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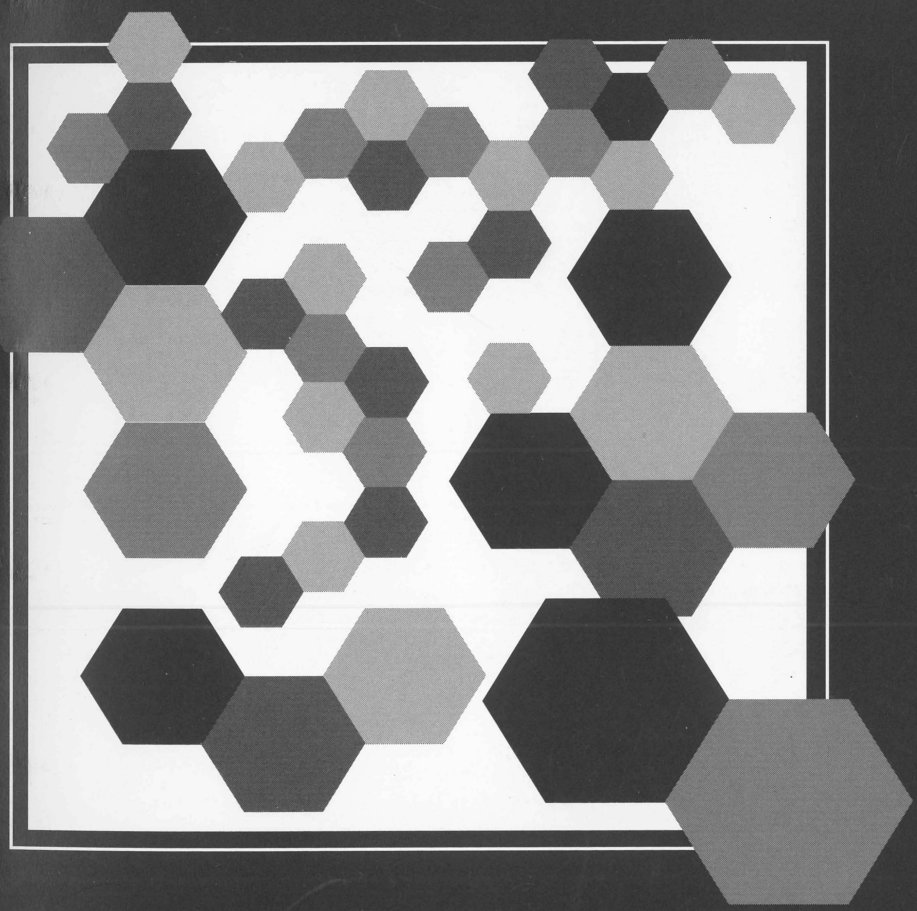

by L.A.I. Wyborn and R.J. Ryburn

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Bureau of Mineral Resources, Geology and Geophysics

BMR
GEOLOGY AND
GEOPHYSICS
AUSTRALIA

Tennant Creek

Rockchem Data Set

Documentation

Record 1991/42

by

L.A.I. Wyborn and R.J. Ryburn

R9104201

DEPARTMENT OF PRIMARY INDUSTRIES AND ENERGY

Minister: The Hon. Alan Griffiths

Secretary: G.L. Miller

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Executive Director: R.W.R. Rutland AO

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ABSTRACT

ROCKCHEM is the whole rock geochemical data storage system of the Minerals and Land Use Program of the BMR, Geology and Geophysics and utilises the relational database management system ORACLE. This data set contains 1601 analyses (both major and trace elements) from the Tennant Creek Inlier, and the Davenport Province. Most samples are located by AMG grid references and/or decimal latitude and longitude. This record describes tables used in ROCKCHEM and defines the fields used within these tables. A short description of the data contained is given and a bibliography of the main references that were generated from the data.

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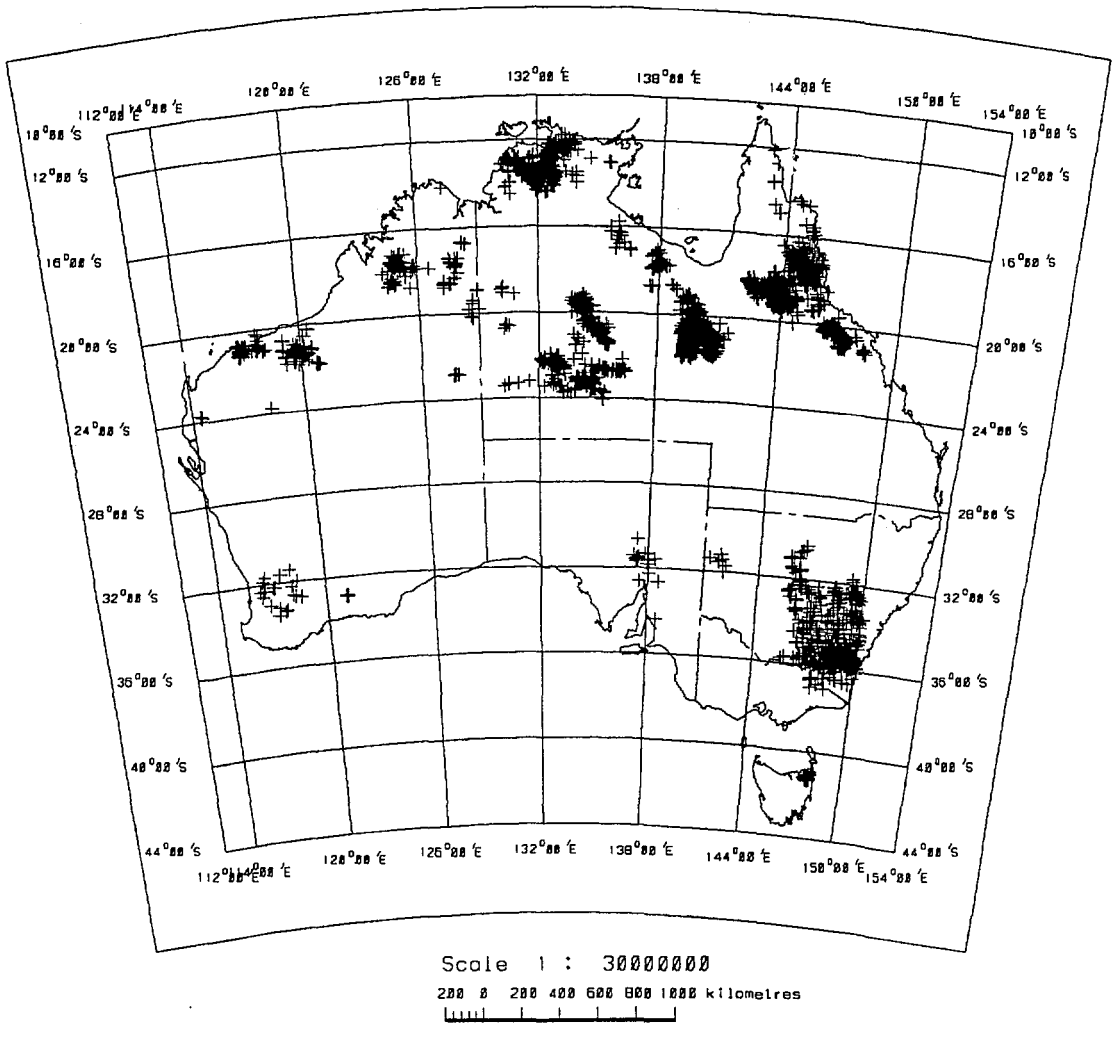

Figure 1. Distribution of Rockchem samples in Australia.

1. INTRODUCTION

ROCKCHEM is the whole-rock geochemical data storage system of the Minerals and Land Use Program of the BMR Geology and Geophysics, Australia. It is based on the commercial relational database management system ORACLE. The complete database contains approximately 17445 analyses from Australia (see Figure 1) and Antarctica, and can be divided into either regional or thematic data sets. The data is currently subdivided into the data sets as listed in Table 1. Most of these data sets will be released by late 1991.

Subset	Areas Covered	No. of Analyses	Coordinator
Regional Databases			
Antarctica	Antarctica	1318	J.W. Sheraton
Arunta	Arunta Block	793	RG. Warren, L. Wyborn
Lachlan	Lachlan Fold Belt NE Tasmania NW Tasmania	1149 300 40	D. Wyborn
McArthur	McArthur Basin Murphy Tectonic Ridge	533 74	K. Plumb, L. Wyborn
Mount Isa	Mount Isa Inlier	2296	L. Wyborn
NE Queensland	Georgetown Inlier NE Queensland	1940	D.E. Mackenzie
Pilbara	Pilbara Block	1386	A.Y. Glikson
Pine Creek	Pine Creek Inlier	2056	L. Wyborn
South Australian Proterozoic	Stuart Shelf, Adelaide Geosyncline	232	J. Knutson
Tennant Creek	Tennant Creek Inlier Davenport Province	1431 170	L. Wyborn
West Australian Proterozoic	Capricorn Province Granites Tanami Block Halls Creek Block	227 56 164	L. Wyborn
Yilgarn	Yilgarn Block	400	P.R. Williams
Thematic Databases			
Alkaline	Kimberlites Alkaline Rocks	880	A.L. Jaques
EAVS	East Australian Volcanics(Cainozoic)	2000	J. Knutson

Table 1. List of Data Sets in Rockchem.

2. THE TENNANT CREEK DATA SET

This ROCKCHEM data set is a release of approximately 1601 analyses from the Tennant Creek Inlier, and the Davenport Province. Figure 2 shows the distribution of the analyses within the data set. Appendix 1 contains lisitngs of the individual components of the data set.

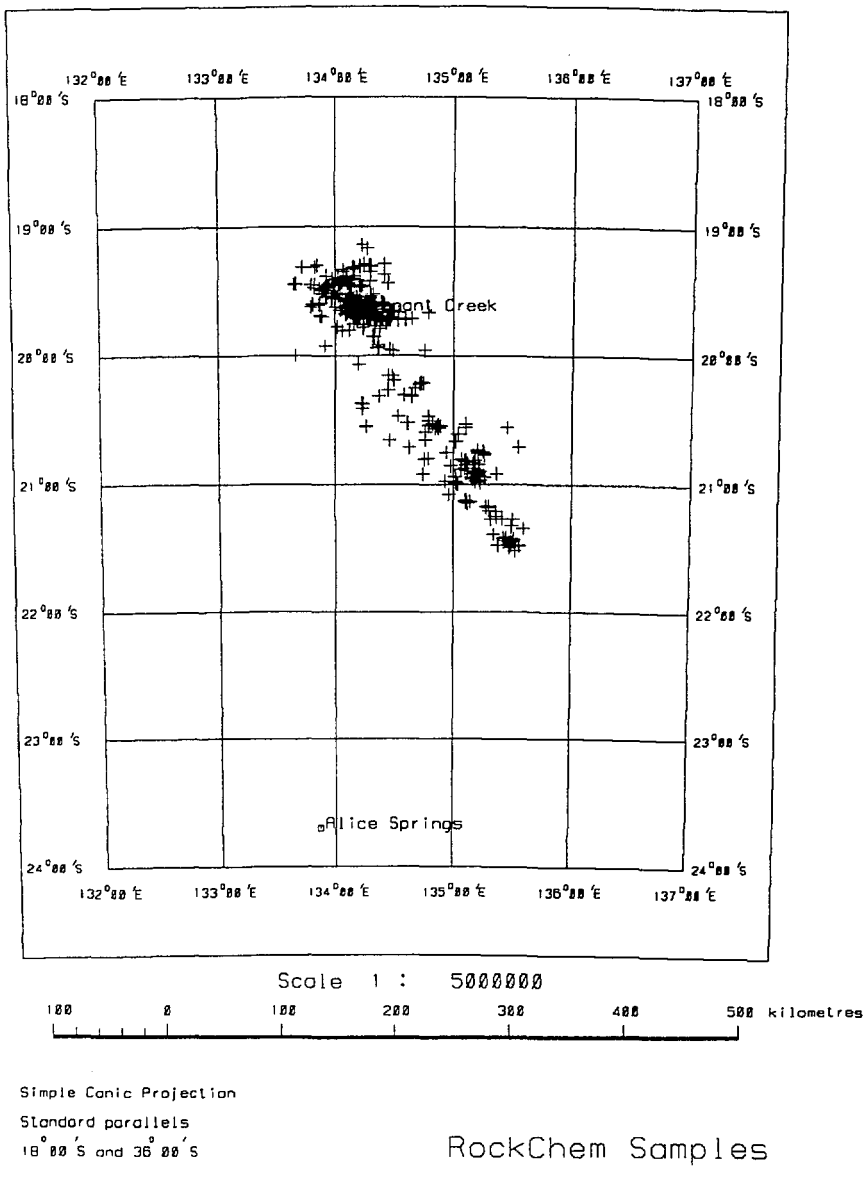

Figure 2. Rockchem samples in the Tennant Creek Inlier and the Davenport Province.

2a. Tennant Creek Inlier Database

Database type: regional

General Selection Criteria:

Field = region *Entry* = 39

Data description:

The Tennant Creek Database consists of 1431 analyses that are the result of three separate projects carried out by BMR in the Tennant Creek Inlier between 1970 and 1973. The data were obtained from surface outcrops and from Australian Development, Geopeko, NTGS and BMR drill holes and can be subdivided into three main groups.

- 973 ironstones that were sampled to investigate the feasibility of using trace element chemistry to distinguish between mineralised and non-mineralised ironstones. Only partial analyses of the ironstones are available, as the major elements do not include Na_2O (although the levels are expected to be low and <1 wt %) and only 10 trace elements (Pb, Cr, Co, Mn, Ni, Cu, Zn, Mo, Ag, and Bi) were run.
- 394 representative analyses of the major rock units in the Inlier.
- analyses of 64 geochronology specimens described by Black (1977).

Future work:

No work is planned in this area in the immediate future.

Bibliography:

Black, L.P., 1977. A Rb-Sr geochronological study in the Proterozoic Tennant Creek Block, central Australia. *BMR Journal of Australian Geology and Geophysics,* 2, 283-330.

Smith, S.E., 1980. Trace metal content of ironstones, Tennant Creek Au-Cu mineral Field, N.T. In: Butt, C.R.M., and Smith, R.E. (editors), Conceptual Models in Exploration Geochemistry, Australia. *Journal of Geochemical Exploration,* 12, 207-211regional

2b. Davenport Province Database

Database type: regional

General Selection Criteria:

Field = regiono *Entry* = 10

Data description:

The 170 analysed samples from the Davenport Province, central Australia, are of Proterozoic igneous rocks collected in 1981-1984 as part of the joint BMR/Northern Territory Geological Survey Davenport project. They comprise representative samples of felsic volcanics from the Warramunga Group and cogenetic granites, isotopically dated (U-Pb zircon) at about 1870 Ma; felsic and mafic volcanics from the unconformably

overlying Hatches Creek Group, dated at around 1870 Ma; comagmatic sills; younger granite, and lamprophyre dykes.

Future work:

No further geochemical work is planned in this province.

Bibliography:

Blake, D.H., Stewart, A.J., Sweet, I.P., & Hone, I.G., 1987. Geology of the Proterozoic Davenport province, central Australia. *Bureau of Mineral Resources, Geology and Geophysics, Australia, Bulletin, 226.*

Blake, D.H., & Page, R.W., 1988. The Proterozoic Davenport province, central Australia: regional geology and geochronology. *Precambrian Research,* 40/41, 329-340.

3 . STRUCTURE OF THE ROCKCHEM DATABASE

The ROCKCHEM database contains seven main tables of data and eleven associated 'authority' tables. The names of the tables are as follows and full definitions are listed in Appendix 2.

Table Name	Contents
Main Tables	
SAMPLES	Samples and their locations and provenance
SAMPLESPLITS	Sample splits and their storage
MAJORS	Major element analyses in weight percentages of oxides
TRACES	Trace element analyses in parts per million
PPB	Trace element analyses in parts per billion
ROCKPROPS	Density and magnetic rock properties
REFERENCES	Bibliographic references
Authority tables	
ORIGINATORS	List of valid contributors
COUNTRIES	List of valid countries
STATES	List of valid Australian States
REGIONS	List of valid regions
HMAPS	List of valid 1:100 000 maps
ROCKTYPES	List of valid rock types
STOREBOXES	List of valid boxes in the BMR museum
SOURCES	List of valid analytical laboratories
METHODS	List of valid analytical methods
MAXNOS	Table for highest index number in the database

The fields in the main tables are described in section 4. The authority tables are described in section 5. They generally consist of a number and a text field. For example, the REGIONS table consists of a region number and a region name (see Appendix 2). The region names in this table are unique. Each region appears once, and only once, in this

table, and nowhere else in the database. The SAMPLES table refers ('relates') to the region name via its associated number.

4. DESCRIPTION OF THE MAIN TABLES

4.1 THE SAMPLES TABLE

This table contains information about samples and their provenance. The Samples Block contains the following relational fields - ORIGINATORS, ROCKTYPES, COUNTRIES, STATES, REGIONS, HMAPS, and REFERENCES (up to 5 different references can be entered for each sample). With each authority field, there is an associated table containing the value pointed to by a number or in the case of COUNTRIES, a 3-letter mnemonic. The number (or mnemonic) is the only information stored in the SAMPLES table, the values are stored separately in the relevant authority table.

All fields are either mandatory or optional. All BMR users must enter the mandatory fields before the geochemical data can be entered.

Description of Fields:

Origno - Mandatory relational field of 5 digits. The originator is represented by a number and the full name is recorded in the relational 'ORIGINATORS' table. The originator is generally the person or organization that collects the sample and/or submits it for laboratory work. The main purpose of this field is to ensure a unique combination of originator and sample number.

Sample Number - Mandatory field of 16 characters. Any combination of letters and numbers may be entered, provided that it is unique to the originator. All BMR samples should have registered 8 digit numbers, which should be unique. The first two digits in the BMR sample number refer to the year in which the sample was collected, the next two digits refer to a region in Australia (e.g. Arunta, Pine Creek), and the remaining four numbers are used by individuals belonging to that project at their discretion.

Field Number - Optional field of 16 characters. This field is designed to accommodate any alternative numbering systems that might apply to a sample or group of samples. For example, some samples are given field numbers that differ from the final registered numbers.

Group or Batholith - Optional field of 64 characters, giving the name of the stratigraphic group or igneous batholith from which the sample was collected.

Subgroup or Suite - Optional field of 64 characters, giving the name of the stratigraphic subgroup or igneous suite pertaining to the sample.

Stratigraphic Formation - Optional field of 64 characters, giving the relevant stratigraphic unit at formation level.

Stratigraphic Member - Optional field of 64 characters for the name of a stratigraphic member, if appropriate.

Stratigraphic Height - Optional number field with up to two decimal places. Designed for samples from measured stratigraphic sections.

Map Symbol - Optional field of 10 characters: the letter symbol used on 1:100 000 or 1:250 000 geological maps for the rock unit from which the sample was collected.

Rock Type - Mandatory relational field of 5 digits. See the description of the authority tables for the list of 18 permissible rock types, 1 being 'unknown'.

Lithology - Optional field of 64 characters for a full lithological description.

Grouping - Optional field of 22 characters to allow the user to supply other divisions for samples, for example, the alteration zones of an ore body.

Age - Optional field of 64 characters for the geological age, e.g., late Ordovician. If known, the absolute age is included in brackets, e.g., early Proterozoic (1860 Ma).

References - 5 optional relational numeric fields of 5 digits each. The full reference is listed in the REFERENCES table.

Country - Mandatory relational field of 3 capital letters. The default value is 'AUS'.

State - Relational field of 3 capital letters, mandatory if country is Australia. Only the standard capital letter abbreviations for Australian states can be entered in this field, and it cannot be used for other countries.

Region - Mandatory relational field of 5 digits. Only those regions in the REGIONS table may be entered. A region is a recognised geological province or area such as the Lachlan Fold Belt, Mount Isa Inlier, or Carnarvon Basin. As regions may overlap one another, the region that is entered is dependent on the purpose for which the sample was collected.

Geographic Area - Optional 64 character field for the name of the geographic area (e.g., valley, plain, mountain range) from which the sample comes. Examples are 'Newcastle Range' and 'Tuggeranong Valley'. Another purpose for which this field is used is for subprovinces of major regions (e.g., the Leichhardt River Fault Trough of the Mount Isa Inlier).

Locality - Optional 64 character field for a description of the sample site to aid in its relocation in the field. For example, '5.5km NW of Brown's Bore, on east bank of dry creek'.

1:100 000 Map - Relational field of 4 digits, mandatory if country is Australia. The number supplied must identify one of the standard series 1:100 000 map in the

HMAPS table. In insert or update mode, the name may be entered and the number retrieved automatically. Only the map number is stored in the SAMPLES table.

Grid Reference - Field of 6 digits, mandatory if 1:100,000 map name is given. The 6 digit reference required is that described on the face of Australian 1:100 000 maps. The grid reference given must be metric and on the Australian National Spheroid.

Decimal Latitude - Field of 8 digits, mandatory if sample is not from Australia. Up to 6 digits may follow the decimal point. For most samples this field has been entered using a BMR program called 'GetLat', which calculates latitudes and longitudes from the 1:100 000 maps and metric grid references.

North or South - Single character field, 'S' by default. Only 'N' or 'S' may be entered.

Decimal Longitude - Field of 9 digits, 7 of which may follow the decimal point. Otherwise as for latitude.

East or West - Single character field 'E' by default. Only 'E' or 'W' may be entered. Make sure this field is correctly filled in for samples from outside Australia (e.g. Antarctica). It must be given as 'W' for latitudes measured west of the Greenwich Meridian.

Drill Hole - Optional field of 22 characters. If the sample is from a drill hole, its name, or some other identification, is required.

Depth in Metres - Optional field of 10 characters. The depth of the sample from within the drill hole. A character field is used here to enable depth ranges to be entered, e.g., '112- 115' - as some samples are collected from finite depth intervals.

Other Data - Optional field of 64 characters. May be used for any data not covered by the above fields that the originator feels are relevant.

Entry Date - Invisible date field. This field automatically assumes the date that the sample data is inserted into the SAMPLES table via the form.

4.2 THE SAMPLE SPLITS TABLE

This table indicates the sample type (whole rock geochemistry, geochronology, thin section, hand specimen etc.) and the number of the box that the sample is stored in within the BMR museum.

Description of Fields:

Origno - Mandatory relational field of 5 digits. The originator is represented by a number and the full name is recorded in the relational 'Originator Table'. The originator is generally the person or organization that collects the sample and/or submits it for laboratory work. The main purpose of this field is to ensure a unique combination of originator and sample number.

Sample Number - Mandatory field of 16 characters. Any combination of letters and numbers may be entered, provided that it is unique to the originator. All BMR samples should have registered 8 digit numbers, which should be unique. The first two digits in the BMR sample number refer to the year in which the sample was collected, the next two digits refer to a region in Australia (e.g. Arunta, Pine Creek), and the remaining four numbers are used by individuals belonging to that project at their discretion.

Sample Type - Mandatory relational field of 5 digits. The sample type entered must be one of those in the SAMPLETYPES table, e.g., 'whole-rock analysis' or 'geochronology'.

Storebox - Optional numeric field of up to 5 digits. This number must correspond to a Storebox number already in the STOREBOXES table. Although most existing samples do not yet have a storebox number, it is a requirement for all new samples housed in the BMR museum to have a storebox number.

4.3 THE MAJORS TABLE

The majors table contains all of the major element data with all values expressed as weight percentages of oxides.

Description of Fields:

Sample Number - Mandatory field of 16 characters. Any combination of letters and numbers may be entered, provided that it is unique to the originator. All BMR samples should have registered 8 digit numbers, which should be unique. The first two digits in the BMR sample number refer to the year in which the sample was collected, the next two digits refer to a region in Australia (e.g. Arunta, Pine Creek), and the remaining four numbers are used by individuals belonging to that project at their discretion.

Analysis Number - Mandatory field of up to 5 digits. Primary key field assigned by the system; it cannot be inserted or updated. It may be used to query the tables.

Origno - Mandatory relational field of 5 digits. The originator is represented by a number and the full name is recorded in the relational 'Originator Table'. The originator is generally the person or organization that collects the sample and/or submits it for laboratory work. The main purpose of this field is to ensure a unique combination of originator and sample number.

Source Number - Mandatory relational field of up to 5 digits. The 'source' of an analysis is normally the laboratory that performed the analysis or the person or organization that provided the data (e.g., BMR, BMR restricted, BHP, B.W. Chappell). The SOURCES table contains the authority list of all sources.

Method Number - Mandatory relational field of up to 5 digits describing the method by which the laboratory analysis was performed. The details of the analytical techniques used are in the METHODS table.

Major Elements - Optional numeric fields of up to 4 digits, two after the decimal point. Automatically right justified. Detection limit values are entered as negative numbers and it is impossible to enter '<' or 'n.d.'.

*Fe_2O_3 - This field is reserved for total iron as Fe_2O_3. It should be entered only for analyses in which the oxidation state of iron has not been determined. Where this field is entered, the fields for FeO and Fe_2O_3 should be left empty.

Rest - Trace elements are converted to oxide percent, summed and then added to the total.

Total - Optional numeric field of up to 5 digits. This is for an entered total.

Calculated Total - The value in this field is automatically calculated from the data in the major element fields. It cannot be entered and is not a database field. Except where detection limit values are involved, this field provides a check on the entered total; the two should coincide. Because detection limit values are entered as negative numbers, they are subtracted from the calculated total.

4.4 THE TRACES TABLE

This table includes all trace elements in ppm.

Description of Fields:

Sample Number - Mandatory field of 16 characters. Any combination of letters and numbers may be entered, provided that it is unique to the originator. All BMR samples should have registered 8 digit numbers, which should be unique. The first two digits in the BMR sample number refer to the year in which the sample was collected, the next two digits refer to a region in Australia (e.g. Arunta, Pine Creek), and the remaining four numbers are used by individuals belonging to that project at their discretion.

Analysis Number - Mandatory field of up to 5 digits. Primary key field assigned by the system; it cannot be inserted or updated. It may be used to query the tables.

Origno - Mandatory relational field of 5 digits. The originator is represented by a number and the full name is recorded in the relational 'Originator Table'. The originator is generally the person or organization that collects the sample and/or submits it for laboratory work. The main purpose of this field is to ensure a unique combination of originator and sample number.

Source Number - Mandatory relational field of up to 5 digits. The 'source' of an analysis is normally the laboratory that performed the analysis or the person or organization that provided the data (e.g., BMR, BMR restricted, BHP, B.W. Chappell). The SOURCES table contains the authority list of all sources.

Method Number - Mandatory relational field of up to 5 digits describing the method by which the laboratory analysis was performed. The details of the analytical techniques used are in the METHODS table.

Trace Elements - Optional numeric fields of up to 8 digits, two of which may be after a decimal point. The fields are automatically right justified and as is the case for major elements, a negative entry signifies a detection-limit value.

4.5 THE PPB (parts per billion) TABLE

This table includes all trace elements in ppb.

Description of Fields:

Sample Number - Mandatory field of 16 characters. Any combination of letters and numbers may be entered, provided that it is unique to the originator. All BMR samples should have registered 8 digit numbers, which should be unique. The first two digits in the BMR sample number refer to the year in which the sample was collected, the next two digits refer to a region in Australia (e.g. Arunta, Pine Creek), and the remaining four numbers are used by individuals belonging to that project at their discretion.

Analysis Number - Mandatory field of up to 5 digits. Primary key field assigned by the system; it cannot be inserted or updated. It may be used to query the tables.

Origno - Mandatory relational field of 5 digits. The originator is represented by a number and the full name is recorded in the relational 'Originator Table'. The originator is generally the person or organization that collects the sample and/or submits it for laboratory work. The main purpose of this field is to ensure a unique combination of originator and sample number.

Source Number - Mandatory relational field of up to 5 digits. The 'source' of an analysis is normally the laboratory that performed the analysis or the person or organization that provided the data (e.g., BMR, BMR restricted, BHP, B.W. Chappell). The SOURCES table contains the authority list of all sources.

Method Number - Mandatory relational field of up to 5 digits describing the method by which the laboratory analysis was performed. The details of the analytical techniques used are in the METHODS table.

Trace Elements - Optional numeric fields of up to 8 digits, 3 of which may be after a decimal point. The fields are automatically right justified and as is the case for major and trace elements, a negative entry signifies a detection-limit value.

4.6 THE REFERENCES TABLE

The bibliographic References Form accesses the REFERENCES table. The authors and year fields are spanned by a concatenated unique index. This means that no two references can have the same values in the author(s) and year fields.

Description of Fields:

Reference Number - Mandatory field of up to 5 digits. A monotonically increasing primary key field assigned by the system. The reference number in the fields in the samples table refer to this field.

Other ID - Optional field of up to 16 characters. Any other identifying sequence that the user may care to apply.

Username - Mandatory field of up to 16 characters.

Authors - Mandatory field of up to 128 characters.

Year - Mandatory field of up to 16 characters.

Title - Optional field of up to 240 characters.

Source - Optional field of up to 240 characters - the journal name, volume and page numbers.

5. DESCRIPTION OF AUTHORITY TABLES

5.1 THE 1:100 000 MAPS FORM

The 1:100 000 maps form table has the underlying HMAPS table as an important table in its own right.

Description of Fields:

100K Map Number - The unique four digit number for any 1:100 000 map sheet from Australia.

1M Map ID - The 1:1 000 000 map sheet in which the 1:100 000 sheet lies. This is identified by two capital letters followed by two numbers, e.g., 'SF54'. The two digits are the UTM zone, which is needed to convert metric references to latitude and longitude.

250K Map Number - Up to 2 digits identifying the 1:250 000 map sheet from 16 covering each 1:1 000 000 map area. The full 1:250 000 map ID is obtained by joining the 1:1 000 000 map ID to this number, e.g., SF54-12, which is the Winton 1:250 000

map sheet, in Queensland. Note that the 1:250 000 map sheets in Tasmania are the theoretical ones, not the shifted ones actually published.

100K Map Name - Up to 22 upper case characters for the name of the 1:100 000 map sheet identified by the 100K Map Number. There are many offshore sheets which are named 'UNNAMED'.

100K Map NW Corner Lat. & Long. - The decimal latitude and longitude of the northwest corner of the 1:100 000 map sheet. It is possible, using a single SQL*Plus command, to make use of this field to select a 1:100 000 map name for any given latitude and longitude.

100K Map AMG Ref. SW Corner Easting and Northing - The metric easting and northing of the southeast corner of the 1:100 000 map sheet. These values are necessary to convert a 6-digit grid reference obtained from a 1:100 000 map to the full Australian Map Grid metres east and metres north.

5.2 COUNTRIES TABLE

This table is for recognised countries. All have an associated ID.

ID	Country
AUS	Australia
PNG	Papua-New Guinea
SI	Solomon Islands
ANT	Antarctica
UK	United Kingdom
SEA	International Waters

5.3 STATES TABLE

This table is for the states of Australia only and all have a set ID.

ID	STATE
???	unknown
ACT	Australian Capital Territory
NSW	New South Wales
NT	Northern Territory
QLD	Queensland
SA	South Australia
TAS	Tasmania
VIC	Victoria
WA	Western Australia

5.4 ORIGINATOR TABLE

This table refers to the collector of the sample in the field. With some BMR authors, it is possible to refer to original sample note books which are stored within BMR so as to obtain more precise location descriptions of any samples that are of interest.

The following list gives the key for the entries in this authority table.

ORIGNO	ORIGINATOR
1	unknown
2	Blake, D.H.
3	Branch, C.D.
4	Bultitude, R.J.
5	Gardner, C.
6	Croxford, W.
7	Cruikshank, B.I.
8	Hoatson, D.M.
10	Dallwitz, W.B.
11	Derrick, G.M.
12	Duff, B.
13	Ellis, D.J.
14	England, R.N.
15	Ewers, G.R.
16	Warren, R.G.
17	Glikson, A.Y.
18	Tanaka, H.
19	Hill, R.M.
20	Holmes, R.D.
21	Hutton, L.J.
22	Lambert, I.
23	Knutson, J.
24	Jaques, A.L.
25	Chapple, K.
27	Lewis, J.D.
28	Etheridge, M.
29	Mackenzie, D.E.
30	McNaughton, N.
31	Mitchell, J.M.
32	Mock, C.M.
33	Higgins, N.C.
34	Oversby, B.S.
35	Cook, P.
36	Stuart-Smith, P.G.
37	Page, R.W.
38	Plumb, K.A.
39	Valenta, R.
40	Needham, R.S.
41	Santul, J.
42	Sheraton, J.W.
43	Smith, S.E.
44	Tunks, A.
45	Wallace, D.A.
46	Willmott, W.F.
47	Wilson, I.H.
48	Withnall, I.W.
49	Wyborn, D.
50	Wyborn, L.A.I.
51	Bain, J.H.C.

52	Johnson, R.W.
53	Williams, P.R.
54	Miller, A.
55	Bettenay, L.
56	Black, L.P.
57	Pederson, C.P.
58	Ferguson, J.
59	Hegge, M.R.
60	Wilkes, P.G.
61	Roberts, W.M.B.
62	Walpole, B.
63	Joplin, G.
64	Crick, I.
65	Hills, J.
66	Rhodes, J.
67	Smart, P.
68	Sweet, I.P
69	Shaw, R.D.
70	Stewart, A.J.
71	Wyche, S.
72	Watchman, A.
73	Stuart, J.E.
74	Stratton, J.
75	Duggan, M.B.
76	Yeates, A.N.
77	ANU RSES
78	Allen, A.R.
79	Bofinger, V.M.
80	Gee, R.D.
81	De Laeter, J.R.
82	Cooper, J.A.
83	Williams, S.J.
84	Windrim, D.P.
85	Gray, C.M.
86	Ludwig, K.R.
87	Currie, K.L.
88	Chin, R.J.
89	Mortimer, G.E.
90	Marjoribanks, R.W.
91	Webb, A.W.
92	Langworthy, A.P.
93	SADME
94	Jagodzinski, E.A.
95	Compston, W.
96	Freeman, M.J.
97	Offe, L.A.
98	Bagas, L.
99	Joklik, G.F.
100	Korsch, R.
101	Dobos, S.K.
102	Foden, J.D.
103	Roarty, M.J.
104	Pidgeon, R.T.
105	W.A. Geological Survey
106	Southgate, P.N.
107	Kralik, M.
108	Richards, J.R.
109	McDougall, I.
110	Turek, A.

111	Collins, W.J.
112	Kinny, P.D.
113	Heinrich, C.A.
114	Hill, R.I.
115	Henderson, G.A.M.
116	Johnston, C.
117	Richards, D.
118	Bailey, J.
119	Blewett, R.S.
120	Chappell, B.W.C.
121	Adams, C.J.
122	Turner, N.J.
123	Perason, P.J.
124	Rao, C.P.
125	McCulloch, M.T.
126	Vanderhor, F.
127	Rattenbury, M.S.
128	Young, D.N.
129	Arriens, P.A.

5.5 REGIONS TABLE

The following list of regions was initially compiled from all the existing databases. However, for the purpose of database management, only a select number of major regions are now used for the Australian section of this data set. Those that have been used with the regional databases are marked * in the list below. Most of those Australian regions listed below now entered in the field "Geogarea"; Antarctic regions used are marked +.

REGIONO	REGION
1	unknown
2	Adelaide Fold Belt
3	Albany-Fraser Province
4	Arunta Block *
5	Bunger Hills +
6	Cape York Peninsula
7	Carnarvon Basin
8	Commonwealth Bay +
9	Cummins Range
10	Davenport Province *
11	Denman Glacier +
12	East Kimberley
13	Enderby Land +
14	Gawler Craton
15	George V Land +
16	Georgetown Inlier
17	Halls Creek Inlier *
18	Kemp Land +
19	Lachlan Fold Belt *
20	Lawn Hill Platform
21	Mawson Coast +
22	McArthur Basin
23	Mount Isa Inlier *
24	Northern Prince Charles Mountains +
25	NE Queensland *
26	NE Tasmania
27	NW Tasmania

29	North Victoria Land +
30	North Kimberley
31	Pilbara Block *
32	Pine Creek Inlier *
33	Prydz Bay Coast +
34	Southern Prince Charles Mountains +
35	Stuart Shelf *
36	Granites-Tanami Block *
37	Tasman Fold Belt
38	Tasmania
39	Tennant Creek *
40	Turee Creek
41	Tuross
42	Vestfold Hills +
43	West Kimberley
44	Wilhelm II Land +
45	Wilkes Land +
46	Willyama Block
47	Yilgarn Block
48	Hammersley Basin
49	SE Tasmania
50	SW Tasmania
51	New Georgia Island
52	Eastern Goldfields
53	Capricorn Orogen *
54	Ashburton Trough
55	Gascoyne Province
56	Glengarry Sub-basin
57	Earaheedy Sub-basin
58	Murphy Tectonic Ridge
59	South Nicholson Basin
60	Westmoreland Region
61	New England Fold Belt
62	Sydney Basin
63	Admiralty Islands
64	Birrindudu Basin
65	Bangemall Basin
66	Musgrave Block
67	Paterson Province
68	Amadeus Basin
69	Ammaroodinna Inlier
70	Peake Denison Inlier
72	Georgina Basin
73	Curnamona Inlier
74	Carpentaria Province
75	Northampton Block
76	Houghton Inlier
77	Bougainville
78	Tabar-Feni
79	New Britain
80	St. Andrews Strait
81	Fly Highlands
82	Manus Basin
83	Eastern Papua
84	Officer Basin
85	Woodlark Basin

5.6 ROCK TYPES TABLE

This table provides a coarse subdivision of samples based on broad rocktyoes. It was initiated primarily for database management and block retrieval, and for future online extraction of data. For example, this table can be used to extract all mafic extrusive rocks from the database or all alkaline rocks. The following gives a list of the 18 permitted rock types:

ROCKNO	ROCKTYPE
1	unknown
2	felsic intrusive
3	intermediate intrusive
4	mafic intrusive
5	felsic extrusive
6	intermediate extrusive
7	mafic extrusive
8	ultramafite
9	alkaline igneous
10	clastic sediment
11	chemical sediment
12	metabasite
13	felsic gneiss
14	metasediment
15	metasomatite
16	ore
17	regolith
18	mixed clastic/chemical sediment

5.7 SAMPLE TYPES TABLE

This table gives an indication of the nature of work that has been carried out on each individual sample.

SAMPLETYPENO	SAMPLETYPE
1	unknown
2	whole-rock geochemistry
3	geochronology
4	hand specimen
5	thin section
6	geochronology K-Ar
7	geochronology Ar-Ar
8	geochronology Rb-Sr
9	geochronology Sm-Nd
10	geochronology U-Pb minerals
11	geochronology U-Pb SHRIMP
12	geochronology Pb-Pb
13	geochronology Pb-Pb ores
14	geochronology Lu-Hf
15	geochronology Re-Os
16	geochronology fission-track
17	geophysical properties
18	geochemical rock chip samples

5.8 SOURCES TABLE

This table gives the laboratory or organisation which analysed the sample.

SOURCENO	SOURCE
1	unknown
2	ANU
3	Adelaide University
4	AMDEL
5	BMR
6	BMR restricted
7	CSIRO/BMR
8	Macquarie University
9	Melbourne University
10	NTGS (AMDEL)
11	WA Govt. Chem. Lab.
12	WA/BMR Restricted
13	University of Queensland
14	James Cook University of North Queensland
15	Tasmanian Department of Mines
16	University of Tasmania
17	Queensland Department of Mines
18	BGR (Bundesanstalt fur Geowissenschaften und Rohstoffe)
19	Labtech Pty. Ltd., WAIT, WA Govt. Chem. Lab., Perth.
20	Institute for Petrology, Copenhagen University, Denmark
21	ANALABS
22	BMR/CRAE - T.Stachel

5.9 METHODS TABLE

This table describes the analytical methods used in deriving the analyses.

METHODNO	METHOD
1	unknown
2	XRF (Norrish & Hutton, 1969); FeO Vol.; LOI Grav.
3	XRF (Norrish & Hutton, 1969); FeO Vol.; H2O+, H2O-, & CO2 Grav.
4	XRF (Norrish & Chappell, 1977); Ag, Be, Co, Li by AAS
5	XRF (Norrish & Chappell, 1977);Ag, Be, Co, Cu, Li, Ni, Zn by AAS
6	XRF (Norrish & Hutton, 1969); FeO, H2O(total), CO2 by AMDEL
7	XRF (Norrish Chappell 1967); Li Be Cr Co Ni Cu Zn Sn AAS F AMDEL
8	Rb, Sr by XRF (Norrish & Chappell, 1967); Ni, Co, V by AAS
9	XRF (Norrish & Chappell, 1977); FeO vol.; LOI grav.
10	XRF (N & C, 1977); REE Hf Ta Cr Sc Sb Cs INA; Th U Gamma spectrm
11	XRF (N & C, 1977); REE Hf Ta Sb Cs INAA; U delayed neutron count
12	XRF (Norrish & Chappell, 1977).
13	XRF (Norrish & Chappell, 1977); Co Cu Ni Pb Zn by emiss.
14	ICP,AES Inductively Coupled Plasma, Atomic Emission
15	XRF (N & C, 1977) at ANU; Na, K by AAS (JCUNQ).
16	XRF(N&C 1977) UQ; REE Th U Pb Hf Ba Cs Sn Mo Nb Y Bi W MS7 RSES.

17	AMDL 'wet' chem. +/- XRF (N & H, 1969)?
18	Tas. Dept. Mines Assay Labs Launceston: "classical methods".
19	J. Klominsky & D.I. Groves: X-ray spectrography.
20	XRF (Norrish & Chappell, 1977); REE,Sc,Hf,Th,U INAA
21	XRF (N & C, 1977); REE ion-exchange/XRF (Robinson & others,1986)
22	AMACHEM Nickel sulfide assay- neutron activation.
23	XRF (Norrish & Hutton, 1969) on 1:1 purified silica mix
24	AAS
25	ANALABS: fire assay, Pb collection, carbon rod finish (30g samp)
26	ANALABS: fire assay fusion, AAS finish (30g sample)
27	ANALABS: combination of methodno = 25 (Pd & Pt) and 26 (Au)
28	RNAA from Melbourne University
29	ANALABS: fire assay, lead collection; ICP-MS finish
30	Direct-reading optical spectrograph (DROS), BMR.

Appendix 1a - Listings of the components in the Tennant Creek data set.

A1a.1 Samples assigned to Stratigraphic Groups.

STRATGROUP	COUNT(*)
unassigned	382
Hatches Creek Group	1
Pre-Warramunga Group	6
Warramunga Group	1041
Warramunga Group ?	1

A1a.2 Samples assigned to Subgroups.

SUBGROUP	COUNT(*)
unassigned	1431

A1a.3 Samples assigned to Stratigraphic Units.

STRATUNIT	COUNT(*)
unassigned	438
Bernborough Formation	18
Cabbage Gum Granite	16
Carraman Formation	815
Carraman Formation - position uncertain	6
Channingum Granite	1
Gecko Volcanics	1
Gosse River East Granite	4
Gosse River North Granite	4
Gosse River South Adamellite	5
Monument beds and other Arunta Division 1 equivalents	19
New Hope Granite	9
North Seismic Adamellite	5
Red Bluff Granite	16
Tennant Creek Granite	28
Tennant Creek Granite ?	3
Warrego Granite	18
Warrego Volcanics	8
undifferentiated	5
unnamed intrusive porphyry	5
unnamed lamprophyre intrusion	3
unnamed mafic igneous rock	4

A1a.4 Samples assigned to Stratigraphic Members.

STRATMEMBER	COUNT(*)
unassigned	614

Black Eye Member - above porphyry	12
Black Eye Member - below porphyry	167
Black Eye Member - just above porphyry	35
Black Eye Member - just below porphyry	95
Black Eye Member - lower porphyry margin	35
Black Eye Member - position uncertain	286
Black Eye Member - upper porphyry margin	18
Black Eye Member - well above porphyry	10
Black Eye Member - well below porphyry	156
Pebbles granite	1
basement	2

A1a.5 Samples assigned by Rocktype.

ROCKNO	ROCKTYPE	COUNT(*)
2	felsic intrusive	100
4	mafic intrusive	21
5	felsic extrusive	84
9	alkaline igneous	40
10	clastic sediment	134
11	chemical sediment	43
12	metabasite	19
14	metasediment	10
15	metasomatite	979
16	ore	1

A1a.6 Samples assigned by Chronological Age.

AGE	COUNT(*)
early Proterozoic	1431

A1a.7 Samples assigned by Geographic Area.

GEOGAREA	COUNT(*)
unassigned	1431

A1a.8 Listings of the samples assigned to 1:100 000 Map Sheet Areas.

MAPNAME	MAPNO	COUNT(*)
BONNEY	5757	2
CHALUBA	5657	2
FLYNN	5759	168
GOSSE RIVER	5858	17
KELLY	5658	73
SHORT RANGE	5659	144
TENNANT CREEK	5758	1025

A1a.9 Samples assigned to Drillholes.

DRILLHOLE	COUNT(*)
unassigned	807
163	1
168	1
169	16
172	2
277	1
288	1
318	1
336	3
342	2
354	2
356	5
362	4
363	1
364	1
365	11
367	8
374	2
377	2
A3, Hole 6	1
A3, Hole 7	2
A3, Hole 7a	1
A4, Hole 8	3
A4, Hole 9	2
AN 13 Hole 1	6
AN 4, Hole 1	2
AN 4, Hole 2	1
AN 4, Hole 4	3
AN 5, Hole 17	1
AN C12, Hole 1	1
AN C13, Hole 3	5
AN C6, Hole 5	1
AN C6, Hole 5a	1
AN C6, Hole 5b	1
AN5, Hole 17	1
AR2, Hole 14	1
Anomaly 4 Hole 2	1
Anomaly 4 Hole 3	1
Anomaly 4 Hole 4	3
Anomaly 6, Hole 1	5
Anomaly C13 Hole 3	2
Anomaly C6 Hole 5	24
Anomaly C6 Hole 5A	26
Area 2 Hole 12	11
Area 3, H7A	4
Area A5 Hole 17	1
Area AR2 Hole 14	5
BMR 3, DDH 1	1
BMR 3, Hole 169	6
BMR-NTGS 1	1
BMR-NTGS 10	5
BMR-NTGS 11	4

BMR-NTGS 2	4
BMR-NTGS 3	1
BMR-NTGS 4	1
BMR-NTGS 5	5
BMR-NTGS 6	4
BMR-NTGS 7	5
BMR-NTGS 8	5
Black Angel 5	4
Black Angel 6A	1
Black Angel 8WR1	1
Black Angel, Hole 5	2
Black Angel, Hole 7	1
Blue Moon 1	1
Blue Moon 2	1
Blue Moon 3	1
Blue Moon 4	1
Blue Moon 5	1
Burnt Shirt	2
Burnt Shirt 1	1
Cabbge Gum,Hole 200/90	2
Cabbge Gum,Hole190/105	1
Cabbge Gum,Hole200/100	2
Cabbge Gum,Hole215/100	2
Cats Whisker 5	1
Comet 1	2
Comet 2	1
DDH 149	1
DDH 164	4
DDH 168	2
DDH 202	1
DDH 251	4
DDH 258	2
DDH 260	1
DDH 268	5
DDH 274	1
DDH 342	1
DDH 352	1
DDH 365	1
DDH 372	1
DDH 376	1
DDH 381	4
DDH 404	4
East New Hope, Hole 1	1
East New Hope, Hole 2	1
Eldorado An2 Hole 3	4
Eldorado An3 Hole 5	4
Eldorado An5 Hole 1	2
Eldorado An5 Hole 1/1	1
Eldorado, Hole 4, AN5	2
Eldorado, Hole 4,AN5	2
Explorer 1 An2 Hole 15	4
Explorer 1,Hole 20,AN2	5
Explorer 10	2
Explorer 12, Hole 1	5
Explorer 13 Hole 1	3
Explorer 13 Hole 4	1
Explorer 14, Hole 1	1
Explorer 15, Hole 1	3
Explorer 16, Hole 1	4

Explorer 17, Hole 1	2
Explorer 17, Hole 2	4
Explorer 18 Hole 1	1
Explorer 18 Hole 2	2
Explorer 18, Hole 1	5
Explorer 2 Hole 1	2
Explorer 2, Hole 1	2
Explorer 26 Hole 2	1
Explorer 27, Hole 1	1
Explorer 28 Hole 3	5
Explorer 28, Hole 3	3
Explorer 36, Hole 1	5
Explorer 37 Hole 1	1
Explorer 37, Hole 2	2
Explorer 38 Hole 1	4
Explorer 38, Hole 2	4
Explorer 4, Hole 1	1
Explorer 41 Hole 1	1
Explorer 41, Hole 2	1
Explorer 42, Hole 1	1
Explorer 43, Hole 2	2
Explorer 44, Hole 1	1
Explorer 45 Hole 2	4
Explorer 46 Hole 1	2
Explorer 46, Hole 2	5
Explorer 47, Hole 1	2
Explorer 5, Hole 14	3
Explorer 5, Hole 21	6
Explorer 50 Hole 1	2
Explorer 50, Hole 1	6
Explorer 6 Hole 1	4
Explorer 63, Hole 1	3
Explorer 64 Hole 1	2
Explorer 64, Hole 1	2
Explorer 69, Hole 1	2
Explorer 69, Hole 2	5
Explorer 7, Hole 1	2
Explorer 8, Hole 1	2
Explorer 91 Hole 1	1
Gigantic 1	3
Gigantic 2	4
Gigantic 3	4
Gigantic 4	4
Golden 40	1
Golden Kangaroo	1
Ivanhoe Mine	1
Juno Mine	1
Kelly Well West	1
Kelly Well West 5	1
Lone Star 1	10
Lone Star 4	1
Lone Star 5	1
Mary Lane 2	3
Memsahib 1	1
Navigator 1, Hole 1a	3
Navigator 3, Hole 1	1
Navigator 6, Hole 2	2
Navigator, Hole 1	5
New Hope 5	2

New Hope Flag 1	1
New Hope, Flag 1	1
New Hope, Hole 2, AN2	2
Nobles Nob	1
North Star 17	3
Northern Star Hole 17	1
Olive Wood	3
One-Oh-Two Hole 1A	1
Oneohtwo, Hole 1,AN2	1
Orlando Mine	2
PN 3	2
PN 5	2
Perserverance Hole 1	5
Perseverance, Hole 1	1
Peter Pan 1	2
Pinnacles 2	4
Pinnacles 3	2
Queen of Sheba Hole 2	2
Red Bluff 12B	2
Red Bluff 12b	2
Red Bluff 1a	1
Red Bluff 7C	7
Rising Sun	1
Rover 1	2
Stratigraphic Hole 1	3
Stratigraphic Hole 2	3
Stratigraphic Hole 3	2
Stratigraphic Hole 4	4
Stratigraphic Hole 5	4
Stratigraphic Hole 6	3
Stratigraphic Hole 7	3
Survey 28	1
Telegraph Area 10	1
Telegraph Area 12	1
Telegraph Area 15	1
Tennant Creek 1	1
Tennant Creek 10	1
Tennant Creek 11	1
Tennant Creek 12	1
Tennant Creek 13	1
Tennant Creek 14	1
Tennant Creek 15	1
Tennant Creek 16	1
Tennant Creek 17	1
Tennant Creek 18	1
Tennant Creek 19	1
Tennant Creek 2	1
Tennant Creek 20	1
Tennant Creek 21	1
Tennant Creek 22	1
Tennant Creek 3	1
Tennant Creek 4	1
Tennant Creek 5	1
Tennant Creek 6	1
Tennant Creek 7	1
Tennant Creek 8	1
Tennant Creek 9	1
U124	1
U125	1

U126	1
U127	1
U128	1
U129	1
U130	1
U131	1
U132	1
Warrego Mine	2
West Gibbet Hole 5	5
West Peko 2	21
Wheal Doria	5

Appendix 1b - Listings of the components in the Davenport Province Data Set.

A1b.1 Samples assigned to Stratigraphic Groups.

STRATGROUP	COUNT(*)
unassigned	76
Hatches Creek Group	85
Warramunga Group	9

A1b.2 Samples assigned to Subgroups.

SUBGROUP	COUNT(*)
unassigned	85
Ooradidgee Subgroup	48
Wauchope Subgroup	37

A1b.3 Samples assigned to Stratigraphic Units.

STRATUNIT	COUNT(*)
unassigned	9
Arabulja Volcanics	2
Devils Marbles Granite	2
Edmirringee Volcanics	10
Elkedra Granite	5
Epenarra Volcanics	7
Hill of Leaders Granite	9
Kudinga Basalt	10
Kurinelli Sandstone	1
Mia Mia Volcanics	3
Newlands Volcanics	24
Treasure Volcanics	27
Yeeradgi Sandstone	1
dolerite	1
dolerite dyke	2
dolerite sill	12
dolerite sill?	5
granophyre	3
granophyre dyke	1
granophyre sill	29
lamprophyre dyke	2
porphyry intrusion	1
unnamed granite	4

A1b.4 Samples assigned to Stratigraphic Members.

STRATMEMBER	COUNT(*)
unassigned	170

A1b.5 Samples assigned by Rocktype.

ROCKNO	ROCKTYPE	COUNT(*)
1	unknown	1
2	felsic intrusive	49
4	mafic intrusive	20
5	felsic extrusive	75
7	mafic extrusive	23
9	alkaline igneous	2

A1b.6 Samples assigned by Chronological Age.

AGE	COUNT(*)
-early Proterozoic	170

A1b.7 Samples assigned by Geographic Area.

GEOGAREA	COUNT(*)
unassigned	170

A1b.8 Samples assigned to 1:100 000 Map Sheet Areas.

MAPNAME	MAPNO	COUNT(*)
BONNEY	5757	8
DAVENPORT RANGE	5856	24
ELKEDRA	5955	31
GEORGE CREEK	6055	8
HANLON	6056	1
HATCHES	5956	74
MURRAY DOWNS	5855	1
OORADIDGEE	5857	19
SANDOVER	6054	1
WAUCHOPE	5756	3

A1b.9 Samples assigned to Drillholes.

DRILLHOLE	COUNT(*)
unassigned	170

Appendix 2 - Rockchem database definitions

A2.1 Samples Table Description:

```
CREATE SPACE DEFINITION SPACE_GCSAMPLES
      DATAPAGES     ( INITIAL       2000,
                      INCREMENT     500,
                      MAXEXTENTS    9999,
                      PCTFREE       25    )
      INDEXPAGES    ( INITIAL       200,
                      INCREMENT     100,
                      MAXEXTENTS    9999  )
      PARTITION C;

CREATE TABLE SAMPLES (
      ORIGNO                  NUMBER          (5,0)           NOT NULL,
      SAMPNO                  CHAR            (16)            NOT NULL,
      FIELDNO                 CHAR            (16),
      STRATGROUP              CHAR            (64),
      SUBGROUP                CHAR            (64),
      STRATUNIT               CHAR            (64),
      STRATMEMBER             CHAR            (64),
      STRATHEIGHT             NUMBER          (8,2),
      MAPSYMBOL               CHAR            (10),
      ROCKNO                  NUMBER          (5,0),
      LITHOLOGY               CHAR            (64),
      GROUPING                CHAR            (22),
      AGE                     CHAR            (64),
      REFNO1                  NUMBER          (5,0),
      REFNO2                  NUMBER          (5,0),
      REFNO3                  NUMBER          (5,0),
      REFNO4                  NUMBER          (5,0),
      REFNO5                  NUMBER          (5,0),
      COUNTRYID               CHAR            (22),
      STATE                   CHAR            (10),
      REGIONO                 NUMBER          (5,0),
      GEOGAREA                CHAR            (64),
      LOCALITY                CHAR            (64),
      MAPNO                   NUMBER          (5,0),
      AIRPHOTO                CHAR            (22),
      GRIDREF                 CHAR            (10),
      DLAT                    NUMBER          (8,6),
      NS                      CHAR            (1),
      DLONG                   NUMBER          (9,6),
      EW                      CHAR            (1),
      DRILLHOLE               CHAR            (22),
      DEPTH                   CHAR            (10),
      OTHERDATA               CHAR            (64),
      ENTRYDATE               DATE                                    )
SPACE SPACE_GCSAMPLES;
CREATE UNIQUE INDEX ORIGSAMP ON SAMPLES ( ORIGNO, SAMPNO );
CREATE        INDEX SAMPLENO ON SAMPLES ( SAMPNO );
CREATE        INDEX REGIONS ON SAMPLES ( REGIONO );
```

```
CREATE          INDEX HMAPS ON SAMPLES ( MAPNAME );
```

A2.2 Samplesplits Table description:

```
CREATE SPACE DEFINITION SPACE_GCSPLITS
      DATAPAGES    ( INITIAL        500,
                     INCREMENT      250,
                     MAXEXTENTS     9999,
                     PCTFREE        25    )
      INDEXPAGES   ( INITIAL        150,
                     INCREMENT      100,
                     MAXEXTENTS     9999  )
      PARTITION C;

CREATE TABLE SAMPLES (
      ORIGNO                    NUMBER          (5,0)          NOT NULL,
       SAMPNO                   CHAR            (16)           NOT NULL,
      SAMPTYPENO                NUMBER          (5,0)          NOT NULL,
      STOREBOXNO                NUMBER          (5,0)          )
SPACE SPACE_GCSPLITS;

CREATE INDEX SAMPORIG ON SAMPLESPLITS  ( ORIGNO, SAMPLENO  ) ;
CREATE INDEX SPLITYPE ON SAMPLESPLITS  ( SAMPTYPENO  ) ;
```

A2.3 Majors Table description:

```
CREATE SPACE DEFINITION SPACE_GCMAJORS
      DATAPAGES    ( INITIAL        1000,
                     INCREMENT      400,
                     MAXEXTENTS     9999,
                     PCTFREE        10    )
      INDEXPAGES   ( INITIAL        200,
                     INCREMENT      100,
                     MAXEXTENTS     9999  )
      PARTITION C;

CREATE TABLE MAJORS (
      ORIGNO                    NUMBER          (5,0)          NOT NULL,
      SAMPNO                    CHAR            (16)           NOT NULL,
      ANALNO                    NUMBER          (5,0)          NOT NULL,
      SOURCENO                  NUMBER          (5,0),
      METHODNO                  NUMBER          (5,0),
      SIO2                      NUMBER          (4,2),
      TIO2                      NUMBER          (4,2),
      AL2O3                     NUMBER          (4,2),
      FE2O3TOT                  NUMBER          (4,2),
      FE2O3                     NUMBER          (4,2),
      FEO                       NUMBER          (4,2),
      MNO                       NUMBER          (4,2),
      MGO                       NUMBER          (4,2),
      CAO                       NUMBER          (4,2),
      NA2O                      NUMBER          (4,2),
      K2O                       NUMBER          (4,2),
      P2O5                      NUMBER          (4,2),
      H2OPLUS                   NUMBER          (4,2),
```

```
    H2OMIN                  NUMBER      (4,2),
    CO2                     NUMBER      (4,2),
    LOI                     NUMBER      (4,2),
    REST                    NUMBER      (4,2),
    TOTAL                   NUMBER      (5,2),
    ENTRYDATE               DATE                    )
SPACE SPACE_GCMAJORS;

CREATE UNIQUE INDEX  MANALNO  ON  MAJORS ( ANALNO );
CREATE         INDEX  MORIGSAMP  ON  MAJORS ( ORIGNO, SAMPNO);
CREATE         INDEX  MSAMPLENO  ON  MAJORS ( SAMPNO );
```

A2.4 Traces Tables Description:

```
CREATE SPACE DEFINITION SPACE_GCTRACES
    DATAPAGES    ( INITIAL      1200,
                   INCREMENT    400,
                   MAXEXTENTS   9999,
                   PCTFREE      30     )
    INDEXPAGES   ( INITIAL      200,
                   INCREMENT    100,
                   MAXEXTENTS   9999   )
    PARTITION C;


CREATE TABLE TRACES     (
    ORIGNO                  NUMBER      (5,0)       NOT NULL,
    SAMPNO                  CHAR        (16)        NOT NULL,
    ANALNO                  NUMBER      (5,0)       NOT NULL,
    SOURCENO                NUMBER      (5,0),
    METHODNO                NUMBER      (5,0),
    AG                      NUMBER      (8,2),
    AL                      NUMBER      (8,2),
    ARS                     NUMBER      (8,2),
    AU                      NUMBER      (8,2),
    B                       NUMBER      (8,2),
    BA                      NUMBER      (8,2),
    BE                      NUMBER      (8,2),
    BI                      NUMBER      (8,2),
    BR                      NUMBER      (8,2),
    C                       NUMBER      (8,2),
    CA                      NUMBER      (8,2),
    CD                      NUMBER      (8,2),
    CE                      NUMBER      (8,2),
    CL                      NUMBER      (8,2),
    CO                      NUMBER      (8,2),
    CR                      NUMBER      (8,2),
    CS                      NUMBER      (8,2),
    CU                      NUMBER      (8,2),
    DY                      NUMBER      (8,2),
    ER                      NUMBER      (8,2),
    EU                      NUMBER      (8,2),
    F                       NUMBER      (8,2),
    FE                      NUMBER      (8,2),
    GA                      NUMBER      (8,2),
```

```
    GE                      NUMBER          (8,2),
    GD                      NUMBER          (8,2),
    HF                      NUMBER          (8,2),
    HG                      NUMBER          (8,2),
    HO                      NUMBER          (8,2),
    IR                      NUMBER          (8,2),
    K                       NUMBER          (8,2),
    LA                      NUMBER          (8,2),
    LI                      NUMBER          (8,2),
    LU                      NUMBER          (8,2),
    MG                      NUMBER          (8,2),
    MN                      NUMBER          (8,2),
    MO                      NUMBER          (8,2),
    NA                      NUMBER          (8,2),
    NB                      NUMBER          (8,2),
    ND                      NUMBER          (8,2),
    NI                      NUMBER          (8,2),
    OS                      NUMBER          (8,2),
    P                       NUMBER          (8,2),
    PB                      NUMBER          (8,2),
    PD                      NUMBER          (8,2),
    PR                      NUMBER          (8,2),
    PT                      NUMBER          (8,2),
    RB                      NUMBER          (8,2),
    S                       NUMBER          (8,2),
    SB                      NUMBER          (8,2),
    SE                      NUMBER          (8,2),
    SC                      NUMBER          (8,2),
    SI                      NUMBER          (8,2),
    SM                      NUMBER          (8,2),
    SN                      NUMBER          (8,2),
    SR                      NUMBER          (8,2),
    TA                      NUMBER          (8,2),
    TB                      NUMBER          (8,2),
    TE                      NUMBER          (8,2),
    TI                      NUMBER          (8,2),
    TH                      NUMBER          (8,2),
    TL                      NUMBER          (8,2),
    TM                      NUMBER          (8,2),
    U                       NUMBER          (8,2),
    V                       NUMBER          (8,2),
    W                       NUMBER          (8,2),
    Y                       NUMBER          (8,2),
    YB                      NUMBER          (8,2),
    ZN                      NUMBER          (8,2),
    ZR                      NUMBER          (8,2),
    ENTRYDATE               DATE      )
SPACE SPACE_GCTRACES;

CREATE UNIQUE INDEX  TANALNO   ON  TRACES ( ANALNO );
CREATE         INDEX  TORIGSAMP  ON TRACES ( ORIGNO, SAMPNO );
CREATE         INDEX  TSAMPLENO  ON  TRACES ( SAMPNO );
```

A2.5 ppb Table Description (elements in parts per billion):

```
CREATE SPACE DEFINITION SPACE_GSMALL
      DATAPAGES    ( INITIAL      50,
                     INCREMENT    50,
                     MAXEXTENTS   9999,
                     PCTFREE      25    )
      INDEXPAGES   ( INITIAL      20,
                     INCREMENT    12,
                     MAXEXTENTS   9999  )
      PARTITION C;

CREATE TABLE PPB     (
      ORIGNO                     NUMBER        (5,0)          NOT NULL,
      SAMPNO                     CHAR          (16)           NOT NULL,
      ANALNO                     NUMBER        (5,0)          NOT NULL,
      SOURCENO                   NUMBER        (5,0),
      METHODNO                   NUMBER        (5,0),
      SE                         NUMBER        (8,3),
      RB                         NUMBER        (8,3),
      RU                         NUMBER        (8,3),
      RH                         NUMBER        (8,3),
      PD                         NUMBER        (8,3),
      AG                         NUMBER        (8,3),
      CS                         NUMBER        (8,3),
      LA                         NUMBER        (8,3),
      CE                         NUMBER        (8,3),
      PR                         NUMBER        (8,3),
      ND                         NUMBER        (8,3),
      PM                         NUMBER        (8,3),
      SM                         NUMBER        (8,3),
      EU                         NUMBER        (8,3),
      GD                         NUMBER        (8,3),
      TB                         NUMBER        (8,3),
      DY                         NUMBER        (8,3),
      HO                         NUMBER        (8,3),
      ER                         NUMBER        (8,3),
      TH                         NUMBER        (8,3),
      YB                         NUMBER        (8,3),
      LU                         NUMBER        (8,3),
      RE                         NUMBER        (8,3),
      OS                         NUMBER        (8,3),
      IR                         NUMBER        (8,3),
      PT                         NUMBER        (8,3),
      AU                         NUMBER        (8,3),
      ENTRYDATE                  DATE                         )

CREATE UNIQUE INDEX  PPBANALNO     ON PPB   ( ANALNO );
CREATE        INDEX  PPBORIGSAMP   ON PPB   ( ORIGNO, SAMPNO );
CREATE        INDEX  PPBSAMPLENO   ON PPB   ( SAMPNO );
```

A2.6 Rocktypes Table Description:

```
CREATE SPACE DEFINITION SPACE_GSMALL
      DATAPAGES    ( INITIAL      50,
                     INCREMENT    50,
```

```
                    MAXEXTENTS  9999,
                    PCTFREE     25    )
    INDEXPAGES  (   INITIAL     20,
                    INCREMENT   12,
                    MAXEXTENTS  9999  )
    PARTITION C;

CREATE TABLE ROCKTYPES (
    ROCKNO                  NUMBER      (5,0)       NOT NULL,
    ROCKTYPE                CHAR        (64)        NOT NULL  )
SPACE SPACE_GCSMALL;
```

A2.7 References Table Description:

```
CREATE SPACE DEFINITION SPACE_GSMALL
    DATAPAGES   (   INITIAL     50,
                    INCREMENT   50,
                    MAXEXTENTS  9999,
                    PCTFREE     25    )
    INDEXPAGES  (   INITIAL     20,
                    INCREMENT   12,
                    MAXEXTENTS  9999  )
    PARTITION C;

CREATE TABLE REFERENCES(
    REFNO                   NUMBER      (5,0)       NOT NULL,
    OTHERID                 CHAR        (16)
    USERNAME                CHAR        (16)
    AUTHORS                 CHAR        (128)
    YEAR                    CHAR        (16)
    TITLE                   CHAR        (240)
    SOURCE                  CHAR        (240)       )
SPACE SPACE_GCSMALL;

CREATE UNIQUE INDEX REFNUMBER  ON REFERENCES  ( REFNO );
CREATE UNIQUE INDEX REFUNIQUE  ON REFERENCES  ( AUTHORS, YEAR );
```

A2.8 Originators Table Description:

```
CREATE SPACE DEFINITION SPACE_GSMALL
    DATAPAGES   (   INITIAL     50,
                    INCREMENT   50,
                    MAXEXTENTS  9999,
                    PCTFREE     25    )
    INDEXPAGES  (   INITIAL     20,
                    INCREMENT   12,
                    MAXEXTENTS  9999  )
    PARTITION C;

CREATE TABLE ORIGINATORS (
    ORIGNO                  NUMBER      (5,0)       NOT NULL,
    ORIGINATOR              CHAR        (22)        NOT NULL  )
SPACE SPACE_GCSMALL;

CREATE UNIQUE INDEX ORIGNOS ON ORIGINATORS ( ORIGNO );
```

```
CREATE UNIQUE INDEX ORIGINS ON ORIGINATORS ( ORIGNATOR );
```

A2.9 Regions Table Description:

```
CREATE SPACE DEFINITION SPACE_GSMALL
      DATAPAGES     ( INITIAL          50,
                      INCREMENT        50,
                      MAXEXTENTS       9999,
                      PCTFREE          25     )
      INDEXPAGES    ( INITIAL          20,
                      INCREMENT        12,
                      MAXEXTENTS       9999   )
      PARTITION C;

CREATE TABLE REGIONS (
      REGIONO                    NUMBER          (5,0)          NOT NULL,
      REGION                     CHAR            (64)           NOT NULL )
SPACE SPACE_GCSMALL;

CREATE UNIQUE INDEX REGIONO     ON REGIONS ( REGIONO );
CREATE UNIQUE INDEX REGIONAME ON REGIONS ( REGION );
```

A2.10 HMAPS Table Description:

```
CREATE SPACE DEFINTION HMAPS
      DATAPAGES     ( INITIAL          50
                      INCREMENT        10
                      MAXEXTENTS       9999,
                      PCTFREE          10     )
      INDEXPAGES    ( INITIAL          20
                      INCREMENT        10
                      MAXEXTENTS       9999   )
      PARTITION C;

CREATE TABLE HMAPS (
      HMAPNO                     NUMBER          (4,0)
      HMAPID                     CHAR            (4)
      QMAPNO                     NUMBER          (2,0)
      N_LAT                      NUMBER          (3,1)
      W_LONG                     NUMBER          (4,1)
      MEAST                      NUMBER          (6)
      MNORTH                     NUMBER          (7)
SPACE SP_LOCAL

CREATE UNIQUE INDEX HMAPNO      ON HMAPS   ( HMAPNO );
CREATE        INDEX HMAPNAME    ON HMAPS   ( HMAPNAME );
CREATE        INDEX NLAT        ON HMAPS   ( N_LAT );
CREATE        INDEX WLONG       ON HMAPS   ( W_LONG );
```

A2.11 Sampletypes Table Description:

```
CREATE SPACE DEFINITION SPACE_GSMALL
      DATAPAGES     ( INITIAL          50,
                      INCREMENT        50,
                      MAXEXTENTS       9999,
                      PCTFREE          25     )
      INDEXPAGES    ( INITIAL          20,
```

```
                    INCREMENT     12,
                    MAXEXTENTS    9999   )
    PARTITION C;

CREATE TABLE SAMPLETYPES (
    SAMPLETYPENO                  NUMBER          (5,0)          NOT NULL,
    SAMPLETYPE                    CHAR            (64)           NOT NULL )
SPACE SPACE_GCSMALL;
```

A2.12 Sources Table Description:

```
CREATE SPACE DEFINITION SPACE_GSMALL
    DATAPAGES     ( INITIAL     50,
                    INCREMENT   50,
                    MAXEXTENTS  9999,
                    PCTFREE     25    )
    INDEXPAGES    ( INITIAL     20,
                    INCREMENT   12,
                    MAXEXTENTS  9999  )
    PARTITION C;

CREATE TABLE SOURCES (
    SOURCENO                      NUMBER          (5,0)          NOT NULL,
    SOURCE                        CHAR            (64)           NOT NULL )
SPACE SPACE_GCSMALL;

CREATE UNIQUE INDEX SOURCENOS ON SOURCES ( SOURCENO );
CREATE UNIQUE INDEX SOURCES  ON SOURCE ( SOURCE );
```

A2.13 Methods Table Description:

```
CREATE SPACE DEFINITION SPACE_GSMALL
    DATAPAGES     ( INITIAL     50,
                    INCREMENT   50,
                    MAXEXTENTS  9999,
                    PCTFREE     25    )
    INDEXPAGES    ( INITIAL     20,
                    INCREMENT   12,
                    MAXEXTENTS  9999  )
    PARTITION C;

CREATE TABLE SOURCES (
    SOURCENO                      NUMBER          (5,0)          NOT NULL,
    SOURCE                        CHAR            (64)           NOT NULL )
SPACE SPACE_GCSMALL;

CREATE UNIQUE INDEX METHODNO ON METHODS ( METHODNO );
CREATE UNIQUE INDEX METHOD  ON METHODS ( METHOD);
```

A2.14 Storeboxes Table Description:

```
CREATE SPACE DEFINITION SPACE_GSMALL
    DATAPAGES     ( INITIAL     50,
                    INCREMENT   50,
                    MAXEXTENTS  9999,
                    PCTREE      25    )
    INDEXPAGES    ( INITIAL     20,
```

```
                    INCREMENT    12,
                    MAXEXTENTS   9999   )
    PARTITION C;

CREATE TABLE SOURCES (
    SOURCENO                NUMBER          (5,0)          NOT NULL,
    SOURCE                  CHAR            (64)           NOT NULL )
SPACE SPACE_GCSMALL;

CREATE UNIQUE INDEX STOREBOXNOS ON STOREBOXES ( BOXNO );
```

A2.15 Maxnos Table Description:

```
CREATE SPACE DEFINITION SPACE_GSMALL
    DATAPAGES    ( INITIAL      50,
                   INCREMENT    50,
                   MAXEXTENTS   9999,
                   PCTFREE      25    )
    INDEXPAGES   ( INITIAL      20,
                   INCREMENT    12,
                   MAXEXTENTS   9999   )
    PARTITION C;

CREATE TABLE SOURCES (
    SOURCENO                NUMBER          (5,0)          NOT NULL,
    SOURCE                  CHAR            (64)           NOT NULL )
SPACE SPACE_GCSMALL;
```