AGSO

USER'S GUIDE TO THE OZMIN MINERAL DEPOSITS DATABASE

by

G.R. Ewers & R.J. Ryburn

RECORD 1993/94

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AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

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ABSTRACT

OZMIN is a new mineral deposit database which has been developed in AGSO for use in the National Geoscience Mapping Accord and in national metallogenic research. OZMIN has been structured so that attribute data can be retrieved and analysed in relation to spatial data contained in a geographic information system (GIS). It utilises the ORACLE relational database system. This Record provides the necessary documentation for users to access and enter data specific to mineral deposits, prospects, and occurrences; their host rocks; and important features of their geological setting. The Record explains the relationship of OZMIN to other AGSO relational databases, the attributes used in the database and their legal values. It also describes the various screen forms used in the database and provides information on those corporate authority tables commonly accessed by OZMIN.

1 - INTRODUCTION

This record provides essential documentation for a new mineral deposit database (OZMIN) that is being developed by AGSO (formerly BMR) to meet the needs of the National Geoscience Mapping Accord (NGMA, Jaques, 1992). OZMIN represents a refinement of BMR's original mineral deposits database (MINDEP) in as much as it contains many of the original attributes. However, the complexity and all embracing nature of MINDEP meant that BMR could not hope to maintain, let alone expand, the database with the available resources. Further, although many of the attributes in MINDEP did provide for structured responses, the use of free form text fields led to much information being entered in an unstructured form that was not amenable to query and therefore was incapable of use in a geographic information system (GIS).

OZMIN is more tightly structured so that, for a given attribute, the user can select from a list of legal values (domain) contained in an authority or reference table. Unstructured free form text fields have been discouraged and kept to a minimum. The effect of these changes has been to simplify the database to one which can be supported, to standardise entries by different users, and to make interrogation of the database more effective.

The attributes selected for OZMIN have been restricted to those of key importance to maintain simplicity and to avoid a database that is complex in design, maintenance, and operation. For example, ownership of deposits could be regarded as a desirable attribute, but this has not been included at this time because of the anticipated high demand on resources to retain currency for this information. However, the design of the database allows the addition of further attributes without the need to restructure. It should be emphasised that most of the attributes relating to deposits, prospects, and mineral occurrences are essentially point or deposit specific data, rather than polygon data more appropriate to Authorities to Prospect and mineral leases.

Two main applications for the database are envisaged at this stage. These are:

1. Reporting from the database - this could take the form of a complete printout of all information on a given deposit, or selective reporting based on interrogation of the database. The selective retrieval of data may take the form of a simple query (for example, which deposits occur in the Koolpin Fm?) or more complex queries (for example, which gold deposits are associated with carbonaceous shale in the Koolpin Fm?).

2. Linkage to geographic information systems (GIS) - attribute data in the mineral deposit database could be retrieved and analysed in relation to spatial data contained in a GIS. This attribute data would provide further layers of information and could be incorporated into thematic maps generated in a GIS.

2 - STRUCTURE OF OZMIN

OZMIN is one of a family of NGMA databases that have been developed by AGSO using Oracle's relational database management software on a DG AViiON UNIX platform. It's relationship to other NGMA field and laboratory databases is illustrated in Figure 1.

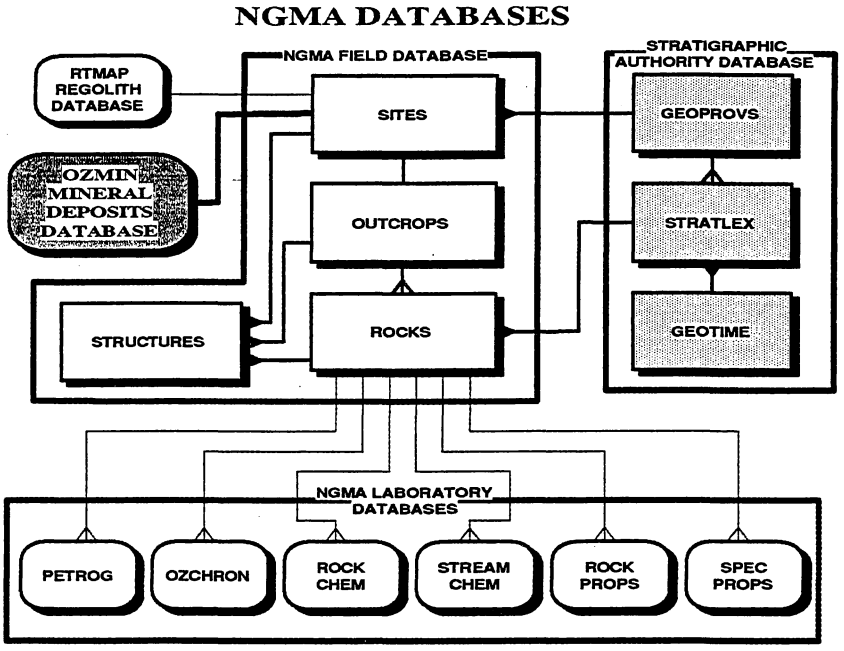

Figure 1 Simplified structure of AGSO's field and laboratory database system

Including the SITES table, which is also a part of the NGMA Field Database, OZMIN has 8 main data tables - those owned by OZMIN include DEPOSITS, DEPOSDATA, COMMODS, REGROCKS, REGROCKDATA, REGSTRUCT, and DEPOSREFS. The relationships between these tables are illustrated in Figure 2 together with those authority tables used to validate the classifications and nomenclature used in the main tables.

Locational data for deposit and occurrence are stored in the SITES table which standardises the way point data is recorded and ensures that the accuracy and lineage of coordinates are noted. The other tables are unique to OZMIN and contain data specific to the deposit, its host rocks, and the environment of the deposit (i.e. information about major structures and igneous bodies and their proximity to the deposit).

OZMIN MINERAL DEPOSITS DATABASE

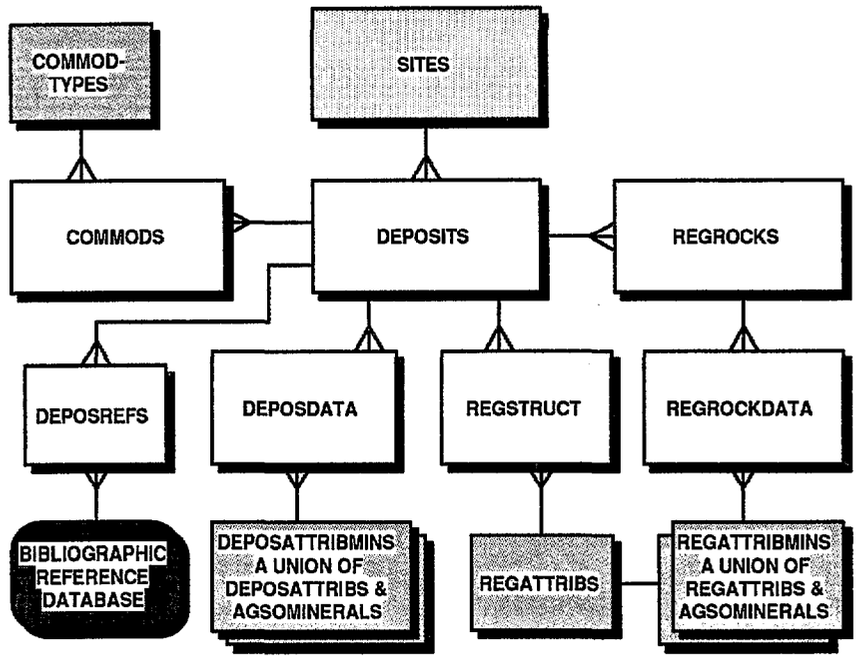

Figure 2 The structure of OZMIN showing the relationships between tables, with 'crows feet' at the 'many' end of the many-to-one links. The look-up tables associated with the SITES table are not shown.

Where necessary OZMIN draws on information contained in AGSO corporate authority tables listed below:

TABLE NAME	CONTENTS	CUSTODIAN
NGMA.AGSOCOUNTRIES	list of valid countries	Rod Ryburn
NGMA.AGSOMINERALS	mineral names	Morrie Duggan
NGMA.AGSOSTATES	list of valid Australian States	Rod Ryburn
NGMA.HMAPS	Australian 1:100 000 map sheets	Murray Hazell
NGMA.LITHNAMES	lithological names	Jan Knutson
NGMA.LOCMETHODS	spatial location methods	Richard Blewett
NGMA.FIELDREFS	bibliographic references	various
NGMA.ORIGINATORS	contributors of data	Murray Hazell
NGMA.QMAPS	Australian 1:250 000 map sheets	Murray Hazell
STRATA.GEOPROVS	Australian geological provinces	Dave Palfreyman
STRATA.GEOTIME	geological time scale	John Laurie
STRATA.STRATLEX	Australian stratigraphic names	Cathy Brown

As a general rule, only the designated custodians are permitted to change the data in these tables. Full definitions of all tables, sequences, indexes and views used by OZMIN are given in Appendix A.

Data can be entered into OZMIN either directly using the screen forms or by compiling information onto copies of the OZMIN data recording forms (Appendix B) for later entry into the database.

3 - SITE 'NUMBERING'

For the purpose of location on a map we assume that all mineral deposits or occurrences in OZMIN can be represented by a point recorded in the NGMA.SITES table. For large deposits plotted on detailed maps this may not be strictly true, but in this case the centroid of the deposit is what is recorded in the SITES table.

With the help of an Originator Number (ORIGNO) the NGMA.SITES and OZMIN.DEPOSITS tables maintain original site IDs. If all sites were AGSO's and had unique IDs, then the site ID would be sufficient on its own. However, the SITES table is also intended for data provided by universities, State geological surveys, companies and private individuals, all of whom use their own systems. Originator Numbers are needed to maintain uniqueness amongst diverse 'numbering' systems. The names of originators are recorded against their numbers only in the NGMA.ORIGINATORS authority table. An Originator Number of 93, for example, corresponds to SADME - the South Australian Department of Mines and Energy. The originator is the person, organisation, or database primarily responsible for the data. For OZMIN, this could be the person who observed the mineral deposit or occurrence at the site, the database from which the information has been sourced (e.g. MINDEP, MINOCC, etc), or an author of a published description.

A site in the SITES table is fully identified only by a unique combination of Originator Number and Site ID (SITEID), the latter being any sequence of numbers and letters up to 16 characters long. For the Kidston deposit, where the information has been sourced from MINDEP and has the deposit number 97, it is uniquely identified in OZMIN as 'MINDEP 97'. In the SITES table the uniqueness of an Originator Number/Site ID combination is enforced by a unique index that spans both of these fields.

4 - SECURITY AND ACCESS

SELECT-ONLY DATABASE ACCESS

AGSO's Oracle production environment allows internal AGSO users select-only access to the main data tables in the OZMIN Database. The menu system provides 'read-only' versions of the forms that allow internal users to retrieve all data in the databases, but not to insert, update or delete data. Users also have select-only access to all validation tables. When in SQL*Plus, all users may select data from tables provided they add the owner's name 'OZMIN.' to the front of a table or view name. For example:

SELECT NAME FROM OZMIN.DEPOSITS WHERE FIELDCHECKED = 'N';

Remember that not all tables are owned by OZMIN. The SITES table and most of its associated lookup tables are owned by NGMA. All tables in the Stratigraphic Authority Database, including STRATLEX, GEOPROVS and GEOTIME, are owned by STRATA.

INSERT, UPDATE AND DELETE ORACLE ACCESS

In the production environment, internal Oracle users can add, change or delete their own data. This is accomplished via the following named views and their respective base tables:

BASE TABLE	INSERT/UPDATE VIEW
NGMA.SITES	NGMA.USITES
NGMA.OUTCROPS	NGMA.UOUTCROPS
NGMA.STRUCTURES	NGMA.USTRUCTURES
NGMA.ROCKS	NGMA.UROCKS
NGMA.LITHDATA	NGMA.ULITHDATA

In SQL*Forms all 'Insert/Update' forms cover the above views. The restrictions applying to the above views are the same in each case. For example, the view UDEPOSITS of the SITES tables is defined as:

CREATE VIEW UDEPOSITS AS SELECT * FROM DEPOSITS WHERE ENTEREDBY = USER;

The word ***USER*** in the above statement is an Oracle function that returns the current user ID. Each of the above tables has the mandatory field ENTEREDBY for the username of the person entering the data. This scheme guarantees that the users see only their own records, and only they (and the data custodians) can alter or delete them. Users wishing to use SQL*Plus to insert, update or delete records in the above main tables (or SQL*Loader to load records from an ASCII file) must use the above views.

CUSTODIANS' ACCESS PRIVILEGES

Custodians have been given appropriate access privileges to the data or authority tables that they administer. They may select, insert, update and delete all data in these tables via screen forms or from SQL*Plus. They cannot drop tables or alter the structure of tables.
Custodians must use the 'read-only' forms to insert, update and delete rows in tables. This is because their access privileges apply to the base tables, not to the views of the tables. The 'insert-update' forms do not allow them to retrieve records they do not own.

OWNER'S ACCESS RIGHTS

OZMIN has full privileges on all tables it owns in the OZMIN database, as does NGMA in the NGMA Field Database and STRATA in the Stratigraphic Authority Database.

5 - THE OZMIN DATABASE MENU SYSTEM

Access to NGMA databases is via a tree-structured menu system used to branch to OZMIN and other NGMA databases. The menu system provides access to SQL*Plus and most screen forms associated with the databases. After logging into the AViiON UNIX environment and specifying your terminal type, the NGMA Database Menu System can be run by typing -

ngma <ENTER>

This brings up the SQL*Menu login screen, and after entering your Oracle user name and password, the first menu screen is displayed. This currently appears as follows -

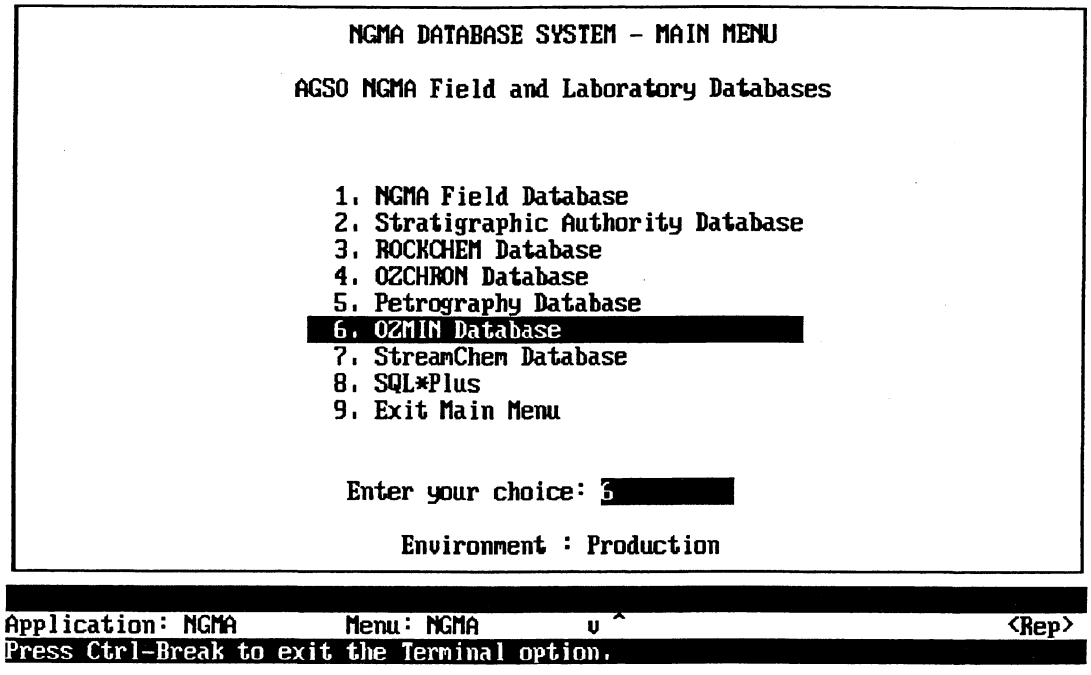

Figure 3. The Main Menu of the NGMA Database Menu System. This menu gives access to all areas of the NGMA Database System.

Selecting item **9** in the menu, or pressing the **EXIT (ALT F10, CTRL K , or F11)** function key, exits back to UNIX. Item **8** allows the user into the SQL*Plus command-line environment without having to log into Oracle again. By entering item **6**, the user can access and select those forms and appropriate authority tables available in OZMIN. These are provided in two submenus illustrated in Figures 4 and 5.

The remainder of this manual describes each of the main screen forms of the OZMIN mineral deposits database (SITES, DEPOSITS, HOST ROCKS, and DEPOSIT ENVIRONMENT), with attention being given to the purpose and definitions of all displayed fields. Each of these forms is available in 'Read-Only' or 'Insert/Update' versions. References used to compile data and the main authority tables that are unique to OZMIN are also shown in OZMIN Menu 2 (Figure 5), and access has been given also to the Stratigraphic Lexicon (STRATA.STRATLEX), the Geological Provinces (STRATA.GEOPROVS), and the Geological Time Scale (STRATA.GEOTIME). The user can exit back to the main menu of the NGMA Database Menu System by selecting 'Exit Submenu' from within OZMIN.

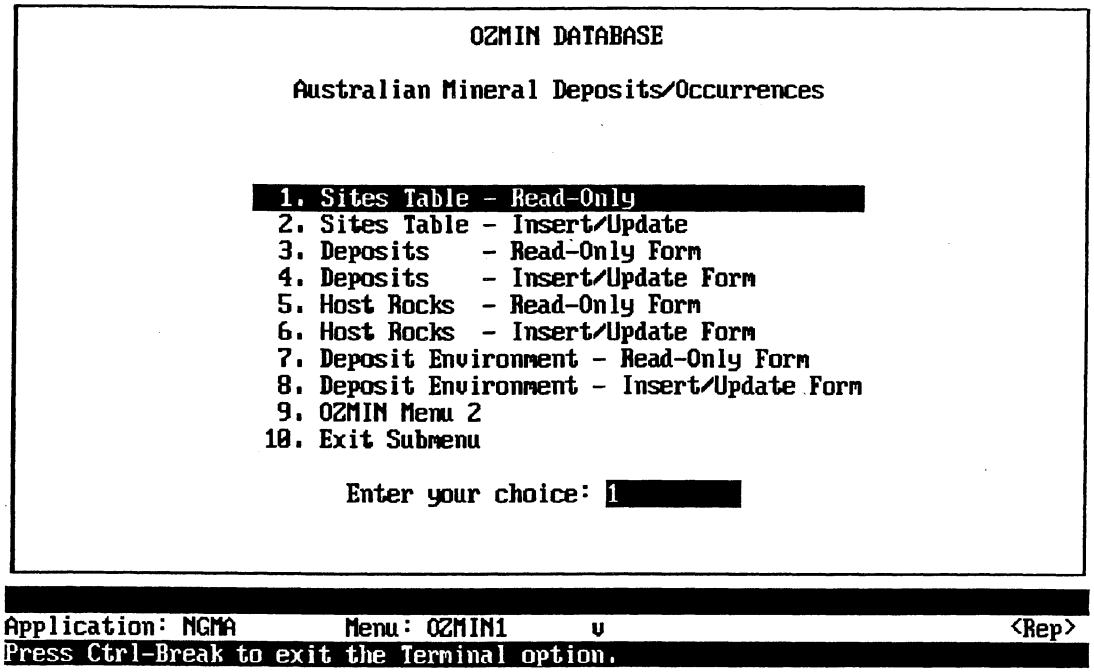

Figure 4 The OZMIN database Menu 1

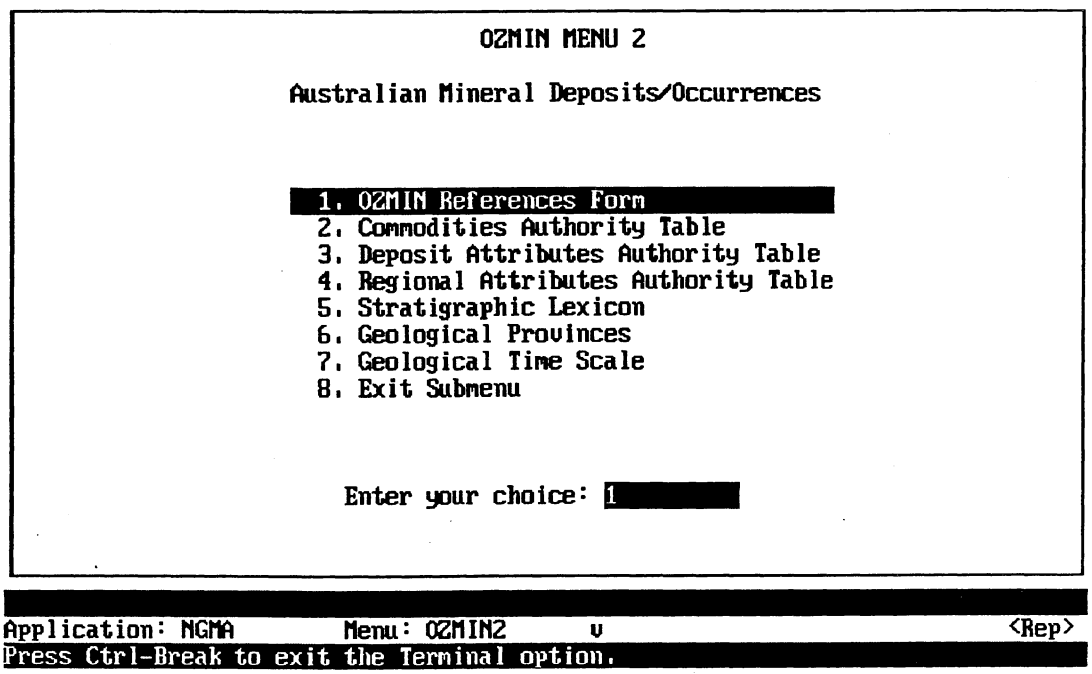

Figure 5 The OZMIN database Menu 2

6 - THE SITES FORM

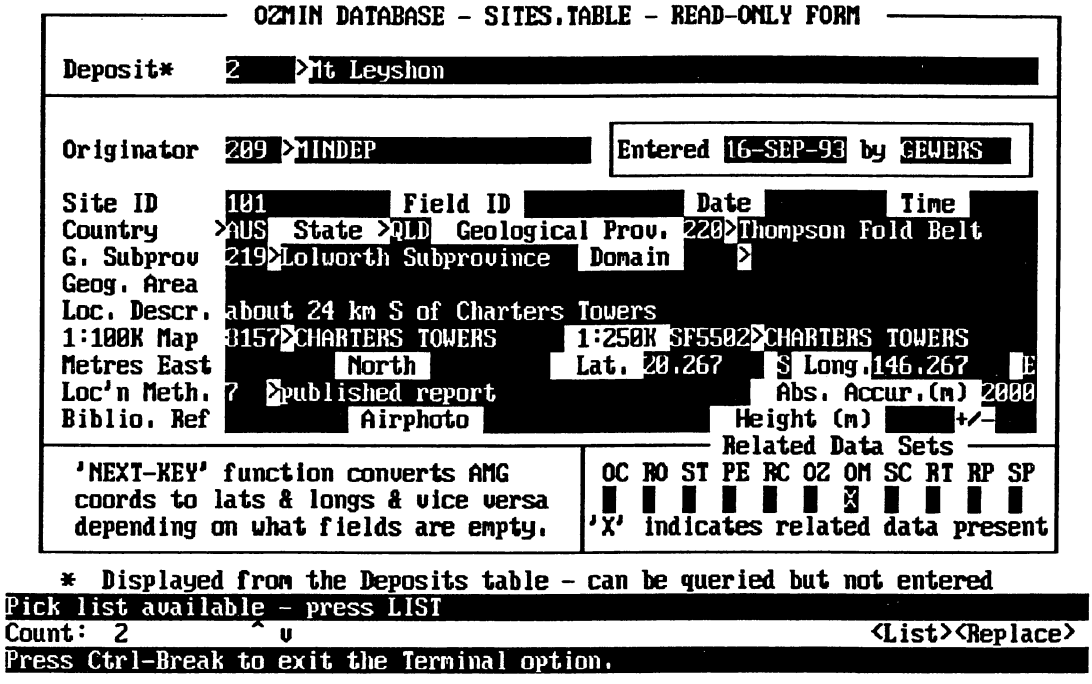

Figure 6 The SITES Form.

The NGMA.SITES table standardises the way geographic point location data are recorded in NGMA databases. The form attaches to this table but also draws on standard terms from associated look-up or authority tables. The OZMIN version of the form displays the corresponding deposit number and name from the OZMIN.DEPOSITS table, and it only displays sites records in which the 'OM' field has an 'X'. The SITES table is mainly intended for surface location data for field geological, geochemical and geophysical observations, but is used in this context for the location of a deposit, propect, or mineral occurrence.

Geographic coordinates, either as decimal latitudes and longitudes or as AMG eastings and northings, are mandatory, but the form includes a key trigger (press 'NEXT-KEY') that converts AMG coordinates to latitudes and longitudes - and *vice versa.* Also of considerable importance are the data relating to the accuracy of the coordinates and their provenance - i.e., how they were obtained. The form insists on an absolute accuracy estimate in metres on the ground - but this is often just an order-of-magnitude guestimate. Location data accurate to ±100 metres are generally OK when plotted at 1:250 000 scale, but may be too inaccurate for use at 1:50 000 scale. Similary, the method used to obtain the location coordinates is essential information. If a map was used, a reference to the exact map may also be included.

The Sites Form has fields for Country, State, Geological Province, Subprovince, Domain, 1:250 000 and 1:100 000 map sheet areas, and Airphoto. Some of these fields could be eliminated by using SQL joins between geographic coordinates in the SITES and other tables, but the procedures are cumbersome and slow in practice, and the inclusion of these attributes in the SITES table is in the interests of speed and simplicity.

In the following field definitions (and those of subsequent forms), the true name of each field is given in round brackets following the name used in the form. In the interests of saving screen space the field names are often abbreviated in the forms.

Deposit - (DEPOSITS.DEPOSNO, DEPOSITS.NAME) These fields for Deposit Number and Name are not part the SITES table - they are derived from the OZMIN. DEPOSITS table. These fields cannot be used to enter a new Deposit Number and Name, as this is done via the Deposits Form. Both fields can be used to query the form, or for a query on other fields (e.g., Origno, Site ID) the associated Deposit Number and Name are automatically displayed. For the name field a pop-up list of Deposits is seen on pressing ***LIST***. To restrict the resulting list, first enter the initial two or three letters of the Deposit Name.

Originator - (ORIGNO) A mandatory integer of up to 5 digits automatically displays the corresponding originator's name. Only the number of an originator already in the NGMA.ORIGINATORS table may be entered. A pop-up list of originators and their numbers may be viewed by pressing the LIST key - from which an originator may be selected with the ACCEPT or ENTER key. The originator is usually the person or organisation that collected the data at the site, and is also an indication of where to go for more information. The main purpose of this field is to allow the retention of any original site numbering systems.

Entered - (ENTRYDATE) This is a mandatory field for the date the current record was entered into the SITES table. This field is automatically inserted by a trigger when the record is committed. The cursor can only be placed in this field when the form is in query mode.

By - (ENTEREDBY) A mandatory field for the Oracle Owner (username) of the current record. This field is automatically inserted by a trigger when the record is first committed. The field can only be entered in query mode.

Site ID- (SITEID) This is a mandatory field of up to 16 characters for a user-supplied number or ID for the site. AGSO staff should use the AGSO registered number system. Otherwise, any combination of numbers and letters may be used but the Site ID must be unique to the originator. This is enforced by a validation trigger on the field as well as a unique index on ORIGNO plus SITEID. Even in SQL*Plus, attempts to insert records with duplicate Site IDs for the same Originator will result in the Oracle error 'duplicate value in index'.

Field ID - (FIELDID) This is an optional field of up to 16 characters for an alternative site number or ID. In the past, some AGSO field parties

used field numbering systems that were later translated in the office to AGSO registered numbers. The field numbers were marked on the back of airphotos. This field is not indexed and field numbers need not be unique.

Observation Date - (OBSDATE) The date that the field site was visited or observed is entered here in the standard Oracle date format of DD-MMM-YY - e.g. '23-JUL-92'. This is not always known for old sites, but should always be supplied with new site data.

Observation Time - (OBSTIME) The time that the field site was observed is recorded in Oracle's 24-hour format of HH:MM - e.g. '14:47'.

Country - (COUNTRYID) Mandatory 3 capital characters indicating the country or continent. Defaults to 'AUS' for Australia. Valid capital letters are those in the NGMA.AGSOCOUNTRIES table, which can be viewed as a pop-up list. With a few minor additions, the countries and abbreviations used in this table are taken from Australian Standard 2632-1983 (Standards Association of Australia, 1983). Note that the abbreviation for Antarctica is now 'ATA', not 'ANT' as before, and that INT may be used for international waters.

State - (STATE) Two or three capital letters indicating the Australian state in which the site lies. A validation trigger makes this field mandatory if Country is 'AUS', or unenterable if some other country is given. A pop-up list of valid states is available. Valid States are those in the NGMA.AGSOSTATES table, which currently has the following values -

Letters	State
ACT	Australian Capital Territory
NSW	New South Wales
NT	Northern Territory
QLD	Queensland
SA	South Australia
TAS	Tasmania
VIC	Victoria
WA	Western Australia

Geological Province - (GEOPROVNO) An integer of up to 5 digits pointing to the Geological Province in the STRATA.GEOPROVS authority table. Only geological provinces proper (i.e., those with a rank of 1) may be accessed. A pop-up list of valid geological provinces is available. This field must be entered if the Country is Australia.

Subprovince - (SUBPROVNO) As for Geological Province, but optional. Must point to a Subprovince (with a rank of 2) of the above Geological Province that is already entered in the NGMA.GEOPROVS table. A pop-up list of valid geological subprovinces is available.

Domain - (DOMAINNO) An optional field as for Subprovince, but it must point to a Domain already entered into the GEOPROVS table. A pop-up list of domains is available. A validation trigger checks to see if the Domain is correctly attributed to a Province or Subprovince.

Geographic Area - (GEOGAREA) An optional descriptive field of 64 characters for the geographic area (e.g. - valley, plain, mountain range) the site is in. Examples include 'Hey Plain', 'Tuggeranong Valley' and 'Selwyn Range'. This field is inherited from the old samples table in the PetChem Database (Ryburn, 1990) and is not controlled by any authority table. It should not be used for the names of geological provinces or features - as has often happened in the past.

Location Description - (LOCDESC) An optional descriptive field of 64 characters for additional information relating to to the site's location - e.g., '5 Km SE of Brown's Bore'. Some sites are difficult to re-occupy in the field without this kind of information.

1:100 000 Map - (HMAPNO) A 4-digit integer identifying the 1:100 000 map sheet-area on which the site falls. Mandatory if the country is Australia, otherwise it is unenterable. The name is automatically displayed from the NGMA.HMAPS table, which has over 3000 Australian 1:100 000 maps. A pop-up list is available. A valid entry will automatically insert the correct 1:250 000 Map ID.

1:250 000 Map - (QMAPID) The 6-character ID of the 1:250 000 map sheet-area on which the site falls - e.g., 'SF5402'. Mandatory if the country is Australia, otherwise it is unenterable. This field is automatically filled in when a valid 1:100 000 map is entered. The name is displayed from the NGMA.QMAPS authority table, and a pop-up list is available. Note that the first four characters identify the 1:1 000 000 map, and the first two letters in the ID record the 6^0 UTM (AMG) zone on which the map falls - essential for AMG coordinates.

Decimal Latitude - (DLAT) A positive numeric field with up to 2 digits in front of the decimal point, and up to 6 digits after the decimal point. All latitudes and longitudes must be entered in decimal degrees and must not be negative. Mandatory if an AMG northing is not entered. A validation trigger ensures that the lattitude given must lie within the given 100 000 map sheet area.

N/S - (NS) A single character field that can only take the values 'N' or 'S'. It defaults to 'S'. This field is needed because the SITES table has provision for locations in the northern hemisphere, but there are none as yet.

Decimal Longitude - (DLONG) A positive numeric field with up to 3 digits in front of the decimal point and up to 6 digits after the decimal point. Mandatory if an AMG easting is not entered. A validation trigger ensures that the longitude given must lie within the given 100 000 map sheet area.

E/W - (EW) A single character field that can only take the values 'E' or 'W'. Defaults to 'E'. There are no sites yet from the western hemisphere in the SITES table.

Metres East - (EASTING) Normally a 6-digit positive integer for the full AMG easting of the site in metres, but up to two decimal places may also be entered (a precision of ±1.0 cm on the ground). Mandatory if the country is 'AUS' and a longitude is not entered. A validation trigger checks that the easting lies within the given 1:100 000 map.

Metres North - (NORTHING) Normally a 7-digit positive integer for the full AMG northing of the site in metres, but up to two decimal places may also be entered (a precision of ±1.0 cm on the ground). Mandatory if the country is 'AUS' and a latitude is not entered. A validation trigger checks that the northing lies within the given 1:100 000 map.

Location Method - (METHOD) A mandatory integer of up to 3 digits pointing to a record in the NGMA.LOCMETHODS table showing the method used to obtain the geographic coordinates of the site. In most cases an entry in this field will automatically insert a default estimate in the Absolute Accuracy field. If a standard series map is indicated it is assumed that the map used was the most up-to-date edition at the time the observation was made. If this was not the case then a specific map, report or publication can be referenced via the Bibliographic Reference field. The LOCMETHODS table currently has the following entries -

Number	Description	Default Accuracy (±m)
0	unknown	
1	GPS observation (WGS-84)	50
2	GPS observation (AMG-66)	50
3	GPS observation (AMG-84)	50
4	GPS observation (GSA-92)	50
5	astronomical observation	
6	surveyed from ground control	
7	published report	
8	unpublished report	
10	non-standard topographic map	
11	1:25 000 topographic map	25
12	1:50 000 topographic map	50
13	1:100 000 topographic map	100
14	1:250 000 topographic map	250

15	1:500 000 topographic map	500
16	1:1 000 000 topographic map	1000
20	non-standard geological map	
21	1:25 000 geological map	25
22	1:50 000 geological map	50
23	1:100 000 geological map	100
24	1:250 000 geological map	250
25	1:500 000 geological map	500
26	1:1 000 000 geological map	1000

Bibliographic Reference - (BIBREF) A positive integer of up to 6 digits identifying a bibliographic reference in AGSO's Reference Database that locates or refers to the site. This could be a locality diagram in a publication, a non-standard published map or a map from a PhD thesis or company report. This field is provided principally as a means of recording the lineage of data about a site that has come from a second hand source. It records the provenance of the data. Note that almost any map can be treated as a bibliographic reference using the standard 'Harvard-style' of refererence notation.

Absolute Accuracy in Metres - (ACCURACY) A mandatory positive integer of up to 4 digits for the absolute accuracy of the given coordinates in metres on the ground. If a site cannot be located to better than ±10 000 meters then it should not be entered in the database! For many pre-existing sites the locational accuracy is just an order of magnitude figure, but this is still better than no estimate. For example. points measured on a map at 1:250 000 scale are generally accurate to ±1 mm on the face of the map or ±250 metres on the ground. Estimates like this are automatically supplied by the trigger in the Location Method field but these may need to be refined - depending on the particular circumstances. This field is important for assessing whether a point in the SITES table can be plotted at particular scales - it provides the table with a degree of scale independence.

The accuracy estimate should not be just the reproducibility of measurement on a map, as this is of little value in comparing results obtained by different methods. It is usually assumed that the field worker has located the point on the map as accurately as possible with respect to surrounding topographic details. Non-statistical errors, such as a point located in the wrong drainage, can only be detected - if at all - by tedious manual inspection. However, GPS measurements are increasingly being used to obtain geographic coordinates in the field and these always include precise accuracy estimates. It should be noted that where a location is taken from a report giving latitude and longitude in degrees and minutes, a variation of one minute between different sources of information is equivalent to about 1800 metres on the ground.

Airphoto - (AIRPHOTO) An optional field of 36 characters to identify the airphoto on which the site is located and/or was plotted. The field is for the name of the airphoto series, the run number and the photo number - e.g. 'Cloncurry 8/2134'. It is not a comprehensive reference to a major national airphoto database, as this is beyond AGSOs present role. AGSO geologists often wish to re-locate and re-inspect airphotos on which sites occur.

Height in Metres - (HEIGHT) An integer of up to 5 digits for the height of the site in metres above mean sea level. Can be negative. This information is not generally recorded, but it is essential for some purposes - e.g., gravity readings. The field may be useful for subsurface mine information.

± Metres - (HEIGHTACC) A positive integer of up to 3 digits for the absolute error in metres of the height entered in the previous field.

Related Data Sets - (OC, RO, ST, PE, RC, OZ, OM, SC, RT, RP, SP) Eleven single character fields that show what data sets join to the site. In all cases, OZMIN sites automatically receive an 'X' in the 'OM' field. This is accomplished by a pre-insert trigger in the form. Other than a null, only a capital 'X' is allowed in any of these fields - indicating that the related data set exists.

ID	Related Data Set
OC	OUTCROPS Table - outcrop information
RO	ROCKS Table - sample & lithology information
ST	STRUCTURES Table - Structural information
PE	PETROGRAPHY Thin Section Database
RC	ROCKCHEM Whole-Rock Chemistry Database
OZ	OZCHRON Geochronolgy Database
OM	OZMIN Mineral Deposits Database
SC	STREAMCHEM Geochemical Database
RT	RTMAP Regolith-Terrain Database
RP	ROCKPROPS Geophysical Properties Database
SP	SPECPROPS Spectral Properties Database

Although SQL*Plus can be used to determine what sites relate to what data sets, the exercise is complicated and slow, and these fields are needed for the immediate identification of related data. However, item 9 of the main menu for the NGMA Field Database has a SQL*Plus routine called 'ADDX.SQL', which automatically updates these related data set boxes from the records present in each data subset. Allow plenty of time for this process to go to completion.

7 - THE DEPOSITS FORM

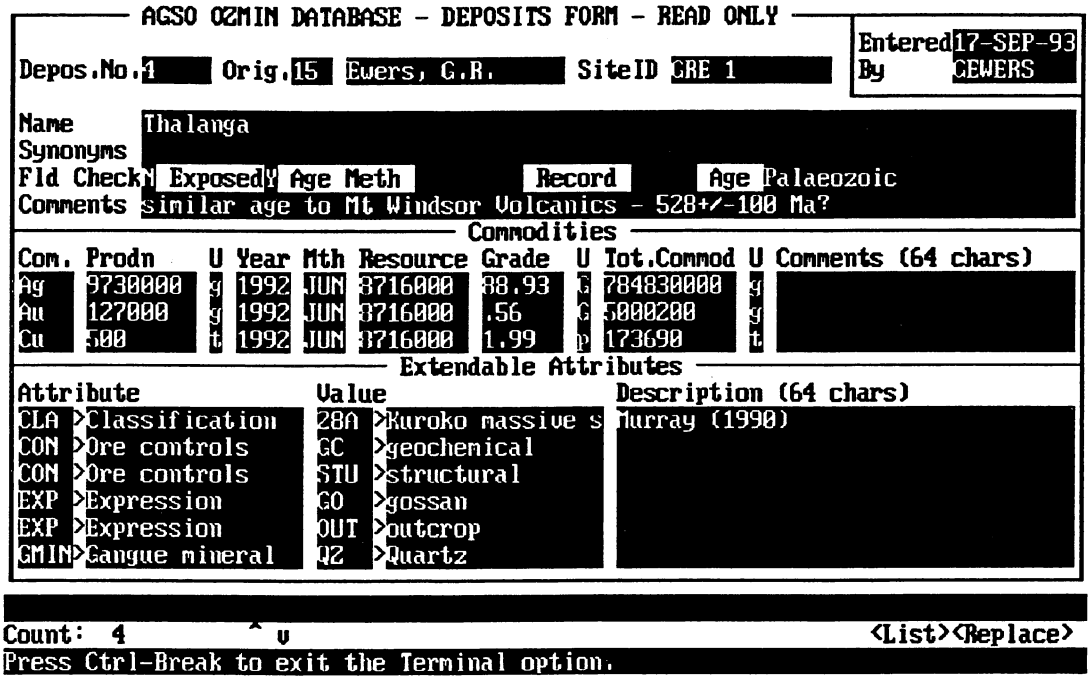

Figure 7 The DEPOSITS Form

The Deposits Form summarises data that is specific to a deposit. Information concerned with the host rocks to the deposit, igneous rocks that may be genetically related to the deposit, and regional structural features that are proximal to the deposit are dealt with in the Host Rocks and Deposit Environment Forms.

The Deposits Form is divided into three 'blocks' corresponding to the DEPOSITS, COMMODITIES and DEPOSDATA tables. These are linked by a common deposit number (DEPOSNO) which is the primary key in the DEPOSITS table. The COMMODITIES and DEPOSITS tables both have a many-to-one relationships with the DEPOSITS table. The DEPOSITS table shares the Originator and Site ID fields with the SITES table and it can thus have a many-to-one relationship with SITES. Although a one-to-one relationship is the norm, it is worth remembering that several deposits can theoretically occur at the one site (e.g. one deposit may lie beneath another).

Most of the attribute data presented in the Deposits Form has been tightly structured so that it can be searched readily. For a given attribute, 'unknown' (UN) is a legal value included in most tables. This value is important because it acknowledges that a particular attribute has been addressed and that the necessary information was found to be unavailable. For example, 'unknown' allows a distinction to be drawn between an absence of structural modification (SMO) to a deposit (i.e. no entry is made in this case) and an absence of information as to whether there has been modification (i.e. recorded as 'unknown').

The definitions and purposes of the fields displayed on the form are as follows:

Deposit Number - (DEPOSNO) Mandatory positive integer of up to 7 digits. The number is unique to the deposit and is assigned sequentially by the form starting from 1. The field can only be entered by the user in query mode. This field provides a common linkage between all OZMIN tables.

Originator - (ORIGNO) As for the Sites Form.

Site ID - (SITEID) As for the Sites Form.

Entered - (ENTRYDATE) As for the Sites Form.

By - (ENTEREDBY) As for the Sites Form.

Name - (NAME) An 80-character field that stores the preferred name of the mineral occurrence, prospect, or deposit as recorded on a map or other source reference. "UNNAMED" must be entered where an occurrence/deposit has not been named.

Synonyms - (SYNONYMS) An 80-character field that stores any alternative names that may have been given to the occurrence/deposit.

Field Checked - (FIELDCHECKED) A single character field seeking a yes (Y) or no (N) response and signifying whether the compiled data has been validated by field checking.

Exposed - (EXPOSED) A single character field seeking a yes (Y) or no (N) response to indicate whether the deposit/occurrence is exposed at the surface (e.g. Mout Isa) or concealed by cover rocks (e.g. Olympic Dam).

Age Method - (AGEMETHOD) An 8 character field that enables the user to enter the geochronological method used to supply (where available) the *preferred* age of mineralisation. Legal values are K-Ar, Ar-Ar, Rb-Sr, Sm-Nd, U-Pb, and SHRIMP (these correlate with those methods covered by the AGSO geochronological database, OZCHRON). If more than one method has been used to date the deposit, the user can record this further information in the Comments field at the end of the block on this form.

Record - (OZCHRONREC) A 6-digit field for the record number in the OZCHRON table indicated by Age Method. This record contains detailed geochronological information (where such information is available) on the preferred age of the mineralisation. If multiple records are available in OZCHRON the user can record this further information in the Comments field at the end of the block on this form.

Age - (AGE) A 32 character field that (preferably) records the absolute numerical age (e.g. 320 Ma), or alternatively the descriptive relative age of mineralisation (e.g., 'Paleo-proterozoic'). If the latter, then a validation trigger ensures that only terms held held in the STRATA. GEOTIME authority table can be entered. A pop-up list of valid time terms from this table may be obtained by pressing the LIST key. Where an absolute age can be given, the previous two fields provide the capacity to cross reference with the OZCHRON database.

Comments - (COMMENTS) This field is provided as an optional 255-character text field to allow the user to enter information on the deposit which is deemed to be important and which cannot be entered into any or the other provided fields. A text entry and editing box for this field may be activated by pressing the EDIT key. This field should not be treated as an alternative to providing responses in the other fields on this form - as a free text field, it ensures that important information not easily categorised is recorded, but its unstructured nature means that it cannot be effectively queried when retrieving information.

THE COMMODITIES BLOCK

The Commodities Block provides production and/or resource data for each commodity within a deposit/occurrence. Where these data apply to several pits or orebodies that are treated as a single deposit, the compiler must combine the individual values into the production or resource categories. For simplicity, the resource data makes no distinction as to whether they are demonstrated or inferred, economic or subeconomic resources: these categories will change with time as a result of many factors (e.g. further successful exploration and mine development, changes in commodity prices, improvements in mining and extraction methods, etc) and the continued currency of information for a comprehensive resource classification is beyond the scope of this database and the capacity of AGSO to undertake maintenance of the database.

Commodity - (COMMODITY) A mandatory 4-character field to be completed where production and/or resource information is to be recorded. Data can be reported for more than one commodity in a given deposit (e.g. the Hilton silver-lead-zinc deposit), and legal values are drawn from the OZMIN.COMMODTYPES authority table. A pop-up list of valid commodities is available.

Production - (PRODUCTION) A 10-digit field to record the production of a given commodity from a deposit. For most commodities, production will be recorded in tonnes, though precious metals (i.e. Ag, Au, and platinum group elements) are given in grams, and diamonds would be recorded as carats. By reporting precious metals in grams rather than kilograms, the total contained metal in a deposit can be more easily calculated given that grade is in grams per tonne.

Production Units - (PRODUNIT) A single character field that relates directly to the preceding Production field, where values are either 't' (tonnes), 'g'

(grams), or 'c' (metric carats). A validation trigger ensures that only one of these three letters may be entered.

Year - (PRODYEAR) This is a 4-digit field which provides for entry of the year (the stated year included) to which production figures have been compiled and entered in the Production field. It enables the user to more easily update production figures between the last recorded year and the present.

Month - (PRODMONTH) This is an optional field of up to three capital letters for the month to the end of which the production figures were compiled. If no value is entered 'DEC ' is assumed. A pop-up list of valid abbreviations is available.

Resource - (RESOURCES) A 12-digit field to record the resources for the given commodity in a deposit. Invariably, the resource will be expressed as tonnes of ore, so resource units need not be specified. Note that the column name 'RESOURCE' could not be used as it is already an Oracle reserved word.

Grade - (GRADE) This is a field with up to 4 digits before the decimal point and up to 2 digits after the decimal point in which the grade of the given resource is given either as a percentage, as grams per tonne, or as metric carats per tonne depending on the commodity in question.

Grade Units - (GRADEUNIT) A single character field that relates directly to the preceding Grade field, where values are given as 'P' (percent), 'G' (grams per tonne), or 'C' (metric carats per tonne). A validation trigger ensures that only one of these these three letters may be entered.

Total Commodity - (TOTCOMMOD) A field of up to 14 digits is available to allow the user to calculate the total metal content for each commodity in a deposit (based on total production and/or resources) and, from this information, the value of contained metal on the basis of prevailing or past commodity prices.

Total Commodity Units - (TOTUNIT) A single character field that relates directly to the preceding Total Commodity field, where values are as for PRODUNIT - either 't' (tonnes), 'g' (grams), or 'c' (metric carats). A validation trigger ensures that only one of these these three letters may be entered.

Comments - (COMMENTS) This field is provided as an optional 64-character text field to allow the user to enter information (which is deemed to be important but cannot be recorded in the fields provided) relevant to the commodities mined or present as a resource. As in the previous block on the DEPOSITS Form, this field is a free text field

which ensures that important information not easily categorised is recorded, but its unstructured nature means that it cannot be effectively queried when retrieving information. For some commodities (gemstones in particular), production and/or resources may only be available as a dollar value rather than quantifiable units: such information would therefore be given in this field.

THE EXTENDABLE ATTRIBUTES BLOCK

This block contains extendable attributes for the Deposits Form as an inverted table with a mandatory Attribute field of up to 4 characters forming the first column. A full listing of the attributes and their associated permissible values - as used on the Deposits Form - are set out below. Definitions of the values are set out in Appendix C.

Attributes (ATTRIBID)
This 4-character field caters for an abbreviation (in capital letters) pointing to an attribute in the EXTENDABLE ATTRIBUTES view, and the full attribute name is automatically displayed in the next field. Only those attributes already in the EXTENDABLE ATTRIBUTES view may be entered, but the same attribute may be inserted more than once (for example a deposit may exhibit several types of mineralisation style, and multiple ore and gangue mineral entries are to be expected). If an attribute that does not exist is entered, an error message appears at the bottom of the Deposits Form. The EXTENDABLE ATTRIBUTES view currently contains the following attributes:

Abbreviation	Attribute
CLA	Classification
CON	Ore Controls
EXP	Expression
GMIN	Gangue Minerals
MIS	Mineralisation Style
MIT	Mineralisation Texture
OPS	Operating Status
OMIN	Ore Minerals
ORI	Orientation
REH	Relation to Host
SHA	Shape
SMO	Structural Modifier

Values (VALUEID)
A 4-character field consisting of an abbreviation (in capital letters) referring to a legal value of the attribute in the EXTENDABLE ATTRIBUTES view. If the value exists in the PERMISSIBLE VALUES view its description is automatically displayed in the next field, otherwise an error message appears at the bottom of the form.

Description (DESCRIPTION)
An optional 64-character field for any additional descriptive information relating to the chosen attribute/value record. For example, one may wish to comment on the abundance of a particular gangue mineral, etc.

Classification - (CLA) Provision has been made in the database to classify mineral occurrences and deposits using mineral deposit models where sufficient information exists. A mineral deposit model can be defined as the systematic arrangement of information describing the essential properties of a group or class of mineral deposits. The value of these models lies in their ability to apply what is known about a group of significant mineral deposits to mineral occurrences so that the true character of these occurrences can be identified and their potential to constitute an ore deposit can be assessed. In the absence of a published, uniquely Australian set of deposit models at the present time, the comprehensive USGS scheme put forward by Cox and Singer (1986) has been adopted (see Appendix D) and the user is referred to this publication for the detail of these models.

Expression - (EXP) This attribute discloses whether the mineral occurrence/deposit has a surface expression or has been detected under cover rocks and gives a broad indication of the nature of that expression.

Abbreviation	Value
CON	concealed
GC	geochemical
GO	gossan
GP	geophysical
OUT	outcrop
UN	unknown

The permissible values could provide more detailed information (for example, geophysical expression could extend to whether the anomaly is radiometric, magnetic, resistivity, gravity, IP, etc. and geochemical expression could indicate whether the anomaly is soil, stream sediment, rock chip, whole rock, water, biogeochemical, etc.). However, this database is primarily concerned with point data and the detailed anomalies noted above are commonly polygon data which in most cases apply to Authorities to Prospect rather than specific mineral occurrences or deposits. Should the user require more detailed information on a mineral occurrence/deposit which has a geophysical expression (for example), OZMIN has the capacity to tag specific information in the database to a source reference for further follow up.

Gangue Minerals - (GMIN) Those minerals which form that part of the ore which cannot be avoided in mining, are separated from the ore minerals during processing, and are economically undesirable are referred to as gangue minerals. Legal values are available in an AGSO authority table (NGMA.AGSOMINERALS) which provides a comprehensive listing of accepted mineral names.

Mineralisation Style - (MIS) This attribute describes the form of the mineralisation with the following values:

Abbreviation	Value
AL	alluvial
BE	bed
BR	breccia
EV	evaporitic
MAG	magmatic
MB	multiple bed
MV	multiple vein
RPL	replacement
RE	residual
SK	skarn
ST	stockwork
SUP	supergene
SUR	surficial
SV	single vein
SZ	shear zone
UN	unknown

Mineralisation Texture - (MIT) This attribute describes the general physical appearance or character of the mineralisation with the following values:

Abbreviation	Value
BX	brecciated
CU	cumulus
DI	disseminated
IC	intercumulus
LA	laminated (or banded)
MA	massive
NO	nodular
PI	pisolitic
UN	unknown
ZO	zoned

Operating Status - (OPS) This attribute describes the current stage of development of the deposit, prospect. or mineral occurrence. Values are:

Abbreviation	Value
AM	abandoned mine
D	mineral deposit
O	occurrence
OM	operating mine
P	prospect
UN	unknown

Ore Controls - (CON) This attribute provides (at a very basic level) information on the principal localising features or controls on the formation and distribution of ore minerals. Legal values are:

Abbreviation	Value
GC	geochemical
MAG	magmatic
MEC	mechanical
MET	metamorphic
STA	stratigraphic
STU	structural
UN	unknown

Ore Minerals - (OMIN) Ore minerals are classed as those that are economically desirable. Permissible values are provided as a subset of ore minerals derived from the AGSO authority table (NGMA.AGSOMINERALS) which provides a comprehensive listing of accepted mineral names.

Orientation - (ORI) Consists of three values given as:

Abbreviation	Value
DI	dip
PL	plunge
ST	strike
UN	unknown

The numeric values for the strike, dip, and plunge (where available) are provided in the description field (e.g. an E-W trending deposit would be given a strike of 90 degrees) and may be expressed either as a single value, several values (e.g. a strike of 30 degrees and 140 degrees), or a range of values (e.g. strike 160-180 degrees and dip 60-80 degrees E). Where a range is given, there is no attempt to degrade the information by reducing it to a mean value, but it is recognised that the description field cannot be queried. The strike, dip, and plunge refer to the deposit as a whole or the major lode rather than individual ore bodies within a deposit.

Relation to Host - (REH) This attribute indicates the broad relationship of mineralisation to the enclosing host rocks and carries the following values:

Abbreviation	Value
CO	concordant
DI	discordant
IC	intrusive contact
SB	stratabound
SF	stratiform
UN	unknown

Shape - (SHA) The gross geometry or morphology of the mineralised body is described by this attribute with the permissible values being:

Abbreviation	Value
IR	irregular
LE	lenticular
PL	pipe-like
SH	sheeted
TA	tabular
UN	unknown

Structural Modifier - (SMO) This attribute records whether the deposit/occurrence has been deformed or modified since its formation. Permissible values include:

Abbreviation	Value
FA	faulted
FO	folded
FR	fractured
SH	sheared
UN	unknown

8 - THE HOST ROCKS FORM

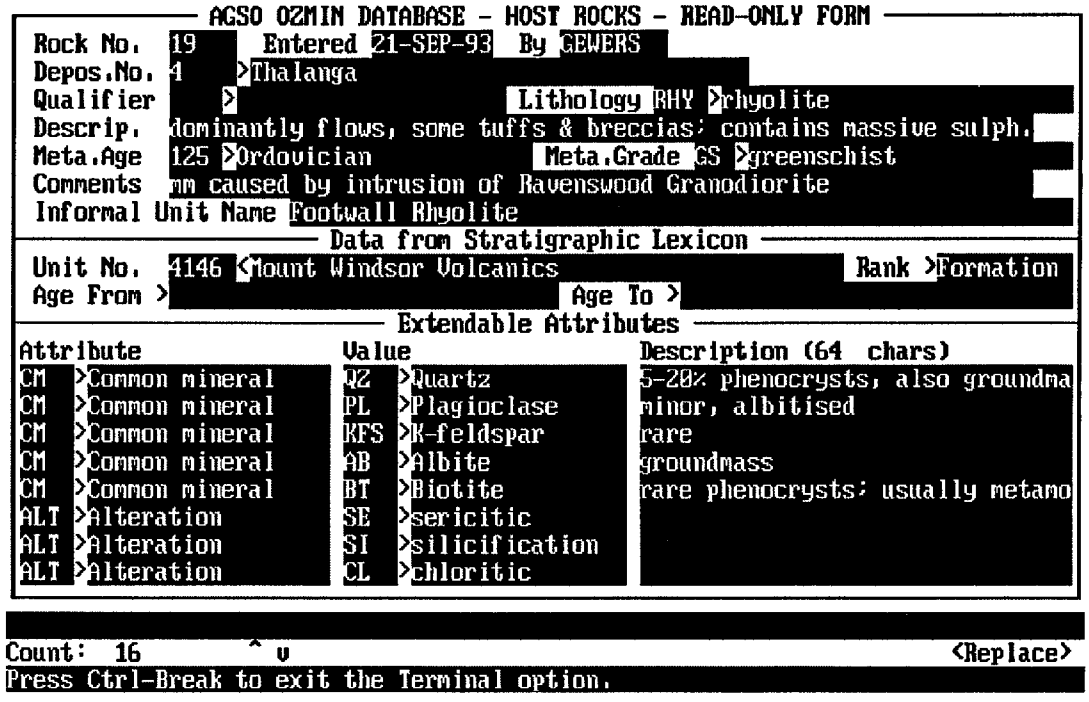

Figure 8 The HOST ROCKS Form

The Host Rocks Form summarises information concerned with the host rocks to the deposit, and is linked to the Deposits Form through a common deposit number (DEPOSNO). The form covers the REGROCKS and REGROCKDATA tables. REGROCKDATA is the expandable attributes table for REGROCKS and has a many-to-one relationship with that table. In turn, REGROCKS has a many-to-one relationship with DEPOSITS, since more than one host rock is commonly present at one deposit. Information has been structured around the host rock's lithology rather than its stratigraphic unit. Thus, a number of host-rock lithologies from the one formation may be present at any given deposit.

As with the Deposits Form, most of the attribute data presented in the Host Rocks Form has been tightly structured to enable it to be queried readily. The definitions and purposes of the fields displayed on the form are as follows:

Rock Number - (REGROCKNO) Mandatory integer of up to 5 digits. The number is unique to the host rock and is assigned sequentially by ORACLE starting from 1. The user should be aware that the same host rock at an adjacent deposit will have a different Rock Number.

Entered - (ENTRYDATE) As for the Sites and Deposits Forms.

By- (ENTEREDBY) As for the Sites and Deposits Forms.

Deposit Number- (DEPOSNO) As for the Deposits Form, with the deposit name automatically displayed when the deposit number is entered.

Qualifier - (QUALIFIER) This is a 20-character optional field that can be triggered by a 4-character (capital letters) abbreviation: it allows for a qualifying term to be added to the lithology that appears in the field that follows. The qualifier must be in the NGMA.LITHNAMES authority table and classified as Type 'Q' for qualifier. Suitable values can be listed in the LITHOLOGY QUALIFIER view. An example of the usage is 'carbonaceous' as in 'carbonaceous shale'.

Lithology - (LITHNAME) A 20-character optional field for a lithogy name. Only names already in the NGMA.LITHNAMES authority table and classified as Type 'I', 'M' or 'S' (igneous, metamorphic, sedimentary) may be entered. Suitable values can be listed in the LITHOLOGIES view, and automatically displayed by the entry of an abbreviation of up to 4-characters (all capital letters).

Description - (DESCRIPTION) A 64-character optional field for a description of the lithology where it is characterised insufficiently by the previous fields.

Metamorphic Age - (METAMAGE) An integer of up to 4 digits pointing to a geological time term in the STRATA.GEOTIME authority table. The term is automatically displayed in the adjacent field. A pop-up list of valid time terms from this table appears when the LIST key is pressed - from which one term may be selected.

Metamorphic Grade - (METAGRADE) A 3-character field that automatically displays a value that provides information on the grade of regional metamorphism, and for the recognition of contact metamorphism. Permissible values are given below, and can be displayed by entry of the appropriate abbreviation.

Abbreviation	Value
AM	amphibolite facies
AAD	amphibolite- andalusite zone
AST	amphibolite- staurolite zone
AKY	amphibolite- kyanite zone
ASL	amphibolite- sillimanite zone
ASK	amphibolite- sillimanite/K-feldspar zone
BS	blueschist facies
EL	eclogite facies
GR	granulite facies
GS	greenschist facies
GSC	greenschist - chlorite zone
GSB	greenschist - biotite zone
GSG	greenschist - garnet zone
HF	hornfels facies
HFA	hornfels- albite/epidote

HFH	hornfels- hornblende
HFP	hornfels- pyroxene
HFS	hornfels- sanidinite
PP	prehnite/pumpellyite facies
UN	unknown
ZL	zeolite facies

Comments- (COMMENTS) An optional 64-character field for any additional information relevant to metamorphism of the host rocks. If more than one episode of metamorphism has occurred, this can be noted in the Comments field. However, the previous two fields (metamorphic age and grade) should only be completed where a metamorphic event is believed to have given rise to or subsequently modified a deposit: in this instance, the Comments field can be used to indicate the nature of the event. In general, metamorphic events affecting the host rocks well before the mineralising event will be of no interest.

Informal Unit Name - (INFORMAL) A 64-character field which enables the user to enter an informal statigraphic name in the absence of a registered name from the Stratigraphic Lexicon. This field may be used for new units not yet in the Lexicon, or for geological mapping units that will always be informal units.

Stratigraphic Unit - (STRATNO) An integer of up to 5 digits can be used to identify a unit in AGSO's Stratigraphic Lexicon (STRATA.STRATLEX) - for example, '38' will automatically display 'Corella Formation' together with its Rank (i.e. whether the unit is a Group, Subgroup, Formation, Member, etc), and Age Range (age from and age to), where STRATA.STRATLEX contains this information. Ages are given as relative ages contained in AGSO's STRATA.GEOTIME authority table. Alternatively, the unit name may be entered and all other related fields retrieved automatically.

THE EXTENDABLE ATTRIBUTES BLOCK

Attributes (ATTRIBID)

This block contains the extendable attributes from the REGROCKDATA table for use in the Host Rocks Form. To enter data, a mandatory field of up to 4 characters must be entered under Attribute. This 4-character field caters for an abbreviation (in capital letters) which refers to an attribute in the EXTENDABLE ATTRIBUTES view, and the full attribute name is automatically displayed in the next field. Only those attributes already in the EXTENDABLE ATTRIBUTES view may be entered, but the same attribute may be inserted more than once (for example the host rock mineralogy will lead to multiple entries, and more than one type of alteration could be anticipated). If an attribute that does not exist is entered, an error message appears at the bottom of the Host Rocks Form. The EXTENDABLE ATTRIBUTES view as applied to the Host Rocks form currently contains the following attributes:

Abbreviation	Attribute
ALT	Alteration
CM	Common minerals

Values (VALUEID)
A 4-character field consisting of an abbreviation (in capital letters) referring to a permissible value of the attribute in the EXTENDABLE ATTRIBUTES view. If the value exists in the PERMISSIBLE VALUES view its description is automatically displayed in the next field, otherwise an error message appears at the bottom of the form.

Description (DESCRIPTION)
An optional 64-character field for any additional descriptive information relating to the chosen attribute/value record. For example, one may wish to comment on the intensity of sericitic alteration or the abundance of a mineral in the host rocks.

The following attributes occur within the Extendable Attributes block. Definitions of the permissible values for alteration are set out in Appendix C.

Alteration - (ALT) Alteration refers to host rock or wallrock alteration produced by fluids during the mineralising event. This attribute does not include alteration which is clearly the product of weathering (e.g. iron oxide staining on fracture surfaces). Permissible values are:

Abbreviation	Value
AB	albitic
AR	argillic
CA	carbonate
CL	chloritic
GR	greisen
HM	hematitic
OTH	other
PO	potassic
PR	propylitic
PY	pyritic
SE	sericitic
SI	silicification
SK	skarn
SP	serpentinisation
UN	unknown
ZE	zeolitic

OTHER is allowed as a legal value (30 character field) to record uncommon alteration which does not conform to any of the above legal values (e.g. fuchsite alteration at Hellyer). Depending on usage, a given type of wallrock alteration frequently recorded as OTHER may be elevated to a legal value in future, if necessary.

Common minerals - (CM) The values available cover the common rock forming minerals found in the host rocks whether they are of igneous, sedimentary, or metamorphic origin. The list of permissible values are a subset of the authority table known as NGMA.AGSOMINERALS, and can be displayed in the COMMON MINERALS view.

9 - THE DEPOSIT ENVIRONMENT FORM

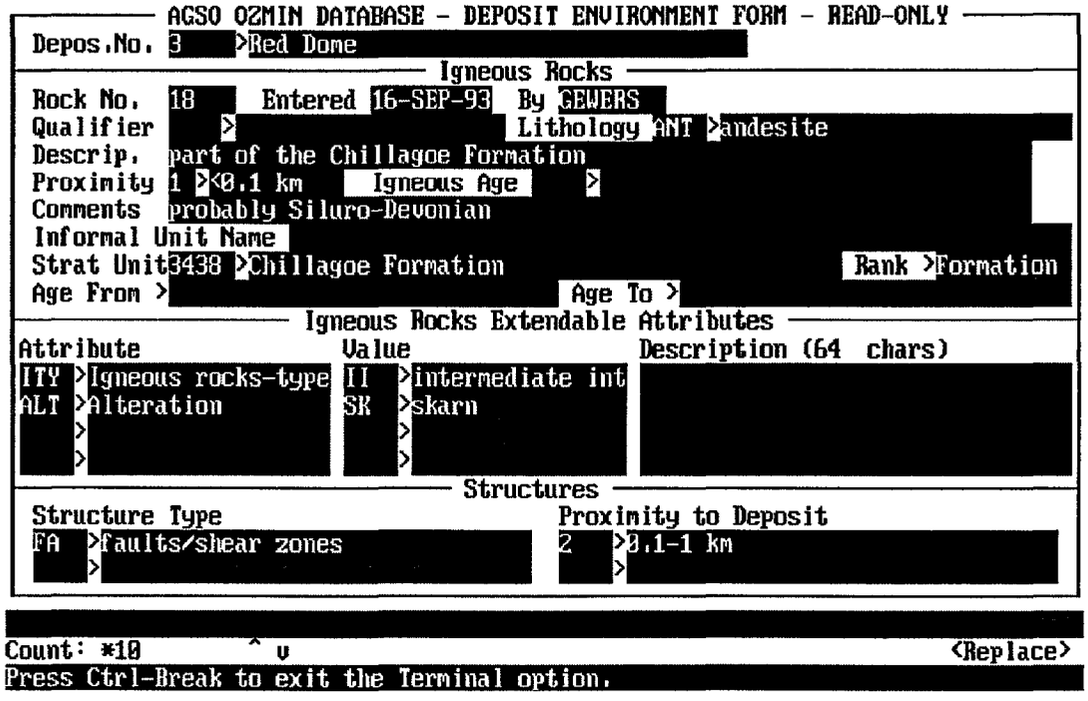

Figure 9 The DEPOSIT ENVIRONMENT Form

The Deposit Environment Form summarises information about major structures and igneous bodies and their proximity to a given deposit. It is linked to the Deposits and Host Rocks Forms through a common deposit number (DEPOSNO), and to the Host Rock Form by a common rock number (REGROCKNO). The form is derived from the REGROCKS, REGSTRUCT, and REGROCKDATA tables and has a many-to-one relationship with the DEPOSITS table, since more than one igneous body and structure may be present.

As with the preceeding two forms, most of the attribute data presented in the Deposit Environment Form has been tightly structured to enable it to be queried readily. The definitions and purposes of the fields displayed on the form are as follows:

Deposit Number- (DEPOSNO) As for the Deposit and Host Rock Forms.

Rock Number - (REGROCKNO) As for the Host Rocks Form.

Entered - (ENTRYDATE) As for the Sites, Deposits, and Host Rocks Forms.

By- (ENTEREDBY) As for the Sites, Deposits, and Host Rocks Forms.

Qualifier - (QUALIFIER) As for the Host Rocks Form.

Lithology - (LITHNAME) As for the Host Rocks Form.

Description - (DESCRIPTION) As for the Host Rocks Form. A 64-character optional field for a description of the igneous rock where it is characterised insufficiently by the previous fields.

Proximity - (PROXIMITY) A 2-character field which automatically displays a value that provides an indication of the proximity of an igneous body to mineralisation. This information may have important genetic implications as these rocks could have been a source of heat, fluids, and/or metals in the ore-forming process. Permissible values are:

Abbreviation	Value
1	<0.1 km
2	0.1-1 km
3	1-5 km
4	>5 km
UN	unknown

The proximity is a measure not only of the lateral distance to an outcrop, but could represent the distance to a buried intrusion as intersected by drilling or interpreted from geophysics.

Igneous Age - (IGAGE) A maximum 4-digit field that enables the user to enter the age of magmatic activity by accessing relative ages contained in the STRATA.GEOTIME authority table. The name is automatically displayed by entering a number for the time term - for example '170' will display 'Late Carboniferous'. A pop-up list of permissible time terms and their associated numbers is available.

Comments- (COMMENTS) An optional 64-character field for any additional information relevant to the igneous rocks which is deemed to be important and which cannot be recorded in the fields provided. As before, this field should not be treated as an alternative to providing responses in the other fields on this form - as a free text field, it ensures that important information not easily categorised is recorded, but its unstructured nature means that it cannot be effectively queried when retrieving information.

Informal Unit Name - (INFORMAL) A 64-character field which enables the user to enter an informal statigraphic name in the absence of a registered name from the Stratigraphic Lexicon. This field may be used for new units not yet in the Lexicon, or for geological mapping units that will always be informal units.

Stratigraphic Unit - (STRATNO) An integer of up to 5 digits can be used to identify a unit in AGSO's Stratigraphic Lexicon (STRATA.STRATLEX) - for example, '121' will automatically display 'Nelungaloo Volcanics' together with its Rank (i.e. whether the unit is a Group, Subgroup, Formation, Member, etc), and Age Range (age from and age to), where STRATA.STRATLEX contains this information. Ages are

given as relative ages contained in AGSO's STRATA.GEOTIME authority table. Alternatively, the unit name may be entered and all other related fields retrieved automatically.

THE IGNEOUS ROCKS EXTENDABLE ATTRIBUTES BLOCK

Attributes (ATTRIBID)

This block contains the extendable attributes from the REGROCKDATA table for use in the Deposit Environment Form. To enter data, a mandatory field of up to 4 characters must be entered under Attribute. This 4-character field caters for an abbreviation (in capital letters) which refers to an attribute in the IGNEOUS ROCK ATTRIBUTES pop-up list, and the full attribute name is automatically displayed in the next field. Only those attributes already in the IGNEOUS ROCK ATTRIBUTES pop-up list may be entered, but the same attribute may be inserted more than once (for example the igneous rock mineralogy will lead to multiple entries, and more than one type of alteration could be anticipated). If an attribute that does not exist is entered, an error message appears at the bottom of the Host Rocks Form. The IGNEOUS ROCK ATTRIBUTES pop-up list as applied to the Deposit Environment Form currently contains the following attributes:

Abbreviation	**Attribute**
ALT	Alteration
CM	Common minerals
ITY	Igneous rock - type
MMG	Metamorphic grade

Values (VALUEID)

A 4-character field consisting of an abbreviation (in capital letters) referring to a permissible value of the attribute in the IGNEOUS ROCK ATTRIBUTES pop-up list. If the value exists in the IGNEOUS ROCK VALUES list, its description is automatically displayed in the next field, otherwise an error message appears at the bottom of the form.

Description (DESCRIPTION)

An optional 64-character field for any additional descriptive information relating to the chosen attribute/value record. For example, one may wish to comment on the intensity of sericitic alteration or the abundance of a mineral in the igneous rocks.

The following attributes occur within the Igneous Rocks Extendable Attributes block. Definitions of the permissible values for alteration are set out in Appendix C.

Alteration - (ALT) As for the Host Rocks Form.

Common minerals - (CM) As for the Host Rocks Form.

Igneous rocks - type - (ITY) This attribute provides a broad classification of the igneous rocks that are proximal to the deposit. This attribute may be useful to indicate, for example, which deposits are proximal to mafic extrusive rocks or possibly associated with felsic intrusives, etc.

Abbreviation	Attribute
CA	carbonatite
FE	felsic extrusive
FI	felsic intrusive
IE	intermediate extrusive
II	intermediate intrusive
KI	kimberlite
LA	lamprophyre
ME	mafic extrusive
MI	mafic intrusive
UE	ultramafic extrusive
UI	ultramafic intrusive

Metamorphic grade - (MMG) As for the Host Rocks Form, except that the metamorphic grade appears as an extendable attribute rather than a separate field as in the Host Rocks Form. The permissible values are the same as previously described.

THE STRUCTURES BLOCK

This block contains two linked attributes that provide information on the broad nature of major structures and their proximity to a deposit. These structures could be important in establishing the genesis of a deposit because they have the potential to focus fluid flow and facilitate the emplacement of igneous rocks that are related to mineralisation. Some deposit models identify structure as an important genetic control (e.g. unconformity-related uranium deposits).

The same type of structure can be entered more than once (e.g. there may be several major faults in the vicinity of mineralisation) and where there are more than two entries in this block, the information will scroll.

Structure Type - (TYPE) A field of up to 4-characters can be entered as an abbreviation (in capital letters) such that the full value is automatically displayed. The values that are available in the STRUCTURES TYPE pop-up list are as follows:

Abbreviation	Value
FA	faults/shear zones
FO	folds
RC	igneous ring complex
UC	unconformity
UN	unknown

Proximity to deposit - (PROXIMITY) A 2-character field which provides an indication of how close the identified structure is to mineralisation and automatically displays a value available from the PROXIMITY CLASSES pop-up list. Permissible values are:

Abbreviation	Value
1	<0.1 km
2	0.1-1 km
3	1-5 km
4	>5 km
UN	unknown

10 - THE BIBLIOGRAPHIC REFERENCES FORM

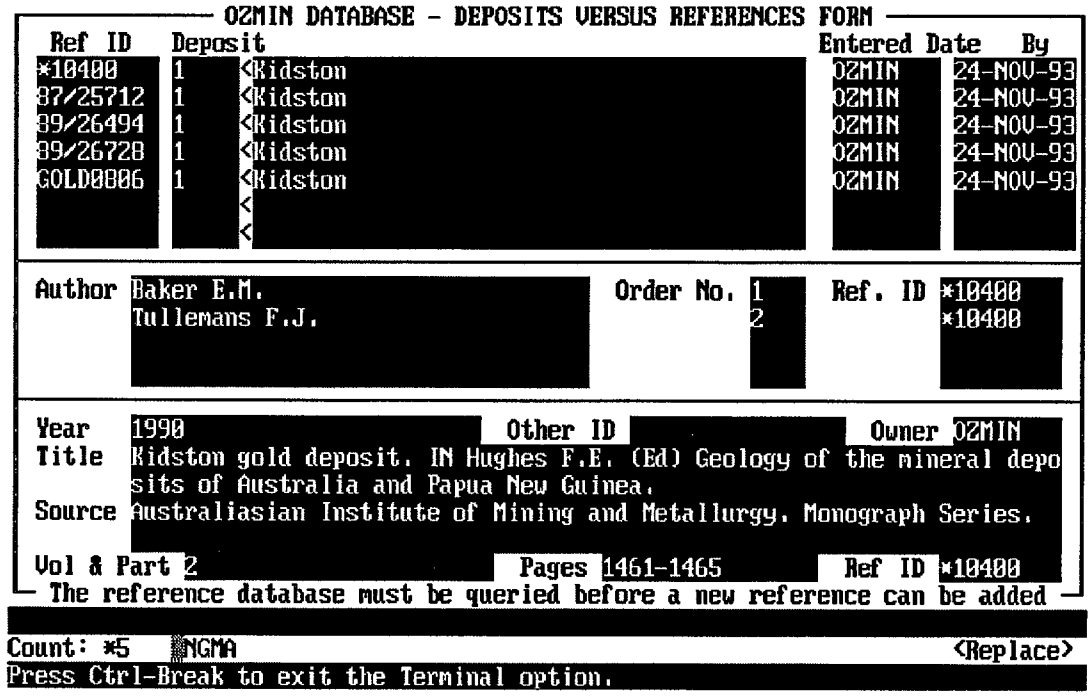

Figure 10 The BIBLIOGRAPHIC REFERENCES Form.

This form links mineral deposits to AGSO's Reference Database in many-to-many mode. For any given deposit there can be many references, and any one reference may refer to many deposits. The top block of the form, which corresponds to the OZMIN.DEPOSREFS table, shows all the reference numbers for a particular deposit, or all deposit numbers for a particular reference. Although only 7 records are displayed on the screen, these may be scrolled vertically with no practical limit. The bottom two blocks, which display a reference at a time, correspond to the GEOREF.AGSOAUTHS and GEOREF.AGSOREFS views of the Reference Database. These encompass a union with the GEODX bibliography, which has over 22 000 references on Australian geology. As the cursor is moved from record to record in the top block, the corresponding reference is displayed in the bottom two blocks.

To prevent the entry of duplicate references the form insists that you query the Reference Database before you can enter a new reference or update an existing one. Having done so, though, you are free to enter or update more than one reference. The onus is on the user to try to prevent the duplication of references in the shared database (a percentage of duplicate records is inevitable). To engage the Reference Insert/Update Form place press ***INSERT RECORD*** (do not use NEXT FIELD) when the cursor is in the top block. Enter and commit the required reference. The same procedure may be used to update existing references, but only those references belonging to you (the entry form will only display references with your Oracle user name attached to them). You should not update a reference to the extent that it becomes another reference, as other people may have set

pointers to the reference from other databases. Use updates only to correct errors in existing references. All new references go into the GEOREF.AUTHORS and GEOREF. REFERENCES tables. A more complete description of AGSO's Reference Database will be be published in the users' guide to that database, but the information presented here is adequate for the purposes of attaching references to the OZMIN Database.

TOP BLOCK

The Top Block, which corresponds to the DEPOSREFS table, is the only block in the form that actually belongs to the OZMIN Database. The Deposit Number and Name fields are displayed from the DEPOSITS table. To enter new records into the DEPOSREFS table just add them to the bottom of the displayed records with ***NEXT FIELD***. As already mentioned, the INSERT RECORD key takes you into a form for entering new references.

Reference ID - (REFID) A 9-character field (foreign key) for the ID of a bibliographic reference in AGSO's Reference Database. The GEODX IDs in the database are various - e.g. '79/20055', 'R156' 'GOLD239'. The IDs of non-GEODX references are always a number starting with an asterix - e.g. '*2156'.

Deposit Number - (DEPOSNO) Mandatory positive integer of up to 5 digits pointing to the deposit in the OZMIN. DEPOSITS table.

Deposit Name - This field cannot be entered. The deposit name is automatically displayed by a 'post-change' trigger from the OZMIN.DEPOSITS table - it is not part of the DEPOSREFS table

Entered by - (ENTEREDBY) The Oracle owner of the record -as in the Deposits Form.

Entry Date - (ENTRYDATE) The date of entry of the record - as in the Deposits Form.

AUTHOR'S BLOCK

The Authors Block provides access to the GEOREF.AGSOAUTHS view (read only).

Authors - (AUTHNAME) A mandatory character field of up to 32 characters for the surname of an author in lower case (except for the first letter) followed by a space and the author's initials with full stops and no spaces between the initials. Capital letters can also occur inside a surname (e.g., d'Albertis, McDonald).

Order Number - (ORDERNO) A positive integer of up to two digits indicating the order of the author in the authors list of the reference. This field must be entered. Must start with one and must increment by one.

Reference ID - (REFID) As in the Top Block. The foreign key to the reference record.

REFERENCE BLOCK

The References Block corresponds to the GEOREF.AGSOREFS view (read only).

Year - (YEAR) A mandatory character field of up to 32 characters for the year of publication of the reference.

Other ID - (OTHERID) An optional 32 character field for any alternative user-supplied reference number or ID. References that have come from GEODX have a GEODX number.

Owner - (ENTEREDBY) A mandatory 8-character field for the Oracle user name of the person or database owner who entered the reference in the AGSO Reference Database system.

Title - (TITLE) A mandatory field of up to 255 characters for the title of the reference. Use lower case except for the first letter of the first word and all proper names. Use a full stop at the end of the title. In symposium-style references the title of the symposium or collected works should also be entered, following the word 'In' and the names and initials of the editors plus (Ed) or (Eds).

Source - (SOURCE) A mandatory field of up to 255 characters for the journal name or publication of the reference. Use mostly lower case - as in the title field. Do not include volume, part, or page numbers. A pick list is available from GEODX.

Volume and Part - (VOLPART) Up to 32 characters for the volume and/or part number of the publication containing the reference. A single number indicates a volume number. If a part or issue number is also included place it in round brackets. Special volumes may require text entry - e.g. 'The Sam Carey Special Volume'.

Page Numbers - (PAGENOS) Up to 32 characters for the page numbers of the reference - e.g. '234-257'.

Reference ID - (REFID) As in the Top Block of the form - the primary reference key.

11 - THE COMMODITIES AUTHORITY TABLE

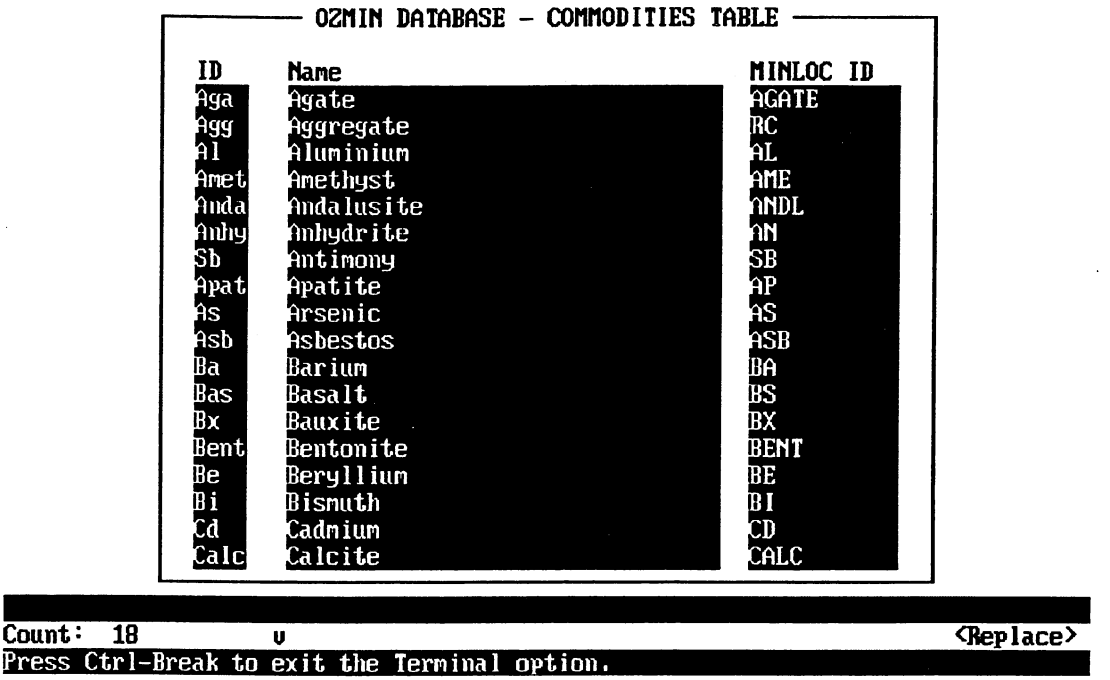

Figure 11 The COMMODITIES Authority Table

This form provides the user with a view of the Commodities Authority Table used in the Commodities block of the Deposits Form. The table contains 122 permissible values covering the range of metallic and non-metallic commodities likely to be used in compiling data for OZMIN.

ID - (COMMODID) A mandatory field of up to 4 characters which provides an abbreviation for the selected commodity. If that commodity is an element in the periodic table the appropriate element symbol is used (e.g. gold is entered as Au). Other commodities (such as industrial minerals and gemstones) carry an abbreviation of up to 4 characters (e.g. 'Agg' for aggregate, 'Grnt' for garnet, etc)

Commodity name - (COMMODNAME) A mandatory field of 32 characters for the full name of the commodity.

Minloc ID - (MINLOCID) An 11-character field which relates the OZMIN Commodity ID to the equivalent abbreviation used in MINLOC. The MINLOC ID abbreviation is always given in capital letters.

12 - THE DEPOSIT ATTRIBUTES AUTHORITY TABLE

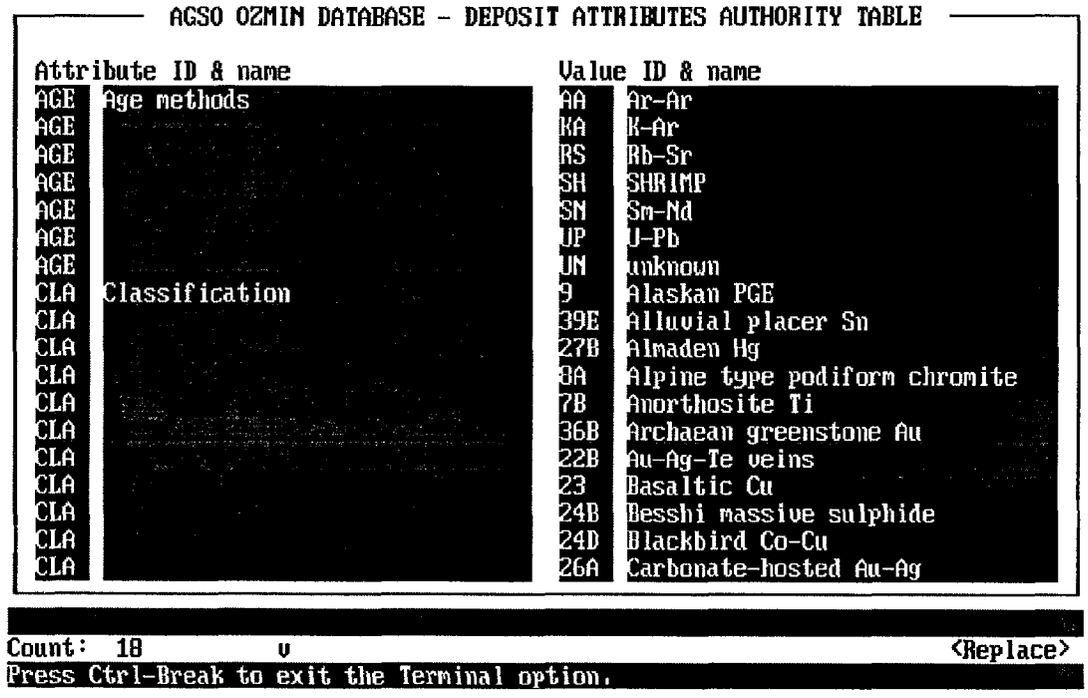

Figure 12 The DEPOSIT ATTRIBUTES Authority Table

This form contains the attributes and associated permissible values used in the Extendable Attributes block of the Deposits Form. There are 4 fields providing the user with the following information:

Attribute ID - (ATTRIBID) A mandatory field of up to 4 characters which contains the attribute abbreviation (e.g. 'OPS' for Operating status, 'REH' for Relation to host, etc).

Attribute name - (ATTRIBNAME) A 32-character field for the attribute name (e.g. 'Operating status'). The name begins with a capital letter (it is, in effect, an attribute name) and it can only appear once in the table. It must be entered if the record is the first of its type in the table - otherwise the field remains empty.

Value ID - (VALUEID) A mandatory 4-character field of capital letters for the value abbreviation (e.g. 'CO' for concordant, 'SUP' for supergene). The Value must be unique to the Attribute. 'Unknown' (UN) is a legal value included in most tables: this value is important because it acknowledges that a particular attribute has been addressed and that the necessary information was found to be unavailable.

Value name - (VALUENAME) A 32-character field for the permissible value name (e.g. 'concordant', 'supergene', etc).

13 - THE REGIONAL ATTRIBUTES AUTHORITY TABLE

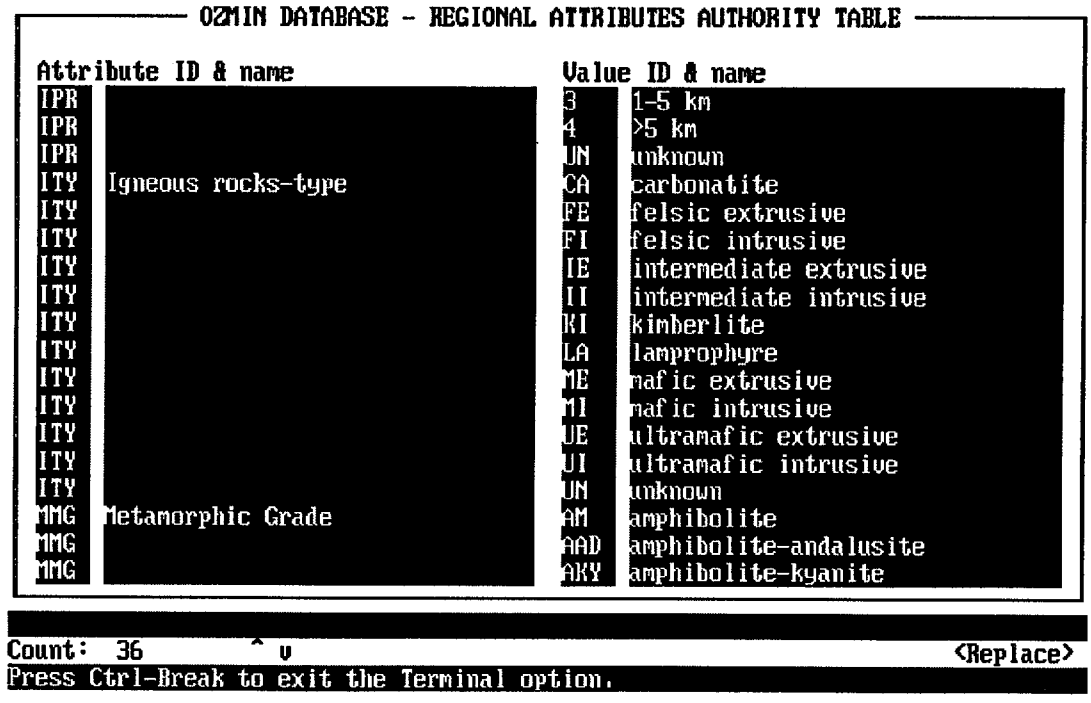

Figure 13 The REGIONAL ATTRIBUTES Authority Table

This form contains the attributes and associated values used for Metamorphic grade (MMG) and the Extendable Attributes block (ALT-Alteration) of the Host Rocks Form. The Regional Attributes Authority Table also contains attributes used in the Igneous Rocks block (IPR-Proximity), the Igneous Rocks Extendable Attributes block (ALT-Alteration; ITY- Igneous rocks-type; MMG- Metamorphic grade), and the Structures block (STY- Structure type; SPR- Structure proximity) of the Deposit Environment Form.

Permissible values for the common minerals attribute (CM) are available in both the Host Rocks and Deposit Environment Forms: these values have been derived as a subset from the larger NGMA.AGSOMINERALS authority table. The common mineral values can be listed during data entry within either the Host Rocks or Deposit Environment Forms but have not been reproduced here in the Regional Attributes Authority Table. There are 4 fields providing the user with the following information:

Attribute ID - (ATTRIBID) A mandatory field of up to 4 characters which contains the attribute abbreviation (e.g. 'ALT' for Alteration, 'CM' for Common minerals, etc).

Attribute name - (ATTRIBNAME) A 32-character field for the attribute name (e.g. 'Alteration'). The name begins with a capital letter (it is, in effect, an attribute name) and it can only appear once in the table. It must be entered if the record is the first of its type in the table - otherwise the field remains empty.

Value ID - (VALUEID) A mandatory 4-character field of capital letters for the value abbreviation (e.g. 'SE' for sericitic, 'FI' for felsic intrusive). The Value must be unique to the Attribute. As already mentioned, 'unknown' (UN) is a legal value included in most tables. This value is important because it acknowledges that a particular attribute has been addressed and that the necessary information was found to be unavailable. For example, this value allows a distinction to be drawn between an absence of alteration, metamorphism, etc (i.e. no entry is made in this case) and an absence of information about alteration, metamorphism, etc (i.e. recorded as unknown).

Value name - (VALUENAME) A 32-character field for the permissible value name (e.g. 'sericitic', 'felsic intrusive', etc).

14 - THE STRATIGRAPHIC LEXICON FORM

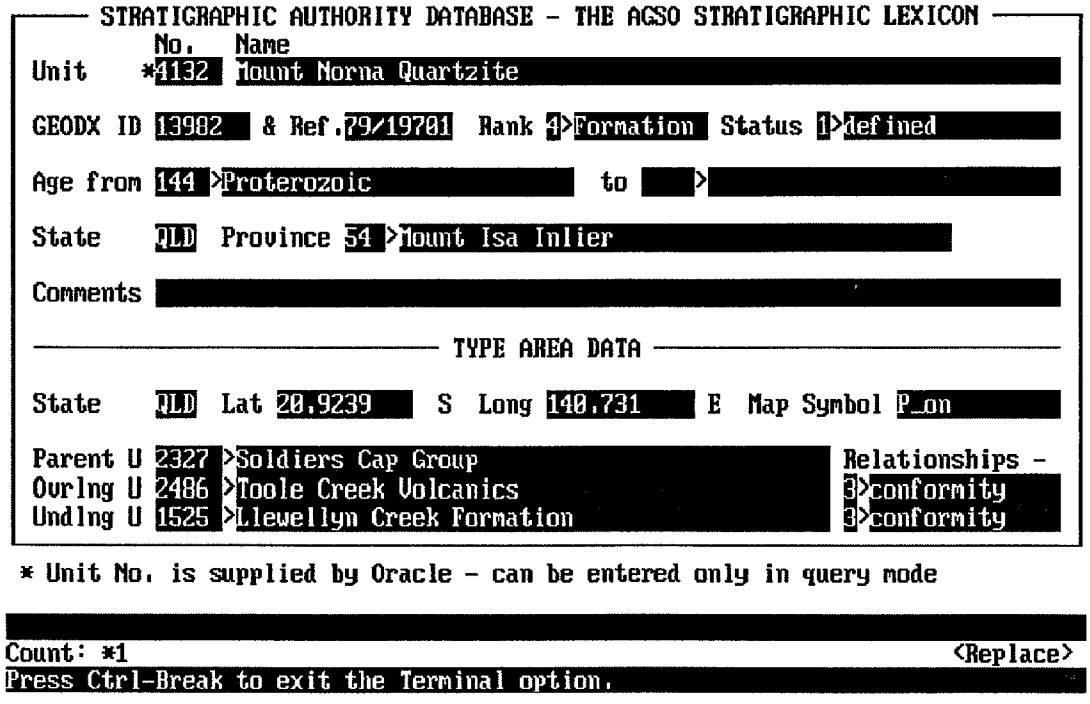

Figure 14 The STRATIGRAPHIC LEXICON Form.

AGSO's Statigraphic Lexicon Form covers the STRATA.STRATLEX table - one of the three main authority tables in the Stratigraphic Authority Database (Ryburn, in prep.). The database is owned by the Oracle user 'STRATA'. STRATLEX presents formal Australian stratigraphic units one at a time. The fields in this form are as follows -

Unit Number - (UNITNO) System-supplied integer of up to 6 digits. This is the primary key to the STRATLEX table and cannot be inserted manually. It is automatically generated when commiting new records to the table. The cursor can be placed in this field only in query mode - i.e. after pressing ***ENTER QUERY***.

Unit Name - (UNITNAME) Mandatory 64 character field for the unique name of the stratigraphic unit, including any rank term that may be part of the name - e.g. 'Soldiers Cap Group' (where 'Group' is the rank term). Use a combination of initial capitals and lower case letters - except where the ranking term is deliberately used with a lower case letter to signify an informal term - e.g. 'Corella beds'. In the rare instance where the same unit name occurs in non-adjacent states (e.g. 'Lake George beds'), put the state ID in brackets after the name to maintain uniqueness. A unique index on this field ensures that the same name cannot be entered twice.

GEODX ID - (GEODXID) A positive integer of up to 5 digits that identifies the stratigraphic unit in the GEODX Stratigraphic Index Database. Informal units in STRATLEX that have not come from GEODX do

not have an entry in this field. By pressing ***LIST*** with the cursor in the GEODX ID field the GEODX References Form may be accessed. By entering a GEODX ID all references in GEODX that refer to the unit may be viewed.

Reference - (DEFREF) An 8-character ID pointing to the most authoritative GEODX reference defining or redefining the unit. This is normally the bibliographic reference from which the information in the current record was taken. Can sometimes be a map.

Rank - (RANK) One-digit numeric field to indicate stratigraphic rank - e.g. Group, Formation, Member, etc. The name of the rank corresponding to the number is automatically selected from the STRATRANK table. This may be viewed with the ***LIST*** key when the cursor is in the field. The STRATA.STRATRANK table also shows the equivalent alphabetic code from the GEODX database -

Status No.	GEODX ID	Status Description
1	DEF	defined
2	RDEF	redefined
3	FD	fully described
4	DESC	described
5	BD	briefly described
6	M	mentioned
7	I	informal
8	D	deleted

Status - (STATUS) Mandatory one-digit field for the status of the unit. The status name associated with the number is displayed from the STRATA.STRATSTATUS table. The following values can currently be entered into Status field -

Rank No.	Rank Name
1	Supergroup
2	Group
3	Subgroup
4	Formation
5	Member
6	Bed
7	beds

Age From - (AGE1) A positive integer of up to 4 digits pointing to the lower age limit of the stratigraphic unit. The corresponding term from the STRATA.GEOTIME Authority Table is displayed in the next field. Where no upper age limit is entered the 'Age From' term is taken to be a general age for the unit as a whole. Press ***LIST*** to access the associated AGSO Geological Time Scale form.

Age To - (AGE2) As for the 'Age From' pointer, but referring to an upper age limit for the unit - if one is known.

Geological Province - (GEOLPROV) An integer of up to 4 digits pointing to the geological province in the STRATA.GEOPROVS table. While the cursor is in this field you may press ***LIST*** to enter the Geological Provinces Form. You can also enter a name in the name field and the corresponding number is automatically supplied when the cursor leaves the field.

Comments - (COMMENTS) A 240 character field for comments on the unit, particularly those on any synonyms and the history of definition and nomenclature. Any conflicts with other stratigraphic names in STRATLEX should also be noted. A pop-up editing window is available on pressing ***EDIT***.

TYPE AREA DATA

The part of the form below the horizontal line is for information from the type area or type section for the stratigraphic unit. It does not necessarily apply to the unit as a whole.

State - (TYPESTATE) Two or three capital letters indicating the State in Australia. A pop-up validation list of states is available. Valid States are those in the NGMA.AGSOSTATES table. This field could be used to subdivide the database if the custodianship were to be distributed amongst the States.

Latitude - (DLAT) A numeric field with up to 2 digits in front of the decimal point, and up to 6 digits after the decimal point. All latitudes and longitudes must be entered in decimal degrees and must not be negative. They should mark the centroid of the type area or the centre of the type section. A location in the southern hemisphere and at longitudes east of Greenwich are implicit.

Longitude - (DLONG) A numeric field with up to 3 digits in front of the decimal point and up to 6 digits after the decimal point. Otherwise as for latitude.

Map Symbol - (SYMBOL) A 24 character field for the unit's map symbol in the type area. The map symbol should come from the most recently published 1:100 000 geological map, or from the most recent 1;250 000 sheet if no 1:100 000 map. Non ASCII symbols should be represented according to the following table -

Description	Symbol	Comment
Precambrian 'P'	P_	
Archaen-Precambrian 'AP'	AP	used in Western Australia
Cambrian slashed 'C'	C_	
Ordovician slashed 'O'	O_	no longer used in AGSO
Triassic 'TR'	TR	
Superscript	^	e.g.'Ta^c'
Subscript	/	e.g.'Pkc/br'

The map symbol entered here is the prevailing symbol at the time of data entry, and need be unique only for the map from which it was obtained. It would be nice if all letter codes were uniqe, but this is not really practical on a continent-wide basis.

Parent Unit - (PARENT) A positive integer of up to 5 digits for the unit number of the parent stratigraphic unit - i.e. the related unit that is next higher in rank. For example, the parent unit for a Member would always be a Formation, while the parent unit for a Formation could be a Group or a Subgroup. The Name of the parent unit is displayed automatically as soon as the parent's Unit Number is entered. Only valid Unit Numbers may be entered. It is possible to view a second copy of the Stratigraphic Lexicon form by pressing ***LIST*** when the cursor is in this field.

Overlying & Underlying Units - (OVERLYING, UNDERLYING) A positive integer of up to 5 digits for the Unit Number of the stratigraphically overlying and underlying units. The name of each unit is automatically displayed. Only existing Unit Numbers may be entered.

Boundary Relationships - (OVEREL, UNDEREL) Two positive two-digit integer fields indicating relationships to the overlying and underlying units. The associated terms are automatically displayed from the STRATA. STRATRELS table. Valid numbers and terms are -

Number	Name
1	unknown
2	not exposed
3	conformity
4	unconformity
5	disconformity
6	nonconformity
7	paraconformity
8	diastem

15 - THE GEOLOGICAL PROVINCES FORM

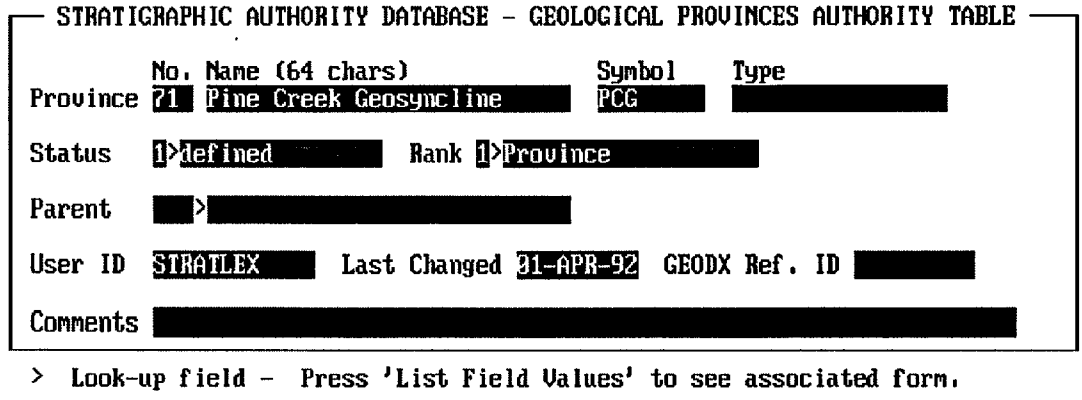

Figure 15 The GEOLOGICAL PROVINCES Form.

This form covers the STRATA.GEOPROVS table, which is part of the Stratigraphic Authority Database. GEOPROVS attempts to provide an authoritative subdivision of the Australian Continent into Geological Provinces and Sub-provinces - based initially on the account of Palfreyman (1980). The table also has provision for Domains and Sub-domains, but at this level the terms used are not yet regarded as formal subdivisions. However, the Domain rank has found a useful purpose in providing a pigeon-hole for batholith names, which are not regarded as part of mainstream stratigraphic nomenclature. The term Domain is also used for subdivisions of Sub-provinces in the sense normally used by structural geologists. 'Sub-domain' has not yet been used.

Province Number - (PROVNO) System-supplied positive integer of up to 5 digits - the primary key for the STRATA.GEOPROVS table. Automatically generated when commiting new records to the table. The cursor can be placed in this field only in query mode - i.e. after pressing ***ENTER QUERY***.

Province Name - (PROVNO) A 64-character mandatory field for the name of the province, subprovince or domain. Province names must be unique, but Sub-province, Domain or Sub-domain names can re-occurr in different provinces (e.g. 'Eastern Fold Belt').

Symbol - (PROVLETS) Up to 4 capital letters for the abbreviation for the province or subprovince. These abbreviations, which must be unique, are designed to function as labels on maps and diagrams.

Type - (TYPE) A 16-character field for the type of Province, Sub-province, Domain etc. The only entries in this field at present are 'Basin' and 'Batholith', but others types may be added in future (e.g. 'Fold Belt'). This field will probably graduate to being controlled by a lookup table.

Status - (STATUS) A single digit number pointing to the status of the name in the STRATA. STRATSTATUS table (e.g. 'redefined'). The description of the status is automatically displayed from the STRATA.STRATSTATUS table.

Rank - (RANK) A 1-digit number pointing to the rank of the name in the STRATA. PROVRANKS table (e.g. 'Sub-province'). The description of the status is automatically displayed from the STRATA.STRATSTATUS table. Press ***LIST*** with the cursor in the field to view a popup list of possible ranks -

Number	Rank
1	Province
2	Sub-province
3	Domain
4	Sub-domain

Parent - (PARENT) A 5-digit positive integer pointing to the Province Number of the record next highest in rank to the current Sub-province, Domain or Sub-domain. For example, the 'Eastern Fold Belt' Subprovince points to Province Number 54, the 'Mount Isa Inlier' Province. This field provides the table with a superimposed heirarchical structure. It is always left empty for Provinces.

User ID - (USERID) An 8-character field for the Oracle username - in capital letters - of the person who entered or last updated the record. This field cannot be entered - the system supplies the user ID automatically as records are committed.

Last Changed - (LASTCHANGED) A date field in the standard Oracle date format of 'DD-MMM-YY' indicates when the record was inserted or last updated. This field also cannot be entered - the system supplies the date as records are committed.

GEODX Reference ID - (GEODX_REF) A 9-character field for the ID of a bibliographic reference in the GEODX Database. The reference should contain the definition or redefinition of the Province, Sub-province, etc.

Comments - (COMMENTS) A 64-character field for any additional relevant information on the Province, Sub-province, etc.

16 - GEOLOGICAL TIME SCALE FORM

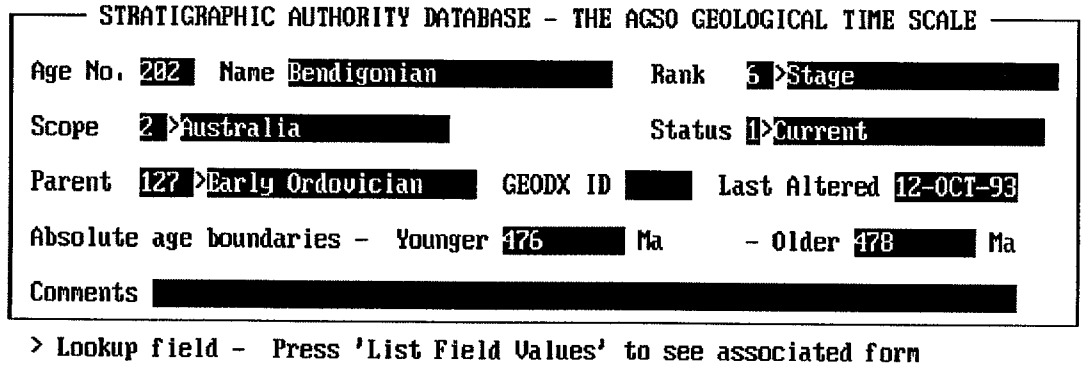

Figure 16 The GEOLOGICAL TIME SCALE Form.

The Geological Time Scale Form covers the STRATA.GEOTIME table, which is also in the Stratigraphic Authority Database. The form displays all valid geological time terms one at a time. The table is heirarchical, with a Rank field and a pointer to the Age Number of the time term next highest in rank. For example, a Substage would normally have a pointer to the Stage to which it belongs. The fields in this form are as follows-

Age Number - (AGENO) A mandatory integer of up to 4 digits that is automatically allocated by the system. This is the primary key for the GEOTIME table and the field can only entered in query mode - i.e., after pressing ***ENTER QUERY***.

Age Name - (AGENAME) A mandatory field of 32 characters for the name of the geological age or time term - e.g. 'Late Permian'.

Rank - (RANK) Mandatory single-digit field indicating the rank of the time term. The rank name is automatically displayed from the STRATA.TIMERANK lookup table. A pop-up list of rank terms may be viewed by pressing ***LIST*** when the cursor is in the field. The current contents of the TIMERANK table are as follows-

Number	Name
1	Eon
2	Erathem
3	Period
4	Epoch

5	Series
6	Stage
7	Substage

Scope - (SCOPE) A mandatory integer of up to 2 digits indicating the scope of the time term - i.e., to what region does the term apply. The Scope Description is automatically displayed from the STRATA.TIMESCOPE lookup table. A pop-up list of scope terms may be viewed by pressing ***LIST*** when the cursor is in the field. The following values are currently in TIMESCOPE -

Number	Description
1	International
2	Australia
3	Australasia
4	New Zealand
5	United Kingdom
6	North America
7	China

Status - (STATUS) Mandatory 1-digit field pointing to the Status of a time term. The Status Description is automatically selected from the TIMESTATUS lookup table. A popup list of status terms may be viewed by pressing ***LIST*** when the cursor is in the field. TIMESTATUS has only three records at present -

Number	Description
1	Current
2	Obsolete
3	Deleted

Parent - (PARENT) An integer of up to 4 digits that points to the Age Number of the term next higher in Rank in the GEOTIME table. For example, the parent age for the Ordovician Period is the Palaeozoic Era. The Age Name of the parent is automatically pulled from the GEOTIME table. Another copy of the time-scale form may be viewed by pressing ***LIST*** when the cursor is in the field.

GEODX Reference ID - (GEODX ID) Up to 6 characters for the GEODX Reference ID of the primary reference to the time term. This is usually the most authoritative reference to the absolute age boundaries of the unit. Press ***LIST*** with the cursor in this field to view the GEODX References Form.

Last Altered - (LASTALT) Date field in which the current date is automatically inserted whenever a new record is entered or an old one updated. It is not possible to enter this field, except in query mode.

Absolute Age Boundaries - (YNGBOUND, OLDBOUND) The age in millions of years of the younger and older boundaries of the geological time term - as published in the reference indicated by the GEODX reference ID field. Both values may have a precision of up to 3 decimal places.

Comments - (COMMENTS) A field of 64 characters for any comments relating to the time term or its absolute age boundaries. Synonymy, or any qualifications regarding the term can be indicated here.

17 - ACKNOWLEDGMENTS

The authors would like to acknowledge the role of fellow members of a working group established to examine the requirements for a new mineral deposits database to serve the needs of the National Geoscience Mapping Accord (NGMA). The working group consisted of Stewart Needham, Greg Ewers and Dean Hoatson (Minerals and Land Use Program, AGSO), Bill McKay, Brian Elliott, Keith Porritt and Yanis Miezitis (Mineral Resource Assessment Branch, AGSO but now with the Bureau of Resource Sciences), and Rod Ryburn (Information Systems Branch, AGSO).

We acknowledge the assistance and advice of Brian Elliott and Keith Porritt through their involvement with the MINDEP database - a database from which many of the attributes and refinements in OZMIN have been derived. We would also like to thank our colleagues in AGSO, state and territory geological surveys, industry, and universities for their valued comments on the content and design of OZMIN throughout its development.

We thank Mirek Kucka (ISB), Ollie Raymond, and Alan Whitaker (MLUP) for their review and constructive comments on this manuscript.

18 - REFERENCES

Blewett, R.L. & Ryburn, R.J., 1992 - Recent developments in field-geoscience databases in BMR. *In:* Geographic Information Systems, Cartographic and Data Standards, Workshop Proceedings. *Bureau of Mineral Resources, Record, 1992/27.*

Chopra, P.N. & Ryburn, R.J. 1993 - Linking continental databases in the Oracle RDBMS with project data in the Arc/Info GIS. *Australian Geological Survey Organisation, Record, 1993/12, 34pp.*

Collins, D. 1990 - MAPDAT: a program for plotting spatial data from a relational database onto maps. *Bureau of Mineral Resources, Record, 1990/79*, 25pp.

Jaques, A.L., 1992 - Second generation maps and the National Geoscience Mapping Accord. *In:* Geographic Information Systems, Cartographic and Data Standards, Workshop Proceedings. *Bureau of Mineral Resources, Record, 1992/27, 3-13.*

Lenz, S.L., Ryburn, R.J. & Kucka, M., 1993 - Users' Guide to AGSO's Oracle Database System. *Australian Geological Survey Organisation, Record, 1993/81, 38pp.*

Ryburn, R.J., 1993 - Users' Guide to the NGMA Field Database. *Bureau of Mineral Resources, Australia, Record 1993/49.*

Ryburn, R.J., 1992 - Relational databases for continent-wide data. In: Geographic Information Systems, Cartographic and Data Standards, Workshop Proceedings. *Bureau of Mineral Resources, Record , 1992/27.*

Ryburn, R.J., in prep. - Users' guide to the Stratigraphic Authority Database. *Australian Geological Survey Organisation, Record.*

Ryburn, R.J., Page, R.W. & Richards, J.R. 1993 - Users' guide to the OZCHRON Database. *Australian Geological Survey Organisation, Record, 1993/11.*

Standards Association of Ausralia, 1983 - Codes for the representation of names of countries. *Australian Standard 2632-1983*, 28pp.

Withnall, I.W., Grimes, K.G., Lang, S.C., & Thornton, M. 1992. Computerised geological field data management in Queensland - the REGMAP system. *In.* Geographic Information Systems, Cartographic and Data Standards, Workshop Proceedings. *Bureau of Mineral Resources, Record , 1992/27*, 181-185.

APPENDIX A - OZMIN DEFINITIONS

```
REM ******************************************************
REM ** NGMA FIELD DATABASE - SITES TABLE - OWNER IS NGMA **
REM ******************************************************

REM  SITES IS FOR GROUND POINT LOCATIONS + ACCURACY & LINEAGE

CREATE TABLE SITES (
        ORIGNO          NUMBER (5)     NOT NULL  REFERENCES NGMA.ORIGINATORS,
        SITEID          CHAR   (16)    NOT NULL,
        FIELDID         CHAR   (16),
        OBSDATE         DATE,
        OBSTIME         NUMBER (4,2),
        COUNTRYID       CHAR   (3)     NOT NULL  REFERENCES NGMA.AGSOCOUNTIES,
        STATE           CHAR   (3)               REFERENCES NGMA.AGSOSTATES,
        GEOPROVNO       NUMBER (5)               REFERENCES STRATA.GEOPROVS,
        SUBPROVNO       NUMBER (5)               REFERENCES STRATA.GEOPROVS,
        DOMAINNO        NUMBER (5)               REFERENCES STRATA.GEOPROVS,
        GEOGAREA        CHAR   (64),
        LOCDESC         CHAR   (64),
        HMAPNO          NUMBER (4)               REFERENCES NGMA.HMAPS,
        QMAPID          CHAR   (6)               REFERENCES NGMA.QMAPS,
        EASTING         NUMBER (8,2),            /* MAX PRECISION +/- 2 CM */
        NORTHING        NUMBER (9,2),            /* MAX PRECISION +/- 2 CM */
        ACCURACY        NUMBER (4)     NOT NULL,
        HEIGHT          NUMBER (5,0),
        HEIGHTACC       NUMBER (3,0),
        DLAT            NUMBER (8,6),
        NS              CHAR   (1),
        DLONG           NUMBER (9,6),
        EW              CHAR   (1),
        METHOD          NUMBER (3)     NOT NULL  REFERENCES NGMA.LOCMETHODS,
        BIBREF          NUMBER (6)               REFERENCE  NGMA.FIELDREFS,
        AIRPHOTO        CHAR   (36),
        OC              CHAR   (1),              /* OUTCROPS    TABLE    */
        RO              CHAR   (1),              /* ROCKS       TABLE    */
        ST              CHAR   (1),              /* STRUCTURE   TABLE    */
        PE              CHAR   (1),              /* PETROGRAPHY DATABASE */
        RC              CHAR   (1),              /* ROCKCHEM    DATABASE */
        OZ              CHAR   (1),              /* OZCHRON     DATABASE */
        OM              CHAR   (1),              /* OZMIN       DATABASE */
        SC              CHAR   (1),              /* STREAMCHEM  DATABASE */
        RT              CHAR   (1),              /* REGOLITH    DATABASE */
        RP              CHAR   (1),              /* ROCKPROPS   DATABASE */
        SP              CHAR   (1),              /* SPECPROPS   DATABASE */
        ENTEREDBY       CHAR   (8)   NOT NULL,
        ENTRYDATE       DATE         NOT NULL,
        LASTUPDATE      DATE,
        PRIMARY KEY (ORIGNO,SITEID) );

GRANT SELECT ON SITES TO PUBLIC;
```

```
CREATE UNIQUE INDEX SITESUNIQUE   ON SITES ( ORIGNO, SITEID );
CREATE         INDEX SITESIDS     ON SITES ( SITEID );
CREATE         INDEX SITESUSERS   ON SITES ( ENTEREDBY );
CREATE         INDEX SITESPROVS   ON SITES ( GEOPROVNO );
CREATE         INDEX SITESSUBPROVS ON SITES ( SUBPROVNO );
CREATE         INDEX SITESHMAPS   ON SITES ( HMAPNO );
CREATE         INDEX SITESQMAPS   ON SITES ( QMAPID );
CREATE         INDEX SITESDLATS   ON SITES ( DLAT );
CREATE         INDEX SITESDLONGS  ON SITES ( DLONG );
CREATE         INDEX SITESSTRUC   ON SITES ( ST );
CREATE         INDEX SITESOZMIN   ON SITES ( OM );
CREATE         INDEX SITESRTMAP   ON SITES ( RT );

REM  USITES IS THE INSERT/UPDATE VIEW OF THE SITES TABLE

CREATE VIEW USITES AS SELECT * FROM SITES WHERE ENTEREBY = USER;

GRANT SELECT, INSERT, UPDATE, DELETE ON USITES TO PUBLIC;


REM ******************************************************
REM **  OZMIN -  MAIN DATA TABLES  -  OWNER IS OZMIN    ***
REM ******************************************************

REM  DEPOSITS IS FOR DATA ON MINERAL DEPOSITS AND OCCURRENCES

CREATE TABLE DEPOSITS (
        DEPOSNO         NUMBER (5,0)  NOT NULL  PRIMARY KEY,
        ORIGNO          NUMBER (5,0)  NOT NULL,
        SITEID          CHAR   (16)   NOT NULL,
        NAME            CHAR   (80),
        SYNONYMS        CHAR   (80),
        FIELDCHECKED    CHAR   (1),
        EXPOSED         CHAR   (1),
        AGEMETHOD       CHAR   (8),
        OZCHRONREC      NUMBER (4,0),
        MINAGE          CHAR   (32),
        COMMENTS        CHAR   (255),
        ENTEREDBY       CHAR   (8)    NOT NULL,
        ENTRYDATE       DATE          NOT NULL,
        LASTUPDATE      DATE )
TABLESPACE TBSPA;

GRANT SELECT ON DEPOSITS TO PUBLIC;

CREATE UNIQUE INDEX DEPOSNOS       ON DEPOSITS ( DEPOSNO )
TABLESPACE INDXA;
CREATE         INDEX DEPOSORIGSITES ON DEPOSITS ( ORIGNO, SITEID )
TABLESPACE INDXA;
CREATE         INDEX DEPOSSITES    ON DEPOSITS ( SITEID )
TABLESPACE INDXA;
CREATE         INDEX DEPOSUSERS    ON DEPOSITS ( ENTEREDBY )
TABLESPACE INDXA;
```

```
REM  UDEPOSITS IS THE INSERT/UPDATE VIEW OF THE DEPOSITS TABLE

CREATE VIEW UDEPOSITS AS SELECT * FROM DEPOSITS WHERE ENTEREDBY =
USER;•

GRANT SELECT, INSERT, UPDATE, DELETE ON UDEPOSITS TO PUBLIC;


REM  DEPOSDATA IS THE EXTENDABLE ATTRIBUTES TABLE FOR DEPOSITS

CREATE TABLE DEPOSDATA (
        DEPOSNO         NUMBER (5,0)  NOT NULL,
        ATTRIBID        CHAR   (4)    NOT NULL,
        VALUEID         CHAR   (4),
        DESCRIPTION     CHAR   (64),
        ENTEREDBY       CHAR   (8)    NOT NULL,        /* CURRENTLY
CHAR(16) */
        ENTRYDATE       DATE          NOT NULL,
        PRIMARY KEY (DEPOSNO, DATATYPE, SUBTYPE) )
TABLESPACE TBSPA;

GRANT SELECT ON DEPOSDATA TO PUBLIC;

CREATE INDEX DEPOSDATADEPOSNOS ON DEPOSDATA ( DEPOSNO )
TABLESPACE INDXA;
CREATE INDEX DEPOSDATAUSERS    ON DEPOSDATA ( ENTEREDBY )
TABLESPACE INDXA;


REM  UDEPOSDATA IS THE INSERT/UPDATE VIEW OF THE DEPOSDATA TABLE

CREATE VIEW UDEPOSDATA AS SELECT * FROM DEPOSDATA WHERE ENTEREDBY =
USER;

GRANT SELECT, INSERT, UPDATE, DELETE ON UDEPOSDATA TO PUBLIC;


REM  COMMODS IS THE COMMODITIES TABLE FOR THE DEPOSITS FORM

CREATE TABLE COMMODS (
        DEPOSNO         NUMBER (5,0)  NOT NULL,
        COMMODITY       CHAR   (4)    NOT NULL,
        PRODUCTION      NUMBER (10,0),
        PRODUNIT        CHAR   (1),
        PRODYEAR        NUMBER (4,0),
        PRODMONTH       CHAR   (3),
        RESOURCES       NUMBER (12,0),
        GRADE           NUMBER (6,2),
        GRADEUNIT       CHAR   (1),
        TOTCOMMOD       NUMBER (14,0),
        TOTUNIT         CHAR   (1),
        COMMENTS        CHAR   (64),
        ENTEREDBY       CHAR   (8)   NOT NULL,
        ENTRYDATE       DATE          NOT NULL,
        PRIMARY KEY (DEPOSNO, COMMODITY) )
TABLESPACE TBSPA;
```

```
GRANT SELECT ON COMMODS TO PUBLIC;

CREATE INDEX COMMODSDEPOSNOS ON COMMODS ( DEPOSNO )
TABLESPACE INDXA;
CREATE INDEX COMMODSUSERS    ON COMMODS ( ENTEREDBY )
TABLESPACE INDXA;

REM  UCOMMODS IS THE INSERT/UPDATE VIEW OF THE COMMODS TABLE;

CREATE VIEW UCOMMODS AS SELECT * FROM COMMODS WHERE ENTEREDBY = USER;

GRANT SELECT, INSERT, UPDATE, DELETE ON UCOMMODS TO PUBLIC;


REM  REGROCKS IS THE TABLE FOR REGIONAL ROCK ATTRIBUTES

CREATE TABLE REGROCKS (
        REGROCKNO       NUMBER (5,0)  NOT NULL  PRIMARY KEY,
        DEPOSNO         NUMBER (5,0)  NOT NULL,
        STRATNO         NUMBER (5,0),
        INFORMAL        CHAR   (64),
        QUALIFIER       CHAR   (20),
        LITHNAME        CHAR   (20),
        DESCRIPTION     CHAR   (64),
        METAMAGE        NUMBER (4,0),
        METAGRADE       CHAR   (2),
        IGNEOUS         CHAR   (1)    NOT NULL,
        PROXIMITY       CHAR   (2),
        IGAGE           NUMBER (4,0),
        COMMENTS        CHAR   (64),
        ENTEREDBY       CHAR   (8)    NOT NULL,
        ENTRYDATE       DATE          NOT NULL )
TABLESPACE TBSPA;

GRANT SELECT ON REGROCKS TO PUBLIC;

CREATE INDEX REGROCKNOS      ON REGROCKS ( REGROCKNO )
TABLESPACE INDXA;
CREATE INDEX REGROCKDEPOSNOS ON REGROCKS ( DEPOSNO )
TABLESPACE INDXA;
CREATE INDEX REGROCKUSERS    ON REGROCKS ( ENTEREDBY )
TABLESPACE INDXA;

REM  UREGROCKS IS THE INSERT/UPDATE VIEW OF THE REGROCKS TABLE

CREATE VIEW UREGROCKS AS SELECT * FROM REGROCKS WHERE ENTEREDBY =
USER;

GRANT SELECT, INSERT, UPDATE, DELETE ON UREGROCKS TO PUBLIC;
```

```
REM  REGROCKDATA IS THE EXPANDABLE ATTRIBUTES TABLE FOR REGROCKS

CREATE TABLE REGROCKDATA (
        REGROCKNO       NUMBER (5,0)  NOT NULL,
        ATTRIBID        CHAR   (4)    NOT NULL,
        VALUEID         CHAR   (4),
        DESCRIPTION     CHAR   (64),
        ENTEREDBY       CHAR   (8)    NOT NULL,
        ENTRYDATE       DATE          NOT NULL,
        PRIMARY KEY (REGROCKNO,DATATYPE,SUBTYPE) )
TABLESPACE TBSPA;

GRANT SELECT ON REGROCKDATA TO PUBLIC;

CREATE INDEX RRDATAREGROCKNOS   ON REGROCKDATA ( REGROCKNO )
TABLESPACE INDXA;
CREATE INDEX RRDATAUSERS ON REGROCKDATA ( ENTEREDBY )•
TABLESPACE INDXA;


REM  UREGROCKDATA IS THE INSERT/UPDATE VIEW OF THE REGROCKDATA TABLE

CREATE VIEW UREGROCKDATA AS SELECT * FROM REGROCKDATA WHERE ENTEREDBY = USER;

GRANT SELECT, INSERT, UPDATE, DELETE ON UREGROCKDATA TO PUBLIC;


REM  REGSTRUCT IS THE TABLE FOR THE STRUCTURE OF IGNEOUS DEPOSITS.

CREATE TABLE REGSTRUCT (
        DEPOSNO         NUMBER (5,0)  NOT NULL,
        TYPE            CHAR   (4),
        PROXIMITY       CHAR   (2),
        ENTEREDBY       CHAR   (8)    NOT NULL,
        ENTRYDATE       DATE          NOT NULL,
        PRIMARY KEY ( DEPOSNO, TYPE, PROXIMITY ) )
TABLESPACE TBSPA;

GRANT SELECT ON REGSTRUCT TO PUBLIC;

CREATE INDEX REGSTRUCTNOS   ON REGSTRUCT ( DEPOSNO )•
TABLESPACE INDXA;
CREATE INDEX REGSTRUCTUSERS ON REGSTRUCT ( ENTEREDBY )
TABLESPACE INDXA;

REM  UREGSTRUCT IS THE INSERT/UPDATE VIEW OF THE REGSTRUCT TABLE

CREATE VIEW UREGSTRUCT AS SELECT * FROM REGSTRUCT WHERE ENTEREDBY = USER;

GRANT SELECT, INSERT, UPDATE, DELETE ON UREGSTRUCT TO PUBLIC;

REM TABLE PROVIDING MANY-TO-MANY LINK BETWEEN DEPOSITS & REFERENCES

CREATE TABLE DEPOSREFS (
        DEPOSNO         NUMBER (5,0)  NOT NULL,
        AGSREFNO        NUMBER (5,0)  NOT NULL,
        PRIMARY KEY (DEPOSNO,AGSREFNO) );
```

```
GRANT SELECT ON DEPOSREFS TO PUBLIC;

CREATE INDEX DEPREFSDEPNOS ON DEPOSREFS ( DEPOSNO )
TABLESPACE INDXA;
CREATE INDEX DEPREFSREFNOS ON DEPOSREFS ( AGSREFNO )
TABLESPACE INDXA;


REM  TABLE TO KEEP TRACK OF MAXIMUM PRIMARY-KEY NUMBERS IN OZMIN

CREATE TABLE OZMINOS (
        IDMAXNO         CHAR    (10)    NOT NULL  PRIMARY KEY,
        OZMAXNO         NUMBER (5,0)    NOT NULL )
TABLESPACE TBSPA;

GRANT SELECT, UPDATE ON OZMINOS TO PUBLIC;


REM ******************************************************
REM **              OZMIN AUTHORITY TABLES                ***
REM ** UNLESS OTHERWISE SHOWN ALL TABLES OWNED BY OZMIN ***
REM ******************************************************


REM AUTHORITY TABLE FOR EXTENDABLE ATTRIBUTES FOR THE DEPOSDATA TABLE

CREATE TABLE DEPOSATTRIBS (
        ATTRIBID        CHAR    (4)       NOT NULL,
        ATTRIBNAME      CHAR    (32),
        VALUEID         CHAR    (4)       NOT NULL,
        VALUENAME       CHAR    (32)      NOT NULL,
        PRIMARY KEY ( ATTRIBID, VALUEID ) )
TABLESPACE TBSPA;

GRANT SELECT ON DEPOSATTRIBS TO PUBLIC;

CREATE UNIQUE INDEX DEPOSATTRIBIDS   ON DEPOSATTRIBS ( ATTRIBID,
VALUEID )
TABLESPACE INDXA;
CREATE UNIQUE INDEX DEPOSATTRIBNAMES ON DEPOSATTRIBS ( ATTRIBID,
VALUENAME )
TABLESPACE INDXA;


REM VIEW COMBINING DEPOSATTRIBS WITH NGMA.AGSOMINERALS USING UNIONS

CREATE VIEW DEPOSATTRIBMINS AS (
        SELECT ATTRIBID, ATTRIBNAME, VALUEID, VALUENAME
            FROM OZMIN.DEPOSATTRIBS
        UNION
        SELECT 'OMIN', 'Ore mineral', MINABBREV, MINNAME
            FROM NGMA.AGSOMINERALS
            WHERE ORE = 'O'
        UNION
        SELECT 'GMIN', 'Gangue mineral', MINABBREV, MINNAME
            FROM NGMA.AGSOMINERALS );
```

```
GRANT SELECT ON DEPOSATTRIBMINS TO PUBLIC;


REM AUTHORITY TABLE FOR EXTENDABLE ATTRIBUTES FOR THE REGROCKSDATA
TABLE

CREATE TABLE REGATTRIBS (
        ATTRIBID        CHAR    (4)       NOT NULL,
        ATTRIBNAME      CHAR    (32),
        VALUEID         CHAR    (4)       NOT NULL,
        VALUENAME       CHAR    (32)      NOT NULL,
        PRIMARY KEY ( ATTRIBID, VALUID ) )
TABLESPACE TBSPA;

GRANT SELECT ON REGATTRIBS TO PUBLIC;

CREATE UNIQUE INDEX REGATTRIBVIDS   ON REGATTRIBS ( ATTRIBID, VALUEID
)
TABLESPACE INDXA;
CREATE UNIQUE INDEX REGATTRIBVNAMES ON REGATTRIBS ( ATTRIBID,
VALUENAME )
TABLESPACE INDXA;


REM VIEW COMBINING REGROCKDATATYPES WITH NGMA.AGSOMINERALS USING
UNIONS

CREATE VIEW REGATTRIBMINS AS (
        SELECT ATTRIBID, ATTRIBNAME, VALUEID, VALUENAME
            FROM OZMIN.REGATTRIBS
    UNION
        SELECT 'CM', 'Common mineral', MINABBREV, MINNAME
            FROM NGMA.AGSOMINERALS
            WHERE COMMON = 'C' );

GRANT SELECT ON REGATTRIBMINS TO PUBLIC;


REM AUTHORITY TABLE FOR COMMODITY TYPES - e.g. 'Au', 'Cu', 'Zn'

CREATE TABLE COMMODTYPES (
        COMMODID        CHAR    (4)       NOT NULL  PRIMARY KEY,
        COMMODNAME      CHAR    (32)      NOT NULL,    /* CURRENTLY
LAST FIELD */
        MINLOCID        CHAR    (11) )
TABLESPACE TBSPA;

GRANT SELECT ON COMMODTYPES TO PUBLIC;

CREATE UNIQUE INDEX COMMODTYPEIDS ON COMMODTYPES ( COMMODID )
TABLESPACE INDXA;
```

APPENDIX B - OZMIN DATA CODING FORMS

DEPOSIT NAME:

SITES FORM

Originator (up to 4 digits)	
Site ID (up to 16 chars)	
Field ID (up to 16 chars)	
Obs. date (e.g. DD-MM-YY)	
Obs. time (e.g. HH-MM)	
Country (3 chars)	AUS (default)
State (3 chars)	
Geological Province (up to 5 digits)	
Subprovince (up to 5 digits)	
Domain (up to 5 digits)	
Geographic area (up to 64 chars)	
Location description (up to 64 chars)	
1:100 000 map sheet (4 digits)	
Latitude (decimal) e.g. 12.123456^0 *	S
Longitude (decimal) e.g. 123.123456^0 *	E
AMG Metres East (6 digit) *	
AMG Metres North (7 digit) *	
Location Method (up to 3 digits)	
Bibliographic reference (up to 6 digits)	
Absolute accuracy (up to 4 digits)	
Airphoto (up to 36 chars)	
Height in metres (up to 5 digits)	
± metres (up to 3 digits)	
Related datasets	

Fields that are in bold are mandatory, others are optional

* either the lat-long **or** AMG coordinates are mandatory

DEPOSITS FORM

Name (up to 80 chars)	
Synonyms (up to 80 chars)	
Field checked (Y or N)	
Exposed (Y or N)	
Age Method (up to 8 char)	
OZCHRON Record (up to 6 digit)	
Age (up to 32 char)	
Comments (up to 255 chars)	

Commodities Block

Com	Prodn	U	Year	Resource	Grade	U	Tot com.	U	Comments

Extendable Attributes Block

Attribute	Values
Classification (CLA)	
Ore Controls (CON)	
Expression (EXP)	
Gangue Minerals (GMIN)	
Mineralisation Style (MIS)	
Mineralisation Texture (MIT)	
Operating Status (OPS)	
Ore Minerals (OMIN)	
Orientation (ORI)	strike: dip: plunge:
Relation to Host (REH)	
Shape (SHA)	
Structural Modifier (SMO)	

HOST ROCKS FORM **Deposit Name:**

Host Rock 1

Qualifier (up to 20 chars)	
Lithology (up to 20 chars)	
Description (up to 64 chars)	
Metamorphic Age (up to 32 chars)	
Metamorphic Grade (2 chars)	
Comments (up to 64 chars)	
Informal Unit Name (up to 64 chars)	
Stratigraphic Unit (check STRATLEX)	

Extendable Attributes for Host Rock 1

Attribute	Values
Alteration (ALT)	
Common Minerals (CM)	

Host Rock 2

Qualifier (up to 20 chars)	
Lithology (up to 20 chars)	
Description (up to 64 chars)	
Metamorphic Age (up to 32 chars)	
Metamorphic Grade (2 chars)	
Comments (up to 64 chars)	
Informal Unit Name (up to 64 chars)	
Stratigraphic Unit (check STRATLEX)	

Extendable Attributes for Host Rock 2

Attribute	Values
Alteration (ALT)	
Common Minerals (CM)	

HOST ROCKS FORM (continued) **Deposit Name:**

Host Rock 3

Qualifier (up to 20 chars)	
Lithology (up to 20 chars)	
Description (up to 64 chars)	
Metamorphic Age (up to 32 chars)	
Metamorphic Grade (2 chars)	
Comments (up to 64 chars)	
Informal Unit Name (up to 64 chars)	
Stratigraphic Unit (check STRATLEX)	

Extendable Attributes for Host Rock 3

Attribute	Values
Alteration (ALT)	
Common Minerals (CM)	

Host Rock 4

Qualifier (up to 20 chars)	
Lithology (up to 20 chars)	
Description (up to 64 chars)	
Metamorphic Age (up to 32 chars)	
Metamorphic Grade (2 chars)	
Comments (up to 64 chars)	
Informal Unit Name (up to 64 chars)	
Stratigraphic Unit (check STRATLEX)	

Extendable Attributes for Host Rock 4

Attribute	Values
Alteration (ALT)	
Common Minerals (CM)	

DEPOSIT ENVIRONMENT FORM **Deposit Name:**

Igneous rocks 1

Qualifier (up to 20 chars)	
Lithology (up to 20 chars)	
Description (up to 64 chars)	
Proximity (up to 2 chars)	
Igneous age (up to 4 digits)	
Comments (up to 64 chars)	
Informal Unit Name (up to 64 chars)	
Stratigraphic Unit (check STRATLEX)	

Igneous rocks extendable attributes for igneous rock 1

Attribute	Values
Alteration (ALT)	
Common Minerals (CM)	
Igneous rocks - type (ITY)	
Metamorphic grade (MMG)	

Igneous rocks 2

Qualifier (up to 20 chars)	
Lithology (up to 20 chars)	
Description (up to 64 chars)	
Proximity (up to 2 chars)	
Igneous age (up to 4 digits)	
Comments (up to 64 chars)	
Informal Unit Name (up to 64 chars)	
Stratigraphic Unit (check STRATLEX)	

Igneous rocks extendable attributes for igneous rock 2

Attribute	Values
Alteration (ALT)	
Common Minerals (CM)	
Igneous rocks - type (ITY)	
Metamorphic grade (MMG)	

Structures

Structure - type (STY)	Structure - proximity (SPY)

APPENDIX C - LEGAL VALUE DEFINITIONS FOR SELECTED ATTRIBUTES

ALTERATION

albitic (AB)	Albite is the dominant alteration phase, although associated minerals are generally of the propylitic assemblage, especially epidote. Includes albitization and sodic alteration.
argillic (AR)	Alteration is characterised by minerals belonging to the clay group. Assemblages are characterised by dickite, kaolinite, pyrophyllite, montmorillonite, and halloysite, usually with sericite, quartz, and possibly alunite, pyrite, tourmaline, topaz, diaspore, and amorphous clays. No distinction is made here between advanced and intermediate argillic alteration.
carbonate (CA)	Covers the different carbonate minerals that form as the dominant alteration (e.g. calcite, dolomite, ankerite, siderite, etc).
chloritic (CL)	Characterised by chlorite.
greisen (GR)	Formed by pneumatolytic alteration of granitic rocks and composed largely of quartz, mica (usually muscovite or lepidolite), and topaz, with tourmaline, fluorite, rutile, cassiterite, and wolframite as common accessory minerals.
hematitic (HM)	Characterised by hematite.
other (OTH)	This value is provided as a 30 character free text field to record uncommon alteration which does not conform to the above legal values (e.g. fuchsite alteration at Hellyer). Depending on usage, a given type of wallrock alteration frequently recorded as other may be elevated to a legal value in future, if necessary.
potassic (PO)	Alteration that forms as a consequence of potassium metasomatism which is characterised by the formation of potassium feldspar and/or biotite.
propylitic (PR)	Characterised by an assemblage of epidote, chlorite, and carbonate and commonly associated with sericite, albite, zeolites, pyrite, or iron oxides.
pyritic (PY)	Characterised by pyrite.
sericitic (SE)	Sericite, quartz, and pyrite are the prominent mineral phases. Synonymous with phyllic alteration.
silicification (SI)	The introduction of, or replacement by silica which generally results in the formation of fine grained quartz, chalcedony, or opal.

skarn (SK) Skarn alteration consists of coarse-grained Ca-Fe-Mg-Mn silicates formed by replacement of carbonate-bearing rocks accompanying regional or contact metamorphism or metasomatism. Skarn that replaces dolomite largely consists of magnesian silicates such as forsterite and serpentine (magnesian skarn). Those formed by the replacement of limestone consist of Fe-Ca silicates such as andradite and hedenbergite (calcic skarn).

serpentinisation (SP) Replacement of magnesium-rich silicate minerals by serpentine minerals such as chrysotile, antigorite, etc.

zeolitic (ZE) Alteration is dominated by zeolite minerals, although minerals found in propylitic assemblages are generally present also.

MINERALISATION STYLE

alluvial (AL) Mineralisation results from weathering, transport, and mechanical concentration such as in a placer deposit.

bed (BE) Said of mineralisation that is confined to a layer parallel to bedding or layering.

breccia (BR) A coarse-grained clastic rock which acts as a host to mineralisation and is composed of angular broken rock fragments held together by a mineral cement or a fine-grained matrix. No judgement is made as to whether the breccia is of sedimentary, igneous, or tectonic origin.

evaporitic (EV) Mineralisation produced by evaporation from a saline solution (e.g. anhydrite, gypsum, rock salt).

magmatic (MAG) Applied to mineralisation that is formed by magmatic segregation. Includes metal oxide concentrations and immiscible sulphide liquid accumulations generally in mafic rocks and layered intrusions, and extends to mineralisation associated with pegmatites.

multiple bed (MB) As for bed, except that more than one bed is present.

multiple vein (MV) As for a single vein, except that there are a series of veins filling faults or fractures which are likely to have a similar orientation.

replacement (RPL) Mineralisation results from the replacement of host rock material

residual (RE) Mineralisation results from an in situ accumulation caused by weathering. The accumulation may be mechanical (e.g. an eluvial Sn or Au deposit) or the result of chemical alteration in a weathered zone (e.g. kaolin, lateritic nickel, and some bauxite deposits). The important distinction between alluvial and residual is that in the latter the mineralisation forms in situ with little or no transportation.

skarn (SK) — Mineralisation associated with skarn gangue minerals formed by the replacement of carbonate-rich host rocks.

stockwork (ST) — A closely spaced three dimensional network of planar to irregular veinlets.

supergene (SUP) — Mineralisation forms as an enrichment near the surface by deposition from descending solutions.

surficial (SUR) — Refers to mineralisation that has formed at or near the surface as a chemical accumulation (e.g. calcrete, bog ore).

single vein (SV) — A single epigenetic mineral filling of a fault or fracture in the host rock, possibly with associated replacement of the host rock.

shear zone (SZ) — A tabular zone of rock that is a suitable site for mineralisation because it has been crushed and brecciated by many parallel fractures due to shear strain.

MINERALISATION TEXTURE

brecciated (BX) — Ore occurs as angular fragments resulting from subsequent crushing of the original ore.

cumulus (CU) — An accumulation of early crystallising ore minerals that have formed from a fractionating magma.

disseminated (DI) — Ore minerals occur as scattered grains throughout the host rock.

intercumulus (IC) — Ore minerals that have formed late from a magma in the space between crystals of a cumulus.

laminated (LA) **(or banded)** — Ore minerals occur in thin layers or bands with differing colour or texture which may or may not reflect differences in mineral composition.

massive (MA) — Ore minerals (especially sulphides) are concentrated in one place as opposed to disseminations.

nodular (NO) — Ore consists of small irregularly rounded lumps or nodules which may have aggregated and may form in a matrix of similar or different composition (includes colloform textures).

pisolitic (PI) — Ore consists of an aggregate of small, round or ellipsoidal pea-sized grains or pisoliths

zoned (ZO) — Ore minerals have a regular spatial distribution or pattern about a feature such as a centre of intrusive activity or a vein.

RELATION TO HOST (REH)

concordant (CO) Mineralisation displays parallelism to bedding or structure in the host rocks.

discordant (DI) Mineralisation lacks conformity or parallelism to bedding or structure in the host rocks.

intrusive contact (IC) Mineralisation occurs along the contact between an igneous intrusion and the enclosing rocks.

stratabound (SB) Mineralisation is confined to a single stratigraphic unit.

stratiform (SF) A special type of stratabound deposit in which the mineralisation is strictly coextensive with, one or more sedimentary, metamorphic, or igneous layers (e.g. beds of salt or iron oxide, layers rich in chromite or platinum group elements in a layered igneous rock complex).

SHAPE (SHA)

irregular (IR) refers to a mineralised body which has no discernible regularity of form.

lenticular (LE) refers to a mineralised body that is lens shaped in cross section (includes podiform).

pipe-like (PL) refers to a mineralised body that is either cylindrical or funnel-shaped and more or less vertical. (It could be a vein deposit or a breccia column and still be classified as pipe-like.)

sheeted (SH) used where the mineralised body consists of a series of thin continuous masses which are areally extensive relative to their thickness.

tabular (TA) used where the mineralised body is characterised by two long dimensions and one short dimension.

APPENDIX D - COX AND SINGER DEPOSIT CLASSIFICATION

Deposits related to mafic and ultramafic intrusions in stable environments

1 Stillwater Ni-Cu
2a Bushveld Cr
2b Merensky Reef PGE
3 Bushveld Fe-Ti-V

Deposits related to mafic-ultramafic rocks in unstable areas

5a Duluth Cu-Ni-PGE
5b Noril'sk Cu-Ni-PGE
6a Komatiitic Ni-Cu
6b Dunitic Ni-Cu
7a Synorogenic-synvolcanic Ni-Cu
7b Anorthosite Ti
8a Podiform Cr
8c Limassol Forest Co-Ni
8d Serpentine-hosted asbestos
9 Alaskan PGE

Deposits related to alkaline intrusions

10 Carbonatite deposits
12 Diamond pipes

Deposits related to felsic phanerocrystalline intrusive rocks

14a W skarn
14b Sn skarn
14c Replacement Sn
15a W veins
15b Sn veins
15c Sn greisen

Deposits related to felsic porphyroaphanitic intrusions

16 Climax Mo
17 Porphyry Cu
18a Porphyry Cu, skarn related
18b Cu skarn
18c Zn-Pb skarn
18d Fe skarn
18e Carbonate-hosted asbestos
19a Polymetallic replacement
19b Replacement Mn
20a Porphyry Sn
20b Sn-polymetallic veins
20c Porphyry Cu-Au
21a Porphyry Cu-Mo
21b Porphyry Mo, low F
22a Volcanic-hosted Cu-As-Sb
22b Au-Ag-Te veins

22c Polymetallic veins

Deposits related to subaerial mafic extrusive rocks
23 Basaltic Cu

Deposits related to marine mafic extrusive rocks
24a Cyprus massive sulphide
24b Besshi massive sulphide
24c Volcanogenic Mn
24d Blackbird Co-Cu

Deposits related to subaerial felsic to mafic extrusive rocks
25a Hot spring Au-Ag
25b Creede epithermal veins
25c Comstock epithermal veins
25d Sado epithermal veins
25e Epithermal quartz-alunite Au
25f Volcanogenic U
25g Epithermal Mn
25h Rhyolite-hosted Sn
25i Volcanic-hosted magnetite
26a Carbonate-hosted Au-Ag
27a Hot spring Hg
27b Almaden Hg
27c Silica-carbonate Hg
27d Simple Sb

Deposits related to marine felsic to mafic extrusive rocks
28a Kuroko massive sulphide
28b Algoma Fe

Deposits in clastic sedimentary rocks
29a Quartz pebble conglomerate Au-U
29b Olympic Dam Cu-U-Au
30a Sandstone-hosted Pb-Zn
30b Sediment-hosted Cu
30c Sandstone U
31a Sedimentary exhalative Zn-Pb
31b Bedded barite
31c Emerald veins

Deposits in carbonate rocks
32a Southeast Missouri Pb-Zn
32b Appalachian Zn
32c Kipushi Cu-Pb-Zn

Chemical-sedimentary rocks
34a Superior Fe
34b Sedimentary Mn

34c Upwelling type phosphate
34d Warm-current type phosphate

Deposits related to regionally metamorphosed rocks

36a Low-sulphide Au-quartz veins
36b Homestake Au
37a Unconformity U-Au
37b Gold in flat faults

Deposits related to surficial processes and unconformities

38a Lateritic Ni
38b Laterite type bauxite
38c Karst type bauxite
39a Placer Au-PGE
39b Placer PGE-Au
39c Shoreline placer Ti
39d Diamond placers
39e Alluvial placer Sn