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WIRE-LINE LOGGING OF WATER WELLS IN THE GREAT ARTESIAN BASIN - ADP DATA TRANSCRIPTION MANUAL

by

M.A. HABERMEHL

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ABSTRACT

The coding of information from wire-line logged water wells and logs in the Great Artesian Basin is described in this data transcription manual. Information from wells logged is collected on twelve fixed format data transfer sheets and data cards, including: Master; Geophysical Well Logs - 1, 2, 3; Water Chemistry - 1, 2; Lithostratigraphy; Hydrogeology; Well Casing and Screen; Hydrology; Temperature; and Barometric Data cards.

CONTENTS

FIGURE

INTRODUCTION

The Bureau of Mineral Resources, Geology and Geophysics and its contractors geophysically logged flowing and non-flowing artesian water wells in the Queensland, New South Wales, and the Northern Territory parts of the Great Artesian Basin between 1960 and 1975 (Appendix 1 and 2).

The objective of the well-logging program was to apply borehole geophysics to existing water wells in the Great Artesian Basin in order to obtain information on the subsurface geology and hydrogeology.

All existing water wells in the basin contain steel casing for most or all of their total depths, and wire-line logs are therefore mainly restricted to nuclear logs. Natural gamma-ray logs were obtained from all wells logged during this program, and in addition some neutron logs. From many wells, temperature, differential temperature, casing collar locator logs, and, from some, flowing artesian wells flow-meter logs were acquired. If the hole was uncased and open for more than 300 feet (about 100 m), spontaneous potential , resistivity, and caliper logs were also run.

The logs can be interpreted to determine the lithology, geometry, and porosity of lithological units; to identify and correlate stratigraphic units and mineral or water-bearing beds; to define the source and movement of water discharged by the aquifers; and to determine construction and corrosion details of the casing in the well.

Logs were recorded at the scale of 1 inch to 100 feet (1:1200) and also at 1 inch to 20 feet (1:240). The originals of these logs are stored in BMR; a collection of paperprints of the logs at 1 inch to 100 feet is available for examination in the Geological Branch of the Bureau of Mineral Resources, Geology and Geophysics. Additional paperprint copies for use by private individuals and companies can be ordered from the Copy Service, Government Printer (Production), P.O. Box 84, Canberra, A,C,T, 2600.

Extensive use has already been made of these logs for litho-stratigraphic identification and correlation (e.g., Senior & others, 1978), in hydrogeological studies (e.g., Habermehl, 1980), as well as in mineral and petroleum exploration by industry.

Basic data from about 1250 logged water wells, and the types of logs available for those wells, had to be transcribed to enable computer processing which facilitates computer storage and retrieval (Habermehl & Morrissey, in prep).

In addition, results of chemical analyses of water samples taken from some of the wells at the time of logging were transcribed, together with barometric data used to determine ground elevations of well sites.

Basic data acquired by the Geological Surveys of New South Wales (about 235) and South Australia (17) from logged water wells in the Great Artesian Basin were also recorded.

The format of the recording of the well and log data follows that of the geological and hydrological data recorded in the GAB-ADP system for the purpose of the hydrogeological study of the Great Artesian Basin by BMR. The fixed format of the data base of the GAB-ADP system, which contains data on nearly all 4700 flowing artesian and some non-flowing artesian wells in the Great Artesian Basin, is described by Ungemach & Habermehl (1973). Sorting and checking of the data of the GAB-ADP data bank was reported by Krebs (1973); manipulation of the basic data by a set of processing programs was described by Krebs (1974). The storage and retrieval system of the GAB-ADP data was described by Seidel (1973).

Each of the thirteen transfer sheets and data cards in the GAB-ADP system were identified by two characters, from 4A to 4M. The twelve data transfer sheets and data cards in the present system are labelled from 4P to 4Z and 4*, and consist of:

4P	Master card
4Q	Geophysical well log - 1
4R	Geophysical well log - 2
4S	Geophysical well log - 3
4T	Water chemistry - 1
4U	Water chemistry - 2
4V	Lithostratigraphy
4W	Hydrogeology
4X	Well casing
4Y	Hydrology
4Z	Temperature
4*	Barometric elevation

This Record is the data transcription manual for the coding of information from logged water wells and logs on transfer sheets and data cards 4P to 4Z and 4*.

When these coded data are entered into an ADP system, computer processing, storage, and retrieval are possible.

In the following sections the fixed format of the twelve data transfer sheets and corresponding data cards is given, and the coding described in detail. Common to all cards is the Identification section.

IDENTIFICATION provides a unique identification of the well from which data are recorded, and specifies its geographical location.

The first column of the Identification section, column 3, is filled with a numeric character, indicating the State in which the well is located (see explanation of the Master sheet or card for code). Column 4 is filled with the second letter of the 1:1 000 000 topographical map sheet identification (the first letter S, being common to all Australia, is omitted). Columns 5 to 8 refer to the numeric index of the 1:250 000 map sheet on which the well is located (Fig. 1).

Column 9 is used to indicate whether subsequent cards exist with more data for the same well. Column 10 is used to indicate deepening of the well during its existence.

Columns 11-15 deal with the well number, to be filled in from the registration numbers (which are exclusive and sequential in each State), issued by the State water authority (e.g., Water Resources Commission Queensland (formerly Irrigation and Water Supply Commission), Water Resources Commission New South Wales (formerly Water Conservation and Irrigation Commission), Department of Mines of South Australia, Northern Territory Department of Transport and Works (formerly Northern Territory Administration, etc.).

Note that the Identification section is the same for an individual well on all cards, with the exception of column 9, which contains information unique to each card.

TRANSFER SHEET AND DATA CARD PRESENTATION

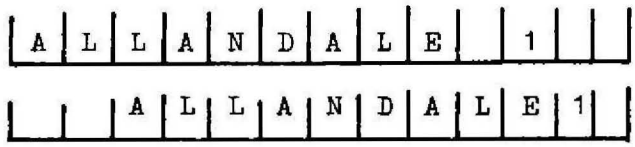
This chapter is designed as an operator's manual for the transcription of well and geophysical log information on to transfer sheets. It provides the data collection team with the guidelines needed for this operation.

Preliminary remarks

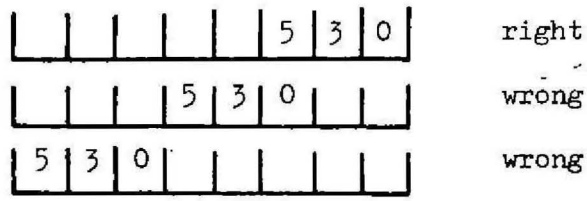
The transfer sheets for all cards contain eighty columns on one line, and deal with several headings and subheadings. These columns (headings and their detailed content) have to be filled either in coded or non-coded form, as indicated in the following explanatory notes.

One line with eighty columns on a transfer sheet corresponds to one standard Hollerith punch card containing eighty columns. Information recorded on the fixed-format transfer sheets will be punched onto Hollerith punch cards.

All alphanumeric data are to be framed on the left-hand side of the space allowed for the set of digits of the record - i.e., left justification, example: ALLANDALE 1



All numerical data are to be framed on the right-hand side of the space allowed for the set of digits of the record, unless the contrary is stated in the explanatory note - i.e., right justification, example: 530



Filling of the reliability items will be done after consultation with the geologist in charge of the data collection operation; reference should also be made to him if any doubts occur when filling the transfer sheets.

Date items have to be filled in 2 or 3 columns, depending on the type of transfer sheet. For the date in years, these 2 or 3 spaces refer to the 2 or 3 last numbers of the year (see note on the filling of numerical data),

example: 1892

Yields either

8	9	2

or

9	2

Months, coded from 1 to 12, and days 1 to 31, have to be filled in accordance with the note on the framing of numerical data (right justification).

A blank character (quoted b in the explanatory notes) is equivalent to zero in numerical format.

The following alphabetic and numerical characters are to be used during the filling of the transfer sheets:

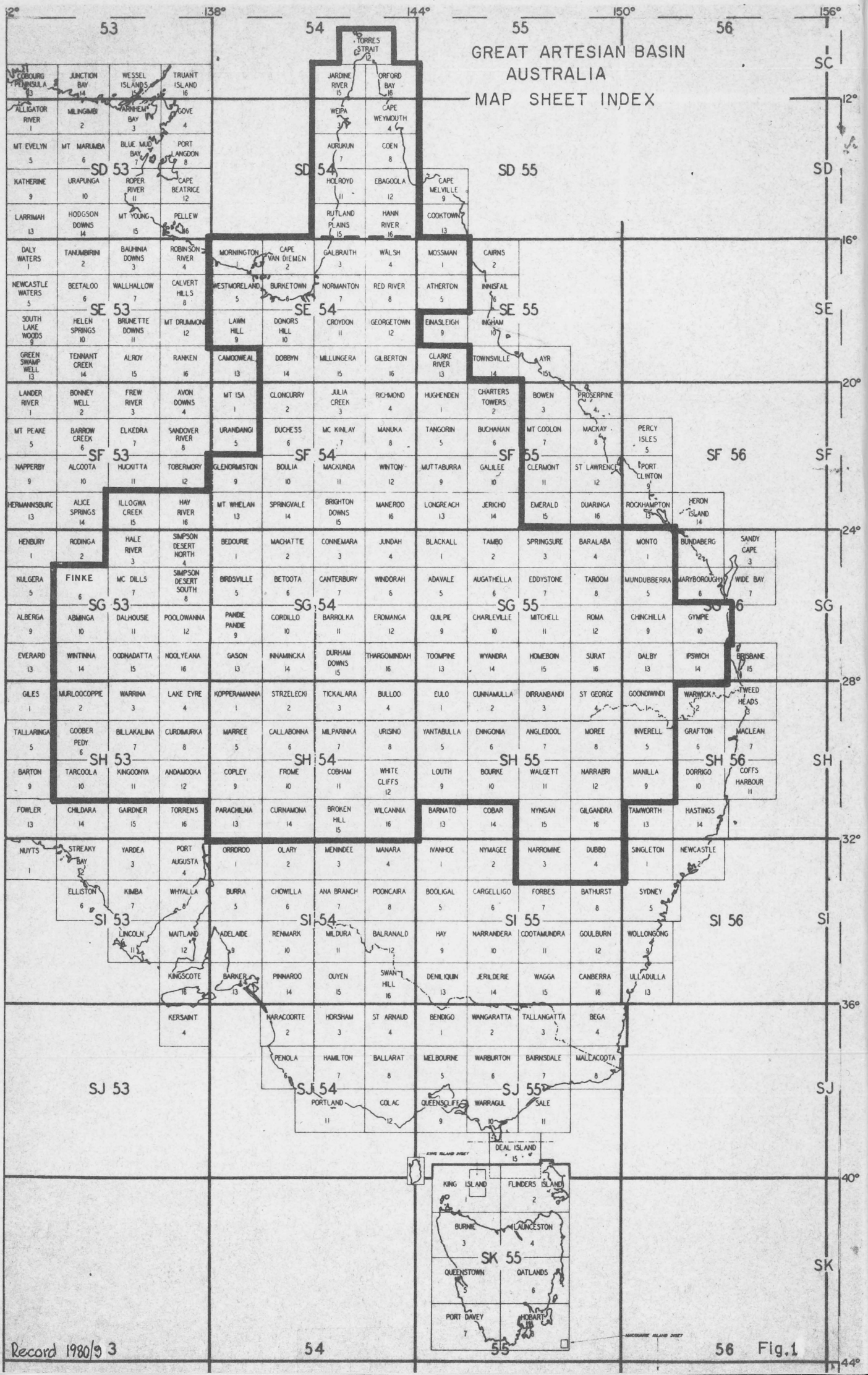
0 - zero	Ø - alphabetic O
1 - one	I - alphabetic I
2 - two	Z - alphabetic Z

If these symbols are not used during the data collection stage, errors may occur in the punching stage, subsequently causing expensive or time-consuming errors in the processing stage.

All depths, heights, and elevations are to be scheduled in feet or feet and tenths of feets (and not in inches). Inches (and fractions of inches) are only used for diameter measurements on the well casing and screen sheet.

All depths are taken from a reference level, which is ground level unless stated otherwise. Provision is made on the transfer sheets for measurements taken from other reference points.

Aquifer numbering and filling of the lithostratigraphy and hydrogeology sheet and parts of the hydrology and temperature sheets will be done by the geologist in the data collection team, or under his guidance.



Record 1980/93

Fig.1

MASTER CARD

The master card relates the main constant information about a well: its identification (registration number, name), geographical location, ground elevation, total depth, and completion date. Other information on this card relates whether the well is artesian or subartesian; the type, use and status of the well; the availability of original drillers' casing, and hydrology log records; various geophysical well logs; and the maximum depth reached by the logger. In addition, data about the logging authority, and the availability of other information recorded by the logger, are shown, as well as the availability of interpretative data about the logs and the chemical analysis of water samples. The Master card does not give information about the amount and reliability of the information on other data cards.

BMR-GAB Wireline logging of waterwells **MASTER SHEET** GAB-ADP System

CODE	IDENTIFICATION: State	Letter	1:250 000 Map Number	Card Cont.	Deepening	Well Number	WELL NAME	WELL LOCATION: Longitude Deg.	Min.	Sec.	Latitude Deg.	Min.	Sec.	Accuracy	GROUND ELEVATION Feet	01 feet	Accuracy	TOTAL DEPTH DRILLED (feet)	DATE COMPL Year	ART./SUBART.	TYPE AND USE	STATUS	LOGS AVAILABLE: DRILLERS	CASING	HYDROLOGY	GAMMA-RAY	NEUTRON	CAS.CAL.LOG	TEMPERAT.	FLOWM.	CALIPER	SPON. POT.	RESISTIV.	WATER ANAL.	LITHOSTRAT.	HYDROGEOL. INT.	BOTTOM DEPTH LOGGER (feet)	LOGGED BY	ADMIN. FORMS	BAROM. DATA	RESIST. DATA
1 2	3	4	5 6 7 8	9	10	11 12 13 14 15	16 17 18 19 20 21 22 23 24 25	26 27 28	29 30	31 32	33 34	35 36	37 38	39	40 41 42 43	44	45	46 47 48 49 50	51 52 53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71 72 73 74 75	76	77	78	79	80
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WELL MASTER INFORMATION CARD EXPLANATORY NOTE

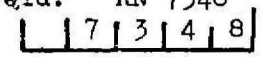
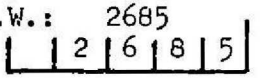
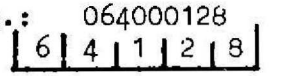
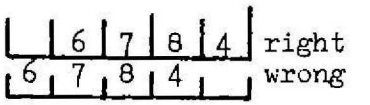
Master transfer sheet

Topic	Total	Column Start	Column End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are pre-printed and refer to the Code of the card; see Introduction.	Master card/sheet | 4 | P |
IDENTIFICATION	13	3	15	Columns 3 to 15 refer to the Identification of the well, i.e. the general geographic location and well number.	
State	1	3	3	Column 3 refers to the State where the well is located, to be coded as: A.C.T. 1 N.S.W. 2 N.T. 3 Qld. 4 S.A. 5 Tasm. 6 Vict. 7 W.A. 8 P.N.G. 9	Queensland Qld. | 4 |
Map identification	5	4	8	Columns 4 to 8 refer to the map sheet on which the well is located.	
Letter	1	4	4	Column 4 refers to the second letter which characterises 1:1 000 000 and 1:250 000 topographic and geological map sheets. (Omit the first letter S of the map reference)	1:1 000 000 Charleville SG 55 | G |

Master transfer sheet

Topic	Total	Column Start	Column End	Explanation	Example
Map number	4	5	8	Columns 5 to 8 refer to the map sheet number	
				Columns 5 and 6 refer to the index number of the 1:1 000 000 topographic and geological map sheets.	SG 55 5 5
				Columns 7 and 8 refer to the number of the 1:250 000 topographic and geological map sheets that follows the number in columns 5 and 6. These numbers in columns 7 and 8 (1 to 16) are the subdivisions of the 1:1 000 000 map sheet (in columns 5 and 6).	1:250 000 Tambo SG 55 - 2 2 G 5 5 2
				Note: Figure 1 shows the distribution of map names and numbers.	
Card continuation	1	9	9	Column 9 refers to card continuation. Fill column 9 with 0, if after the present card (which corresponds to one horizontal line on the transfer sheet) no other card follows with information about the specific well. Fill Column 9 with 1, if another card follows with records about the well.	
				Note: Column 9 will be unique for each transfer sheet. Continue filling column 9 with 1 until the last but one card, and insert 0 on the last card (or line in case of the transfer sheet).	
Deepening	1	10	10	Column 10 indicates whether the well has been deepened during its existence. Insert 1 in column 10 if the well is deepened once, 2 if its deepened for the second time, 3 for the third time, etc. If there was no deepening after the initial drilling, fill column 10 with 0.	Not deepened 0 deepened 1 3rd deepening 3

Master transfer sheet

Topic	Total	Column Start	End	Explanation	Example
Well number	5	11	15	Columns 11 to 15 include the well number. Fill columns 11 to 15 with:	
				Queensland: bore registration number of IWSC (Irrigation and Water Supply Commission).	Qld: RN 7348 
				New South Wales: bore registration number of WCIC (Water Conservation and Irrigation Commission).	N.S.W.: 2685 
				South Australia: bore registration number of Dept. of Mines, which consists of nine figures and has to be reduced to five figures as follows: Omit the first figure (grid squares areas SA: 052 to 125 52 to 25), and use the 2nd and 3rd figures (52 to 25), omit the 4th, 5th, and 6th figures (county numbers: 000); use the 7th, 8th, and 9th figures representing the SA bore number.	S.A.: 064000128 
				Northern Territory: bore registration number	
				Note: Fill last number in column 15, i.e., right justification of numeric data.	 right wrong
				Note: Columns 3 to 15 include the main identification of the well and are repeated on all transfer sheets/cards, except for column 9, which depends on the amount of information for a well, and whether this information can be inserted on one or more cards/lines on transfer sheets. Column 9 will therefore be different for all transfer sheets/cards, whereas columns 3 to 8 and 10 to 15 contain the same information on all transfer sheets/ cards for one well.	

Master transfer sheet

Topic	Total	Column Start	Column End	Explanation	Example
WELL NAME	10	16	25	Columns 16 to 25 refer to the well name. If no name exists, leave columns blank. When the name exceeds 10 characters, stop at the 10th character. If a number follows the name, the last columns must be used for the number, and a dash placed before the number. In some cases mnemonic abbreviations should be used (see example). For further explanation on abbreviations refer to Preliminary remarks.	Alton: A L T O N Cunnamulla: C U N N A M U L L A Thargomindah: T H A R G O M I N D Cunnamulla No. 3: C U N N A M U L - 3 Lightning Ridge: L I G H T R I D G E
				Note: Left justification for alphabetic data.	
WELL LOCATION	14	26	39	Columns 26 to 39 refer to the well location in longitude and latitude.	
Longitude	7	26	32	Columns 26 to 32 refer to the longitude of the well location, in degrees (columns 26 to 28), minutes (columns 29 to 30), and seconds (columns 31 and 32).	$136^{\circ}42'09''$ 1 3 6 4 2 0 9
Latitude	6	33	38	Columns 33 to 38 refer to the latitude of the well in, degrees (columns 33 and 34) minutes (columns 35 and 36), and seconds (columns 37 and 38).	$24^{\circ}07'12''$ 2 4 0 7 1 2
Accuracy	1	39	39	Column 39 designates the accuracy of the well location, as inserted in columns 26 to 38, and is to be coded as: unknown 0 surveyed by instrument 1 not surveyed by instrument 2	not surveyed 2

Topic	Total	Column Start	End	Explanation	Example
				(If a well is plotted on a map, this does not necessarily mean that it has been surveyed).	
GROUND ELEVATION	6	40	45	Columns 40 to 44 refer to the ground elevation of the well in feet. Fill columns 40 to 43 with the integer part of this figure (with the last figure in column 43), and column 44 with the decimal part. Note: If the ground elevation is below sea level, fill column 40 with minus sign, -.	954.3 ft | | 9 | 5 | 4 | 3 |
Accuracy	1	45	45	Column 45 refers to the accuracy of the ground elevation recorded columns 40 to 44, coded as: unknown 0 elevation surveyed (instrument) 1 elevation not surveyed (instrument) 2 elevation from barometric data 3	330.0 ft not surveyed | | 3 | 3 | 0 | 0 | 2 |
TOTAL DEPTH DRILLED	5	46	50	Columns 46 to 50 refer to the total depth drilled in feet, with an accuracy of 1 foot; ignore decimal parts. Last figure in column 50. (right justification).	3027 ft | | 3 | 0 | 2 | 7 | 13465.8 ft | 1 | 3 | 4 | 6 | 5 | 6854.2 ft | | 6 | 8 | 5 | 4 |
DATE COMPLETED	3	51	53	Columns 51 to 53 refer to the date of completion of the well.	13 May 1887 | 8 | 8 | 7 |
Year	3	51	53	Columns 51 to 53 refer to the three last figures of the year of completion. If the year of completion is unknown, leave columns 51 to 53 blank.	1928 | 9 | 2 | 8 |

Topic	Total	Column Start	End		Explanation	Example
ARTESIAN OR SUBARTESIAN WELL	1	54	54	Column	54 refers to the well as an artesian or subartesian well. An artesian well is here defined as a well from which water flows or has flowed naturally to the surface. An artesian well from which water has ceased to flow is a non-flowing artesian well. A subartesian well is a well from which water has never flowed naturally to the surface, and has to be raised to the surface by artificial means. Information concerning the designation of a well can be derived from the IWSC, WCIC, DMSA, and NTWRB records and from the water-level records of the well. Code as: artesian 1 subartesian 2	
TYPE AND USE OF WELL	1	55	55	Column	55 refers to the type and use of the well, i.e., the purpose of drilling the well and the present principal use of the well, coded as: type and use unknown A type unknown, use - water supply B water well, use - water supply (not specified) C " " " - town water supply D " " " - domestic water supply E " " " - irrigation water supply F " " " - stockwater supply G " " " - industrial water supply H " " " - dewatering I " " " - test and observation J " " " - abandoned K	

Master transfer sheet

Topic	Total	Column Start	End		Explanation	Example
					stratigraphic hole, use - stratigraphy and abandoned	L
					" " " - water supply (not specified)	M
					" " " - town water supply	N
					" " " - domestic water supply	Ø
					" " " - irrigation water supply	P
					" " " - stock water supply	Q
					" " " - industrial water supply	R
					" " " - test and observation	S
					petroleum well, use - petroleum production well	T
					" " " - abandoned	U
					" " " - water supply (not specified	V
					" " " - town water supply	W
					" " " - domestic water supply	X
					" " " - irrigation water supply	Y
					" " " - stock water supply	Z
					" " " - industrial water supply	1
					" " " - test and observation	2
					" " " - (water) recharge/injection	3
					mining exploration, use - mining exploration and abandoned	4
					" " " - water supply (not specified)	5
					" " " - water observation	6
					waste disposal	7
					miscellaneous	8
					others	9
					others	0
STATUS	1	56	56	Column	56 refers to the status of the well at the time of logging the well, i.e. the well was flowing; the well was not flowing; the well was being pumped; the well contained a pump, but the pump was not operating; the well had been abandoned.	

Topic	Total	Column Start	Column End	Explanation	Example
				Code the information as: unknown 0 flowing 1 non-flowing 2 pumping 3 pump present, not pumping 4 abandoned 5	artesian well, found to be non-flowing [2] artesian well, found to be pumped [3] subartesian well pumping [3]
				Note: No information about the condition of the well or its headworks will be recorded in this column.	
LOGS AVAILABLE	11	57	67	Columns 57 to 67 refer to the availability of information on logs as recorded on data transfer sheets or cards. Insert in these columns the highest folio number of specific data cards for a given log; if no record or card is present fill in 0. Note that each data card corresponds with one line on the corresponding transfer sheet.	
				Note: The amount and reliability of the information on the data transfer sheets or data cards is not defined in the columns of the Master data card; records in columns 57 to 67 refer only to the availability of other data cards, and the total number of these cards.	

Master transfer sheet

Topic	Total	Column Start	End		Explanation	Example
Drillers' log	1	57	57	Column	57 refers to availability of the original Drillers' logs, records of which contain a description of the depth, thickness and strata penetrated, which, if present, should have been added onto the gamma-ray log. Code: drillers' log not present on gamma-ray log 0 drillers' log present on gamma-ray log 1	drillers' log present [1]
Casing log	1	58	58	Column	58 refers to the availability of the original Casing log, records of which are often contained in the original Drillers' log, and which describe the depth, length and measurements of casing in the well, together with information on slots, etc. This information could be shown on the gamma-ray log, and is present on data transfer sheet and data card 4X.	casing log not present [0] casing log present [1]
Hydrology log	1	59	59	Column	59 refers to the availability of the original Hydrology log, records of which are often contained in the original Drillers' log, and which describe the depth at which water was encountered, depth or elevation or pressure to which the water rose, and the original flow rate or pumping rate. This information could be shown on the gamma-ray log, and is present on data transfer sheet and data card 4Y.	hydrology log not present [0] hydrology log present [1]

Topic	Total	Column Start	End		Explanation	Example
Geophysical well logs					The following geophysical well logs were generally logged at scales 1 inch to 100 feet and 1 inch to 20 feet. No reference is made to the availability of either of these log scales, but in general at least the log at scale 1 inch to 100 feet will be present. Detailed information is given on the data cards 4Q, 4R, and 4S. This information concerns the type and scale of the logs, depth intervals logged, and the date of logging. Information about the various log units, e.g., API units for gamma-ray and neutron, millivolts for spontaneous potential, etc., logging speed, time constants, sensitivity settings, etc., are not recorded on the data cards 4Q, 4R, and 4S. For this type of information the appropriate log headings should be consulted, as well as for particulars of the logging probes, e.g., type, diameter, etc.	
Gamma-ray log	1	60	60	Column	60 refers to the availability of the natural gamma-ray log. Information on this log is recorded on data card 4Q, column 78. Detailed information about the type of log, depth interval, and date of logging, are shown in columns 16 to 33 of data card 4Q.	gamma-ray log not present [0] one gamma-ray log present [1] three gamma-ray logs present [3]
Neutron log	1	61	61	Column	61 refers to the availability of the neutron log. Information on this log is recorded on data card 4Q, column 79. Detailed information about the type of log, depth interval, and date of logging, are shown in columns 34 to 51 of data card 4Q.	neutron log not present [0] one neutron log present [1]

Master transfer sheet

Topic	Total	Column Start	End		Explanation	Example
Casing collar locator	1	62	62	Column	62 refers to the availability of the casing collar locator log. Information on this log is recorded on data card 4Q, column 80. Detailed information about the type, depth interval, and date of logging, are shown in columns 52 to 69 of data card 4Q.	casing collar locator log not present [0] one casing collar locator log present [1]
Temperature log	1	63	63	Column	63 refers to the availability of the temperature log. Information on this log is recorded on data card 4R, column 78. Detailed information about the type, depth interval, and date of logging, are shown in columns 16 to 33 of data card 4R.	no temperature log present [0] one temperature log present (either dT/T or T) [1]
				Note:	Data card 4Z contains interpreted data from the temperature logs. This information (on data card 4Z) should not be confused with the basic information about the log on data card 4R.	
Flowmeter log	1	64	64	Column	64 refers to the availability of the flowmeter log. Information on this log is recorded on data card 4R, column 79. Detailed information about the type, depth interval, and date of logging, are shown in columns 34 to 51 of data card 4R.	flowmeter log not present [0] one flowmeter log present [1]
Caliper log	1	65	65	Column	65 refers to the availability of the caliper log. Information on this log is recorded on data card 4R, column 80. Detailed information about the type, depth interval, and date of logging, are shown in columns 52 to 69 of data card 4R.	caliper log not present [0] one caliper log present [1]

Topic	Total	Column Start	End		Explanation	Example
Spontaneous potential log	1	66	66	Column	66 refers to the availability of the spontaneous potential log. Information on this log is recorded on data card 4S, column 78. Detailed information about the type, depth interval, and date of logging, are shown in columns 16 to 33 of data card 4S.	Spontaneous potential log not present [0] two spontaneous potential logs present [2]
Resistivity log	1	67	67	Column	67 refers to the availability of the resistivity log. Information on this log is recorded on data card 4S, column 79. Detailed information about the type, depth interval, and date of logging, are shown in columns 34 to 51 of data card 4S.	resistivity log not present [0] one resistivity log (suite of resistivity logs, e.g. 16 and 64 inch) [1]
WATER ANALYSIS	1	68	68	Column	68 refer to the availability of water analysis data. Laboratory determinations of the chemical analysis of water samples is recorded on data cards 4T and 4U, and contain, apart from the result, information about date of sampling and analysing, the sampling and analysing authorities, etc. Only laboratory results (mainly data card 4U) are taken into account for the water analysis availability, so, do not consider field determination.	no result of chemical analysis present [0] one result of chemical analysis present [1]
LITHOSTRATIGRAPHY	1	69	69	Column	69 refers to the availability of litho-stratigraphic data. These interpretative data are recorded on data card 4V, and show the depth (top) of the lithostratigraphic unit and a code for that unit.	no lithostratigraphic data available [0] lithostratigraphy interpreted [1]

Master transfer sheet

Topic	Total	Column Start	End		Explanation	Example
HYDROGEOLOGY	1	70	70	Column	70 refers to the availability of hydrogeological data. These interpretative data are recorded on data card 4W, and show the depth intervals of the aquifers and aquicludes or confining beds, and their respective codes.	no hydrogeological data available [0] hydrogeological units interpreted and recorded [1]
BOTTOM-DEPTH LOGGER	5	71	75	Columns	71 to 75 refer to the bottom depth of the logger, which is the **greatest** depth reached by the logger during the logging of the well, (sometimes the depth reached by the 'dummy'). This depth to be shown in feet, with 1 foot accuracy, last figure in column 75, right justified.	(bottom) depth logger 1541 ft [1][5][4][1]
				Note:	This depth is often greater than the bottom of the logged interval.	
Unsuccessful logging	2	74	75		Wells which could not successfully be logged but which were attempted, are to be coded by inserting a minus sign in column 74, and a numerical in column 75. Reasons why the logging was unsuccessful are commonly shown on the completed Bore data sheets, and otherwise in the reports submitted by the logger. These reasons are to be shown in column 75, and coded:	

Topic	Total	Column Start	End	Explanation		Example
				Well abandoned	1	
				Unloggable, no reason given	2	well not logged, obstruction at 200 ft
				Obstruction in well	3	[3]
				Dangerous well, danger of damage to well if logged	4	well not logged, located in hot pool
				Permission to log refused by owner	5	[6]
				Technical reasons for not logging; because of headworks, well in pool, at bottom of well, etc.	6	
				Impassable road	7	
LOGGED BY	1	76	76	Column 76 refers to the authority or contractor which carried out the logging, to be coded as:		
				BMR (truck mounted instruments)	1	
				Qld Geological Survey	2	
				Qld Irrig. Water Supply Comm.	3	
				NSW Geological Survey	4	
				NSW Water Conserv. Irrig. Comm.	5	Well logged by BMR truck
				SA Geological Survey	6	[1]
				SA Engin. Water Supply Dept.	7	
				NT Geological Survey	8	
				NT Water Resources Branch	9	
				BMR (portable loggers, operated by field geologist or well site geologist)	A	
				Contractors:		
				Schlumberger Seaco Inc.	B	Well logged by Down Under Well Serv. P/L
				Down Under Well Services Pty Ltd	C	[C]
				Agnew-Co-Western Pty Ltd	D	
				Austral United Geophysical Pty Ltd	E	

Master transfer sheet

Topic	Total	Column Start	End		Explanation	Example
					Contractors - Welex	F G H I
					Petroleum and mining companies	J K L M N
					Water consultants	O P Q
					Universities and research organisations	R S T U V
					Drillers	W X
					Others	Y Z
ADMINISTRATION FORMS	1	77	77	Column	77 refers to the availability of the various administrative forms related to the logging. For each well logged two forms are present: Permission to log form and Bore data sheet. Permission to log forms are documents which have been signed by the well owner, and by which the logger acquired permission to work on and log the well. These forms are filed in BMR Registry files.	

Topic	Total	Column Start	End	Explanation	Examples
				Bore data sheets contain basic information about the well, its status and condition, basic log data, water resistivity measurement results, operating time of the logger, and any comments by the logger. These forms are filed in the GAB technical data system. Water analysis results of the various chemical laboratories to which water samples were sent for analysis are also held by the GAB technical data system. Code the availability of these forms as: **forms unknown** 0 forms **not present** 1 only permission to log form present 2 only bore data sheet present 3 only water analysis results present 4 permission form & bore data sheet present 5 permission form & water analysis present 6 bore data sheet & water analysis present 7 permission to log form & bore data sheet & water analysis present 8	permission to log form, bore data sheet, result of chemical analysis present 8

Master transfer sheet

Topic	Total	Column Start	End		Explanation	Example
BAROMETRIC DATA	1	78	78	Column	78 refers to the availability of barometric data measurements, which were carried out at the well location to calculate the ground elevation. Barometric data are recorded on data card 4*.	no barometric data present [0] barometric data present [1]
RESISTIVITY DATA	1	79	79	Column	79 refers to the availability of water resistivity measurement data which were carried out at the well site, and recorded on data card 4T under Field determination (and present on the Bore data sheet).	no field resistivity data present [0] field resistivity data present [1]
OTHER DATA	1	80	80	Column	80 is left open for optional further information recording.	

Follows from p.25

GEOPHYSICAL WELL LOG - 1 CARD

The Geophysical Well Log - 1 card deals with the information about the gamma-ray, neutron, and casing collar locator logs which have been run in the well.

The type of log, the scale at which the log was recorded, the depth interval over which the log was run, and the date of logging are recorded.

BMR-GAB Wireline logging of waterwells GEOPHYSICAL WELL LOGS-1 SHEET GAB-ADP System

CODE	IDENTIFICATION						RECORDS																							
							GAMMA-RAY						NEUTRON						CASING COLLAR LOCATOR											
							TYPE	DEPTHS		DATE			TYPE	DEPTHS		DATE			TYPE	DEPTHS		DATE								
	State	Letter	1:250 000 Map Number	Card Cont.	Deepening	Well Number		From	To	Day	Mth	Year		From	To	Day	Mth	Year		From	To	Day	Mth	Year				G - Record	N - Record	C - Record
1 2	3	4	5 6 7 8	9	10	11 12 13 14 15	16	17 18 19 20 21	22 23 24 25 26	27 28	29 30	31 32 33	34	35 36 37 38 39	40 41 42 43 44	45 46	47 48	49 50 51	52	53 54 55 56 57	58 59 60 61 62	63 64	65 66	67 68 69	70 71 72 73 74 75 76 77			78	79	80
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Geophysical Well Log - 1 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the code of the data card, see Introduction.	Geophysical Well Log - 1 card/sheet [4]2
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master card 4Γ. For coding of these columns, refer to the Master transfer sheet explanation section Identification.	
				Note: column 9 see Introduction	
RECORDS	54	16	69	Records for one gamma-ray, neutron, and casing collar locator log each are allocated to each line of the Geophysical Well Log - 1 transfer sheet, which corresponds to one data card.	
GAMMA-RAY	18	16	33	Columns 16 to 33 refer to records on gamma-ray logs.	
TYPE	1	16	16	Column 16 refers to the type of gamma-ray log and the scale at which the log has been recorded.	
				Natural gamma-ray at scale 1 inch to 100 feet 1	natural gamma-ray log 1 inch to 100 ft [1]
				Natural gamma-ray at scale 1 inch to 20 feet 2	
				Natural gamma-ray at scale 1 inch to 100 feet and 20 feet 3	
				Gamma-gamma ray at scale 1 inch to 100 feet 4	
				Gamma-gamma ray at scale 1 inch to 20 feet 5	
				Gamma-gamma ray at scales 1 inch to 100 feet and 20 feet 6	
				gamma-spectrometry 7	

Geophysical Well Log - 1 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
DEPTHS	10	17	26	Columns 17 to 26 refer to the depth interval (in feet) over which the gamma-ray log was recorded. Last numbers to be filled in columns 21 and 26, i.e. right justification. The depth is to be recorded as a positive figure and represents the depth in feet, without decimal parts, measured from the ground elevation as datum. Any depth measurements made from different datums have to be recalculated to ground-level datum.	gamma-ray log from -1758 to 0 ft (=ground level) From | | 1 | 7 | 5 | 8 | To | | | | | 0 |
				Note: Logs can be either recorded up or down in the well so the logged interval can either start at the top or bottom of the hole. Code therefore the commencement of logging under From, and the end of logging under To.	
DATE	7	27	33	Columns 27 to 33 deal with the date on which the gamma-ray logging was carried out.	
Day	2	27	28	Columns 27 and 28 refer to the day on which the logging was carried out.	gamma-ray log run on 7 May 1975
Month	2	29	30	Columns 29 and 30 refer to the month in which the logging was carried out, months to be coded from 1 to 12.	| | 7 | | 5 | 9 | 7 | 5 |
Year	3	31	33	Columns 31 to 33 refer to the year in which the logging was carried out; delete the first digit 1.	
				Note: The right justification of all numerics belonging to day, month and year.	

Topic	Total	Column Start	Column End	Explanation	Example
NEUTRON	18	34	51	Columns 34 to 51 refer to records on neutron logs.	
TYPE	1	34	34	Column 34 refers to the type of neutron log and the scale at which the log has been recorded. Neutron-gamma at scale 1 inch to 100 feet 1 Neutron-gamma at scale 1 inch to 20 feet 2 Neutron-gamma at scales 1 inch to 100 feet and 20 feet 3 Neutron-thermal-neutron at scale 1 inch to 100 feet 4 Neutron-thermal-neutron at scale 1 inch to 20 feet 5 Neutron-thermal-neutron at scales 1 inch to 100 feet and 20 feet 6 Neutron-epithermal-neutron at scale 1 inch to 100 feet 7 Neutron-epithermal-neutron at scale 1 inch to 20 feet 8 Neutron-epithermal-neutron at scales 1 inch to 100 feet and 20 feet 9	neutron-gamma log at scales 1 inch to 100 ft and 20 ft | 3 |
DEPTHS	10	35	44	Columns 35 to 44 refer to the depth interval (in feet) over which the neutron log was recorded. See further as for columns 17 to 26.	neutron log from -25 ft to -1950 ft (below ground level) From | | | 2 | 5 | To | 1 | 9 | 5 | 0 |

Geophysical Well Log - 1 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
DATE	7	45	51	Columns 45 to 51 refer to the date on which the neutron logging was carried out. See further as for columns 27 to 33.	
CASING COLLAR LOCATOR	18	52	69	Columns 52 to 69 refer to records on casing collar locator logs.	
TYPE	1	52	52	Column 52 refers to the type of casing collar locator log and the scale at which the log has been recorded. Casing-collar locator at scale 1 inch to 100 feet 1 Casing-collar locator at scale 1 inch to 20 feet 2 Casing-collar locator at scale 1 inch to 100 feet and 20 ft 3	
DEPTHS	10	53	62	Columns 53 to 62 refer to the depth interval (in feet) over which the casing collar locator log was recorded. See further as for columns 17 to 26.	total depth 2170 ft casing in hole from 0 (=ground level) to -2075 ft; casing collar locator log from -2160 ft to 0 ft From | | 2 | 1 | 6 | 0 | To | | | | | 0 |
DATE	7	63	69	Columns 63 to 69 refer to the date on which the casing collar locator logging was carried out. See further as for columns 27 to 33.	

Geophysical Well Log - 1 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
COMMENT	8	70	77	Columns 70 to 77 are left for optional comment or further information about any of the nuclear logs or the casing collar locator log.	
FOLIO NUMBERS	3	78	80	Columns 78 to 80 are for the folio numbering of the gamma-ray, neutron and casing-collar locator records. The folio number refers to one well, i.e. the sequence of records (corresponding to lines on a transfer sheet and to individual data cards) to be used for one type of log for one well.	
Gamma-ray record	1	78	78	Column 78 refers to the folio number of the gamma-ray record.	3 gamma-ray records (=3 lines on transfer sheet) [3]
Neutron record	1	79	79	Column 79 refers to the folio number of the neutron record.	no neutron record [0]
Casing-collar locator record	1	80	80	Column 80 refers to the folio number of the casing-collar locator record.	1 casing-collar locator record (= 1 line) [1]
				Note: The highest number for one well in column 78 of transfer sheet 4Q will be inserted in column 60 of transfer sheet 4P; the highest number in column 79 of 4Q in column 61 of sheet 4P; and the highest number in column 80 of 4Q in column 62 of sheet 4P.	

Follows from p.33

GEOPHYSICAL WELL LOG - 2 CARD

The Geophysical Well Log - 2 card deals with the information about the temperature, flowmeter and caliper logs which have been run in the well.

The type of log, the scale at which the log was recorded, the depth interval over which the log was run, and the date of logging are recorded.

BMR - GAB Wireline logging of waterwells GEOPHYSICAL WELL LOGS - 2 SHEET GAB-ADP System

CODE	IDENTIFICATION						RECORDS																							
							TEMPERATURE						FLOWMETER						CALIPER											
	State	Letter	1:250 000 Map Number	Card Cont	Deepening	Well Number	TYPE	DEPTHS From	DEPTHS To	DATE Day	DATE Mth	DATE Year	TYPE	DEPTHS From	DEPTHS To	DATE Day	DATE Mth	DATE Year	TYPE	DEPTHS From	DEPTHS To	DATE Day	DATE Mth	DATE Year		T - Record	F - Record	C - Record
1 2	3	4	5 6 7 8	9	10	11 12 13 14 15	16	17 18 19 20 21	22 23 24 25 26	27 28	29 30	31 32 33	34	35 36 37 38 39	40 41 42 43 44	45 46	47 48	49 50 51	52	53 54 55 56 57	58 59 60 61 62	63 64	65 66	67 68 69	70 71 72 73 74 75 76 77	78	79	80
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Geophysical Well Log - 2 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the code of the data card, see Introduction	Geophysical Well Log - 2 card/sheet 4R
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master card 4P. For coding of these columns, refer to the Master transfer sheet explanation, section Identification.	
				Note: Column 9, see Introduction.	
RECORDS	54	16	69	Records for one temperature, flow meter, and caliper log each are allocated to each line of the Geophysical Well Log - 2 transfer sheet, which corresponds to one data card.	
TEMPERATURE	18	16	33	Columns 16 to 33 refer to records on temperature logs.	
TYPE	1	16	16	Column 16 refers to the type of temperature log and the scale at which the log has been recorded.	

Temperature log at scale 1 inch to 100 feet 1
Temperature log at scale 1 inch to 20 feet 2
Temperature log at scales 1 inch to 100 feet and 20 feet 3
Differential temperature log at scale 1 inch to 100 feet 4
Differntial temperature log at scale 1 inch to 20 feet 5
Differential temperature log at scales 1 inch to 100 feet and 20 feet 6

Topic	Total	Column Start	End	Explanation	Example
				Temperature and differential temperature logs a scale 1 inch to 100 feet 7 Temperature and differential temperature logs at scale 1 inch to 20 feet 8 Temperature and differential temperature logs at scales 1 inch to 100 feet and 20 feet 9	Temperature and differential temperature logs at scale 1 inch to 100 ft and 20 ft [9]
DEPTHS	10	17	26	Columns 17 to 26 refer to the depth interval (in feet) over which the temperature log was recorded. See further as for columns 17 to 26 of Geophysical Well Log - 1 transfer sheet. Note: Right justification and From and To.	Temperature log from -1640 to -60 ft From [·|1|6|4|0] To [| | |6|0]
DATE	7	27	33	Columns 27 to 33 deal with the date on which the temperature logging was carried out. See further as for columns 27 to 33 of Geophysical Well Log - 1 transfer sheet.	Logged on 30 November 1975 [3|0|1|1|9|7|5]
FLOWMETER	18	34	51	Columns 34 to 51 refer to records on flowmeter logs.	
TYPE	1	34	34	Column 34 refers to the type of flowmeter log and the scale at which the log has been recorded. Flowmeter at scale 1 inch to 100 feet 1 Flowmeter at scale 1 inch to 20 feet 2 Flowmeter at scales 1 inch to 100 feet and 20 feet 3	Flowmeter log at scale 1 inch to 100 feet [1]

Geophysical Well Log - 2 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
DEPTHS	10	35	44	Columns 35 to 44 refer to the depth interval (in feet) over which the flowmeter log was recorded. See further as for columns 17 to 26 of Geophysical Well Log - 1 transfer sheet. **Note: Right justification and From and To.**	Flowmeter from -10 ft to -869 ft From | | | 1 | 0 To | | 8 | 6 | 9
DATE	7	45	51	Columns 45 to 51 refer to the date on which the flowmeter logging was carried out. See further as for columns 27 to 33 of Geophysical Well Log - 1 transfer sheet.	
CALIPER	18	52	69	Columns 52 and 69 refer to records on caliper logs.	
TYPE	1	52	52	Column 52 refers to the type of caliper log and the scale at which the log has been recorded. Caliper at scale 1 inch to 100 feet 1 Caliper at scale 1 inch to 20 feet 2 Caliper at scales 1 inch to 100 feet and 20 feet 3	
DEPTHS	10	53	62	Columns 53 to 62 refer to the depth interval (in feet) over which the caliper log was recorded. See further as for columns 17 to 26 of Geophysical Well Log - 1 transfer sheet. Note: Right justification and From and To.	
DATE	7	63	69	Columns 63 to 69 refer to the date on which the caliper logging was carried out. See further as for columns 27 to 33 of Geophysical Well Log - 1 transfer sheet.	

Geophysical Well Log - 2 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
COMMENT	8	70	77	Columns 70 to 77 are left for optional comment or further information about any of the temperature, flowmeter or caliper logs.	
FOLIO NUMBERS	3	78	80	Columns 78 to 80 are for the folio numbering of the temperature, flowmeter, and caliper records. The folio number refers to one well, i.e., the sequence of records (corresponding to lines on a transfer sheet and to individual data cards) to be used for one type of log for one well.	
Temperature record	1	78	78	Column 78 refers to the folio number of the temperature record.	One temperature and differential temperature record (= 1 line) 1
Flowmeter record	1	79	79	Column 79 refers to the folio number of the flowmeter record.	
Caliper record	1	80	80	Column 80 refers to the folio number of the caliper record.	

Note: The highest number for one well in column 78 of transfer sheet 4R will be inserted in column 63 of transfer sheet 4P; the highest number in column 79 of 4R in column 64; and the highest number in column 80 of 4R in column 65 of transfer sheet 4P.

GEOPHYSICAL WELL LOG - 3 CARD

The Geophysical Well Log - 3 card deals with the information about the spontaneous potential and resistivity and resistance logs, and any other logs - not mentioned on Geophysical Well Log - 1, 2 and 3 cards - which have been run in the well.

The type of log, the scale at which the log was recorded, the depth interval over which the log was run, and the date of logging are recorded.

BMR-GAB Wireline logging of waterwells GEOPHYSICAL WELL LOGS-3 SHEET GAB-ADP System

CODE	IDENTIFICATION						RECORDS																					
							SPONTANEOUS POTENTIAL						RESISTIVITY						OTHER							S - Record	R - Record	O - Record
	State	Letter	1:250 000 Map Number	Card Cont.	Deepening	Well Number	TYPE	DEPTHS From	DEPTHS To	DATE Day	DATE Mth	DATE Year	TYPE	DEPTHS From	DEPTHS To	DATE Day	DATE Mth	DATE Year	TYPE	DEPTHS From	DEPTHS To	DATE Day	DATE Mth	DATE Year		S	R	O
1 2	3	4	5 6 7 8	9	10	11 12 13 14 15	16	17 18 19 20 21	22 23 24 25 26	27 28	29 30	31 32 33	34	35 36 37 38 39	40 41 42 43 44	45 46	47 48	49 50 51	52	53 54 55 56 57	58 59 60 61 62	63 64	65 66	67 68 69	70 71 72 73 74 75 76 77	78	79	80
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Geophysical Well Log - 3 transfer sheet

Topic	Total	Column Start	Column End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the code of the data card, see Introduction.	Geophysical Well Log - 3 sheet/card 4S
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master card 4P. For coding of these columns, refer to the Master transfer sheet explanation, section Identification.	
				Note: Column 9, see Introduction.	
RECORDS	54	16	69	Records for one spontaneous potential, resistivity and one other log are allocated on each line of the Geophysical Well Log - 3 transfer sheet, which corresponds to one date card.	
SPONTANEOUS POTENTIAL	18	16	33	Columns 16 to 33 refer to records on spontaneous potential logs.	
TYPE	1	16	16	Column 16 refers to the type of spontaneous potential log and the scale at which the log has been recorded.	
				Spontaneous potential at scale 1 inch to 100 feet 1	
				Spontaneous potential at scale 1 inch to 20 feet 2	
				Spontaneous potential at scales 1 inch to 100 feet and 20 feet 3	

Topic	Total	Column Start	End	Explanation	Example
DEPTHS	10	17	26	Columns 17 to 26 refer to the depth interval (in feet) over which the spontaneous potential log was recorded. See further as for columns 17 to 26 of Geophysical Well Log - 1 transfer sheet. Note: Right justification and From and To.	
DATE	7	27	33	Columns 27 to 33 deal with the date on which the spontaneous potential logging was carried out. See further as for columns 27 to 33 of Geophysical Well Log - 1 transfer sheet.	
RESISTIVITY	18	34	51	Columns 34 to 51 refer to the records on resistivity logs and resistance logs.	
TYPE	1	34	34	Column 34 refers to the type of resistivity log or resistance log and the scale on which the log has been recorded. Resistivity 16-inch short normal and 64-inch long normal at scale 1 inch to 100 feet 1 Resistivity 16 inch short normal and 64-inch long normal at scale 1 inch to 20 feet 2 Resistivity 16 inch short normal and 64-inch long normal at scales 1 inch to 100 feet and 20 feet 3 Resistivity 16-inch short and 64-inch long normal and 18 feet 8 inch lateral log at scale 1 inch to 100 feet 4	resistivity log 16 and 64 inch at scale 1 inch to 100 ft [1]

Geophysical Well Log - 3 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
				Resistivity 16-inch short and 64-inch long normal and 18 feet 8 inch lateral log at scale 1 inch to 20 feet	5
				Resistivity 16-inch short and 64 inch long normal and 18 feet 8 inch lateral log at scales 1 inch to 100 feet and 20 feet	6
				Single-point resistance at scale 1 inch to 100 feet	7
				Single-point resistance at scale 1 inch to 20 feet	8
				Single-point resistance at scales 1 inch to 100 feet and 20 feet	9
DEPTH	10	35	44	Columns 35 to 44 refer to the depth interval (in feet) over which the resistivity or resistance log was recorded. See further as for columns 17 to 26 of Geophysical Well Log - 1 transfer sheet.	
				Note: Right justification and From and To.	
DATE	7	45	51	Columns 45 to 51 refer to the date on which the resistivity or resistance logging was carried out. See further as for columns 27 to 33 of Geophysical Well Log - 1 transfer sheet.	
OTHER LOGS	18	52	69	Columns 52 to 69 refer to the records on any other logs which have been run in the well, and which are not listed on the Geophysical Well Log - 1, 2, and 3 cards (excluding drillers, casing, hydrology and lithological or stratigraphic logs).	

Geophysical Well Log - 3 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
TYPE	1	52	52	Column 52 refers to the type and scale of any other log which has been run in the well; e.g., acoustic log, conductivity log, etc. Use can be made of columns 70 to 77 to define the type and the scale of the log, and to define the code for column 52.	
DEPTHS	10	53	62	Columns 53 to 62 refer to the depth interval (in feet) over which the additional log was recorded. See further as for columns 17 to 26 of Geophysical Well Log - 1 transfer sheet.	
				Note: Right justification and From and To.	
DATE	7	63	69	Columns 63 to 69 refer to the date on which the additional logging was carried out. See further as for columns 27 to 33 of Geophysical Well Log - 1 transfer sheet.	
COMMENT	8	70	77	Columns 70 to 77 are left for optional comment or further information about the electric logs, or to define the additional logs run in the well.	
FOLIO NUMBERS	3	78	80	Columns 78 to 80 are for the folio numbering of the spontaneous potential, resistivity or resistance, or other log records. The folio number refers to one well, i.e. the sequence of records (corresponding to line on a transfer sheet and to individual data cards to be used for one type of log for one well.	

Geophysical Well Log - 3 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
Spontaneous potential record	1	78	78	Column 78 refers to the folio number of the spontaneous potential record.	
Resistivity	1	79	79	Column 79 refers to the folio number of the resistivity or resistance record.	one resistivity log record 16 and 64 inch (= 1 line) [1]
Other	1	80	80	Column 80 refers to the folio number of any other log record.	

Note: Resistivity measurements of the fluid in the well are, apart from records on the log headings of the electric logs, also shown in the Bore data sheets, and on data card 4T under Field determinations. Availability of resistivity measurements data is recorded on the Master card 4P in column 79.

Note: The highest number for one well in column 78 of transfer sheet 4S will be inserted in column 66 of transfer sheet 4P; the highest number in column 79 of 4S in column 67 of transfer sheet 4P.

Follows from p.47

WATER CHEMISTRY - 1 CARD

The Water Chemistry - 1 card deals with some physical and chemical characteristics of a water sample or fluid in the well.

Information recorded on this card includes the aquifer(s) tapped by the well, the well, the date of sampling and the sampling authority, date of analysis and laboratory which carried out the analysis, field determinations, and laboratory determinations.

Field determinations include data on the bottom-hole and surface temperature of the water, pH, and resistivity or conductivity values, and the temperature during those measurements in or at the well.

Laboratory determinations include the pH value as recorded in the laboratory, the resistivity or conductivity values and the temperature during those measurements in the laboratory, total dissolved solids, total hardness, total alkalinity, amount of free carbon-dioxide, and amount of aggressive carbon dioxide.

BMR-GAB Wireline logging of waterwells WATER CHEMISTRY-1 SHEET GAB-ADP System

CODE	IDENTIFICATION						Aquifer Code	Aquifer Sub Layer	Date Sampled Field			Sampled By	Date Analyzed Laboratory			Analyzed By	Field Determination									Laboratory Determination																	F-Determin.	L-Determin.
	State	Letter	1:250 000 Map Number	Card Cont.	Deepening	Well Number			Day	Mth	Year		Day	Mth	Year		Temp. bottom of hole	°C or °F	Temp. surface	°C or °F	pH	Resistivity Conductiv.	10^n	Unit	Temp. °C Res./Cond.	pH	Resistivity Conductivity	10^n	Unit	Temp. °C Res./Cond.	Total Dissolv. Solids ppm	10^n	Total Hardn. ppm	10^n	Total Alkal. ppm	10^n	Free CO_2 ppm	10^n	Aggr. CO_2 ppm	10^n			
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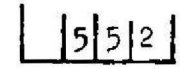
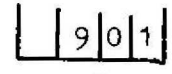
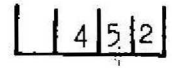
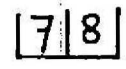
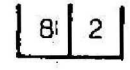
Water Chemistry - 1 transfer sheet

Topic	Total	Column Start	Column End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the code of the data card, see Introduction	Water chemistry - 1 sheet/card |4|T|
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master card 4P. For coding of these columns refer to the Master transfer sheet explanation, section Identification	
				Note: Column 9, see Introduction	
AQUIFER CODE	1	16	16	Column 16 refers to the main aquifer tapped by the well. For coding of this column refer to card 4W Hydrogeology transfer sheet explanation, column 29	
AQUIFER SUBLAYER	2	17	18	Columns 17 to 18 refer to the aquifer sublayers tapped by the well. For coding of these columns refer to card 4W Hydrogeology transfer sheet explanation, columns 30 and 31	
DATE SAMPLED FIELD	7	19	25	Columns 19 to 25 refer to the date on which the sample of water was taken from the well	
Day	2	19	20	Columns 19 to 25 refer to the day, month, and year on which the water sample was taken from the well; for coding see Introduction, Preliminary remarks	sampled on 1 June 1976 |1|6|9|7|6|
Month	2	21	22		
Year	3	23	25		
SAMPLED BY	1	26	26	Column 26 deals with the authority which took the water sample at the well on the date given in columns 19 to 25. For coding refer to card 4P, Master transfer sheet Explanation, column 76	

Topic	Total	Column Start	End	Explanation	Example
DATE ANALYSED LABORATORY	7	27	33	Columns 27 to 33 refer to the date on which the sample of water was analysed in the laboratory	
Day	2	27	28	Columns 27 to 33 refer to the day, month, and year on which the water sample, which was obtained on the date given in columns 19 to 25, was analysed in the laboratory. For coding see Introduction, Preliminary remarks	analysed on 2 June 1976
Month	2	29	30		
Year	3	31	33		2 6 9 7 6
ANALYSED BY	1	34	34	Column 34 deals with the authority which analysed the sample on the date given in columns 27 to 33	
				Bureau of Mineral Resources, Geol. Geophys. 1	
				State Government Chemical Laboratories	
				Queensland Govt. Chem. Lab. 2	
				New South Wales Dept. Mines. Chem. Lab. 3	
				Northern Territory Water Resourc. Branch 4	
				South Australia Dept. Mines 5	analysed by NSW Dept.
				AMDEL 6	Mines Chem. Lab.
				Australian Atomic Energy Commission 7	
				Contractors 8	3
				Others 9	
FIELD DETERMINATION	17	35	51	Columns 35 to 51 refer to the determination of some physical characteristics of the water at the well site	
Temperature at bottom of hole	3	35	37	Columns 35 to 37 refer to the temperature measurement of the water taken at the bottom of the hole at the date given in columns 19 to 25. Ignore decimal parts; right justification	125°F
					1 2 5 1

Water Chemistry - 1 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
Temperature unit	1	38	38	Column 38 deals with the unit in which the temperature in columns 35 to 37 is expressed, coded as degrees Fahrenheit 1 degrees Celsius 2	55° C 
Temperature at surface of hole	3	39	41	Columns 39 to 41 refer to the measurement of the water temperature at the surface outlet of the well at the date given in columns 19 to 25, provided that the well has been flowing or pumped for some time before the measurement. Ignore decimal parts; right justification	
Temperature unit	1	42	42	Column 42 deals with the unit in which the temperature in columns 39 to 41 is expressed, coded as degrees Fahrenheit 1 degrees Celsius 2	90° F  45° C 
pH	2	43	44	Columns 43 and 44 refer to the pH measurement of the water from the well, either at the surface outlet or of a sample at the well site, by the authority mentioned in column 26, on the date given in columns 19 to 25. Column 43 to be used for the integer part of the pH value (the value used to designate the logarithm - base 10 - of the reciprocal of the hydrogen-ion concentration), and column 44 for the decimal part	pH = 7.8  pH = 8.2 

Topic	Total	Column Start	End	Explanation	Example
Resistivity or Conductivity	5	45	49	Columns 45 to 49 refer to the measurement of resistivity or conductivity of the water from the well, carried out at the surface outlet or of a sample at the well site, on the date given in columns 19 to 25. Insert in columns 45 to 47 the value of the resistivity or conductivity measurement result, to a maximum of 3 digits (with right justification), and fill in column 48 the power of 10 to complement the remaining multiplicator of the multiplicant in columns 45 to 47. Column 49 deals with the unit of the recorded resistivity or conductivity value, coded as Resistivity - ohm.m 1 Conductivity - micromhos/cm 2 Conductivity - microsiemens/cm 3 Resistivity - ohm/cm 4	1200 ohm.cm 1 2 0 1 8.4 ohm.m 8 0 1 5200 micromho/cm 5 2 2 2
Temperature of Resistivity or Conductivity sample	2	50	51	Columns 50 and 51 deal with the temperature, expressed in degrees Celsius, of the water sample at the time that the resistivity or conductivity measurements were made, the values of which are recorded in columns 45 to 49	27° C 2 7 25° C 2 5

Water Chemistry - 1 transfer sheet

Topic	Total	Column Start	End		Explanation	Example
LABORATORY DETERMINATION	26	52	76	Columns	52 to 76 refer to the determination of some physical and chemical characteristics of the water sample as carried out in the laboratory	
pH	2	52	53	Columns	52 and 53 refer to the pH measurement of the water sample made in the laboratory, by the authority indicated in column 34, at the date recorded in columns 27 to 33. Column 52 to be used for the integer part of the pH value (the value used to designate the logarithm - base 10 - of the reciprocal of the hydrogen-ion concentration), and column 53 for the decimal part	pH = 7.8 7 8 pH = 8.2 8 2
Resistivity or Conductivity	5	54	58	Columns	54 to 58 refer to the measurement of resistivity or conductivity of the water from the well, carried out in the laboratory by the authority mentioned in column 34, at the date recorded in columns 27 to 33. Insert in columns 54 to 56 the value of the resistivity or conductivity measurement result, to a maximum of 3 digits (with right justification), and fill in column 57 the power of 10 to complement the remaining multiplicator of the multiplicant in columns 54 to 56. Column 58 deals with the unit of the recorded resistivity or conductivity value, coded as Resistivity - ohm.m 1 Conductivity - micromhos/cm 2 Conductivity - microsiemens/cm 3 Resistivity - ohm/cm 4	10.9 ohm.m 1 1 0 1 3200 micromhos/cm 3 2 2 2 850 microsiemens/cm 8 5 1 3

Water Chemistry - 1 transfer sheet

Topic	Total	Column Start	End	Explanation	Example
Temperature of Resistivity or Conductivity sample	2	59	60	Columns 59 to 60 deal with the temperature, expressed in degrees Celsius, of the water sample at the time that the resistivity or conductivity measurements were made, the values of which are recorded in columns 54 to 58	27° C |2|7| 25° C |2|5| 20° C |2|0|
Total dissolved solids	4	61	64	Columns 61 to 64 refer to the amount of total dissolved solids expressed in parts per million (ppm), as determined in the laboratory analysis. The total dissolved solids in a water sample includes all solid material in solution, whether ionised or not, and does not include suspended sediments, colloids,or dissolved gases. Columns 61 to 63 to be used for the value of the TDS measurement in ppm, to a maximum of 3 digits (with right justification), and column 64 for the power of 10 to complete this value	total dissolved solids 1200 ppm | |1|2|2| 350 ppm | |3|5|1|
Total hardness	3	65	67	Columns 65 to 67 refer to total hardness, a measure of the calcium and magnesium concentration in the water sample, expressed as the hypothetical concentration in ppm of equivalent calcium carbonate ($CaCO_3$). Columns 65 and 66 to be used for the value of the total hardness (as $CaCO_3$) in ppm, to a maximum of 2 digits (with right justification), and column 67 for the power of 10 to complete this value.	total hardness 15 ppm |1|5|0| 30 ppm |·|3|1|

Topic	Total	Column Start	End	Explanation	Example
				If the hardness is expressed in English degrees, insert the integer part in columns 65 and 66, and code 9 in column 67. If the hardness in English degrees is greater than 100, insert code 66 in columns 77 and 78, and omit the first digit of the hardness value. If the hardness is expressed in Clark degrees, do as for English degrees	
Total alkalinity	3	68	70	Columns 68 to 70 refer to total alkalinity, a measure of the concentration of all salts which cause alkalinity (almost exclusively bicarbonate and carbonate ions), determined by the amount of a standard concentration of sulphuric acid needed to titrate a water sample to an end point of pH 4.5, and expressed as ppm of calcium carbonate. Columns 68 and 69 to be used for the value of the total alkalinity (as ppm $CaCO_3$) to a maximum of 2 digits (with right justification), and column 70 for the power of 10 to complete this value.	Total alkalinity 350 ppm 3 5 1 1070 1 0 2
Free carbon dioxide	3	71	73	Columns 71 to 73 refer to the amount of free carbon dioxide (CO_2) in the water sample, expressed in ppm, determined in the laboratory. Columns 71 and 72 to be used for the value of the free carbon dioxide (at equilibrium) as CO_2 in ppm to a maximum of 2 digits (with right justification), and column 73 for the power of 10 to complete this value.	5 ppm 5 0

Water Chemistry - 1 transfer sheet

Topic	Column Total	Start	End	Explanation	Example
Aggressive carbon dioxide	3	74	76	Columns 74 to 76 refer to the amount of aggressive carbon dioxide in the water sample, expressed in ppm, determined in the laboratory. Columns 74 and 75 to be used for the value of the aggressive carbon dioxide as CO_2 in ppm, to a maximum of 2 digits (with right justification), and column 73 for the power of 10 to complete this value	4 ppm | | 4 | 0 |
COMMENT	2	77	78	Columns 77 and 78 are left for optional comment or further information about any of the records in columns 16 to 76	
FOLIO NUMBERS	2	79	80	Columns 79 to 80 are for the folio numbering of the field determination and laboratory determination of physical and chemical analysis of water samples. The folio number refers to one well, i.e., the sequence of records (corresponding to lines on a transfer sheet and to individual data cards) to be used for one type of determination for one well	
Field determination	1	79	79	Column 79 refers to the folio number of the field determination record	1 field determination | 1 |
Laboratory	1	80	80	Column 80 refers to the folio number of the laboratory determination record	2 laboratory determination | 2 |

Note: The highest number for one well in column 79 of transfer sheet 4T will be inserted in column 79 of transfer sheet 4P.

The highest number for one well in column 80 of transfer sheet 4T, or the highest number of the same well in column 80 of transfer sheet 4U, whichever is larger, is inserted in column 68 of transfer sheet 4P.

WATER CHEMISTRY - 2 CARD

The Water Chemistry - 2 card deals with the detailed laboratory results of the chemical analysis of the water sampled from a well.

Information recorded on this card includes the laboratory determinations of anions and cations present in the water sample, at the date recorded on the Water Chemistry - 1 card : date analysed laboratory. The results of the chemical analysis of the water can be recorded in different units.

In addition, the aquifer and aquifer sublayers tapped by the well are recorded, and also, if present on the analysis result, the total amount of ions as determined in the laboratory, and remarks about the suitability of the water from the well for specific purposes, and the year of analysis.

BMR-GAB Wireline logging of waterwells **WATER CHEMISTRY-2 SHEET** GAB-ADP System

CODE	IDENTIFICATION: State	IDENTIFICATION: Letter	IDENTIFICATION: 1:250 000 Map Number	IDENTIFICATION: Card Cont.	IDENTIFICATION: Deepening	IDENTIFICATION: Well Number	AQUIFER CODE	AQUIFER SUBLAYER	LABORATORY DETERMINATION – CATIONS: Na	10^{-n}	K	10^{-n}	Ca	10^{-n}	Mg	10^{-n}	Fe	10^{-n}	Mn	10^{-n}	Si	10^{-n}	ANIONS: HCO_3	10^{-n}	CO_3	10^{-n}	Cl	10^{-n}	F	10^{-n}	NO_3	10^{-n}	SO_4	10^{-n}	UNIT	TOTAL IONS LABOR. DETERM.	REM. SUIT.: USE	REM. SUIT.: QUAL. RESTR.	YEAR ANALYSIS	L. DETERM.
1 2	3	4	5 6 7 8	9	10	11 12 13 14 15	16	17 18	19 20 21 22	23	24 25	26	27 28 29	30	31 32 33	34	35 36	37	38 39	40	41 42	43	44 45 46 47	48	49 50 51	52	53 54 55 56	57	58 59	60	61 62	63	64 65 66	67	68	69 70 71 72 73	74	75 76	77 78 79	80
4U							A	5	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
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Water Chemistry - 2 transfer sheet

Topic	Total	Column Start	Column End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the Code of the data card, see Introduction	Water Chemistry - 2 card/ sheet 4 U
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master card 4P. For coding of these columns refer to the Master transfer sheet explanation, section Identification	
				Note: Column 9, see Introduction	
AQUIFER CODE	1	16	16	Column 16 refers the main aquifer tapped by the well. For coding of this column refer to card 4 W Hydrogeology transfer sheet explanation, column 29	
AQUIFER SUBLAYER	2	17	18	Columns 17 and 18 refer to the aquifer sublayers tapped by the well. For coding of these columns refer to card 4 W Hydrogeology transfer sheet explanation, columns 30 and 31	
LABORATORY DETERMINATION	49	19	67	Columns 19 to 67 refer to the results of the laboratory determination of the detailed chemical analysis of the water sample from the well. This analysis was carried out by the authority/laboratory mentioned on Water Chemistry - 1 card, column 34, on the date shown in column 27 to 33 of that card. The unit in which the results are recorded, is shown in column 68, and the total amount of ions (if determined by the laboratory), in columns 69 to 73	

Topic	Column Total	Start	End	Explanation	Example
CATIONS	25	19	43	Columns 19 to 43 refer to the results of the chemical analysis of the water sample as far as the cations is concerned. Values are recorded in the units in which they were reported by the analysing laboratory. Column 68 provides the code for the unit used (all records on one data card or one line of a transfer sheet should be expressed in the same unit). Each cation record contains two, three, or four columns, and one column to record the negative power of 10 to complete the value of the analysis result. In the first two, three, or four columns of each cation record, put the first two, three, or four digits (with right justification) of the amount of the analysis result in the appropriate unit of the ion determined. In the last column (third, fourth or fifth column) of the cation record, put the negative power of 10 necessary to complete the value of the analysis result	
Sodium	5	19	23	Columns 19 to 23 refer to the amount of sodium, Na^+ determined	Na : 1250 ppm 1 2 5 0 0
Potassium	3	24	26	Columns 24 to 26 refer to the amount of potassium, K^+ determined	: : 0.64 epm 6 4 2

Topic	Column Total	Start	End	Explanation	Example
Calcium	4	27	30	Columns 27 to 30 refer to the amount of calcium, Ca^{2+}, determined	Ca : 38 mg/l | | 3 | 8 | 0 |
Magnesium	4	31	34	Columns 31 to 34 refer to the amount of magnesium, Mg^{2+}, determined	Mg : 0.24 meq/l | | 2 | 4 | 2 |
Iron	3	35	37	Columns 35 to 37 refer to the amount of iron, Fe^{2+}, determined	Fe : 0.5 ppm | | 5 | 1 |
Manganese	3	38	40	Columns 38 to 40 refer to the amount of manganese, Mn^{2+}, determined	Mn : 0.03 ppm | | 3 | 2 |
Silica	3	41	43	Columns 41 to 43 refer to the amount of silica, generally as silicon dioxide, SiO_2, determined	SiO_2 : 40 ppm | 4 | 0 | 0 |
ANIONS	24	44	67	Columns 44 to 67 refer to the results of the chemical analysis of the water sample as far as the anions is concerned.	

Values are recorded in the units in which they were reported by the analysing laboratory.
Column 68 provides the code for the unit (all records on one data card or one line of a transfer sheet should be expressed in the same unit).

Each anion record contains two, three, or four columns, and one more column to record the negative power of 10 to complete the value of the analysis result.

In the first two, three, or four columns of each anion record, put the first two, three, or four digits (with right justification) of the amount of the analysis result in the appropriate unit of the ion determined. In the last column (third, fourth, or fifth column) of the anion record, put the negative

Topic	Total	Column Start	Column End	Explanation	Example
				power of 10 necessary to complete the value of the analysis result	
Bicarbonate	5	44	48	Columns 44 to 48 refer to the amount of bicarbonate, HCO_3^-, determined	HCO_3 : 750 ppm | |7|5|0|0|
Carbonate	4	49	52	Columns 49 to 52 refer to the amount of carbonate, CO_3^{2-}, determined	CO_3 : 25 ppm | |2|5|0|
Chloride	5	53	57	Columns 53 to 57 refer to the amount of chloride, Cl^-, determined	Cl : 1450 ppm |1|4|5|0|0|
Fluoride	3	58	60	Columns 58 to 60 refer to the amount of fluoride, F^-, determined	F : 0.085 epm |8|5|3|
Nitrate	3	61	63	Columns 61 to 63 refer to the amount of nitrate, NO_3^-, determined	NO_3 : 0.005 epm | |5|3|
Sulphate	4	64	67	Columns 64 to 67 refer to the amount of sulphate, SO_4^{2-}, determined	SO_4 : 22 ppm. | |2|2|0|
UNIT	1	68	68	Column 68 refers to the unit in which the analysis results in columns 19 to 67 are expressed, coded as	
				parts per million - ppm 1	
				equivalents per million - epm 2	ppm |1|
				milligrams per litre - mg/l 3	
				milligram equivalents per litre - meq/l 4	
				grains per gallon - gr/gall 5	epm |2|
				ounces per gallon 6	
				parts per hundred thousand 7	

Topic	Column Total	Start	End	Explanation	Example
TOTAL IONS	5	69	73	Columns 69 to 73 refer to the total amount of ions as determined by the detailed chemical analysis, and reported by the laboratory. This amount is expressed in the same unit (see column 68) as the cations and anions in columns 19 to 67, and represents the sum of all ions and excludes anything in solution in non-ionised form	1410 ppm 1 4 1 0
REMARKS SUITABILITY	3	74	76	Columns 74 to 76 refer to the remarks about the suitability of the water for specific purposes, as reported by the analysing authority or laboratory with the result of the chemical analysis	
USE	1	74	74	Column 74 refers to the suitable use as reported by the analysing laboratory, coded as Water suitable for: drinking 1 domestic 2 stock 3 irrigation 4 Inclusion of a higher figure means elimination of the suitability of the water for the purpose shown by a lower figure	water not suitable for drinking, but suitable for domestic, stock, etc. 2
QUALITY RESTRICTIONS	2	75	76	Columns 75 and 76 refer to the quality reasons which restrict the usage of the water for the purpose outlined under Use, column 74. Only the most common quality restrictions are given, and coded as salinity 1 alkalinity 2 fluoride 3 chloride 4 sulphate 5	too saline and too high in fluoride 7

Topic	Total	Column Start	Column End	Explanation	Example
				salinity + alkalinity 6 salinity + fluoride 7 salinity + chloride 8 salinity + sulphate 9 alkalinity + fluoride 10 alkalinity + chloride 11 alkalinity + sulphate 12 fluoride + chloride 13 fluoride + sulphate 14 chloride + sulphate 15 salinity + alkalinity + fluoride 16	too high in alkalinity and too high in fluoride for use as drinking or domestic water 3 1 0
YEAR OF ANALYSIS	3	77	79	Columns 77 to 79 refer to the year in which the chemical analysis was carried out. Insert the last 3 digits of the year	1976 9 7 6
LABORATORY DETERMINATION	1	80	80	Column 80 refers to the folio number of the laboratory determination record. The highest number for one well in column 80 of transfer sheet 4U, is inserted in column 68 of transfer sheet 4P	1 laboratory determination 1

LITHOSTRATIGRAPHY CARD

The lithostratigraphy card deals with the information about the lithostratigraphy of the well-versus-depth.

The lithostratigraphy is expressed as far as possible in formations, for which names are abbreviated to two, three, or (maximal) four-digit alphabetic symbols, similar to the ones used on BMR geological maps.

The alphabetic symbols, representing formation names, are recorded versus the depth at which this specific formation or lithostratigraphic unit is first encountered in the well, i.e. the top of the formation is stated (in feet).

BMR-GAB Wireline logging of waterwells

LITHOSTRATIGRAPHY SHEET

GAB- ADPSystem

	IDENTIFICATION						LITHOSTRATIGRAPHY RECORDS															
							1		2		3		4		5		6		7			
CODE	State	Letter	1:250 000 Map Number	Card Cont	Deepening	Well Number	Depth	Lithost	Depth	Lithost	Depth	Lithost	Depth	Lithost	Depth	Lithost	Depth	Lithost	Depth	Lithost		FOLIO NUMBER
1 2	3	4	5 6 7 8	9	10	11 12 13 14 15	16 17 18 19 20	21 22 23 24	25 26 27 28 29	30 31 32 33	34 35 36 37 38	39 40 41 42	43 44 45 46 47	48 49 50 51	52 53 54 55 56	57 58 59 60	61 62 63 64 65	66 67 68 69	70 71 72 73 74	75 76 77 78	79	80
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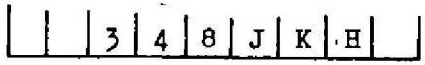
Lithostratigraphy Transfer Sheet

Topic	Total	Column Start	End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the Code of the card; see Introduction	Lithostratigraphy card 4 V
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master card 4P. For coding of these columns, refer to the Master transfer sheet explanation.	
				Note: Column 9, see Introduction	
LITHOSTRATIGRAPHY/ DEPTH RECORDS	63	16	78	Seven lithostratigraphy/depth records are allocated to each line of the lithostratigraphy transfer sheet (which corresponds to one data card)	
DEPTH	5	16	20	Columns 16 to 20 refer to the depth of the top of the formation in feet (ignore decimal parts). The depth in feet is to be recorded of the formation top measured from the ground elevation as datum. In case measurements of formation tops are made from the kelly bushing or other part of the drilling rig, the depths have to be recalculated from ground level	368.5' 3 6 8 12375' 1 2 3 7 5

Lithostratigraphy Transfer Sheet

Topic	Total	Column Start	Column End	Explanation	Example
Lithostratigraphy	4	21	24	Columns 21 to 24 refer to the lithostratigraphy of the bore-hole or well. The lithostratigraphy is expressed in formations, the names of which are abbreviated to two, three, or (maximal) four-digit alphabetic symbols, similar to the ones used on BMR geological maps; the symbols are listed in the appendix 4Va (Stratigraphic) and 4Vb (alphabetic). Fill the first letter in column 21, i.e., left justification. A total of seven records can be filled in columns 16 to 24, 25 to 33, 34 to 42, 43 to 51, 52 to 60, 61 to 69, and 70 to 78	Top of Hooray Sandstone at 348 ft 
COMMENT	1	79	79	Column 79 is left for optional comment or further information	
FOLIO NUMBER	1	80	80	Column 80 refers to the folio number of the lithostratigraphy card. This folio number refers to one well, i.e., the set of cards (or lines on a transfer sheet) used for one well. The highest number for one well in column 80 of transfer sheet 4V will be inserted in column 69 of the Master transfer sheet 4P	18th formation, on 3rd line (= card No. 3) 

4Va. Appendix - Lithostratigraphic Symbols for Rock Units

Stratigraphic List

Quaternary, undivided	Q	Coreena Member	KLC
Tertiary, undivided	TE	Ranmoor Member	KLQ
Cainozoic, undivided	CZ	Jones Valley Member	KLJ
		Doncaster Member	KLD
Mesozoic, undivided	M	Griman Creek Formation	KLGG
		Surat Siltstone	KLS
		Rumbalara Shale	KLR
Cretaceous, undivided	K	Oodnadatta Formation	KLØD
Upper Cretaceous, undivided	KU	Mt Alexander Sandstone Member	KLAS
Lower Cretaceous, undivided	KL	Wooldridge Limestone Member	KLWL
Pre-Cretaceous, undivided	XK	Coorikiana Member	KLCØ
Rolling Downs Group	KR	Bulldog Shale	KLB
Manuka Subgroup	KM	Bungil Formation	KLY
Wilgunya Subgroup	KLW	Minmi Member	KLI
Winton Formation	KW	Nullawurt Sandstone Member	KLN
Mackunda Formation	KLM	Kingull Sandstone Member	KLK
Allaru Mudstone	KLA	Claravale Sandstone Member	KLX
Toolebuc Formation	KLØ	Mooga Sandstone (Surat Basin only)	KLMØ
Normanton Formation	KLR	Gilbert River Formation	KLG
Wallumbilla Formation	KLU	Wyandra Sandstone Member	KWS
Neales River Group	KNR		

Cadna-owie Formation	KCØ
Mt Anna Sandstone Member	KLMA
Gum Vale beds	KLV
Crooble beds	KLCR
Jurassic to Cretaceous, undivided	JK
Hooray Sandstone	JKH
Upper Hooray Sandstone	JKHU
Lower Hooray Sandstone	JKHL
Pre-Jurassic	XJ
Kumbarilla beds	JKK
Ronlow beds	JKR
Longsight Sandstone	JKL
De Souza Sandstone	JKD
Southlands Formation	JKS
Jurassic, undivided	J
Upper Jurassic, undivided	JU
Middle Jurassic, undivided	JM
Lower Jurassic, undivided	JL
Westbourne Formation	JUW
Adori Sandstone	JA
Eulo Queen Group	JUE
Birkhead Formation	JMB
Injune Creek Group	JI
Hutton Sandstone	JLH
Evergreen Formation	JLE
Boxvale Sandstone Member	JLB
Oolite Member	JLØ
Westgrove Ironstone Member	JLW
Precipice Sandstone	JLP
Orallo Formation	JUØ
Gubberamunda Sandstone	JUG
Springbok Sandstone	JS
Walloon Coal Measures	JMW
Eurombah Formation	JME
Marburg Sandstone	JLM
Helidon Sandstone	JLL
Blantyre beds	JUB
Loth Formation	JUL
Hampstead Sandstone	JH
Algebuckina Sandstone	JUA
Pilliga Sandstone	JP
Purlawaugh beds	JPU
Warialda Sandstone	JPW

Garrawilla Volcanics	JG	Peawaddy Formation	PUP
Gragin Conglomerate Member	JGC	Colinlea Sandstone	PLØ
		Ingelara Formation	PLI
Triassic, undivided	T	Cattle Creek Formation	PLK
Pre-Triassic	XT	Aldebaran Sandstone	PLL
Moolayember Formation	TM	Back Creek Group	PB
Clematis Sandstone	TRE	Reids Dome beds	PLJ
Dunda beds	TLD	Betts Creek beds	PUB
Rewan Formation	TLR	Boonderoo beds	PLB
Brumby Sandstone Member	TB	Crown Point Formation	PC
Warang Sandstone	TLW	Gidgealpa Group	PG
Showgrounds Sandstone	TS	Toolachee Formation	PUT
Wandoan Formation	TW	Fly Lake Member	PUF
Narrabeen Group	TN	Roseneath Shale	PLR
Nappamerrie Formation	TP	Daralingie Member	PLD
Napperby beds	TNA	Epsilon Formation	PLE
Digby beds	TD	Murteree Shale	PLM
Palaeozoic, undivided	PZ	Tirrawarra Sandstone	PLT
Permian, undivided	P	Merrimelia Formation	PM
Upper Permian	PU	Barra beds	PUBB
Lower to Upper Permian	PLU	Werrie Formation	PLW
Lower Permian	PL		
Pre-Permian	XP	Carboniferous to Permian, undivided	CP
Blackwater Group	PUW		
'Bandanna' Formation	PUA	Joe Joe Formation	CPJ
Black Alley Shale	PUC		

Carboniferous, undivided	C
Drummond Group	CD
Devonian, undivided	D
Adavale Group	DA
Silurian, undivided	S
Ordovician, undivided	Ø
Cambrian to Ordovician, undivided	EØ
Cambrian, undivided	E
Precambrian to Palaeozoic, undivided	XEPz
Precambrian	XE
'Basement'	BAS

4Vb. Alphabetic List

Adavale Group	DA	Cadna-owie Formation	KCØ
Adori Sandstone	JA	Cainozoic, undivided	CZ
Aldebaran Sandstone	PLL	Cambrian, undivided	E
Algebuckina Sandstone	JUA	Cambrian to Ordovician, undiv.	EØ
Allaru Mudstone	KLA	Carboniferous, undivided	C
		Carboniferous to Permian, undivided	CP
Back Creek Group	PB	Cattle Creek Formation	PLK
'Bandanna' Formation	PUA	Claravale Sandstone Member	KLX
Barra beds	PUBB	Clematis Sandstone	TRE
'Basement'	BAS	Colinlea Sandstone	PLØ
Betts Creek beds	PUB	Coorikiana Member	KLCØ
Birkhead Formation	JMB	Coreena Member	KLC
Black Alley Shale	PUC	Cretaceous, undivided	K
Blackwater Group	PUW	Crooble beds	KLCR
Blantyre beds	JUB	Crown Point Formation	PC
Boonderoo beds	PLB		
Boxvale Sandstone Member	JLB	Daralingie Member	PLD
Brumby Sandstone Member	TB	De Souza Sandstone	JKD
Bulldog Shale	KLB	Devonian, undivided	D
Bungil Formation	KLY	Digby beds	TD
		Doncaster Member	KLD
		Drummond Group	CD
		Dunda Beds	TLD

Eulo Queen Group	JUE
Epsilon Formation	PLE
Eurombah Formation	JME
Evergreen Formation	JLE
Fly Lake Member	PUF
Garrawilla Volcanics	JG
Gidgealpa Group	PG
Gilbert River Formation	KLG
Gragin Conglomerate Member	JGC
Griman Creek Formation	KLGG
Gubberamunda Sandstone	JUG
Gum Vale beds	KLV
Hampstead Sandstone	JH
Helidon Sandstone	JLL
Hooray Sandstone	JKH
Hutton Sandstone	JLH
Ingelara Formation	PLI
Injune Creek Group	JI
Joe Joe Formation	CPJ
Jones Valley Member	KLJ
Jurassic to Cretaceous, undivided	JK
Jurassic, undivided	J
Kingull Sandstone Member	KLK
Kumbarilla beds	JKK
Longsight Sandstone	JKL
Loth Formation	JUL
Lower Cretaceous, undivided	KL
Lower Hooray Sandstone	JKHL
Lower Jurassic, undivided	JL
Lower Permian, undivided	PL
Lower to Upper Permian, undivided	PLU
Mackunda Formation	KLM
Manuka Subgroup	KM
Marburg Sandstone	JLM
Merrimelia Formation	PM
Mesozoic, undivided	M
Middle Jurassic, undivided	JM
Minmi Member	
Mooga Sandstone (Surat Basin only)	KLMØ

Moolayember Formation	TM	Quaternary, undivided	Q
Mt Alexander Sandstone Member	KLAS		
Mt Anna Sandstone Member	KLMA	Ranmoor Member	KLQ
Murteree Shale	PLM	Reids Dome beds	PLJ
		Rewan Formation	TLR
		Rolling Downs Group	KR
Nappamerrie Formation	TP		
Napperby beds	TNA		
Narrabeen Group	TN	Ronlow beds	JKR
Nullawurt Sandstone Member	KLN	Roseneath Shale	PLR
Neales River Group	KNR	Rumbalara Shale	KLR
Normanton Formation	KLR		
Oodnadatta Formation	KLØD		
Oolite Member	JLØ	Showgrounds Sandstone	TS
Orallo Formation	JUØ	Silurian, undivided	S
Ordovician, undivided	Ø	Southlands Formation	JKS
		Springbok Sandstone	JS
Palaeozoic, undivided	PZ	Surat Siltstone	KLS
Peawaddy Formation	PUP		
Permian, undivided	P	Tertiary, undivided	TE
Pilliga Sandstone	JP	Tirrawarra Sandstone	PLT
Precambrian, undivided	XE	Toolachee Formation	PUT
		Toolebuc Formation	KLØ
Precambrian to Palaeozoic, undivided	XEPZ	Triassic, undivided	T
Pre-Cretaceous, undivided	XK		
Pre-Jurassic, undivided	XJ		
Pre-Permian, undivided	XP		
Pre-Triassic, undivided	XT		
Precipice Sandstone	JLP		
Purlawaugh beds	JPU		

Upper Cretaceous, undivided	KU
Upper Hooray Sandstone	JKHU
Upper Jurassic, undivided	JU
Upper Permian, undivided	PU
Walloon Coal Measures	JMW
Wallumbilla Formation	KLU
Wandoan Formation	TW
Warang Sandstone	TLW
Warialda Sandstone	JPW
Werrie Formation	PLW
Westbourne Formation	JUW
Westgrove Ironstone Member	JLW
Wilgunya Subgroup	KLW
Winton Formation	KW
Wooldridge Limestone Member	KLWL
Wyandra Sandstone Member	KWS

HYDROGEOLOGY CARD

The Hydrogeology card deals with results of the hydrogeological analysis of the logs obtained from a well.

Information recorded on this card includes the determination of the type of hydrogeologic unit, the code of the aquifer or confining bed as used in the Great Artesian Basin hydrogeological study and the depths of the top and bottom of these layers.

BMR-GAB Wireline logging of waterwells HYDROGEOLOGY SHEET GAB-ADP System

CODE	IDENTIFICATION						1						2 RECORDS						3						4						FOLIO NUMBER
	State	Letter	1:250000 Map Number	Card Cont.	Deepening	Well Number	DEPTHS From	DEPTHS To	Aquif./Aqcl.	Aquif./Conf. code	Aquif. code	Sublayer	DEPTHS From	DEPTHS To	Aquif./Aqcl.	Aquif./Aqcl. code	Aquif. code	Sublayer	DEPTHS From	DEPTHS To	Aquif./Aqcl.	Aquif./Aqcl. code	Aquif. code	Sublayer	DEPTHS From	DEPTHS To	Aquif./Aqcl.	Aquif./Aqcl. code	Aquif. code	Sublayer	
1 2	3	4	5 6 7 8	9	10	11 12 13 14 15	16 17 18 19 20	21 22 23 24 25	26	27 28	29	30 31	32 33 34 35 36	37 38 39 40 41	42	43 44	45	46 47	48 49 50 51 52	53 54 55 56 57	58	59 60	61	62 63	64 65 66 67 68	69 70 71 72 73	74	75 76	77	78 79	80
4W																															
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Hydrogeology Transfer Sheet

Topic	Total	Column Start	Column End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the Code of the data card, see Introduction.	Hydrogeology card/sheet | 4 | W |
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master card 4P. For coding of these columns refer to the Master transfer sheet explanation, section Identification. Note: Column 9, see Introduction.	
HYDROGEOLOGIC UNIT/ DEPTH RECORDS	64	16	79	Four Hydrogeologic Units/Depth Records are allocated to each line of the Hydrogeology transfer sheet (which correspond to one data card).	
DEPTH	10	16	25	Columns 16 to 25 refer to the depth interval (from - to) of the hydrogeological unit in feet (ignore smaller parts). The depth is to be recorded as a depth in feet of the top of the hydrogeological unit measured from the ground elevation as datum in columns 16 to 20 (also columns 32-36, 48-52, 64-68), the - From - record. The depth is to be recorded as a depth in feet of the bottom of the hydrogeological unit measured from the ground elevation as datum in columns 21 to 25 (also columns 37-41, 53-57, 69-73), the - To - record. These depths are to be recorded as positive figures and are right justified. Any depth measurements made from different datums have to be recalculated to ground-level datum.	top of unit 1235 ft. From | | 1 | 2 | 3 | 6 | bottom of unit 1405 ft. | | 1 | 4 | 0 | 5 |

Topic	Total	Column Start	End	Explanation	Example
Aquifer/ Aquiclude	1	26	26	Column 26 (also 42, 58, 74) refers to the type of hydrogeological units as interpreted from the logs and recorded by the depth interval From - To record. Aquifers or the water-bearing portions, which transmit and store water are coded : A. Parts of the sequence which are not aquifers and generally interpreted as confining beds are coded : C. If detailed knowledge about the non-aquifer part is available, then the following codes may be used: Aquiclude (may contain water, no transmission of water, impervious) - L Aquitard (contains water, transmission at very slow rate, semi-pervious) - T Aquifuge (does not contain, nor transmit water, impervious) - G	aquifer [A] confining bed [C] aquiclude [L] aquitard [T] aquifuge [G]
Aquifer/Confining Bed	2	27	28	Columns 27 and 28 (and 43-44, 59-60, 75-76) refer to the Aquifer or Confining Bed code as used in the BMR Great Artesian Basin hydrogeological and model study (1971-1980). In this study, a simplified aquifer model was proposed, which consists of a confined aquifer (Cretaceous aquifer, corresponding to the aquifers in the Winton and Mackunda Formations) with the code CA1 (from confined aquifer -1); this model aquifer is here coded as : A1. The overlying model confining bed CB1 is here coded as : B1.	

Topic	Total	Column Start	Column End	Explanation	Example
				The lower confined aquifer (Jurassic aquifer, corresponding to the aquifers in the Lower Cretaceous-Jurassic part of the sedimentary sequence, including in some parts Triassic aquifers) with the code CA2 is here coded as : A2 The confining bed in the simplified aquifer model between CA1 and CA2 with the code CB2 is here coded as : B2.	Jurassic aquifer A 2 Lower Cretaceous confining bed B 2
Aquifer code	1	29	29	Column 29 refers to the detailed aquifer code used in the Great Artesian Basin hydrogeological study to identify aquifers or groups of aquifers within a lithostratigraphic unit (Formation). Note that the Aquifer code or aquifer number as described in Ungemach & Habermehl (1973) for the data cards 4D to 4M was not used in the coding of the GAB geological and hydrological data and does not occur in the GAB data bank. Instead the following codes were used for aquifers present in the stratigraphic sequence, and these codes are also to be used for data card 4W column 29 (and columns 45, 61 and 77): Aquifer layer located in - code Cretaceous - A Hooray Sandstone (or equivalents) - B Adori Sandstone (or equivalents) - D Hutton Sandstone (or equivalents) - F	

Topic	Total	Start	End	Explanation	Example

code

Clematis Sandstone (or equivalents) - H

Permian and older units - J

Cambrian - L

Pilliga Sandstone - P

Subdivisions:

A - (Z (Y

B - (X (W

D - D

F - (T (S

H - H

J - J

L - L

A_L = B

Combinations:

doubtful combinations of a higher aquifer and a known aquifer being tapped by water well:

aquifer in Hooray Sandstone and possible aquifer above Hooray Sandstone - code 1

$B^?_+$ - 1

$D^?_+$ - 2

$F^?_+$ - 3

$H^?_+$ - 4

$J^?_+$ - 5

$L^?_+$ - 6

$P^?_+$ - 7

Topic	Total	Column Start	Column End	Explanation	Example
				Combinations:	

A	B	D	F	H	J	code
X	X					=
	X	X				>
		X	X			$
			X	X		<
				X	X	C
X	X	X				/
	X	X	X			)
		X	X	X		-
			X	X	X	+
X	X	X	X			*
	X	X	X	X		%
	X	X	X	X	X	↑

some additional combinations:

B + L code :

A + F " ^

B + P " # - ?

P + F " & - ;

Sublayer	2	30	31	Columns 30 and 31 (and also columns 46, 47; 62, 63 and 78, 79) refer to the sublayer division of the aquifer coded in column 29 and recorded in depth interval in columns 16 to 20 and 21 to 25 (similar for Hydrogeology Records 2, 3 and 4). The total number of sublayers within an aquifer group is recorded.	

Topic	Total	Column Start	Column End	Explanation	Example
				Sublayers or individual aquifers within the main aquifer group (coded in column 29) encountered in the well are numbered sequentially, starting from the top of the well. This numbering is a sequential number system in each well of all individual aquifers from the top to bottom, and is independent of the coding of aquifer groups in columns 27, 28, and 29. For specific purposes depths (columns 16 to 25) and the sequential number of sublayers (columns 30, 31) can be recorded for individual aquifers and columns 27 to 29 left open.	
FOLIO NUMBER	1	80	80	Column 80 refers to the folio number of the Hydrogeology card. This folio number refers to one well, i.e. the set of cards (or lines on a transfer sheet) used for one well. The highest number for one well in column 80 of transfer sheet 4W will be inserted in column 70 of the Master transfer sheet 4P.	7 Hydrogeology Record, i.e. 2 lines 2

WELL CASING AND SCREEN CARD

The well-casing and screen card deals with the downhole equipment of the well, and gives details of the casing, cementation, screens (including perforated or slotted casing), and open hole.

This provides reliable data on the aquifers tapped by the well.

BMR-GAB Wireline logging of waterwells WELL CASING AND SCREEN SHEET GAB-ADP System

CODE	IDENTIFICATION						CASING RECORDS																						YEAR COMPLETED		FOLIO NUMBER
							1											2													
	State	Letter	1:250 000 Map Number	Card Cont	Deepening	Well Number	Equip diam	Nature	Material	Depth from	Depth to	Drilling diam.	Method	Cemented from	Cemented to	Corroded		Equip diam	Nature	Material	Depth from	Depth to	Drilling diam	Method	Cemented from	Cemented to	Corroded				
4,X																															
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Well Casing and Screen transfer sheet

Topic	Total	Column Start	Column End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the Code of the card, see Introduction	Well casing and screen card |4|X|
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master Card 4P. For coding of these columns, refer to the Master transfer sheet explanation, section Identification. Note: Column 9, see Introduction. Column 10 refers to the deepening of the well; first deepening, fill in 1, second deepening: 2, 3rd, 4th and 5th: 3, 4 and 5. First reconditioning of the well, fill in 6, 2nd reconditioning: 7 etc.	
RECORDS	30	16	45	Two record sequences are allocated to each line of the Well casing and screen transfer sheet (which corresponds to one data card); record 1 from columns 16 to 45, record 2 from columns 46-75	
Equipment diameter	4	16	19	Columns 16 to 19 refer to the <u>diameter</u> of the equipment (casing, screen, open hole) in <u>inches</u> Columns 16 to 17 to be used for the integer part, columns 18 and 19 for the fractional part	9'5/8 ||9|5|8|

Well Casing and Screen transfer sheet

Topic	Total	Column Start	Column End	Explanation	Example
Nature	1	20	20	Column 20 refers to the nature of the equipment, to be coded as indicated below: unknown 0 open hole 1 cased 2 perforated casing 3 screened 4 5 6 7 8 9	cased well [2]
Material	1	21	21	Column 21 refers to the type of material of the downhole equipment: unknown 0 metal 1 plastic 2 timber 3 4 5 6 7 8 other 9	metal [1]
Depth	8	22	29	Columns 22 to 29 refer to the depth interval in <u>feet</u> (ignore decimal parts) for which equipment is present in the bore-hole. Datum is ground elevation.	from 450.3 [4][5][0] to 931.5 [9][3][1]

Well Casing and Screen transfer sheet

Topic	Total	Column Start	Column End	Explanation	Example
Drilling diameter	4	30	33	Columns 30 to 33 refer to the diameter of the drilled hole in inches. Columns 30 and 31 to be used for the integer part, columns 32 and 33 for the fractional part	12' 7/8 | 1 | 2 | 7 | 8 |
Method	1	34	34	Column 34 refers to the method of drilling, to be coded as indicated below: unknown 0 cable tool 1 rotary 2 jetted 3 down hole hammer 4 dug well 5 6 7 8 9	
Cemented	8	35	42	Columns 35 to 42 refer to the depth interval from top to bottom in feet (ignore decimal parts) for which the bore-hole has been cemented. Last numbers to be filled in columns 38 and 42, i.e. right justification Datum is ground elevation.	from 250.8 | | 2 | 5 | 0 | to 0.0 | | | | 0 |
Corroded	1	43	43	Column 43 refers to the condition of the well-casing. A corroded section of the casing is coded as 1, a non-corroded section as 2. If unknown, fill column 43 with 0. Information about corrosion will mostly come from geophysical logging, i.e. the casing collar locator log	corrosion | 1 |

Topic	Total	Column Start	Column End	Explanation	Example
Miscellaneous	2	44	45	Columns 44 and 45 are left open for optional further information eventually required for the Well casing and screen card	
The record sequence is to be repeated in the columns 46 to 75 of the Well casing and screen transfer sheet/card					
YEAR COMPLETED	3	76	78	Columns 76 and 78 refer to the date of completion of the well; the last three numbers of the year to be filled in	1927 |9|2|7|
COMMENT	1	79	79	Column 79 is left for optional comment or further information	
FOLIO NUMBER	1	80	80	Column 80 is for the folio numbering of the Well casing and screen card. This folio number refers to one well, i.e. the sequence of cards (which corresponds to lines on a transfer sheet) to be used for one well. The highest number for one well in column 80 of transfer sheet 4 X will be inserted in column 58 of the Master transfer sheet 4 P	9th record is on 5th line (= 5th card) |5|

HYDROLOGY CARD

The Hydrology card deals with the hydrological data observed during the drilling of the well and recorded by the driller. Data include the date, the depth of the aquifer tested, the depth or pressure of the water encountered, and the flow rate of the well if artesian.

Other information recorded is derived from the flowmeter log, and concerns the date of logging, the water-level elevation or pressure-head and the flow-rate or pumping rate as measured at the well site, the flow-rate as determined from the flowmeter log, and the depth at which the latter data were acquired.

In addition the depth of the pump (if installed) and the type of pump are recorded.

BMR-GAB Wireline logging of waterwells

HYDROLOGY SHEET

GAB-ADP System

CODE	IDENTIFICATION						HYDROLOGY RECORDS: DRILLERS RECORD-1				HYDROLOGY RECORDS: FLOWMETER LOG					HYDROLOGY RECORDS: DRILLERS RECORD-2				PUMP AT DEPTH	TYPE PUMP	D- Record	F- Record
	State	Letter	1:250 000 Map Number	Cartd Cont.	Deepening	Well Number	DATE	DEPTH TESTED	PRESSURE OR DEPTH	FLOW RATE	DATE	PRESSURE OR DEPTH	FLOW OR PUMP RATE	FLOW BY FLOW METER	DEPTH TESTED	DATE	DEPTH TESTED	PRESSURE OR DEPTH	FLOW RATE				
1 | 2	3	4	5 | 6 | 7 | 8	9	10	11 | 12 | 13 | 14 | 15	16 | 17 | 18	19 | 20 | 21 | 22 | 23	24 | 25 | 26 | 27 | 28 | 29	30 | 31 | 32 | 33	34 | 35 | 36	37 | 38 | 39 | 40 | 41	42 | 43 | 44 | 45	46 | 47 | 48 | 49	50 | 51 | 52 | 53 | 54	55 | 56 | 57	58 | 59 | 60 | 61 | 62	63 | 64 | 65 | 66 | 67 | 68	69 | 70 | 71 | 72	73 | 74 | 75 | 76 | 77	78	79	80
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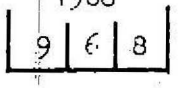
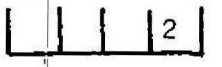
Hydrology Transfer Sheet

Topic	Total	Column Start	Column End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the Code of the data card, see Introduction	Hydrology card/sheet 4 Y
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master card 4P. For coding of these columns refer to the Master transfer sheet explanation, section Identification. Note: Column 9, see Introduction	
HYDROLOGY RECORDS	67	16	72	Hydrology Records contain data obtained from the drillers' logs and the flowmeter log. Two Records are allocated on each line (corresponding to one data card) for data obtained from drillers' logs, and one Record of flowmeter log data.	
DRILLERS RECORD	18	16	33	Data obtained from the drillers log can also be recorded in columns 55 to 72.	
Date	3	16	18	Columns 16 to 18 refer to the date, i.e. year of the measurement (usually the year of drilling) of data present on the drillers' log. The date is expressed as the last three digits.	1921 9 2 1
Depth tested	5	19	23	Columns 19 to 23 refer to the depth at which water was met during drilling (normally expressed in drillers' logs as "Water struck"). Ground elevation of the well is used as datum for depth measurements. Record depth in feet; ignore decimal parts; right justification.	746.8 feet 7 4 6

Topic	Column Total	Start	End	Explanation	Example
Pressure or depth	6	24	29	Columns 24 to 29 refer to the pressure-head or water-level elevation/depth of the water from the aquifer in the well tested and whether the well is flowing artesian or non-flowing artesian at the time of measurement.	
				Column 24 shows whether the well was flowing or non-flowing artesian at the time of the measurement. In case a flowing artesian aquifer was tested in the well fill column 24 with +, i.e. the water level is expressed as a positive pressure in feet above the ground surface. For a non-flowing artesian aquifer (or phreatic surface) tested, fill column 24 with -, when the standing water-level is expressed as a negative depth or elevation below the groundsurface.	water-level above groundsurface [+] water-level below groundsurface [-]
				Columns 25 to 29 refer to the water-level measured with the ground elevation as datum.	-28 ft [-][ ][ ][2][8]
Flow rate	4	30	33	Columns 30 to 33 deal with the flow rate of the aquifer tested or of the well tested when flowing artesian conditions occur. For most cases the flow rate of the well rather than the flow-rate of individual aquifers tested will have to be recorded because of the data available.	
				The flow rate is expressed as 1000 gpd. If the well was non-flowing at completion, and a pump was installed, then the pump rate can be recorded in columns 30 to 33. See also column 56 of the Master card.	flow 750 000 gpd [ ][7][5][0]

Hydrology Transfer Sheet

Topic	Total	Column Start	Column End	Explanation	Example
FLOWMETER LOG	21	34	54	Interpretation of the flowmeter log provides data to be recorded in columns 34 to 54.	
Date	3	34	36	Columns 34 to 36 refer to the date, i.e. the year (expressed in three digits) of flowmeter logging.	1968 
Pressure or depth	5	37	41	Columns 37 to 41 refer to the pressure-head or water-level elevation/depth of the water in the well at the time of logging. For coding see the explanation of columns 24 to 29; column 37 to contain the sign and columns 38 to 41 the water level elevation or depth.	-57 feet 
Flow or pump rate	4	42	45	Columns 42 to 45 refer to the flow rate (for a flowing artesian well) or pump rate of the well or aquifer at the time of measurement (see columns 30 to 33). Flow- or pumping rates to be expressed in 1000 gpd. See also column 56 of the Master card.	pumped at 2000 gpd 
Flow by flowmeter	4	46	49	Columns 46 to 49 refer to the flow rate determined from analysis of the flowmeter log at the time of measurement (columns 34 to 36) and depth tested (columns 50 to 54). The flow rate is expressed in 100 gpd.	

Topic	Column Total	Start	End	Explanation	Example
Depth tested	5	50	54	Columns 50 to 54 refer to the depth at which the flow rate (recorded in columns 46 to 49) on the flowmeter log was determined. Record depth tested in feet, with ground elevation as datum.	
DRILLERS' RECORD	18	55	72	Refer to explanation of Drillers' Record -1 in columns 16 to 33.	
PUMP AT DEPTH	5	73	77	Columns 73 to 77 refer to the depth at which the pump, if installed, is present. Record the depth, in feet, with ground elevation as datum, of the lowest part of the intake or footvalve of the pump in columns 74 to 77. Column 73 is used to indicate the presence of a pump in the well, by coding: + If no pump is present, leave column 73 blank	bottom of inlet at 60 ft | + | | | 6 | 0 |
TYPE OF PUMP	1	78	78	Column 78 refers to the type of pump installed in the well. windmill - reciprocating - 1 petrol/diesel - centrifugal - 2 electric - centrifugal - 3 electric submersible centrifugal - 4 other - 5	98 windmill pump present | 1 |
FOLIO NUMBERS	2	79	80	Columns 79 to 80 are for the folio numbering of the Drillers' and Flowmeter Records. The folio numbers refer to one well, i.e., the sequence of records, corresponding to lines on a transfer sheet or individual data cards.	

Hydrology Transfer Sheet

Topic	Total	Column Start	End	Explanation	Example
Drillers' Record	1	79	79	Column 79 refers to the folio number of the Drillers' Record. The highest number for one well in column 79 of transfer sheet 4Y will be inserted in column 59 of the Master transfer sheet 4P.	
Flowmeter Record	1	80	80	Column 80 refers to the folio number of the Flowmeter Record. Do not transfer this number to the Master transfer sheet 4P.	

Follows from p.99

TEMPERATURE CARD

The Temperature card deals with information determined from the temperature log. Basic data on the date of logging, the bottomhole and surface temperature of the well, the depth interval logged, temperatures at the top and bottom of the logged interval in the well, the maximum temperature measured in the well, and the depth of the maximum recorded temperature are recorded.

Other data determined from the log and recorded on the card include the depth and temperature at specific locations in the well, and the depth and temperature of distinctive temperature anomalies.

The flow rate for flowing artesian wells is recorded. Provision is made to also record the calculated geothermal gradient for the well.

BMR-GAB Wireline logging of waterwells — TEMPERATURE SHEET — GAB-ADP System

IDENTIFICATION					TEMPERATURE RECORDS																												
CODE	State Letter	1:250000 Map Number	Card Cont. Deepening	Well Number	DATE	UNIT	BOTTOM HOLE TEMPER.	SURFACE TEMP.	DEPTH BOTTOM LOG	TEMP. BOTTOM LOG	DEPTH TOP LOG	TEMP. TOP LOG	MAX. TEMP.	DEPTH MAX. TEMP.	1 DEPTH TEMP. REC.	1 TEMP. ANOMAL	2 DEPTH TEMP. REC.	2 TEMP. ANOMAL	3 DEPTH TEMP. REC.	3 TEMP. ANOMAL	FLOW RATE 1000 GPD	GEOTHERM GRAD.	FLOW FIBER
1			10				20		30			40			50		60		70				80
1 2 3	4 5 6 7 8 9	10 11 12 13 14 15			16 17 18	19	20 21 22	23 24 25	26 27 28 29 30	31 32 33	34 35 36 37 38	39 40 41	42 43 44	45 46 47 48 49	50 51 52 53 54	55 56 57	58 59 60 61 62	63 64 65	66 67 68 69 70	71 72 73	74 75 76 77	78 79 80	
4	2				17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
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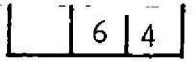
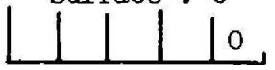
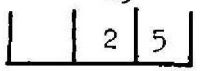
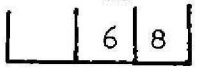
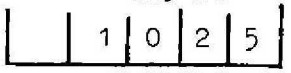
Temperature Transfer Sheet

Topic	Total	Column Start	Column End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the Code of the data card, see Introduction	Temperature card/sheet 4 Z
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master card 4P. For coding of these columns refer to the Master transfer sheet explanation, section Identification. Note: Column 9, see Introduction.	
TEMPERATURE RECORDS	64	16	79	Temperature Records data are derived from analysis of the Temperature Log. Basic data on the date of logging, the bottom-hole and surface temperature of the well, data on the depth interval logged, temperatures at the top and bottom of the logged interval in the well, and the maximum temperature measured in the well and its depth are recorded. Other data determined from the log, including the depth and temperature at specific locations in the well, and the depth and temperature of distinctive temperature anomalies are also recorded. The flow rate for flowing artesian wells can be recorded and the geothermal gradient of the well. Though this card is meant to contain data derived from Temperature Logs, it also can be used to record data acquired during drilling of the well.	

Temperature Transfer Sheet

Topic	Total	Column Start	Column End	Explanation	Example
Date	3	16	18	Columns 16 to 18 refer to the date, i.e. the year of logging and temperature measurements. Record last three digits. If no log derived data are recorded, but temperature data obtained during drilling or completion of the well, then the year of drilling or completion is to be recorded.	1971 9 7 1
Unit	1	19	19	Column 19 refers to the unit in which the temperatures recorded on this line/on this data card are expressed, coded as: degrees Fahrenheit -1 degrees Celsius -2	$^{o}_{C}$ 2
Bottom-hole temperature	3	20	22	Columns 20 to 22 refer to the temperature measurement of the water taken at the bottom of the hole at the date given in columns 16 to 18. Ignore decimal parts, and express in units recorded in column 19.	BHT 68° 6 8
Surface temperature	3	23	25	Columns 23 to 25 refer to the temperature measurement of the water at the surface outlet of the well at the date given in columns 16 to 18. Ignore decimal parts. Express the temperature in the units recorded in column 19.	Surface temp. 25° 2 5
Depth bottom log	5	26	30	Columns 26 to 30 refer to the depth, in feet, with the ground elevation as datum, of the bottom of the temperature log.	926 ft . 9 2 6

Temperature Transfer Sheet

Topic	Column Total	Start	End	Explanation	Example
Temperature bottom log	3	31	33	Columns 31 to 33 refer to the temperature, derived from the temperature log, at the bottom of the logged interval. The temperature is to be expressed in the units recorded in column 19.	64° 
Depth top log	5	34	38	Columns 34 to 38 refer to the depth in feet, with the ground elevation as datum, at the top of the temperature log interval.	Surface : 0 
Temperature top log	3	39	41	Columns 39 to 41 refer to the temperature, determined from the temperature log, at the top of the interval logged. The temperature is to be expressed in the units recorded in column 19.	25° 
Maximum temperature	3	42	44	Columns 42 to 44 refer to the maximum temperature recorded in the water well, either determined from the log, or outside the depth interval logged. Express the temperature value in the units recorded in column 19.	68° 
Depth maximum temperature	5	45	49	Columns 45 to 49 refer to the depth at which the maximum temperature was recorded. The depth to be recorded in feet, with the ground elevation of the well as datum.	1025 ft 

Temperature Transfer Sheet

Topic	Total	Column Start	Column End	Explanation	Example
Depth of temperature record	5	50	54	Columns 50 to 54 and 58 to 62, 66 to 70 refer to the depth at which temperature records shown in columns 55 to 57 (and 63 to 65, 71 to 73) were recorded. In the case of rather uniformly or gently changing temperature curves, depth and temperature values will be recorded at 100 or multiples of 100 feet; 1000 feet is the maximum interval. If sudden changes occur in the temperature curve, then the actual depths and values of these temperature measurements will be recorded. The recorded depth so indicates whether a gradual temperature curve is present or an anomaly (anomalies) occur in the water well. Record the depth in <u>feet</u>, with the ground elevation of the well as datum.	100 ft: 1 0 0 200 ft: 2 0 0 300 ft: 3 0 0 637 ft: 6 3 7
Temperature record or temperature anomaly	3	55	57	Columns 55 to 57 (and 63 to 65, 71 to 73) refer to the temperature recorded at the depth shown in columns 50 to 54 (and 58 to 62, 66 to 70). For gradual changing temperature curves the temperature is to be recorded at regular intervals, i.e., at 100 feet, multiples of 100 feet, or 1000 feet intervals. If sudden temperature changes occur, then the actual depth(s) and temperature value(s) are to be recorded. The recorded depth so serves as an indication of gradual or sudden changes in the temperature over the interval logged in the water well. Record the temperature in the units shown in column 19.	27°: 2 7 29°: 2 9 31°: 3 1 44°: 4 4

Temperature Transfer Sheet

Topic	Total	Column Start	End	Explanation	Example
Flow rate	4	74	77	Columns 74 to 77 refer to the flow rate of the flowing artesian well at the time of temperature measurement. For non-flowing artesian wells these columns can be used to record the pumping rate immediately prior to the logging of the well (See also column 56 on the Master card). Flow rate or pumping rates are recorded in 1000 gpd.	150 000 gpd | | 1 | 5 | 0 | pump present, but not pumping. | | | | 0 |
Geothermal gradient	2	78	79	Columns 78 and 79 refer to the geothermal gradient expressed in degrees Celsius per 1000 m. If the geothermal gradient of the well or the gradient of the interval logged has been determined it might be recorded in these columns. Ignore decimal parts.	48.56°C | 4 | 8 |
Folio number	1	80	80	Columns 80 refers to the folio number of the Temperature Record. The folio numbers refer to one well, i.e. the sequence of records, corresponding to lines on a transfer sheet or to the number of individual data cards.	

Follows from p.107

BAROMETRIC DATA CARD

The Barometric Data card deals with the information about the barometric pressure measurements at the well locations and at the reference bench-marks. It also contains information about the elevation of those reference bench-marks, and, with the additional meteorological data, enables the well elevations to be calculated.

Records on the Barometric Data card include the location of the reference bench-mark; the name, number, and elevation of the bench-mark; the date and time of measurement; and the actual data about barometric pressure, air temperature, and humidity.

BMR - GAB Wireline logging of waterwells

BAROMETRIC DATA SHEET

GAB- ADP System

BAROMETRIC DATA RECORDS

CODE	IDENTIFICATION: State	Letter	1:250000 Map Number	Card Cont	Dodge Flag	Well Number	REF. BENCHMARK LOC. Longitude: Deg	Min	Sec	Latitude: Deg	Min	Sec	NAME and/or NUMBER REF. BENCHM. or REF. WELL	ELEV. REF. BM or WELL	0.1	UNIT	DATE: Day	Mth	Year	TIME	BAROMETRIC PRESSURE: BAR. I mbar	0.1	BAR. II mbar	0.1	TEMPER. AIR	°C or °F	HUMIDITY %		FOL. NO. WELL	FOL. NO. BM	FOLIO NUMBER
1 2	3	4	5 6 7 8	9	10	11 12 13 14 15	16 17 18	19 20	21 22	23 24	25 26	27 28	29 30 31 32 33 34 35 36 37 38	39 40 41 42	43	44	45 46	47 48	49 50 51	52 53 54 55	56 57 58	59	60 61 62	63	64 65 66	67	68 69	70 71 72 73 74 75 76 77	78	79	80
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Barometric Data transfer sheet

Topic	Column Total	Start	End	Explanation	Example
CODE	2	1	2	Columns 1 and 2 are preprinted and refer to the code of the data card, see Introduction	Barometric Data card/ sheet 4 *
IDENTIFICATION	13	3	15	Columns 3 to 15 deal with the identification of the well; this information is to be repeated from the Master card 4P. For coding of these columns, refer to the Master transfer sheet explanation section Identification Note: Column 9, see Introduction Note: If the record refers to a reference bench-mark or well, do not fill the columns 11 to 15, Well Number	
BAROMETRIC DATA RECORDS	54	16	69	Columns 16 to 69 refer to the Barometric Data Records, which include all the information necessary to calculate the elevation of the wells measured. Records contain the location of the reference bench-mark; the name, number, and elevation of that bench-mark; the date and time of measurement; the values of the barometric pressure measurement; and data about air temperature and humidity	
REFERENCE BENCH-MARK LOCATION	13	16	28	Columns 16 to 28 refer to the location of the reference bench-mark or well, expressed in longitude and latitude Fill the location in degrees, minutes, and seconds, see explanation Master transfer sheet, columns 26 to 38	$142^{\circ}05'39"$ 1 4 2 0 5 3 9 $26^{\circ}15'27"$ 2 6 1 5 2 7
NAME or NUMBER OF REFERENCE	10	29	38	Columns 29 to 38 refer to the name, and number of the reference bench-mark, or, in the case of a water well being used as bench-mark, to the well registration number only (with right justification).	State Bench-mark Eulo B M E U L O Warra Railway Stn. B M W A R R A

Topic	Column Total	Start	End	Explanation	Example
				Use the prefix BM for all State, Government, Railway or National Mapping bench-marks, and BMR for BMR gravity stations. Note that names are left justified and numbers right justified.	State Bench-mark 138 Condamine B M C O N D 1 3 8 BMR gravity station Miles B M R M I L E S
ELEVATION OF REFERENCE	5	39	43	Columns 39 to 43 refer to the elevation of the reference point, being it an official bench-mark or any other reference with know elevation, e.g. wells, etc. Column 43 is used for the decimal part of the elevation value. When two decimals are present, round the figure of the first decimal to the value shown, if the second decimal has a value of 0 to 4; and round the first decimal to one higher value, if the second decimal is 5 to 9	1205.6 1 2 0 5 6 1546.87 1 5 4 6 9 336 3 3 6
UNIT	1	44	44	Column 44 refers to the unit in which the elevation of the reference is expressed, coded as feet 1 metres 2	
DATE	7	45	51	Columns 45 to 51 refer to the date on which the barometric pressure measurements were made. For coding, see Introduction, use right justification	4 August 1972 4 8 9 7 2
TIME	4	52	55	Columns 52 to 55 refer to the time (during the date recorded in columns 45 to 51) at which the measurement was made Record the time in 24-hour clock system, hours and minutes expressed as a string of four digits	09.15 9 1 5 13.20 1 3 2 0

Barometric Data transfer sheet

Topic	Total	Column Start	Column End	Explanation	Example
BAROMETRIC PRESSURE	8	56	63	Columns 56 to 63 refer to the barometric pressure readings at the time recorded in columns 52 to 55, on the date recorded in columns 45 to 51, at the location of the well or bench-mark which number and/or name appears in columns 11 to 15 or 29 to 38.	
				The barometric pressure in millibars is recorded in columns 56 to 58, with one decimal in column 59, for barometer I or left barometer.	986.6 |9|8|6|6|
				The barometric pressure in millibars is recorded in columns 60 to 62, with one decimal in column 63, for barometer II or right barometer.	1032.4 |0|3|2|4|
				Omit the first figure 1 in values greater than 999.9	
TEMPERATURE AIR	3	64	66	Columns 64 to 66 refer to the air temperature at the time, date and location of the barometric pressure measurement. Code integer values only, and use right justification	83° F |.|8|3|
TEMPERATURE UNIT	1	67	67	Column 67 refers to the unit in which the temperature in columns 64 to 66 is expressed, coded as Fahrenheit 1 Celsius 2	65° F |.|6|5|1|
HUMIDITY	2	68	69	Columns 68 and 69 refer to the humidity of the air, expressed in percent, at the time and place of the barometric pressure reading	67% |6|7|

Barometric Data transfer sheet

Topic	Column Total	Start	End	Explanation	Example
COMMENTS	8	70	77	Columns 70 to 77 are left for optional comment or further information about the barometric data records	
WELL RECORDS	1	78	78	Column 78 refers to the folio number of the barometric data records for the well with unknown elevation the number of which is recorded in columns 11 to 15. The folio number refers to one well, and to all barometric pressure readings carried out at that well during one day. The highest number (of these records) for one well in column 78 of transfer sheet 4 * will be inserted in column 78 of transfer sheet 4 P.	
REFERENCE RECORD	1	79	79	Column 79 refers to the folio number of the barometric data record for the reference bench-mark or well with known elevation, the number or name of which is recorded in columns 29 to 38. The folio number refers to one well or bench-mark, and all barometric pressure readings carried out at that well or bench-mark during one day	
FOLIO NUMBER	1	80	80	Column 80 refers to the folio number of the barometric data records, i.e., it is a number which corresponds to the sequence of barometric data readings taken during a traverse from a bench-mark during a time period	

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APPENDIX - 1

BMR RECORDS AND FILES RELATED TO WIRE-LINE LOGGING OF WATER WELLS IN THE GREAT ARTESIAN BASIN 1960-1975

BMR Records:

Record 1960/125 - F. Jewell - Corfield no. 1 bore logging, Queensland, 1960.

Record 1961/14 - E.E. Jesson & A. Radeski - Winton no. 2 bore logging, Queensland, 1960.

Record 1961/15 - F. Jewell & E.E. Jesson - Mitchell no. 2 bore logging, Queensland, 1960.

Record 1963/17 - A. Radeski & F. Jewell - Combarngo no. 1 gamma-ray logging, Queensland, 1961.

Record 1963/103 - E.E. Jesson, A. Radeski, & F. Jewell - Great Artesian Basin experimental bore logging, south-west Queensland, 1960.

Record 1964/4 - F. Jewell, A. Radeski, & E.E. Jesson - Great Artesian Basin bore logging, Queensland, 1961.

Record 1964/103 - E.E. Jesson & A. Radeski - Great Artesian Basin bore logging, Queensland, 1962.

Record 1966/26 - E.E. Jesson & A. Radeski - Great Artesian Basin bore logging, Queensland, 1964.

also:

Record 1963/16 - F. Jewell - Arcadia (AAO no. 7) well logging, Qld 1957.

BMR Files

- 167-31 part 1 - Logging of waterbores in Queensland 15-2-1960 - 1-3-1961.

- 167-31 part 2 - Logging of waterbores in Queensland 1-3-1961 - 27-12-1962.

- 167-31 part 3 (also: 65-6775) - Logging of waterbores in Queensland 2-1-1963 - 27-10-1965

- 1964/879 also: 65/8093 also: 3/4/5/1/B1 - Gamma-ray logging Great Artesian Basin area, Queensland. Geophysics Surveying by contract Sept. 1964 - April 1965.

- as above B2 as above May 1965 - Sept. 1965

- as above B3 as above Sept 1965 - May 1966

- 1964/879 also 1978/908 Oil search gamma-ray logging - Great Artesian Basin 28-3-1963 - 30-8-1965

- 1964/879 also 1978/982 as above 29-9-1965 - 13-9-1966

- 1964/879 also 1978/983 as above 20-9-1966 - 4-10-1967

- 1964/1322 Oil search-Gamma-ray logging GAB

- 1964/1323 Oil search-Gamma-ray logging - Great Australian Basin

- 1967/606 also 1972/561 also 1977/801 Gamma-ray logging of waterbores 1967 - Project file 11-4-1967 - 23-2-1968

- as above, also 1972/562 also 1977/802 as above 23-2-1968 - 21-10-1968

- 1968/115 also 1972/1466 also 1977/813 Gamma-ray logging of waterbores 1968 - Progress file 31-1-1968 - 6-3-1969

- as above also 1972/1467 also 1977/814 as above 11-3-1969 - 10-10-1969

- 1968/114 also 1972/2033 also 1977/815 Gamma-ray logging of waterbores 1968 - Project file 31-1-1968 - 19-1-1970

- 1968/114 also 1972/2034 also 1977/816 as above 22-1-1970 - 26-5-1971

- 1969/577 part 1 also 1975/379 Surveys - General: gamma-ray water-bore logging 1969 - Progress file 22-7-1969 - 9-10-1970

- 1969/577 part 2 also 1975/378 Surveys - general: gamma-ray water-bore logging 1969-Progress file 12-10-1970 - 6-1-1972

- 1969/687 part 1 also 1972/1346 also 1977/790 Logging of difficult boreholes - BMR 5-9-1969 - 12-10-1970

- 1969/687 part 2 also 1972/1347 also 1977/791 Logging of difficult boreholes - BMR 13-10-1970 - 13-9-1972

- 1972/407 also 1977/817 Gamma-ray logging of waterbores 1972 - Project file 19-1-1972 - 8-11-1973

- 1972/75 also 1975/386 Surveys general - gamma-ray waterbore logging 1972 - Progress file 7-1-1972 - 8-9-1972

- 1973/1440 also 1977/818 Gamma-ray logging of waterbores 1972 - Project file 28-11-1973 - 2-5-1977

- 1974/400 Gamma-ray logging of waterbores - 1973-1974 - Progress file 22-2-1974 - 18-2-1975

- 1974/495 also 1977/792 BMR logging of waterbores 19-3-1974 - 9-6-1977

- 1976/270 BMR wire-line logging of waterwells and drillholes 30-3-1976 -

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- 1975/145 Gamma-ray logging of waterbores - Great Artesian Basin, Qld - Permission to log forms.

- 1975/146 Gamma-ray logging of waterbores - Great Artesian Basin, NSW and NT - Permission to log forms.

- 1978/999 Well-logging contract, 1968 - Permission to log and releases.

- 1972/2917 - 1972/2414 - 1973/1357 Analyses of water samples collected for bore logging programme - Great Artesian Basin.

Wells logged and footage:

- 1965/1555 also 1978/995 Claims and records of payments gamma-ray logging, Great Artesian Basin, 1965.

- 1966/2086 also 1978/996 as above, 1966

- 1967/605 also 1972/560 also 1977/800 Contract gamma-ray logging of waterbores 1967 Record of payments.

- 1968/506 also 1978/997 as above, 1968.

- 1969/604 also 1975/380 as above, 1969.

- 1970/815 as above, 1970/71.

- 1972/407 as above, 1972.

APPENDIX - 2

AREA AND TIME OF WIRE-LINE LOGGING ACTIVITIES IN THE GREAT ARTESIAN BASIN, 1960-1975

BMR Records and Registry File Numbers	Contract Period	BMR or Contractor	Area - 1:250 000 Map Sheet	
Record 1963/103 File 167/31	3-9-1960 - 3-10-1960 21-10-1960 - 7-11-1960	BMR	Charleville Cunnamulla Dirribandi Eromanga Homeboin Mitchell Roma St George Toompine Windorah Wyandra	SG 55-10 SH 55-2 SH 55-3 SG 54-12 SG 55-15 SG 55-11 SG 55-12 SH 55-4 SG 55-13 SG 54-8 SG 55-14
Record 1964/4 File 167/31	24-8-1961 - 28-11-1961	BMR	Augathella Bedourie Betoota Birdsville Blackall Brighton Downs Longreach Manuka Machattie Tambo Winton	SG 55-6 SG 54-1 SG 54-6 SG 54-5 SG 55-1 SF 54-15 SF 55-13 SF 54-8 SG 54-2 SG 55-2 SF 54-12
Record 1964/103 File 167/31	3-10-1962 - 22-11-1962	BMR	Augathella Charleville Chinchilla Dalby Goondiwindi Homeboin Roma Wyandra	SG 55-6 SG 55-10 SG 56-9 SG 56-13 SH 56-1 SG 55-15 SG 55-12 SG 55-14
Record 1966/26 File 1965/8093	3-6-1964 - 1-12-1964	BMR	Julia Creek McKinley Manuka Richmond Tangorin	SF 54-3 SF 54-7 SF 54-8 SF 54-4 SF 55-5

BMR Records and Registry File Numbers	Contract Period	BMR or Contractor	Area - 1:250 000 Map Sheet	
File 167/31 File 1965/8093 File 1964/879	11-7-1965 - 23-10-1965	Schlumberger	Buchanan Jundah Longreach Mackunda Maneroo Manuka Muttaburra Richmond Tangorin Toompine	SF 55-6 SG 54-4 SF 55-13 SF 54-11 SF 54-16 SF 54-8 SF 55-9 SF 54-4 SF 55-5 SG 55-13
File 1965/8093 File 1964/1322 File 1964/1323	July-December 1966	Schlumberger	Adavale Betoola Bedourie Blackall Boulia Brighton Downs Charleville Connemara Longreach Machattie Manuka McKinlay Quilpie Springvale	SG 55-5 SG 54-6 SG 54-1 SG 55-1 SF 54-10 SF 54-15 SG 55-10 SG 54-3 SF 55-13 SG 54-2 SF 54-8 SF 54-7 SG 55-9 SF 54-14
File 1964/1323 File 1967/606 pt. 1 File 1967/606 pt. 2 File 1968/115	Aug. 1967 - Dec. 1967 March 1968- May 1968	DUWS	Augathella Blackall Charleville Durham Downs Eulo Jundah Longreach Mitchell Jericho Quilpie Tambo Thargomindah Toompine Wyandra	SG 55-6 SG 55-1 SG 55-10 SG 54-15 SH 55-1 SG 54-4 SF 55-13 SG 55-11 SF 55-14 SG 55-9 SG 55-2 SG 54-16 SG 55-13 SG 55-14
File 1968/114 pt. 1 File 1968/115 pt. 1 File 1968/115 pt. 2	Aug. 1968 - Dec. 1968 March 1969-April 1969	DUWS	Bulloo Charleville Cunnamulla Dirrabandi Durham Downs Eromanga Eulo Homeboin Thargomindah Toompine Quilpie	SH 54-4 SG 55-10 SH 55-2 SH 55-3 SG 54-15 SG 54-12 SH 55-1 SG 55-15 SG 54-16 SG 55-13 SG 55-9

BMR Records and Registry File Numbers	Contract Period	BMR or Contractor	Area - 1:250 000 Map Sheet	
File 1968/114 pt. 1	July 1969 - Dec. 1969	DUWS	Burketown	SE 54-6
			Cloncurry	SF 54-2
File 1968/114 pt. 2	May 1970		Croydon	SE 54-11
File 1969/577 pt. 1			Dobbyn	SE 54-14
			Donors Hill	SE 54-10
			Gilberton	SE 54-16
			Goondiwindi	SH 56-1
			Homeboin	SG 55-15
			St George	SH 55-4
			Millungera	SE 54-15
			Normanton	SE 54-7
File 1968/114 pt. 2	14-9-1970 - 14-12-1970	DUWS	Chinchilla	SG 56-9
			Dalby	SG 56-13
File 1969/577 pt. 1	19-4-1971 - 17-7-1971		Dirranbandi	SH 55-3
			Goondiwindi	SH 56-1
File 1969/577 pt. 2			St George	SH 55-4
			Homeboin	SG 55-15
			Mitchell	SG 55-11
			Roma	SG 55-12
			Surat	SG 55-16
File 1969/687 pt. 1	17-8-1970 - 15-11-1970	BMR	Brighton Downs	SF 54-15
			Manuka	SF 54-8
			McKinlay	SF 54-7
			Winton	SF 54-12
File 1972/75	Jan. 1972 - Aug. 1972	Bendix	Gilberton	SE 54-16
File 1972/407			Hughenden	SF 55-1
			Richmond	SF 55-4
			Tangorin	SF 55-5
			Hale River	SG 53-3
			Finke	SG 53-6
			McDills	SG 53-7
File 1969/687 pt. 2	April 1972-July 1972	BMR	Adavale	SG 55-5
			Blackall	SG 55-1
			Croydon	SE 54-11
			Dobbyn	SE 54-14
			Donors Hill	SE 54-10
			Jericho	SF 55-14
			Lawn Hill	SE 54-9
			Longreach	SF 55-13
			Millungera	SE 54-15
			Normanton	SE 54-7
			Red River	SE 54-8
			Windorah	SG 54-8

BMR Records and Registry File Numbers	Contract Period	BMR or Contractor	Area - 1:250 000 Map Sheet	
File 1972/407 File 1973/1440	Nov. 1972 - May 1973	DUWS	Dalby Goondiwindi	SG 56-13 SH 56-1
File 1972/407 File 1973/1440	Nov. 1973 - May 1974	DUWS	Chinchilla Mundubbera Roma Taroom	SG 56-9 SG 56-5 SG 55-12 SG 55-8
File 1974/495	Sept. 1974-Oct. 1974	BMR	Aurukun Burketown Charleville Galbraith Jundah Quilpie Rutland Plains Toompine Weipa	SD 54-7 SE 54-6 SG 55-10 SE 54-3 SG 54-4 SG 55-9 SD 54-15 SG 55-13 SD 54-3
File 1974/400 File 1973/1440	3-11-1974 - 10-12-1974	DUWS-Agnew	Gilgandra Inverell Moree Narrabri Nyngan	SH 55-16 SH 56-5 SH 55-8 SH 55-12 SH 55-15
File 1974/495	21-4-1975 - 30-6-1975	BMR	Angledool Milparinka Nyngan Urisino Walgett White Cliffs	SH 55-7 SH 54-7 SH 55-15 SH 54-8 SH 55-11 SH 54-12
File 1974/495	18-9-1975 - 28-11-1975	BMR	Augathella Blackall Charleville Cunnamulla Eulo Longreach Tambo Toompine Wyandra	SG 55-6 SG 55-1 SG 55-10 SH 55-2 SH 55-1 SF 55-13 SG 55-2 SG 55-13 SG 55-14

BMR - Bureau of Mineral Resources, Geology and Geophysics
Schlumberger - Schlumberger Seaco Inc.
DUWS - Down Under Well Services Pty Ltd
DUWS-Agnew - (Down Under Well Services) Agnew-Go Western Pty Ltd
Bendix - Bendix-Austral United Geophysical Pty Ltd