AGSO

USERS' GUIDE TO THE OZCHRON DATABASE OF AUSTRALIAN GEOCHRONOLOGY

by
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ABSTRACT

OZCHRON is a relational computer database of Australian isotopic age determinations that records all primary analytical data as well as calculated or interpreted ages. The initial data in OZCHRON is mainly from the Proterozoic, but the database will eventually span all parts of the geological time scale. The dating methods currently covered by OZCHRON are K-Ar, Ar-Ar, Rb-Sr, Sm-Nd, U-Pb Mineral and U-Pb SHRIMP.

OZCHRON is one of a family of field and laboratory databases that include mineral deposits, regolith, rock chemistry, petrography, stream-sediment geochemistry, geophysical rock properties and ground spectral properties for remote sensing. All these databases rely on a central Field Database for information on geographic location, outcrops and rock samples. OZCHRON depends, in particular, on the Field Database's SITES and ROCKS tables, as well as a number of lookup tables of standard terms. The SITES table allows OZCHRON tables to be accessed from geographic information systems.

This guide presents an overview of OZCHRON's infrastructure and describes in detail the menus and screen forms used to input and view the data. In particular, the definitions of most fields in the database are given in some depth under descriptions of the screen forms - providing, in effect, a comprehensive data dictionary of the database. The database schema, with all definitions of tables, views and indexes is contained in an appendix to the guide.

1 - INTRODUCTION

OZCHRON is a database of physical age determinations of Australian rocks and the analytical data on which they are based, but it does include some results from Antarctica and Papua New Guinea. Currently, the data are mainly from the Proterozoic, but the database is being expanded to the Archaean, and eventually to the entire geological time scale. OZCHRON has tables for the following methods - K-Ar, Ar-Ar, Rb-Sr, Sm-Nd, U-Pb Mineral, and U-Pb Sensitive High-Resolution Ion Microprobe (SHRIMP). Tables for sources of data and analytical methods, and links to AGSO's Field and Bibliographic Reference Databases, are an integral part of the system. OZCHRON currently runs on the Oracle 6.0 relational database management system (RDBMS) under UNIX 5.4 on AGSO's DG AViiON 6240 computer.

OZCHRON is one of a number of field and laboratory databases that make up the National Geoscience Mapping Accord (NGMA) Database System (Figure 1). ROCKCHEM, for example, is a laboratory database of rock chemistry that shares its field information with OZCHRON. Comprehensive information on OZCHRON's dated rock samples and their locations reside in the Field Database, which is described in detail in the user's guide to that database (Ryburn *et al.*, 1993). However, brief accounts of the parts of the Field Database that are critical to OZCHRON are also included here.

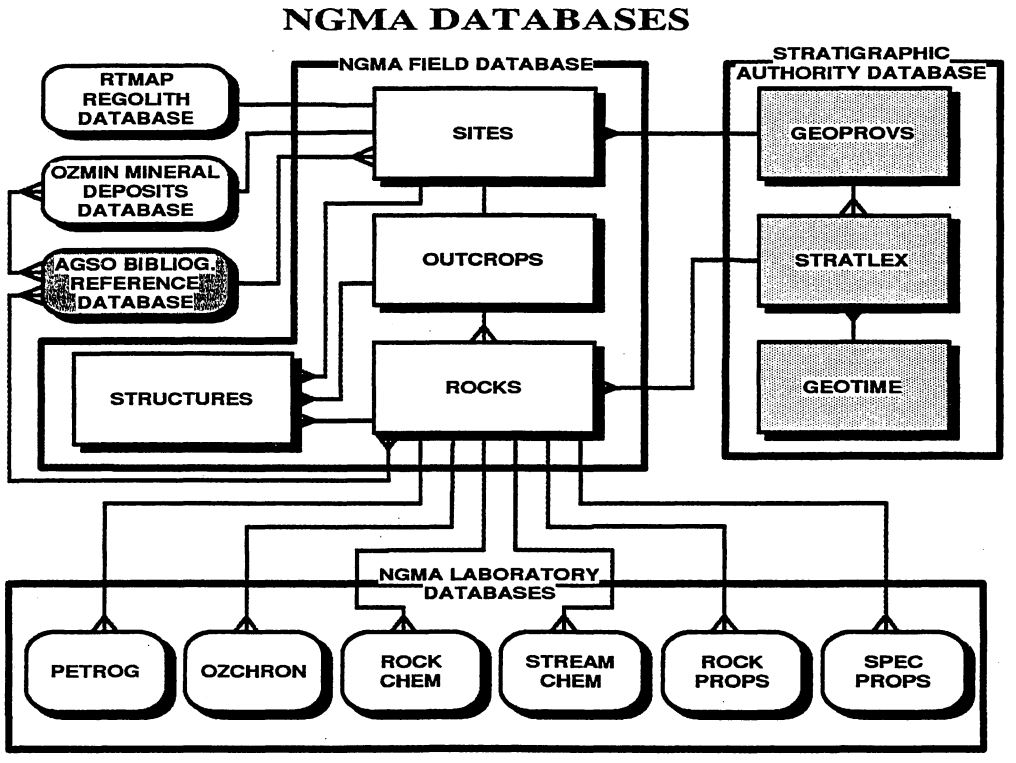

Figure 1. Simplified Structure of the NGMA Database System.

This guide describes the infrastructure of the OZCHRON Database, including all screen forms and definitions of all fields and tables. A preliminary account of OZCHRON and the data in it is given by Page *et al.* (1993). For information on the AViiON server, AGSO's Oracle environments and the use of SQL*Plus, SQL*Forms, etc., see the 'Users' Guide to AGSO's Oracle Database System' (Lenz *et al.* 1993).

Although OZCHRON has had modest beginnings, we hope the database will eventually become the authoritative source of rock geochronological data from Australia. By developing the database in a shared corporate relational database mangement system (Oracle), accessible via the SQL language, we are trying to ensure that the database will remain accessible, portable and flexible. Geographic information systems and client-server types of graphical application can make use of the data directly from the database.

2 - STRUCTURE OF THE FIELD DATABASE

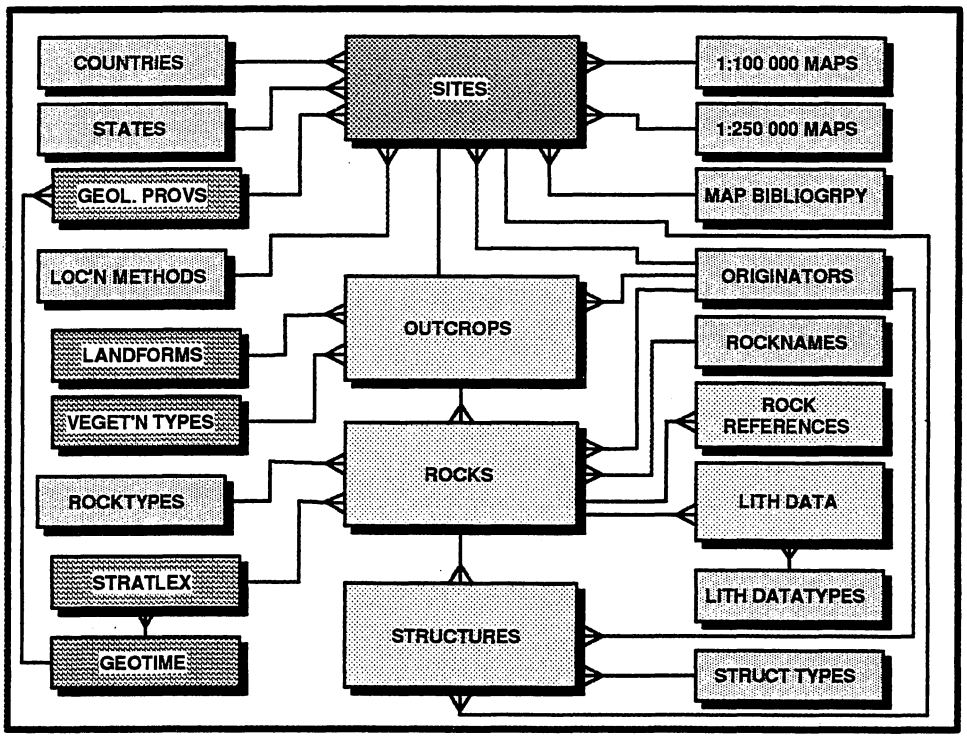

Figure 2. The structure of the NGMA Field Database showing relationships between tables with 'crows' feet' at the 'many' end of many-to-one links. The authority table labels emphasise function and are not necessarily actual table names (see below).

The Field Database has five main data tables - SITES, OUTCROPS, ROCKS, LITHDATA and STRUCTURES - of which only SITES and ROCKS are essential to OZCHRON. These tables are accessed via the Sites and Rocks screen forms, which are briefly described later in this guide (see sections 7 and 8). Also relevant, though, is the ROCKREFS table, which links

rock samples to bibliographic references (see section 9). Most of the other tables in Figure 2 are lookup tables used to validate the classifications and nomenclature used in the main tables.

The main data tables in the NGMA Field Database are owned by the Oracle user called 'NGMA'. The ownership of all tables is indicated in full table names by a prefix occurring before the decimal point. The contents of the main NGMA data tables are as follows -

TABLE NAME	CONTENTS
NGMA.SITES	ground sites location data, accuracy & lineage
NGMA.OUTCROPS	outcrop-related data, including drill holes
NGMA.ROCKS	rock samples and lithological data
NGMA.LITHDATA	extendable attributes for the ROCKS table
NGMA.STRUCTURES	mesoscopic structures at a site or outcrop
NGMA.ROCKREFS	bibliographic reference *versus* rock samples

In addition, the following views of the above tables allow ordinary users (as opposed to owners or custodians) to add, update and delete their own data - NGMA.USITES, NGMA.UOUTCROPS, NGMA.UROCKS, NGMA.ULITHDATA NGMA.USTRUCTURES and NGMA.UROCKREFS. There are also a number of authority tables and one view, not all of which belong to NGMA. Those of possible interest to OZCHRON users include -

TABLE NAME	CONTENTS	CUSTODIAN
NGMA.ORIGINATORS	contributors of data	Murray Hazell
NGMA.AGSOCOUNTRIES	list of valid countries	Rod Ryburn
NGMA.AGSOSTATES	list of valid Australian States	Rod Ryburn
NGMA.QMAPS	Australian 1:250 000 map sheets	Murray Hazell
NGMA.HMAPS	Australian 1:100 000 map sheets	Murray Hazell
NGMA.LOCMETHODS	spatial location methods	Richard Blewett
NGMA.ROCKTYPES	basic classification of rocktypes	Lesley Wyborn
NGMA.LITHNAMES	lithological names	Jan Knutson
NGMA.LITHDATATYPES	extendable lithological attributes	P. Stuart-Smith
NGMA.AGSOMINERALS	mineral names	Morrie Duggan
NGMA.ROCKDATATYPES	view of lithdatatypes/agsominerals union	
STRATA.GEOPROVS	Australian geological provinces	D. Palfreyman
STRATA.STRATLEX	Australian stratigraphic names	Cathy Brown
STRATA.GEOTIME	geological time scale	John Laurie

As a general rule, only the designated custodians are permitted to change the data in these tables. Full definitions of all tables, indexes and views used by the Field Database are given in Appendix A of Ryburn et. al (1993).

3 - STRUCTURE OF OZCHRON

As indicated in Figure 3, the OZCHRON database currently consists of 11 main data tables. Except for K-Ar results, which occupy a single table, all other geochronology methods require two tables - one for the analytical data and one for the pooled results with model ages. The analytical tables have a many-to-one relationship with the pooled results table, as the age determinations often depend on data from more than one analysis, mineral or sample. Not shown in Figure 3 are the OZCHRON.METHODS and NGMA. ORIGINATORS tables which are used for validation purposes by the OZCHRON data tables. Full definitions of all OZCHRON tables are given in the appendix to this guide.

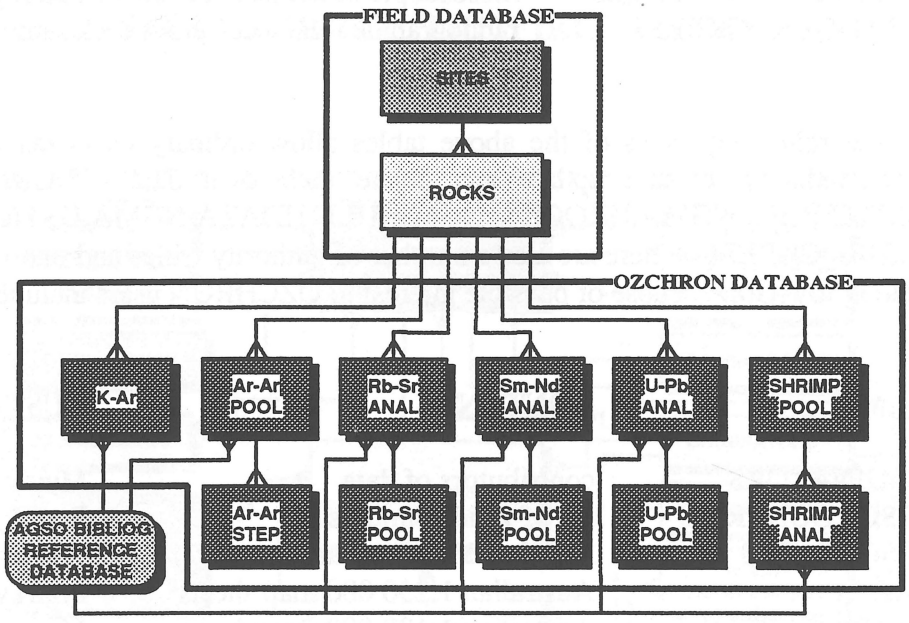

Figure 3. Simplified structure of OZCHRON showing joins to the Field and Bibliographic Reference Databases. Validation tables not shown. The 'many' end of many-to-one joins are indicated by 'crows feet'.

All OZCHRON tables and their contents are listed below. The only table that is not owned by OZCHRON is the NGMA.ORIGINATORS table, which lists the names and numbers of all 'Originators' of rock samples. The Originator Number is an essential component to the identification of all samples (see section 4) and is present with the Sample ID in either the pooled results or analytical data tables for each dating method. Unlike the Field Database, OZCHRON does not use special views (see section 5) of its data tables to prevent one user altering another's data. The relatively few OZCHRON users wishing to enter or alter records are granted specific insert and update privileges on the tables they require. Others have select access only.

TABLE NAME	CONTENTS
OZCHRON.K_AR	Potassium-Argon results
OZCHRON.AR40_39A	Argon-Argon sample & mineral data
OZCHRON.AR40_39B	Argon-Argon analytical data & ages
OZCHRON.RB_SR	Rubidium-Strontium analytical data
OZCHRON.RBSR_AGES	Rubidium-Strontium pooled results
OZCHRON.SM_ND	Samarium-Neodymium analytical data
OZCHRON.SMND_AGES	Samarium-Neodymium pooled results
OZCHRON.U_PB	Uranium-Lead Mineral analytical data
OZCHRON.UPB_AGES	Uranium-Lead Mineral pooled results
OZCHRON.SHRIMP	Uranium-Lead Ion Microprobe analytical data
OZCHRON.SHRIMP_AGES	Uranium-Lead Ion Microprobe pooled results
OZCHRON.METHODS	Validation table - analytical methods used
NGMA.ORIGINATORS	Validation table - contributors of data
OZCHRON.MAXNOS	Table for tracking primary keys in the data tables

Full definitions of all tables and indexes used by OZCHRON are listed in the appendix to this guide.

4 - SITE AND SAMPLE NUMBERING

Tables in OZCHRON and the Field Database maintain original site and sample 'numbers' with the help of an Originator Number (Origno). In most cases the sample number will be the same as the site number, perhaps with one or two appended letters to distinguish several samples at the one site, but ***sample numbers can be unrelated to site numbers.*** If all sites and samples were from AGSO, and had unique registered numbers, then the site and sample numbers would be sufficient on their own. However, AGSO databases also contain data provided by universities, State geological surveys, companies and private individuals, all of whom use their own numbering systems. The Originator Number is needed to preserve uniqueness amongst diverse numbering systems. Originator numbers are recorded against names in the NGMA.ORIGINATORS authority table.

A site in the SITES table is fully identified 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. The uniqueness of an Originator Number and Site ID combination is enforced by a unique index covering these fields. Similarly, a sample in the ROCKS table is fully identified by a unique combination of Originator Number and Sample ID (Sampleid), which is protected by a trigger in the ROCKS form - it is not possible to enter a combination already in the ROCKS table. All analytical tables in OZCHRON and other laboratory databases record both the Originator Number and Sample ID. Although a sample number on its own is usually sufficient to fetch the required sample, do not forget that ***sample numbers on their own are not unique***.

The originator of a site or sample is the person or organisation primarily responsible for the data. This could be the person who observed the site or collected the sample, a laboratory worker, or an author of published results - someone who might reasonably be expected to know about the sample and perhaps be able to supply further information. Note that the name of the Originator is recorded only once in the database. All other references to the Originator use the Originator Number, which is listed against the name in the NGMA. ORIGINATORS table.

5 - SECURITY AND ACCESS

Select-Only Database Access

The Oracle production environment allows all internal AGSO users select-only access to the main data tables in both the Field and OZCHRON Databases. The menu system provides 'read-only' versions of the forms that allow users to select most of the data in the databases, but not to insert, update or delete data. Users should also have select-only access to all validation tables. When in SQL*Plus, all users may select data from any of these tables provided they include the owner's name plus a full stop in the name of the table or view, e.g. -

SELECT SAMPLEID FROM NGMA.ROCKS WHERE ORIGNO = 56;

SELECT SITEID FROM OZCHRON.RB_SR WHERE ORIGNO = 56;

Insert, Update and Delete Oracle Access

In OZCHRON only those users that have been given specific insert, update and delete privileges by the owner can add or alter data. In the Field Database, however, all internal Oracle users on the production environment can add, change or delete ***their own data***. This is accomplished via special named views. Those relevant to OZCHRON, and their corresponding base tables, are as follows -

BASE TABLE	INSERT/UPDATE VIEW
NGMA.SITES	NGMA.USITES
NGMA.ROCKS	NGMA.UROCKS
NGMA.LITHDATA	NGMA.ULITHDATA
NGMA.ROCKREFS	NGMA.UROCKREFS

From the menu, special 'Insert/Update' versions of each form cover the above views. The restrictions applying to the above views are the same in each case. For example, the view USITES of the SITES table is defined as -

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

The word **USER** in the above statement is an Oracle function that returns the current Oracle username. 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 in the insert/update versions of the forms, and only they or 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

All 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. Note that custodians use the 'read-only' forms to insert, update and delete rows in the main data tables. This is because their access privileges apply to the base tables, not to views of the tables. The 'insert-update' forms do not allow them to retrieve records they do not own.

Owners' Access Rights

The user OZCHRON has complete privileges on all the tables it owns in the OZCHRON Database, as does NGMA in the Field Database.

6 - MENU SYSTEM

Access to OZCHRON and the Field Database is via a tree-structured 'NGMA' Menu System. This provides access to SQL*Plus, some reporting programs and nearly all screen forms associated with the NGMA Database System. Most ad-hoc queries, data inserts and updates are done via screen forms, although you should also know that batch retrievals and updates are often done via SQL*Plus (see Lenz *et al.*, 1993). To run the menu type -

ngma <ENTER>

- after logging into the AViiON UNIX environment and specifying your terminal type. This automatically puts you into the Oracle production environment and brings up the SQL*Menu login screen. After entering your Oracle username and password, the first menu screen is displayed. This currently looks like this -

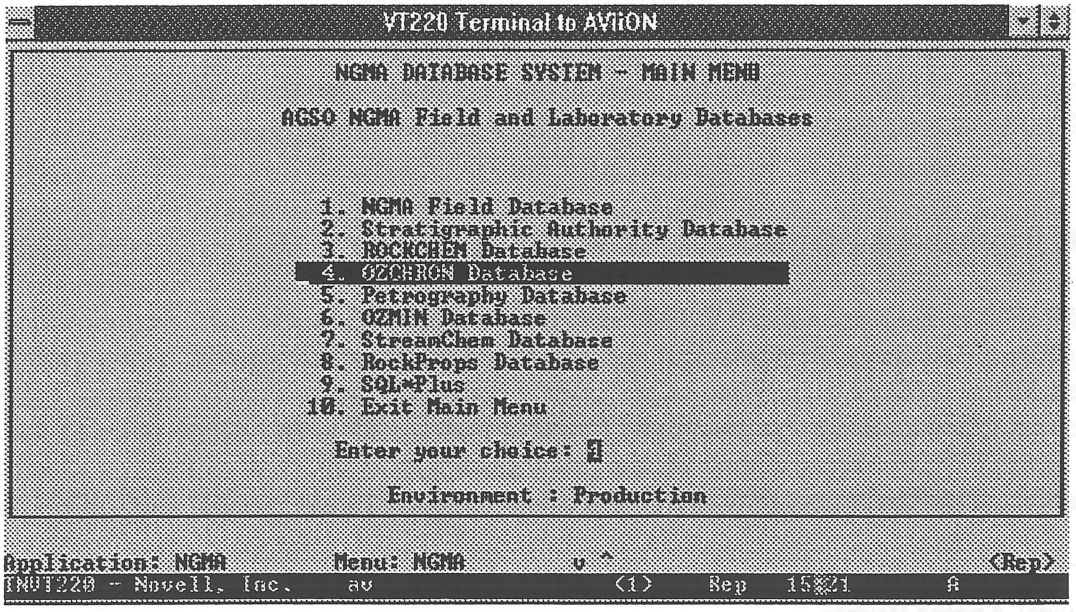

Figure 4. The Main Menu for the NGMA Database System. This menu gives access to nearly all areas of the NGMA database system.

Selecting item ***10*** in the menu, or pressing the ***EXIT*** function key, takes you back to the UNIX prompt. Item ***9*** puts you into the SQL*Plus command-line environment without having to log into Oracle again. To engage the OZCHRON database menu just enter ***4***, or move the highlight bar down to item 4 then press ***ENTER***. The following screen appears -

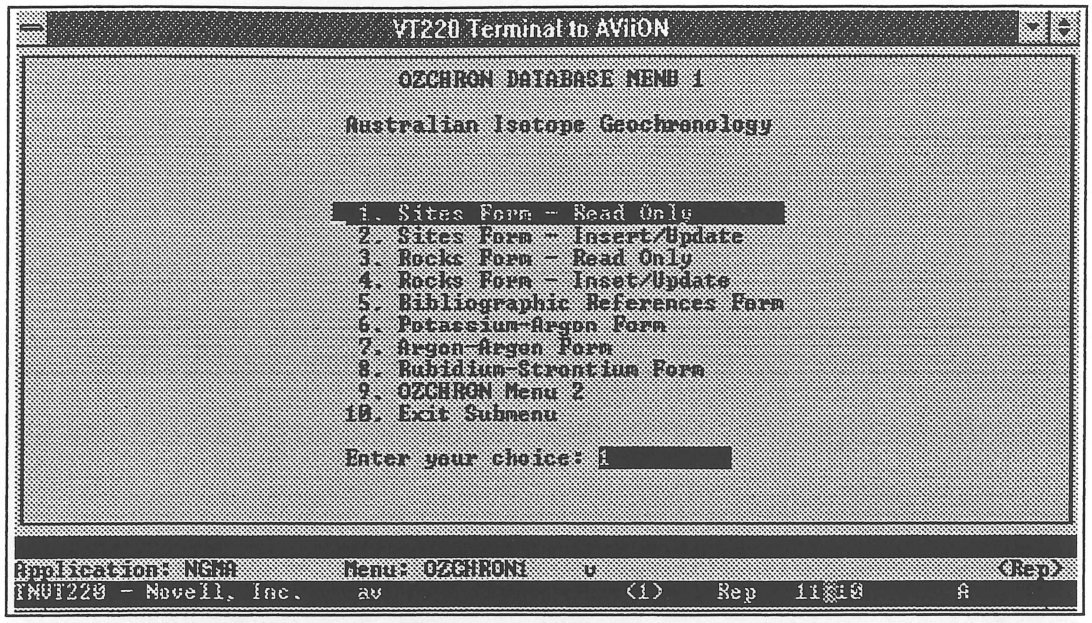

Figure 5. OZCHRON Menu 1.

This menu allows you to run the SITES, ROCKS, and REFERENCES forms from the Field Database as well as the K-Ar, Ar-Ar, and Rb-Sr OZCHRON forms. Selecting item ***10*** returns you to the Main Menu. Selecting item ***9*** runs the second OZCHRON menu -

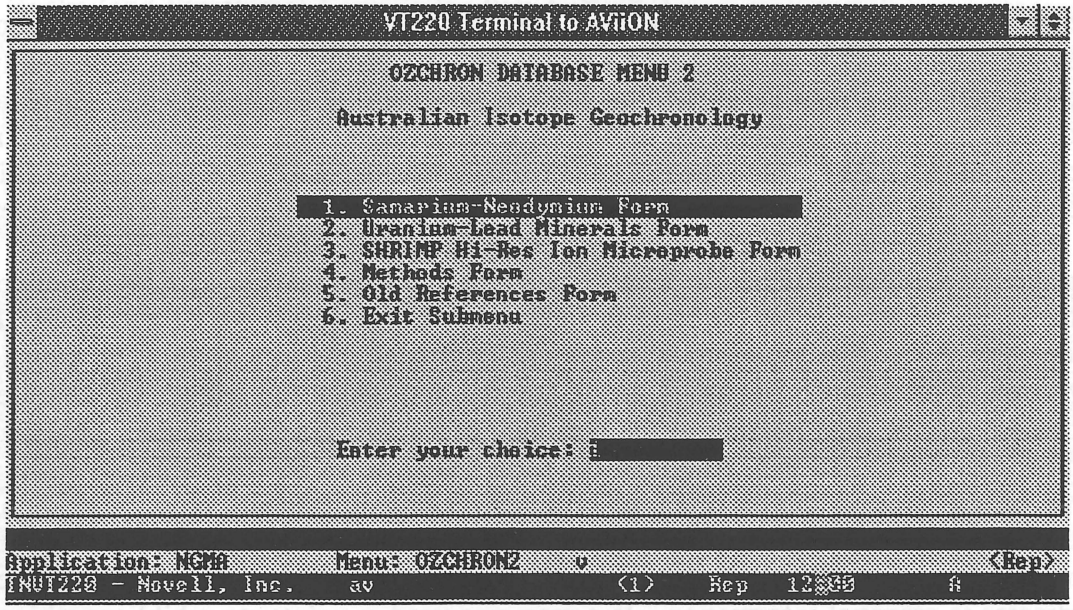

Figure 6. OZCHRON Menu 2.

All screen forms relevant to the OZCHRON Database are now described, including the Sites, Rocks and References Forms from the Field Database. Refer to Ryburn *et al.* (1993) for the full details of all the forms in the Field Database.

7 - THE SITES FORM

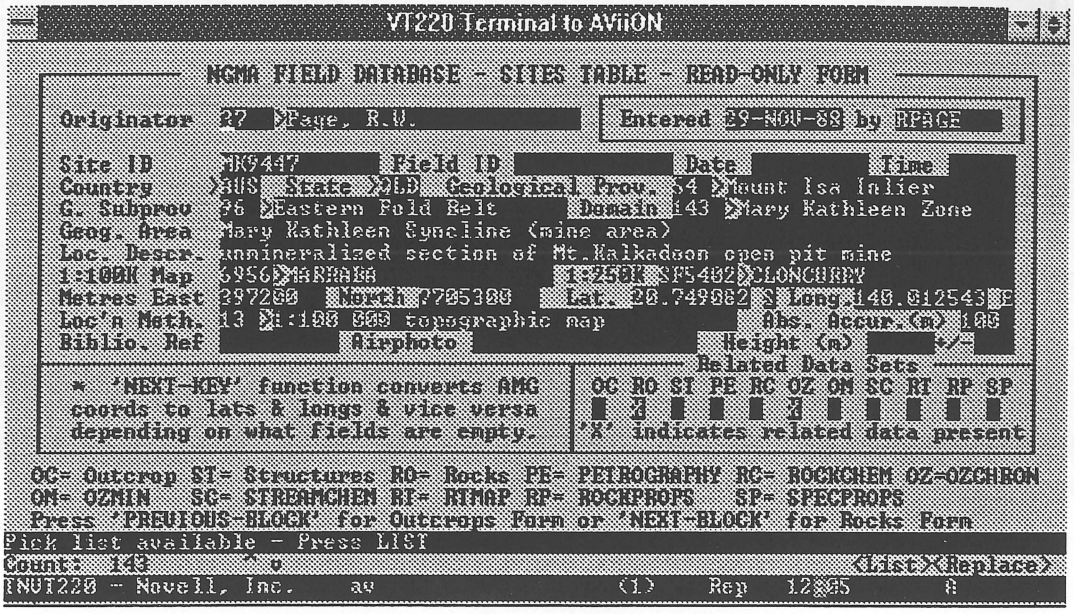

Figure 7. The Field Database's Sites Form.

The Sites Form standardises the way geographic point location data are recorded. The form attaches to the NGMA.SITES table, but also draws on standard terms from associated validation tables - such as the STRATA.GEOPROVS table. The form is primarily for surface location data relating to field geological, geochemical and geophysical observations - or of more interest to OZCHRON, for the locations of dated rock samples. You may move directly from the Sites Form to the Rocks Form by pressing ***NEXT BLOCK***. The Originator Number and Site ID are transferred to the Rocks Form, which is then automatically queried.

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 PRIMARY KEY***) that converts AMG coordinates to latitudes and longitudes, and *vice versa*. The direction of conversion is determined by which fields are full and which are empty. Of considerable importance are the data relating to the accuracy of the coordinates and their provenance - i.e., how they were obtained. Although the form insists on an absolute accuracy estimate in metres on the ground this is often an order-of-magnitude estimate only. Location data accurate to ±100 metres are generally acceptable when plotted at 1:250 000 scale, but may be too inaccurate for use at 1:50 000 scale. Similarly, the method used to obtain the location coordinates is essential information. If a map was used, a pointer to a bibliographic reference (in AGSO's Biliographic Reference Database) to the exact map may also be included.

Detailed information on all the fields in the Sites table is given by Ryburn *et al.* (1993).

8 - THE ROCKS FORM

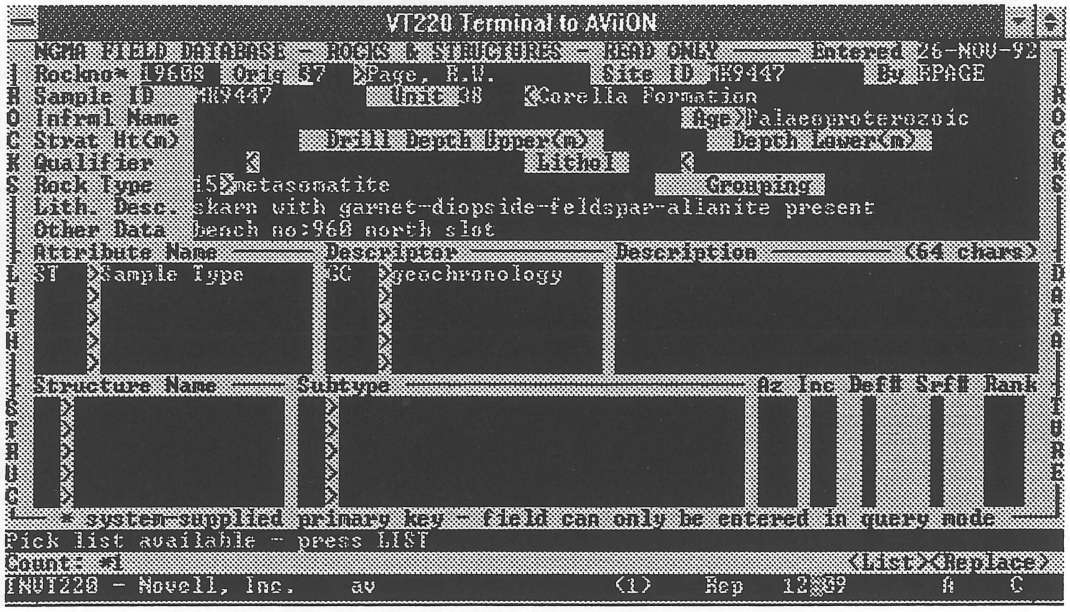

Figure 8. The Field Database's Rocks (and Structures) Form.

The Rocks (and Structures) Form is for data on lithologies, rock samples and mesoscopic geological structures that occur at a site or outcrop. It is a three-block form covering the ROCKS, LITHDATA and STRUCTURES tables. The ROCKS table has a many-to-one relationship with SITES. The LITHDATA table has a many-to-one relationship with the ROCKS table and functions as an extendable attributes table for that table. The STRUCTURES table also has a many-to-one relationship with ROCKS. A system-generated 'Rockno' key ties all three blocks together.

If a sample exists then a Sample Number must be supplied, otherwise the record is regarded as a lithology observation without a sample having been taken. The sample number can be the site number, or it can be different, but it must be unique to the originator. If the site number is used and several samples were taken, then the site number is typically modified by adding letters to represent each sample. This is the recommended system, as the connection between samples and sites is made clear. However, the data come from many sources, and as far as possible the numbering system used by the originator should be preserved.

The definitions and purposes of the fields in the form are given by Ryburn *et al.* (1993).

9 - THE BIBLIOGRAPHIC REFERENCES FORM

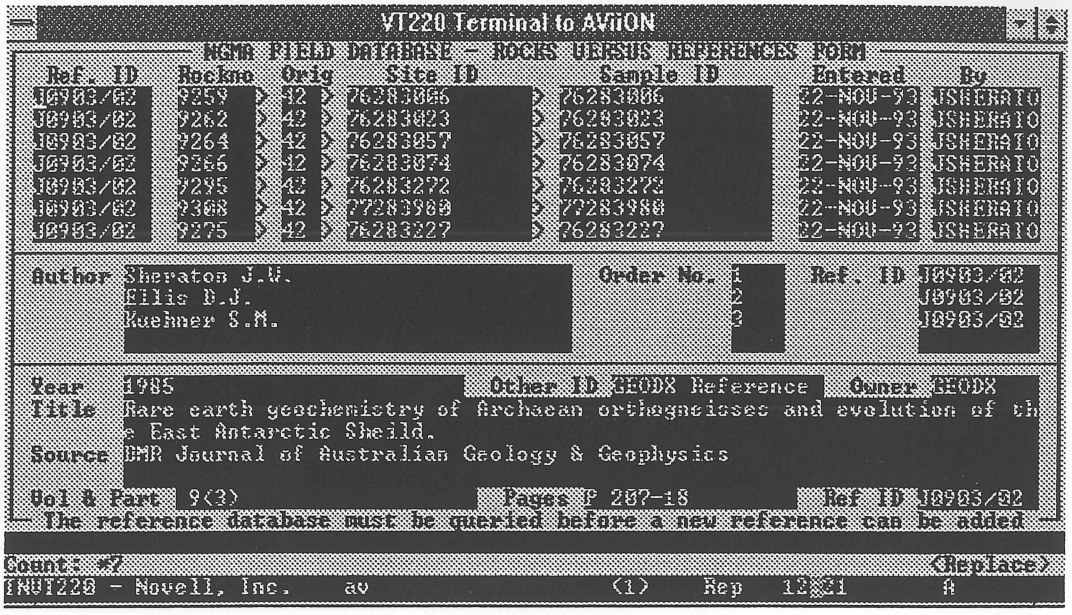

Figure 9. The (Rock) References Form.

This Field Database form links rock samples to AGSO's Bibliographic Reference Database. It also serves as access to all references flagged by Reference ID ('Ref. No.') in OZCHRON tables (see Figure 3). The form's top block corresponds to the NGMA.ROCKREFS table. It joins the NGMA.ROCKS table to the Reference Database in a many-to-many relationship. For any given rock sample there could be several references, and any one reference may refer to many rock samples. The top block shows all the Reference IDs for a particular Rockno, or all Rocknos for a particular Reference ID. 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 (Lenz & Modrak, 1990), 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. For the purpose of accessing AGSO's Reference Database, however, the top block can be ignored.

This form can also be used to inspect and insert the references pointed to by the Bibliographic Reference field in the NGMA.SITES table. A more complete description of AGSO's Bibliographic Reference Database will be be published in the users' guide to that database, but the information presented here is adequate for entering references required by OZCHRON, or attaching sites and rock samples to references. This corporate reference system now replaces OZCHRON's old reference table and reference numbering system. Old OZCHRON reference numbers are still shown in the Other ID field of the References Block.

To query AGSO's Reference Database by Ref. ID, authors, year, etc., press ***NEXT BLOCK*** to position the cursor in the Authors (or Reference) Block, then press ***ENTER QUERY*** to

obtain a pop-up query form. Enter your query information in this form then press ***EXECUTE QUERY*** to retrieve one or more references to the underlying form. Make your query criteria as specific as possible to speed retrieval. Single author queries are slow if there are many references by that author. Use ***NEXT RECORD*** to step through the retrieved references, and ***NEXT PRIMARY KEY*** to transfer the Reference ID of the currently displayed reference to the top block - to which a Rockno must be added. In this way, pre-existing references in the References Database may be attached to rock samples.

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 duplicated records is inevitable). To obtain the Reference Insert/Update Form 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 username 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.

TOP BLOCK

Not all the fields in the Top Block belong to the underlying NGMA.ROCKREFS table. As soon as a 'Rockno' is entered, the Originator, Site ID and Sample ID fields are automatically populated by a trigger from the NGMA.ROCKS table. To enter new records into ROCKREFS just add them to the bottom of the displayed records with ***NEXT FIELD***. As already mentioned, in this block the ***INSERT RECORD*** takes you into the 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 asterisk - e.g. '*2156'.

Rockno - (ROCKNO) As in the Rocks Form (foreign key). Only Rocknos already entered in the NGMA.ROCKS table may be entered here.

Originator - (ORIGNO) As in the Rocks Form. Display field only.

Site ID - (SITEID) As in the Rocks Form. Display field only.

Sample ID - (SAMPLEID) As in the Rocks Form. Display field only.

Entered - (ENTRYDATE) As in the Rocks Form.

By - (ENTEREDBY) As in the Rocks Form.

AUTHORS 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. All old OZCHRON reference numbers are shown here.

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.

10 - K-Ar FORM

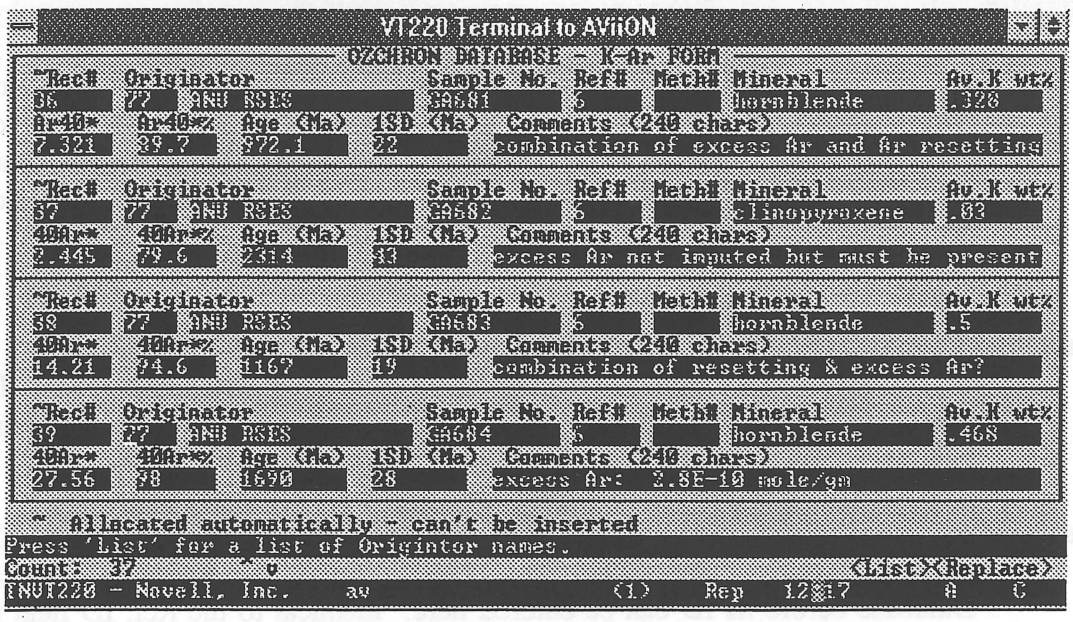

Figure 9. The K-Ar Form.

This form is for the "conventional" K-Ar dating method, where potassium is typically measured by flame-photometry (Cooper, 1963) and Ar by isotope dilution (McDougall, 1966). Each analysis of total ^{40}Ar trapped in the sample yields one age determination. For some samples, especially those where potassium concentration is low, K may be measured by methods such as isotope dilution.

For data in OZCHRON from 1972 onwards (ANU 72-x no.s onwards) Ar spikes were apportioned by use of a precise pipetting system (c.f. experimental comments by Richards & Singleton, 1981). Remeasurement of selected samples confirms that every batch of pre-1972 spikes has a reproducible bias caused by the spike-apportioning arrangement used in the earliest years of the ANU project. Pre 72-x Ar/K estimates should be corrected by the factor 1.0224. Although the adjustment lies within the bounds of the originally estimated errors, it becomes significant when assessing regional averages.

The K-Ar form displays up to four records at a time - the unique primary key being the system-generated record number (the equivalent column name is ANALNO in the K_AR table). As is the case in analyses of different mineral separates from one rock sample, the same combination of originator and sample number can occur in many records. Use the ***NEXT RECORD*** key to view any records following the first four records displayed.

The definitions and purposes of the fields displayed on this form are as follows. Refer to the table definitions in the appendix to this guide for the size and precision of all analytical fields.

Record No. - (ANALNO) Mandatory integer of up to 6 digits. Allocated automatically by a trigger in the form. Can be queried but not entered. Also called Analysis Number.

Originator - (ORIGNO) Mandatory integer of up to 5 digits that 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, 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 and sample numbering systems.

Sample No. - (SAMPLEID) Mandatory field of 16 characters for the ID of a sample. Must be unique to the Originator, but it need bear no relationship to the Site ID. A validation trigger ensures that only sample numbers that are already in the NGMA.ROCKS may be entered.

Reference No. - (REFID) Mandatory pointer of up to 9 characters to a reference in AGSO's Reference Database. It follows that the reference must first exist in the Reference Database before its ID can be entered here. Identical to the Ref. ID field in the References Form (see section 9).

Method No. - (METHOD) Optional pointer to an existing analytical method in the OZCHRON.METHODS table.

Mineral - (MINERAL) Mandatory field of up to 16 characters for the analysed mineral separate. Can be entered as 'whole rock' if necessary.

Average Weight % K - (K_WTPCT) Mandatory. The average of all analytical results for Potassium expressed in weight percent.

^{40}Ar* - (R40AR_MPG) Mandatory. Radiogenic argon in units of E^{-10} mole per gram.

^{40}Ar*% - (R40AR_PCT) Mandatory. The atomic percentage of total ^{40}Ar which is of radiogenic origin (100 ^{40}Ar*/total ^{40}Ar).

Age - (AGE_MA) Mandatory. Expressed in Ma (millions of years before present).

Standard Deviation - (STD_DEV) Optional. Standard deviation of age, expressed in Ma, at the 67% confidence level of the age (1SD).

Comments - (COMMENTS) Optional 240-character field for additional information.

11 - Ar-Ar FORM

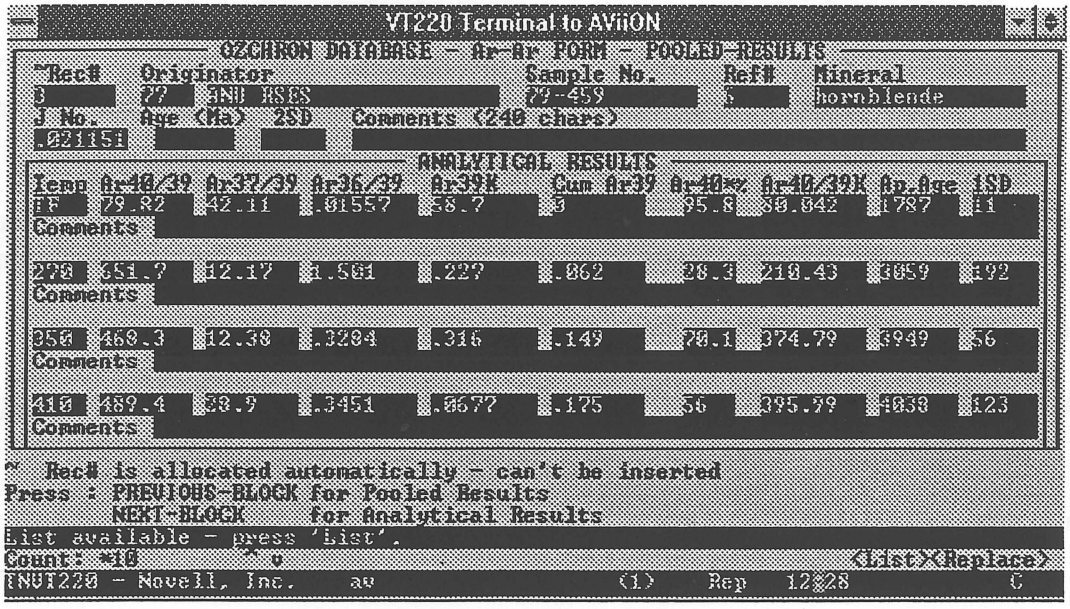

Figure 10. The Ar-Ar Form.

In the Ar-Ar method neutron irradiation of a powdered rock or mineral sample transforms some ^{39}K to ^{39}Ar. The subsequently measured 40Ar/39Ar ratio is proportional to a sample's Ar/K ratio, from which the age is calculated. Two splits of the irradiated sample are normally investigated. The first is taken directly to fusion as in isotope dilution. The second is treated to a rising succession of temperature steps. The argon released at each step is isotopically assayed; the quantity of ^{39}Ar is estimated "manometrically", on the assumption that mass-spectrometer peak height is proportional to pressure. The proportionality factor may be estimated either by independent measurement of a known volume of air argon, or from samples which have previously been examined by the "classical" isotope dilution procedure. The procedure is complete when the next rise in temperature results in sample fusion.

The Ar-Ar form comprises two 'blocks'. The first or outer block records information about the sample and final age interpretation, and the second or inner block is for analytical data and calculated step ages. Up to four two-line records are displayed simultaneously in the second block. Each record contains the results from a single temperature step. As in all 2-block OZCHRON screen forms, the blocks are coordinated so that a query in the block 1 also retrieves the related records in block 2.

BLOCK 1 - POOLED RESULTS

Record No. - (ANALNO) System supplied primary key. Cannot be entered.

Originator - (ORIGNO) As in the K-Ar Form.

Sample No. - (SAMPLEID) As in the K-Ar Form.

Reference No. - (REFID) As in the K-Ar Form.

Mineral - (MINERAL) Mandatory field of up to 16 characters for the analysed mineral separate. Can be 'whole rock'.

J No. - (JNO) Mandatory. This number is obtained from standards included among the irradiated samples. It is a measure of the ^{39}Ar production during irradiation.

Pooled (Plateau) Age - (AGE) Optional. In Ma.

2SD - (STDEVX2) Optional. Age standard deviation in Ma at the 95% confidence level.

Comments - (COMMENTS) Optional 240-character field for additional information.

BLOCK 2 - ANALYTICAL RESULTS

Temperature - (STEP_TEMP) Mandatory 4-character field for the analytical temperature in degrees Celsius. Alternatively, enter 'TF' to denote data from the total fusion split, or 'FUSE' to indicate the step at which the sample finally fuses.

Ar40/39 - (AR40_AR39) Mandatory. Observed $^{40}Ar/^{39}Ar$ ratio, corrected for line blank ($\times E^{-14}$ mole of ^{40}Ar).

Ar37/39 - (AR37_AR39) Mandatory. Observed $^{37}Ar/^{39}Ar$, corrected for the decay of ^{37}Ar.

Ar36/39 - (AR36_AR39) Mandatory. Observed $^{36}Ar/^{39}Ar$, corrected for line blank ($\times E^{-4}$).

Ar39K - (AR39K) Mandatory. Calculated quantity of ^{39}Ar ($\times E^{-14}$ mole) obtained manometrically (relative peak height).

Cumulative Ar39 - (CUM_AR39) Optional. The sum of all ^{39}Ar liberated up to the current temperature step as a percentage of the eventual total.

Ar40*% - (AR40_RAD_TOT) Optional. Atomic percent of total ^{40}Ar which is of radiogenic origin (100 $^{40}Ar^*/tot\ ^{40}Ar$).

Ar40/39K - (AR40_39_K) Optional. The Ar/Ar ratio which corresponds to the parent-daughter ratio $^{40}Ar/^{40}K$.

Apparent Age - (APP_AGE) Optional. The apparent age, in Ma, derived from the parent-daughter ratio.

Standard Deviation - (STDEV) Optional. In Ma at the 67% confidence level (1 s.d.).

Comments - (COMMENTS) Optional 240-character field for additional information.

12 - Rb-Sr FORM

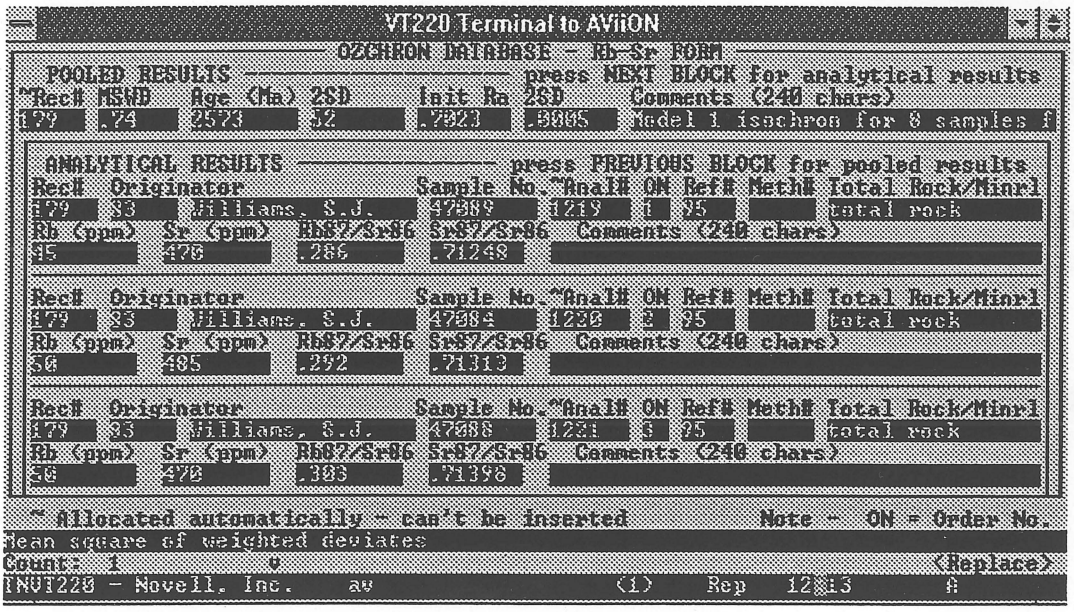

Figure 11. The Rb-Sr Form.

The Rb-Sr form embodies the now-standard isochron method of Rb-Sr dating. Analysed samples may be from crushed whole rocks or mineral separates. The analytical results from either yield a pair of isotope ratios which can be plotted on the coordinates $^{87}Sr/^{86}Sr$ versus $^{87}Rb/^{86}Sr$. A suite of geologically related whole-rock samples should form a straight line, with the slope related to the time since the rock system cooled to beneath the strontium migration temperature, and the $^{87}Sr/^{86}Sr$ axis intercept giving the isotopic makeup of the Sr at that time. Data from a combination of whole-rock and constituent minerals may provide information on the timing of a subsequent metamorphic event.

Several analytical procedures exist. The best approach involves separate isotope dilution analyses for Rb and for Sr from aliquots of the same dissolution. Alternatively, only the $^{87}Sr/^{86}Sr$ ratio is obtained by mass-spectrometry, and the abscissa may be derived from X-ray fluorescence analysis of Rb and Sr. This is quicker but sampling error can be a problem.

The Rb-Sr form has two blocks. The 'Pooled Results' block is for the age information derived from the combined analytical results of geologically related samples. The 'Analytical Results' block records the analytical data on individual samples or separates. The blocks are linked by a Record Number, which commonly ties several records of analytical data to a pooled result record. Up to 4 analytical records are displayed at any one time, but there is no limit to the number that may be linked to any one pooled result record. Use ***NEXT RECORD*** to view any further records.

BLOCK 1 - POOLED RESULTS

Record No. - (RECNO) System supplied primary key of up to 6 digits - sometimes followed by up to two decimal places.

MSWD - (MSWD) Optional. Mean square of weighted deviates.

Age - (AGE) Optional. The Rb-Sr isochron age expressed in Ma.

2SD - (STD_DEVA) Optional. Age error envelope at the 95% confidence level.

Initial Ratio - (INIT_RATIO) Optional. The isochron's intercept on the $^{87}Sr/^{86}Sr$ axis.

2SD - (STD_DEVI) Optional. Initial Ratio error envelope at the 95% confidence level.

Comments - (COMMENTS) Optional 240-character field for additional information.

BLOCK 2 - ANALYTICAL RESULTS

Record No. - (AGE_POINTER) Automatically generated. Points to the record number of the associated Pooled Results record.

Originator - (ORIGNO) As in the K-Ar Form.

Sample No. - (SAMPLEID) As in the K-Ar Form.

Analysis No. - (ANALNO) System-generated unique number. Primary key.

Order No. - (ORDERNO) Determines the ordering of records with same Record No.

Reference No. - (REFID) As in the K-Ar Form.

Method No. - (METHODNO) Optional pointer to a method in the METHODS Table.

Total Rock/Mineral - (MINERAL) Optional 16-character field for indicating the material analysed - either 'whole rock', or the name of the separated mineral.

Rb (ppm) - (RB_PPM) Optional. Mass abundance of rubidium in parts per million.

Sr (ppm) - (SR_PPM) Optional. Mass abundance of strontium in parts per million.

Rb87/Sr86 - (RB87SR86) Optional. Calculated isotope ratio $^{87}Rb/^{86}Sr$.

Sr87/Sr86 - (SR87SR86) Optional. Observed isotope ratio $^{87}Sr/^{86}Sr$.

Comments - (COMMENTS) Optional 240-character field for any additional information.

13 - Sm-Nd FORM

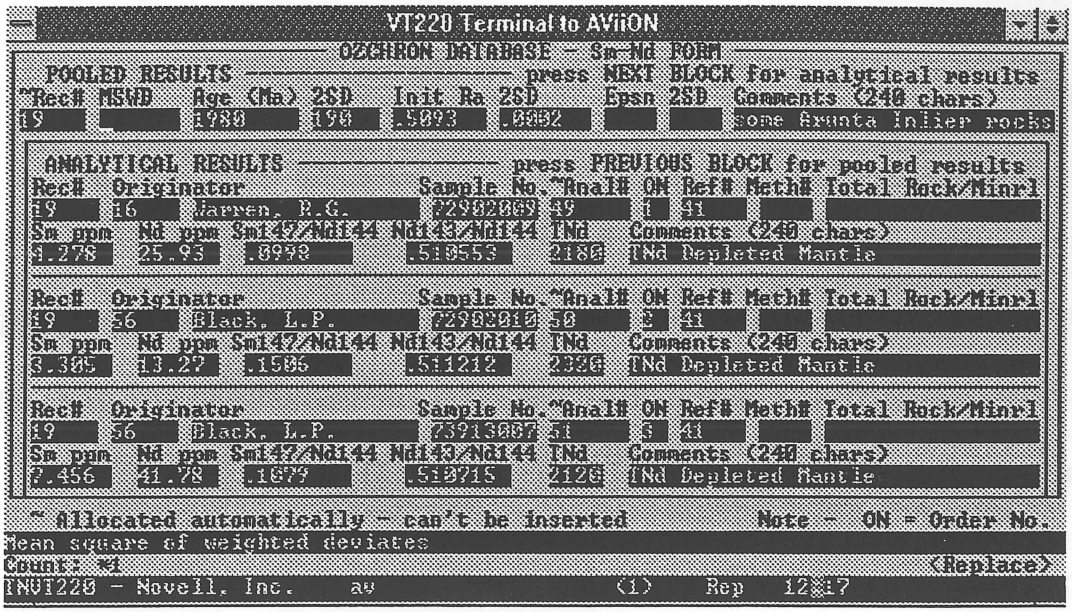

Figure 12. The Sm-Nd Form.

It might be expected that a method similar to the Rb-Sr isochron technique could be applied to the Neodymium-Samarium system using a plot of $^{143}Nd/^{144}Nd$ versus $^{147}Sm/^{144}Nd$. Indeed, information on mineral ages can occasionally be obtained from a combination of whole-rock samples and mineral separates, and for this reason the arrangement of the Sm-Nd Form has been kept similar to the Rb-Sr form, with blocks for Pooled Results and for Analytical Data. However, a linear regression through a suite of related whole-rock samples is usually not practical because of insufficient spread in the Sm/Nd ratio. In most cases each analysis must be treated separately, with a model age calculated from assumptions about the protolith. Similar assumptions were required in the early days of dating by other radioactive decay systems. The assumed quantity is the 'initial ratio' - the isotopic make-up of the daughter nuclide at the time diffusive losses ceased.

In the Sm-Nd system the assumptions are somewhat different, but the principle of age calculation remains the same. The model age (T Nd) derives from the slope of the chord on the isochron diagram which connects sample point and reference point. In early publications the latter was chosen assuming that the original Mantle (assumed protolith) was chemically similar to cosmic material represented by chondritic meteorites (**CHUR** = **CH**ondritic **U**niform **R**eference). This is no longer considered adequate as the Mantle is now known to be inhomogeneous and "depleted" as a result of crust formation. Since different depleted mantle references have been selected for different age ranges, an expert should be consulted before the data are adjusted. However, the time-adjusted initial ratio (ε^{Nd}) is still presented as a (parts per 10,000) difference from the CHUR value for $^{143}Nd/^{144}Nd$. There is a change, too, in the convention for mass-spectrometer bias adjustment. Formerly based on

the ratio $^{146}Nd/^{142}Nd = 0.636151$, the convention now adopted (November, 1989) is $^{146}Nd/^{144}Nd = 0.7219$. For publications prior to this the tabulated $^{143}Nd/^{144}Nd$ has been multiplied by 1.100159.

BLOCK 1 - POOLED RESULTS

Record No. - (RECNO) System supplied primary key. Cannot be entered.

MSWD - (MSWD) Optional. Mean square of weighted deviates.

Age - (AGE) Optional. The pooled age (if applicable) expressed in Ma.

2SD - (STD_DEVA) Optional. Age error envelope at the 95% confidence level

Initial Ratio - (INIT_RATIO) Optional. Extrapolated intercept of the isochron on the $^{143}Nd/^{144}Nd$ axis, or a calculated value based on the measured or estimated geological age.

2SD - (STD_DEVI) Optional. The Initial Ratio error envelope at the 95% confidence level.

Epsilon - (EPSILON) Value calculated from the critical ratio, based on the equation -

$$\varepsilon_{\text{at time T}} = \left[\frac{(^{143}Nd/^{144}Nd)_{\text{sample at time of formation}}}{(^{143}Nd/^{144}Nd)_{\text{CHUR at same time}}} - 1 \right] \times 10^4$$

2SD - (STD_DEV2) Optional. The Epsilon error envelope at the 95% confidence level.

Comments - (COMMENTS) Optional 240-character field for additional information.

BLOCK 2 - ANALYTICAL RESULTS

Record No. - (AGE_POINTER) Automatically generated. Points to the record number of the associated Pooled Results record.

Originator - (ORIGNO) As in the K-Ar Form.

Sample No. - (SAMPLEID) As in the K-Ar Form.

Analysis No. - (ANALNO) System-generated unique number. Primary key.

Order No. - (ORDERNO) Determines the ordering of records with same Record No.

Reference No. - (REFID) As in the K-Ar Form.

Total Rock/Mineral - (MINERAL) Mandatory field of up to 16 characters indicating the material analysed - 'whole rock' or the name of the separated mineral.

Sm (ppm) - (SM_PPM) Optional. Mass abundance of samarium in parts per million.

Nd (ppm) - (ND_PPM)Optional. Mass abundance of neodymium in parts per million.

Sm147/Nd144 - (SM147ND144) Optional. The isotope ratio $^{147}Sm/^{144}Nd$.

T(Nd) - (TND) Optional. The model age in Ma.

Nd143/Nd144 - (ND143ND144) Optional. The isotope ratio $^{143}Nd/^{144}Nd$.

Comments - (COMMENTS) Optional 240-character field for any additional information.

14 - U-Pb MINERALS FORM

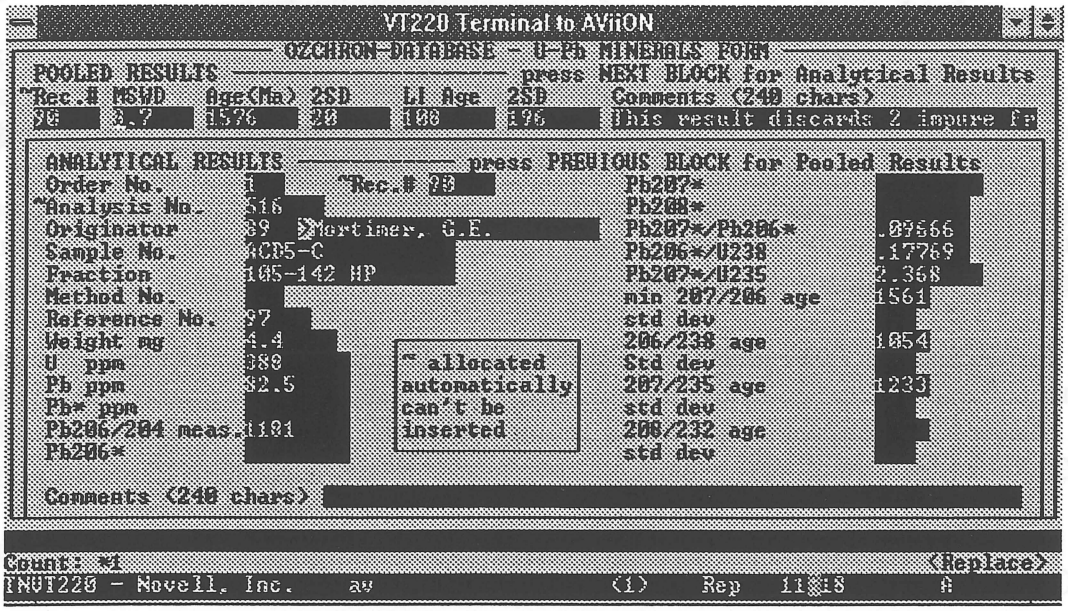

Figure 13. The U-Pb Minerals Form.

This form covers one of two methods based on the transformation of uranium to lead. The method allows for chemical pre-treatment of a uranium-bearing mineral - commonly zircon - in amounts ranging from milligrams to a few grains, and reduction of the data according to the 'concordia' diagram (Weatherill, 1956) consisting of an X axis = $^{207}Pb^*/^{235}U$ and a Y axis = $^{206}Pb^*/^{238}U$. The asterisk in these relationships denotes the radiogenic component generated over the lifetime of the host mineral - a quantity obtained by subtracting the common Pb in proportion to the observed ^{204}Pb abundance.

Conventionally this contaminant is isotopically likened to the average Pb in the country rock, or to the ratios for Pb of the appropriate age as prescribed by the Pb growth curve most favoured by the author. A possible further complication is contamination in the laboratory during processing. Since there is an inevitable uncertainty about the isotopic character of the common Pb, the corrected concordia variables, and the consequent age estimates, are most reliable when the observed $^{206}Pb/^{204}Pb$ is large (~10,000).

The power of the concordia treatment lies in the assumption that the present-day value of the ratio $^{238}U/^{235}U$ is constant. This is true for most localities and for virtually all of the analysed samples in the database. However, one case is known of a "natural reactor" at Oklo, Gabon, West Africa. Here a mid-Proterozoic uranium accumulation in an old river bed "went critical", and a significant proportion of its ^{235}U was consumed.

It is this assumed constancy in the U ratio which allows us to define concordia as a single time-dependent exponential curve. It is the locus of all samples which have neither lost nor gained U or Pb in the time since crystal formation. Loss of Pb (gain of U) yields a point

below the concordia curve. The converse, that is points plotting above the curve, is rare. A suite of fractions from the one sample, in which there is a range of Pb loss, describes a single line (discordia), for which the upper intercept with concordia corresponds with zero Pb loss and the age of crystal formation. Displacement along the discordia line depends on the degree of loss.

There are several algorithms which describe such a line. The simplest permits a second lower intercept which may be related to the time of a second event associated with "instantaneous" loss of the missing Pb. A chord joining sample point with the origin intercepts concordia at the minimum possible age estimate for the host sample. There is yet another complication possible, arising from the inheritance of Pb from an earlier incarnation. This is discussed below under the SHRIMP Form.

The U-Pb Minerals Form embodies a many-to-one relationship, as there are commonly a number of analyses that go to make up the one pooled result. Due to screen constraints only one analysed fraction may be displayed at one time, and you may have to use the ***NEXT RECORD*** key to view all the analytical results for a particular sample.

BLOCK 1 - POOLED RESULTS

Record No. - (RECNO) System supplied primary key number. Cannot be entered.

MSWD - (MSWD) Optional. Mean square of weighted deviates.

Age - (AGE) Optional pooled age expressed in Ma. Deduced from the upper intercept of the discordia line with the concordia curve.

2SD - (STD_DEVA) Optional error envelope at the 95% confidence level for the pooled age.

Lower Intercept Age - Optional age in Ma indicating the time of Pb-loss allowed for in the simplest model - i.e. the lower intercept of the discordia line with concordia line.

2SD - (STD_DEVI) Optional lower intercept error envelope at the 95% confidence level.

Comments - (COMMENTS) Optional 240-character field for any additional information.

BLOCK 2 - ANALYTICAL RESULTS

Order No. - (ORDERNO) Optional number for establishing the ordering of analytical results records associated with a particular pooled results record number.

Record No. - (RECNO) Mandatory. Automatically inserted by a form trigger. Points to the number of the associated record in the pooled results block.

Analysis No. - (ANALNO) System-generated unique number - the primary key.

Originator - (ORIGNO) As in the K-Ar Form.

Sample No. - (SAMPLEID) As in the K-Ar Form.

Fraction - (FRACTION) Optional 16 character field for the analysed fraction of a sample.

Method No. - (METHODNO) Optional pointer to a description of the analytical method in the METHODS table.

Reference No. - (REFID) As in the K-Ar Form.

Weight (mg) - (WEIGHT) Optional. Sample weight in milligrams.

U (ppm) - (U_PPM) Optional. Mass abundance of uranium in parts per million.

Pb (ppm) - (Pb_PPM) Optional. Mass abundance of lead in parts per million.

Radiogenic Pb (ppm) - (PBRAD_PPM) Optional. Calculated mass abundance of radiogenic lead in parts per million - after correction for common lead.

Pb206/Pb204 Measured - (PB206PB204) Optional. Measured $^{206}Pb/^{204}Pb$ ratio. An indicator of the amount of common Pb contamination.

206Pb* (ppm) - (PB206RAD) Optional. Mass abundance of radiogenic ^{206}Pb in parts per million.

207Pb* (ppm) - (PB207RAD) Optional. Mass abundance of radiogenic ^{207}Pb in parts per million.

208Pb* (ppm) - (PB208RAD) Optional. Mass abundance of radiogenic ^{208}Pb in parts per million.

207Pb*/206Pb* - (PB207PB206) Optional. Atomic ratio of radiogenic ^{207}Pb and ^{206}Pb.

206Pb*/238U - (PB206U238) Optional. Atomic ratio of radiogenic ^{206}Pb to parent ^{238}U - ordinate of concordia diagram.

207Pb*/235U - (PB207U235) Optional. Atomic ratio of radiogenic ^{207}Pb to parent ^{235}U - abscissa of concordia diagram.

Minimum 207/206 Age - (MIN76_AGE) Optional. Minimum Pb-Pb age in Ma derived from the slope of the chord from origin to sample point. This age is also given by the intercept of this chord on concordia.

Standard Deviation - (STD_DEVI) Optional. The 67% error limits of the minimum age estimate in Ma.

206/238 Age - (APP206_238) Optional. Age in Ma derived from the atomic ratio $^{206}Pb^*/^{238}U$.

Standard Deviation - (STD_DEV2) Optional. 67% error limits of the 206/238 age in Ma.

207/235 Age - (APP207_235) Optional. Age in Ma derived from the atomic ratio $^{207}Pb^*/^{235}U$.

Standard Deviation - (STD_DEV3) Optional. 67% error limits to the 207/235 age in Ma.

208/232 Age - (APP208_232) Optional. Age in Ma calculated from the atomic ratio $^{208}Pb^*/^{232}Th$.

Standard Deviation - (STD_DEV4) Optional. 67% error limits to the 208/232 age in Ma.

Comments - (COMMENTS) Optional 240-character field for any additional information.

15 - U-Pb SHRIMP FORM

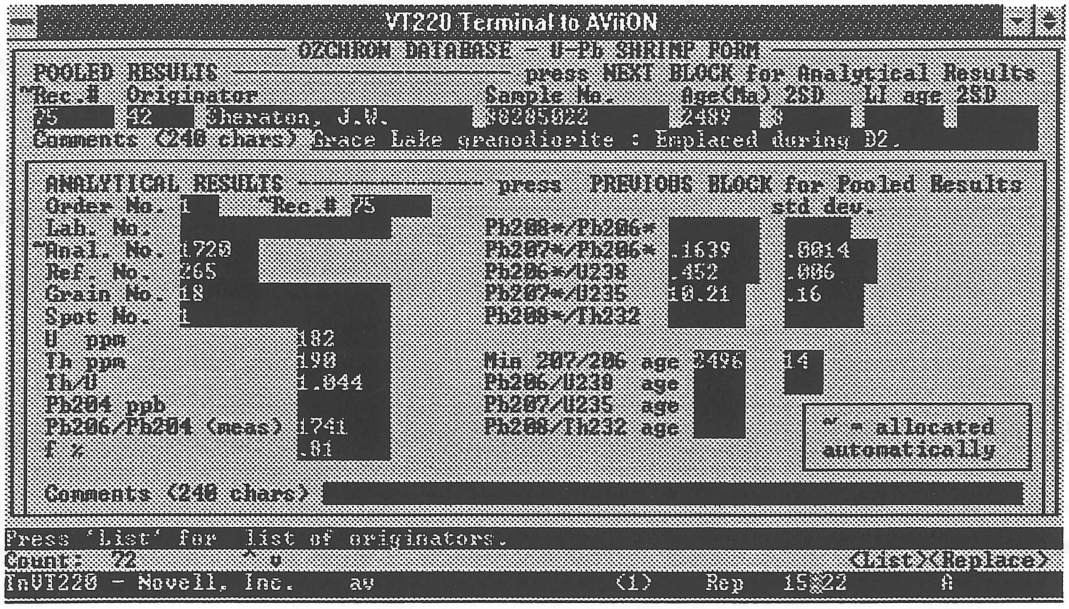

Figure 14. The U-Pb SHRIMP Form.

This form is for U-Pb data obtained from the sensitive high-resolution ion microprobe (SHRIMP). The calculations are similar to those described above under the conventional U-Pb Mineral Form. The difference is that polished sections of individual grains are examined. A beam of negatively charged oxygen ions is focussed to a spot (~30 microns diameter) and multiple analyses of a single grain are thus obtained. Separate analyses can be made in order to distinguish between the older cores of some mineral grains and the younger material forming the rims.

The SHRIMP form has a many-to-one arrangement, similar to the U-Pb Minerals Form. However, the Originator and Sample Number are located in the pooled results block, as the one sample is usually associated with multiple spot analyses.

POOLED RESULTS

Record No. - (RECNO) System supplied primary key number. Cannot be entered.

Originator - As for the K-Ar Form.

Sample No. - As for the K-Ar Form.

Age - (AGE) Optional pooled age expressed in Ma. Deduced from the upper intercept of the discordia line with concordia.

2SD - (STD_DEVA) Optional 95% confidence level error envelope for age.

Lower Intercept Age - (LI_AGE) Optional age in Ma indicating the time of Pb-loss allowed for in the simplest model - i.e. the lower intercept of the discordia line with concordia.

2SD - (STD_DEVI) Optional error envelope at the 95% confidence level for the lower intercept age.

Comments - (COMMENTS) Optional 240-character field for any additional information.

BLOCK 2 - ANALYTICAL RESULTS

Order No. - (ORDERNO) Optional number for establishing the ordering of analytical results records associated with a particular Pooled Results record number.

Record No. - (RECNO) Automatically generated. Points to the record number in the Pooled Results Block.

Laboratory No. - (LABNO) Optional 16-character field for any laboratory identification used, as distinct from field sample numbering.

Analysis No. - (ANALNO) System-generated unique number - the primary key.

Reference No. - (REFID) As for the K-Ar Form..

Grain No. - (GRAINO) Optional 16-character field for identifying a particular mineral grain on the sample mounting.

Spot No. - (SPOTNO) Optional 16-character field for identifying a spot analysis amongst several on a single mineral grain.

U (ppm) - (U_PPM) Optional. Mass abundance of uranium in parts per million.

Th (ppm) - (TH_PPM) Optional. Mass abundance of thorium in parts per million.

Th/U - (TH_OVER_U) Optional. Calculated weight ratio of thorium to uranium.

Pb204 (ppb) - (PB204_PPB) Optional. Calculated mass abundance of ^{204}Pb in parts per billion.

Pb206/Pb204 Measured - (PB206B204) Optional. Measured $^{206}Pb/^{204}Pb$ ratio.

f% - (F_PCT) Optional. Percentage of Common ^{206}Pb in measured ^{206}Pb.

Pb208*/Pb206* - (PB208PB206) Optional. Atomic ratio of radiogenic isotopes ^{208}Pb and ^{206}Pb after correction for common lead. Unless otherwise specified in the Comments field, the common Pb ratio is from the Cumming-Richards Model 3 growth curve.

Standard Deviation - (STD_DEV2) Optional. The 67% error limits in the 208*/206* ratio.

Pb207*/Pb206* - (PB207PB206) Optional. Atomic ratio of radiogenic isotopes ^{207}Pb and ^{206}Pb after correction for Common lead.

Standard Deviation - (STD_DEV1) Optional. The 67% error limits in the 207*/206* ratio.

Pb206*/U238 - (PB206U238RAD) Optional. Atomic ratio of radiogenic ^{206}Pb to parent ^{238}U - ordinate of concordia diagram.

Standard Deviation - (STD_DEV3) Optional. The 67% error limits in the 206*/238* ratio.

Pb207*/U235 - (PB207U235RAD) Optional. Atomic ratio of radiogenic ^{207}Pb to parent ^{235}U - abscissa of concordia diagram.

Standard Deviation - (STD_DEV4) Optional. The 67% error limits in the 207*/235* ratio.

Pb208*/Th232 - (PB208TH232RAD) Optional. Atomic ratio of radiogenic ^{208}Pb* to parent ^{232}Th.

Standard Deviation - (STD_DEV5) Optional. The 67% error limits in the 208*/232* ratio.

Minimum 207/206 Age - (MIN76_AGE) Optional. Minimum Pb-Pb age in Ma derived from the slope of the chord from origin to sample point. This age is also given by the intercept of this chord on the concordia curve.

Standard Deviation - (STD_DEV6) Optional. The 67% error limits of the minimum 207/206 age estimate in Ma.

206/238 Age - (AGE206_238) Optional. Age in Ma derived from the ratio ^{206}Pb*/^{238}U.

Standard Deviation - (STD_DEV7) Optional. The 67% error limits of the 206/238 age in Ma.

207/235 Age - (AGE207_235) Optional. Age in Ma derived from the ratio ^{207}Pb*/^{235}U.

208/232 Age - (AGE208_232) Optional. Age in Ma calculated from ratio ^{208}Pb*/^{232}Th.

Comments - (COMMENTS) Optional 240-character field for any additional information.

16 - METHODS FORM

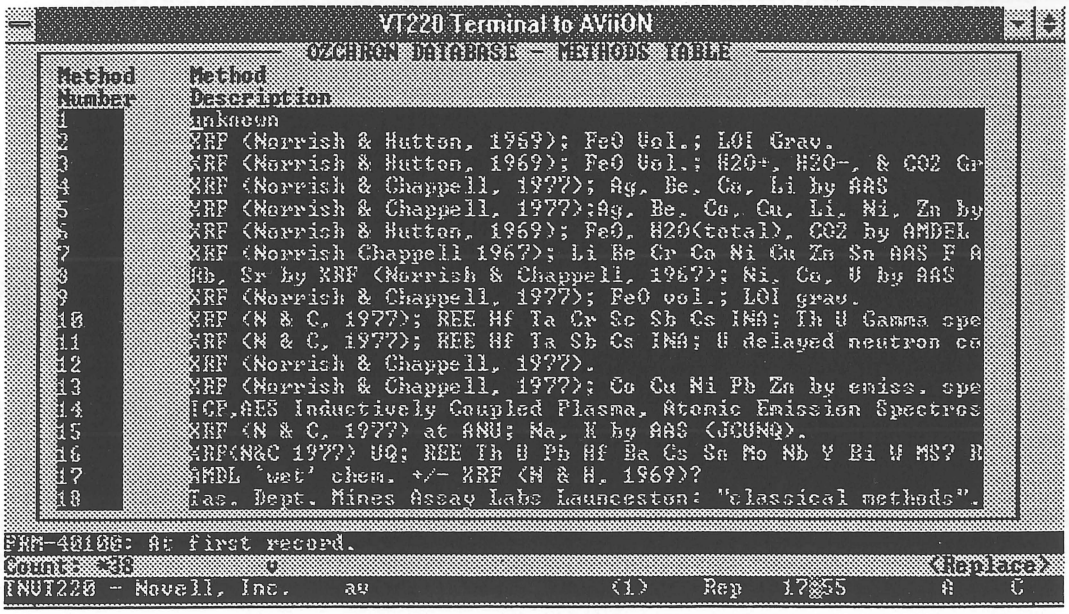

Figure 15. The Methods Form.

This form accesses a lookup table of analytical methods (OZCHRON.METHODS), which controls the entries in the Method Number fields of the K-Ar, Rb-Sr, Sm-Nd and U-Pb Minerals Forms. You may notice that many of the entries in the METHODS table refer to the chemical analysis of rocks. This results from the history of this table, which was originally shared with the ROCKCHEM Database.

Method Number - (METHODNO) A mandatory integer of up to 5 digits. The primary key for the OZCHRON.METHODS table. Cannot be entered, as it is automatically allocated by a form trigger when a new record is inserted.

Method Description - (METHOD) A mandatory test field of up to 240 characters for a description of the analytical method. The ***EDIT*** key may be used to see the whole of the field. Bibliographic references to analytical methods can be included, if appropriate.

17 - ACKNOWLEDGEMENTS

We wish to note the contributions of Lynton Jaques, Lesley Wyborn and Murray Hazell to the development and population of the OZCHRON Database. Lynton Bond added block coordination, pop-up lists and data validation triggers to the forms. This Record has benefitted considerably from peer reviews by Prame Chopra and Murray Hazell.

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APPENDIX - DATABASE DEFINITIONS

```
REM  THE PRIMARY AND FOREIGN KEY ('REFERENCES') DEFINITIONS IN
REM  CREATE-TABLE STATEMENTS ARE A FEATURE OF ORACLE VERSION 7
REM  AND ARE IGNORED BY ORACLE VERSION 6 -  DOCUMENTATION ONLY


REM ******************************************************
REM **      THE FOLLOWING TABLES BELONG TO 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.AGSOCOUNTRIES,
        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),
        NORTHING      NUMBER (9,2),
        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        CHAR   (9)               REFERENCES GEOREF.AGSOREFS,
        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 SITESSC      ON SITES ( SC );
CREATE         INDEX SITESRP      ON SITES ( RP );
CREATE         INDEX SITEOZCHRON  ON SITES ( OZ );
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  ROCKS IS FOR DATA ON LITHOLOGIES AND SAMPLES

CREATE TABLE ROCKS (
        ROCKNO       NUMBER (6)    NOT NULL  PRIMARY KEY,
        ORIGNO       NUMBER (5,0)  NOT NULL  REFERENCES NGMA.ORIGINATORS,
        SITEID       CHAR   (16)   NOT NULL,
        SAMPLEID     CHAR   (16),
        ROCKTYPE     NUMBER (2,0)            REFERENCES NGMA.ROCKTYPES,
        QUALIFIER    CHAR   (20)             REFERENCES NGMA.LITHNAMES,
        LITHNAME     CHAR   (32)             REFERENCES NGMA.LITHNAMES,
        GROUPING     CHAR   (50),
        STRATNO      NUMBER (5,0)            REFERENCES NGMA.STRATLEX,
        INFORMAL     CHAR   (64),
        AGE          CHAR   (54),
        STRATHEIGHT  NUMBER (8,3),
        HOLEDEPTH    NUMBER (8),
        HOLEDEPTH2   NUMBER (8),
        DESCRIPTION  CHAR   (64),
        OTHERINFO    CHAR   (64),
        ENTEREDBY    CHAR   (8)      NOT NULL,
        ENTRYDATE    DATE            NOT NULL,
        FOREIGN KEY (ORIGNO,SITEID) REFERENCES NGMA.SITES(ORIGNO,SITEID) );

GRANT SELECT ON ROCKS TO PUBLIC;

CREATE UNIQUE INDEX ROCKROCKNOS   ON ROCKS ( ROCKNO );
CREATE         INDEX ROCKORIGSITES ON ROCKS ( ORIGNO, SITEID );
CREATE         INDEX ROCKSITES    ON ROCKS ( SITEID );
CREATE         INDEX ROCKORIGSAMPS ON ROCKS ( ORIGNO, SAMPLEID );
CREATE         INDEX ROCKUSERS    ON ROCKS ( ENTEREDBY );

REM  UROCKS IS THE INSERT/UPDATE VIEW OF THE ROCKS TABLE

CREATE VIEW UROCKS AS SELECT * FROM ROCKS WHERE ENTEREDBY = USER;
```

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


REM  LITHDATA IS THE EXTENDABLE ATTRIBUTES TABLE FOR ROCKS

CREATE TABLE LITHDATA (
        ROCKNO       NUMBER (5,0)  NOT NULL  REFERENCES NGMA.ROCKS,
        DATATYPE     CHAR   (4)    NOT NULL  REFERENCES
                                                NGMA.LITHDATATYPES(DATATYPE),
        SUBTYPE      CHAR   (4)              REFERENCES
                                                NGMA.LITHDATATYPES(SUBTYPE),
        DESCRIPTION  CHAR   (64),
        ENTEREDBY    CHAR   (8)    NOT NULL,
        ENTRYDATE    DATE          NOT NULL,
        PRIMARY KEY (ROCKNO, DATATYPE, SUBTYPE) );

GRANT SELECT ON LITHDATA TO PUBLIC;

CREATE INDEX LDLITHNO ON LITHDATA ( ROCKNO );
CREATE INDEX LDUSERS  ON LITHDATA ( USER );

REM  ULITHDATA IS THE INSERT/UPDATE VIEW OF THE LITHDATA TABLE

CREATE VIEW ULITHDATA AS SELECT * FROM LITHDATA WHERE ENTEREDBY = USER;

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


REM  TABLE ROCKREFS RELATES ROCKS RECORDS TO AGSO CORPORATE REFERENCES

CREATE TABLE ROCKREFS (
        ROCKNO       NUMBER (6,0)  NOT NULL  REFERENCES NGMA.ROCKS,
        REFID        CHAR   (9)    NOT NULL  REFERENCES GEOREF.AGSOREFS
        ENTEREDBY    CHAR   (8)    NOT NULL,
        ENTRYDATE    DATE          NOT NULL );

GRANT SELECT ON ROCKREFS TO PUBLIC;

CREATE INDEX ROCKREFROCKNOS ON ROCKREFS ( ROCKNO );
CREATE INDEX ROCKREFREFIDS  ON ROCKREFS ( REFID );
CREATE INDEX ROCKREFUSERS   ON ROCKREFS ( ENTEREDBY );

CREATE VIEW UROCKREFS AS SELECT * FROM ROCKREFS WHERE ENTEREDBY = USER;

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


REM  ORIGINATORS IS THE AUTHORITY TABLE FOR ORIGINATORS

CREATE TABLE ORIGINATORS (
        ORIGNO       NUMBER (5,0)  NOT NULL  PRIMARY KEY,
        ORIGINATOR   CHAR   (22)   NOT NULL,
        OWNER        CHAR   (8) );

GRANT SELECT ON ORIGINATORS TO PUBLIC;

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

```
REM ******************************************************
REM **      THE FOLLOWING TABLES BELONG TO OZCHRON      ***
REM ******************************************************


REM  SINGLE TABLE COVERING THE K-Ar METHOD

CREATE TABLE K_AR (
       ANALNO          NUMBER  (6,0)   NOT NULL  PRIMARY KEY,
       ORIGNO          NUMBER  (5,0)   NOT NULL  REFERENCES NGMA.ORIGINATORS,
       SITEID          CHAR    (16)    NOT NULL  REFERENCES NGMA.SITES(SITEID),
       SAMPLEID        CHAR    (16)    NOT NULL  REFERENCES NGMA.ROCKS(SAMPLEID),
       REFID           CHAR    (9)     NOT NULL  REFERENCES GEOREF.AGSOREFS,
       METHODS         NUMBER  (5,0)             REFERENCES OZCHRON.METHODS,
       MINERAL         CHAR    (16)    NOT NULL,
       K_WTPCT         NUMBER  (7,5)   NOT NULL,
       R40AR_MPG       NUMBER  (7,4)   NOT NULL,
       R40AR_PCT       NUMBER  (4,1)   NOT NULL,
       AGE_MA          NUMBER  (6,2)   NOT NULL,
       STD_DEV         NUMBER  (6,2),
       COMMENTS        CHAR    (240) );

CREATE UNIQUE INDEX KARANALNOS   ON K_AR ( ANALNO );
CREATE        INDEX KARORIGSAMPS ON K_AR ( ORIGNO, SAMPNO );


REM  THE POOLED RESULTS TABLE FOR THE Ar-Ar METHOD

CREATE TABLE AR40_39A (
       ANALNO          NUMBER  (6,0)   NOT NULL  PRIMARY KEY,
       ORIGNO          NUMBER  (5,0)   NOT NULL  REFERENCES NGMA.ORIGINATORS,
       SITEID          CHAR    (16)    NOT NULL  REFERENCES NGMA.SITES(SITEID),
       SAMPLEID        CHAR    (16)    NOT NULL  REFERENCES NGMA.ROCKS(SAMPLEID),
       REFID           CHAR    (9)     NOT NULL  REFERENCES GEOREF.AGSOREFS,
       MINERAL         CHAR    (16)    NOT NULL,
       JNO             NUMBER  (7,6)   NOT NULL,
       AGE             NUMBER  (5,1),
       STDEVX2         NUMBER  (4,1),
       COMMENTS        CHAR    (240) );

CREATE UNIQUE INDEX ARANALNOS   ON AR40_39A ( ANALNO );
CREATE        INDEX ARORIGSAMPS ON AR40_39A ( ORIGNO, SAMPLEID );
CREATE        INDEX ARORIGSITES ON AR40_39A ( ORIGNO, SITEID );
```

```
REM  THE ANALYTICAL DATA TABLE FOR THE Ar-Ar METHOD

CREATE TABLE AR40_39B (
       TABLEA_PTR       NUMBER   (6,0)    NOT NULL  REFERENCES OZCHRON.AR40_39A,
       STEP_TEMP        CHAR     (4)      NOT NULL,
       AR40_AR39        NUMBER   (6,2)    NOT NULL,
       AR37_AR39        NUMBER   (6,2)    NOT NULL,
       AR36_AR39        NUMBER   (7,6)    NOT NULL,
       AR39K            NUMBER   (7,4)    NOT NULL,
       CUM_AR39         NUMBER   (6,3),
       AR40_RAD_TOT     NUMBER   (3,1),
       AR_40_39_K       NUMBER   (7,3),
       APP_AGE          NUMBER   (5,1),
       STDEV            NUMBER   (4,1),
       COMMENTS         CHAR     (240) );

CREATE INDEX ARTABLEAPOINT ON AR40_39B ( TABLEA_PTR );


REM  THE POOLED RESULTS TABLE FOR THE Rb-Sr METHOD

CREATE TABLE RBSR_AGES  (
       RECNO            NUMBER   (8,2)    NOT NULL  PRIMARY KEY,
       MSWD             NUMBER   (6,2),
       AGE              NUMBER   (6,2),
       STD_DEVA         NUMBER   (6,2),
       INIT_RATIO       NUMBER   (7,6),
       STD_DEVI         NUMBER   (7,6),
       COMMENTS         CHAR     (240) );

CREATE UNIQUE INDEX RBSRARECNOS ON RBSR_AGES ( RECNO );


REM  THE ANALYTICAL DATA TABLE FOR THE RB_SR METHOD

CREATE TABLE RB_SR (
       AGE_POINTER      NUMBER   (8,2)    NOT NULL  REFERENCES RBSR_AGES,
       ANALNO           NUMBER   (6,0)    NOT NULL  PRIMARY KEY,
       ORDERNO          NUMBER   (2,0),
       ORIGNO           NUMBER   (5,0)    NOT NULL  REFERENCES NGMA.ORIGINATORS,
       SITEID           CHAR     (16)     NOT NULL  REFERENCES NGMA.SITES(SITEID),
       SAMLEID          CHAR     (16)     NOT NULL  REFERENCES NGMA.ROCKS(SAMPLEID),
       REFID            CHAR     (9)               REFERENCES GEOREF.AGSOREFS,
       METHODNO         NUMBER   (6,0)             REFERENCES OZCHRON.METHODS,
       MINERAL          CHAR     (16),
       RB_PPM           NUMBER   (9,4),
       SR_PPM           NUMBER   (9,4),
       RB87SR86         NUMBER   (10,5),
       SR87SR86         NUMBER   (10,5),
       COMMENTS         CHAR     (240) );

CREATE UNIQUE INDEX RBSRANALNOS   ON RB_SR ( ANALNO );
CREATE        INDEX RBSRAGEPOINTS ON RB_SR ( AGE_POINTER );
CREATE        INDEX RBSRORIGSAMPS ON RB_SR ( ORIGNO, SAMPNO );
```

```
REM  THE POOLED RESULTS TABLE FOR THE Sm-Nd METHOD

CREATE TABLE SMND_AGES  (
       RECNO            NUMBER  (6,0)   NOT NULL  PRIMARY KEY,
       MSWD             NUMBER  (6,2),
       AGE              NUMBER  (6,2),
       STD_DEVA         NUMBER  (6,2),
       INIT_RATIO       NUMBER  (7,6),
       STD_DEVI         NUMBER  (7,6),
       EPSILON          NUMBER  (4,1),
       STD_DEV2         NUMBER  (3,1),
       COMMENTS         CHAR    (240) );

CREATE UNIQUE INDEX SMNDRECNOS ON SMND_AGES ( RECNO );


REM  THE ANALYTICAL DATA TABLE FOR THE Sm-Nd METHOD

CREATE TABLE SM_ND (
       AGE_POINTER      NUMBER  (6,0)   NOT NULL  REFERENCES SMND_AGES,
       ANALNO           NUMBER  (6,0)   NOT NULL  PRIMARY KEY,
       ORDERNO          NUMBER  (2,0)   NOT NULL,
       ORIGNO           NUMBER  (5,0)   NOT NULL  REFERENCES NGMA.ORIGINATORS,
       SITEID           CHAR    (16)    NOT NULL  REFERENCES NGMA.SITES(SITEID),
       SAMPLEID         CHAR    (16)    NOT NULL  REFERENCES NGMA.ROCKS(SAMPLEID),
       REFID            CHAR    (9)               REFERENCES GEOREF.AGSOREFS,
       METHODNO         NUMBER  (6,0)             REFERENCES OZCHRON.METHODS,
       MINERAL          CHAR    (16),
       SM_PPM           NUMBER  (8,4),
       ND_PPM           NUMBER  (9,4),
       SM147ND144       NUMBER  (8,5),
       ND143ND144       NUMBER  (9,6),
       TND              NUMBER  (4,0),
       COMMENTS         CHAR    (240) );

CREATE UNIQUE INDEX SMNDANALNOS   ON SM_ND ( ANALNO );
CREATE        INDEX SMNDAGEPOINTS ON SM_ND ( AGE_POINTER );
CREATE        INDEX SMNDORIGSAMPS ON SM_ND ( ORIGNO, SAMPNO );


REM  THE POOLED RESULTS TABLE FOR THE U-Pb WHOLE-MINERAL METHOD

CREATE TABLE UPB_AGES  (
       RECNO            NUMBER  (6,0)   NOT NULL  PRIMARY KEY,
       MSWD             NUMBER  (6,2),
       AGE              NUMBER  (6,2),
       STD_DEVA         NUMBER  (6,2),
       LI_AGE           NUMBER  (6,2),
       STD_DEVI         NUMBER  (6,2),
       COMMENTS         CHAR    (240) );

CREATE UNIQUE INDEX UPBAGERECS ON UPB_AGES ( RECNO );
```

```
REM  THE ANALYTICAL DATA TABLE FOR THE U-Pb WHOLE-MINERAL METHOD

CREATE TABLE U_PB (
       RECNO            NUMBER   (5,0)    NOT NULL  REFERENCES UPB_AGES,
       ANALNO           NUMBER   (6,0)    NOT NULL  PRIMARY KEY,
       ORIGNO           NUMBER   (5,0)    NOT NULL  REFERENCES NGMA.ORIGINATORS,
       SITEID           CHAR     (16)     NOT NULL  REFERENCES NGMA.SITES(SITEID),
       SAMPLEID         CHAR     (16)     NOT NULL  REFERENCES NGMA.ROCKS(SAMPLEID),
       ORDERNO          NUMBER   (3,0),
       FRACTION         CHAR     (16),
       REFID            CHAR     (9)               REFERENCES GEOREF.AGSOREFS,
       METHODNO         NUMBER   (6,0)             REFERENCES OZCHRON.METHODS,
       WEIGHT           NUMBER   (6,4),
       U_PPM            NUMBER   (8,2),
       PB_PPM           NUMBER   (8,2),
       PBRAD_PPM        NUMBER   (8,2),
       PB206PB204       NUMBER   (8,2),
       PB206RAD         NUMBER   (8,2),
       PB207RAD         NUMBER   (8,2),
       PB208RAD         NUMBER   (6,2),
       PB207PB206       NUMBER   (6,5),
       PB206U238        NUMBER   (6,5),
       PB207U235        NUMBER   (7,5),
       MIN76_AGE        NUMBER   (4,0),
       STD_DEV1         NUMBER   (3,0),
       APP206_238       NUMBER   (4,0),
       STD_DEV2         NUMBER   (3,0),
       APP207_235       NUMBER   (4,0),
       STD_DEV3         NUMBER   (3,0),
       APP208_232       NUMBER   (4,0),
       STD_DEV4         NUMBER   (3,0),
       COMMENTS         CHAR     (240) );

CREATE UNIQUE INDEX UPBANALNOS   ON ZIRCON ( ANALNO );
CREATE        INDEX UPBRECPTRS   ON ZIRCON ( RECNO );
CREATE        INDEX UPBORIGSAMPS ON ZIRCON ( ORIGNO, SAMPNO );


REM  THE POOLED RESULTS TABLE FOR THE U-Pb SHRIMP METHOD

CREATE TABLE SHRIMP_AGES (
       RECNO            NUMBER   (6,0)    NOT NULL  PRIMARY KEY,
       ORIGNO           NUMBER   (5,0)    NOT NULL  REFERENCES NGMA.ORIGINATORS,
       SITEID           CHAR     (16)     NOT NULL  REFERENCES NGMA.SITES(SITEID),
       SAMPID           CHAR     (16)     NOT NULL  REFERENCES NGMA.ROCKS(SAMPLEID),
       AGE              NUMBER   (6,2),
       STD_DEVA         NUMBER   (6,2),
       LI_AGE           NUMBER   (6,2),
       STD_DEVI         NUMBER   (6,2),
       COMMENTS         CHAR     (240) );

CREATE UNIQUE INDEX SHRIMPAGERECS      ON SHRIMP_AGES ( RECNO );
CREATE        INDEX SHRIMPAGEORIGSAMPS ON SHRIMP_AGES ( ORIGNO, SAMPNO );
```

```
REM  THE ANALYTICAL DATA TABLE FOR THE U-Pb SHRIMP METHOD

CREATE TABLE SHRIMP (
       RECNO            NUMBER  (6,0)   NOT NULL  REFERENCES SHRIMP_AGES,
       ANALNO           NUMBER  (6,0)   NOT NULL  PRIMARY KEY,
       LABNO            CHAR    (16),
       GRAINO           CHAR    (16),
       SPOTNO           CHAR    (16),
       ORDERNO          NUMBER  (3,0),
       REFID            CHAR    (9)               REFERENCES GEOREF.AGSOREFS,
       WEIGHT           NUMBER  (5,3),
       U_PPM            NUMBER  (7,2),
       TH_PPM           NUMBER  (6,2),
       TH_OVER_U        NUMBER  (6,3),
       PB204_PPB        NUMBER  (9,2),
       PB206PB204       NUMBER  (8,1),
       F_PCT            NUMBER  (6,3),
       PB207PB206       NUMBER  (6,5),
       STD_DEV1         NUMBER  (6,5),
       PB208PB206       NUMBER  (6,5),
       STD_DEV2         NUMBER  (4,4),
       PB206U238RAD     NUMBER  (6,5),
       STD_DEV3         NUMBER  (6,5),
       PB207U235RAD     NUMBER  (5,3),
       STD_DEV4         NUMBER  (5,3),
       PB208TH232RAD    NUMBER  (5,4),
       STD_DEV5         NUMBER  (5,4),
       MIN76_AGE        NUMBER  (4,0),
       STD_DEV6         NUMBER  (3,0),
       AGE206_238       NUMBER  (4,0),
       AGE207_235       NUMBER  (4,0),
       AGE208_232       NUMBER  (4,0),
       COMMENTS         CHAR    (240) );

CREATE UNIQUE INDEX SHRIMPANALNOS   ON SHRIMP ( ANALNO );
CREATE        INDEX SHRIMPRECPTRS   ON SHRIMP ( RECNO );


CREATE TABLE METHODS (
       METHODNO         NUMBER (5,0)    NOT NULL  PRIMARY KEY,
       METHOD           CHAR   (64)     NOT NULL  );


CREATE TABLE MAXNOS  (
       IDMAXNO          CHAR   (16)     NOT NULL  PRIMARY KEY,
       MAXNO            NUMBER (6,0)    NOT NULL  );
```