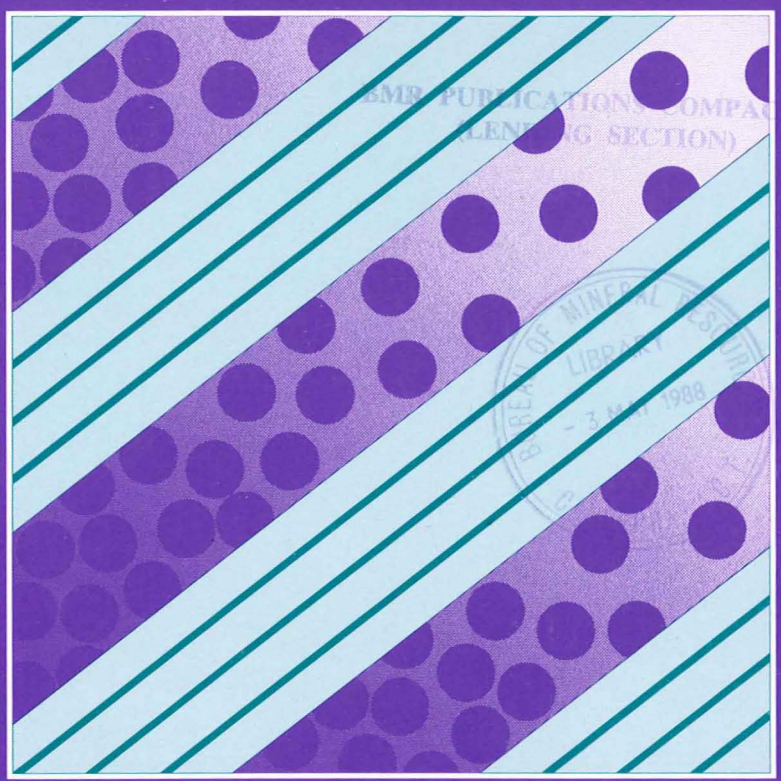
GROUNDWATER 7

Studies in Hydrogeology

NATIONAL GROUNDWATER DATA BASE INVENTORY 5 YEAR FORWARD PROGRAM VOLUME 2

AUSTRALIAN GROUNDWATER CONSULTANTS



BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS

DIVISION OF CONTINENTAL GEOLOGY

RECORD 1987/57

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Division of Continental Geology Groundwater Series No 7

NATIONAL GROUNDWATER DATA BASE INVENTORY 5 YEAR FORWARD PROGRAM

by

Australian Groundwater Consultants Pty Limited

VOLUME 2

BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS

DEPARTMENT OF PRIMARY INDUSTRY & ENERGY

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APPENDIX A
SOUTH AUSTRALIAN GROUNDWATER DATA BASE

APPENDIX A

SOUTH AUSTRALIAN GROUNDWATER DATA BASE

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Appendix A
GROUNDWATER DATA SOUTH AUSTRALIAN

A1.0 INTRODUCTION

Groundwater data in South Australia are stored principally by the South Australian Department of Mines & Energy (SADME), and to a lesser extent by the State Water Laboratories of the Engineering & Water Supply Department, the Chemistry Division of the Department of Services and Supply and the Department of Agriculture.

The SADME data are stored according to a unique "unit number" assigned to every data point marked on a set of well location plans and based on the A.M.G. 1:100,000 sheet numbers. Some selected data have been computerized but most are stored in microfiche or hard copy form.

The lesser amounts of information held by other departments are not filed according to this unit system and are consequently more difficult to retrieve.

A2.0 SADME DATA

Data held by SADME fall into four categories as discussed below:

A2.1 Individual Well Records

Records are held of some 106,000 water wells, as at late 1984, out of a likely total of some 150,000 - 200,000 wells in the State. The data are stored in microfiche form, with a copy of every sheet of information formerly stored in "bore folders" together with new information on proforma field sheets, including construction details, geological logs, water analysis reports, pumping test data, etc. These data form the basic storage from which selected information has been taken and stored in the various computer files described below. The information is retrieved according to well unit numbers, which are obtained from a set of cadastral well location plans at scales ranging from 1:2,500 to 1:250,000 scales depending upon the density of information.

Individual records and well location plans are freely available in microfiche/microfilm form or hard copy.

A2.2 Computer Based Data Storage

A number of specialist files have been or are being established to allow presentation of particular data as well as its manipulation. Data are available as computer printouts, usually listed under their unit numbers.

A2.2.1 Bore General File

This file has two output formats (see Figures A-1 and A-2)

(1) a comprehensive listing of the type of data available for a particular unit number, e.g. chemical analysis, geological log etc. together with a one line abbreviated list of specific well construction and hydrogeological data both from the time of construction or first data registration and from the most recent visit, and
(2) a one line abbreviated listing of the most recent data in the form as described in (1) above, designed to satisfy most commonly requested

information in public enquiries, such as depth, standing water level, salinity, yield, etc.

The data may be recalled (as a printout) in a number of ways:

- 1:100,000 sheets
- AMG co-ordinates (file not yet complete)
- Hundred (a South Australian unit of land sub-division in the settled areas)
- discriminatory recall by listed parameter (e.g. depth, geological log, water well permit, etc.)

This file can be manipulated by statistical packages e.g. by SPSS.

A2.2.2. Water Analysis

This file lists chemical analysis data (major anions and cations) in two formats for all wells for which information is avialable (see Figures A-3 and A-4). The data can be manipulated and selectively recalled in much the same way as those stored in the bore general file. Format 1 gives all available data, whilst Format 2 is a one-line summary printout of the most requested data.

A2.2.3 Observation Well File

This file stores all water level and salinity data from observation well networks (although not all salinity data have yet been coded) and lists them against the date of measurement in two formats depending upon which area is requested (see Figures A-5 and A-6). The earlier format will progressively be eliminated in the future. Hydrographs can be presented using the normal output characters. Graphic output is not available at present although this is planned. In this file the data are listed by unit number of the form WLD 101 where the letters refer to the Hundred (or the 1:250,000 sheet in remote areas) and the digits to the number of the observation wells within the hundred or 1:250,000 sheet.

A2.2.4 Trace Element File

This file is incomplete (see Figure A-7) and is currently being completed using data from 3 sources:

- those few water wells for which the analyses are available
- the statewide network of TCWQ monitoring wells, and
- data from mineral exploration programs as they become available to the public.

A2.2.5 Aquifer Test File

This file is currently being designed to allow selective retrieval of unit numbers for which test data are available. The data are currently stored on microfiche.

A2.3 Other Water Well Data

Some data are stored elsewhere with SADME. They are:

(1) data which accrue from mineral exploration are reported (initially in confidential files) to SADME according to conditions of Exploration Licences issued under the Mining Act. Except for a small proportion

Licences issued under the Mining Act. Except for a small proportion of this information which has been retrieved and stored in parts of the groundwater data files, this information is held in "envelopes" numbered consecutively as they arrive and which can only be selectively retrieved by Exploration Licence number, company name and date. As there is no external indication whether or not an envelope contains groundwater data, search and retrieval is tedious, and data quality is often poor.

(2) data from all pumping tests carried out by SADME are held on micro-fiche storage, listed partly according to unit number and partly by informal names or numbers (e.g. Penola No. 2 town water supply bore). Some of these have been plotted and some have reports available (see section A2.4 below).

(3) geophysical logs are stored as transparencies at Head Office, or, where digital, on magnetic tape at the Glenside geophysical services section. These logs are rarely filed by unit number, which has seldom been allocated at the time of logging, but on an index currently stored at Head Office based on the bore name or informal number. Whilst retrieval may be hampered by this system, the existence of the logs is readily determined from the computerised bore general file.

A2.4 Departmental Reports

Groundwater reports cover a range of investigations, from small groundwater advice reports to large, detailed regional groundwater resource investigations. Most are unpublished reports with an identifying index "RB" number (e.g. RB 74/2, where 74 refers to the 1974 date of preparation) but some are published in various Departmental forms. All are listed in a computer file and may be retrieved by "RB" number, author, locality or keyword index (see Figures A-8 and A-9). A recent report (RB82/58, in Figure A-10) provides useful index listings of various types of groundwater reports for water well survey individual clients, schools, towns, etc. together with maps showing their localities.

A2.5 Procedures for Retrieval

All data held by the SADME can be obtained by contacting the Technical Information Services Branch at the Head Office, 191 Greenhill Road, Parkside, S.A. 5063. Some information is also available through Regional Offices and the Drilling and Mechanical Services Branch.

A3.0 DATA HELD BY OTHER GOVERNMENT DEPARTMENTS

Although the main data storage is operated by SADME, other Departments hold some data pertinent to their own needs. Unfortunately little of this information is as readily available as that held by SADME and few can be retrieved by SADME unique number.

A3.1 Engineering and Water Supply Department

Data held fall into two catergories, modern water quality data held by the State Water Laboratories and older, generalised groundwater data stored at the E.W.S. Head Office.

A3.1.1 State Water Laboratories

The laboratory analyses water samples from reticulated water supplies, some of which include groundwater sources, and also those samples collected in the course of water quality investigations undertaken by the Engineering and Water Supply Department.

Data are stored in a computerised system at the State Water Laboratories, each regular sampling point having a unique number within that system. There are approximately 3000 sampling points identified within the system, of which several hundred are for groundwater data. In some cases data are grouped under "generic" description to file many "one-off" samples which have been submitted for analysis and for which sites regular sampling is not planned. Examples include rainwater tanks, seepages and some private bores.

There are three main files:

1. LOCATION - information such as State Water Laboratory unique number, AMG co-ordinates, name of site, SADME well number etc. is or can be recorded.

2. SAMPLE - this file records information about the collection of the sample, such as date, time, method, etc. together with the S.W.L. unique location number and the laboratory reference number (allocated for each sample) to allow cross referencing with the other files.

3. RESULTS - stores all the analytical results, method of analysis etc., filed under laboratory reference number.

A range of statistical programs has been developed in-house for manipulation of the data, and coloured plots of data are also available in a wide range of formats as required.

Retrieval of the data from regularly sampled bores is simple, quick and is available as a hard copy printout or report, or as a display on a VDU. The format of the printout can be arranged as required. Retrieval can be based on any of the items listed in the Location File, e.g. sample points within a defined area, or according to determinant or analysis method from the Results File. An example is given in Figure A-11.

Data recorded using generic location descriptors instead of the specific descriptors are more difficult to retrieve and search for; however, at this stage there is not a large amount of data in this form.

Requests to obtain data should be addressed to Mr D. Lane, Manager, State Water Laboratories, Private Postal Bag, Salisbury, S.A. 5108.

A3.1.2 Reports and Files at Head Office

Groundwater data and interpretation reports dating back to the 19th century are held within the E&WS Department library and within files and ledgers stored in the Water Resources Branch. Library reports are readily available through the index system; however, whatever data there may be in files and ledgers are not indexed, difficult to retrieve and of largely unknown quality.

A3.2 Other Government Departments Authorities and Laboratories

A3.2.1Chemistry Division

The Chemistry Division of the Department of Services and Supply have some

thousands of water analyses stored in work books, dockets and files, dating mainly from pre 1982/3 (after which government water analysis work was largely centralised at the State Water Laboratories of the E & WS Department).

Although these files include valuable information it is not indexed and the identification of data and their retrieval would be difficult and time-consuming.

A3.2.2 Other Departments

Much smaller amounts of groundwater data are stored by various other organisations such as Department of Agriculture, Electricity Trust of South Australia, and maybe others, generally in a form which, like 3.2.1 above makes them very difficult to discover and retrieve.

Data can be found, given time, if they are known to exist or to be likely to exist, when the appropriate contact person has been identified.

A3.2.3 Laboratories

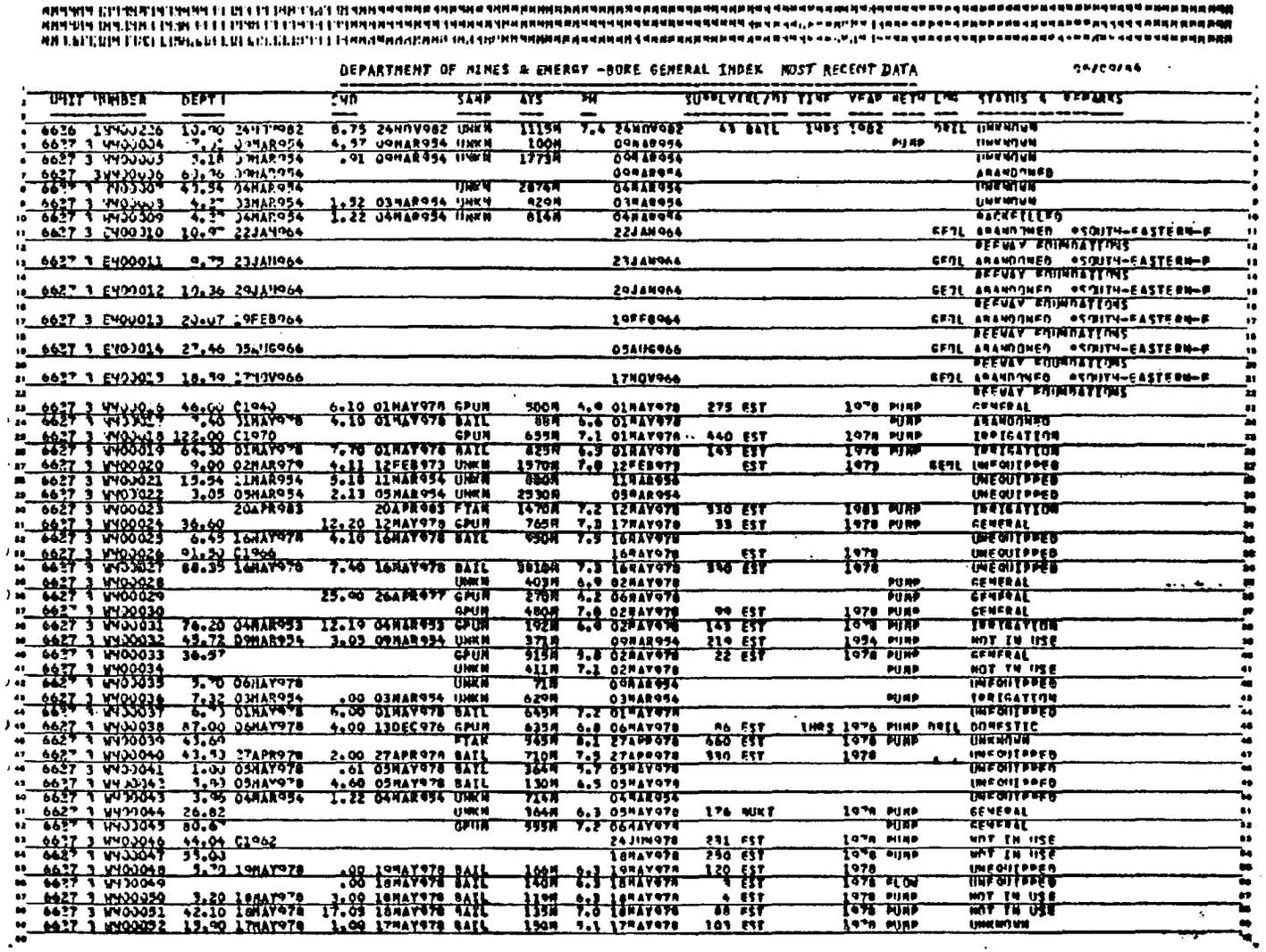
Private laboratories and the semi-governmental organisation, AMDEL, analyse water samples for various organisations such as mineral exploration companies, private consultants, and in the case of AMDEL, for the South Australian Department of Mines & Energy.

These data are not generally available except for the cases in which they are ultimately filed with one of the Government Departments already discussed. Even then they may be difficult to retrieve as discussed.

A.4.0 COMMENTS

Most groundwater data in South Australia are stored within the SADME system where they are readily retrievable. As that system has a unique unit number for each borehole it would be sensible for other systems, especially the State Water Laboratories' computer storage, to use the unit number whenever possible, to facilitate retrieval of the data. Considering the relatively small amounts of water quality data held by the State Water Laboratories outside the SADME system, use of the well unit number would be relatively simple to implement at this stage and would certainly be helpful for outside users of the data.

Some old ledgers, such as those detailing individual bores which date back to the 19th century warrant copying followed by proper archival storage of the originals, maybe in the State Library.



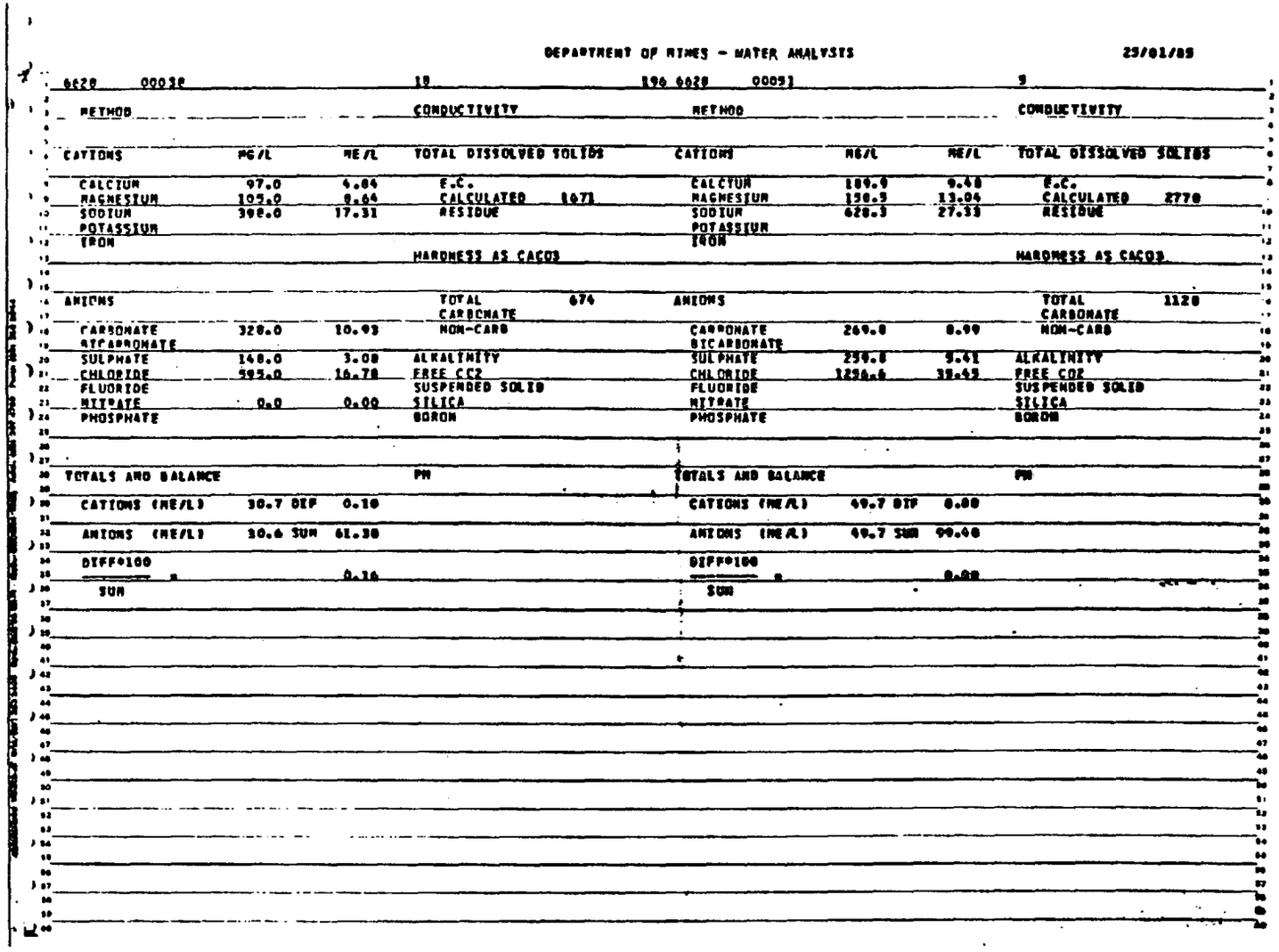
DEPARTMENT OF MINES & ENERGY -BORE GENERAL INDEX MOST RECENT DATA

UNIT NUMBER	DEPTH		SWL		SAMP	AYS	YM	SUPPLY(L/S)	TEST	YEAR	METH	USE	STATUS & REMARKS
6626 1WN00226	10.90	24NOV982	8.75	24NOV982	UNKN	1115M	7.4	24NOV982	45 BAIL	1985	1982		UNKNOWN
6627 1 WN00004	[illegible]	09MAR954	4.57	09MAR954	UNKN	100M		09MAR954			PUMP		UNKNOWN
6627 3 WN00005	5.18	09MAR954	.91	09MAR954	UNKN	1775M		09MAR954					UNKNOWN
6627 3WN00006	61.26	09MAR954						09MAR954					ABANDONED
6627 1 WN00007	45.54	04MAR954			UNKN	2876M		04MAR954					UNKNOWN
6627 3 WN00008	4.27	03MAR954	1.52	03MAR954	UNKN	420M		03MAR954					UNKNOWN
6627 3 WN00309	4.57	04MAR954	1.22	04MAR954	UNKN	816M		04MAR954					BACKFILLED
6627 3 E400310	10.97	22JAN964						22JAN964				GEOL	ABANDONED *SOUTH-EASTERN-P
													BEEWAY ENUMERATIONS
6627 1 E400011	8.79	23JAN964						23JAN964				GEOL	ABANDONED *SOUTH-EASTERN-P
													BEEWAY ENUMERATIONS
6627 1 E400012	19.36	29JAN964						29JAN964				GEOL	ABANDONED *SOUTH-EASTERN-P
													BEEWAY ENUMERATIONS
6627 3 E400013	23.47	29FEB964						19FEB964				GEOL	ABANDONED *SOUTH-EASTERN-P
													BEEWAY ENUMERATIONS
6627 1 E400014	27.46	05AUG966						05AUG966				GEOL	ABANDONED *SOUTH-EASTERN-P
													BEEWAY ENUMERATIONS
6627 1 E400015	18.99	17NOV966						17NOV966				GEOL	ABANDONED *SOUTH-EASTERN-P
													BEEWAY ENUMERATIONS
6627 3 WN00016	46.00	C1940	6.10	01MAY978	GPUN	500M	4.0	01MAY978	275 EST		1978 PUMP		GENERAL
6627 1 WN00017	9.40	31MAY978	4.10	01MAY978	BAIL	88M	6.6	01MAY978				PUMP	ABANDONED
6627 3 WN00018	122.00	C1970			GPUN	695M	7.1	01MAY978	440 EST		1978 PUMP		IRRIGATION
6627 3 WN00019	64.30	01MAY978	7.78	01MAY978	BAIL	825M	6.9	01MAY978	145 EST		1978 PUMP		IRRIGATION
6627 3 WN00020	9.00	02MAR979	4.11	12FEB973	UNKN	1970M	7.8	12FEB973	EST		1973	GEOL	UNEQUIPPED
6627 3 WN00021	15.54	11MAR954	5.18	11MAR954	UNKN	880M		11MAR954					UNEQUIPPED
6627 3 WN00022	3.05	05MAR954	2.13	05MAR954	UNKN	2530M		05MAR954					UNEQUIPPED
6627 3 WN00023		20APR983		20APR983	FTAR	1470M	7.2	12MAY978	330 EST		1983 PUMP		IRRIGATION
6627 3 WN00024	36.60		12.20	12MAY978	GPUN	765M	7.8	17MAY978	33 EST		1978 PUMP		GENERAL
6627 3 WN00025	6.45	16MAY978	4.10	16MAY978	BAIL	950M	7.5	16MAY978					UNEQUIPPED
6627 3 WN00026	91.50	C1966						16MAY978	EST		1978		UNEQUIPPED
6627 3 WN00027	88.35	16MAY978	7.40	16MAY978	BAIL	3818M	7.3	16MAY978	340 EST		1978		UNEQUIPPED
6627 3 WN00028					UNKN	403M	6.9	02MAY978				PUMP	GENERAL
6627 1 WN00029			25.00	26APR977	GPUN	270M	4.2	06MAY978				PUMP	GENERAL
6627 1 WN00030					GPUN	480M	7.0	02MAY978	90 EST		1978 PUMP		GENERAL
6627 3 WN00031	76.20	04MAR953	12.19	04MAR953	GPUN	1920M	6.0	02MAY978	145 EST		1978 PUMP		IRRIGATION
6627 3 WN00032	45.72	09MAR954	3.05	09MAR954	UNKN	3718M		09MAR954	210 EST		1954 PUMP		NOT IN USE
6627 1 WN00033	36.57				GPUN	915M	5.8	02MAY978	22 EST		1978 PUMP		GENERAL
6627 1 WN00034					UNKN	411M	7.1	02MAY978				PUMP	NOT IN USE
6627 1 WN00035	5.70	06MAY978			UNKN	71M		06MAY978					UNEQUIPPED
6627 3 WN00036	7.32	03MAR954	.00	03MAR954	UNKN	620M		03MAR954				PUMP	IRRIGATION
6627 1 WN00037	6.71	01MAY978	6.00	01MAY978	BAIL	645M	7.2	01MAY978					UNEQUIPPED
6627 1 WN00038	87.00	06MAY978	4.09	13DEC976	GPUN	635M	6.8	06MAY978	86 EST	1985	1976 PUMP	BAIL	DOMESTIC
6627 1 WN00039	41.69				FTAR	945M	8.1	27APR978	660 EST		1978 PUMP		UNKNOWN
6627 1 WN00040	43.93	27APR978	2.00	27APR978	BAIL	710M	7.5	27APR978	330 EST		1978		UNEQUIPPED
6627 3 WN00041	1.00	05MAY978	.61	05MAY978	BAIL	364M	5.7	05MAY978					UNEQUIPPED
6627 3 WN00042	9.93	05MAY978	4.60	05MAY978	BAIL	130M	6.5	05MAY978					UNEQUIPPED
6627 1 WN00043	3.05	04MAR954	1.22	04MAR954	UNKN	716M		04MAR954					UNEQUIPPED
6627 1 WN00044	26.82				UNKN	984M	6.3	05MAY978	176 AUKT		1978 PUMP		GENERAL
6627 1 WN00045	80.67				GPUN	595M	7.2	06MAY978				PUMP	GENERAL
6627 3 WN00046	44.04	C1962						24JUN978	231 EST		1978 PUMP		NOT IN USE
6627 1 WN00047	55.03							18MAY978	250 EST		1978 PUMP		NOT IN USE
6627 3 WN00048	3.70	19MAY978	.00	19MAY978	BAIL	164M	6.3	19MAY978	120 EST		1978		UNEQUIPPED
6627 1 WN00049			.00	18MAY978	BAIL	140M	6.3	18MAY978	4 EST		1978 FLOW		UNEQUIPPED
6627 3 WN00050	3.20	18MAY978	3.00	18MAY978	BAIL	1190M	6.3	18MAY978	4 EST		1978 PUMP		NOT IN USE
6627 3 WN00051	42.10	18MAY978	17.03	18MAY978	BAIL	1350M	7.0	18MAY978	88 EST		1978 PUMP		NOT IN USE
6627 1 WN00052	13.90	17MAY978	1.09	17MAY978	BAIL	150M	5.1	17MAY978	101 EST		1978 PUMP		UNKNOWN

FIGURE A1 - BORE GENERAL FILE (FORMAT 1)

```
662842HEW00011   LOCATION      ADELAIDE  0557 RES 11 LAT 34 55 17.3  LONG 138 36 31.7

                 REFERENCES    F/N  24205  PERMIT          REF NO        DEPT REF  DM220/55 RS6N5/55 PLAN55/25 R842/1AIR-PHOTO

                 DRILLING      COMPLETED  28MAR555         DEPTH     24.30                   CORE LAB
                 DETAILS       METHOD     CATL             CASED     NO                      LOGGED     GEOL
                               DRILLER    MINES DEPT       FROM                              SAMPLES    1  3
                               PURPOSE    ENGIN.INV        DIAM                              ANALYSIS
                               STATUS     ENGIN.INV                                          TECH-LOGS

                 AQUIFER       METHOD OF SUPPLY            WATER CUT   SWD     SUPPLY  SALINITY  DEV   PH
                 DETAILS
                               HOW MEASURED                     8.30   4.80                      N
                                                               18.59   4.80                      N
                               TIME

                 RECENT        DEPTH              SWD              SUPPLY    METH MEAS TIME      STATUS      SAMP SALINITY PH
                 INFORMATION
                                 24.30M 28MAR555    4.8F 28MAR555                                ABANDONED

                 REMARKS       RAH WOMENS RADIOTHERAPY BLOCK PLAN55/381                          NAME

662842HEW00012   LOCATION      ADELAIDE  0557 RES 12 LAT 34 55 17.9  LONG 138 36 32.2

                 REFERENCES    F/N  24207  PERMIT          REF NO        DEPT REF  DM220/55 RS716/55 R842/1A PLAN55/2AIR-PHOTO

                 DRILLING      COMPLETED  31MAR555         DEPTH     12.34                   CORE LAB
                 DETAILS       METHOD     CATL             CASED     NO                      LOGGED     GEOL
                               DRILLER    MINES DEPT       FROM                              SAMPLES    1  3
                               PURPOSE    ENGIN.INV        DIAM                              ANALYSIS
                               STATUS     ENGIN.INV                                          TECH-LOGS

                 AQUIFER       METHOD OF SUPPLY            WATER CUT   SWD     SUPPLY  SALINITY  DEV   PH
                 DETAILS
                               HOW MEASURED                     6.40   6.10                      N
                                                               11.28   6.10                      N
                               TIME

                 RECENT        DEPTH              SWD              SUPPLY    METH MEAS TIME      STATUS      SAMP SALINITY PH
                 INFORMATION
                                 12.34M 31MAR555    6.1C 31MAR555                                ABANDONED

                 REMARKS       RAH WOMENS RADIOTHERAPY BLOCK                                     NAME
```

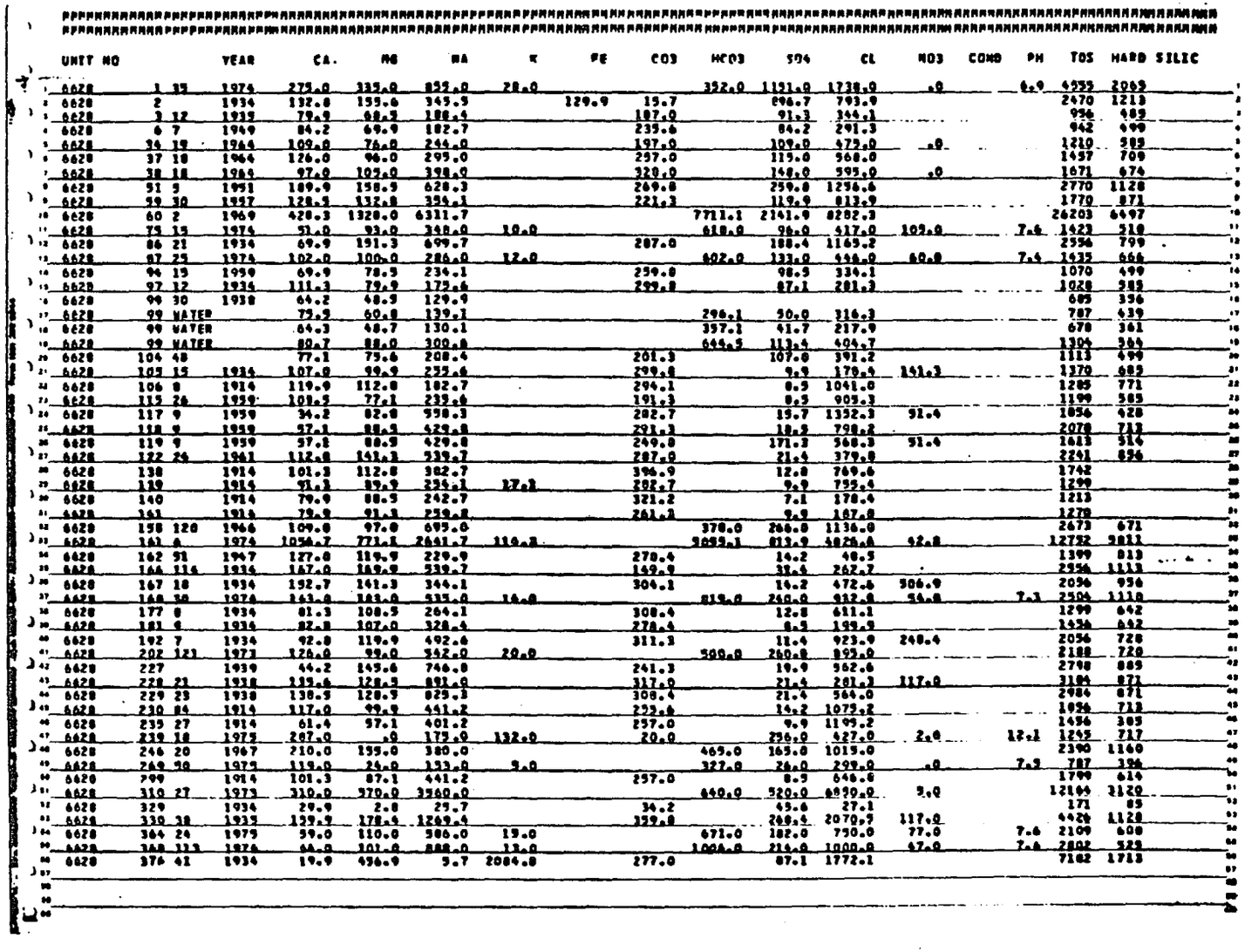
FIGURE A-2 - BORE GENERAL FILE (FORMAT 2)



DEPARTMENT OF MINES - WATER ANALYSIS 25/01/89

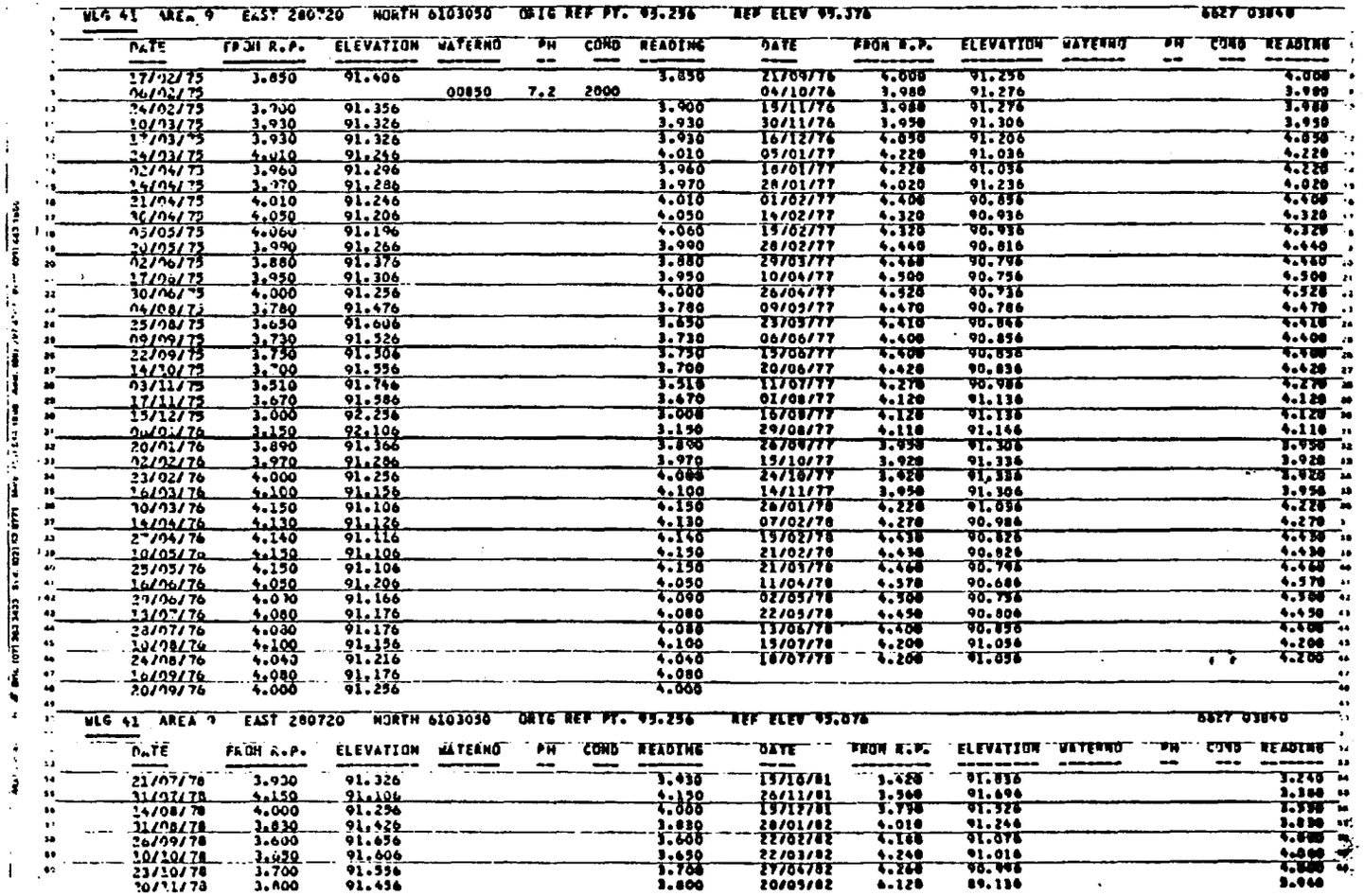
6628 00028			18		196 6628 00091			9	
METHOD			CONDUCTIVITY		METHOD			CONDUCTIVITY	
CATIONS	MG/L	ME/L	TOTAL DISSOLVED SOLIDS		CATIONS	MG/L	ME/L	TOTAL DISSOLVED SOLIDS	
CALCIUM	97.0	4.84	F.C.		CALCIUM	189.0	9.43	F.C.	
MAGNESIUM	105.0	8.64	CALCULATED	1071	MAGNESIUM	158.5	13.04	CALCULATED	2770
SODIUM	398.0	17.31	RESIDUE		SODIUM	628.3	27.33	RESIDUE	
POTASSIUM					POTASSIUM				
IRON					IRON				
			HARDNESS AS CACO3					HARDNESS AS CACO3	
ANIONS			TOTAL CARBONATE	674	ANIONS			TOTAL CARBONATE	1128
CARBONATE	328.0	10.93	NON-CARB		CARBONATE	269.8	8.99	NON-CARB	
BICARBONATE					BICARBONATE				
SULPHATE	148.0	3.08	ALKALINITY		SULPHATE	256.8	5.41	ALKALINITY	
CHLORIDE	995.0	16.78	FREE CO2		CHLORIDE	1256.6	35.45	FREE CO2	
FLUORIDE			SUSPENDED SOLID		FLUORIDE			SUSPENDED SOLID	
NITRATE	0.0	0.00	SILICA		NITRATE			SILICA	
PHOSPHATE			BORON		PHOSPHATE			BORON	
TOTALS AND BALANCE			PH		TOTALS AND BALANCE			PH	
CATIONS (ME/L)	30.7 DIF	0.10			CATIONS (ME/L)	49.7 DIF	0.00		
ANIONS (ME/L)	30.6 SUM	61.30			ANIONS (ME/L)	49.7 SUM	99.40		
DIFF*100 / SUM	=	0.16			DIFF*100 / SUM	=	0.00		

FIGURE A-3 - WATER ANALYSES (FORMAT 1)



UNIT NO		YEAR	CA.	MG	NA	K	FE	CO3	HCO3	SO4	CL	NO3	COND	PH	TDS	HARD	SILIC
6628	1 35	1974	275.0	335.0	855.0	28.0			352.0	1151.0	1738.0	.0		6.9	4555	2065	
6628	2	1934	132.8	155.6	345.5		129.9	15.7		896.7	793.9				2470	1213	
6628	3 12	1939	79.9	68.9	188.4			187.0		91.3	344.1				996	489	
6628	6 7	1949	84.2	69.9	182.7			235.6		84.2	291.3				962	499	
6628	34 19	1964	109.8	76.8	244.0			197.0		109.0	475.0	.0			1210	585	
6628	37 18	1964	126.0	96.0	295.0			297.0		115.0	568.0				1497	709	
6628	38 18	1964	97.0	107.0	398.0			328.0		148.0	595.0	.0			1671	674	
6628	51 9	1951	189.9	158.9	628.3			269.8		259.8	1296.6				2770	1128	
6628	59 30	1957	128.5	132.8	354.1			221.3		119.9	813.9				1770	871	
6628	60 2	1969	428.3	1328.0	6311.7				7711.1	2141.9	8282.3				26203	6497	
6628	75 15	1974	51.0	93.0	348.0	10.0			618.0	98.0	417.0	109.0		7.6	1423	510	
6628	86 21	1934	69.9	191.3	699.7			287.0		188.4	1165.2				2596	799	
6628	87 25	1974	102.0	100.0	286.0	12.0			602.0	133.0	446.0	60.8		7.4	1435	666	
6628	94 15	1959	69.9	78.5	234.1			259.8		98.5	334.1				1070	499	
6628	97 12	1934	111.3	79.9	175.6			299.8		87.1	281.3				1028	545	
6628	98 30	1938	64.2	48.9	129.9										605	356	
6628	99 WATER		75.9	60.8	139.1				296.1	50.0	216.3				787	439	
6628	99 WATER		64.3	48.7	130.1				397.1	41.7	217.9				678	361	
6628	99 WATER		80.7	88.0	300.8				644.5	113.4	404.7				1304	544	
6628	104 48		77.1	75.6	208.4			281.3		107.0	391.2				1113	499	
6628	105 15	1934	107.0	99.9	255.6			299.8		9.9	179.9	141.3			1370	682	
6628	106 8	1914	119.9	112.8	182.7			294.1		8.5	1041.0				1285	771	
6628	115 26	1959	108.5	77.1	239.6			191.3		8.5	909.3				1199	585	
6628	117 9	1959	34.2	82.8	958.3			282.7		19.7	1352.3	91.4			1856	428	
6628	118 9	1959	57.1	88.5	429.8			291.3		18.5	798.2				2078	712	
6628	119 9	1959	57.1	88.5	429.8			249.8		171.3	568.3	91.4			1613	514	
6628	122 24	1961	112.8	141.3	539.7			287.0		21.4	379.8				2241	896	
6628	138	1914	101.3	112.8	382.7			396.9		12.8	769.6				1742		
6628	139	1914	91.3	89.9	236.1	17.2		282.7		9.9	752.4				1299		
6628	140	1914	79.9	88.5	242.7			321.2		7.1	178.4				1213		
6628	141	1914	79.9	91.3	259.8			261.3		9.9	187.8				1279		
6628	158 128	1966	109.8	97.8	695.8				378.8	266.8	1136.8				2673	671	
6628	161 A	1974	1054.7	771.1	2641.7	116.8			5099.1	813.9	4826.8	42.8			12752	5811	
6628	162 91	1947	127.8	119.9	229.9			278.4		14.2	48.5				1399	813	
6628	166 114	1934	167.0	169.9	539.7			149.9		35.4	262.7				2556	1113	
6628	167 18	1934	192.7	141.3	344.1			304.1		14.2	472.6	506.9			2096	956	
6628	168 58	1974	143.0	101.0	535.0	14.0			819.0	240.0	912.0	54.8		7.1	2504	1118	
6628	177 8	1934	81.3	108.5	264.1			308.4		12.8	611.1				1299	642	
6628	181 6	1934	82.8	107.0	328.4			278.4		8.5	199.9				1434	642	
6628	192 7	1934	92.8	119.9	492.6			311.3		11.4	923.9	248.4			2056	728	
6628	202 121	1973	126.0	99.0	542.0	20.0			598.0	240.0	895.0				2188	720	
6628	227	1939	44.2	145.6	746.8			241.3		19.9	562.6				2798	885	
6628	228 21	1938	119.6	128.5	891.0			317.0		21.4	281.3	117.8			3184	871	
6628	229 23	1938	138.5	128.9	829.3			308.4		21.4	564.0				2984	871	
6628	230 84	1914	117.0	99.9	441.2			253.6		14.2	1079.2				1956	713	
6628	235 27	1914	61.4	97.1	401.2			257.0		9.9	1199.2				1496	585	
6628	239 18	1973	287.0	.0	175.0	132.0		20.0		256.0	427.0	2.8		12.1	1245	717	
6628	246 20	1967	210.0	155.0	380.0				469.0	165.8	1015.0				2390	1160	
6628	249 90	1973	119.0	24.0	133.0	9.0			327.0	26.0	299.0	.0		7.3	787	396	
6628	299	1914	101.3	87.1	441.2			257.0		8.5	646.8				1799	614	
6628	310 27	1973	310.0	370.0	3560.0				640.0	520.0	6890.0	9.0			12164	3120	
6628	329	1934	29.9	2.8	29.7			34.2		45.6	27.1				171	85	
6628	330 38	1935	139.9	178.4	1269.4			329.8		248.4	2070.9	117.0			4426	1128	
6628	364 24	1973	59.0	110.0	586.0	19.0			671.0	182.0	750.0	77.0		7.6	2109	608	
6628	368 113	1974	64.0	101.0	888.0	13.0			1004.0	214.0	1000.0	47.0		7.6	2802	525	
6628	376 41	1934	19.9	456.9	9.7	2084.8		277.0		87.1	1772.1				7182	1713	

FIGURE A-4 - WATER ANALYSES (FORMAT 2)



WLG 41 AREA 9 EAST 280720 NORTH 6103030 ORIG REF PT. 95.256 REF ELEV 95.076 6827 03840

DATE	FROM R.P.	ELEVATION	WATERNO	PH	COND	READING	DATE	FROM R.P.	ELEVATION	WATERNO	PH	COND	READING
17/02/75	3.850	91.406				3.850	21/09/76	4.000	91.256				4.000
06/03/75			00850	7.2	2000		04/10/76	3.980	91.276				3.980
24/02/75	3.900	91.356				3.900	15/11/76	3.980	91.276				3.980
10/03/75	3.930	91.326				3.930	30/11/76	3.950	91.306				3.950
17/03/75	3.930	91.326				3.930	16/12/76	4.050	91.206				4.050
24/03/75	4.010	91.246				4.010	05/01/77	4.220	91.036				4.220
02/04/75	3.960	91.296				3.960	16/01/77	4.220	91.036				4.220
14/04/75	3.970	91.286				3.970	28/01/77	4.020	91.236				4.020
21/04/75	4.010	91.246				4.010	01/02/77	4.400	90.856				4.400
30/04/75	4.050	91.206				4.050	14/02/77	4.320	90.936				4.320
05/05/75	4.060	91.196				4.060	15/02/77	4.320	90.936				4.320
20/05/75	3.990	91.266				3.990	28/02/77	4.440	90.816				4.440
02/06/75	3.880	91.376				3.880	29/03/77	4.460	90.796				4.460
17/06/75	3.950	91.306				3.950	10/04/77	4.500	90.756				4.500
30/06/75	4.000	91.256				4.000	26/04/77	4.528	90.736				4.528
04/08/75	3.780	91.476				3.780	09/05/77	4.470	90.786				4.470
25/08/75	3.650	91.606				3.650	23/05/77	4.410	90.846				4.410
09/09/75	3.730	91.526				3.730	06/06/77	4.400	90.856				4.400
22/09/75	3.750	91.506				3.750	15/06/77	4.400	90.856				4.400
14/10/75	3.700	91.556				3.700	20/06/77	4.420	90.836				4.420
03/11/75	3.510	91.746				3.510	11/07/77	4.270	90.986				4.270
17/11/75	3.670	91.586				3.670	01/08/77	4.120	91.136				4.120
15/12/75	3.000	92.256				3.008	16/08/77	4.120	91.136				4.120
06/01/76	3.150	92.106				3.150	29/08/77	4.110	91.146				4.110
20/01/76	3.890	91.366				3.890	26/09/77	3.950	91.306				3.950
02/02/76	3.970	91.286				3.970	15/10/77	3.920	91.336				3.920
23/02/76	4.000	91.256				4.000	24/10/77	3.920	91.336				3.920
16/03/76	4.100	91.156				4.100	14/11/77	3.950	91.306				3.950
30/03/76	4.150	91.106				4.150	26/01/78	4.220	91.036				4.220
14/04/76	4.130	91.126				4.130	07/02/78	4.270	90.986				4.270
27/04/76	4.140	91.116				4.140	15/02/78	4.430	90.826				4.430
10/05/76	4.150	91.106				4.150	21/02/78	4.430	90.826				4.430
25/05/76	4.150	91.106				4.150	21/03/78	4.460	90.796				4.460
16/06/76	4.050	91.206				4.050	11/04/78	4.520	90.686				4.520
29/06/76	4.090	91.166				4.090	02/05/78	4.500	90.756				4.500
13/07/76	4.080	91.176				4.080	22/05/78	4.450	90.806				4.450
28/07/76	4.080	91.176				4.080	13/06/78	4.400	90.856				4.400
10/08/76	4.100	91.156				4.100	19/07/78	4.200	91.056				4.200
24/08/76	4.040	91.216				4.040	18/07/78	4.200	91.056				4.200
16/09/76	4.080	91.176				4.080							
20/09/76	4.000	91.256				4.000							

WLG 41 AREA 9 EAST 280720 NORTH 6103030 ORIG REF PT. 95.256 REF ELEV 95.076 6827 03840

DATE	FROM R.P.	ELEVATION	WATERNO	PH	COND	READING	DATE	FROM R.P.	ELEVATION	WATERNO	PH	COND	READING
21/07/78	3.930	91.326				3.930	15/10/81	3.820	91.436				3.820
31/07/78	4.150	91.106				4.150	26/11/81	3.900	91.696				3.900
14/08/78	4.000	91.256				4.000	19/12/81	3.750	91.326				3.750
31/08/78	3.830	91.426				3.830	28/01/82	4.010	91.246				4.010
26/09/78	3.600	91.656				3.600	22/02/82	4.188	91.076				4.080
10/10/78	3.650	91.606				3.650	22/03/82	4.240	91.016				4.000
23/10/78	3.700	91.556				3.700	27/04/82	4.268	90.988				4.000
30/11/78	3.800	91.456				3.800	20/05/82	4.120	89.136				3.940

FIGURE A-5 - OBSERVATION WELL FILE DATA PRINTOUT

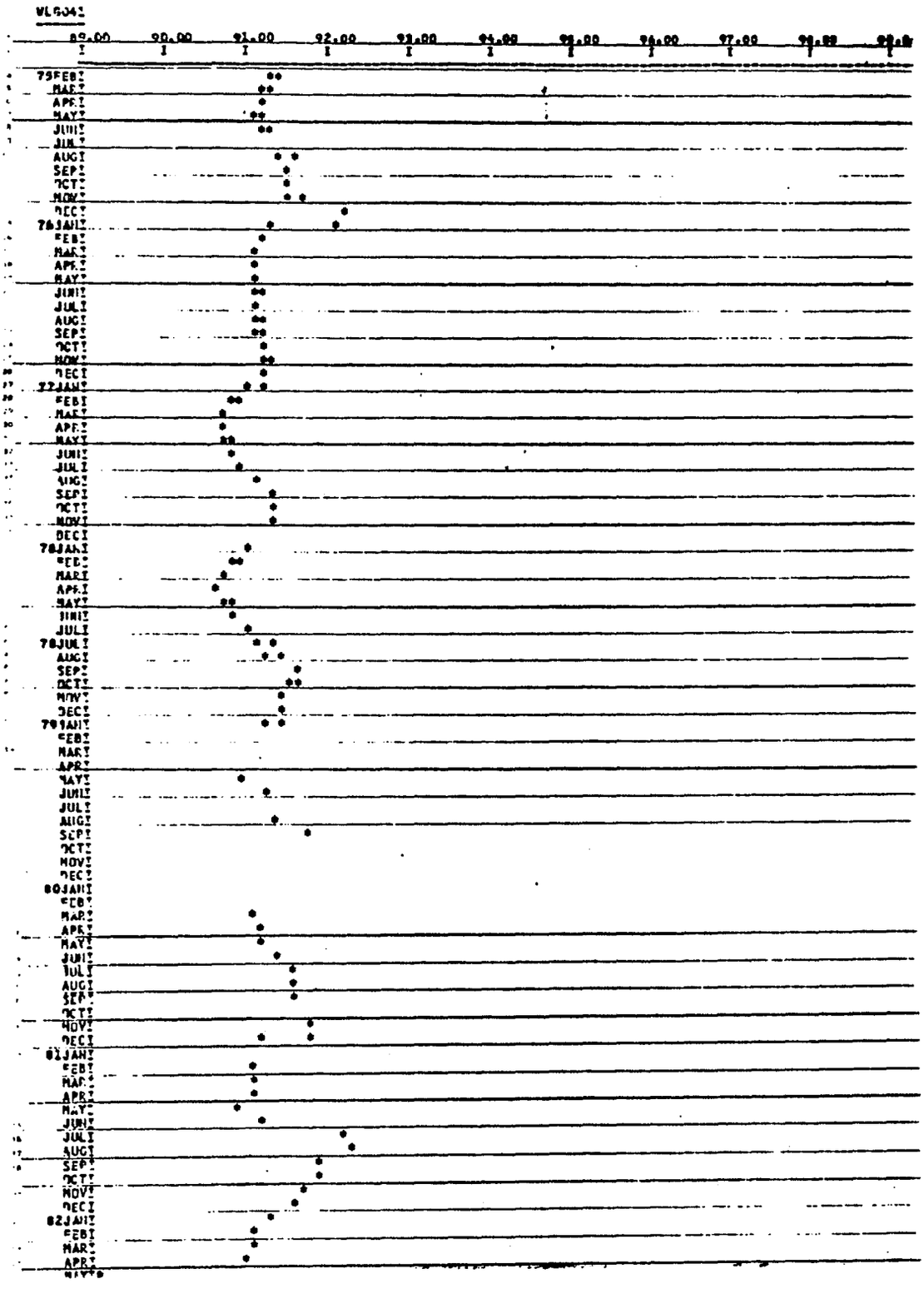
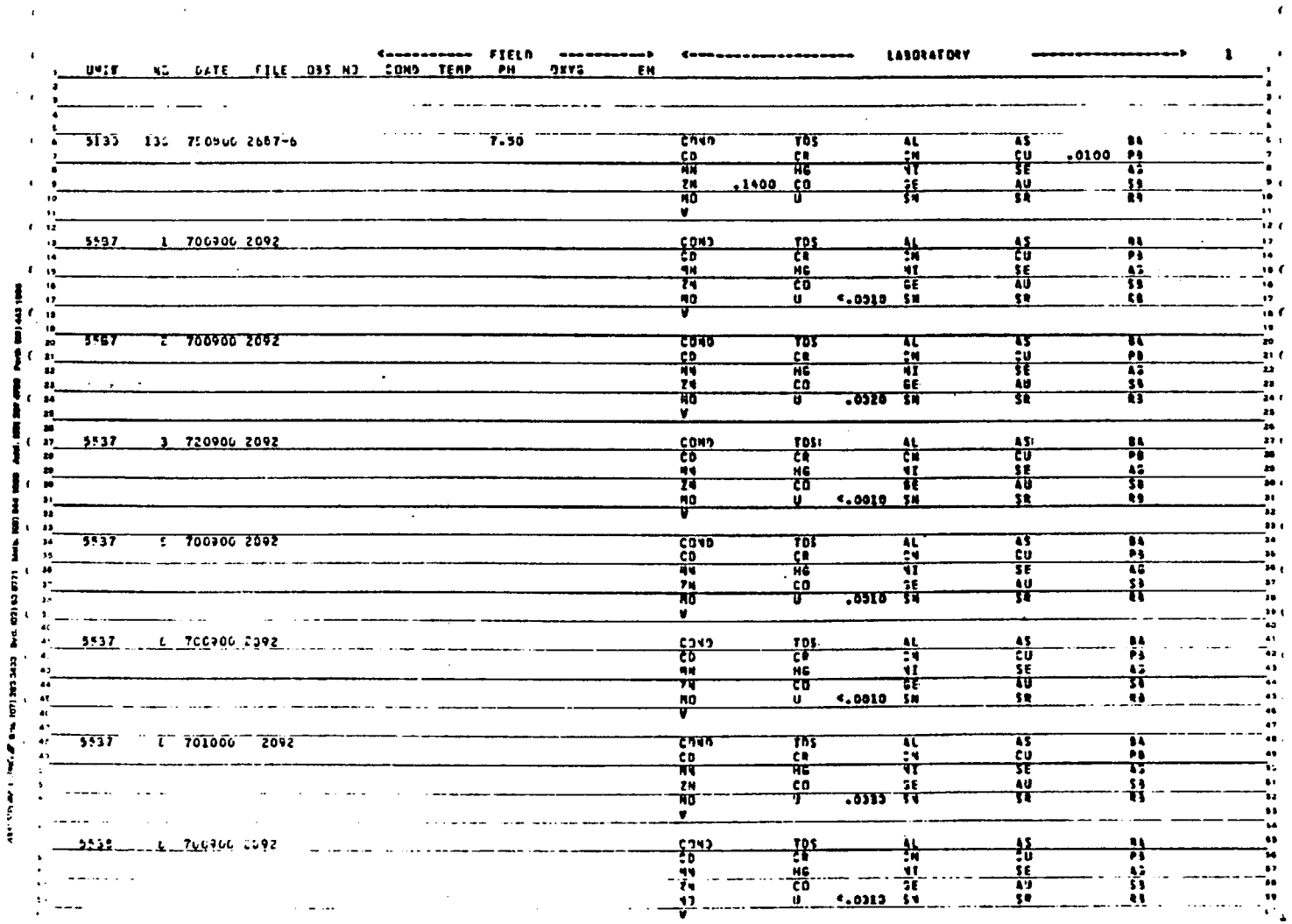
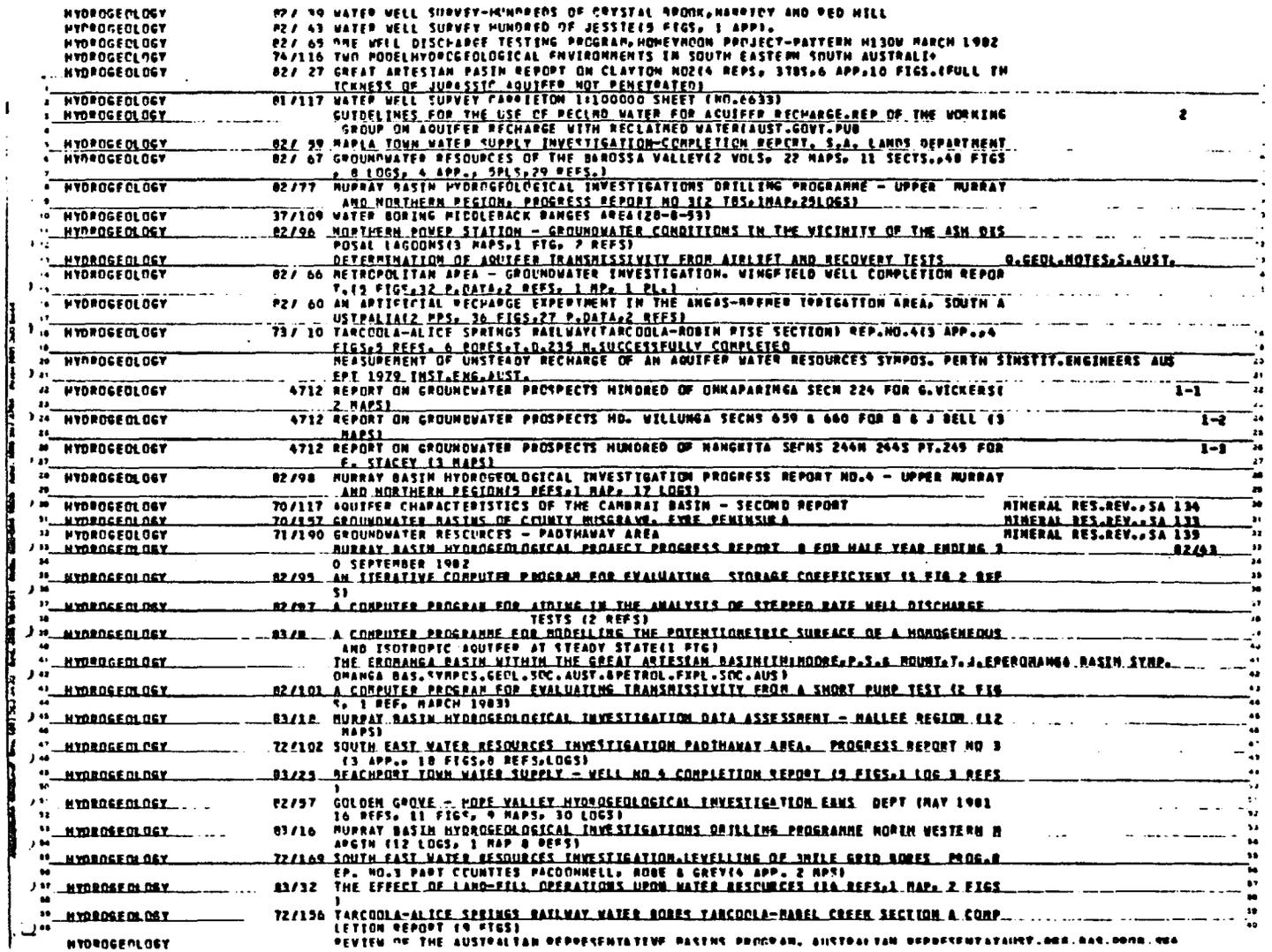


FIGURE A-6 - OBSERVATION WELL FILE SAMPLE HYDROGRAPH



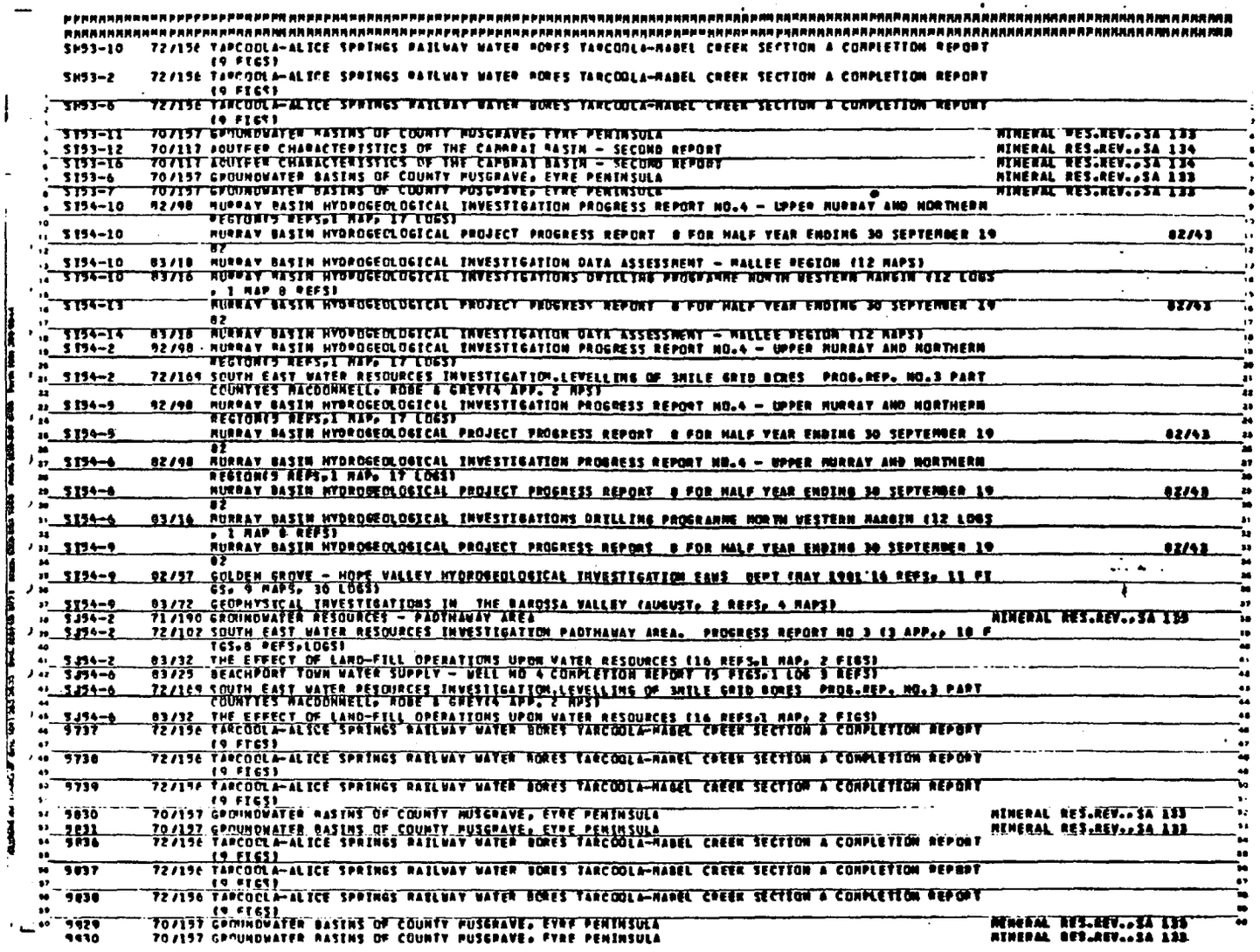
USGS	NO	DATE	FILE	OBS NO	FIELD COND	FIELD TEMP	FIELD PH	FIELD OXYG	FIELD EH	LABORATORY					
5135	130	750906	2687-6				7.50			COND	TDS	AL	AS		BA
										CD	CR	CN	CU	.0100	PB
										MN	HG	NI	SE		AG
										ZN	.1400 CO	GE	AU		SB
										MO	U	SN	SR		RB
										V					
5537	1	700906	2092							COND	TDS	AL	AS		BA
										CD	CR	CN	CU		PB
										MN	HG	NI	SE		AG
										ZN	CO	GE	AU		SB
										MO	U	<.0010	SN		SR
										V					
5537	2	700906	2092							COND	TDS	AL	AS		BA
										CD	CR	CN	CU		PB
										MN	HG	NI	SE		AG
										ZN	CO	GE	AU		SB
										MO	U	.0020	SN		SR
										V					
5537	3	720906	2092							COND	TDS	AL	AS		BA
										CD	CR	CN	CU		PB
										MN	HG	NI	SE		AG
										ZN	CO	GE	AU		SB
										MO	U	<.0010	SN		SR
										V					
5537	5	700906	2092							COND	TDS	AL	AS		BA
										CD	CR	CN	CU		PB
										MN	HG	NI	SE		AG
										ZN	CO	GE	AU		SB
										MO	U	.0010	SN		SR
										V					
5537	6	700906	2092							COND	TDS	AL	AS		BA
										CD	CR	CN	CU		PB
										MN	HG	NI	SE		AG
										ZN	CO	GE	AU		SB
										MO	U	<.0010	SN		SR
										V					
5537	1	701006	2092							COND	TDS	AL	AS		BA
										CD	CR	CN	CU		PB
										MN	HG	NI	SE		AG
										ZN	CO	GE	AU		SB
										MO	U	.0383	SN		SR
										V					
5537	6	700906	2092							COND	TDS	AL	AS		BA
										CD	CR	CN	CU		PB
										MN	HG	NI	SE		AG
										ZN	CO	GE	AU		SB
										MO	U	<.0383	SN		SR
										V					

FIGURE A-7 - TRACE ELEMENT FILE



HYDROGEOLOGY 82/ 39 WATER WELL SURVEY-HUNDREDS OF CRYSTAL BROOK,NARROTY AND RED HILL
HYDROGEOLOGY 82/ 43 WATER WELL SURVEY HUNDRED OF JESSTE(9 FIGS, 1 APP).
HYDROGEOLOGY 82/ 69 ONE WELL DISCHARGE TESTING PROGRAM,HONEYMOON PROJECT-PATTERN M130W MARCH 1982
HYDROGEOLOGY 74/116 TWO MODELHYDROGEOLOGICAL ENVIRONMENTS IN SOUTH EASTERN SOUTH AUSTRALI+
HYDROGEOLOGY 82/ 27 GREAT ARTESIAN BASIN REPORT ON CLAYTON NO2(4 REPS, 3789,6 APP,10 FIGS.(FULL TH ICKNESS OF JURASSIC AQUIFER NOT PENETRATED)
HYDROGEOLOGY 81/117 WATER WELL SURVEY PARKIETON 1:100000 SHEET (NO.6633)
HYDROGEOLOGY GUIDELINES FOR THE USE OF RECLND WATER FOR AQUIFER RECHARGE.REP OF THE WORKING GROUP ON AQUIFER RECHARGE WITH RECLAIMED WATER(AUST.GOVT.PUB 2
HYDROGEOLOGY 82/ 99 MAPLA TOWN WATER SUPPLY INVESTIGATION-COMPLETION REPORT, S.A. LANDS DEPARTMENT
HYDROGEOLOGY 82/ 67 GROUNDWATER RESOURCES OF THE BAROSSA VALLEY(2 VOLS, 22 MAPS, 11 SECTS.,48 FIGS , 8 LOGS, 4 APP., 5PLS,29 REFS.)
HYDROGEOLOGY 82/77 MURRAY BASIN HYDROGEOLOGICAL INVESTIGATIONS DRILLING PROGRAMME - UPPER MURRAY AND NORTHERN REGION, PROGRESS REPORT NO 3(2 TBS,1MAP,29LOGS)
HYDROGEOLOGY 37/109 WATER BORING MIDDLEBACK RANGES AREA(28-8-53)
HYDROGEOLOGY 82/96 NORTHERN POWER STATION - GROUNDWATER CONDITIONS IN THE VICINITY OF THE ASH DIS POSAL LAGOONS(3 MAPS,1 FIG, 2 REFS)
HYDROGEOLOGY DETERMINATION OF AQUIFER TRANSMISSIVITY FROM AIRLIFT AND RECOVERY TESTS Q.GEOL.NOTES,S.AUST.
HYDROGEOLOGY 82/ 66 METROPOLITAN AREA - GROUNDWATER INVESTIGATION. WINGFIELD WELL COMPLETION REPOR T,(2 FIGS,32 P.DATA,2 REFS, 1 MAP, 1 PL.)
HYDROGEOLOGY 82/ 60 AN ARTIFICIAL RECHARGE EXPERIMENT IN THE ANGAS-BREMER IRRIGATION AREA, SOUTH A USTRALIA(2 PPS, 36 FIGS,27 P.DATA,2 REFS)
HYDROGEOLOGY 73/ 10 TARCOOLA-ALICE SPRINGS RAILWAY(TARCOOLA-ROBIN RISE SECTION) REP.NO.4(3 APP.,4 FIGS,9 REFS, 6 BORES,T.D.235 M.SUCCESSFULLY COMPLETED
HYDROGEOLOGY MEASUREMENT OF UNSTEADY RECHARGE OF AN AQUIFER WATER RESOURCES SYMPOS. PERTH SINSTIT.ENGINEERS AUS EPT 1979 INST.ENG.AUST.
HYDROGEOLOGY 4712 REPORT ON GROUNDWATER PROSPECTS HUNDRED OF ONKAPARINGA SECN 224 FOR G.VICKERS(2 MAPS) 1-1
HYDROGEOLOGY 4712 REPORT ON GROUNDWATER PROSPECTS HD. WILLUNGA SECNS 659 & 660 FOR B & J BELL (3 MAPS) 1-2
HYDROGEOLOGY 4712 REPORT ON GROUNDWATER PROSPECTS HUNDRED OF NANGKITA SECNS 244N 244S PT.249 FOR E. STACEY (3 MAPS) 1-3
HYDROGEOLOGY 82/98 MURRAY BASIN HYDROGEOLOGICAL INVESTIGATION PROGRESS REPORT NO.4 - UPPER MURRAY AND NORTHERN REGION(5 REFS,1 MAP, 17 LOGS)
HYDROGEOLOGY 70/117 AQUIFER CHARACTERISTICS OF THE CAMBRAI BASIN - SECOND REPORT MINERAL RES.REV.,SA 134
HYDROGEOLOGY 70/157 GROUNDWATER BASINS OF COUNTY MUSGRAVE, EYRE PENINSULA MINERAL RES.REV.,SA 133
HYDROGEOLOGY 71/190 GROUNDWATER RESOURCES - PADTHAWAY AREA MINERAL RES.REV.,SA 139
HYDROGEOLOGY MURRAY BASIN HYDROGEOLOGICAL PROJECT PROGRESS REPORT 8 FOR HALF YEAR ENDING 3 82/93
0 SEPTEMBER 1982
HYDROGEOLOGY 82/95 AN ITERATIVE COMPUTER PROGRAM FOR EVALUATING STORAGE COEFFICIENT (1 FIG 2 REF S)
HYDROGEOLOGY 82/97 A COMPUTER PROGRAM FOR AIDING IN THE ANALYSIS OF STEPPED RATE WELL DISCHARGE TESTS (2 REFS)
HYDROGEOLOGY 83/8 A COMPUTER PROGRAMME FOR MODELLING THE POTENTIOMETRIC SURFACE OF A HOMOGENEOUS AND ISOTROPIC AQUIFER AT STEADY STATE(1 FIG)
HYDROGEOLOGY THE ERDMANGA BASIN WITHIN THE GREAT ARTESIAN BASIN(IN:MOORE,P.J.& MOUNT,T.J.,ERDMANGA BASIN SYMP. ORMANGA BAS.SYMPOS.GEOL.SOC.AUST.&PETROL.EXPL.SOC.AUS)
HYDROGEOLOGY 82/101 A COMPUTER PROGRAM FOR EVALUATING TRANSMISSIVITY FROM A SHORT PUMP TEST (2 FIG S, 1 REF, MARCH 1983)
HYDROGEOLOGY 83/18 MURRAY BASIN HYDROGEOLOGICAL INVESTIGATION DATA ASSESSMENT - MALLEE REGION (12 MAPS)
HYDROGEOLOGY 72/102 SOUTH EAST WATER RESOURCES INVESTIGATION PADTHAWAY AREA. PROGRESS REPORT NO 3 (3 APP., 18 FIGS,8 REFS,LOGS)
HYDROGEOLOGY 83/25 BEACHPORT TOWN WATER SUPPLY - WELL NO 4 COMPLETION REPORT (9 FIGS,1 LOG 3 REFS)
HYDROGEOLOGY 82/57 GOLDEN GROVE - HOPE VALLEY HYDROGEOLOGICAL INVESTIGATION EANS DEPT (MAY 1981 16 REFS, 11 FIGS, 9 MAPS, 30 LOGS)
HYDROGEOLOGY 83/16 MURRAY BASIN HYDROGEOLOGICAL INVESTIGATIONS DRILLING PROGRAMME NORTH WESTERN R APGIN (12 LOGS, 1 MAP 8 REFS)
HYDROGEOLOGY 72/169 SOUTH EAST WATER RESOURCES INVESTIGATION.LEVELLING OF SMALE GRID BORES PROG.R EP. NO.3 PART COUNTIES MACDONNELL, ROBE & GREY(4 APP., 2 MPS)
HYDROGEOLOGY 83/32 THE EFFECT OF LAND-FILL OPERATIONS UPON WATER RESOURCES (16 REFS,1 MAP, 2 FIGS)
HYDROGEOLOGY 72/156 TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES TARCOOLA-MABEL CREEK SECTION A COMP LETION REPORT (9 FIGS)
HYDROGEOLOGY REVIEW OF THE AUSTRALIAN REPRESENTATIVE BASINS PROGRAM, AUSTRALIAN REPRESENTATIVE.BAS.BAS.PROG.REV

FIGURE A-8 - HYDROLOGY REPORTS



SM93-10	72/156	TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES TARCOOLA-MABEL CREEK SECTION A COMPLETION REPORT (9 FIGS)		
SM93-2	72/156	TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES TARCOOLA-MABEL CREEK SECTION A COMPLETION REPORT (9 FIGS)		
SM93-6	72/156	TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES TARCOOLA-MABEL CREEK SECTION A COMPLETION REPORT (9 FIGS)		
SI93-11	70/157	GROUNDWATER BASINS OF COUNTY MUSGRAVE, EYRE PENINSULA	MINERAL RES.REV.,SA 133	
SI93-12	70/117	AQUIFER CHARACTERISTICS OF THE CAMBRAI BASIN - SECOND REPORT	MINERAL RES.REV.,SA 134	
SI93-16	70/111	AQUIFER CHARACTERISTICS OF THE CAMBRAI BASIN - SECOND REPORT	MINERAL RES.REV.,SA 134	
SI93-6	70/157	GROUNDWATER BASINS OF COUNTY MUSGRAVE, EYRE PENINSULA	MINERAL RES.REV.,SA 133	
SI93-7	70/157	GROUNDWATER BASINS OF COUNTY MUSGRAVE, EYRE PENINSULA	MINERAL RES.REV.,SA 133	
SI94-10	82/98	MURRAY BASIN HYDROGEOLOGICAL INVESTIGATION PROGRESS REPORT NO.4 - UPPER MURRAY AND NORTHERN REGIONS (9 REFS,1 MAP, 17 LOGS)		
SI94-10		MURRAY BASIN HYDROGEOLOGICAL PROJECT PROGRESS REPORT 8 FOR HALF YEAR ENDING 30 SEPTEMBER 19 82		82/43
SI94-10	83/18	MURRAY BASIN HYDROGEOLOGICAL INVESTIGATION DATA ASSESSMENT - MALLEE REGION (12 MAPS)		
SI94-10	83/16	MURRAY BASIN HYDROGEOLOGICAL INVESTIGATIONS DRILLING PROGRAMME NORTH WESTERN MARGIN (12 LOGS , 1 MAP 8 REFS)		
SI94-13		MURRAY BASIN HYDROGEOLOGICAL PROJECT PROGRESS REPORT 8 FOR HALF YEAR ENDING 30 SEPTEMBER 19 82		82/43
SI94-14	83/18	MURRAY BASIN HYDROGEOLOGICAL INVESTIGATION DATA ASSESSMENT - MALLEE REGION (12 MAPS)		
SI94-2	82/98	MURRAY BASIN HYDROGEOLOGICAL INVESTIGATION PROGRESS REPORT NO.4 - UPPER MURRAY AND NORTHERN REGIONS (9 REFS,1 MAP, 17 LOGS)		
SI94-2	72/169	SOUTH EAST WATER RESOURCES INVESTIGATION.LEVELLING OF 3MILE GRID BORES PROG.REP. NO.3 PART COUNTIES MACDONNELL, ROBE & GREY(4 APP, 2 MPS)		
SI94-9	82/98	MURRAY BASIN HYDROGEOLOGICAL INVESTIGATION PROGRESS REPORT NO.4 - UPPER MURRAY AND NORTHERN REGIONS (9 REFS,1 MAP, 17 LOGS)		
SI94-9		MURRAY BASIN HYDROGEOLOGICAL PROJECT PROGRESS REPORT 8 FOR HALF YEAR ENDING 30 SEPTEMBER 19 82		82/43
SI94-6	82/98	MURRAY BASIN HYDROGEOLOGICAL INVESTIGATION PROGRESS REPORT NO.4 - UPPER MURRAY AND NORTHERN REGIONS (9 REFS,1 MAP, 17 LOGS)		
SI94-6		MURRAY BASIN HYDROGEOLOGICAL PROJECT PROGRESS REPORT 8 FOR HALF YEAR ENDING 30 SEPTEMBER 19 82		82/43
SI94-6	83/16	MURRAY BASIN HYDROGEOLOGICAL INVESTIGATIONS DRILLING PROGRAMME NORTH WESTERN MARGIN (12 LOGS , 1 MAP 8 REFS)		
SI94-9		MURRAY BASIN HYDROGEOLOGICAL PROJECT PROGRESS REPORT 8 FOR HALF YEAR ENDING 30 SEPTEMBER 19 82		82/43
SI94-9	82/57	GOLDEN GROVE - HOPE VALLEY HYDROGEOLOGICAL INVESTIGATION E&WS DEPT (MAY 1981'16 REFS, 11 FI GS, 9 MAPS, 30 LOGS)		
SI94-9	83/72	GEOPHYSICAL INVESTIGATIONS IN THE BAROSSA VALLEY (AUGUST, 2 REFS, 4 MAPS)		
SJ94-2	71/190	GROUNDWATER RESOURCES - PADTHAWAY AREA	MINERAL RES.REV.,SA 135	
SJ94-2	72/102	SOUTH EAST WATER RESOURCES INVESTIGATION PADTHAWAY AREA. PROGRESS REPORT NO 3 (3 APP,, 10 F TGS.8 REFS,LOGS)		
SJ94-2	83/32	THE EFFECT OF LAND-FILL OPERATIONS UPON WATER RESOURCES (16 REFS,1 MAP, 2 FIGS)		
SJ94-6	83/25	BEACHPORT TOWN WATER SUPPLY - WELL NO 4 COMPLETION REPORT 15 FIGS,1 LOG 3 REFS)		
SJ94-6	72/169	SOUTH EAST WATER RESOURCES INVESTIGATION.LEVELLING OF 3MILE GRID BORES PROG.REP. NO.3 PART COUNTIES MACDONNELL, ROBE & GREY(4 APP, 2 MPS)		
SJ94-6	83/32	THE EFFECT OF LAND-FILL OPERATIONS UPON WATER RESOURCES (16 REFS,1 MAP, 2 FIGS)		
9737	72/156	TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES TARCOOLA-MABEL CREEK SECTION A COMPLETION REPORT (9 FIGS)		
9738	72/156	TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES TARCOOLA-MABEL CREEK SECTION A COMPLETION REPORT (9 FIGS)		
9739	72/156	TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES TARCOOLA-MABEL CREEK SECTION A COMPLETION REPORT (9 FIGS)		
9830	70/157	GROUNDWATER BASINS OF COUNTY MUSGRAVE, EYRE PENINSULA	MINERAL RES.REV.,SA 133	
9831	70/157	GROUNDWATER BASINS OF COUNTY MUSGRAVE, EYRE PENINSULA	MINERAL RES.REV.,SA 133	
9836	72/156	TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES TARCOOLA-MABEL CREEK SECTION A COMPLETION REPORT (9 FIGS)		
9837	72/156	TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES TARCOOLA-MABEL CREEK SECTION A COMPLETION REPORT (9 FIGS)		
9838	72/156	TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES TARCOOLA-MABEL CREEK SECTION A COMPLETION REPORT (9 FIGS)		
9929	70/157	GROUNDWATER BASINS OF COUNTY MUSGRAVE, EYRE PENINSULA	MINERAL RES.REV.,SA 133	
9930	70/157	GROUNDWATER BASINS OF COUNTY MUSGRAVE, EYRE PENINSULA	MINERAL RES.REV.,SA 133	

FIGURE A-9 - GROUNDWATER INVESTIGATION REPORTS

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept. Bk. No.82/58
D.M.E. No. 237/82
Disk No.11

INDEX OF HYDROGEOLOGY REPORTS

ABSTRACT

This index of all groundwater reports from the South Australian Department of Mines and Energy Bibliography (SADMEB) facilitate the search for groundwater prospects reports of small areas (usually specific properties). A series of index maps also show the availability of those reports and the areas of more general hydrogeological investigations.

INTRODUCTION AND PURPOSE

Of the bibliography indexes available at Technical Information Services (TIS) for searches for groundwater information the main one used is a listing according to map area of all hydrogeological and engineering geology reports. The bibliographical details are listed under 1:250 000 and 1:100 000 map sheets, but in the southern Mt Lofty Ranges the reports are so numerous that it is impractical to scan for them. For example, the 1:100 000 scale map sheet covering the Adelaide metropolitan area (see Fig. 2a) contains about 1 000 entries.

A large proportion of groundwater reports are of surveys which were undertaken for landholders of farming and grazing properties by Department geologists before 1973 when groundwater enquiries were taken over by TIS. Many other reports such as groundwater prospects for government properties and township supplies are also specific to small areas and are only brief and of limited general value. They do however include useful information obtained by site investigation, particularly in fractured rock areas, of conditions relevant to groundwater prospects and well siting.

A new index of hydrogeology reports has been prepared by the author and B. Rescignano to facilitate the search for these brief reports (referred to as Groundwater Prospects Reports). This is mainly for the use of TIS personnel when answering groundwater enquiries from farmers and graziers. Index maps have been prepared to show the areas for which these reports are available. Areas covered by more general hydrogeological studies are also shown.

THE INDEXES

Hydrogeology Bibliography Index (on computer printout)

This contains a comprehensive listing of groundwater reports from the Department of Mines and Energy Bibliography (SADMEB). The computer printout is kept at TIS and has two listings of reports:

a) Groundwater Prospects Reports listed alphabetically by Hundred, and numerically by Section.

b) Reports of more general hydrogeological studies listed according to 1:250 000 and 1:100 000 map area.

Index Maps of Groundwater Prospects Reports

Figure 1 indicates the Hundreds that contain Groundwater Prospects Reports. In the southern Mt Lofty Ranges Groundwater Prospects Reports are very numerous and Figure 2 is a reference to the sections that contain them in this area. Groundwater Prospects Reports donated to the Department by private groundwater consultants, C. Bleys and Associates and D.B. Clarke & Associates are also referred to on this map. The index to the bibliographical details of these surveys is the new Hydrogeology Index on computer printout.

Index Maps of Hydrogeological Studies of Larger Areas

These are shown on Figures 1, 2, 3 and 4. The index maps are not comprehensive, and the reports were chosen on the basis of their usefulness for deriving general groundwater prospect information.

Supplementary Indexes

Appendix 1 contains indexes for reports on

1) Water Well Surveys of Hundreds in area 5 (See Fig. 1)
2) Groundwater prospects for townships
3) Groundwater prospects for schools
4) Groundwater prospects for pastoral stations - the location of these stations may be obtained from a 1:100 000 scale map of South Australia showing pastoral runs (see References)
5) General hydrogeological reports not suitable for presentation on the index maps.

REFERENCES

Dept Lands, S.A. Map of South Australia showing land utilisation and pastoral runs 1:100 000 scale.

Gerdes, L.A. Retrieval of information from SADMEB (South Australian Department of Mines and Energy Bibliography) S. Aust. Dept. Mines and Energy report 79/70 (unpublished).

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A3 GROUNDWATER PROSPECTS AND SUPPLIES FOR TOWNSHIPS	
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A5 GROUNDWATER PROSPECTS FOR STATIONS	
A6 GENERAL HYDROGEOLOGY REPORTS	

FIGURES

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FIGURE A-10

EXTRACT FROM REPT. BK. NO. 82/58.
INDEX OF HYDROGEOLOGY REPORTS MAY 1984.
DME 237/82.

BORE DATA
DATA FOR JOHN WATERHOUSE

SAMPLING DATE	pH	TOTAL DISSOLVED SALTS	COND AT 25 C	FLUORIDE	NITRATE+ NITRITE AS N
	pH UNITS	mg/L	uS/cm	mg/L	mg/L
TARPEENA BORE NO.2					
LOC NO. 2370					
08/02/84	7.6	580	1060	0.14	<0.01
15/08/84	7.3	570	1040	0.13	0.02
MINIMUM	7.3	570	1040	0.13	<0.01
MAXIMUM	7.6	580	1060	0.14	0.02
AVERAGE	7.5	580	1050	0.14	0.02
MEDIAN	7.5	580	1050	0.14	0.02
MEAN SQ	0.0450	87.952	288.00	0.0001	0.0001
NUMBER	2	2	2	2	2

BORE DATA
DATA FOR JOHN WATERHOUSE

SAMPLING DATE	pH	TOTAL DISSOLVED SALTS	COND AT 25 C	FLUORIDE	NITRATE+ NITRITE AS N
	pH UNITS	mg/L	uS/cm	mg/L	mg/L
TARPEENA BORE NO.1					
LOC NO. 2369					
08/02/84	7.5	620	1130	0.15	<0.01
15/08/84	7.3	570	1040	0.13	0.02
MINIMUM	7.3	570	1040	0.13	<0.01
MAXIMUM	7.5	620	1130	0.15	0.02
AVERAGE	7.4	600	1080	0.14	0.02
MEDIAN	7.4	600	1080	0.14	0.02
MEAN SQ	0.0200	1265.1	4140.5	0.0002	0.0001
NUMBER	2	2	2	2	2

FIGURE A-11 - EXAMPLE OF WATER ANALYSES DATA

APPENDIX B
NEW SOUTH WALES GROUNDWATER DATA BASE

APPENDIX B
NEW SOUTH WALES GROUNDWATER DATA BASE

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Appendix B
NEW SOUTH WALES GROUNDWATER DATA BASE

B1.0 INTRODUCTION

The Water Resources Commission is the official repository of all data relating to water supply boreholes in the State. At present data on approximately 60,000 bores and wells are recorded in several ways as outlined below.

B2.0 WATER RESOURCES COMMISSION DATA

B2.1 Individual Well Records

The present 60,000 well records are believed to come from a total of some 100,000 wells in the State.

Data earlier than about the mid-seventies were recorded on a manual bore card system. However, all data since this time plus the bore card system data have now been transferred to the computer data system.

B2.2 Computer Based Data Storage

Data from this system are available in microfiche form. The system includes the following files:

- Bore Master/Lithology File
- Chemistry File
- Hydrographic file
- Artesian File
- Licensing File
- Groundwater Returns File

This data base system is presently run on a Burroughs computer operated by . In addition, an in-house Digital 11/23 mini-computer operated by the Hydrogeological Section is utilised to manipulate data from the chemistry and hydrographic files. This system has available a 9 track tape drive which reads in either ASCII or EBSIDIC format. The system has a 40 megabyte disc which is to be upgraded to 330 megabytes.

B2.2.1 Bore Master/Lithology File

This file carries all the data on the location and construction of the borehole. Location data include co-ordinates (which are compatible with machine use), land titles (to facilitate ad hoc inquiries and linking with licensing information) and river basins (to facilitate linking with future surface water data systems). Construction data include details of all casing and screens, aquifers penetrated (depth, thickness, yield, salinities), and any gravel pack used. These are treated as series of repetitive sub-records to save space. In order to fulfil its function as the basic enquiry file, the Bore Master file also carries brief details (if available) of pumping tests, hydrogeological parameters, water salinity, any reconditioning or refitting of the borehole, present and proposed use, and other administrative data.

'Free format' notes are also allowed in the file if required.
The lithology data include drillers' logs and, if available, geologists' logs and grain-size analyses. The logs are reduced to a complex series of numeric and alphabetic codes for storage and manipulation, but are expanded

to a more readily understood mnemonic form on the printed listings. A lengthy dictionary has been developed to cover the wide variety of terms used in this file.

Figures B-1, B-2 and B-3 are examples of the microfiche output of the bore master/lithology file. These data can be readily accessed in the Hydrogeological Section data base system. Figure B-1 presents data from a private bore and drillers logs whilst Figure B-2 presents data from a Commission constructed borehole including a geologist's lithological description. Figure B-3 presents data for an artesian bore located in the Great Artesian Basin (see also B2) below.

Access to data can be made by locating the area of interest on a series of graticules covering the State for which there a key diagram showing the respective locations of these graticules. Bore locations are now being transferred onto either 1:50,000 or 1:25,000 topographic maps where available. Locations of these maps have been superimposed on the graticule key diagram so that a graticule reference can be related back to the map where the bore location is recorded.

In addition a northerly and easterly co-ordinate is recorded to further facilitate plotting the bore location on these maps.

Locations on each graticule are further defined by an alpha numeric scheme where the letters A to D on the top of the graticule and numbers 1 to 4 on the side subdivide the graticule in the vertical and horizontal directions respectively. Thus in Figure B-1 79B2 refers to graticule 79 and location B2.

Access to data is also possible by defining a window within an area using the northings and eastings to define the corners of this window.

Statistical manipulation of data is also possible; however, specific requests normally require programming input from the computer data programs to extract the information required.

B2.2.2. Chemistry File

The Chemistry File carries water quality analysis information for the major ions and also groups of less commonly measured parameters, including some bacteriological data. The chemistry file, although initially devised to include only groundwater, now also includes surface water. Hardness, sodium adsorption ratio and ionic balance are determined by the computer program.

Figure B-4 presents standard analyses at different dates for Commission bore 36052 whilst Figure B-5 presents analysis for a number of bores which include data on more specific constituents.

The analyses are accessed by reference to graticule map number and co-ordinate number (ie. 8A2 - graticule 8 co-ordinate A2).

Statistical information or specific selection of data is possible, although some requests would require additional programming or modification to existing programs. Data can also be extracted by the defining an area window using northings and eastings to define the corners of this window.

A program exists, for example, which will extract groundwater analyses considered suitable for mineral waters based on specific ionic strengths.

B2.2.3 Hydrographic File

The hydrographic file contains records of water levels measured periodically in Commission observation holes. In general water levels are not measured more than once a month but the hydrographic file is capable of accepting data taken at one minute intervals if necessary. Figure B-6 presents the microfiche printout of the data for Bore 36325. Again, refernce to location is provided by the graticule map number and graticule co-ordinates.

Data may be plotted as hydrographs using an in-house mini-computer system. In this case data are transferred to a nine track tape (ie. ASCII or EBSIDIC) and ready by the in-house system.

B2.2.4 Artesian File

About 20% of New South Wales is underlain by the Great Artesian Basin. Early in this century it was recognised that water from the basin formed a major resource, and, as such, required regular monitoring. Every borehole which still has a hydrostatic head above local ground level is visited on a regular annual to triennial cycle, and a number of flow and pressure tests are carried out. These data are carried on the 'artesian flow' file, together with relevant administrative data such as the condition of the well-head and the method of delivery of the water to the supply points. Figure B-7 provides an example of microfiche output of this file.

B2.2.5 Licensing File

The licensing file is essentially used for auditing and administrative function. The system is designed to issue the annual groundwater usage return forms, and reminders if necessary, and to collate the resulting incoming data. The information is used primarily for the long-term management of regional groundwater resources. In addition licenses due, or overdue, for renewal are listed at frequent intervals.

B2.2.6 Groundwater Returns File

The groundwater returns file records information on groundwater usage in specific designated areas. The data are essentially used for groundwater management purposes.

B2.3 Other Groundwater Data

B2.3.1 Pumping Tests

Pumping test information on Commission test bores and observation bores is generally held in individual files which have been created for each valley investigation. In general these tests are difficult to retrieve.

Information on whether a pumping test has been carried out is usually indicated on the Bore Master file. However, if details are required it is necessary to search the appropriate file related to the particular investigation.

B2.3.2 Geophysical Data

Geophysical data are recorded in the Hydrogeological Section. Practically all investigations have been written up into a summary report form. The data include both resistivity, seismic refraction, bore hole logging and to a lesser extent other types of geophysical data.

B2.4 References

1. Joseph, J.B., Garrard, R.J., Woolley D.R., 1978.

An Advanced Hydrogeological Data Storage and Retrieval System in Use in New South Wales.
Water Research Centre
Michenham Laboratory, England. Proceedings International Conference on Geological Data, London, April, 1978.

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*       PRINT: 21/01/85                    WATER RESOURCES COMMISSION                    PAGE:   33188
        MAP NO:   7982              BOREMASTER/LITHOLOGY PRINTOUT  -  PROGRAM: WCBL30      7982  23894

••• BORE NO:  23894  (  7982)  •••   CONTINUED

              DIAM      TOP     LTH/THK     TYPE        DESCRIPTION/SALINITY  APTR/SIZE       SWL      YIELD       ALT DATE SH NO
    AQUIFER:              3.1 M    0.9 M   UNCNSLIDATED   GOOD                                3.0 M   2.273 L/S             : 01

      •• DRILLER'S LOG ••
      ••••••••••••••••••
                C • CONFIDENCE LEVEL  G • GRAINSIZE  E • 1 • WATER SUPPLY  W • WEATHERING
THICK    BASE      CGEW    DESCRIPTION         COLOUR      FORM
3.05     3.05 CLAY 9
1.00     4.05 GRVL   1  WRWR
                          CODE  F292         DEPTH GIVEN    4.05 METRES


 ••••••••••••••••••••••••••••••••
••• BORE NO:  23962  (  7982)  •••
 ••••••••••••••••••••••••••••••••

      BOREMASTER DATA        •• PAPERS: 66/08112  ••  ALT DATE: 12/06/81  ••
      ••••••••••••••
      COUNTY : MITCH    MAP  :  GRATICULE    SURFACE RL:              YIELD:                SWL:     2.1 M   S:     EXP
      PARISH :    31    ZONE :                                        EQUIP:                DDL:
      PORTION:   111                         TOT DEPTH :   12.2 M     DATE :22/05/1966  TOT DEPTH:    12.2 M   T     EXP
      R-BASIN:   410                         COMPLETED : 05-1966      TIME :          HRS PUMP AT:

      LOGS   : DRILLER           PROPOSED USE:  GENERAL               CONTRACTOR:  PRIVATE     TYPE   :  WELL
      MEAS   :                   PRESENT USE :  GENERAL               OWNER      :  PRIVATE     METHOD:
      SETTING:                   SALINITY    :                        DRILLER    :              STATUS:

              DIAM      TOP     LTH/THK     TYPE        DESCRIPTION/SALINITY  APTR/SIZE       SWL      YIELD       ALT DATE SH NO
    CASING:    914 MM  A  0.9 M             CONCRETE CYL                                                                  1 01
    AQUIFER:              7.0 M    5.2 M   UNCNSLIDATED                                        2.1 M                        1 01

      •• DRILLER'S LOG ••
      ••••••••••••••••••
                C • CONFIDENCE LEVEL  G • GRAINSIZE  E • 1 • WATER SUPPLY  W • WEATHERING
THICK    BASE      CGEW    DESCRIPTION         COLOUR      FORM
7.01     7.01 CLAY 9    LOMY                  GREY
5.18    12.19 SAND   1  AND  SMLL STON
                          CODE  33WL         DEPTH GIVEN   12.19 METRES


 ••••••••••••••••••••••••••••••••
••• BORE NO:  24123  (  7982)  •••
 ••••••••••••••••••••••••••••••••

      BOREMASTER DATA        •• PAPERS: 66/06924  ••  ALT DATE: 12/06/81  ••
      ••••••••••••••
      COUNTY : WYNYA    MAP  :  GRATICULE    SURFACE RL:              YIELD:    1.010 L/S   SWL:     0.3 M   S:     EXP
      PARISH :    51    ZONE :                                        EQUIP:  CNTRFGL       DDL:     1.5 M
      PORTION:    12                         TOT DEPTH :    1.8 M     DATE :21/02/1966  TOT DEPTH:    1.8 M   T     EXP
      R-BASIN:   410                         COMPLETED : 02-1966      TIME :    6.0   HRS PUMP AT:    1.8 M
```

K7

FIGURE B-1 - BORE MASTER - LITHOLOGY MICROFICHE OUTPUT - PRIVATE BORE

LITHOLOGY DATA

*** BORE NO: 30607 (7981) ***

BOREMASTER DATA ** PAPERS: 74/20433 ** ALT DATE: 14/04/76 **

COUNTY : CLARD MAP : GRATICULE SURFACE RL: 184.5 M YIELD: 106.845 L/S SWL: 6.1 M S: 5.0 EXP-4
PARISH : 9 ZONE : (3) RL AT SURFACE EQUIP: TURB SFT DDL: 15.4 M
PORTION: 42 TOT DEPTH : 67.3 M DATE :10/03/1975 TOT DEPTH: 67.3 M T: 1.1 EXP 3
R-BASIN: 410 COMPLETED : -1971 TIME : 24.0 HRS PUMP AT: 35.0 M

LIC:999005 NAME: PUBLIC WORKS DEPT PERIOD: PP EXPIRY: PP/PP/PP LICAM1: 106.8 L/S LICAM2:

LOGS : OTHER PROPOSED USE: PUBLIC/MUNICIPAL CONTRACTOR: W.R.C. TYPE : BORE
MEAS : PRESENT USE : PUBLIC/MUNICIPAL OWNER : P.W.D. METHOD: CABLE TOOL
SETTING: SALINITY : 0-500 PPM DRILLER : NOT CODED STATUS:

	DIAM	TOP	LTH/THK	TYPE	DESCRIPTION/SALINITY	APTR/SIZE	SWL	YIELD	ALT DATE	SH	NO
CASING:		67.3 M	0.9 M	BACKFILLED						1	01
	711 MM	0.0 M	2.5 M	WELDED STEEL						1	02
	660 MM	0.0 M	16.6 M	WELDED STEEL						1	03
	406 MM A	0.3 M	52.4 M	WELDED STEEL						1	04
	406 MM	65.8 M	1.5 M	WELDED STEEL						1	05
AQUIFER:		50.5 M	16.4 M		0-500 PPM					1	01
SCREEN:	406 MM	52.1 M	13.7 M	SURESCREEN	STAINLESS STEEL	3.81 MM				1	01
G-PACK:	660 MM	52.1 M	13.7 M	WTRWRN ROUND	GRADED	0.07- MM				1	01

SECTION: GUMLY GUMLY ISLAND 0 09/05/79
NOTE: ADJ TEST HOLE BN 30567 HAS LOGS 1 14/04/76 NOTE: FULL PUMP TEST REPORT AVAILABLE 2 14/04/76
USE: SOUTH-WEST TABLELANDS WATER SUPP 3 20/07/84

PUMP TEST: SWL 10.0 M DDL 24.2 M YLD 106.092 L/S TIME 672.0 H PUMP AT M EQP 4 ON 09/10/1971 14/04/76

N1

PRINT: 21/01/85 WATER RESOURCES COMMISSION PAGE: 33102

MAP NO: 7981 BOREMASTER/LITHOLOGY PRINTOUT - PROGRAM: WCBL30 7981 30607

*** BORE NO: 30607 (7981) *** CONTINUED

** DRILLER'S LOG **

C = CONFIDENCE LEVEL G = GRAINSIZE E = 1 = WATER SUPPLY W = WEATHERING

THICK	BASE	CGEW	DESCRIPTION	COLOUR	FORM	THICK	BASE	CGEW	DESCRIPTION	COLOUR	FORM
0.30	0.30	TPSL 9				3.05	38.10	CLAY 9	STCK	GREY	
1.83	2.13	SAND	DRY CRSE			0.30	38.40	CLAY	STCK SNDY	GREY	
6.10	8.23	CLAY	SNDY			3.05	41.45	CLAY	HARD	GREY	
12.5	20.73	SAND	AND GRVL			0.31	41.76	CLAY	SOFT SNDY	GREY YLLW	
1.83	22 56	CLAY	SLTY	GREN		3.35	45.11	CLAY	STCK	BRWN GREY	
1.82	24.38	SAND	AND GRVL			1.83	46.94	CLAY	STCK	YLLW GREY	
4.27	28.65	CLAY	SLTY	BLCK GREY		3.66	50.60	CLAY	HARD SNDY	GREY	
3.05	31.70	CLAY	STCK	GREY		16.4	67.06	SAND 1	AND GRVL		
3.35	35.05	CLAY	SLTY	GREY		1.22	68.28	CLAY	STCK SNDY	GREY	

CODE. AEJ7 DEPTH GIVEN 68.28 METRES

FIGURE B-2 - BORE MASTER - LITHOLOGY MICROFICHE OUTPUT - COMMISSION INVESTIGATION BORE

```
.        PRINT: 21/01/85                         WATER RESOURCES COMMISSION                                PAGE:       2        .
         MAP NO:    184                BOREMASTER/LITHOLOGY PRINTOUT  -  PROGRAM: WCBL30                   184     4121

*********************************
*** BORE NO:   4121  (   184)  ***
*********************************

     BOREMASTER DATA        ** PAPERS: REG 2     ** ALT DATE: 30/01/74  **
     ***************
     COUNTY : BENAR     MAP  :  GRATICULE   SURFACE RL:   174.2 M     YIELD:     66.306 L/S    SWL:               S:     EXP
     PARISH :    31     ZONE :        (3)           RL AT SURFACE     EQUIP:                   DOL:  F  0.0 M
     PORTION:    13                         TOT DEPTH :  1216.4 M     DATE :            TOT DEPTH:  1216.4 M     T:     EXP
     R-BASIN:   416                         COMPLETED : 02-1908       TIME  :         HRS PUMP AT:

     LOGS    : DRILLER            PROPOSED USE:  STOCK              CONTRACTOR:  PRIVATE      TYPE   :  B OPEN THRU ROCK
     MEAS    : FLOW               PRESENT USE :  STOCK              OWNER      :  PRIVATE      METHOD :  CABLE TOOL
     SETTING:                     SALINITY    :  501-1000 PPM       DRILLER    :  NOT CODED    STATUS :

               DIAM       TOP       LTH/THK    TYPE           DESCRIPTION/SALINITY  APTR/SIZE       SWL      YIELD        ALT DATE SH NO

   CASING:     254 MM               131.7 M    THREAD STEEL   CEMENTED                                                    07/08/74  1 01
               203 MM   A   1.5 M   268.8 M    THREAD STEEL   CEMENTED                                                              1 02
               152 MM   A   1.8 M   999.9 M    THREAD STEEL   DRVN SMALL HOLE                                                       1 03
                                    165.3 M                                                                                         1 04

   AQUIFER:              794.0 M               CONSOL FLOW                                                  0.031 L/S               1 01
                         816.8 M               CONSOL FLOW                                                  1.052 L/S               1 02
                        1017.4 M               CONSOL FLOW                                                 13.156 L/S               1 03
                        1073.2 M               CONSOL FLOW                                                                          1 04
                        1080.5 M               CONSOL FLOW                                                 35.784 L/S               1 05
                        1102.1 M      3.6 M    CONSOL FLOW    SEE CHEM FICHE                               56.835 L/S               2 06
                        1110.6 M               CONSOL FLOW                                                                          2 07
                        1144.8 M     71.6 M    CONSOL FLOW                                                 77.885 L/S               2 06

   SCREEN:     152 MM   1076.6 M     34.1 M    VERTCL SLOTS   SLOTTED IN HOLE      12.70 MM                               17/03/80  1 01
               152 MM   1120.1 M     44.2 M    VERTCL SLOTS   SLOTTED IN HOLE      12.70 MM                                         1 02

       NAME:     COOBAL                                  0    30/01/74

      ** DRILLER'S LOG **
      *******************
                         C = CONFIDENCE LEVEL  G = GRAINSIZE  E = 1 = WATER SUPPLY  W = WEATHERING
THICK     BASE        CGEW   DESCRIPTION        COLOUR        FORM   THICK     BASE       CGEW   DESCRIPTION        COLOUR      FORM
6.10      6.10 CLAY  9                                               1.22     755.90 UNKN  9     HARD                           STRK
12.8     18.90 CLAY         SNDY                                     37.4     793.39 SHLE
8.23     27.13 CLAY                                                  23.4     816.86 SDSN  1
5.79     32.92 CLAY         AND  SAND                                6.71     823.57 SDSN  1     HARD
7.01     39.93 SAND                                                  175      999.13 SHLE
6.40     46.33 CLAY                                                  15.8    1014.93 SDSN
7.62     53.95 SAND                                                  3.66    1018.64 GRVL  1
6.71     60.66 CLAY                                                  36.5    1055.22 SHLE
56.0    116.74 DRFT                                                  50.5    1105.81 SDSN  1
352     469.39 SHLE                                                  9.45    1115.26 SDSN  1     HARD
3.35    472.74 ROCK                                                  22.5    1137.82 SDSN
180     653.19 SHLE                                                  6.09    1143.91 SDSN        HARD
18.9    672.08 SHLE         SNDY                                     0.92    1144.83 ROCK        HARD
15.2    687.32 SHLE         LGHT                                     71.6    1216.46 SDSN  1
67.3    754.68 SHLE
                                    CODE  A2AE         DEPTH GIVEN 1216.46 METRES

                                                  B1
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FIGURE B-3 - BORE MASTER - LITHOLOGY MICROFICHE OUTPUT -

ARTESIAN BORE (ie. ARTESIAN BASIN)

PRINT: 27/09/84 WATER RESOURCES COMMISSION PAGE 1955 1

MAP NO: 9A2 GROUNDWATER ANALYSIS PRINTOUT 9A2 36052

* = ION IMBALANCE > 5% MG/L EPM MG/L EPM UNSPECIFIED UNITS ARE GENERALLY MG/L
EXPLANATORY NOTES ARE ON PAGE 1

|| BORE || 36052 (CONTINUED)

DATE	05/03/75	CA	18.036	0.900	CO3			PH	7.00	T/A	111.3	NO3(N)	0.840	SAR	0.95
STRUCK	23.0	MG	10.937	0.900	HCO3	128.14	2.10	TS*	140	HRD	90.1	FE			
BASE	25.0	NA	20.69	0.90	SO4	7.205	0.150	S/C	270	R/A	15.9	SIO2	43.000	A/C	C1 S1
ANAL	MINES	K	1.95	0.05	CL	17.727	0.500	T/I	204.7			F	0.2280	B	
DATE 11	10/03/75	CA	17.034	0.850	CO3			PH	7.20	T/A	106.0	NO3(N)	0.420	SAR	0.92
STRUCK	26.6	MG	10.330	0.850	HCO3	122.03	2.00	TDS		HRD	85.1	FE			
BASE	31.2	NA	19.54	0.85	SO4	N.D.		S/C	260	R/A	15.9	SIO2	43.000	A/C	C1 S1
ANAL	MINES	K	1.95	0.05	CL	15.954	0.450	T/I				F	0.0760	B	
DATE	16/09/75	CA	20.040	1.000	CO3			PH	7.70	T/A	124.0	NO3(N)		SAR	1.14
STRUCK	26.6	MG	6.441	0.530	HCO3	142.78	2.34	TDS		HRD	76.6	FE			
BASE	31.2	NA	22.99	1.00	SO4	N.D.		S/C	250	R/A	42.9	SIO2		A/C	C1 S
ANAL	WRC	K	2.35	0.06	CL	9.572	0.270	T/I				F		B	
DATE	29/09/80	CA	33.266	1.660	CO3	0.00	0.00	PH	7.57	T/A	150.5	NO3(N)		SAR	0.90
STRUCK	10.0	MG	20.173	1.660	HCO3	173.29	2.84	TS*	228	HRD	166.2	FE			
BASE	18.0	NA	26.67	1.16	SO4	28.338	0.590	S/C	420	R/A	0.0	SIO2	43.200	A/C	C1 S1
ANAL 4	WRC	K	1.56	0.04	CL	32.627	0.920	T/I	315.9			F		B	
DATE	29/09/80	CA	33.266	1.660	CO3	0.00	0.00	PH	7.45	T/A	150.5	NO3(N)		SAR	0.87
STRUCK	23.0	MG	20.538	1.690	HCO3	173.29	2.84	TS*	225	HRD	167.7	FE			
BASE	24.0	NA	25.75	1.12	SO4	26.897	0.560	S/C	420	R/A	0.0	SIO2	42.000	A/C	C1 S1
ANAL 4	WRC	K	1.56	0.04	CL	31.908	0.900	T/I	313.2			F		B	
DATE	29/09/80	CA	31.262	1.560	CO3	0.00	0.00	PH	7.52	T/A	143.1	NO3(N)		SAR	0.84
STRUCK	26.5	MG	19.079	1.570	HCO3	164.75	2.70	TS*	209	HRD	156.7	FE			
BASE	28.0	NA	24.14	1.05	SO4	23.535	0.490	S/C	380	R/A	0.0	SIO2	43.200	A/C	C1 S1
ANAL 4	WRC	K	1.56	0.04	CL	28.717	0.810	T/I	293.0			F		B	
DATE	28/06/82	CA	36.272	1.810	CO3	0.00	0.00	PH	7.75	T/A	142.0	NO3(N)	1.261	SAR	0.84
STRUCK	10.0	MG	19.322	1.590	HCO3	163.53	2.68	TS*	219	HRD	170.2	FE			
BASE	18.0	NA	25.06	1.09	SO4	28.338	0.590	S/C	440	R/A	0.0	SIO2	46.200	A/C	C1 S1
* ANAL 4	WRC	K	1.56	0.04	CL	28.008	0.790	T/I	302.1			F		B	
DATE	28/06/82	CA	33.066	1.650	CO3	0.00	0.00	PH	7.65	T/A	133.0	NO3(N)	0.840	SAR	0.83
STRUCK	23.0	MG	17.378	1.430	HCO3	153.15	2.51	TS*	204	HRD	154.2	FE			
BASE	24.0	NA	23.68	1.03	SO4	26.417	0.550	S/C	390	R/A	0.0	SIO2	44.800	A/C	C1 S1
ANAL 4	WRC	K	1.56	0.04	CL	26.944	0.760	T/I	282.2			F		B	

FIGURE B-4 - CHEMISTRY FILE - WATER QUALITY STANDARD ANALYSES

PRINT: 27/09/84 WATER RESOURCES COMMISSION PAGE: 7924 1

MAP NO: 8A4 GROUNDWATER ANALYSIS PRINTOUT 8A4 53731

* = ION IMBALANCE > 5% MG/L MG/L EPM UNSPECIFIED UNITS ARE GENERALLY MG/L
EXPLANATORY NOTES ARE ON PAGE 1

|| BORE || 53731 (CONTINUED)

DATE 28/09/81 ANAL AGRIC PH T/A METER TEMP C S/C 620 LAB CON MET TURB DO
STRUCK 42.7 BASE 90.5 R/A 140.0 HRD 110.0 TRUE COL APP COL A/C C1 S3

|| BORE || 54928

DATE 19/08/81 CA CO3 PH T/A NO3(N) SAR UNAVAL
STRUCK 32.6 MG HCO3 TDS 192 HRD FE
BASE 45.4 NA 18.40 SO4 S/C R/A SIO2 A/C C1 S
ANAL 1 AGRIC K CL 120.001 3.385 T/I F B

DATE 19/08/81 ANAL AGRIC PH METER TEMP C S/C 300 LAB CON MET TURB DO
STRUCK 32.6 BASE 45.4 T/A R/A 20.0 HRD 110.0 TRUE COL APP COL A/C C1 S

|| BORE || 55011

DATE 12/05/81 CA CO3 PH 7.40 T/A NO3(N) 19.040 SAR UNAVAL
STRUCK MG HCO3 TDS HRD FE 0.3400
BASE NA 65.00 SO4 S/C 1350 R/A SIO2 A/C C2 S
ANAL 1 HEALTH K 1.10 CL 128.999 3.639 T/I F B

N-NH3 TKN P-SOL SULPHDE ORGC
N-ALB N-NO2 0.040 P-TOT DETERG BOD
PB CU HG CR MET 1
ZN MN AS CD
0623TCNS 24000.000

E COLI 35 M T COLIF SO UNESC LORENZ PHAE

DATE 12/05/81 ANAL HEALTH PH TEMP C S/C TURB 1.00 HELLIGE DO
STRUCK BASE T/A HRD 690.0 TRUE COL APP COL A/C C S

|| BORE || 55229

DATE /05/82 ANAL OTHER PH METER TEMP C S/C 1000 LAB CON MET TURB 2.00 HELLIGE DO
STRUCK 31.4 BASE 32.0 T/A HRD 526.0 TRUE COL APP COL A/C C S

|| BORE || 55232

DATE 25/09/81 CA 216.216 CO3 PH 7.50 T/A NO3(N) SAR UNAVAL
STRUCK 15.0 MG HCO3 TDS HRD 540.0 FE
BASE 18.3 NA 1.70 SO4 S/C 1250 R/A SIO2 A/C C2 S
ANAL 1 AGRIC K CL 209.999 5.923 T/I F B

|| BORE || 56405

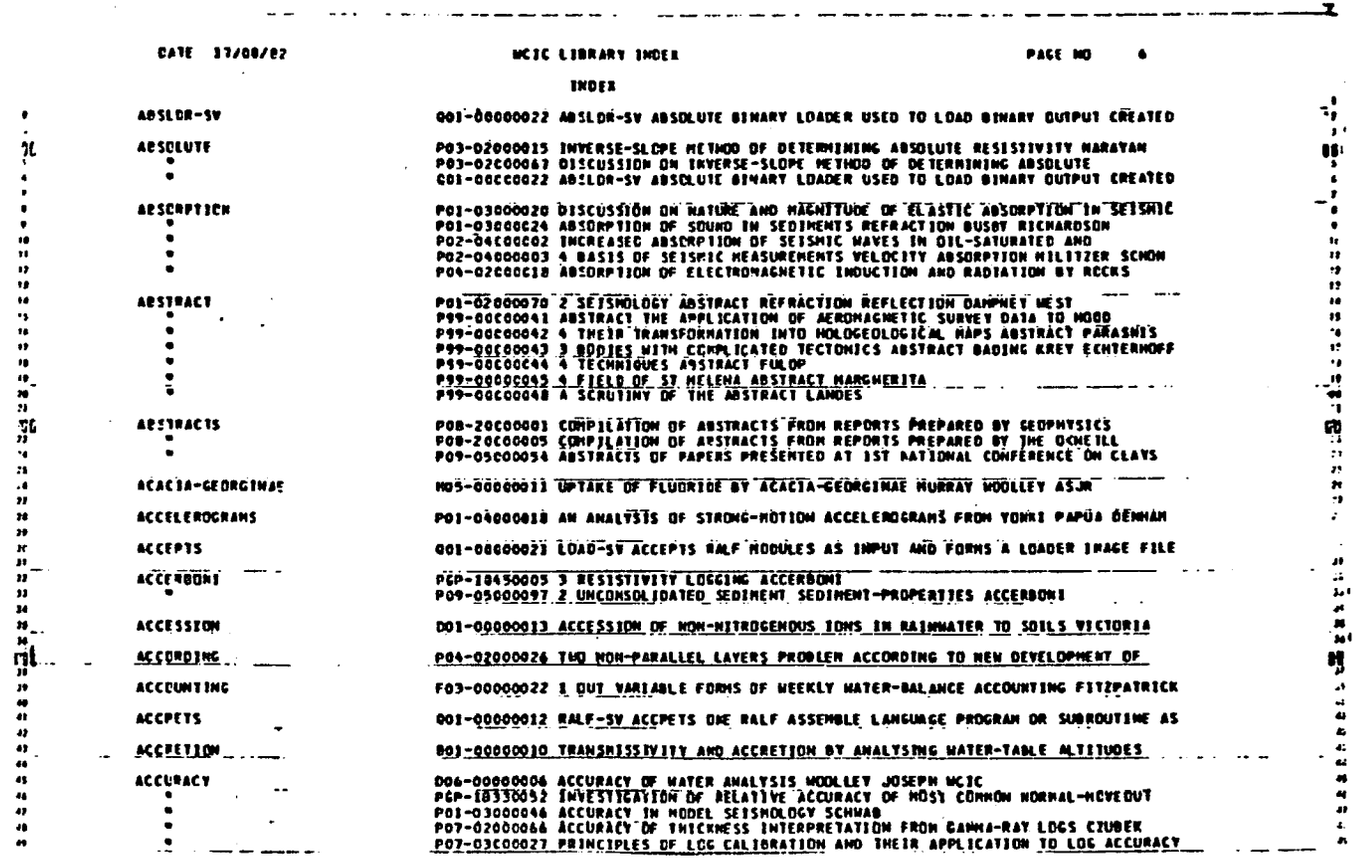
DATE 25/05/82 CA CO3 PH T/A NO3(N) SAR UNAVAL
STRUCK 142.0 MG HCO3 TDS HRD FE
BASE 163.0 NA SO4 S/C R/A SIO2 A/C C S
ANAL 1 AGRIC K CL 90.001 2.539 T/I F B

M15

FIGURE B-5 - CHEMISTRY FILE - WATER QUALITY ANALYSES - SPECIFIC CONSTITUENTS

H02-00000002	H02-00000002 GEOLOGY OF THE STANHOPE DISTRICT NSW SCOTT
H02-00000003	H02-00000003 COMPARISON OF RYDAL AND WARTLEY EXOGENOUS CONTACT-ZONES JOPLIN H02-00000003 1 GEOLOGY
H02-00000004	H02-00000004 PETROLOGY OF THE WARTLEY DISTRICT JOPLIN GEOLOGY
H02-00000005	H02-00000005 COMPOSITION AND ORIGIN OF UPPER-ORDOVICIAN GRAPTOLITE BEARING SLATE H02-00000005 1 JOPLIN GEOLOGY
H02-00000006	H02-00000006 UPPER DEVONIAN SEDIMENTS AT MOUNT LAMBIE NSW BROWN GEOLOGY
H02-00000007	H02-00000007 BEN-BULLEN PLUTONIC COMPLEX NSW JOPLIN GEOLOGY
H02-00000008	H02-00000008 EXOGENOUS CONTACT-ZONE AT BEN-BULLEN NSW JOPLIN GEOLOGY
H02-00000009	H02-00000009 LEUCITE-BEARING ROCKS FROM NSW ULTRABASIC OCCURRENCE MURRUMURRAH H02-00000009 1 GEOLOGY HARVEY
H02-00000010	H02-00000010 GEOLOGY H02-00000010 STUDIES IN METAMORPHISM AND ASSIMILATION COOMA DISTRICT NSW JOPLIN
H02-00000011	H02-00000011 DIORITE LIMESTONE REACTION AT BEN-BULLEN NSW JOPLIN GEOLOGY
H02-00000012	H02-00000012 ENDOGENOUS CONTACT-ZONE OF MAGNESIAN LIMESTONE BEN-BULLEN NSW H02-00000012 1 GEOLOGY JOPLIN
H02-00000013	H02-00000013 OCCURRENCE OF CALCITE IN A BASALT FROM MAITLAND NSW BROWNE GEOLOGY
H02-00000014	H02-00000014 ORIGIN OF BASIC XENOLITHS IN PLUTONIC ROCKS JOPLIN GEOLOGY
H02-00000015	H02-00000015 RIVER TERRACES AND SOIL DEVELOPMENT ON THE HEPEAN-RIVER NSW WALKER
H02-00000016	H02-00000016 THE YASS EXCURSION WILLIAMSON GEOLOGY
H02-00000017	H02-00000017 STRUCTURAL GEOLOGY OF CARBONIFEROUS ROCKS HUNTER RIVER DISTRICT H02-00000017 1 OSBORNE
H02-00000018	H02-00000018 GEOLOGY OF THE CANOWINDRA DISTRICT NSW STEVENS
H02-00000019	H02-00000019 PETROLOGICAL STUDIES IN THE ORDOVICIAN IN NSW JOPLIN GEOLOGY
H02-00000020	H02-00000020 THE WIANAMATTA SHALE WATERS OF THE SYDNEY DISTRICT OLD SALINITY
H02-00000021	H02-00000021 STRATIGRAPHY PHYSIOGRAPHY GOULBURN RIVER DISTRICT NSW OULHUNTY

FIGURE B-6 - REPORTS AVAILABLE IN HYDROGEOLOGICAL SECTION



DATE 17/08/82 MCIC LIBRARY INDEX PAGE NO 6

INDEX

ABSLDR-SV	G01-00000022 ABSLDR-SV ABSOLUTE BINARY LOADER USED TO LOAD BINARY OUTPUT CREATED
ABSOLUTE	P03-02000015 INVERSE-SLOPE METHOD OF DETERMINING ABSOLUTE RESISTIVITY NARAYAN
	P03-02C00063 DISCUSSION ON INVERSE-SLOPE METHOD OF DETERMINING ABSOLUTE
	G01-00CC0022 ABSLDR-SV ABSOLUTE BINARY LOADER USED TO LOAD BINARY OUTPUT CREATED
ABSORPTION	P01-03000020 DISCUSSION ON NATURE AND MAGNITUDE OF ELASTIC ABSORPTION IN SEISMIC
	P01-03000C24 ABSORPTION OF SOUND IN SEDIMENTS REFRACTION BUSBY RICHARDSON
	P02-04C00C02 INCREASED ABSORPTION OF SEISMIC WAVES IN OIL-SATURATED AND
	P02-04000003 4 BASIS OF SEISMIC MEASUREMENTS VELOCITY ABSORPTION MILITZER SCHON
	P04-02C00C18 ABSORPTION OF ELECTROMAGNETIC INDUCTION AND RADIATION BY ROCKS
ABSTRACT	P01-02000070 2 SEISMOLOGY ABSTRACT REFRACTION REFLECTION DAMPNEY WEST
	P99-00C00041 ABSTRACT THE APPLICATION OF AEROMAGNETIC SURVEY DATA TO MOOD
	P99-00C00042 4 THEIR TRANSFORMATION INTO HOLOGEOLOGICAL MAPS ABSTRACT PARASNIS
	P99-00C00043 3 BODIES WITH COMPLICATED TECTONICS ABSTRACT BADING KREY ECHTERHOFF
	P99-00C00C44 4 TECHNIQUES ABSTRACT FULOP
	P99-00000045 4 FIELD OF ST HELENA ABSTRACT MARGHERITA
	P99-00C00048 A SCRUTINY OF THE ABSTRACT LANDES
ABSTRACTS	P08-20C00001 COMPILATION OF ABSTRACTS FROM REPORTS PREPARED BY GEOPHYSICS
	P08-20C00005 COMPILATION OF ABSTRACTS FROM REPORTS PREPARED BY THE O'NEILL
	P09-05C00054 ABSTRACTS OF PAPERS PRESENTED AT 1ST NATIONAL CONFERENCE ON CLAYS
ACACIA-GEORGINAE	M05-00000011 UPTAKE OF FLUORIDE BY ACACIA-GEORGINAE MURRAY WOOLLEY ASJR
ACCELEROGRAMS	P01-04000018 AN ANALYSIS OF STRONG-MOTION ACCELEROGRAMS FROM YONKI PAPUA DENHAM
ACCEPTS	G01-00000021 LOAD-SV ACCEPTS RALF MODULES AS INPUT AND FORMS A LOADER IMAGE FILE
ACCERBONI	P6P-18450005 3 RESISTIVITY LOGGING ACCERBONI
	P09-05000097 2 UNCONSOLIDATED SEDIMENT SEDIMENT-PROPERTIES ACCERBONI
ACCESSION	D01-00000013 ACCESSION OF NON-NITROGENOUS IONS IN RAINWATER TO SOILS VICTORIA
ACCORDING	P04-02000026 TWO NON-PARALLEL LAYERS PROBLEM ACCORDING TO NEW DEVELOPMENT OF
ACCOUNTING	F03-00000022 1 OUT VARIABLE FORMS OF WEEKLY WATER-BALANCE ACCOUNTING FITZPATRICK
ACCPETS	G01-00000012 RALF-SV ACCPETS ONE RALF ASSEMBLE LANGUAGE PROGRAM OR SUBROUTINE AS
ACCRETION	B03-00000010 TRANSMISSIVITY AND ACCRETION BY ANALYSING WATER-TABLE ALTITUDES
ACCURACY	D06-00000006 ACCURACY OF WATER ANALYSIS WOOLLEY JOSEPH MCIC
	P6P-18330052 INVESTIGATION OF RELATIVE ACCURACY OF MOST COMMON NORMAL-MOVEOUT
	P01-03000046 ACCURACY IN MODEL SEISMOLOGY SCHWAB
	P07-02000066 ACCURACY OF THICKNESS INTERPRETATION FROM GAMMA-RAY LOGS CIUBER
	P07-03C00027 PRINCIPLES OF LOG CALIBRATION AND THEIR APPLICATION TO LOG ACCURACY

FIGURE B-7 - KEYWORD INDEX TO REPORTS IN HYDROGEOLOGICAL SECTION

FIGURE B-8 - ARTESIAN FLOW DATA

DATE: 07/08/84 — WATER RESOURCES COMMISSION — PAGE: 2215

MAP-NO: 2503 — ARTESIAN FLOW AND PRESSURE MEASUREMENTS — 2503 4489

** BORE ** 4489 ** QUABOTHOO NO 2 ** — PRESSURE TESTS (CONTINUED)

07/08/29	TIME	0320	PRESSURE	1	41 KPA	2	48 KPA
		0340		1	62 KPA	2	62 KPA
		0400		1	62 KPA	2	69 KPA
		0420		1	69 KPA	2	69 KPA
		0520		1	69 KPA	2	76 KPA
		0700		1	76 KPA	2	76 KPA
		0940		1	76 KPA	2	83 KPA
		1240		1	83 KPA	2	83 KPA
		2340		1	90 KPA	2	90 KPA
14/05/30	TIME	0130	PRESSURE	1	34 KPA	2	41 KPA
		0200		1	55 KPA	2	55 KPA
		0230		1	55 KPA	2	62 KPA
		0300		1	62 KPA	2	62 KPA
		0400		1	62 KPA	2	69 KPA
		0500		1	69 KPA	2	69 KPA
		0600		1	69 KPA	2	76 KPA
		0800		1	76 KPA	2	76 KPA
		1900		1	83 KPA	2	83 KPA
01/08/31	TIME	1020	PRESSURE	1	34 KPA	2	34 KPA
		1050		1	48 KPA	2	55 KPA
		1120		1	55 KPA	2	55 KPA
		1150		1	55 KPA	2	62 KPA
		1250		1	62 KPA	2	62 KPA
		1500		1	69 KPA	2	69 KPA
		1630		1	69 KPA	2	76 KPA
		1800		1	76 KPA	2	76 KPA
		2130		1	76 KPA	2	76 KPA
27/08/32	TIME	0500	PRESSURE	1	34 KPA	2	34 KPA
		0530		1	48 KPA	2	48 KPA
		0600		1	55 KPA	2	55 KPA
		0630		1	55 KPA	2	62 KPA
		0730		1	62 KPA	2	62 KPA
		0830		1	62 KPA	2	69 KPA
		0930		1	69 KPA	2	69 KPA
		1030		1	69 KPA	2	76 KPA
		1400		1	69 KPA	2	76 KPA

2503 4489

DATE: 07/08/84 — WATER RESOURCES COMMISSION — PAGE: 2284

MAP-NO: 26A1 — ARTESIAN FLOW AND PRESSURE MEASUREMENTS — 26A1 4187

** BORE ** 4187 ** EUROKA NO 1 ** — FLOW MEASUREMENTS

UNRS	30/11/03	FLOWS	ARRIVAL	16.5 L/S	OPENFLOW	16.5 L/S	TEMP	42.2 C
UNRS	26/03/06	FLOWS	ARRIVAL	8.2 L/S	OPENFLOW	8.2 L/S	TEMP	42.2 C
UNRS	29/07/09	FLOWS	ARRIVAL	5.3 L/S	OPENFLOW	5.3 L/S	TEMP	43.3 C
UNRS	20/10/10	FLOWS	ARRIVAL	5.3 L/S	OPENFLOW	5.3 L/S	TEMP	43.9 C
UNRS	01/02/12	FLOWS	ARRIVAL	24.4 L/S	OPENFLOW	24.4 L/S	TEMP	44.7 C
UNRS	17/04/13	FLOWS	ARRIVAL	18.9 L/S	OPENFLOW	18.9 L/S	TEMP	43.3 C
UNRS	03/07/15	FLOWS	ARRIVAL	15.1 L/S	OPENFLOW	15.1 L/S	TEMP	44.4 C
UNRS	09/11/15	FLOWS	ARRIVAL	14.0 L/S	OPENFLOW	14.0 L/S	TEMP	44.4 C
UNRS	03/10/16	FLOWS	ARRIVAL	13.3 L/S	OPENFLOW	13.3 L/S	TEMP	44.4 C
	18/10/17	FLOWS	ARRIVAL	12.6 L/S	OPENFLOW	15.1 L/S	TEMP	44.4 C
	05/12/18	FLOWS	ARRIVAL	12.2 L/S	OPENFLOW	14.7 L/S	TEMP	44.4 C
	29/09/19	FLOWS	ARRIVAL	11.6 L/S	OPENFLOW	14.4 L/S		
	30/08/20	FLOWS	ARRIVAL	10.5 L/S	OPENFLOW	13.3 L/S	TEMP	43.6 C
	05/10/21	FLOWS	ARRIVAL	9.9 L/S	OPENFLOW	13.3 L/S	TEMP	44.4 C
	16/05/22	FLOWS	ARRIVAL	10.2 L/S	OPENFLOW	12.6 L/S	TEMP	44.2 C
	05/04/23	FLOWS	ARRIVAL	8.3 L/S	OPENFLOW	11.6 L/S	TEMP	45.0 C
	11/04/24	FLOWS	ARRIVAL	7.7 L/S	OPENFLOW	10.9 L/S	TEMP	45.6 C
	30/03/25	FLOWS	ARRIVAL	7.4 L/S	OPENFLOW	1[illegible].9 L/S	TEMP	45.0 C
	27/07/26	FLOWS	ARRIVAL	6.2 L/S	OPENFLOW	11.6 L/S	TEMP	45.0 C
	09/04/27	FLOWS	ARRIVAL	5.1 L/S	OPENFLOW	11.2 L/S	TEMP	44.4 C
UNRS	23/03/28	FLOWS	ARRIVAL	9.6 L/S	OPENFLOW	9.6 L/S	TEMP	44.7 C
UNRS	15/08/29	FLOWS	ARRIVAL	8.9 L/S	OPENFLOW	8.9 L/S	TEMP	44.7 C

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APPENDIX C
VICTORIAN GROUNDWATER DATA BASES

APPENDIX C
VICTORIAN GROUNDWATER DATA BASES

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Appendix C
VICTORIAN GROUNDWATER DATA BASES

C1.0 INTRODUCTION

Groundwater data are held at the Department of Minerals and Energy (VDME) now Industry, Technology and Resources) primarily in computer form within the Geoscience Data System. This system presently consists of a number of data bases which are not integrated. It is proposed however to bring these data bases together into an Integrated Geological Data Base (IGDB) using a central inhouse VAX 11/780 mini-computer during 1985 (Kenley, 1984).

The present Geoscience Data system is comprised of four main data sub-systems which include:

- Borehole data
- Groundwater data
- Mineral Resources data
- Library Serials data

The first two are major systems compared to the latter two and constitute the major storage of groundwater-related data within the Department.

C2.0 VDME DATA BASE SYSTEM

The Bore Hole Data System contains information on all bores which number about 64,000 at present. One third of these are groundwater bores, one third mineral investigation bores and the remainder relate to coal investigation. Many of the mineral and coal related bores also record some groundwater data.

The Bore Hole data system contains four major files:

- .Bore Master
- .Core Data
- .Eleclog
- .Litholog

Each file is updated independently, the information being obtained from VDME drillers reports, bore completion reports submitted under the Groundwater Act, SECV (State Electricity Commission Victoria) coal drilling reports, VDME geologists' notes, exploration licence reports, etc. The data input sheets are key punched by private bureaus and returned on a standard 9 track phase uncoded tape in EBCDIC code.

C2.1 Bore Master File

The Bore Master File

Lists basic information compiled from the completion reports of bores. A description of the borehole master data system follows page 23. It presently contains records of 64,000 boreholes drilled throughout Victoria for gold, minerals, stone, groundwater, coal, petroleum, geotechnical investigations and geological investigations by government (mainly VDME), company and private agencies.

The bores have been divided into separate groups or series based on assigned bore numbers.

Series 1-7999 include bores constructed by the government.

Series 8000-9999 (known as the 8000 series) include miscellaneous bores, which comprise groundwater bores constructed before the drilling act was passed, exploratory holes drilled by mining companies, road construction authority bores (RCA) and additional bores which do not fit into the remaining series.

Series 10000-11999 (known as the 10000 series) include the bores constructed under the Groundwater Act.

Series 12000 and above (known as the 12000 series) have been allocated for bores held by the now Rural Water Commission. However, the data held by the Commission have not as yet been merged into this series. (The Rural Water Commission have a separate system consisting of data on about 6000 bores located in the area. See relevant section of this report).

Parish subdivision is used throughout the State, and about 2000 parishes are presently listed.

Within about 15 of the 50 parishes in the Latrobe Valley there is information on SECV bores*. The bore data consist primarily of geological information (ie. coal strata). No groundwater data are available from this set. SECV have their own numbering systems, within the 15 parishes, however all data are pariodically transferred to the Series 1-7999 from the SECV data base using magnetic tape and/or supplied to VDME using microfiche.

The VDME bore master file generally consists of one record for each bore (maximum 132 characters), however only about 100 characters are printed.

Petroleum bores, coal bores and mineral drilling data are included within the 8000 series but availability depends on the voluntary supply by the respective private companies who collect these data.

C2.2 Groundwater Data System

The Groundwater Data System is a data bank of information on groundwater aquifer systems.

The groundwater data system contains four major files:

- .Aquifer
- .Chemical
- .Pollution
- .Water levels

C2.2.1 The Aquifer File

The Aquifer File contains a coded description of each aquifer in each water bore. The aquifers are identified by the depth interval and numbered sequentially.

---

*See also description of SECV data base system.

C2.2.2 The Chemical File

The Chemical File contain chemical analyses of bore water (30,000 analyses) for about 20,000 bores. The standard water analyses cover all major cations and anions together with total dissolved solids (TDS), pH, iron and silica. At least one analysis is available for every water bore. No ion balance data are presented.

C2.2.3 The Pollution File

The Pollution File contains about 1200 analyses. The analyses cover basic ionic concentrations as well as more specific data such as trace elements and other chemicals such as organic carbon and surfactants. Many of the pollution data are not yet in a computer readable form.

Whilst the EPA request information on pollution analysis from the VDME, there is no interchange of data from the EPA to the VDME records.

C2.2.4 The Water Level File

Water Level File contains data on about 600 observation bores throughout Victoria. These readings are reduced to sea level and stored under a modified julian date.

The file records monthly readings, which are recorded in the field by about 5 technical assistants across the State. The bore locations are recorded on Parish plans, and in addition on 1:100,000 and some 1:25,000 scale topographic maps.

Whilst the distribution occurs widely over the entire State, the bores are largely concentrated in the irrigation areas (see also Rural Water Commission Data Base).

Output reports are produced each time one of the files is updated. Apart from complete output listings, selective listings and output tapes can be obtained for specific subjects based on co-ordinate localities, map sheets or parish groupings as for the Bore Hole System.

It is possible to create parameter files which allow statistical information to be assembled. These files are sub-files created from the Master file. For example, it might provide depth, yield, drawdown, top and bottom of aquifer, etc. from the groundwater file or specific chemical selection from the chemistry file (selection of groundwater suitable for mineral water for example).

It is also possible to produce data from the master and chemical file which are suitable for day to day enquiries in specific areas. The information is listed under Parish Headings and thereby can be accessed quickly with respect to an enquiry.

Additional data include a Melbourne metropolitan map on 1:25,000 scale which contains data on depth and yield. However, this map has not been updated since the drought in 1983.

Pumping test information is stored in the in-house HP-9815 in addition to some hydrographic data.

Some field chemical data such as Eh, pH are stored in a small independent file on the CYBER system. This file contains data which are primarily projected orientated.

Some hydrogeological maps north of Bendigo and in Shepparton are also in preparation.

Drilling data are submitted to the drilling branch and then vetted by the DME hydrogeologists who look at adequacy of data before they are transferred to the Data Base. A chemical sample is also submitted but normally there is a long delay in sample analysis as the completion report is finalised.

C3.0 BOARD OF WORKS DATA BASE

The Board of Works have data on about 5000 boreholes around the Melbourne metropolitan area plus bore data in the Thompson River Area. Although the data available are primarily of a geological or geotechnical nature, base information on groundwater does exist in a percentage of these bores.

A single water level has been recorded in about 5000 of these holes along with the geological logs. Long-term monitoring of water level is carried out in only about 100 of these holes.

All holes are generally up to 40 metres in depth and most information is not compromised.

About 1700 bores have information stored on a computer date base system comprising a HP-3000 computer and inhouse software. Most data stored are project-related.

The software allows geographic solution of data within a prespecified rectangular area. A series of parameters can be selected from the data base and these values can be plotted along side the bores' location.

Bore hole log data are available on paper or are stored in microfiche form.

C4.0 STATE ELECTRICITY COMMISSION DATA BASE

The State Electricity Commission of Victoria (SECV) maintain a computer data bank covering approximately 15,000 bores which relate to brown coal investigation in the State of Victoria. The development of the computer system developed since 1957 is described by Gill (1982).

The data bank is orientated mainly to storage and retrieval of coal strata information, which includes about 1,000,000 metres of drilling recorded on about 400,000 card images.

Groundwater data are related mainly to monitoring associated with dewatering operations in the Latrobe Valley brown coal deposits. These data include monthly information on drawdowns, pumping, outages, etc. for operational usage.

Elsewhere data are sparse since groundwater in drillholes is normally suppressed during drilling operations and no details on groundwater conditions are recorded.

Regional recording of groundwater data is underway in the Latrobe valley with the cooperation of VDME. At present these data are only in paper form but they will be added to the data base in the future.

Within the Latrobe Valley there are about 55 parishes. The numbering system in fifteen of these is controlled by the SECV and the remainder by

the VDME. The drilling and survey data are supplied from time to time to VDME by tape and/or microfiche.

C5.0 RURAL WATER COMMISSION

The Rural Water Commission have bore data recorded on about 6000 observation bores located and concentrated almost entirely within the Goulburn River - River Murray area of northern Victoria. These bores are mainly shallow (generally less than 20 m in depth).

Data are recorded in both paper and computer form, in a number of categories as follows:

C5.1 Groundwater Data (General)

Data include bore location, elevation and bore relationships, water level readings. The data base includes at present about 57,000 readings per year. At present there is a total of 430,000 readings stored. About 60% of the data has been processed into computer form whilst the remainder is in paper form.

C5.2 Soil Salinity

Data are recorded specifically on soil salinities. About 4000 readings are available including bore number, elevation, lab. no., date sampled, and values at various depths.

The data are being stored in computer form and to date about 70% have been processed.

C5.3 Groundwater Salinity Data

The data category includes about 6000 salinity data readings per year commencing from about 1973 onwards. At present up to 30000 records are available. The data are in paper form. No data have been processed into a computer format.

C5.4 Pumping Test Data

This category includes details on the bore location, and associated observation bores, and pumping test details. An average of 10 per year of these test are analysed. At present data on about 100 tests are available. The data are stored only in paper format.

C5.5 Sand Survey Analysis

Several hundred of these are available in paper form.

Additional data include bore maintenance information, construction details, drilling logs, and hydrogeological data, lake/river levels, river flow data, storage and domestic usage.

All of these data are in paper form and have not been converted.

The data stored in paper form are project based and stored on an area basis.

GG-SYSTEM

MASTER-SUBSYSTEM

"A computer based system to create, update and maintain the borehole Master data system using COBOL on the B7700 of the VPS".

By S. MACK

SUMMARY

The GG-MASTER Subsystem is a suite of COBOL programs wirtten for the Burroughs B7700 computer of the Victorian Public Service.

The data are held on magnetic tape and relate to borehole location, classification and description. The programs are held on "systems resource pack" with backup on magnetic tape.

The first part of the system is the creation, update and maintenance of the master files. The creation program is a once only process but the update and maintenance programs are to be run periodically, at monthly intervals. A father/son configuration is used during update and four generations are retained for backup.

The second part of the system encompasses a group of output programs which produce a selection of the most commonly requested data.

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" " GG/MAST/SPATS

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8 Report listing formats

9 Program listings

3 SYSTEMS DESIGN

Introduction

The boremaster file contains information on the identification, location, description and uses of bores drilled in Victoria since 1876. It includes all bores drilled by both government and private authorization for groundwater, gold, minerals, coal petroleum, engineering and geological purposes.

Data Entry Procedure

The input data is collected on the data entry from ?12 (fig-2). The data for completion of this form have five sources:

1 Groundwater permit bore completion report.

2 Government bore drillers weekly or daily report.

3 Drilling branch bi-annual report.

4 Government bore survey report.

5 The SEC drillers log.

All data collected here are available on completion of the bore and do not include "time-variable" data which are collected separately.

The input data are key punched by the data entry section of the VPS-EDP Centre using key-to-desk equipment. The putput tape is a 7 track tape in BCL code. This requires subsequent conversion, using SYSTEM/DUMPALL to 1 9 track phase encoded tape in EBCDIC code.

System Operation

The update and creation programs, GG/MAST/CRTE and GG/MAST/CPDT use the "father/son" principle to produce the next generation file from the previous generation and data input. They also produce an error listing of rejected input records, and a formatted report of valid input records.

The error listing is used to create a parameter file containing the keys of records requiring deletion from the master file. This parameter file is small and created directly through an on-line terminal using CANDE. The deletion program GG/MAST/DELT consults this parameter file to create a new master file from the old master file less the unwanted records.

Co-ordinate information is not always available at the initial data collection point and is entered at a later date during file maintenance. There are three principal sources of coordinate data and a separate version of the maintenance program is required for each case.

1 GG/MAST/CORD/CHLS - Imperial ANG coordinates originally held on punched cards and subsequently converted to magnetic tape.

2 GG/MAST/CORD/SEC - Metric AMG coordinates of Latrobe Valley coal bores supplied on tape by the SEC.

3 GG/MAST/CORD/AMG - Metric AMG coordinates supplied on tape from the Cyber 73 computer which result from the

digitization of bore location plans. This program will also accept small quantities of data entered via a terminal.

All these programs produce updated master records containing the coordinates and produce new records where there is no previous master record in the old file.

The final phase of the GG/MASTER subsystem are the output programs which generate reports. Four program types are identified here, but this module is continually being modified to meet changing ad-hoc requirements.

1 GG/MAST/REPORT - A report of all bores on file in bore number sequence.

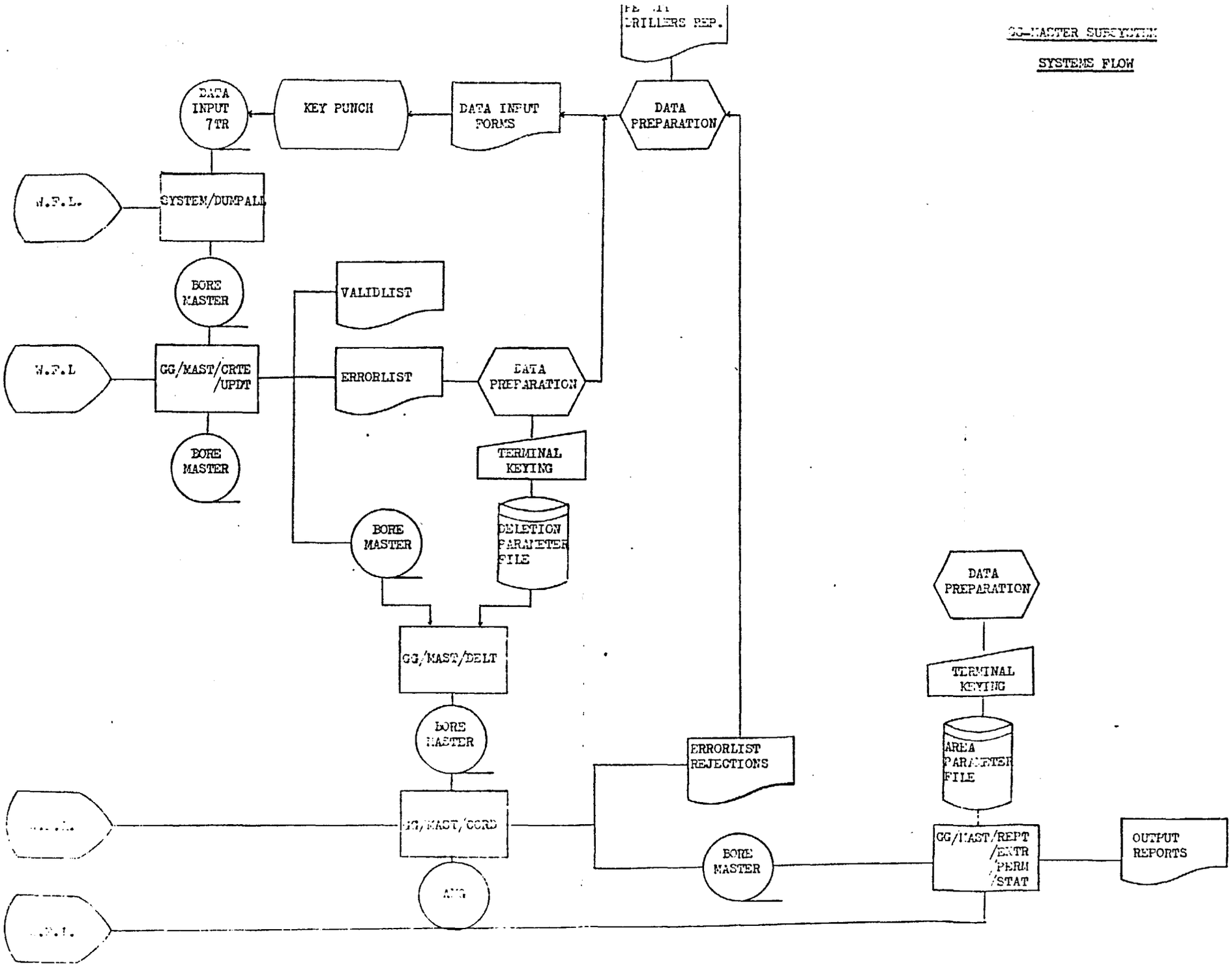
2 GG/MAST/EXTR - A report of all bores within a predefined area or other predefined attributes. Area definitions are obtained from a disk parameter file. Report is in bore number sequence.

3 GG/MAST/PERMIT - A report of all bores drilled under the Groundwater Act in construction permit number sequence.

4 GG/MAST/STATS - A statistics report on drilling progress for each year since 1901 with a breakdown on bore usage.

GG-MASTER SUBSYSTEM

SYSTEMS FLOW



	PARISH	BORE NO	LAB-NO		SAMPLE DATE	AQUIF FROM	AQUIF TO	SAL	TDS	CL	CO3	HCO3	SO4	NO3	CA	MG	NA	K	FE TOT	FE SOL	SI	HARDNESS	PH	ELEC COND
									(-	-	-	-	-	MILLIGRAMS/LITRE	-	-	-	-	-	-	-	-)		MS/CM
	7	[illegible]	[illegible]	10	[illegible]	14?.1	15?.0		5310	16?	(	45	1	C	11	10	0		2.1	1.7	8	65	6.?	
	7	012	[illegible]	11	2?-09-?7	157.5	214.8		2790	105	(	33	1	0	4	17	7		15.5		0	59	6.7	435
	7	[illegible]4	[illegible]	11	[illegible]	125.3	[illegible]		11330	511	(	157	6	0	6	36	0		128.0		0	164	6.5	1660
	7	012	[illegible]-2447	11	1?-05-??	???.0	245.4		3280	190	(	55	12	0	4	5	C		9.0	0.2	16	28	7.4	514
	7	[illegible]	[illegible]	1?	1?-0?-71	1?.	1?.1	?.?	15?6?	1??	??	771	?3	0	71	49	506	?	1.4		40	373	6.?	3171
	7	1[illegible]	[illegible]	11	1?-??-71	137.	141.9	?.?	3540	492	(	58	0	0	5	34	0				0	145	6.7	1653
	7	1006?	[illegible]	1?	?-0?-7?		274.?		3710	112	(	47	C	C	3	5	C			0.1	C	29	7.1	531
	7	1[illegible]4	[illegible]	1	1?-??-73	7.3	9.1		5630	129	(	367	0	0	102	12	C		6.6		0	304	8.0	540
	7	1[illegible]	[illegible]	1?	14-??-73	3?.?	3?.?		4475	113	(	159	13	0	33	11	74	3	5.0		46	125	7.3	618
	7	1006?	?2-446?	10	14-07-75	60.2	72.?		4510	126	(	71	21	C	13	8	131	10	5.0	0.4	22	65	7.3	822
	7	[illegible]	[illegible]-14	1	?-05-77	18.?	21.1	?.3	4993	142	(	121	36	0	9	8	126	5		0.4	52	56	6.5	730
	7	1[illegible]	7?-2??	1?	15-11-77	16.?	17.4	1.?	3335	116	(	226	16	C	59	5	79	3	6.0	0.6	54	184	7.1	740
	7	1[illegible]	7?-[illegible]	11	1?-07-7?	1?3.?	135.3		246?	565	(	30	1	C	6	38	295	4	15.?	1.2	11	172	6.8	2230
	7	1[illegible]	?1-1745	1?	3?-10-??	15.1	17.8	?.1	19655	816	(	397	74	0	104	51	488	7			41	470	7.8	2700
	7	1[illegible]	?2-1457	13	?-11-?1	36.0	40.?	14.1	4755	132	(	96	19	C	13	13	127	3	9.0		26	85	6.9	760

[illegible] MILITARY SHAFT NO 97/7

	PARISH	BORE NO	LAB-NO		SAMPLE DATE	AQUIF FROM	AQUIF TO	SAL	TDS	CL	CO3	HCO3	SO4	NO3	CA	MG	NA	K	FE TOT	FE SOL	SI	HARDNESS	PH	ELEC COND
*	3	130			13-05-51		113.3		540	105	(	150	16	C	13	16	0				0			
*	3	141			31-10-51				340	120	(	160	C	C	0	C	C				C			
	3	012	65-0725	11	11-05-65				6250	333	(	81	0	0	21	21	0		0.2		C	140	7.8	
	3	013	63-1949	12	1-07-63				70360	3920	(	78	C	C	0	0	0				0		7.3	
*	3	033			13-09-65				7036	3020	(	78	C	C	0	0	0				0		7.3	
	3	014	57-0691	11	1-10-57				5640	274	0	74	11	0	9	14	0		1.4	1.2	10	77	6.2	
	3	015	56-0721	12	25-07-56	41.7	44.1	0.5	14000	649	(	55	72	C	26	55	0			0.6	10	285	6.8	
*	3	015			29-07-56	41.7	44.1		1400	649	0	55	72	0	26	55	0			0.6	10		6.8	
	3	015	68-0433	11	19-03-68			4.5	3390	91	0	140	16	0	18	6	0		0.5	0.2	16	65	7.1	545
	3	2010	69-0389	12	21-02-69	115.8	119.2	11.8	16500	765	(	64	25	C	34	60	C			0.3	2	332	6.1	2820
*	3	012			27-06-65	5.7	8.8		481	237	0	189	0	0	0	0	0				0		7.5	
*	3	016			16-03-66		6.0		350	212	0	122	0	0	0	0	0				0			
*	3	018			23-09-65		9.2		605	360	(	204	C	C	0	C	C				C			
	3	026	69-0615	13	5-06-69				8170	323	0	220	0	0	17	19	0				C	121	7.9	1381
	3	027	69-1520	10	3-06-69				4550	140	(	163	C	C	16	8	0				C	75	7.4	735
	3	10001	71-0926	13	8-04-71		63.5	0.6	4535	215	(	65	3	C	6	13	137	3		0.1	11	67	7.3	864
	3	1?011	71-1652	13	8-04-71	10.0	17.0		15985	350	0	94	47	0	12	37	543		11.0	1.6	23	181	7.9	2951
*	3	1?011			12-12-70	65.5			350	0	(	C	0	C	0	0	0				C			
*	3	10001			12-12-70	10.0	17.0		2000	C	(	C	C	C	0	C	C				0			
	3	10?12	72-1031	13	19-10-71	30.4	32.9		5790	220	0	166	0	0	30	18	0			3.0	C	147	6.9	956
	3	10014	72-2571	10	23-05-72		13.7		3090	244	(	C	C	C	16	10	0		40.0	1.8	0	81	7.3	1367
	3	10005	73-0474	13	15-09-72	15.8	19.2		13250	650	(	79	25	0	13	46	0		3.0	1.8	0	222	6.2	2270
	3	1?0?0	72-2211	10	3-03-72	115.8	113.2		15180	777	0	93	0	0	39	49	0		16.6	6.9	C	257	6.8	2602
	3	10010	73-2202	12	15-05-72	115.2	117.3		15180	759	(	55	C	0	33	57	C		17.1		C	315	5.8	2602
	[illegible]	10007	73-2042	10	30-03-73	24.6	25.?		5650	255	(	65	0	0	3	10	0			0.4	0	45	6.8	934
	3	10008	73-1226	14	19-01-73	21.7	22.2		61000	2695	0	915	298	0	199	244	0			0.1	C	1499	7.0	7970
	3	10009	73-2343	15	4-05-73				5350	243	(	77	C	C	7	16	C		1.6	0.4	C	85	6.5	880
	[illegible]	10011	74-1443	1?	4-03-74		53.5		19235	950	(	279	0	0	143	48	452	15		0.9	23	552	6.9	3440
	3	10013	75-1154	11	7-12-75				4725	227	(	71	C	C	7	14	135	3	2.0	0.5	15	75	7.1	880
	3	10014	75-0185	10	14-01-75				5405	323	(	72	4	C	9	21	185	4	3.0		16	109	7.3	1150
		10012	7?-1214	1?	14-07-75				45515	2493	(	123	140	0	170	135	1255	13	19.0		13	557	6.2	7750
		10016	7?-[illegible]	10	15-12-76	17.3	19.5		15505	730	(	30	32	C	31	57	366	6	0.2		48	312	7.3	2450
		10017	77-2?5?	10	7-02-77	?.0	1?.4	?.?	14???	??1	(	77	33	C	49	65	325	7	4.0	0.1	31	350	7.5	2650

PARISH BORE LAB-NO SAMPLE AQUIF AQUIF SAL TDS CL CO3 HCO3 SO4 NO3 CA MG NA K FE FE SI HARD PH ELEC
NO DATE FROM TO TOT SOL NESS COND
(- - - - - MILLIGRAMS/LITRE - - - - - -) MS/CM

BORE COMPLETION

PARISH NUMBER [ ] PARISH NAME .....

BORE NUMBER [ ] BULLEN No [ ]

OWNER OF BORE [ ] AUTHORITY CODE [ ]

HASH TOTAL [ ]

GOVERNMENT DRILLING	PROJECT NUMBER	[ ]/[ ]
	CONSECUTIVE NUMBER	RIG [ ] YR [ ] SEQ [ ]
	DRILL CONTRACT No.	[ ]
COMPANY DRILLING	LICENCE NUMBER	[ ] TYPE OF LICENCE [ ]
	COMPANY NUMBER	[ ]
	LOCAL BORE NAME	[ ]
GROUNDWATER ACT DRILLING	PERMIT NUMBER	[ ]
	PREVIOUS PERMIT No	[ ] if bore has been deepened
	CADASTRAL LOCATION	ALLOT [ ] SECTION [ ] LOT [ ]
	DRILLER	[ ]

DATE DRILLED : COMMENCED [ ]/[ ]/[ ] COMPLETED [ ]/[ ]/[ ]

METHOD : ..... [ ]

PURPOSE : ..... 1 [ ] 2 [ ] 3 [ ]

DEPTH : [ ] m BOTTOM HOLE TEMPERATURE [ ] °C at [ ] m

REDUCED LEVEL: [ ] m of natural surface

LOCATION : AMG ZONE [ ]

AMG MAP [ ] of 1:100000 scale

EASTING [ ] NORTHING [ ]

LATITUDE [ ]/[ ]/[ ] LONGITUDE [ ]/[ ]/[ ]

ACCURACY [ ]

LITHO-LOGS : [ ] GEOLOGIST [ ] DRILLER (Y:available N:not available)

WIRELINE LOGS:

Ga [ ] Ne [ ] SN [ ] LN [ ] SP [ ] Lt [ ] Tp [ ] Da [ ] Mc [ ] Cl [ ] Sl [ ] Sn [ ] Sc [ ] Other [ ]

NUMBER AND TYPE OF SAMPLES TAKEN etc :

[ ] WATER ANALYSES [ ] ROCK ANALYSES [ ] COAL ANALYSES [ ] PETROLOGY SECTION

[ ] CORED INTERVALS [ ] PLUG INTERVALS [ ] SIDEWALL CORE [ ] PALAEONTOLOGY

[ ]

Drillers Log
(Microfiche)

Form D7

MINES DEPARTMENT, VICTORIA

8/4

Parish of ALBERTON WEST

Bore No. 6

Position

SE CNR C/A 72

Surface Level

Strata	Depth Struck ft in.	Thickness ft in.
SURFACE CLAY	0	2·13
SANDY "	2·13	0·92
SAND	3·05	1·83
DRIFT	4·88	5·49
LIGNEOUS SAND	10·37	0·61
BROWN COAL	10·98	52·43
SANDY CLAY	63·41	17·99
GRAVEL	81·40	2·14
CLAY	83·54	7·01
GRAVEL	90·55	1·52

Revised Aug. 1978

DEPARTMENT OF MINERALS AND ENERGY
GEOLOGICAL SURVEY DIVISION

Form No. 311
DP7/1

CHEMICAL

GDPS – BASIC CHEMICAL ANALYSIS

RECORD TYPE	0 3
1. PARISH NUMBER	
2. BORE NUMBER	
3. LAB. NUMBER	/
4. SAMPLE TYPE	
5. SAMPLE TAKEN	NUMBER DATE / /
6. AQUIFER	FROM TO metres
7. S.W.L.	metres
8. T.D.S.	METHOD
9. CHLORIDE (Cl)	
10. CARBONATE (CO3)	
12. BICARBONATE (HCO3)	
13. SULPHATE (SO4)	
14. NITRATE (NO3)	
15. CALCIUM (Ca)	
16. MAGNESIUM (Mg)	
17. SODIUM (Na)	
18. POTASSIUM (K)	
19. TOTAL IRON	
20. SOLUABLE IRON	
21. SILICA (SiO3)	
22. HARDNESS (CaCO3)	
23. PH	
24. ELEC. CONDUCTIVITY	microsiemens /cm
25. T.O.C.	
26. AMMONIA – N	
27. FLUORIDE (F)	
28. BORON (B)	

10		DME	7520	554	717234	5705021	DIGIT	1962	137.15		WATER							
10001	PERM 4335	PRIVATE	7520	554	713461	5705110	DIGIT	8/03/1974	5.96		WATER-STOCK							15

PARISH_OF_ALBERTONEAST________(NUMBER____2)___IMPERIAL_SHEET_8ZZZZ

BORE NUMBER		OWNER	AMG MAP	AMG ZN	AMG EAST	AMG NORTH	CO-ORD METHOD	COMPLETED DATE	BORE DEPTH	RLNS	BORE-USE	DRILL METHOD	LOGS DP	GE	WR	A Q	TESTS WFRMPCF	G
1		DME		555	471354	5722562	SURVEY	1951	279.20	3.70	COAL							16
2		DME		555	472905	5720376	SURVEY	1957	152.40	2.40	WATER							16
3	CONSEC 2/80/002	DME	8220	555	472155	5725852	SURVEY	10/07/1980	372.25	8.70	COAL	ROTARY	N	Y				25
4	CONSEC 1/80/003	DME	8220	555	470981	5727885	SURVEY	2/07/1980	172.00	13.50	COAL	ROTARY	N	Y				25
5		SEC		555	471333	5725009	SURVEY	5/08/1980	164.10	6.30	COAL							16
6		SEC		555	473706	5726236	SURVEY	18/06/1980	87.30	12.70	COAL							16
7		SEC		555	473365	5727570	SURVEY	28/11/1980	192.20	11.20	COAL							16
8		SEC		555	470325	5725128	SURVEY	8/01/1981	225.30	10.00	COAL							16
10		SEC			470844	5727030	SURVEY	8/06/1982	159.30	11.30	COAL							24
11		SEC			472208	5726928	SURVEY	10/02/1983	155.00	10.40	COAL							24
12		SEC			472171	5727937	SURVEY	16/02/1983	194.00	11.70	COAL							24
13		SEC			471232	5729103	SURVEY	4/03/1983	200.00	16.30	COAL							24
16		SEC			470869	5725613	SURVEY	19/03/1983	131.00	6.40	COAL							24
8001		PRIVATE	8220	555	469676	5728867	DIGIT	12/01/1956			USE-UNKNOWN							15
8002		PRIVATE	8220	555	471951	5724870	DIGIT	7/07/1957			USE-UNKNOWN							15
8003		PRIVATE	8220	555	471081	5729068	DIGIT	20/09/1958	218.85		WATER							6
8004		PRIVATE	8220	555	469359	5729598	DIGIT	19/09/1958	161.54		WATER							6
8005		PRIVATE	8220	555	470492	5729459	DIGIT	6/01/1966			USE-UNKNOWN							15
8006		PRIVATE	8220	555	470511	5725214	DIGIT	1/04/1968			USE-UNKNOWN							15
8007		PRIVATE	8220	555	471139	5725630	DIGIT	30/01/1969			USE-UNKNOWN							15
8008		PRIVATE	8220	555	472979	5721816	DIGIT	12/03/1969			USE-UNKNOWN							15
10001	PERM 522	PRIVATE	8220	555	471870	5725934	DIGIT	16/04/1971	12.19		WATER-S&D							15
10002	PERM 476	PRIVATE	8220	555	469594	5729259	DIGIT	15/03/1971	143.86		WATER-IRRIG							15
10003	PERM 2021	PRIVATE	8220	555	472183	5723909	DIGIT	8/02/1973	295.65		WATER-IRRIG							15
10004	PERM 2274	PRIVATE	8220	555	473683	5723718	DIGIT	28/01/1973	47.24		WATER-IRRIG	ROTARY						6
10005	PERM 6001	PRIVATE	8220	555	473688	5723427	DIGIT	28/01/1975	28.04		WATER-STOCK							15
10006	PERM 6401	PRIVATE	8220	555	471192	5722458	DIGIT	1/05/1975	95.98		WATER-IRRIG							15
10007	PERM 8715	PRIVATE	8220	555	473336	5723230	DIGIT	5/06/1977	20.16		WATER-STOCK	CABLE						5
10008	PERM 8714	PRIVATE	8220	555	473933	5723228	DIGIT	15/10/1977	12.49		WATER-STOCK	CABLE						5
10009	PERM 11529	PRIVATE	8220	555	469838	5729060	DIGIT	1/01/1979	135.98		WATER-IRRIG	ROTARY						9
10010	PERM 13238	PRIVATE	8220	555	471276	5724236	DIGIT	29/10/1980	19.80		WATER-STOCK	ROTARY						13
10011	PERM 13998	PRIVATE	8220	555				16/06/1981	11.45		WATER-S&D	ROTARY	N	Y				18
10012	PERM 15473	PRIVATE	8220	555			SCALED	9/11/1981	40.00		WATER-STOCK	ROTARY	N	Y				22
10013	PERM 19155	PRIVATE	8220	555			SCALED	6/04/1983	127.50		WATER-IRRIG	ROTARY	N	Y				31
10014	PERM 18549	PRIVATE	8220	555			SCALED	13/11/1982	43.50		WATER-S&D	ROTARY	N	Y				33

PARISH_OF_ALBERTON_WEST________(NUMBER____3)___IMPERIAL_SHEET_8ZZZZ

BORE NUMBER		OWNER	AMG MAP	AMG ZN	AMG EAST	AMG NORTH	CO-ORD METHOD	COMPLETED DATE	BORE DEPTH	RLNS	BORE-USE	DRILL METHOD	LOGS DP	GE	WR	A Q	TESTS WFRMPCF	G
1		DME		555	458673	5723258	SURVEY	7/10/1912	563.90	12.50	COAL	ROTARY						13
2		DME		555	464541	5723990	SURVEY	26/05/1917	50.40	6.60	COAL	ROTARY						13
3		DME		555	464409	5719762	SURVEY	1917	70.10	7.30	COAL							16
4		DME		555	462131	5724567	SURVEY	15/07/1917	21.70	13.00	COAL	ROTARY						13
5		DME		555	460141	5724871	SURVEY	20/12/1917	20.70	29.50	COAL	ROTARY						13
6		DME		555	461226	5724030	SURVEY	17/01/1918	92.60	13.70	COAL	ROTARY						13
7		DME		555	461331	5724698	SURVEY	12/01/1918	27.40	17.40	COAL	ROTARY						14
8		DME		555	465423	5724453	SURVEY	19/01/1918	32.90	6.00	COAL	ROTARY						13
9		DME		555	465041	5724248	SURVEY	19/01/1918	31.10	6.90	COAL	ROTARY						13
10		DME		555	461947	5723218	SURVEY	18/02/1918	113.10	9.60	COAL	ROTARY						13

GEOLOGICAL SURVEY OF VICTORIA

RECORD STRUCTURE

RECORD	CHEMICAL (STANDARD WATER ANALYSIS)
DOCUMENT TYPE	RECORD 126 CHARACTERS, EBCDIC

FIELD NO.	COL. FROM	TO	LEN	FIELD NAME	TYPE	INSTRUCTIONS
1	1	2	2	REC=TYPE	N	RECORD TYPE
2	3	6	4	PARISH	N	PARISH NUMBER
3	7	11	5	BORE	N	BORE NUMBER
4	12	13	2	AUTH	N	AUTHORITY FOR THE ANALYSIS
						05 Dept. Minerals & Energy
						07 State Rivers & Water Supply Commission
5	14	19	6	LAB=NO	N	LABORATORY NUMBER (YR9999)
6	20	21	2	S-TYPE	N	SAMPLE TYPE
						10 Unknown 20 (same but pollution
						11 Flowing Bore 21 samples)
						12 Pumped Sample 22
						13 Bailed Sample 23
						14 Spring Water
7	22	22	1	S-NUMB	N	SAMPLE NUMBER
8	23	28	6	S-DATE	N	DATE SAMPLED DDMMYY
9	29	34	4v2	AQ-FR	N	AQUIFER TOP
10	35	40	4v2	AQ-TO	N	AQUIFER BOTTOM
11	41	46	4v2	SWL	+N	STANDING WATER LEVEL AT SAMPLE TIME
12	47	52	6	TDS	N	TOTAL DISSOLVED SOLIDS
13	53	53	1	TDS-MTH	A	METHOD OF DETERMINING TDS
						E by Evaporation
						C by Electrical Conductivity
						S by Summation of Constituents
14	54	59	6	CL	N	CHLORIDE
15	60	62	3	CO3	N	CARBONATE

AQUIFER

WATER INTERSECTION

PARISH NUMBER [ ][ ][ ] PARISH NAME . .....

BORE NUMBER [ ][ ][ ][ ]

BORE DESCRIPTION .....

.....

AQUIFER DETAILS

AQUIFER [ ][ ][ ][.][ ] TO [ ][ ][ ][.][ ] metres

AQUIFER SEQ [ ][ ] for a multi-aquifer hole numbered from surface

LITHOLOGY :..... CODE [ ][ ] CONDITION [ ]

BORE DEVELOPMENT DETAILS

DATE OF TEST [ ][ ]/[ ][ ]/[ ][ ][ ]

TEST DEPTH [ ][ ][ ][.][ ] metres

SWL [ ][ ][ ][.][ ] metres

PUMPRATE [ ][ ][ ][.][ ] litres/sec METHOD OF PUMPING [ ]

PUMPING TIME [ ][ ] hrs [ ][ ] mins

DRAWDOWN [ ][ ][ ][.][ ] metres

RECOVERY TIME [ ][ ][ ] hrs [ ][ ] mins

WATER BORE CONSTRUCTION

CASING

[ ][ ][ ][.][ ] TO [ ][ ][ ][.][ ] MATERIAL [ ] PROTECTION [ ] DIAMETER [ ][ ] mm

SCREENED INTERVAL

[ ][ ][ ][.][ ] TO [ ][ ][ ][.][ ] TYPE [ ] MATERIAL [ ] DIAMETER [ ][ ] APER [ ][.][ ]

PACKER SEAL SET AT

[ ][ ][ ][.][ ] TYPE [ ] DIAMETER [ ][ ] mm

PACKED INTERVAL

[ ][ ][ ][.][ ] TO [ ][ ][ ][.][ ] TYPE [ ] GRAVEL SIZE [ ][ ] mm

HASH TOTAL [ ][ ][ ][ ][ ][.][ ] sum of all numeric fields

10011	1	10.4	11.4	SAND	11.4	100	PVC	10.4	11.4	SLOT	PVC	100	1.50	11.4	5.2	0.595	BAIL	1:00	2.8	16-06-1981	19
10012	1	36.0	40.0	SAND	40.0	125	PVC	36.0	40.0	SLOT	PVC			40.0	14.1	1.650	BAIL	4:00	5.0	9-11-1981	19
10013	1	56.0	123.7	SANDSTONE	127.3	150	PVC	55.9	123.7	WIRE	SST	150	0.25	127.8	1.0	23.000	AIR			6-04-1983	24
10014	1		43.5	CLAYSTONE	43.5	132	PVC	37.5	43.5	SLOT	PVC			43.5		0.600	PUMP	5:00	4.0	13-11-1982	25

PARISH OF ALBERTON WEST (NUMBER 8)

BORE	AQ #	AQ-FR	AQ-TO	LITHOLOGY	CASING DPTH	DIA	TYPE	SCREENED INTERVAL FR	TO	TYPE	DIA	APER	PUMP DPTH	SWL	PUMP RATE	TEST TYPE	PUMP TIME	DRAW DOWN	TEST-DATE	
																			21-08-1980	14
197	1	146.3	179.6	SAND										0.7	6.314	PUMP		5.3	29-07-1966	6
8235	1	41.7	44.2	SAND										11.6	21.467	PUMP	12:00	25.9	21-02-1969	6
8010	1	115.8	118.2	SAND										1.9	0.631	BAIL		4.5	28-04-1977	5
10011	1	10.3	17.6	CLAY										0.1	0.006	FLOW		0.1	26-03-1971	15
10011	2	82.3	83.5	SAND	58.5	127	PIPE							3.9	3.758	PUMP	4:00	6.7	14-05-1977	5
10003	1	30.4	32.9	CLAYSTONE										1.2	1.378			1.6	24-05-1972	0
10004	1	4.5	7.6	CLAY										1.2	0.378			3.6	7-05-1972	0
10004	2	11.5	12.1	SAND										5.6	1.262			1.5	8-08-1972	0
10005	1	16.1	18.2	COAL										2.1	0.393			2.7	11-01-1973	0
10007	1	24.5	26.2	SAND										12.4	0.315			13.4	19-11-1972	0
10008	1	30.4	32.3	SAND										5.1	0.631				11-02-1975	0
10015	1	70.1	72.5	SAND										3.9	1.010			2.4	20-12-1975	0
10016	1	17.0	19.2	SAND										3.6	3.798	BAIL		5.4	28-04-1978	5
10022	1	13.0	16.0	CLAY										13.5	1.500	FLOW		13.5	3-02-1978	5
10023	1	81.5	89.0	SAND										0.9	0.500	AIR			30-03-1979	9
10025	1	62.0	75.0	COAL	85.0	101	PVC	62.0	75.0	SLOT	PVC	101		4.6	0.893	AIR		2.4	31-01-1979	9
10026	1	8.0	11.3	SAND	14.0	100	PVC	8.0	11.3	SLOT	PVC		2.00	0.7	0.500	AIR			20-03-1979	9
10027	1	85.0	95.0	COAL	96.9	101	PVC	85.0	95.0	SLOT	PVC	101		5.6	1.310	AIR			23-02-1979	9
10028	1	28.0	40.0	SAND	32.0	168	ST	32.0	37.0	MESH	GST	115	0.03	5.3	2.200	AIR			2-03-1979	9
10029	1	18.0	45.0	SAND	45.0	101	PVC	18.0	45.0	SLOT	PVC	101		5.2	1.860	AIR			28-02-1979	9
10030	1	25.0	43.0	SANDSTONE	55.9	101	PVC	18.0	52.0	SLOT	PVC	101		5.6	1.200	AIR			23-02-1979	9
10031	1	17.0	27.0	CLAY	39.0	101	PVC	21.0	27.0	SLOT	PVC	101		5.0	0.400	FLOW	2:00		25-02-1980	18
10032	1	50.0	79.0	SAND	50.0	168	PVC	50.0	55.0	WIRE	GST	120	0.70	1.8	0.631	PUMP		3.6	11-04-1980	9
10033	1	7.3	8.2	SAND	8.2	100	PVC	7.3	8.2	SLOT	PVC	100	2.00	13.4	0.400	AIR	14:00	12.4	25-03-1980	10
10034	1	160.0	173.0	SAND	160.0	168	ST	150.0	165.0	MESH	GST	120	0.70	13.4	0.400	AIR	14:00	12.4	25-03-1980	10
10034	1	160.0	173.0	SAND	160.0	168	ST	160.0	165.0	MESH	GST	120	0.70	1.9	0.643	PUMP	1:00	3.6	13-04-1984	10
10036	1	8.5	10.3	SAND	10.3	150	PVC	8.5	10.3	SLOT	PVC	100	2.00	2.4	0.600	PUMP		2.2	4-01-1982	18
10037	1	6.0	10.4	SAND	10.4	100	PVC	6.0	10.4	SLOT	PVC	100	2.00	7.5	5.000	FLOW	48:00	7.5	5-04-1982	18
10038	1	229.2	241.2	SAND	121.6	150	PIPE									FLOW			28-01-1983	22
10041	1	197.0	208.0	SANDSTONE	227.0	150	PVC	197.0	216.0	MESH	SST	150	0.14			FLOW			28-01-1983	22
10041	2	215.0	226.0	SANDSTONE				215.0	226.0	MESH	SST	150	0.04		0.012	FLOW			7-12-1982	21
10042	1	181.4	193.4	SANDSTONE	181.4	150	PVC	181.4	193.4	MESH	SST		0.02		5.632	FLOW	16:00		23-11-1982	20
10043	1	84.0	88.5	SANDSTONE	79.0	150	PVC	79.0	87.5	MESH	SST		0.14		25.290	FLOW	7:00		3-11-1982	25
10044	1	19.5	52.0	SANDSTONE	22.0	152	PVC	22.0	52.0	WIRE	SST	152	1.00	52.0		0.253	PUMP	2:00	4.5	10-12-1982	25
10045	1	6.0	7.0	CLAYSTONE	7.0	250	PVC	2.4	7.0	SLOT	PVC	250	2.00	7.0	2.4	1.300	PUMP	5:00	2.5	5-12-1982	23
10046	1	9.5	15.0	SANDSTONE	15.0	125	PVC	9.5	15.5	SLOT	PVC			15.0	5.2	15.785	AIR		12.0	8-12-1982	23
10047	1	88.0	97.0	SANDSTONE	155.0	150	PVC	88.0	97.0	WIRE	SST	150	0.89							17-01-1983	23
10047	2	157.0	164.0	SANDSTONE				157.0	164.0	WIRE	SST	150	0.89							3-03-1983	24
10048	1	36.7	38.2	SANDSTONE	37.0	125	PVC	36.5	37.5	SLOT	PVC			50.2	1.2	0.350	BAIL		10.0	18-01-1983	25
10049	1	42.0	50.0	SANDSTONE	50.0	150	PVC	42.0	50.0	WIRE	SST	150	0.04	50.0	5.0	12.500	AIR	12:00	4.0	27-03-1983	25
10050	1	4.0	47.5	COAL	47.5	225	PVC	41.5	47.5	WIRE	SST		0.15	47.5	5.0	13.100	AIR	8:00		24-01-1983	25
10051	1	60.3	68.0	SANDSTONE	104.7	150	PVC	61.5	68.0	WIRE	SST		0.64							24-01-1983	25
10051	2	98.0	103.7	SANDSTONE				98.0	103.7	WIRE	SST		0.69							11-02-1983	25
10052	1	41.0	45.0	SANDSTONE	46.0	152	PVC	31.5	45.0	WIRE	SST		0.75			AIR	11:30			18-02-1981	25
10056	1	63.5	64.5	SANDSTONE	64.0	132	PVC	63.5	64.5	WIRE	SST		0.65			FLOW				2-02-1981	25
10057	1	42.0	43.0	SANDSTONE	42.0	112	PVC	42.0	43.0	WIRE	SST		1.65			AIR	3:30			5-02-1981	25

GEOLOGICAL SURVEY OF VICTORIA

RECORD STRUCTURE

RECORD	AQUIFER (Programs GW/AQFR/= GW/CHAQ/=)
DOCUMENT TYPE	RECORD 144 CHARACTERS, BLOCK 840 WORDS, EBCDIC

FIELD NO.	COL. FROM	TO	LEN	FIELD NAME	TYPE	INSTRUCTIONS
1	1	4	4	PARISH	N	PARISH NUMBER
2	5	9	5	BORE	N	BORE NUMBER
3	10	15	4v2	AQ-FR	N	AQUIFER TOP
4	16	21	4v2	AQ-TO	N	AQUIFER BOTTOM
5	22	23	2	AQ-NO	N	AQUIFER SEQUENCE NUMBER FROM SURFACE
6	24	26	3	AQ-LITH	N	AQUIFER LITHOLOGY TYPE (See STANDARD CODE)
7	27	27	1	AQ-COND	A	CONDITION OF AQUIFER
						C - Consolidated
						U - Unconsolidated
						W - Weathered
8	28	35	8	T-DATE	N	DATE OF TEST DDMMYYYY
9	36	41	4v2	TEST-DPTH	N	DEPTH PUMP SET
10	42	47	4v2	SWL	+N	STANDING WATER LEVEL
11	48	53	3v3	PUMPAGE	N	YEILD OF PUMP (litres/second)
12	54	54	1	PUMP-MTH	A	METHOD OF PUMPING
						P - Pumped F - Flowing bore
						B - Bailed A - Air lift
13	55	56	2	PUMP-HRS	N	DURATION OF PUMPING (hours)
14	57	58	2	PUMP-MIN	N	DURATION OF PUMPING (minuits)
15	59	64	4v2	DRDWN	N	DRAWDOWN
16	65	67	3	REC-HRS	N	RECOVERY TIME (hours)
17	68	69	2	REC-MIN	N	RECOVERY TIME (minuits)
18	70	75	4v2	CAS-FR	+N	CASING TOP
19	76	81	4v2	CAS-TO	N	CASING BOTTOM

FIELD NO.	COL. FROM	TO	LEN	FIELD NAME	TYPE	INSTRUCTIONS
20	82	82	1	CAS-MTR	X	CASING MATERIAL
						1 - Steel/Iron 6 - Concrete
						2 - Asbestos 7 - Timber (well)
						3 - PVC Tubing 8 - Fibre glass
						4 - Water pipe (well) 9 - Masonary/brick
						5 - Metal alloy - Unknown
21	83	83	1	CAS-PTR	X	CORROSION PROTECTION OF CASING
						0 - None 2 - Bitumen
						1 - Galvanized - Unknown
22	84	86	3	CAS-DIA	N	INTERNAL DIAMETER OF CASING (millimetres)
23	87	92	4v2	SCR-FR	N	SCREEN TOP
24	93	98	4v2	SCR-TO	N	SCREEN BOTTOM
25	99	99	1	SCR-TY	X	SCREEN TYPE
						1 - Wire wrap 3 - Slotted casing
						2 - Wire mesh (scr) 4 - Nylon wrap
26	100	100	1	SCR-MTR	X	SCREEN METERIAL
						1 - Steel 4 - Bronze
						2 - Galvanized steel 5 - PVC
						3 - Stainless steel 6 - Copper
27	101	103	3	SCR-DIA	N	SCREEN DIAMETER (internal)
28	104	107	2v2	SCR-APR	N	SCREEN APERTURE (millimetres)
29	108	113	4v2	PSL-AT	N	PACKER SEAL SET AT
30	114	114	1	PSL-TY	X	SEAL TYPE
						1 - Rubber 2 - Lead
31	115	117	3	PSL-DIA	N	SEAL DIAMETER (millimetres)
32	118	123	4v2	PAK-FR	N	PACKED OR GROUTED INTERVAL - TOP
33	124	129	4v2	PAK-TO	N	PACKED OR GROUTED INTERVAL - BOTTOM

IELD NO.	COL. FROM	TO	LEN	FIELD NAME	TYPE	INSTRUCTIONS
34	130	130	1	PAK-TY	X	MATERIAL USED FOR PACKING
						1 - Cement (grout)
						2 - Bentonite, clay
						3 - Gravel pack
35	131	133	3	PAK-GR-SZ	N	SIZE OF GRAVEL IF USED (millimetres)
36	134	141	8	FILLER	X	
37	142	144	3	GEN	N	UPDATE GENERATION NUMBER

APPENDIX D
QUEENSLAND GROUNDWATER DATA BASE

Appendix D
QUEENSLAND GROUNDWATER DATA BASE

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Appendix D
QUEENSLAND GROUNDWATER DATA BASE

D1.0 INTRODUCTION

Groundwater data in Queensland are held mainly by the Queensland Water Resources Commission. The Department of Local Government also stores groundwater data relevant to town water supply investigations throughout the State. In addition the Department of Primary Industry have data on shallow groundwater conditions in specific existing or potential irrigation areas which includes information on salinity aspects.

Groundwater data collected and collated by the Department of Mines - Geological Survey are automatically transferred to the Water Resources Commission and to BMR Geological maps.

Groundwater data in the Queensland Water Resources Commission are stored on a comprehensive computer data base system whilst data held by all other organisations are stored either as reports, in files, or in some other paper form.

D2.0 QUEENSLAND WATER RESOURCES COMMISSION DATA BASE

D2.1 Computer Based Data Storage and Retrieval

The QWRC computer data base system is outlined in a report (QWRC, 1982).

Figure D-1 summarises the basic files available in the system. In the system these files are known as data sets. Each data set is sub-divided into a series of attributes shown listed in Figure D-1.

Figures D-2 and D4 to D-12 show examples of some of output as described below.

D2.1.1. Registration

This file includes the basic information on identification, location details, etc. of the bore or well. This file is the master data set and there must be a record in this data set for each facility about which data are recorded in the data base. The record is essential for locating the facility graphically by District office, Parish and AMG co-ordinates.

D.2.1.2 Licensing

The purpose of this data set is to record licensing details for all facilities that require a license under the Water Act 1926-1981. One record in the data set is allocated for each license. Records are included for license applications refused, and for current and cancelled licenses.

D2.1.3 Hole Construction

This data set records the characteristics and the dimensions of the hole drilled during the construction of a facility. Most of the records for a facility are entered when construction is completed. Should a facility be deepened, cleaned or reamed out the diameter and length are added as new records to provide a construction history of the hole. Old records are not deleted from this data set thus ensuring a complete history of hole construction.

The combination of these data with data in the casing set provides the physical characteristics of the completed facilities.

D2.1.4 Casing

This includes a number of records describing the casing history of the facility as well as materials used, etc.

D2.1.5 Strata Log

This file stores a transcription of the strata encountered in the hole described on the strata log sheet completed by the driller, geologist, etc.

D2.1.6 Water Bed

This file records information about the permeable water-bearing beds encountered by a hole penetrating a single geological unit or a number of geological units. It may also contain data on salinity in each zone.

D2.1.7 Pumping Test and Design

This file records a summary of the pumping test details including time, discharge, etc. It can record a number of pumping tests carried out on any bore. Each test is identified uniquely by Registered Number. Artesian bore measurements are entered into this data set.

D2.1.8 Elevation

Records details of survey elevation. The file is operated in conjunction with the water level file.

D2.1.9 Water Level

Data include measurements from both water level monitoring network and associated surface water gauges. The file also includes data from bores being drilled or tested or artesian bores being measured or remeasured.

D2.1.10 Water Conductivity

The average water conductivity of the bore or surface water samples is recorded. Individual aquifer zone conductivities are recorded in the water bed file 2.1.6 described above.

D2.1.11 Water Analysis

The Water Analysis file stores the results of chemical determinations performed on water samples by an analyst. These data are supported by written certification, and any data not designated in this name are not entered.

D2.1.12 Metered Water Use

Where water meters have been installed on facilities and the readings taken, the volumes of water used and the period of use are stored in this file.

D2.1.13 Research-Crops

This file is available for irrigation water requirement studies. It is not

used at present.

D2.2 Other Groundwater Data

Some information is held either as manuscript or in microfilm form. This includes original bore records from the time before the data base system was installed.

Artesian inspectors' reports form the Great Artesian Basin are kept, and are of uniformly poor quality, but just legible.

D2.3 Departmental Reports

Reports covering a wide range of groundwater resource investigations and other hydrological work are held by QWRC. The reports can be accessed through a computer file, indexed under the following headings:

NUMERIC (not published)
AUTHOR
BASIN (Topographic)
STREAM
KEYWORD
TYPE OF REPORT

D2.4 Retrieval

Information is freely available from QWRC from the following data sets:

REGISTRATION
HOLE CONSTRUCTION
STRATA LOG
WATER BED
ELEVATION
WATER LEVELS DATA SETS

All other information in the groundwater data base is restricted to Commission or owners' use except for QWRC bores (for which all data are unrestricted).

D3.0 DATA HELD BY OTHER GOVERNMENT DEPARTMENTS

D3.1 Department of Local Government

This Department through its water supply section carries out town water supply investigations throughout the State within the local government areas. The reports are internal and are not available to the public. Although the Department has engaged consultants to carry out some of these water supply studies most of the work is done by the Department's staff.

On average about 6 to 8 bores are constructed by the Department per annum although the actual number has varied between zero and twenty bores per year.

The Department has a water quality section which stores data largely on surface water and only to a minor extent on groundwater. Most groundwater quality data are contained in the water supply reports. A report (Dept., of Local Government of Queensland 1977) has been prepared which summarises the average chemical analysis of reticulated town water supplies of

Queensland.

D3.2 Department of Primary Industry

The availability of groundwater data from the Department of Primary Industry is set out in the attached table.

TABLE D .

AVAILABLE GROUNDWATER DATA - DPI

Region	Bore Logs	Water Levels	EC	Chemical Composition	Time Series of Records	Aquifer Hydraulic Conductivity	Hydrologic or Chemical Interpretation	How data is stored: Unpublished	How data is stored: Pub. Rept	How data is stored: Computer	Who data was collected and analysed for	How information is disseminated
Lower Burdekin												
Leichhardt Downs	x	x	x	x	3years to 1 year	Yes	Yes	x	x	x	DPI QWRC	publications & as data
Lockyer Valley			x	x	1940's to 1981 for some bores	No	Yes	x		x	DPI	publication & workshops
Central Qld.												
Dee River Valley	some (This data duplicates QWRC files)	some	x	x	1960's - 1982 for some bores	No	Some	x			DPI, QWRC	
Callide Valley	QWRC	x	x	x	1976 - 1981 (QWRC extra)	No	Yes	x		x	DPI, QXRC	data & workshops
Emerald Irr. Area	QWRC	QWRC	x	x	1970's current	No	No	x	x	x	DPI, QWRC	publications & as data.
Darling Downs												
Oakey	x	x	x	x	3 years	No	Yes	x			DPI, Farmer	Verbal
Bell	x	x	x	x	4 to 2 years	Yes	Yes	x		x	DPI, Farmer	Verbal, so far
State of Qld. (Filed in Shires)			x	x	1980 - current 1977 - (computer) 1980 (files)	No	Yes	x		x	DPI, QWRC, Farmers	Analysis reports
Rockhampton												
Barmooya	x	x	x	x	1981 - current	No	Yes	x			DPI, Farmer	Data, general publications for the coming workshop
Tanby	x	x	x	x	1981 - current	No	Yes	x			" , Farmer	" "
Central Qld.												
Clermont	x	x	x	x	1981 - current	No	Yes	x			DPI, Farmer	data
Springsure	x	x	x	x	1981 - current	No	Yes	x			" B.S.E.S.	
Mackay	x	x	x	x	1982 - current	No	Yes	x				
Maryborough	x	x	x	x	1981 - current	No	Yes		x		" , Forestry	publications, local authority meetings
Lockyer Valley	x	x	x	x	1979 - current	No	Yes	x			DPI, Farmer	Field day notes, pamphlets
Kalbar	x	x	x	x	1982 - current	No	Yes		x		DPI, Farmer	Field days, data
Bundaberg	x	x	x	x	1982 - current	No	Yes	x			DPI, B.S.E.S.	data

DPI table

FIGURE D-1 - BASIC FILES OR DATA SETS IN SYSTEM

1 Registration

- Registered Number
- District Office
- District Office File Number
- Head Office File Number
- Drainage Sub-Basin
- Sub-Basin Sub-Area
- Shire
- Portions
- Parish
- County
- Longitude
- Latitude
- Easting
- Northing
- Zone
- Map or Plan Scale
- Map Series
- Map or Plan Number
- Type of Facility
- Constructing Authority
- Owner
- Original Purpose of Facility
- Facility Status
- Date of Status
- Type of Mineral Search Bore
- Original Facility Number or Name
- Bore Line
- Present Equipment
- Groundwater Storage
- Number of Associated Test Holes
- Record Search Status and Date

2 Licensing

- Registered Number
- License Number
- Old License Number
- License Issue Date
- License Expiry Date
- Name and Address of Licensee
- Name Index
- Licensed Depth
- Maximum Pumping Rate
- Allocation (Volume)
- Allocation (Area)
- Single or Consolidated Allocation
- Registered Number showing Allocation
- Status of License
- Date Status Defined
- Licensed Use

3

License Conditions dataset not yet implemented

4 Hole Construction

- Registered Number
- Hole
- Date
- Record
- Method of Construction
- Diameter or Size Constructed
- Top of Interval
- Bottom of Interval

5 Casing

- Registered Number
- Hole
- Pipe
- Date
- Record
- Material Description
- Material Size
- Material Size Description
- Diameter
- Inside or Outside Diameter
- Top of Material
- Bottom of Material

6 Strata Log

- Registered Number
- Record
- Top of Strata
- Bottom of Strata
- Strata Description or Notes

7 Water Bed

- Registered Number
- Record
- Top of Bed
- Bottom of Bed
- Lithology
- Condition
- Age of Bed
- Top of Formation
- Bottom of Formation
- Formation Name
- Unit Status or Lithology
- Temperature When Drilled
- S.W.L. When Drilled
- Conductivity When Drilled

8 Pumping Test and Design

- Registered Number
- Pipe
- Date
- Record
- Registered Number of Pumped Bore
- Top of Tested Zone
- Bottom of Tested Zone
- Distance from Reference Point to Natural Surface
- Test Type
- S.W.L. or Static Head
- Temperature
- Test Duration
- Maximum Drawdown or Pressure Reduction
- Discharge at Maximum Drawdown or Pressure Reduction
- Elapsed Time to Maximum Drawdown or Pressure Reduction
- Reliability
- Method of Testing
- Design Yield
- Design Pump Inlet Depth or Design Back Pressure
- Transmissivity
- Storativity

9 Elevation

- Registered Number
- Pipe
- Date
- Elevation Sign
- Elevation
- Measurement Point Definition
- Datum
- Precision
- Source of Detailed Survey

10 Water Level

- Registered Number
- Pipe
- Date
- Record
- Water Level Measurement or Static Head
- Measurement Point Definition
- Remark
- Temperature

11 Water Conductivity

- Registered Number
- Pipe
- Date
- Record
- Conductivity
- Remark

12 Water Analysis

- Registered Number
- Pipe
- Date
- Record
- Analyst
- Analyst Analysis Number
- QWRC Analysis Number
- Remark
- Depth
- Conductivity
- pH
- Silica
- Hardness
- Alkalinity
- Figure of Merit
- Sodium Adsorption Ratio
- Residual Alkalinity Hazard
- Total Dissolved Ions
- Total Dissolved Solids
- Sodium
- Potassium
- Calcium
- Magnesium
- Iron
- Manganese
- Bicarbonate
- Carbonate
- Chloride
- Fluoride
- Nitrate
- Sulphate
- Phosphate
- Domestic Quality
- Stock Quality
- Irrigation Quality

13 Metered Water Use

- Registered Number
- Date of Last Reading
- Date of This Reading
- Water Used Between Readings

14 Research-Crops

- Registered Number
- Date at Start of Period
- Date at End of Period
- Crop
- Area

DATE: .2-12-84

** REGISTRATION - LICENSES FULL DETAILS **

*** REGISTERED NUMBER *** 98148 ********** (REGISTRATION DETAILS) **********

DISTRICT OFFICE	BRISBANE	LONGITUDE	152 21 33	RECORD SEARCH STATUS TABLE	
D/O FILE NUMBER		LATITUDE	27 35 14		
H/O FILE NUMBER		EASTING		**DATASET	CODE DATE**
DRAINAGE SUB-BASIN .	1432	NORTHING		REGISTRATION ..	
SUB-BASIN SUB-AREA .		ZONE NUMBER		LICENSING	
SHIRE	75	MAP/PLAN SCALE ...		HOLE CONST. ...	
PORTIONS		MAP SERIES		BORE CASING ...	
		MAP/PLAN NUMBER ..		STRATA LOG	
PARISH	531			WATER BED	
COUNTY				PUMPING TEST ..	
TYPE OF FACILITY ...	SF	ORIGINAL BORE NO..		ELEVATION	
CONST. AUTHORITY ...	OT	BORE LINE CODE ..		WATER LEVEL ...	
OWNER	OT	PRESENT EQUIPMENT	TE	CONDUCTIVITY ..	
ORIGINAL PURPOSE ...		GROUNDWATER STOR..		WATER ANALYSIS	
FACILITY STATUS	EX	NO. OF TEST HOLES		METERED USE ...	
DATE OF STATUS		TYPE OF MIN SEARCH		RESEARCH CROPS	

*** REGISTERED NUMBER *** 98149 ********** (REGISTRATION DETAILS) **********

DISTRICT OFFICE	BRISBANE	LONGITUDE	152 21 31	RECORD SEARCH STATUS TABLE	
D/O FILE NUMBER		LATITUDE	27 34 44		
H/O FILE NUMBER		EASTING		**DATASET	CODE DATE**
DRAINAGE SUB-BASIN .	1432	NORTHING		REGISTRATION ..	
SUB-BASIN SUB-AREA .		ZONE NUMBER		LICENSING	
SHIRE	75	MAP/PLAN SCALE ...		HOLE CONST. ...	
PORTIONS		MAP SERIES		BORE CASING ...	
		MAP/PLAN NUMBER ..		STRATA LOG	
PARISH	531			WATER BED	
COUNTY				PUMPING TEST ..	
TYPE OF FACILITY ...	SF	ORIGINAL BORE NO..		ELEVATION	
CONST. AUTHORITY ...	OT	BORE LINE CODE ..		WATER LEVEL ...	
OWNER	OT	PRESENT EQUIPMENT	TE	CONDUCTIVITY ..	
ORIGINAL PURPOSE ...		GROUNDWATER STOR..		WATER ANALYSIS	
FACILITY STATUS	EX	NO. OF TEST HOLES		METERED USE ...	
DATE OF STATUS		TYPE OF MIN SEARCH		RESEARCH CROPS	

*** REGISTERED NUMBER *** 98150 ********** (REGISTRATION DETAILS) **********

DISTRICT OFFICE	BRISBANE	LONGITUDE	152 22 10	RECORD SEARCH STATUS TABLE	
D/O FILE NUMBER		LATITUDE	27 32 35		
H/O FILE NUMBER		EASTING		**DATASET	CODE DATE**
DRAINAGE SUB-BASIN .	1432	NORTHING		REGISTRATION ..	
SUB-BASIN SUB-AREA .		ZONE NUMBER		LICENSING	
SHIRE	75	MAP/PLAN SCALE ...		HOLE CONST. ...	
PORTIONS		MAP SERIES		BORE CASING ...	
		MAP/PLAN NUMBER ..		STRATA LOG	
PARISH	531			WATER BED	
COUNTY				PUMPING TEST ..	
TYPE OF FACILITY ...	SF	ORIGINAL BORE NO..		ELEVATION	
CONST. AUTHORITY ...	OT	BORE LINE CODE ..		WATER LEVEL ...	
OWNER	OT	PRESENT EQUIPMENT	TE	CONDUCTIVITY ..	
ORIGINAL PURPOSE ...		GROUNDWATER STOR..		WATER ANALYSIS	
FACILITY STATUS	EX	NO. OF TEST HOLES		METERED USE ...	
DATE OF STATUS		TYPE OF MIN SEARCH		RESEARCH CROPS	

Note: No Figure D-3 included in original.

FIGURE D-2

DATE: 20-11-84

STRATA LOGS

BORE NUMBER	RECORD NUMBER	STRATA TOP (M)	STRATA BOT (M)	STRATA DESCRIPTION
48019	1			DEPTH 80 FET DRILLED SEPT 1974 BY J
	2			WRIGHT SWL 30 FET
	3			SUPPLY 5000 GPH DRAWDOWN 40 FET
	4			6 INS CASING TO 70 FET
	5			PUMPING LEVEL 70 FET
	6			BORE NOT EQUIPPED
	7			NO OTHER DETAILS KNOWN
48020	1			DEPTH 90 FET DRILLED AUG 1974 BY J
	2			WRIGHT SWL 70 FET
	3			SUPPLY 3000 GPH DRAWDOWN 10 FET
	4			6 INS CASING TO 60 FET
	5			PUMPING LEVEL 60 FET
	6			BORE NOT EQUIPPED
	7			NO OTHER DETAILS KNOWN
48022	1	0.00	0.60	SOIL DRILLER M STARK FILE T 3854
	2	0.60	2.43	CLAY 127 MMS TUBING 0 - 226.3 FET
	3	2.43	13.10	SANDSTONE DATE 15/3/1974
	4	13.10	15.24	SHALE SUPPLY 300 GPH
	5	15.24	16.15	SANDSTONE SWL 130 FET
	6	16.15	19.20	SHALE
	7	19.20	19.81	HARD MUDSTONE
	8	19.81	44.19	SANDSTONE SOAK 130 TO 140 FET
	9	44.19	45.72	SHALE
	10	45.72	46.93	SANDSTONE
	11	46.93	51.81	SHALE
	12	51.81	55.16	SANDSTONE
	13	55.16	57.30	SHALE
	14	57.30	58.21	SANDSTONE
	15	58.21	58.82	CONGLOMERATE SANDSTONE
	16	58.82	60.35	SHALE
	17	60.35	64.61	SANDSTONE
	18	64.61	66.75	CONGLOMERATE SANDSTONE (WB)
	19	66.75	68.27	SANDSTONE
	20	68.27	73.15	SHALE
48024	1			BORE NEVER DRILLED LICENSE CANCELLED
48025	1	0.00	0.91	SOIL FILE T 1257 07/04/1974
	2	0.91	7.01	YELLOW CLAY DRILLER M DRABSCH
	3	7.01	8.83	LIGHT BROWN SANDY CLAY
	4	8.83	22.86	MULTICOLOURED CLAYS
	5	22.86	25.90	GREY SANDY CLAYS
	6	25.90	27.43	GREY CLAY & BITS OF COAL
	7	27.43	28.04	SEAM OF COAL & SHALE
	8	28.04	35.96	GREY CLAY
	9	35.96	38.40	DARK GREY CLAY & COAL
	10	38.40	39.01	SEAM OF COAL
	11	39.01	39.92	FINE GRAVEL & SAND
	12	39.92	43.28	GREY CLAY BITS OF SHALE & COAL
	13	43.28	46.02	GREY CLAY WITH TRACE OF COAL
	14	46.02	47.24	GREY MUDSTONE
	15	47.24	51.20	FINE GREY MUDSTONE

FIGURE D-4

DATE: 27-11-84

WATER BED

REG NUMBER	RECORD NUMBER	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	CONDITION	AGE BED	TOP FORM(M)	BOTTOM FORM(M)	FORMATION NAME	UNIT STATUS	TMP (C)	SWL (M)	COND.
42230964	1	27.0	28.0	BSLT	FR	TERT			BASALT				1040
	2	34.0	35.0	BSLT	FR	TERT			BASALT				
	3	43.0	44.0	BSLT	VS	TERT			BASALT				
	4	47.0	47.0	BSLT	WZ	TERT			BASALT			-9.70	740
42230965	1	25.0	26.0	BSLT	FR	TERT			BASALT				
	2	33.0	33.0	COAL	FR	TERT			BASALTCOAL				
	3	52.0	53.0	BSLT	VS	TERT			BASALT				
	4	72.0	73.0	BSLT	VS	TERT			BASALT			-21.0	640
42230966	1	93.0	96.0	BSLT	FR	TERT			BASALT			-24.60	532
42230967	1	5.0	6.0	CLAY SILT MUDD	UC	QUAT			ALLUMBICK				
	2	16.0	18.0	BSLT	VS	TERT			BASALT				
	3	64.0	65.0	BSLT	VS	TERT			BASALT			-5.20	635
42230968	1	7.0	8.0	BSLT	WZ	TERT			BASALT				
	2	15.0	16.0	BSLT	WZ	TERT			BASALT				2450
	3	43.0	44.0	BSLT	FR	TERT			BASALT				1150
42230969	1	24.0	25.0	COAL	FR	TERT			BASALTCOAL				
	2	29.0	30.0	BSLT	VS	TERT			BASALT				715
	3	42.0	43.0	BSLT	VS	TERT			BASALT				
	4	46.0	47.0	COAL	FR	TERT			BASALTCOAL				
	5	79.0	79.0	BSLT	VS	TERT			BASALT				
	6	91.0	92.0	BSLT	VS	TERT			BASALT				493
42230970	1	9.0	10.0	BSLT	WZ	TERT			BASALT			-10.00	
	2	41.0	42.0	BSLT	FR	TERT			BASALT				755
	3	66.0	67.0	BSLT	WZ	TERT			BASALT				415
	4	77.0	80.0	BSLT	WZ	TERT			BASALT				
	5	87.0	88.0	BSLT	WZ	TERT			BASALT			-27.00	432
42230971	1	52.0	53.0	BSLT	WZ	TERT			BASALT				640
	2	55.0	60.0	BSLT	VS	TERT			BASALT				458
	3	86.0	87.0	BSLT	FR	TERT			BASALT				640
	4	89.0	89.0	BSLT	FR	TERT			BASALT				610
42230972	1	18.0	19.0	BSLT	WZ	TERT			BASALT			-5.70	
	2	23.0	24.0	BSLT	FR	TERT			BASALT				780
	3	24.0	25.0	BSLT	VS	TERT			BASALT				
	4	27.0	28.0	BSLT	WZ	TERT			BASALT				
	5	30.0	31.0	BSLT	VS	TERT			BASALT				
	6	34.0	35.0	BSLT	VS	TERT			BASALT				
	7	65.0	66.0	BSLT	VS	TERT			BASALT				
	8	87.0	88.0	BSLT	VS	TERT			BASALT				444
42230973	1	19.0	20.0	BSLT	WZ	TERT			BASALT			-20.00	
	2	28.0	29.0	BSLT	VS	TERT			BASALT				
	3	78.0	79.0	BSLT	VS	TERT			BASALT				560
	4	105.0	107.0	BSLT	VS	TERT			BASALT				610
42230974	1	22.0	23.0	BSLT	FR	TERT			BASALT				700
	2	42.0	43.0	BSLT	WZ	TERT			BASALT				
	3	56.0	56.0	BSLT	FR	TERT			BASALT				
	4	65.0	66.0	BSLT	VS	TERT			BASALT				
	5	68.0	69.0	BSLT	VS	TERT			BASALT				441
	6	80.0	81.0	BSLT	FR	TERT			BASALT				
	7	97.0	98.0	COAL	FR	TERT			BASALTCOAL				612
42230975	1	52.0	53.0	BSLT	VS	TERT			BASALT				
	2	53.0	54.0	BSLT	FR	TERT			BASALT				441
	3	64.0	65.0	BSLT	VS	TERT			BASALT				
	4	74.0	75.0	BSLT	VS	TERT			BASALT				
	5	88.0	88.0	BSLT	WZ	TERT			BASALT				448

FIGURE D-5

DATE: 22-11-84

PUMP TEST

REG NUMBER	P	DATE	REC NO	RN OF PUMP-BORE	TOP (M)	BOTTOM (M)	DIST (M)	TEST TYPE	SWL (M)	TMP (C)	TEST DUR. (HRS)	MAX DRAW OR P-RED (M)	DISC (M3/DY)	EL. TIME (MIN)	REL. METH	DESIGN YIELD (L/S)	DESIGN BACK-P (M)	TMSY STOR. (M2/DY)
206	A	00-00-1910	1	206		133.8			-38.70			42.7	43.6		ES DRI			
207	A	00-00-1910	1	207		129.5			-37.50				57.8		ES EQP			
227	A	00-00-1912	1	227		629.5			-45.70				1048.3		ES EQP			
228	A	00-00-1920	1	228		144.8			-18.30			45.7	38.2		ES DRI			
244	A	00-00-1911	1	244		146.3			-62.20			67.0	54.6		BAI			
285	A	27-11-1890	1	285		1189.2				51		0.0	104.6		ES FRE			
303	A	27-02-1975	1	303		1128.5			-29.60		<24	50.0	250.5		AC PUM	250.5	50.0	
387	A	22-01-1921	1	387		917.1			22.10	52			2258.3		FA FRE			
392	A	00-11-1897	1	392		511.7				53		0.0	1205.7		AC FRE			
393	A	20-07-1900	1	393		1131.5			21.30	40		0.0	1355.9		ES FRE			
394	A	00-00-1910	1	394		1132.4						0.0	627.9		FRE			
404	A	29-10-1975	1	404		471.5			-14.70	33			423.1		ES			
405	A	29-10-1975	1	405		437.6			-8.30	34			773.5		ES			
406	A	15-10-1964	1	406		781.7			-2.50	35	<6	42.7	229.9		AC AIR			
2258	A	28-08-1941	1	2258	79.2	82.2		FR					104.5		FA F/F			0.0 0
	A	28-08-1941	2	2258	82.2	85.3		FR					204.4		FA F/F			0.000
	A	09-08-1960	1	2258	79.2	85.3		FR					48.4		AC F/F			0.000
2339	A	31-07-1907	1	2339			-42.4						27.2		FA F/F			0.000
	A	02-12-1925	2						-34.24									0.000
	A	31-01-1939	3						-17.06									0.0 0
	A	19-11-1974	1	2339		657.2			-39.00		<6		87.3		ES DRI			
2345	A	00-00-1917	1	2345		27.4			-18.30				36.4		ES DRI			
3850	A	28-05-1918	1	3850		497.7			4.50	39			185.1		ES FRE			
3852	A	27-05-1918	1	3852		284.2							57.0		ES FRE			
3853	A	27-05-1918	1	3853		353.8			17.50				5460.0		ES FRE			
3979	A	19-08-1918	1	3979		891.5			4.50	50		0.0	141.9		ES FRE			
3982	A	- -	1	3982		152.5			-97.60				13.6		DRI			
4257	A	- -	1	4257		496.2							750.7		FRE			
4263	A	07-02-1959	1	4263		606.9							104.8		FA FRE			
4990	A	- -	1	4990		369.0							1137.5					
5401	A	10-03-1937	1	5401		167.7			-61.00				9.1		ES			
5402	A	11-02-1938	1	5402		67.4			-24.40			49.7	17.7		ES DRI			
5413	A	- -	1	5413		80.8			-21.30				89.5		DRI			
5414	A	- -	1	5414		333.9			-13.70			106.7	65.5		DRI			
5416	A	16-03-1937	1	5416		239.7			-30.50				43.6		ES DRI			
5426	A	- -	1	5426		122.6							13.6		FRE			
5427	A	- -	1	5427		63.1							13.6		FRE			
5442	A	20-08-1953	1	5442		79.9						0.0	9.8		ES FRE			
5528	A	- -	1	5528		99.7			-27.40				11.3		DRI			
5599	A	01-05-1937	1	5599		120.6			-96.90				22.7		ES DRI			
5600	A	01-05-1937	1	5600		106.1			-70.10				13.6		ES DRI			
5612	A	00-00-1918	1	5612		340.0			-42.70			91.5	52.4		ES STA			
5621	A	00-00-1917	1	5621		313.2			-42.70				87.3		ES STA			
5625	A	00-00-1918	1	5625		275.4			-39.60				61.1		ES STA			
5694	A	- -	1	5694		976.0			-183.00									
5931	A	23-06-1945	1	5931		199.7			-6.70			71.9	36.4		ES DRI			
6064	A	17-12-1941	1	6064		329.4			-45.70			67.1	43.6		ES DRI			
6160	A	- -	1	6160		106.7			-12.20				22.7		DRI			
6161	A	- -	1	6161		106.4			-9.10				22.7		DRI			
6170	A	22-08-1968	1	6170		137.5			-139.90			143.3	152.8		ES EQP			
6428	A	00-00-1937	1	6428		97.9					>24		103.7		FA EQP			
6605	A	31-03-1938	1	6605		152.5			-27.40				26.2		EQP			
6776	A	04-06-1938	1	6776		104.2			-28.90			44.8	500.0		ES DRI			
6876	A	- -	1	6876		1173.0												

FIGURE D-6

DATE: 08-1ć-84

ELEVATION

NUMBER	P	DATE	ELEVATION	N/R	DATUM	PRECISION	SOURCE
9443	X	29-04-1944	378.20	N	STD	EST	
9448	X	- -1943	387.90	N	STD	EST	
9465	X	- -1912	272.90	N	STD	EST	
9466	X	- -1925	286.70	N	STD	EST	
9467	X	- -1921	280.60	N	STD	EST	
9468	X	- -1925	247.00	N	STD	EST	
9479	X	- -1923	283.90	N	STD	SVY	
9480	X	- -1925	289.70	N	STD	EST	
9489	X	- -1943	112.20	N	STD	EST	
9686	X	30-07-1952	134.20	N	STD	EST	
9689	X	26-10-1943	137.20	N	STD	EST	
9703	X	- -1921	274.50	N	STD	EST	
9720	X	- -1928	147.30	N	STD	EST	
9763	X	10-09-1963	147.30	N	STD	EST	
9782	X	15-04-1944	139.60	N	STD	EST	
9817	X	17-03-1944	251.30	N	STD	EST	
9865	X	00-00-1944	192.70	N	STD	EST	
9894	X	15-05-1944	253.10	N	STD	EST	
9908	X	- -1924	384.30	N	STD	EST	
9909	X	- -1910	385.80	N	STD	EST	
9910	X	- -1921	375.10	N	STD	EST	
9932	X	09-07-1944	143.30	N	STD	EST	
9933	X	- -1945	390.40	N	STD	EST	
9965	X	14-10-1944	578.80	N	STD	EST	
9984	X	20-10-1944	127.40	N	STD	EST	
9985	X	19-01-1945	452.90	N	STD	EST	
10198	X	07-11-1944	150.00	N	STD	EST	
10200	X	- -1944	174.10	N	STD	EST	
10283	X	00-00-1945	143.30	N	STD	EST	
10290	X	11-11-1944	133.50	N	STD	EST	
10356	X	17-10-1944	144.80	N	STD	EST	
10357	X	- -1916	141.50	N	STD	EST	
10361	X	- -1926	388.80	N	STD	EST	
10362	X	- -1929	382.70	N	STD	EST	
10368	X	31-03-1946	177.20	N	STD	EST	
10369	X	- -1945	229.00	N	STD	EST	
10370	X	- -1945	326.30	N	STD	EST	
10373	X	- -1945	364.00	N	STD	EST	
10375	X	15-01-1945	390.40	N	STD	EST	
10406	X	16-10-1974	129.90	N	STD	EST	
10411	X	- -1945	508.70	N	STD	EST	
10413	X	- -1945	198.20	N	STD	EST	
10423	X	- -	170.80	N	STD	EST	
10424	X	12-06-1945	171.40	N	STD	EST	
10494	X	- -1945	140.30	N	STD	EST	
10495	X	- -1918	140.30	N	STD	EST	
10496	X	- -1918	150.30	N	STD	EST	
10497	X	- -1918	120.70	N	STD	EST	
10498	X	- -1918	140.30	N	STD	EST	
10499	X	- -1918	147.90	N	STD	EST	
10500	X	- -1918	125.00	N	STD	EST	
10501	X	- -1918	131.40	N	STD	EST	
10502	X	08-02-1947	123.50	N	STD	EST	
10503	X	- -1918	143.90	N	STD	EST	

FIGURE D-7

REG NUMBER	P	DATE	RD	MEASUREMENT	N R	RMK TMP	P	DATE	RD	MEASUREMENT	N R	RMK TMP	P	DATE	RD	MEASUREMENT	N R	RMK TMP
14310119	A	25-01-1966	1	-3.99	R		A	02-03-1966	1	-4.02	R		A	24-05-1966	1	-3.99	R	
	A	18-07-1966	1	-3.99	R		A	07-09-1966	1	-3.89	R		A	20-10-1966	1	-3.84	R	
	A	01-12-1966	1	-3.86	R		A	25-01-1967	1	-4.52	R		A	14-03-1967	1	-4.52	R	
	A	30-05-1967	1	-3.66	R		A	16-06-1967	1	-3.02	R		A	01-08-1967	1	-3.63	R	
	A	26-09-1967	1	-3.56	R		A	09-11-1967	1	-3.53	R		A	24-01-1968	1	-3.56	R	
	A	19-03-1968	1	-3.48	R		A	22-05-1968	1	-3.43	R		A	07-08-1968	1	-3.48	R	
	A	09-10-1968	1	-3.53	R		A	11-12-1968	1	-3.56	R		A	05-03-1969	1	-3.71	R	
	A	03-06-1969	1	-3.89	R		A	22-07-1969	1	-3.84	R		A	30-09-1969	1	-3.81	R	
	A	02-12-1969	1	-3.81	R		A	03-03-1970	1	-3.71	R		A	12-05-1970	1	-3.84	R	
	A	01-07-1970	1	-3.91	R		A	08-09-1970	1	-3.86	R		A	14-04-1971	1	-3.23	R	
	A	24-06-1971	1	-3.38	R		A	25-08-1971	1	-3.45	R		A	09-11-1971	1	-3.56	R	
	A	27-04-1972	1	-3.53	R		A	02-08-1972	1	-3.51	R		A	18-10-1972	1	-3.58	R	
	A	17-04-1973	1	-3.35	R		A	04-07-1973	1	-3.43	R		A	05-09-1973	1	-3.40	R	
	A	31-10-1973	1	-3.43	R		A	28-02-1974	1	-3.11	R		A	24-09-1974	1	-3.44	R	
	A	12-02-1975	1	-3.50	R		A	27-05-1975	1	-3.50	R		A	10-09-1975	1	-3.50	R	
	A	12-11-1975	1	-3.50	R		A	27-01-1976	1	-3.30	R		A	09-08-1976	1	-3.35	R	
	A	03-11-1976	1	-3.47	R		A	12-01-1977	1	-3.36	R		A	24-03-1977	1	-3.38	R	
	A	20-06-1977	1	-3.22	R		A	12-09-1977	1	-3.37	R		A	21-11-1977	1	-3.47	R	
	A	06-02-1978	1	-3.60	R		A	17-04-1978	1	-3.66	R		A	17-07-1978	1	-3.66	R	
	A	23-10-1978	1	-3.57	R		A	13-02-1979	1	-3.65	R		A	15-06-1979	1	-3.70	R	
	A	05-09-1979	1	-3.63	R		A	31-10-1979	1	-3.68	R		A	09-01-1980	1	-3.67	R	
	A	08-04-1980	1	-3.73	R		A	16-07-1980	1	-3.74	R		A	10-11-1980	1	-3.81	R	
	A	15-01-1981	1	-3.73	R		A	30-07-1981	1	-3.42	R		A	09-03-1982	1	-3.25	R	
	A	29-03-1983	1	-3.93	R		X	09-03-1965	1	-4.10	N							
14310120	X	30-04-1965	1	-3.80	N													
14310121	A	25-01-1966	1	-5.46	R		A	02-03-1966	1	-5.49	R		A	24-05-1966	1	-5.34	R	
	A	18-07-1966	1	-5.21	R		A	07-09-1966	1	-5.13	R		A	20-10-1966	1	-5.25	R	
	A	01-12-1966	1	-5.39	R		A	25-01-1967	1	-5.97	R		A	14-03-1967	1	-5.72	R	
	A	30-05-1967	1	-4.93	R		A	16-06-1967	1	-4.19	R		A	01-08-1967	1	-4.85	R	
	A	26-09-1967	1	-4.93	R		A	09-11-1967	1	-4.98	R		A	24-01-1968	1	-4.62	R	
	A	19-03-1968	1	-4.91	R		A	22-05-1968	1	-4.91	R		A	07-08-1968	1	-4.96	R	
	A	09-10-1968	1	-5.03	R		A	11-12-1968	1	-5.13	R		A	05-03-1969	1	-5.31	R	
	A	03-06-1969	1	-5.31	R		A	22-07-1969	1	-5.23	R		A	30-09-1969	1	-5.21	R	
	A	02-12-1969	1	-5.21	R		A	03-03-1970	1	-5.19	R		A	12-05-1970	1	-5.29	R	
	A	01-07-1970	1	-5.39	R		A	08-09-1970	1	-5.36	R		A	14-04-1971	1	-4.78	R	
	A	24-06-1971	1	-4.91	R		A	25-08-1971	1	-5.01	R		A	09-11-1971	1	-5.11	R	
	A	27-04-1972	1	-4.93	R		A	02-08-1972	1	-5.03	R		A	18-10-1972	1	-5.19	R	
	A	17-04-1973	1	-4.83	R		A	04-07-1973	1	-5.03	R		A	05-09-1973	1	-4.83	R	
	A	31-10-1973	1	-4.91	R		A	28-02-1974	1	-4.61	R		A	24-09-1974	1	-4.99	R	
	A	12-02-1975	1	-5.00	R		A	27-05-1975	1	-4.90	R		A	10-09-1975	1	-5.00	R	
	A	12-11-1975	1	-4.70	R		A	27-01-1976	1	-4.50	R		A	09-08-1976	1	-4.88	R	
	A	03-11-1976	1	-4.79	R		A	12-01-1977	1	-4.90	R		A	24-03-1977	1	-4.67	R	
	A	20-06-1977	1	-4.73	R		A	12-09-1977	1	-4.91	R		A	21-11-1977	1	-5.01	R	
	A	06-02-1978	1	-5.11	R		A	17-04-1978	1	-5.09	R		A	17-07-1978	1	-5.11	R	
	A	23-10-1978	1	-5.09	R		A	13-02-1979	1	-5.14	R		A	15-06-1979	1	-5.23	R	
	A	05-09-1979	1	-5.10	R		A	31-10-1979	1	-5.26	R		A	09-01-1980	1	-5.16	R	
	A	08-04-1980	1	-5.33	R		A	16-07-1980	1	-5.19	R		A	10-11-1980	1	-5.32	R	
	A	15-01-1981	1	-5.24	R		A	30-07-1981	1	-4.91	R		A	09-03-1982	1	-4.75	R	
	A	29-03-1983	1	-5.43	R		X	04-03-1965	1	-4.50	N							
143*0122	X	01-12-1966	1	0.60	R		X	25-01-1967	1	0.71	R		X	14-03-1967	1	0.81	R	
	X	30-05-1967	1	0.81	R		X	16-06-1967	1	0.89	R		X	01-08-1967	1	0.86	R	

FIGURE D-8

DATE: 30-11-84

CONDUCTIVITY

REG NUMBER	P	DATE	RD	MEASUREMENT	RMK	P	DATE	RD	MEASUREMENT	RMK	P	DATE	RD	MEASUREMENT	RMK
99095	A	06-12-1978	1	340		A	04-06-1979	1	460		A	30-11-1979	1	465	
	A	03-06-1980	1	285		A	16-09-1980	1	440		A	17-12-1980	1	445	
	A	01-09-1981	1	375		A	26-11-1981	1	460		A	02-03-1982	1	460	
	A	02-06-1982	1	420		A	25-11-1982	1	470	PUN	A	04-03-1983	1	410	PUN
	A	02-09-1983	1	420	PUN	A	04-03-1984	1	390	PUN	A	05-06-1984	1	410	PUN
	A	12-09-1984	1	400	PUN										
99096	A	01-03-1963	1	333		A	20-08-1963	1	370		A	30-09-1963	1	515	
	A	08-01-1964	1	465		A	05-08-1964	1	361		A	15-10-1964	1	335	
	A	22-12-1964	1	302		A	10-02-1965	1	340		A	14-04-1965	1	443	
	A	16-06-1965	1	252		A	14-09-1965	1	339		A	21-10-1965	1	342	
	A	08-12-1965	1	350		A	10-02-1966	1	370		A	09-05-1966	1	350	
	A	05-08-1966	1	345		A	12-10-1966	1	350		A	21-12-1966	1	351	
	A	21-03-1967	1	390		A	07-06-1967	1	400		A	19-10-1967	1	390	
	A	04-01-1968	1	385		A	25-04-1968	1	380		A	12-08-1968	1	420	
	A	06-12-1968	1	380		A	18-02-1969	1	430		A	02-06-1969	1	480	
	A	17-09-1969	1	390		A	01-12-1969	1	430		A	02-03-1970	1	445	
	A	01-06-1970	1	440		A	01-10-1970	1	440		A	08-01-1971	1	390	
	A	29-03-1971	1	260		A	13-12-1971	1	235		A	28-02-1972	1	320	
	A	20-06-1972	1	200		A	05-09-1972	1	205		A	19-12-1972	1	215	
	A	15-06-1973	1	215		A	04-09-1973	1	185		A	14-12-1973	1	235	
	A	04-09-1974	1	270		A	06-12-1974	1	270		A	10-03-1975	1	265	
	A	13-06-1975	1	270		A	15-09-1976	1	320		A	10-12-1976	1	330	
	A	08-12-1977	1	418		A	02-03-1978	1	355		A	02-03-1982	1	420	
99106	A	01-03-1963	1	372		A	31-07-1963	1	378		A	09-10-1963	1	510	
	A	17-12-1963	1	523		A	16-04-1964	1	490		A	10-08-1964	1	394	
	A	16-10-1964	1	410		A	24-12-1964	1	398		A	12-02-1965	1	390	
	A	24-06-1965	1	413		A	17-09-1965	1	447		A	22-10-1965	1	432	
	A	09-12-1965	1	431		A	10-02-1966	1	450		A	11-05-1966	1	429	
	A	08-06-1966	1	450		A	04-08-1966	1	430		A	23-12-1966	1	460	
	A	23-03-1967	1	460		A	08-06-1967	1	451		A	20-10-1967	1	470	
	A	08-01-1968	1	440		A	01-04-1968	1	510		A	12-08-1968	1	490	
	A	06-12-1968	1	470		A	03-02-1969	1	470		A	23-06-1969	1	460	
	A	17-09-1969	1	470		A	01-10-1970	1	520		A	25-03-1971	1	520	
	A	16-12-1971	1	540		A	05-09-1972	1	540		A	20-12-1972	1	520	
	A	07-03-1973	1	520		A	13-06-1973	1	500		A	06-09-1973	1	490	
	A	05-09-1974	1	480		A	04-12-1974	1	440		A	11-03-1975	1	470	
	A	17-06-1975	1	460		A	16-09-1975	1	500		A	16-06-1976	1	490	
	A	07-12-1976	1	475		A	06-06-1977	1	410		A	21-09-1977	1	480	
	A	07-12-1977	1	500		A	03-03-1978	1	450		A	09-06-1978	1	535	
	A	19-09-1978	1	500		A	05-03-1979	1	505		A	06-06-1979	1	495	
	A	17-09-1979	1	490		A	03-12-1979	1	490		A	09-06-1980	1	450	
	A	17-09-1980	1	490		A	10-12-1980	1	570		A	11-03-1981	1	570	
	A	20-07-1981	1	530		A	07-09-1981	1	540		A	08-03-1982	1	680	
	A	11-06-1982	1	440		A	08-09-1982	1	510	PUN	A	03-12-1982	1	570	PUN
	A	09-03-1983	1	570	PUN	A	07-09-1983	1	520	PUN	A	24-11-1983	1	570	PUN
	A	07-03-1984	1	500	PUN	A	06-06-1984	1	580	PUN	A	03-09-1984	1	620	PUN
99107	A	01-03-1963	1	1177		A	31-07-1963	1	988		A	09-10-1963	1	1288	
	A	17-12-1963	1	1442		A	16-04-1964	1	1530		A	10-08-1964	1	1087	
	A	16-10-1964	1	1125		A	09-11-1964	1	1214		A	24-12-1964	1	1210	
	A	12-02-1965	1	1294		A	15-04-1965	1	1276		A	28-05-1965	1	1280	
	A	17-09-1965	1	1087		A	22-10-1965	1	1022		A	09-12-1965	1	1400	

FIGURE D-9

DATE: 21-11-84 WATER ANAL.

REG NUMBER	P P	DATE	RD	QAN	DEPTH	RMK	COND.	PH	SI	TOTAL DIS. IONS	TOTAL DIS. SOLIDS	HARD.	ALK	FIG. OF MERIT	SAR	RAH	QUALITY DOM	QUALITY STK	QUALITY IRR
12311A		05/02/1955	1	014404	407	PUM	0	7.5		467.70	0.00	9	239	0.0	26.8	4.58	SDO		UIR
12314A		22/05/1956	1	015773	244		0			1011.30	0.00	20	425	0.0	39.7	8.08		MST	SIR
12323A		24/07/1953	1	013501	161	PUM	0			1638.50	0.00	48	165	0.0	39.7	2.34		SST	
12330A		19/07/1954	1	014089	160		0	6.7		6595.10	0.00	1018	115	0.2	26.7	0.00	SDO	UST	
12335A		24/07/1953	1	013503	142	PUM	0			430.60	0.00	171	119	0.8	3.2	0.00		SST	
12336A		24/07/1953	1	013504	116	PUM	0			370.30	0.00	168	115	1.1	2.4	0.00		SST	
12340A		11/03/1954	1	013908			0			5172.90	0.00	53	810	0.0	121.7	15.09		MST	
	A	29/04/1974	1	061187			8720	8.4		5805.90	0.00	91	819	0.0	95.3	14.55	UDO	UST	UIR
12341A		19/07/1954	1	014119	184	PUM	0	7.8		5152.00	0.00	622	511	0.2	30.9	0.00	UDO	SST	
12346A		09/11/1953	1	013701	92	BAI	0			706.55	0.00	72	74	0.1	12.7	0.05		SST	
12355A		18/08/1953	1	013541	137		0			4894.30	0.00	468	45	0.1	31.7	0.00	UDO	SST	UIR
12366A		04/09/1953	1	013563	105		0			835.10	0.00	243	241	0.5	6.1	0.00	SDO	SST	SIR
12367A		18/08/1953	1	013512		PUM	0			151.80	0.00	57	41	0.7	2.1	0.00	SDO	SST	SIR
12368A		18/08/1953	1	013511		PUM	0			1156.90	0.00	298	217	0.4	7.9	0.00	SDO	SST	SIR
12379A		01/08/1953	1	013537	153	PUM	0			2821.60	0.00	761	129	0.5	11.7	0.00	UDO	SST	UIR
12382A		23/02/1954	1	013899	140	PUM	0			1454.40	0.00	55	217	0.0	32.6	3.24		SST	
12421A		10/12/1968	1	041488		PUM	1700	8.0		1423.95	0.00	14	651	0.0	48.9	12.73	MDO	SST	UIR
12422A		18/03/1959	1	017468		PUM	0			1556.10	0.00	336	229	0.3	10.7	0.00		SST	
12425A		16/07/1954	1	014175	63	PUM	0	7.4		8842.50	0.00	2153	62	0.4	21.7	0.00	UDO	SST	
12438A		23/02/1954	1	000001	70	BAI	0			5256.90	0.00	2143	129	0.9	10.5	0.00		UST	
12444A		25/08/1954	1	014220	126		0			1651.60	0.00	40	162	0.0	43.7	2.43		SST	
12445A		20/03/1957	1	016116			0			2142.20	0.00	134	442	0.1	29.3	6.14		SST	
	A	15/11/1983	1	100136	61	PUM	1050	8.5	29	820.11	594.96	92	429	0.2	8.9	6.74	SDO	SST	UIR
12497A		14/09/1954	1	014311	91	PUM	0			2318.30	0.00	347	110	0.2	16.8	0.00		SST	
12519A		23/08/1955	1	015019	294		0			969.80	0.00	13	659	0.0	48.7	12.89		SST	
	A	26/03/1971	1	049331			1720	8.8		1348.25	0.00	8	673	0.0	68.3	13.30	MDO	SST	UIR
	A	02/03/1978	1	076293		REM	1750	8.5	19	1453.60	1041.05	14	725	0.0	48.4	14.20	MDO	SST	UIR
12520A		23/08/1955	1	015020	268		0			991.00	0.00	7	705	0.0	67.2	13.92		SST	
	A	07/02/1956	1	015196	268		0			959.70	0.00	11	666	0.0	53.1	13.08		SST	
	A	04/08/1976	1	069445			1780	8.2	16	1409.10	994.06	14	712	0.0	46.3	13.94	MDO	SST	UIR
12531A		11/11/1954	1	014536	116	PUM	0			4965.90	0.00	1441	72	0.6	13.8	0.00		SST	
12550A		14/03/1955	1	014705	78	PUM	0			4370.30	0.00	228	174	0.1	45.3	0.00		SST	
12555A		08/11/1962	1	000001	84	PUM	0	8.3		597.00	0.00	27	191	0.1	18.5	3.27		SST	MIR
12582A		16/06/1955	1	014859		BAI	0			248.95	0.00	125	33	1.5	1.5	0.00		SST	SIR
12583A		16/06/1955	1	014860		PUM	0			277.60	0.00	184	162	2.3	1.2	0.00		SST	SIR
12595A		27/09/1954	1	014292	194	PUM	0			1738.00	0.00	220	98	0.2	15.9	0.00		SST	
12606A		14/03/1955	1	014876	172		0			3471.40	0.00	181	60	0.1	37.8	0.00		SST	
12609A		10/05/1955	1	014909	69		0			2600.10	0.00	277	67	0.1	22.4	0.00		SST	
12611A		16/06/1955	1	014861	87	PUM	0			1942.90	0.00	24	79	0.0	66.5	1.10		SST	
12612A		00/00/1955	1	001428			0			575.10	0.00	33	172	0.1	15.9	2.76	SDO	SST	
	A	26/07/1955	1	015015	95		0			575.10	0.00	33	172	0.1	15.9	2.76	SDO	SST	
12623A		10/05/1955	1	014912	132		0			4457.60	0.00	387	143	0.1	33.9	0.00		SST	
12627A		18/05/1954	1	014061	256	PUM	0			1907.60	0.00	40	217	0.0	50.8	3.53	UDO	SST	
12629A		16/07/1954	1	000001			0			395.20	0.00	175	134	1.0	2.8	0.00		SST	
12635A		20/04/1955	1	001360	95	BAI	0			5964.60	0.00	712	294	0.2	33.9	0.00		SST	
12652A		23/11/1954	1	000796	69	BAI	0	6.3		5610.80	0.00	999	98	0.3	21.2	0.00	UDO	UST	UIR
	A	22/02/1955	1	014727	186	BAI	0			435.10	0.00	13	189	0.0	20.2	3.51	SDO	SST	UIR
12670A		11/05/1954	1	014058	159	PUM	0			247.70	0.00	83	60	0.6	2.9	0.00		SST	
12680A		23/12/1955	1	001458	162	BAI	0			1147.10	0.00	71	246	0.1	21.5	3.48		SST	
12686A		29/10/1954	1	000737			0			2164.90	0.00	58	320	0.0	47.8	5.22		SST	
	A	29/10/1954	1	014424	379		0			2164.90	0.00	58	320	0.0	47.8	5.22		SST	
12700A		00/00/0000	1	061201			1850	8.8		1502.20	0.00	7	764	0.0	72.0	15.14	MDO	UST	UIR
	A	23/08/1955	1	015021	300		0			1057.90	0.00	14	755	0.0	50.9	14.78		SST	
	A	19/04/1968	1	039579			1770	8.2		1559.55	0.00	9	778	0.0	65.4	15.37	MDO	SST	UIR

FIGURE D 10

DATE: 21-11-84

W/ANAL IONS

REG NUMBER	P P	DATE	RD	QAN	TOTAL DIS. IONS	NA	K	CA	MG	FE	MN	HCO3	CO3	CL	F	NO3	SO4	PO4
11022A		02/10/1953	1	013652	1054.10	394.7		20.0	0.0			0.0	87.2	510.5	0.20		41.5	
11027A		21/11/1947	1	000001	11285.50	4115.5		228.8	48.6			0.0	18.6	6874.0			0.0	
11064A		30/12/1958	1	001230	7326.20	2601.2		185.9	60.1			0.0	234.5	4225.7	0.20		18.6	
11079A		12/09/1972	1	053227	2483.80	902.0		8.0		4.00		366.0		1200.0	0.80	3.0		
11088A		25/06/1984	1	013598	4371.50	1156.9		314.6	41.5			0.0	54.3	1258.4			1545.8	
11124A		15/05/1948	1	000001	887.00	370.4		4.3	1.4			0.0	400.4	110.1	0.40		0.0	
11206A		03/09/1948	1	009433	2183.50	828.0		27.2	2.9			0.0	81.5	1225.5	1.20		17.2	
11291A		06/12/1953	1	013818	4080.10	1262.7		113.0	100.1			0.0	31.5	1931.9	0.30		640.6	
11303A		11/10/1948	1	009496	5078.70	1348.5		286.0	105.8			0.0	125.8	1437.2	0.80		1774.6	
11309A		12/07/1952	1	012214	572.02	178.8		11.4	18.6	5.72		0.0	40.0	266.0	0.00		51.5	
11351A		19/06/1963	1	000001	1046.40	437.6		2.9	1.4			0.0	439.0	164.5	1.00		0.0	
	A	25/03/1971	1	048330	1297.00	411.0		3.0	0.0			701.0	38.0	143.0	1.00		0.0	
	A	05/08/1976	1	069444	1480.60	425.0	1.0	6.0	3.0			883.0	6.5	155.0	1.10			
11382A		28/02/1952	1	012387	927.90	387.5		2.9	0.0			0.0	370.4	165.9	1.20		0.0	
11383A		28/02/1952	1	011235	759.00	316.0		2.9	0.0			0.0	296.0	143.0	1.10		0.0	
11420A		14/06/1956	1	015593	3083.10	1069.6		51.5	28.6			0.0	100.1	1347.1			486.2	
	A	14/06/1956	1	015594	1024.00	421.9		5.7	1.4			2.9	409.0	170.2			12.9	
11522A		14/06/1972	1	052897	1104.30	348.0		2.0	0.0			494.0	48.0	150.0	0.30		62.0	
11560A		16/08/1982	1	095084	1357.50	460.0	2.0	6.0	1.0			320.0	9.9	550.0	0.60	0.0	8.0	
11562A		12/01/1953	1	013025	1340.40	557.7		2.9	1.4			0.0	414.7	380.4	3.30		0.0	
11563A		21/01/1953	1	013033	823.40	333.2		4.3	2.9			0.0	281.7	198.8	2.50		0.0	
11578A		31/10/1957	1	016670	11065.60	2775.6		543.4	501.9			0.0	225.9	4820.5	0.40		2197.9	
11581A		05/08/1949	1	010723	9330.80	3507.8		110.1	31.5			0.0	110.1	5571.3			0.0	
11618A		24/07/1952	1	012726	443.70	101.5		25.7	24.3			0.0	68.6	95.8	0.50		127.3	
11619A		05/06/1952	1	012588	252.30	75.8		12.9	10.0			0.0	88.7	57.2	0.50		7.2	
	A	24/07/1952	1	012727	142.80	40.0		7.2	7.2			0.0	54.3	32.9	1.20		0.0	
11629A		30/08/1950	1	011729	5604.70	1768.9		150.2	100.1			0.0	180.2	2145.0	0.50		1259.8	
	A	30/08/1950	1	011730	1293.20	496.2		12.9	1.4			0.0	257.4	374.7	0.40		150.2	
11640A		05/01/1951	1	012016	1195.70	431.9		40.0	1.4			0.0	200.2	460.5	0.20		61.5	
11656A		22/10/1950	1	011923	17865.00	4791.9		1349.9	389.0			0.0	20.0	9724.0			1590.2	
11677A		08/12/1950	1	011961	14652.10	3969.7		762.2	484.8			0.0	108.7	7170.0	0.30		2156.4	
	A	08/12/1950	1	011962	4368.90	1550.1		80.1	22.9			0.0	93.0	2122.1	0.20		500.5	
11696A		05/06/1952	1	012570	4643.20	1338.5		273.1	113.0			0.0	18.6	2731.3	0.00		168.7	
11732A		20/03/1951	1	012577	406.30	117.3		38.6	2.9			0.0	121.6	80.1			45.8	
	A	25/03/1951	1	012578	386.00	120.1		28.6	1.4			0.0	108.7	72.9			54.3	
	A	05/06/1952	1	000001	406.30	117.3		38.6	2.9			0.0	121.6	80.1	0.00		45.8	
	A	05/06/1952	1	000002	0.00	0.0		0.0	0.0			0.0	0.0	0.0			0.0	
11736A		04/06/1951	1	012585	2724.30	961.0		97.2	2.9			0.0	20.0	1634.5	0.10		8.6	
	A	16/07/1951	1	012587	419.20	155.9		5.7	1.4			0.0	101.5	87.2	0.30		47.2	
11740A		02/08/1971	1	049361	1836.80	539.0		4.0	2.0			1092.0	42.0	155.0	2.80		0.0	0.0
11753A		24/07/1952	1	012749	1596.30	619.2		27.2	1.4			0.0	317.5	630.6	0.40		0.0	
11767A		05/06/1952	1	000001	1505.20	604.9		4.3	1.4			0.0	267.4	626.3	0.90		0.0	
11768A		05/06/1952	1	010646	329.30	68.1		30.1	12.1			0.0	10.0	105.0			104.0	
11777A		04/09/1953	1	013557	510.90	197.3		10.0	0.0			0.0	140.1	140.1	0.50		22.9	
11808A		25/09/1951	1	012229	1138.70	434.7		8.6	2.9			0.0	248.8	268.8	0.40		174.5	
	A	22/03/1972	1	051860	2185.30	638.0		60.0	27.0			525.0		660.0	0.30		275.0	
11837A		21/02/1952	1	012379	887.30	366.1		5.7	1.4			0.0	373.2	140.1	0.80		0.0	
11852A		04/12/1951	1	012335	18979.40	5399.7		1101.1	410.4			0.0	5.7	9814.1	0.40		2248.0	
	A	04/12/1951	1	012336	904.10	371.8		8.6	0.0			0.0	361.8	161.6	0.30		0.0	
	A	06/08/1980	1	086697	1274.90	374.0	0.0	3.0	1.0			731.0	6.2	155.0	0.70	2.0	2.0	
11867A		09/11/1953	1	013722	3561.00	1291.3		58.6	5.7			0.0	135.9	1623.1	0.20		446.2	
11868A		26/03/1953	1	013207	852.30	351.8		1.4	0.0			0.0	304.6	163.0			31.5	
11870A		05/12/1952	1	012954	989.10	399.0		10.0	4.3			0.0	384.7	190.2	0.90		0.0	
11882A		14/01/1952	1	012337	1013.90	290.3		52.9	31.5			0.0	91.5	463.3			84.4	

FIGURE D-11

DATE MONITORING — METERED USE

REG. NUMBER	DATE OF LAST READING	DATE OF THIS READING	READING	DATE OF LAST READING	DATE OF THIS READING	READING	DATE OF LAST READING	DATE OF THIS READING	READING
52683	28-09-1980	30-10-1980	67.000	30-10-1980	09-01-1981	57.000	09-01-1981	03-03-1981	33.000
	03-03-1981	29-04-1981	51.000	29-04-1981	07-07-1981	0.000	07-07-1981	31-08-1981	6.000
	31-08-1981	29-10-1981	26.000	29-10-1981	26-01-1982	30.000	26-01-1982	29-03-1982	43.000
	29-04-1982	18-05-1982	0.000	18-05-1982	29-06-1982	2.000	29-06-1982	30-08-1982	0.000
	30-08-1982	28-10-1982	51.000	28-10-1982	15-12-1982	17.000	15-12-1982	14-02-1983	109.000
	14-02-1983	13-07-1983	53.000	13-07-1983	30-08-1983	0.000	30-08-1983	20-12-1983	37.000
	20-12-1983	13-02-1984	35.000	13-02-1984	10-05-1984	54.000	10-05-1984	03-07-1984	0.000
	03-07-1984	27-08-1984	0.000						
52685	- -	27-09-1979	0.000	27-09-1979	25-10-1979	60.000	25- 0-1979	27-11-1979	0.000
	27-11-1979	02-01-1980	97.000	02-01-1980	27-02-1980	119.000	27-02-1980	31-03-1980	66.000
	31-03-1980	29-04-1980	51.000	29-04-1980	03-06-1980	0.000	03-06-1980	01-07-1980	0.000
	01-07-1980	28-08-1980	59.000	28-08-1980	29-10-1980	151.000	29-10-1980	08-01-1981	0.000
	08-01-1981	04-02-1981	24.000	04-02-1981	03-03-1981	0.000	03-03-1981	29-04-1981	26.000
	29-04-1981	07-07-1981	0.000	07-07-1981	31-08-1981	0.000	31-08-1981	28-10-1981	57.000
	28-10-1981	19-01-1982	6.000	19-01-1982	30-03-1982	0.000	30-03-1982	17-05-1982	0.000
	17-05-1982	28-06-1982	0.000	28-06-1982	30-08-1982	37.000	30-08-1982	26-10-1982	30.000
	26-10-1982	25-01-1983	181.000	25-01-1983	10-03-1983	112.000	10-03-1983	14-07-1983	42.000
	14-07-1983	30-08-1983	0.000	30-08-1983	20-12-1983	31.000	20-12-1983	09-02-1984	68.000
	09-02-1984	09-05-1984	103.000	09-05-1984	03-07-1984	0.000	03-07-1984	27-08-1984	0.000
52810	- -	02-10-1979	69.000	02-10-1979	29-10-1979	29.000	29-10-1979	06-12-1979	1.000
	06-12-1979	28-12-1979	25.000	28-12-1979	28-02-1980	47.000	28-02-1980	01-04-1980	45.000
	01-04-1980	28-04-1980	0.000	28-04-1980	06-06-1980	0.000	06-06-1980	01-07-1980	0.000
	01-07-1980	28-08-1980	95.000	28-08-1980	30-10-1980	147.000	30-10-1980	09-01-1981	0.000
	09-01-1981	03-03-1981	17.000	03-03-1981	29-04-1981	48.000	29-04-1981	07-07-1981	0.000
	07-07-1981	31-08-1981	0.000	31-08-1981	29-10-1981	74.000	29-10-1981	26-01-1982	19.000
	26-01-1982	29-03-1982	55.000	29-03-1982	18-05-1982	9.000	18-05-1982	29-06-1982	34.000
	29-06-1982	30-08-1982	0.000	30-08-1982	28-10-1982	0.000	28-10-1982	15-12-1982	36.000
	15-12-1982	14-02-1983	32.000	14-02-1983	13-07-1983	10.000	13-07-1983	30-08-1983	0.000
	30-08-1983	20-12-1983	0.000	20-12-1983	13-02-1984	0.000	13-02-1984	10-05-1984	0.000
	10-05-1984	03-07-1984	0.000	03-07-1984	28-08-1984	0.000			
52811	- -	02-10-1979	0.000	02-10-1979	29-10-1979	0.000	29-10-1979	06-12-1979	0.000
	06-12-1979	28-12-1979	0.000	28-12-1979	28-02-1980	52.000	28-02-1980	01-04-1980	11.000
	01-04-1980	28-04-1980	0.000	28-04-1980	06-06-1980	0.000	06-06-1980	01-07-1980	0.000
	01-07-1980	28-08-1980	0.000	28-08-1980	30-10-1980	94.000	30-10-1980	09-01-1981	25.000
	09-01-1981	03-03-1981	7.000	03-03-1981	29-04-1981	0.000	29-04-1981	07-07-1981	0.000
	07-07-1981	31-08-1981	0.000	31-08-1981	29-10-1981	64.000	29-10-1981	26-01-1982	43.000
	26-01-1982	29-03-1982	27.000	29-03-1982	18-05-1982	9.000	18-05-1982	29-06-1982	35.000
	29-06-1982	30-08-1982	81.000	30-08-1982	28-10-1982	29.000	28-10-1982	15-12-1982	24.000
	15-12-1982	14-02-1983	30.000	14-02-1983	13-07-1983	91.000	13-07-1983	30-08-1983	0.000
	30-08-1983	20-12-1983	19.000	20-12-1983	13-02-1984	23.000	13-02-1984	10-05-1984	19.000
	10-05-1984	03-07-1984	0.000	03-07-1984	28-08-1984	0.000			
52825	- -	02-07-1980	0.000	02-07-1980	29-08-1980	0.000	29-08-1980	31-10-1980	120.000
	31-10-1980	09-01-1981	66.000	09-01-1981	05-02-1981	46.000	05-02-1981	04-03-1981	3.000
	04-03-1981	30-04-1981	51.000	30-04-1981	08-07-1981	0.000	08-07-1981	01-09-1981	0.000
	01-09-1981	09-12-1981	81.000	09-12-1981	26-01-1982	32.000	26-01-1982	31-03-1982	66.000
	31-03-1982	18-05-1982	0.000	18-05-1982	30-06-1982	30.000	30-06-1982	01-09-1982	45.000
	01-09-1982	28-10-1982	35.000	28-10-1982	01-02-1983	27.000	01-02-1983	11-03-1983	68.000
	11-03-1983	18-07-1983	4.000	18-07-1983	01-09-1983	0.000	01-09-1983	22-12-1983	9.000
	22-12-1983	10-02-1984	0.000	10-02-1984	11-05-1984	0.000	11-05-1984	10-07-1984	0.000

FIGURE D-12

APPENDIX E
WESTERN AUSTRALIAN GROUNDWATER DATA BASE

Appendix E
WESTERN AUSTRALIAN GROUNDWATER DATA BASE

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APPENDIX E

WESTERN AUSTRALIAN GROUNDWATER DATA BASE

E1.0 INTRODUCTION

Groundwater data in Western Australia are kept principally by the Geological Survey (GSWA), the Metropolitan Water Authority (MWA) and the Public Works Department (PWD). They have individual responsibilities for the study and management of the State's water resources but work together.

At the time of writing, the MWA and PWD are preparing to combine as the Water Authority of Western Australia. This authority is scheduled to commence operations on 1 July 1985. However, the hydrogeologists and water resources specialists in the Department of Mines - Geological Survey (GSWA) are not due to join the new authority but will continue the advisory relationship which they previously maintained with MWA and PWD.

Other public organisations gather and maintain groundwater data, often for specific project purposes. Generally, these data are available and would be readily incorporated into the major data storage systems.

The groundwater data stored in various sytems in W.A. are described briefly below, listed by organisation.

E2.0 COMMONWEALTH ORGANISATIONS

E2.1 CSIRO

The Commonwealth Scientific and Industrial Research Organisation is represented in Western Australia by groups from a number of CSIRO Divisions.

The Division of Groundwater Research is wholly in WA and naturally is the division most interested in the storage and use of groundwater data. It stores data for several experiments in catchments in the southwest of the State. These data include:

bore locations and elevations,
depths,
water levels,
some chemical analysis and hydraulic test results.

Specific programs are written to sort and retrieve the data, for instance to extract occurrences of increasing salinity with time. They usually employ the languages Fortran and Basic. Their records are accessible, considered public, but they reserve the right to restrict the use or publication of the information.

E3.0 STATE DEPARTMENTS AND ORGANISATIONS

E3.1 Department of Agriculture

The WA Department of Agriculture holds research data mainly on dry land salinity in the wheatbelt, including:

bore locations and elevations,
water levels,

water salinity,
soil salinity.

The data are gathered when the records are constructed and thereafter at approximately six monthly intervals. Little of this information would be duplicated by records held elsewhere.

Their computer use is, in the main, for data storage and retrieval, but they also use software to plot data for presentation such as in reports. They employ a Prime computer with access to the MRD Cyber computer. However, many of the data remain on paper files only and are not necessarily due to be transferred to computer files.

The only reservation concerning public access to their data is the natural desire to protect research data from pre-emptive publication.

E3.2 Health Department

The Health Department of Western Australia's concern is for maintaining and preserving the water quality and avoiding undesirable levels of particular solutes or contaminants. Their groundwater data would normally pass to the PWD and/or the GSWA.

E3.3 Department of Resources Development

The DRD has limited groundwater data such as are included in development proposals and environmental impact statements, and these only in printed form. They do not transfer any of these data to computer systems.

E3.4 Department of Conservation and Environment

The DCE does not expressly maintain a groundwater data storage system, although in papers files and reports they do hold groundwater information on specific project areas. For example, they would have Peel Inlet Study and Pike Lake data, and also data on waste disposal sites, both proposed and developed. It remains in question how much of these data would be made available through a data transfer to the PWD.

E3.5 Department of Conservation and Land Management

This department has been newly formed to embrace the resources and responsibilities of the Forests Department, National Parks Authority and the Wildlife side of the Department of Fisheries and Wildlife.

It is too soon for this re-organisation to have affected their individual practices regarding groundwater data.

The Forests Department holds some groundwater data at its research offices depending upon the needs of the local research. For example, the Dwellingup research office may be fairly described as their centre for hydrological researches and so it maintains both paper and computer files of groundwater data including:

bore locations and elevations,
water levels,
depth to basement rock,
conductivity/salinity (monitored monthly).

The lithological logs are on paper files. As yet, there are no data on hydraulic properties. The computerized data are, for the most part,

compatible with the PWD system. They employ SPFS software to handle their data.

The information is public and generally the data are accessible to the PWD system.

The National Parks Authority does not expressly gather groundwater data. Such data that they do obtain would be on paper files or in reports, and often the bore data would duplicate information at the PWD or GSWA.

The Department of Fisheries and Wildlife does not maintain a formal groundwater data system.

E3.6 The State Energy Commission

SECWA monitor groundwater levels and quality for development and water supply operation purposes. These data are provided to the PWD for inclusion in their data system.

E3.7 Bunbury Water Board

They submit all their groundwater data to the PWD.

E3.8 Harvey Water Board

They submit all their groundwater data to the PWD.

E3.9 Busselton Water Board

They submit their groundwater data to the PWD. Generally, they do not undertake groundwater monitoring.

E3.10 Metropolitan Water Authority

The MWA is responsible for the management of water resources and supplies local to the Perth metropolitan district. There is close co-operation with the PWD and GSWA. Groundwater data were stored in computer files by the MWA but now this system, known as GROWLS, has been transferred to the PWD who maintain a separate GROWLS file on behalf of the MWA.

The new State Water Authority will take over the water resources and supply responsibilities for Western Australia as a whole. The GROWLS file will be incorporated into the Water Authority's data bank (see below).

E3.11 Department of Mines/Geological Survey

The GSWA maintains records of water bores State-wide and these records are as complete as may be expected since details of new bores are forwarded in compliance with statutory requirements. The GSWA records include information gathered by well inventory work undertaken independently or during geological field mapping.

The data are entered on file cards (about 65,000 at present) and the locations are plotted on map sheets. The cards allow for full inventory records to be entered, but full details are not often known. Many cards just record the existence of a bore at a location and no other data. Also, the records generally refer to the time of construction or a field mapping geologist's visit and, as a result, mostly lack sequential monitoring information.

A photocopy at reduced scale of an example record is presented as Figure E-1. The punch code around the card margins is to facilitate mechanical sorting of the records.

The GSWA advises the PWD and MWA on hydrogeological matters and data are shared as appropriate.

The water bore records are to be included in the new Water Authority's data bank, and the GSWA is represented on the steering committee overseeing the preparation of the new system.

The GSWA is part of the Department of Mines which gathers and holds information on mineral exploration of all types. These data would be largely confidential and probably not accessible to the new PWD data bank. However, some of these data would be potentially of use in water resources assessment and so should not be disregarded in the longer term plans for the data bank nor for hydrogeological research in Western Australia.

E3.12 Public Works Department

E3.12.1 Present Situation

The PWD maintains paper records of water bores as details of new bores are forwarded under the terms of the Rights in Irrigation and Water Act and of specific bore licences. In addition, PWD keeps copies of hydrogeological reports submitted supporting licence applications and reviewing the monitored performance of installed wellfields, etc.

Water supply sources are regularly monitored and these data are, from time to time, returned in appropriate summary form to the PWD offices in Perth.

Their computer is used both for data storage and presentation (hydrographs, etc).

The PWD, through its own records and access to the MWA and GSWA, has the vast majority of the groundwater data in the State and through careful use of its abstraction licensing powers, the PWD can direct and co-ordinate effective groundwater data collection from all parts of the State. These responsibilities are scheduled to be taken on by the new Water Authority after 1st July 1985.

The PWD, in conjunction with the MWA and GSWA, are instigating a new computerised data base (SWRIS, described below) not only for groundwater data but to include other water resurces information such as streamflow records. This is to be capable of accepting the full bulk of Western Australian data and will supercede the present PWD computerized data records.

E3.12.2 The Statewide Water Resources Information System

The new data base, SWRIS, under development for the new Water Authority of Western Australia, will store surface and groundwater information including that currently stored by PWD. The groundwater data will be input under the following categories:

Registration
Stratigraphy
Construction Details
Geophysical Logs
Testing Data
Chemical Analysis Data

The system will be operated on the MWA Facom 380R computer which has been expanded for operation by the new authority.

The SWRIS design, which will be completed this year, will be 'user friendly' and allow access from terminals in the Water Authority's and GSWA's offices and possibly elsewhere depending upon general system security arrangements. It will take a number of years before the system is fully operational since the transfer of data needs to have coding-forms completed by technicans under hydrogeological supervision.

Data output will be as screen display or hard copy as well as files formatted for computer transfer. The data will be accessible in response to specific requests for information on hydrogeological conditions and also they will be amenable to computer manipulation so that wider use of the records will be feasible. One of the strengths of the system is that the quality of the basic data is clearly identified.

The potential benefits to resource management in Western Australia are obvious.

FIGURE E-1

REGD. No. 2134-1-I-C-d-190 GEOLOGICAL SURVEY OF W.A. — WATER BORE RECORD

1 : 250 000 | 1 : 100 000 | 1 : 50 000 | 1 : 25 000 | 1 : 1,000,000

1. BORE NAME: 29
2. FILE REF:
3. LOCATION: 1:250,000 SH/50-14
   - Air Photo Ref
   - Lithograph: Bellevue 1:10,000
   - Land District: Swan
   - Location No / Reserve Lease / Crown Land: Lot 198
   - Lat. Long.
4. BASIN / PROVINCE:
5. OWNER: [redacted] Caravan Park
6. ADDRESS: [redacted] Rd. Bushmead
7. DRILLER: [redacted] Bros
8. WHEN DRILLED: 1968
9. TYPE: Percussion ~~Rotary—Jetting—Well~~

10. ELEVATION: c125' Datum L.W.F.
11. DEPTH: 118 Ft. Rept./Meas.
12. SUPPLY: 3000 G.P.H.; Est./Meas.
13. STATIC WATER LEVEL: 26 Ft. Est./Meas.
14. SUCTION DEPTH: Ft.
15. CASING: 99'x6"x3/16"
16. SLOTTED / PERFORATED / SCREEN: 20' double mesh
17. DEVELOPED BY:
18. HOW TESTED:
19. MAIN AQUIFER:
20. REPT. QUALITY: 1141 ppm
21. FIELD CONDUCT. (T.D.S.): P.P.M.
22. LAB. ANALYSIS (T.D.S.): Partial Evap. P.P.M. Standard {Evap. Conduct. P.P.M.
    Register — Volume Page Card No. pH
23. USE: gardens

LOCATION SKETCH — N — Scale

WATER CUT From	WATER CUT To	WATER LEVEL	SUPPLY G.P.H.	SUPPLY Est./Meas.	PUMP TEST Duration	PUMP TEST Drawdown	QUALITY	TEMP °C	STRATA

REMARKS: jet pump

Recorded by: Neil
Source:
Date: 1972

AQUIFER | DEPTH – ft. | WATER LEVEL – ft. | SUPPLY – G.P.H. | SALINITY – P.P.M. | USE

BASIN / PROVINCE — AGE OF AQUIFER — MISCELLANEOUS — Strat — Oil — Coal — Other

LOG OF STRATA

FROM	TO	LOG OF STRATA
0	2	top soil
2	13	yellow sand, fine
13	30	yellow sand, very clayey
30	50	white sandy clay
50	62	pinky grey clay, sandy
62	67	bright orange sandy clay
67	93	orange sandy clay
93	118	yellow sand, very clayey

APPENDIX F
NORTHERN TERRITORY GROUNDWATER DATA BASE

APPENDIX F
NORTHERN TERRITORY GROUNDWATER DATA BASE

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APPENDIX F
NORTHERN TERRITORY GROUNDWATER DATA BASE

F1.0 INTRODUCTION

The Northern Territory Department of Mines & Energy Water Division is the only authority charged with the responsibility of collecting groundwater data.

F2.0 DEPARTMENT OF MINES & ENERGY - WATER DIVISION

Groundwater data in the Department are stored in files which are indexed by Index number in the northern part of the State and Registered number in the southern part of the State.

The index number comprises the 1:250,000 map number and an associated bore number (i.e. IN57/1 refers to 1:250,000 map 57 and bore number 1). Each bore also has a registration number (ie. RN2428).

A genral Water Resources data base is being developed in the Darwin office using an inhouse VAX mini-computer system. No hydrogeological data have been recorded although basic bore information such as location, owner is stored. Basic location data are being recorded for about 4500 bores located primarily around the Darwin region.

Also available is a water level monitoring file. Data are presently being entered in this file.

Whilst bore data are primarily recorded on 1:250,000 sheets, larger scales are available in high bore density areas.

A water quality file has been established which records both surface and groundwater quality information.

All system programs are being developed inhouse although utility software such as a graphics package is also being used (ie. Plot 79 Plotting Package - University of Utah).

APPENDIX G
TASMANIAN GROUNDWATER DATA BASES

APPENDIX G
TASMANIAN GROUNDWATER DATA BASES

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APPENDIX G
TASMANIAN GROUNDWATER DATA BASES

G1.0 INTRODUCTION

Groundwater data in Tasmania are the responsibility of the Tasmanian Department of Mines. Some data are also kept by the Hydro Electric Authority although these are largely for site-specific projects and are not readily accessible.

G2.0 DEPARTMENT OF MINES - GROUNDWATER DATA BASE

Data stored in the Tasmanian Department of Mines include bore locations on a 1:250,000 map. Bore parameters have been summarised into rock type, yield, salinity, cation/anion trilinear diagrams.

The Department propose to prepare 1:100,000 hydrogeological sheets over the northern and eastern coastal regions of the State. At present data are available on about 3,500 bores covering the northern, north-eastern and eastern part of the State. Water bore information comes largely from drillers under the requirements of a license, however it is often difficult to acquire this information. An example of the driller's return is shown in Figure G-1. Additional data are provided from the regional investigation and contract work carried out by the Department.

Groundwater data are stored on cards (see Figure G-2) which are based on 1:50,000 sheet quadrangles.

A computer data base storage and retrieval system has been written, and testing of the system has been completed. The system is known as "BORIS" and a listing of the complete system is available from the Department. A description of the system is included in this appendix after the figures. Data are presently being transferred to the computer system.

Other data on groundwater are included in internal groundwater reports. The report system index is stored in computer form and it is possible to search for specific keywords in this system (Figure G-3).

Underground Water Act 1966

DEPARTMENT OF MINES, TASMANIA

REPORT ON WATER BORING OPERATIONS

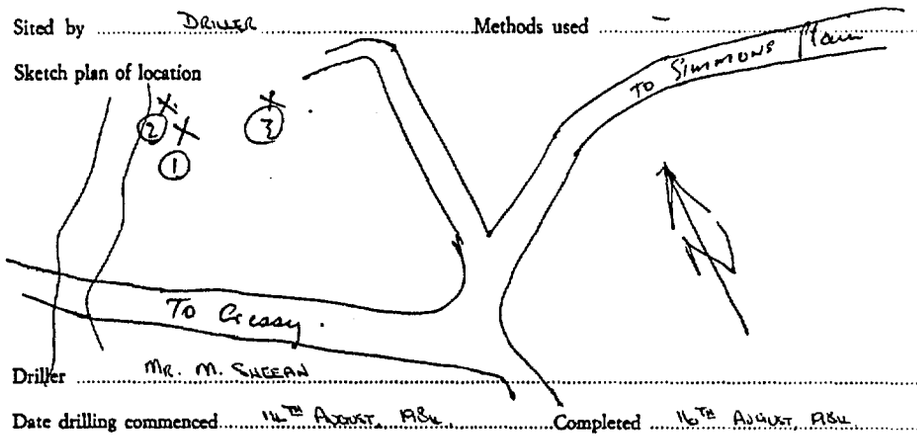
Location of bore Cygnet Bore No. 3.

Owner's name SEAWAY FISHERIES PTY. LTD.

Address P.O. Box 7256, BRIDPORT 7254

Sited by DRILLER Methods used —

Sketch plan of location



Driller MR. M. SHEEAN

Date drilling commenced 14TH AUGUST, 1984 Completed 16TH AUGUST, 1984

Status of bore, i.e., Operating, abandoned, collapsed, capped OPERATING

Type of bore—Percussion, Rotary, Hammer, Jetted, Other HAMMER

Bore diameter 0'-100' = 8"; 100'-149' = 7⅞" Total depth 149 FEET

Length of casing 138 FEET Type and size of casing 6" A/C CASING

Screen —

Deep water struck 107-110 FEET m below surface

Standing water level m below surface

Flow test, whether bailed, pumped, or artesian AIR LIFT

Period of test hours

Maximum drawdown (m from standing level) — at 3,000 G.P.H. ½ lps.

Type of pump — Suction depth —

How was flow measured? VIDE NOTES

Quality SLIGHT

Colour — Taste — Odour —

Was water sample collected for analysis? —

Collected before or after flow test? —

OFFICE USE

Borecard No. Punched by (See reverse side)

70700

FIGURE G-1a

LOG OF BORE

Depth	*Strata*
0 FEET TO 1 FOOT	TOPSOIL
1 FOOT TO 106 FEET	BROWN CLAY
106 FEET TO 109 FEET	BASALT
109 FEET TO 114 FEET	SOFT MUDSTONE
114 FEET TO 149 FEET	RIVER GRAVELS & SAND

Were samples taken? — Sent to —

Results of geophysical measurements —

REMARKS:

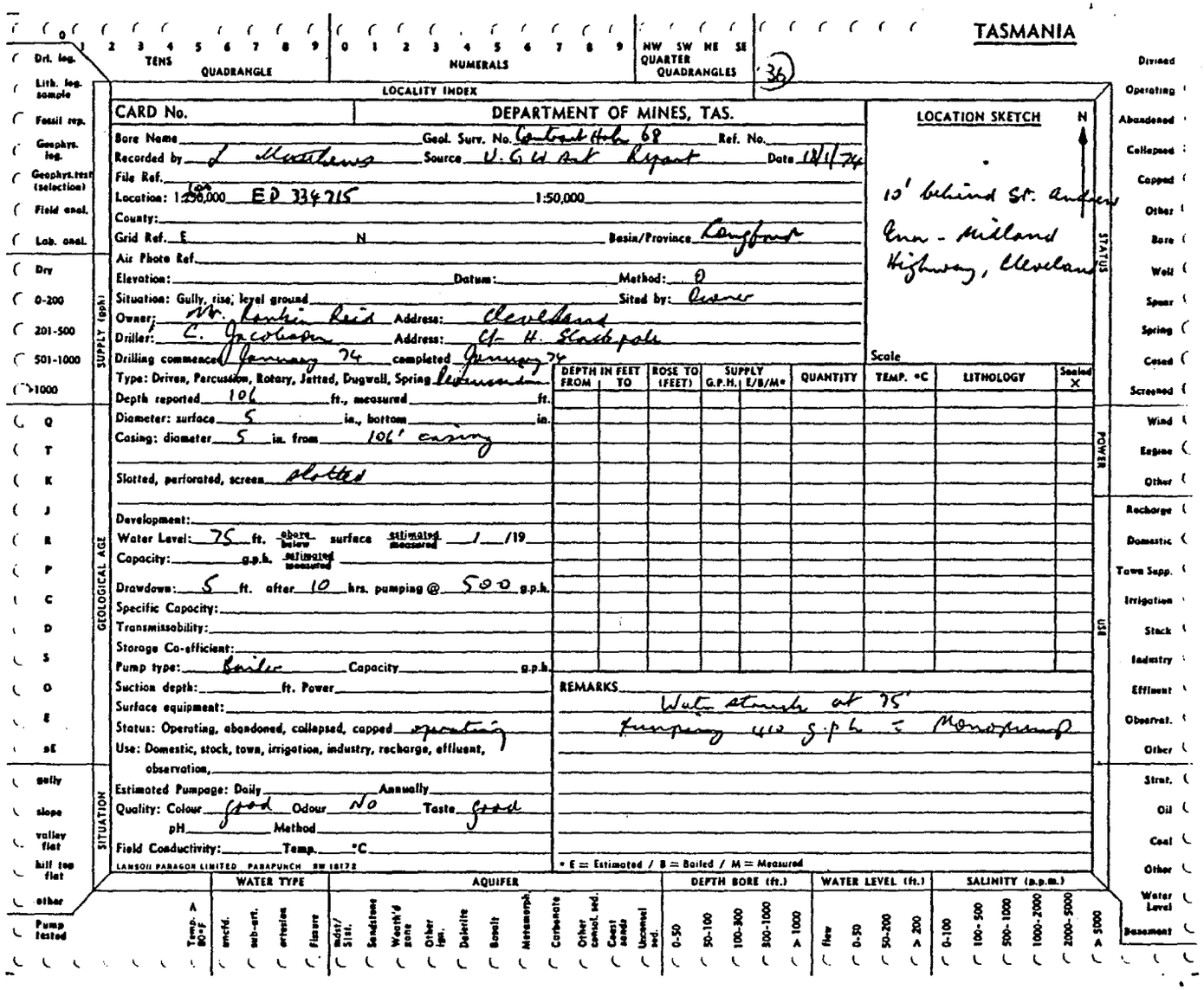
Signature GERALD CRADDOCK DANIELS.

Date 4/10/84.

This form to be completed and forwarded to the Director of Mines, P.O. Box 56, Rosny Park 7018 as soon as possible after completion of each bore.

A. B. CAUDELL, Government Printer, Tasmania

FIGURE G-1b



TASMANIA

LOCALITY INDEX

QUADRANGLE (TENS) 0 1 2 3 4 5 6 7 8 9 — NUMERALS 0 1 2 3 4 5 6 7 8 9 — QUARTER QUADRANGLES NW SW NE SE — (36)

CARD No. — DEPARTMENT OF MINES, TAS.

Bore Name — Geol. Surv. No. Contract Hole 68 — Ref. No.

Recorded by L Matthews — Source U.G.H. Art Report — Date 12/1/74

File Ref.

Location: 1:250,000 ED 334715 — 1:50,000

County:

Grid Ref. E — N — Basin/Province Longford

Air Photo Ref.

Elevation: — Datum: — Method: D

Situation: Gully, rise, level ground — Sited by: Owner

Owner: Mr. Lonkin Reid — Address: Cleveland

Driller: C. Jacobsen — Address: C/- H. Stubbpole

Drilling commenced January 74 — completed January 74

Type: Driven, Percussion, Rotary, Jetted, Dugwell, Spring Percussion

Depth reported 106 ft., measured ft.

Diameter: surface 5 in., bottom in.

Casing: diameter 5 in. from 106' casing

Slotted, perforated, screen slotted

Development:

Water Level: 75 ft. above / below surface estimated / measured 1/1/19

Capacity: g.p.h. estimated / measured

Drawdown: 5 ft. after 10 hrs. pumping @ 500 g.p.h.

Specific Capacity:

Transmissability:

Storage Co-efficient:

Pump type: Bailer — Capacity g.p.h.

Suction depth: ft. Power

Surface equipment:

Status: Operating, abandoned, collapsed, capped operating

Use: Domestic, stock, town, irrigation, industry, recharge, effluent, observation,

Estimated Pumpage: Daily — Annually

Quality: Colour good — Odour No — Taste good

pH — Method

Field Conductivity: — Temp. °C

LOCATION SKETCH — N

10' behind St. Andrews

Evan - Midland Highway, Cleveland

Scale

DEPTH IN FEET FROM	TO	ROSE TO (FEET)	SUPPLY G.P.H.	E/B/M*	QUANTITY	TEMP. °C	LITHOLOGY	Sealed X

REMARKS

Water struck at 75'

pumping 400 g.p.h. ± Monopump

* E = Estimated / B = Bailed / M = Measured

LANSOH PARAGON LIMITED PARAPUNCH BW 18172

SUPPLY (gph): Dry; 0-200; 201-500; 501-1000; >1000

GEOLOGICAL AGE: Q; T; K; J; R; P; C; D; S; O; E; pE

SITUATION: gully; slope; valley flat; hill top flat; other

Pump tested

STATUS: Drilled; Operating; Abandoned; Collapsed; Capped; Other; Bore; Well; Spear; Spring; Cased; Screened

POWER: Wind; Engine; Other

USE: Recharge; Domestic; Town Supp.; Irrigation; Stock; Industry; Effluent; Observat.; Other

Strat.; Oil; Coal; Other; Water Level; Basement

WATER TYPE	AQUIFER	DEPTH BORE (ft.)	WATER LEVEL (ft.)	SALINITY (p.p.m.)
Temp. 80+F; unconfd.; sub-art.; artesian; Fissure	Moist/Silt; Sandstone; Weath'd zone; Other fm.; Dolerite; Basalt; Metamorph.; Carbonate; Other consol. sed.; Coast sands; Unconsol sed.	0-50; 50-100; 100-300; 300-1000; > 1000	Flow; 0-50; 50-200; > 200	0-100; 100-500; 500-1000; 1000-2000; 2000-5000; > 5000

FIGURE G-2a

36' CONTINUED BACK OF CARD

WATER ANALYSIS

Sample No. — Anal. No.
Collected by: — Lab.
Date: — Date of Analysis:
Conditions of sampling:

No.	1		2		3	
pH.	7.1					
E.C. x 10⁶ at 25°C						
Cond. Fact.						
	p.p.m.	e.p.m.	p.p.m.	e.p.m.	p.p.m.	e.p.m.
CO_3	nil					
HCO_3	290	4.75				
Cl	370	10.44				
SO_4	23	0.48				
S						
NO_3						
F						
SiO_2	28					
Ca	32	1.60				
Mg	42	3.45				
Fe	<0.1					
Al	<0.2					
K	0.6	0.02				
Na	260	11.31				
NH_4						
T.D.S.	880					
Total Ions						
Hardness*	253					
Alkalinity*	240					
Sodium absorption ratio						
Percent sodium						
S.A.R.-epm	7.1					
% Na-epm	69.2					
Use & class						

Remarks:—

* PPM $CaCo_3$

LOG

Depth	Strata	Depth	Strata
0-5'	clay		
5-80	clay and odd pebble		
80-106	gravels and clay		
106	brown sandstone?		
	gravels ¼" Av. ½"		

FIGURE G-2b

TASMANIA - DEPT. OF MINES UNPUBLISHED GROUNDWATER REPORTS

File: URDM.BIB/G Keyword: WATER

[illegible]	**Slope stability at Freshwater Point.**	S.Elmer	12. 7.71
1972/27	Underground water prospects near Deloraine.	W.C.Cromer	11. 8.72
1972/28	Underground water investigations of the Launceston Tertiary Basin.	W.L.Matthews	1. 5.72
1972/29	Underground water prospects at Hadspen.	W.L.Matthews	21.12.72
1972/30	Underground water prospects at Pontville.	W.C.Cromer	28. 3.72
1972/31	Underground water prospects at Wattle Hill.	W.C.Cromer	8. 8.72
1972/32	Underground water prospects at Dodges Ferry.	W.L.Matthews	21.12.72
1972/33	Groundwater prospects at South Arm.	W.C.Cromer	24.11.72
1972/34	Groundwater investigation, Hayes property, Bridport.	W.R.Moore	11. 9.72
1973/01	Underground water prospects at Ross.	W.L.Matthews	4. 1.73
1973/02	Underground water prospects at Richmond.	W.L.Matthews	9. 1.73
1973/04	Underground water prospects at Oyster Cove.	W.C.Cromer	11. 1.73
1973/05	Underground water prospects at Flowerpot, near Woodbridge, Southern Tasmania.	W.C.Cromer	11. 1.73
1973/06	Underground water prospects at Birchs Bay, near Woodbridge, Southern Tasmania.	W.C.Cromer	12. 1.73
1973/08	Underground water prospects at Kettering.	W.C.Cromer	16. 1.73
1973/09	Examination of an area around a water bore at Sorell.	W.L.Matthews	22. 1.73
1973/11	Groundwater prospects near Wyena.	C.J.Knights	23. 1.73
1973/12	Underground water prospects in Tertiary sediments at Rowella.	C.J.Knights	23. 1.73
1973/14	Underground water prospects near Exeter.	W.L.Matthews	31. 1.73
1973/16	Prospects of underground water near Sorell.	W.C.Cromer	1. 2.73
1973/18	Prospects of underground water at 'Isis Vale', near Campbell Town.	W.L.Matthews	9. 2.73
1973/19	Groundwater prospects at 'Stone Quarry', near Cressy.	W.L.Matthews	9. 2.73
1973/20	Underground water prospects at Pearns Lane, Bracknell.	W.L.Matthews	9. 2.73
1973/24	Underground water prospects near the Buxton River, eastern Tasmania.	W.C.Cromer	8. 3.73
1973/31	Underground water prospects near Westbury.	W.L.Matthews	29. 2.73
1973/32	Prospects of underground water at Primrose Sands.	W.C.Cromer	30. 3.73
1973/35	Geophysical surveys, Ross water supply.	W.L.Matthews	17. 4.73
1973/37	Underground water prospects, Wattle Hill.	W.C.Cromer	27. 4.73
1973/61	Groundwater prospects at Wiltshire Junction.	W.L.Matthews	21. 8.73

FIGURE G-3

UNPUBLISHED REPORT 1984/34

BORIS - A borehole record information system for water bores (Revision 1)

by R.G. RICHARDSON

T A S M A N I A D E P A R T M E N T O F M I N E S

1984/34. BORIS - A borehole record information system for water bores (Revision 1)

R.G. Richardson

Abstract

The program suite described is used for adding entries to an index of water bore records, changing entries, sorting the index and most of the details entered may be searched.

Introduction

BORIS is a simplification of the WBASE data-base developed by Polya (1982), Data on several thousand Tasmanian underground and surface waters are held by the Department of Mines on cards or within various reports. To search through the data on the basis of one parameter or more using the manual system is extremely difficult and time consuming.

The programs used for BORIS are written in FORTRAN 77 and are run on the Geological Survey Perkin-Elmer mini-computer. It is assumed that the user is familiar with the operating system and the standard editing facilities.

Using the Programs

Data-base maintenance

Data are input by typing WATADD. The program requests the following:

(i) OWNER - the owner's name (up to 24 characters).
- to finish input type END here.

(ii) LOCATION - a description of the bore location (up to 30 characters)

(iii) DRILLING COMPANY - up to 8 characters

(iv) QUADRANGLE NUMBER.

(v) CARD NUMBER - the card number within the quadrangle.

(vi) YEAR - the year of drilling (last 2 digits only).

(vii) GEOLOGIST - the initials of the responsible geologist (up to 3 characters).

(viii) MAP REFERENCE - a 9 figure AMG co-ordinate giving the bore location to the nearest 100 m.

(ix) TOTAL DEPTH - total depth (m) (real)

(x) CASING DEPTH - casing depth (m) (real)

(xi) DEPTH STRUCK - depth at which water struck (m) (real)

(xii) STANDING WATER LEVEL - SWL (m) (real)

(xiii) YIELD - bore yield (l/s) (real)

(xiv) CONDUCTIVITY - the conductivity measured in the field (μS/cm) (integer).

(xv) No. of ANALYSES - the number of analyses done (0). Only one analysis is stored in the data-base.

(xvi) GEOLOGY - a 1 or 2 character summary of the geology.

(xvii) ANALYSIS RESULT - if the number of analyses is not 0 the program then prompts for the data from one analysis.

At the end of input, a proof-sheet is output and the data saved in file WATTEMP.TMP. Corrections may be made to this file using the standard editing facilities and a new proof sheet then printed and checked.

The new data in WATTEMP.TMP must be added to the end of the existing data-base by typing WATMERGE. To ensure that the file remains in quadrangle and card number order, it should be sorted periodically using the WATSORT command.

Date may be chagned by typing WATCHGE. The program requests:

(i) QUADRANGLE, CARD NO. - the quadrangle number and card number of the record to be altered.
- if 0, 0 is entered no further cards are altered.

(ii) A series of opportunities to change particular data values then follow. It should be noted that, if there is now an analysis where there was not one before, this analysis can be added here.

Data-base searching

The search phase is entered by typing WATSRCH. An entry will be retrieved only if the specified search options are matched.

The program requests the following data:

(i) OWNER - one or more names on a single line, each name terminated by /. If a search by owner is not required leave the line blank. e.g. SMITH/JONES/BROWN/

(ii) LOCATION - details as for OWNER.

(iii) QUADRANGLE - one or more quadrangle numbers on a single line, each terminated by a/. Leave blank if not required.
e.g. 27/ only quadrangle 27
27/32/14/ quadrangles 27, 32 and 14.

(iv) YEARS - details as for QUADRANGLE.

(v) GEOLOGIST - details as for OWNER.
e.g. PCS/WCC/DCG

(vi) Search by area - N for no search by area
- Y for finding entries inside a specified coordinated area. Entries on the boundary of the area will not be found. The program prompts for the number of vertices and the vertex co-ordinates in clockwise order. The co-ordinates are in the same form as used for input.

(vii) Total depth range - blank if not to be used.
- MIN, MAX if looking for bores with total depths between MIN and MAX.

(viii) YIELD RANGE - blank if not to be used.
- MIN, MAX if looking for bores with certain yields.

(ix) TDS RANGE - blank if not to be used.
-MIN, MAX if looking for bores with TDS in a certain range.

(x) GEOLOGY - one or more geology codes on a single line, each group terminated by /. Leave blank if not required.
e.g. 0/4/ Coastal sands or Permian
89/ Cambrian and Precambrian

(xi) Search on analysis - N for no search using the results of analyses. - Y for searching usin gthe results of analyses. If this is chosen then a series of ranges will be requested.

(xii) Screen listing required - Y if required, N otherwise. At the end of each screen a choice is made as to whether to list more on the screen or not.

(xiii) Printout required - Y if required, N otherwise.

(xiv) Print analyses - Y if analyses are wanted where available.
- N if otherwise.

The Programs

WATADD (Appendix 1)

This program accepts data from the keyboard and copies it to a file in a format suitable for editing. Prompts are used to guide the user. The file created (WATTEMP.TMP) may then be edited using the standard edit facilities.

WATMERGE (Appendix 2)

The data from WATTEMP.TMP are read and the basic data converted to the format of the data base and put in file WATMAIN.DAT. Any analyses are put in file WATANAL.DAT. Accidental data loss is prevented by copying to intermediate files.

WATSORT (Appendix 3)

The data are sorted into ascending quadrangle and card number order using a temporary work file.

WATCHGE (Appendix 4)

This pair of programs reads data from WATMAIN,DAT and WATANAL.DAT and allows the user to change the data. The temporary work files are then merged with the main files.

WATSRCH (Appendix 5)

The data base is searched for the occurrence of specified strings or values and a point-in-polygon algorithm is used to locate data from within a specified area.

Reference

POLYA, D.A. 1982. WBASE: a data-base system for Tasmanian waters. Unpubl. Ref. Dep. Mines Tasm. 1982/40.

(25 May 1984)

APPENDIX 1
Program WATADD

```
*WATADD.CSS
*FOR RUNNING WATADD AND PRINTING A PROOF SHEET
*IFX WATTEMP.TMP; $WRITE ** CHECK LAST MERGE;  $EXIT;    $ENDC
PRE EIM;  AL WATTEMP.TMP, IN,132
* SET UP THE OUTPUT FILE
  WATADD, 3; AS 6, WATTEMP.TMP;  * LOAD PROG AND SET LU 6
ST
PRINT WATTEMP.TMP
$WRITE FILE IS WATTEMP.TMP;  ENA EIM;  $EXIT
```

APPENDIX H
A.C.T. DATA

APPENDIX H
A.C.T. DATA

H1.0 DATA BASE

Groundwater data in the A.C.T. are kept by the Bureau of Mineral Resources. Records are kept on about 200 bores. Both a manual record system and computer system is available.

Data sorted include basic bore location data, yield, standing water level, water quality information. The computer system operates on a Hewlett Package 9825 mini computer system. Bore locations are recorded on 1:2500 and 1:10,000 scale maps and are referenced via the registered number and co-ordinates.

Other data are generally stored on the hydrogeological group mini-computer system using KNOWLEDGEMAN data base system and the inhouse SIRIUS computer. These data are stored for specific projects (ie. Amadeus/Murray Basin).

All of the GAB bore data are stored in this fashion and may be retrieved using the micro-computer data base system software.

APPENDIX I
PRIVATE SOURCES OF DATA

APPENDIX I
PRIVATE SOURCES OF DATA

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APPENDIX I
PRIVATE SOURCES OF DATA

I1.0 GENERAL

Since 1967 various consulting firms have developed in Australia and have undertaken extensive projects for clients concerned with water resources, e.g., mining companies, irrigators, urban and industrial water supply users. Much of this information is submitted to the government archives, but a great deal is not and is held only in company or the consultants' files.

The easiest access to this information is through the consultants of which there are only a few with less than 5 having undertaken the vast bulk of the work. These are -

Australian Groundwater Consultants Pty. Ltd.
Coffey & Partners
Golder & Associates
Groundwater Resource Consultants
Rockwater Pty. Ltd

Many other firms exist, but they are either too small, too recent or too intermittent in their involvement in groundwater studies to represent an identifiable source of information.

I2.0 DATA AVAILABILITY

In absolute terms the groundwater consultants represent a repository of other organisations' data. They are not at liberty to provide data to casual enquirers except with the express authority of their clients. In some cases, especially where project related resource evaluations have been undertaken, the project may long since have been discontinued and the client may no longer exist or have tenure over the area in question. Under these circumstances, the data should be available.

I3.0 DATA EXTENT

Figure I-1 attached presents the distribution of data in the hands of the five major groundwater consultants. In the event of data collation studies being undertaken in these areas, these data collections could represent a source of readily available collated material.

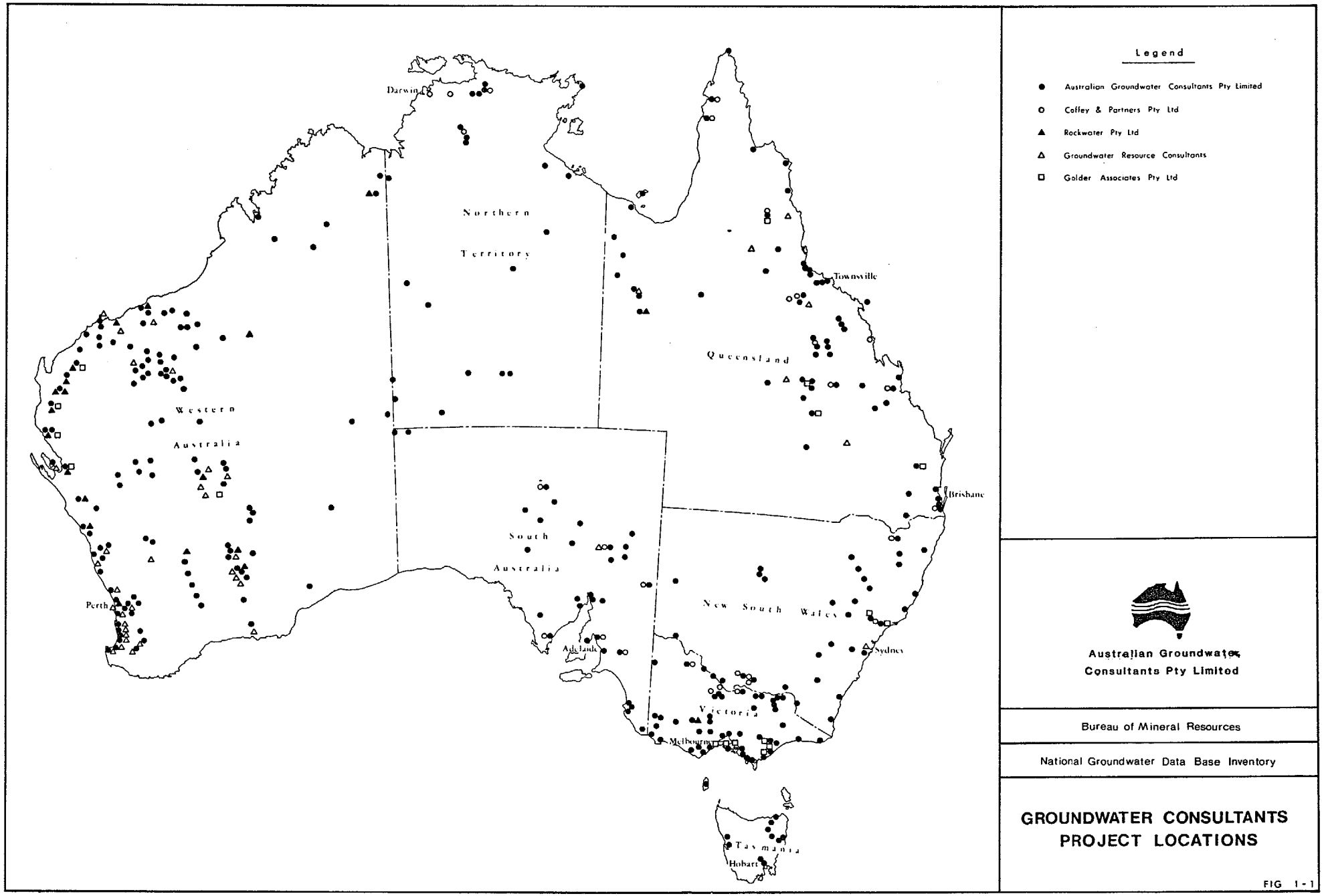
Legend
Australian Groundwater Consultants Pty Limited
Coffey & Partners Pty Ltd
Rockwater Pty Ltd
Groundwater Resource Consultants
Golder Associates Pty Ltd
Darwin
Northern Territory
Townsville
Queensland
Western Australia
Brisbane
South Australia
New South Wales
Perth
Adelaide
Sydney
Victoria
Melbourne
Tasmania
Hobart
Australian Groundwater Consultants Pty Limited
Bureau of Mineral Resources
National Groundwater Data Base Inventory
GROUNDWATER CONSULTANTS PROJECT LOCATIONS
FIG 1-1

FIG. I-1

APPENDIX J
HYDROGEOLOGICAL MAP LEGENDS

APPENDIX J

HYDROGEOLOGICAL MAP LEGENDS

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APPENDIX J
HYDROGEOLOGICAL MAP LEGENDS

J.1 HYDROGEOLOGICAL MAP LEGENDS

The style and final form of the maps will be an important aspect of hydrogeological map completion. It is therefore important that AWRC hydrogeological mapping sub-committee carefully consider the alternative methods and select those which will serve the needs of the Australian environment.

The sub-commitee to date (May 1985) has addressed the basis of an appropriate legend for use in the preparation of hydrogeological maps.

The group has utilised as a guide the legend prepared by I.A.H. (1983). The major preparation of the symbols presented in this publication can be used, albeit with some modification. There has however, been some discussion on the problems associated with suitable representation of rock type, yield and salinity on these maps.

The legend prepared by the I.A.H. group stipulates that rock types be divided into three main groups, namely:

1. Intergranular aquifers
2. Fissured aquifers
3. Strata (intergranular or fissured rocks) (see Figure J-1).

These groups are distinguished by colours, where two colour tones are used to indicate either highly or moderately productive aquifers. I.A.H. states that this subdivision was found to be inadequate and that additional ornaments (ie. patterns of marks, lines or other symbols) should be used to denote the lithology of the strata outcrop. The I.A.H. 1983 legend suggest that salinity be shown by orange hatched lines with the thickness representing the salinity range.

A modified I.A.H. legend has been proposed by the Western Australia Geological Survey (Figure J-2) for acceptance by the AWRC mapping sub-committee. This legend redefines rock types into four categories and expands the colour tones to distinguish four ranges of bore yields (see Figure J-2).

Both the BMR and Water Resources Commission of NSW have attempted to use the I.A.H. or modified I.A.H. approach. The BMR are preparing a hydrogeological map of Australia whilst the WRC have prepared a preliminary 1:250,000 hydrogeological map of the Forbes sheet. In both cases, problems have been experienced with representation of salinity. In the case of the Forbes map, orange was found to be an unsuitable colour since it lacked contrast whilst on the BMR map it has been found difficult to distinquish the salinity ranges, because of the difficulty of the eye to distinguish thickness in hatched lines used to report different salinities. An alternative to thickness is the use of orientation of the hatched lines to represent the range of salinity. This makes interpretation easier; however, it limits the number of ranges which can be easily identified to about four. Although this would be adequate for most maps, no consistent alternative exists for representation of more ranges should this be necessary.

An alternative legend representation which has been used by Victoria and

has developed from groundwater resource maps published previously in Australia is to distinguish salinity by colour (Lakey & Tickell 1981). On these maps yield is represented according to the I.A.H. modified legend described above, that is, colour tone to represent the range of yield (see Figure J-3). Lithology of outcropping strate is represented by use of ornaments.

The basic difference between these approaches is that colour is used to distinguish aquifer types in both the I.A.H. and modified I.A.H. legend, and to distinguish salinity in the alternative approach.

The AWRC Hydrogeological Map Sub-Committee, Draft Minutes 8-9 May 1985) recommended other changes to the I.A.H. legend including the deletion of some symbols not relevant to Australian conditions and the addition of optional symbols. for example constructed features such as different types of bores and wells (Quereshi 1985). The colour grouping of these symbols is suggested in the I.A.H. legend.

AGC believe the alternative representation discussed above has distinct advantages provided geological strata type can be shown superimposed either as an ornament or as a symbol.

Most draft dyeline maps produced as part of the program will need to have a symbol for the geology since some State organisations will not be equipped to handle printed ornaments on dyeline prints. However a symbol is preferable, since once digitised on the graphic terminal these symbols can be readily changed automatically to ornaments from the hydrogeological computer menu developed for the system.

Some of the advantages of the alternative system, which could be dubbed as the Australian Legend as distinct form the I.A.H. legend are:

- Less cluttered appearance of map than if hatched lines are used for salinity.
- More distinctive representation of salinity which is important in Australian environment because of large range and variation in salinity. (This is less important in Europe because of the limited range in salinity).
- Avoids the difficulty in classifying certain aquifer types into the limited number of categories proposed by the I.A.H. legend.

We believe that presentation of aquifer rock type as a substitute for geological data is valid on small scale maps (State or Nationwide) where detailed geology cannot be effectively presented. For maps of 1:250,000 or larger scale the geological data can be presented, particularly using representative sections, and therefore are of more value than abbreviated aquifer rock type. In addition we believe aquifer type has a lower priority in the Australian environment than probably yield and salinity since aquifer type is normally only used in assessing construction conditions of subsurface works (type, method of constructing wells for example.). It is not necessarily required in assessing groundwater potential, flow patterns, potentiometric surface levels, etc, and understanding of the hydrodynamics of the system provided that the geological structure of the system is known.

The consequence of adopting the Australian legend as opposed to the I.A.H. legend is that the scheme will not follow the "international" legend. However, the modified I.A.H. legend with the additional yield range and extra rock type category is not compatible with the primary legend. We note

that hydrogeological maps prepared in other areas of the world also do not necessarily follow the "international" standard and are either modified versions of the I.A.H. legend or use independently developed legends.

Whatever legend is adopted however, it is important that a consistent legend be used throughout the continent.

We believe that if use is made of the Australian hydrogeological legend that little effort will be required by hydrogeologists elsewhere to adjust since all other appropriate symbols recommended by the I.A.H. legend have been adopted for the Australian environment although with some modifications and deletions.

J.2 SUGGESTED HEADINGS FOR HYDROGEOLOGICAL MAP/DATA SHEETS

The following headings are suggested for Hydrogeological Map/Data Sheet Explanatory notes. These are draft suggestions only and should be discussed further by the Hydrogeological Mapping Committee. Not all headings will obviously be relevant to all maps, however such a list should be compiled and headings selected according to the depth of mapping. We recommend that a consistent format be produced for all State drafts and the final presented notes.

1.0 INTRODUCTION
    SCOPE
    LOCATION
2.0 MAP EXPLANATION
    PURPOSE
    INTERPRETATION
    RELIABILITY
3.0 GEOLOGY AND HYDROGEOLOGY
4.0 GROUNDWATER FLOW SYSTEM
5.0 HYDROGEOCHEMISTRY
6.0 GROUNDWATER DEVELOPMENT AND MANAGEMENT
7.0 REFERENCES

FIGURE J-1

I.A.H. PRIMARY LEGEND

GROUNDWATER AND ROCKS

1. Intergranular aquifers

blue 1.1 Extensive and highly productive aquifers

screened blue 1.2 Local or discontinuous productive aquifers or extensive but only moderately productive aquifers

2. Fissured aquifers, including karst aquifers

green 2.1 Extensive and highly productive aquifers

screened green 2.2 Local or discontinuous productive aquifers, or extensive but only moderately productive aquifers.

3. Strata (intergranular or fissured rocks) with local and limited groundwater resources or strate with essentially no groundwater resources.

screened brown 3.1 Strata with local and limited groundwater resources

brown 3.2 Strata with essentially no groundwater resources

brown stripes 3.3 Where there is an extensive aquifer immediately underlying a thin cover the option be used of continuing the appropriate aquifer colour crossed by brown stripes (one mm wide and three mm separation)

Note:

Certain aquifers combine intergranular and fissure characteristics. In such cases the relevant colours described in sections 1 and 2 should be used depending on which characteristic is dominant. Further explanation, if required may be added to the map legend.

FIGURE J-2
STATE HYDROGEOLOGICAL MAP
PROPOSED REVISED LEGEND BASED ON INTERNATIONAL LEGEND

B. GROUNDWATER AND ROCKS

1. Unconsolidated Sediments with intergranular porosity

Yellow	Bores ordinarily have yields of	>500	m^3/day
(Decreasing Intensity)	"	50-500	m^3/day
	"	5-50	m^3/day
Light Orange	"	<5	m^3/day

2. Sedimentary Rocks with intergranular porosity

Blue	Bores ordinarily have yields of	>500	m^3/day
(Decreasing Intensity	"	50-500	m^3/day
	"	5-50	m^3/day
	Confining head which may yield up to $\geq 5m^3$/day from more permeable horizons or lenses		

3. Fissured and karstic rocks with appreciable secondary porosity

Green	Bores ordinarily have yields of	>500	m^3/day
(Decreasing Intensity	"	50-500	m^3/day
	"	5-50	m^3/day

4. Fractured and weathered rocks with limited groundwater resources

Light brown	Undifferentiated suites of rocks containing water-bearing zones which may locally yield low to moderate supplies (i.e., generally $<50m^3$/day).

* Yields to be shown in L/sec >50, 5 - 50, 0.5-5, 0-0.5.
** Water Quality shown by orange hatching in mg/L 0-500, 500-1500, 1500-3000, 3000-7000, 7000-14000, > 14000. Selection of range based on data in area.

FIGURE J-3

YIELD AND SALINITY ZONES (main map)

The zones of yield and salinity refer to the Western Port Group *aquifer except to the north west of* Cora Lynn *and from* Cranbourne *to* Clyde *where the basalt aquifer is represented because in these areas it is the major source of groundwater.*

PROBABLE YIELD (l/sec)			
SALINITY (mg/l TDS)	<2.5 Low	2.5-10 Moderate	>10 High
<1000 Low			
1000-2000 Moderate			
>2000 High			

(Lakey & Tickell , 1981)