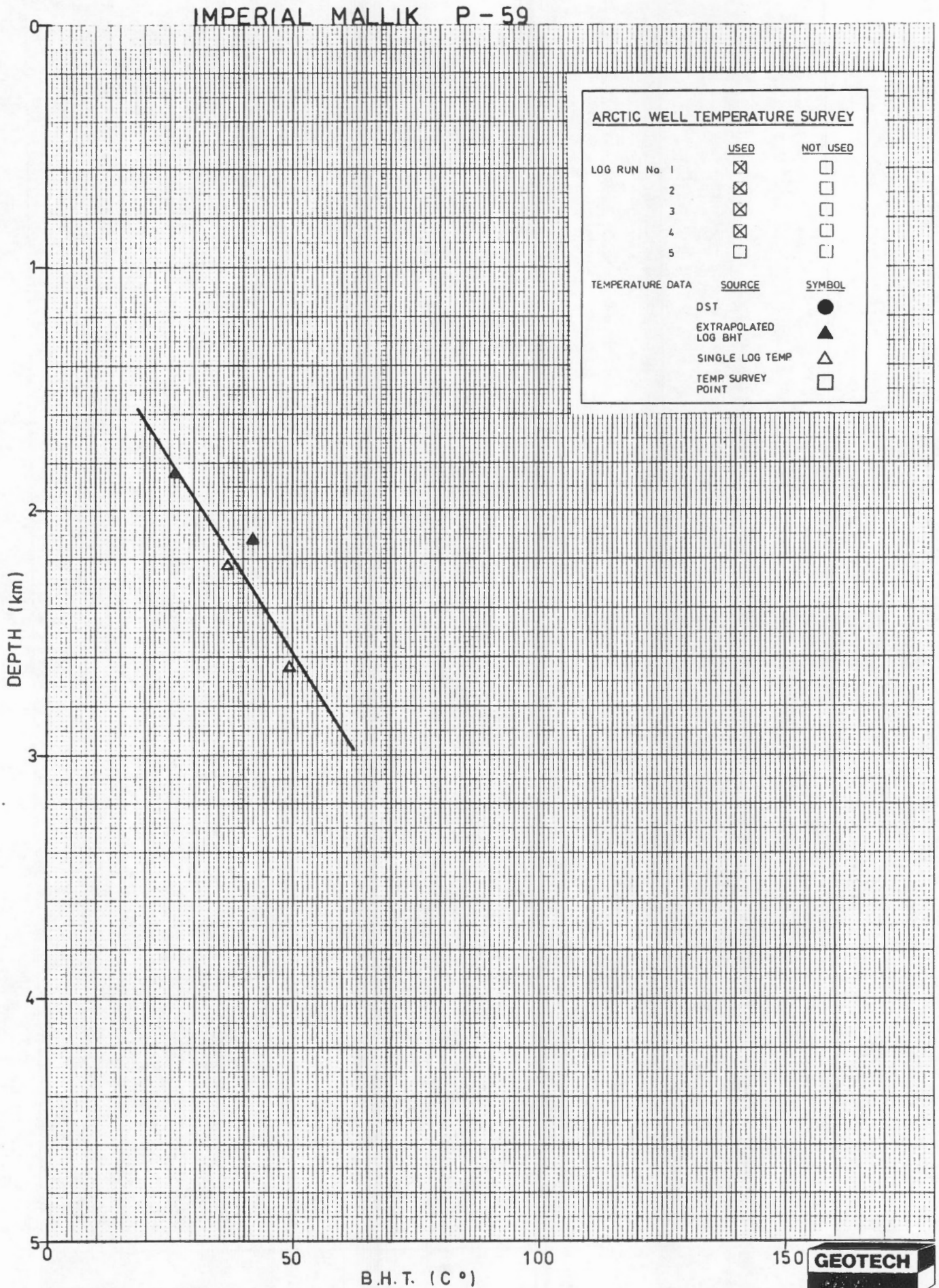


FIGURE B.163

46 1512
K•E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO MADE IN U.S.A.