1985/10. TASROCK - A computer-based catalogue for Tasmanian rocks

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Abstract

The program suite described is designed to provide a unified Tasmanian rock catalogue. Provision is included for searching the collections of a number of organisations, adding to the data, and producing a comprehensive manual.

INTRODUCTION

A number of organisations within Tasmania maintain rock collections (*e.g.* Hydro-Electric Commission, Department of Mines, Tasmanian Museum and Art Gallery, University of Tasmania) but there is no easy way of locating all specimens of a particular type or from a particular area. A committee from the Department of Mines and the University of Tasmania produced a coding sheet containing all required "basic" data, and a suite of FORTRAN 77 programs has been written to provide the required functions.

USING THE PROGRAMS

Data coding

Data are coded onto standard sheets (Appendix 1) using the current lists of standard abbreviations (printed using the program GUIDER), the following notes and the details in Appendix 2.

(a) Registration number - up to 8 characters allowed.

(b) Generic type - up to 2 characters in accordance with the
                    standard list
                  - leave blank if not known

(c) Age - up to 3 characters in accordance with the standard list
         - leave blank if not known

(d) Rock name - up to 10 characters in accordance with the standard
                 list
               - leave blank if not known

(e) Rock unit - up to 8 characters in accordance with the standard
                 list
               - leave blank if not known

(f) Location data - every attempt must be made to complete the fields
                     for state and latitude/longitude or grid co-
                     ordinates

(g) Collector - up to 3 characters in accordance with the standard
                 list
               - leave blank if not known

(h) Field number - up to 6 characters
                  - leave blank if not known

(i) Year of collection - 4 characters
                        - leave blank if not known

(j) Locality name - up to 12 characters
             - leave blank if not known

(k) Holder - 1 character in accordance with the standard list

(1) Mineral name - up to 8 characters in accordance with the
             standard list
             - leave blank if not known

(m) Modifier - two sets of up to 4 characters in accordance with the
             standard list
           - leave blank if not known

(n) Treatment - four sets of up to 2 characters in accordance with
             the standard list
           - leave blank if not known

(o) Reference - up to four sets of 5 characters
             - leave blank if not applicable

(p) Extended reference - up to 40 characters
             - leave blank if not applicable

Data entry

Data are input by typing ROCKADD. As the data will be entered for
only one holder at a time, the program firstly requests the holder. Other
data requested is in accordance with the coding forms. To terminate input
type END in response to the request for registration number. At the end
of input a proof-sheet is output and the data saved in file ROCKTMP.TMP.
Corrections may be made to this file using the standard editing facilities
and a new proof sheet printed and checked.

Data checking

Data are checked for validity of standard abbreviations by typing
ROCKCHEK. Any departures from the standard abbreviations will be listed
on the printer along with the line number in the ROCKTMP.TMP file and the
column number on the line(s). Errors should be corrected then checked
again.

Data merging

After checking, data are merged with the main file by typing ROCKMRGE.

Data sorting

Provided that there are not too many entries for a particular holder
(32000) the entries for that particular holder may be sorted into ascending
registration number order by typing ROCKSORT.

Data searching

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

The program requests the following data:

(i)   Send output to VDU - Y if entries found are to be listed on
                            the VDU.
                            Provision exists for terminating the VDU
                            listing if necessary.

(ii)   Send output to printer - Y if listing of retrieved entries is
                            to be printed. If more than 1000
                            entries are found printing can be
                            terminated at the 1000th entry.

(iii)   Search by registration number - Y to search only a range of
                            registration numbers for a
                            particular holder. Leave blank
                            otherwise.

        (a) Holder - reply with a valid holder abbrevation
        (b) Starting registration number - a number valid for the
                            holder selected, *e.g.* 1234
                            for the University, 77-12
                            for the Mines Department
        (c) Finishing registration number - a number valid for the
                            holder selected and greater
                            than or equal to the start-
                            ing number, *e.g.* 1287 for
                            the University, 79-28 for
                            the Mines Department.

(iv)   Generic type - one or more standard abbreviations on a line
                            each abbreviation terminated by /. If this
                            option is not required leave the line blank.
                            e.g. SE/ME/   sedimentary or metamorphic

(v)   Age - details as for generic type

(vi)   Rock name - details as for generic type

(vii)   Rock unit - details as for generic type

(viii) State - details as for generic type

(ix)   Search by co-ordinates or latitude/longitude - C to search
                            within an area of Tasmania specified by grid co-
                            ordinates
                            - L to search within an area (including Tasmania if
                            necessary) specified by latitude and longitude
                            - leave blank if neither is required

        (a) If search by co-ordinates is specified the western,
             eastern, southern and northern boundaries are requested.
             The co-ordinates should be specified in metres with the
             assumed digit 5 on northings omitted.
        (b) If search by latitude/longitude is specified the southern,
             northern, western and eastern boundaries are requested.
             The latitudes and longitudes are specified as on the input
             sheet.

(x)   Collector - details as for generic type

(xi)   Search by year - Y to search only a range of years of collection
               - leave blank otherwise
        (a) Starting year - a four digit integer specifying
             the starting year
        (b) Finishing year - a four digit integer specifying
             the finishing year and greater than or equal to
             the starting year

(xii)   Holder - details as for generic type

(xiii) Mineral - details as for generic type

(xiv)   Modifier - details as for generic type

(xv)   Treatment - details as for generic type

A sample printout is given in Appendix 3.

Listing standard abbreviations

A list of standard abbreviations may be produced by typing GUIDER.
A sample list is shown in Appendix 4.

<div align="center">THE PROGRAMS</div>

ROCKADD (Appendix 5)

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

ROCKCHEK (Appendix 6)

This program checks the data in ROCKTMP.TMP against files of standard
abbreviations to ensure that abbreviations used are valid. The program
uses the following files:

ROCKTYPE.DAT   50 character records. The first two characters are
                the abbreviation, the third is a blank and the
                remainder are the full description.

ROCKAGES.DAT   50 character records. The first three characters are
                the abbreviation and the balance are as for ROCKTYPE.DAT.

ROCKNAME.DAT   30 character records. The first ten characters are
                taken as the abbreviation.

ROCKUNIT.DAT   30 character records. The first eight characters are
                taken as the abbreviation.

COLECTOR.DAT   40 character records. The first three characters are
                the abbreviation and the balance are as for ROCKTYPE.DAT.

MINERALS.DAT   30 character records. The first eight characters are
                taken as the abbreviation.

MODIFIER.DAT   30 character records. The first four characters are
                the abbreviation and the balance are as for ROCKTYPE.DAT.

TRTMENT.DAT   50 character records. The first two characters are
the abbreviation and the balance are as for ROCKTYPE.DAT.

ROCKMRGE (Appendix 7)

The data from ROCKTMP.TMP are read and added to the main data file
(ROCCAT.DAT). Entries for the Department of Mines rock catalogue are
prefixed with a code to indicate the year.

ROCKSORT (Appendix 8)

The data for a particular holder may be sorted into ascending
registration number order provided that there are not too many (more than
32 000) entries for that holder.

ROCKSRCH (Appendix 9)

The data-base is searched for the occurrence of specified strings
or numeric values using program SEARCHER. Output may be to the VDU, printer
or both.

GUIDER (Appendix 10)

This program produces a guide to the abbreviations used within the
data-base. With the exception of age and generic type abbreviations, the
lists are ordered alphabetically. GUIDER uses all the files used by
ROCKCHEK and in addition uses the 80 character record file INTRODUC.DAT.

[18 March 1985]

APPENDIX 1

TASROCK CATALOGUE

COMPUTER ENTRY SHEET

1. REGISTRATION NUMBER

2. GENERIC TYPE

3. AGE

4. ROCK NAME

5. ROCK UNIT

6. STATE & QUADRANGLE
            OR
    OVERSEAS & COUNTRY

7. MAP CO-ORDINATES   mE   mN
            OR
    LATITUDE & LONGITUDE   ° ' N/S   ° ' E/W

8. COLLECTOR

9. FIELD NUMBER

10. YEAR OF COLLECTION

11. LOCALITY NAME

12. HOLDER

13. MINERAL NAME

14. MODIFIER

15. TREATMENT

16. REFERENCE

17. EXTENDED REFERENCE (UP TO 40 CHARACTERS)

APPENDIX 2

Tasrock catalogue - computer entry sheet

1. **REGISTRATION NUMBER:-** eight (8) characters allowed - searchable

   Mines Dept.   2 digits - up to 4 digits

   e.g.   63 - 131

   University   Entry No.

   e.g.   12345

2. **GENERIC TYPE:-** two (2) characters allowed - searchable
   - two (2) letters, e.g.

IG - Igneous	ML - Mineral
SE - Sedimentary	OR - Ore
ME - Metamorphic	GO - Gossan
VO - Volcanic	SO - Soil
PY - Pyroclastic	MC - Mineral concentrate
MS - Metasedimentary	VE - Vegetation, litter
MI - Meta-igneous	ET - Extraterrestrial
HY - Hydrothermal	
XE - Xenolith, xenocryst	

3. **AGE:-** three (3) characters allowed - searchable
   - (2 or 3 common), e.g.

DE	Devonian
JUL	Lower (or Early Jurassic)
MI	Miocene
OR	Ordovician
ORU	Upper (or Late) Ordovician

   (see Penny Green or R.S. Bottrill for full list)

4. **ROCK NAME:-** ten (10) characters allowed (not 11 as on first printing of entry sheet) - searchable
   - leave off last letters as necessary, e.g.

   CONGLOMERA = CONGLOMERATE
   GABBRO   = √

5. **ROCK UNIT:-** eight (8) characters allowed - searchable
   - leave off last letter as necessary

BADGERHE(AD)	JUNEE
BATHURST	MATHINNA
BURNIE	MT READ
CRIMSON	OONAH
DENISON	OWEN
DUNDAS	PARMEENE(R)
ELDON	ROCKYCAP(E)
FAULKNER	SMITHTON
GORDON	

6. STATE AND QUADRANGLE:- A = one (1) character, then B = five (5) characters

    <u>A</u> 0 for Tas - then anticlockwise
        1 = VIC, 2 = N.S.W. (including A.C.T.), 3 = QLD, 4 = N.T.,
        5 = W.A., 6 = S.A. (A.C.T. = N.S.W.)

        9 for overseas - then abbreviate country name, e.g.
        CANDA = Canada (searchable)

    <u>B</u> _____ insert quadrangle number for Tasmania using
        1:50 000 sheets, if possible e.g.
        7916S = Smithton

    Use latitudes and longitudes for <u>all</u> areas outside Tasmania.

7. MAP CO-ORDINATES (searchable within Tasmania):-
    Use metric co-ordinates, if available
    [If in yards - put at bottom of sheet - will be converted in future]

    Latitude and longitude used outside Tasmania (searchable everywhere).
    Cross out N,S,E,W as appropriate.

    <u>For Metric co-ordinates</u> - universal grid reference
    use at least three (3) digits
    i.e. 357...mE, 486...mN (The Nut, Stanley)
    this will give location to nearest 1000 m. (The assumed digit 5
    on northing is omitted)
    [If more precise location is required use extra digits e.g. 3578..,
    4861.. to nearest 100 m]

8. COLLECTOR:- three (3) characters allowed
    Use two (2) or three (3) as appropriate (searchable)
    e.g.

F.A.	F. Ahmad	J.N.E.	J.N. Elliston
A.V.B.	A.V. Brown	R.J.F.	R.J. Ford
S.W.C.	S.W. Carey	D.I.G.	D.I. Groves

9. FIELD NUMBER:- six (6) characters
    any combination of letters and numbers up to 6 (not searchable)
    e.g. N56, CBDG42 etc.

    Leave off later characters if necessary to preserve meaning
    e.g. ROS PK7 = Rosny Park 7

10. YEAR OF COLLECTION:- four (4) characters, e.g. 1979 (searchable).

11. LOCALITY NAME:- twelve (12) characters (non-searchable)
    abbreviate to preserve sense of description, e.g.
    (i)   3 MLS E BLK STMP = 3 miles east of Black Stump
    (ii) DELORAINE = √

12. HOLDER:- one (1) character (searchable)
    M = Mines Dept., U = University, T = Tas. Museum, H = H.E.C.,
    Q = Queen Victoria Museum, etc.

13. MINERAL NAME:- eight (8) characters allowed (searchable)
    Leave off last letters if necessary, e.g.
    CHALCOPY = Chalcopyrite   RUTILE   = √
    MOLYBDEN = Molybdenite   SCHEELIT = Scheelite

14. MODIFIER:- two (2) sets of four (4) characters allowed (searchable)
      - generally adjectives - abbreviate to preserve sense, e.g.
      ARGL = Argillaceous
      CALC = Calcareous
      OPHC = Ophitic

      If necessary use 2 x 4 characters, e.g.
      GLOM PORP = Glomeroporphyritic
      SUBT RACH = Subtrachytic

15. TREATMENT:- four (4) sets of two (2) characters (searchable)
      Choose from list below:-

AL	Atterberg limits	OT	oriented thin section
AP	acetate peel	PD	powdered specimens
CA	chemical analysis	PF	petrofabrics
CS	crushed specimen	PH	photo
DC	drill core	PM	probe mount
DE	density	PN	palynology
DP	doubly polished section	PR	polished hand specimen
DT	D.T.A.	PS	polished section
DX	X-ray disc	PT	polished thin section
FI	chips for fluid inclusion studies	PX	X-ray pill
		PY	palaeontology
GS	grain size analysis	RE	resistivity
HM	heavy mineral separation	RO	hand specimen
IS	isotope study	SU	susceptibility
LS	load strength	SV	seismic velocity
MA	modal analysis	TS	thin section
MS	mineral separation		

16. REFERENCE:- use up to four (4) sets of five (5) characters or write
      below - still under consideration - (must recognise journal and
      volume at least) e.g.
      GEOL-SURV-BULL-61--- = Geological Survey Bulletin 61
      JOURN, VOLC-, GEOTH, RES14 = Journal of Volcanology and
                                             Geothermal Research, vol. 14.

      If in doubt write out full reference below 16.

APPENDIX 3

Sample of Printout

```
SEARCH OPTIONS ARE:
GENERIC TYPE            SE/ME/IG/
AGE           JU/
ROCK NAME         DOLERITE/BASALT/
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REG NO	TYP	AGE	ROCK NAME	ROCKUNIT	ST	QUAD	COL	FLD NO	YEAR	LOCALITY	HLD	MINERAL	MOD1	MOD2	TREATMENT	REG NO
			REFERENCE				EXTRA REFERENCE			LOCATION						

```
56- 107: IG:JUL:DOLERITE  :          : 0:7916S:SWC:DOL1  :1956:LAKES AREA  : M:          :    :    :DC,DE,DX,PM: 56- 107
        BULL GEOL  SURV TAS27 :TEST OF EXTRA REFERENCE              :490000ME 350000MN

56- 108: IG:JUL:DOLERITE  :          : 0:      :SWC:DOL1  :1956:LAKES       : M:          :    :    :DC,DE,DX,PM: 56- 108
        TEST EXTEN DED REFNO  :WITH LOW NUMBER                      :490000ME 350000MN

57- 107: IG:JUL:DOLERITE  :          : 0:7914N:SWC:DOL2  :1956:LAKES DSTRCT: M:          :    :    :DE,DC,DX,PM: 57- 107
        BULL GEOL  SURV TAS28 :AND MORE REFERENCES                  :492000ME 355000MN
```

APPENDIX 4

TASMANIAN ROCK CATALOGUE

GUIDE TO INFORMATION STORED

DATE 28 FEB 1985

INTRODUCTION

The abbreviations used in the Tasmanian rock catalogue (TASROK)
are outlined in the following lists. Every attempt should be made
to use the latest versions of the abbreviations. In the event of
additional abbreviations being needed please contact the Mines
Department to arrange an update and re-issue to participating groups.

REGISTRATION NUMBERS

FOR THE MINES DEPT. ROCK CATALOGUE
ASSUMED TO BE OF THE FORM 77-127

FOR THE MINES DEPT. MINERAL CATALOGUE
ASSUMED TO BE OF THE FORM 12345

FOR THE UNIVERSITY ASSUMED TO BE OF THE FORM
12345

GENERIC TYPE

```
     BLANK FOR NOT KNOWN
IG   IGNEOUS
SE   SEDIMENTARY
ME   METAMORPHIC
VO   VOLCANIC
PY   PYROCLASTIC
MS   METASEDIMENTARY
MI   METAIGNEOUS
HY   HYDROTHERMAL
XE   XENOLITH, XENOCRYST
ML   MINERAL
OR   ORE
GO   GOSSAN
SO   SOIL
MC   MINERAL CONCENTRATE
VE   VEGETATION, LITTER
ET   EXTRATERRESTRIAL
```

AGE

```
     BLANKS FOR NOT KNOWN
DE   DEVONIAN
JUL  LOWER (OR EARLY) JURASSIC
MI   MIOCENE
OR   ORDOVICIAN
ORU  UPPER (OR LATE) ORDOVICIAN
```

ROCK NAMES

                    BLANKS

BASALT
CONGLOMERATE
DOLERITE
GABBRO
MUDSTONE
SANDSTONE

ROCK UNITS

                    BLANKS

BADGERHEAD
BATHURST
BURNIE
CRIMSON
DENISON
DUNDAS
ELDON
FAULKNER
GORDON
JUNEE
MATHINNA
MT READ
OONAH
OWEN
PARMEENER
ROCKYCAPE
SMITHTON

LOCATION DATA

STATE
0	TASMANIA
1	VICTORIA
2	NEW SOUTH WALES (INCLUDING A. C. T.)
3	QUEENSLAND
4	NORTHERN TERRITORY
5	WESTERN AUSTRALIA
6	SOUTH AUSTRALIA
9	OVERSEAS

FOR ALL AREAS OUTSIDE TASMANIA
LATITUDE AND LONGITUDE ARE USED.

WITHIN TASMANIA THE AUSTRALIAN MAP GRID
IS USED WITH AT LEAST THREE (3) DIGITS
IN EACH COORDINATE.   THE ASSUMED DIGIT 5 IN
NORTHINGS IS OMITTED

10-14

COLLECTORS

BLANKS=UNKNOWN		BLANKS=UNKNOWN
AB1 A V BROWN AND M P MC CLENAGHAN		FA F AHMAD
AVB A V BROWN		AB1 A V BROWN AND M P MC CLENAGHAN
DIG D I GROVES		AVB A V BROWN
FA F AHMAD		SWC S W CAREY
JNE J N ELLISTON		JNE J N ELLISTON
RJF R J FORD		RJF R J FORD
SWC S W CAREY		DIG D I GROVES

HOLDERS

M   DEPARTMENT OF MINES (ROCK CATALOGUE)
        P. O. BOX 56
        ROSNY PARK
        TASMANIA   7018
        AUSTRALIA

N   DEPARTMENT OF MINES (MINERAL CATALOGUE)
        P. O. BOX 56
        ROSNY PARK
        TASMANIA   7018
        AUSTRALIA

U   GEOLOGY DEPARTMENT
        UNIVERSITY OF TASMANIA
        G. P. O. BOX 252C
        HOBART
        TASMANIA   7001
        AUSTRALIA

MINERALS

            BLANKS
        CHALCOPYRITE
        MOLYBDENITE
        RUTILE
        SCHEELITE

MODIFIERS

	BLANKS		ARGL	ARGILLACEOUS
ARGL.	ARGILLACEOUS			BLANKS
CALC	CALCAREOUS		CALC	CALCAREOUS
OPHC	OPHITIC		OPHC	OPHITIC
PORP	PORHYRITIC		PORP	PORHYRITIC

TREATMENTS

	BLANKS
AL	ATTERBURG LIMITS
AP	ACETATE PEEL
CA	CHEMICAL ANALYSIS
CS	CRUSHED SPECIMEN
DC	DRILL CORE
DE	DENSITY
DP	DOUBLY POLISHED SECTION
DT	D. T. A.
DX	X-RAY DISC
FI	CHIPS FOR FLUID INCLUSION STUDIES
GS	GRAIN SIZE ANALYSIS
HM	HEAVY MINERAL SEPARATION
IS	ISOTOPE STUDY
LS	LOAD STRENGTH
MA	MODAL ANALYSIS
MS	MINERAL SEPARATION
OT	ORIENTED THIN SECTION
PD	POWERED SPECIMEN
PF	PETROFABRICS
PH	PHOTO
PM	PROBE MOUNT
PN	PALYNOLOGY
PR	POLISHED HAND SPECIMEN
PS	POLSIHED SECTION
PT	POLISHED THIN SECTION
PX	X-RAY PILL
PY	PALAEONTOLOGY
RE	RESISTIVITY
RO	HAND SPECIMEN
SU	SUSCEPTIBILITY
SV	SEISMIC VELOCITY
TS	THIN SECTION

APPENDIX 5

Program ROCKADD

```
*ROCKADD. CSS - FOR RUNNING ROCKADD
$IFX ROCKTMP. TMP; $WRITE ROCKTMP. TMP EXISTS; $CLEAR; $ENDC
* IF THE FILE IS STILL THERE DONT ALLOW ANY ADDING
L ROCKADD; AL ROCKTMP. TMP, IN, 80; AS 7, ROCKTMP. TMP; ST
PRI ROCKTMP. TMP;  $WRITE  FILE IS ROCKTMP. TMP;  $EXIT
```

```
C ROCKADD.FTN - NEW ENTRIES FOR THE ROCK CATALOGUE
      REAL HOLD, AE, AN, AD, SPACE, AMINUS, TYPE, AGE, COLECT, ZERO, AT
      REAL HOLDER(6), REGNO(8), REGTMP(8), RNAME(3), RUNIT(2), QUAD(2),
   .      LOCN(12), FLDNUM(2), LOCATN(3), MINRL(2), MODIF(2),
   .      TRTMNT(4), REF1(3), REF2(3), REFEXT(10)
C REALS ARE ASSUMED 4 BYTES
      INTEGER IHOLD, I, K, KUP, IUP, J, JUP, ISTATE, IYEAR
      DATA HOLDER/1HH, 1HM, 1HN, 1HQ, 1HT, 1HU/, AE/1HE/, AN/1HN/, AD/1HD/,
   .      SPACE/1H /, AMINUS/1H-/, ZERO/1H0/
C
      OPEN(UNIT=4, FILE='CON:')
C OUTPUT TO TERMINAL ON LU 4
      OPEN(UNIT=5, FILE='CON:')
C INPUT FROM TERMINAL ON LU 5
C
C WRITES TWO 80 CHARACTER RECORDS PER INPUT FORM TO LU 7
C
   10 WRITE(4,100)
  100 FORMAT(' HOLDER'// H    H.E.C.'// M    MINES DEPT. ROCK CATALOGUE'/
   .          ' N    MINES DEPT. MINERAL CATALOGUE'//
   .          ' Q    QUEEN VICTORIA MUSEUM'// T    TASMANIAN MUSEUM'//
   .          ' U    UNIVERSITY OF TASMANIA')
      READ(5,101) HOLD
  101 FORMAT(A1)
C NOW CHECK THAT IT IS A VALID HOLDER AND GET THE HOLDER NUMBER
      DO 11 IHOLD=1,6
      IF (HOLD .EQ. HOLDER(IHOLD)) GOTO 12
C FOUND A MATCH
   11 CONTINUE
C IF FALL OUT NO MATCH
      GOTO 10
C NOW HAVE THE HOLDER NAME FOR THE BATCH SO START READING
C REGISTERED NUMBERS
C
   12 CONTINUE
C IHOLD IS THE HOLDER NUMBER
      WRITE(4,102)
  102 FORMAT(' REGISTRATION NUMBER - END TO FINISH')
      READ(5,103) REGNO
  103 FORMAT(8A1)
C NOW CHECK FOR THE END
      IF (REGNO(1) .EQ. AE .AND. REGNO(2) .EQ. AN .AND. REGNO(3) .EQ. AD)
   .    GOTO 280
C FINISH OFF DATA WHEN FIND END
C
C NOW GOTO THE RIGHT PLACE TO DECODE THE REGISTERED NUMBER ACCORDING TO IHOLD
      GOTO (201, 202, 205, 203, 204, 205), IHOLD
C USE SAME NUMBER SCHEME FOR UNIVERSITY AND MINES DEPT MINERALS
  201 GOTO 10
C DONT YET HAVE A FORMAT FOR THE H.E.C.
  202 CONTINUE
C THE MINES DEPT AS HOLDER - REG NO HAS FORM 67-1234
C MUST REMEMBER TO HAVE A WAY TO ENSURE THAT YEARS 19__ ARE
C LOWER IN VALUE THAN YEARS 20__
      DO 210 I=1,8
      IF (REGNO(I) .NE. SPACE) GOTO 211
C FIND THE FIRST NON-BLANK CHARACTER
  210 CONTINUE
  211 K=2
```

```
C COUNTER FOR POSITION IN TEMPORARY ARRAY
      REGTMP(1)=SPACE
C ENSURE THAT THERE IS A SPACE FOR THE CODE FOR THE CENTURY WHICH
C IS ADDED IN ROCKMRGE.FTN
      REGTMP(K)=REGNO(I)
      K=K+1
      I=I+1
      REGTMP(K)=REGNO(I)
C NOW HAVE TRANSFERRED THE FIRST TWO CHARACTERS - THE YEAR CODE
      K=K+1
      REGTMP(K)=AMINUS
C NOW PUT THE MINUS THERE
C
C NOW COPY THE NUMBER FROM THE RIGHT HAND SIDE
      KUP=8
      IUP=8
      DO 212 J=1,8
      IF (REGNO(IUP) .NE. SPACE) GOTO 213
C FIND THE RIGHT-HAND MOST NON-BLANK
      IUP=IUP-1
  212 CONTINUE
  213 REGTMP(KUP)=REGNO(IUP)
      KUP=KUP-1
      IUP=IUP-1
      IF (REGNO(IUP) .NE. SPACE .AND. REGNO(IUP) .NE. AMINUS) GOTO 213
C SECOND HALF OF NUMBER MAY BE TERMINATED BY MINUS OR SPACE
      K=K+1
      IF (K .GT. KUP) GOTO 250
C NO BLANK FILL REQUIRED - MOST UNLIKELY
      DO 214 J=K,KUP
      REGTMP(J)=SPACE
  214 CONTINUE
C FILLED WITH BLANKS
      GOTO 250
C NOW IN FORMAT I2,A1,I5
C
  203 CONTINUE
C QUEEN VIC
      GOTO 10
C WE KNOW NOTHING
  204 CONTINUE
C TAS MUSEUM
      GOTO 10
C WE DONT KNOW THIS EITHER
C
  205 CONTINUE
C THE UNIVERSITY HAS NUMBERS ONLY SO
C WANT TO RIGHT JUSTIFY
      KUP=8
      JUP=8
      DO 220 J=1,8
      IF (REGNO(JUP) .NE. SPACE) GOTO 221
      JUP=JUP-1
  220 CONTINUE
C LOOK FOR THE LAST NON-BLANK CHARACTER IN THE FIELD
  221 CONTINUE
C NOW COPY UNITL THE NEXT BLANK - STILL READING FROM RIGHT TO LEFT
      REGTMP(KUP)=REGNO(JUP)
      KUP=KUP-1
      JUP=JUP-1
```

```
      IF (JUP .EQ. 0) GOTO 222
      IF (REGNO(JUP) .NE. SPACE) GOTO 221
C GO BACK FOR THE NEXT CHARACTER ONLY IF THERE IS A NON-BLANK LEFT
  222 CONTINUE
      IF (KUP .EQ. 0) GOTO 250
C HAVE FILLED REGTMP
      DO 223 J=1,KUP
      REGTMP(J)=SPACE
  223 CONTINUE
C NOW IN I8 FORMAT
      GOTO 250
C
C
  250 CONTINUE
C NOW GET THE OTHER BITS AND PIECES
      WRITE(4,104)
  104 FORMAT(' TYPE')
      READ(5,105) TYPE
  105 FORMAT(A2)
      WRITE(4,106)
  106 FORMAT(' AGE')
      READ(5,107) AGE
  107 FORMAT(A3)
      WRITE(4,108)
  108 FORMAT(' ROCK NAME')
      READ(5,109) RNAME
  109 FORMAT(2A4,A2)
      WRITE(4,110)
  110 FORMAT(' ROCK UNIT')
      READ(5,111) RUNIT
  111 FORMAT(2A4)
      WRITE(4,112)
  112 FORMAT(' STATE CODE,QUAD OR COUNTRY')
      READ(5,113) ISTATE,QUAD
  113 FORMAT(I1,A4,A1)
      IF (ISTATE .NE. 0) GOTO 260
C FOR ALL BUT TAS READ LAT AND LONG
      WRITE(4,114)
  114 FORMAT(' COORDINATES')
      READ(5,115) LOCN
  115 FORMAT(12A1)
      GOTO 265
C READ AS STRING OF 12 CHARACTERS
C
C NOW FOR LATS AND LONGS
  260 WRITE(4,116)
  116 FORMAT(' LAT & LONG')
      READ(5,117) (LOCN(I),I=2,12)
  117 FORMAT(11A1)
      LOCN(1)=SPACE
C PUT A LEADING SPACE IN THE LATS AND LONGS TO MAKE THEM THE SAME FIELD WIDTH
C THE COORDINATES
C
  265 CONTINUE
      DO 266 I=2,12
      IF (LOCN(I) .EQ. SPACE) LOCN(I)=ZERO
  266 CONTINUE
C ZERO FILL TO ENSURE ALL TRAILING ZEROES ARE PRESENT BUT ENSURE
C THAT LEADING SPACE IN LTA/LONG IS NOT CHANGED
      WRITE(4,118)
```

```
  118 FORMAT(' COLLECTOR')
      READ(5,119) COLECT
  119 FORMAT(A3)
      WRITE(4,120)
  120 FORMAT(' FIELD NO. ')
      READ(5,121) FLDNUM
  121 FORMAT(A4,A2)
      WRITE(4,122)
  122 FORMAT(' YEAR')
      READ(5,123) IYEAR
  123 FORMAT(I4)
      WRITE(4,125)
  125 FORMAT(' LOCALITY')
      READ(5,126) LOCATN
  126 FORMAT(3A4)
      WRITE(4,127)
  127 FORMAT(' HOLDER')
      READ(5,101) AT
C READ AND DISCARD THE HOLDER AS IT DOESNT CHANGE VERY OFTEN AND IS SET
C AT THE START OF THE PROGRAM
      WRITE(4,129)
  129 FORMAT(' MINERAL')
      READ(5,130) MINRL
  130 FORMAT(2A4)
      WRITE(4,131)
  131 FORMAT(' MODIFIER')
      READ(5,132) MODIF
  132 FORMAT(2A4)
      WRITE(4,133)
  133 FORMAT(' TREATMENT')
      READ(5,134) TRTMNT
  134 FORMAT(4A2)
      WRITE(4,135)
  135 FORMAT(' REFERENCE 1')
      READ(5,136) REF1
  136 FORMAT(2A4,A2)
      WRITE(4,137)
  137 FORMAT(' REFERENCE 2')
      READ(5,136) REF2
      WRITE(4,138)
  138 FORMAT(' EXTRA REFERENCES - 40 CHARS MAX')
      READ(5,139) REFEXT
  139 FORMAT(10A4)
C END OF GETTING ONE FORM
C
      WRITE(7,150) REGTMP,TYPE,AGE,RNAME,RUNIT,ISTATE,QUAD,LOCN,COLECT,
     . FLDNUM,IYEAR,LOCATN,HOLD,MINRL,MODIF,TRTMNT,REF1,REF2,REFEXT
  150 FORMAT(8A1,A2,A3,2A4,A2,2A4,I1,A4,A1,12A1,A3,A4,A2,I4,3A4,
     .         A1,A4,1X/A4,2A4,4A2,2(2A4,A2),10A4)
C WRITE TO OUTPUT FILE
      GOTO 12
C AND BACK AROUND
C
C NOW TO CLOSE OFF
  280 CLOSE(UNIT=7,STATUS='KEEP')
C CLOSE OFF OR WRITE FILEMARK OR LOCK OR WHATEVER
      STOP
      END
```

APPENDIX 6

Program ROCKCHEK

```
*ROCKCHEK.CSS - FOR VERIFYING ROCKTMP.TMP DATA FILE
L ROCKCHEK: AS 7,ROCKTMP.TMP,ERO: AS 6,PR:; ST
$EXIT
```

```
C ROCKCHEK. FTN - TO CHECK ROCK CATALOGUE DATA FOR VALID ABBREVIATIONS
C ASSUMES THAT THE PRINTER IS LU 6
C ASSUMES THAT THE OUTPUT OF ROCKADD IS ON LU 7
C ASSUMES THAT LU 4 MAY BE OPENED WITH A VARIETY OF FILE NAMES
C
      REAL HOLD, TYPE, AGE, COLECT, ANAME1, ANAME2, ANAME3, AUNIT1, AUNIT2,
     .     MINRL1, MINRL2, MODIF1, MODIF2, TREAT
      REAL REGNO(8), RNAME(3), RUNIT(2), QUAD(2),
     .     LOCN(12), FLDNUM(2), LOCATN(3), MINRL(2), MODIF(2),
     .     TRTMNT(4), REF1(3), REF2(3), REFEXT(10),
     .     TTYPE(30), TAGE(30), TNAME(3, 150), TUNIT(3, 30),
     .     TCLCT(150), TMINRL(2, 150), TMODIF(200), ATREAT(35)
C REALS ARE ASSUMED 4 BYTES
      INTEGER I, J, ISTATE, IYEAR, NTYPE, NAGE, NNAME, NUNIT, NCLCT, NMINRL,
     .        NMODIF, NTRTMT, LINE, LINEF, ICOL
C
      REWIND 7
C ENSURE AT START OF DATA FILE
      OPEN(UNIT=4, FILE='ROCKTYPE. DAT', SHARE='ERO')
      NTYPE=1
   10 READ(4, 100, END=11) TTYPE(NTYPE)
  100 FORMAT(A2)
      NTYPE=NTYPE+1
      IF (NTYPE .GT. 30) STOP ' TOO MANY TYPES'
      GOTO 10
   11 NTYPE=NTYPE-1
      CLOSE(UNIT=4, STATUS='KEEP')
C READ THE CHOICE OF ROCK TYPES
C
      OPEN(UNIT=4, FILE='ROCKAGES. DAT', SHARE='ERO')
      NAGE=1
   12 READ(4, 101, END=13) TAGE(NAGE)
  101 FORMAT(A3)
      NAGE=NAGE+1
      IF (NAGE .GT. 30) STOP ' TOO MANY AGES'
      GOTO 12
   13 NAGE=NAGE-1
      CLOSE(UNIT=4, STATUS='KEEP')
C READ THE CHOICE OF ROCK AGES
C
      OPEN(UNIT=4, FILE='ROCKNAME. DAT', SHARE='ERO')
      NNAME=1
   14 READ(4, 102, END=15) TNAME(1, NNAME), TNAME(2, NNAME), TNAME(3, NNAME)
  102 FORMAT(2A4, A2)
      NNAME=NNAME+1
      IF (NNAME .GT. 150) STOP ' TOO MANY NAMES'
      GOTO 14
   15 NNAME=NNAME-1
      CLOSE(UNIT=4, STATUS='KEEP')
C READ THE CHOICE OF ROCK NAMES
C
      OPEN(UNIT=4, FILE='ROCKUNIT. DAT', SHARE='ERO')
      NUNIT=1
   16 READ(4, 103, END=17) TUNIT(1, NUNIT), TUNIT(2, NUNIT)
  103 FORMAT(2A4)
      NUNIT=NUNIT+1
      IF (NUNIT .GT. 30) STOP ' TOO MANY UNITS'
      GOTO 16
   17 NUNIT=NUNIT-1
```

```
      CLOSE(UNIT=4,STATUS='KEEP')
C READ THE CHOICE OF ROCK UNITS
C
      OPEN(UNIT=4,FILE='COLECTOR.DAT',SHARE='ERO')
      NCLCT=1
   18 READ(4,104,END=19) TCLCT(NCLCT)
  104 FORMAT(A3)
      NCLCT=NCLCT+1
      IF (NCLCT .GT. 150) STOP ' TOO MANY COLLECTORS'
      GOTO 18
   19 NCLCT=NCLCT-1
      CLOSE(UNIT=4,STATUS='KEEP')
C READ THE CHOICE OF COLLECTORS
C
      OPEN(UNIT=4,FILE='MINERALS.DAT',SHARE='ERO')
      NMINRL=1
   20 READ(4,105,END=21) TMINRL(1,NMINRL),TMINRL(2,NMINRL)
  105 FORMAT(2A4)
      NMINRL=NMINRL+1
      IF (NMINRL .GT. 150) STOP ' TOO MANY MINERALS'
      GOTO 20
   21 NMINRL=NMINRL-1
      CLOSE(UNIT=4,STATUS='KEEP')
C READ THE CHOICE OF MINERALS
C
      OPEN(UNIT=4,FILE='MODIFIER.DAT',SHARE='ERO')
      NMODIF=1
   22 READ(4,106,END=23) TMODIF(NMODIF)
  106 FORMAT(A4)
      NMODIF=NMODIF+1
      IF (NMODIF .GT. 200) STOP ' TOO MANY MODIFIERS'
      GOTO 22
   23 NMODIF=NMODIF-1
      CLOSE (UNIT=4,STATUS='KEEP')
C READ THE CHOICE OF MODIFIERS
C
      OPEN(UNIT=4,FILE='TRTMENT.DAT',SHARE='ERO')
      NTRTMT=1
   24 READ(4,107,END=25) ATREAT(NTRTMT)
  107 FORMAT(A2)
      NTRTMT=NTRTMT+1
      IF (NTRTMT .GT. 35) STOP ' TOO MANY TREATMENTS'
      GOTO 24
   25 NTRTMT=NTRTMT-1
      CLOSE(UNIT=4,STATUS='KEEP')
C READ THE CHOICE OF TREATMENTS
C
C NOW FOR THE CHECKING
      LINE=0
   48 READ(7,150,END=80) REGNO,TYPE,AGE,RNAME,RUNIT,ISTATE,QUAD,LOCN,
     . COLECT,FLDNUM,IYEAR,LOCATN,HOLD,MINRL,MODIF,TRTMNT,REF1,REF2,
     . REFEXT
  150 FORMAT(8A1,A2,A3,2A4,A2,2A4,I1,A4,A1,12A1,A3,A4,A2,I4,3A4,
     .          A1,A4,1X/A4,2A4,4A2,2(2A4,A2),10A4)
      LINEF=LINE+1
      LINE=LINE+2
C
      DO 50 I=1,NTYPE
      IF (TYPE .EQ. TTYPE(I)) GOTO 51
C FOUND IT
```

```
    50 CONTINUE
       WRITE(6,200) TYPE,LINEF
   200 FORMAT(' TYPE ERROR ',A2,' ON LINE',I4,' COLUMN 9')
    51 CONTINUE
C CHECKED TYPES
C
       DO 52 I=1,NAGE
       IF (AGE .EQ. TAGE(I)) GOTO 53
    52 CONTINUE
       WRITE(6,201) AGE,LINEF
   201 FORMAT(' AGE ERROR ',A3,' ON LINE',I4,' COLUMN 11')
    53 CONTINUE
C CHECKED AGES
C
       ANAME1=RNAME(1)
       ANAME2=RNAME(2)
       ANAME3=RNAME(3)
C SAVE ARRAY ACCESSES
       DO 54 I=1,NNAME
       IF (ANAME1 .NE. TNAME(1,I)) GOTO 54
       IF (ANAME2 .NE. TNAME(2,I)) GOTO 54
       IF (ANAME3 .EQ. TNAME(3,I)) GOTO 55
C A MATCH
    54 CONTINUE
       WRITE(6,202) RNAME,LINEF
   202 FORMAT(' ROCK NAME ERROR ',2A4,A2,' ON LINE',I4,' COLUMN 14')
    55 CONTINUE
C CHECKED ROCK NAMES
C
       AUNIT1=RUNIT(1)
       AUNIT2=RUNIT(2)
       DO 56 I=1,NUNIT
       IF (AUNIT1 .NE. TUNIT(1,I)) GOTO 56
       IF (AUNIT2 .EQ. TUNIT(2,I)) GOTO 57
    56 CONTINUE
       WRITE(6,203) RUNIT,LINEF
   203 FORMAT(' ROCK UNIT ERROR ',2A4,' ON LINE',I4,' COLUMN 24')
    57 CONTINUE
C CHECKED ROCK UNIT
C
       DO 58 I=1,NCLCT
       IF (COLECT .EQ. TCLCT(I)) GOTO 59
    58 CONTINUE
       WRITE(6,204) COLECT,LINEF
   204 FORMAT(' COLLECTOR ERROR ',A3,' ON LINE',I4,' COLUMN 50')
    59 CONTINUE
C CHECKED COLLECTOR
C
       MINRL1=MINRL(1)
       MINRL2=MINRL(2)
       DO 60 I=1,NMINRL
       IF (MINRL1 .NE. TMINRL(1,I)) GOTO 60
       IF (MINRL2 .EQ. TMINRL(2,I)) GOTO 61
    60 CONTINUE
       WRITE(6,205) MINRL,LINEF,LINE
   205 FORMAT(' MINERAL ERROR ',2A4,' BETWEEN LINE',I4,' COLUMN 76',
      '           ' AND LINE',I4,' COLUMN 1')
    61 CONTINUE
C CHECKED MINERALS
C
```

```
      MODIF1=MODIF(1)
      MODIF2=MODIF(2)
      DO 62 I=1,NMODIF
      IF (MODIF1 .EQ. TMODIF(I)) GOTO 63
   62 CONTINUE
      WRITE(6,206) MODIF1,LINE
  206 FORMAT(' MODIFIER ERROR ',A4,' ON LINE',I4,' COLUMN 5')
   63 CONTINUE
      DO 64 I=1,NMODIF
      IF (MODIF2 .EQ. TMODIF(I)) GOTO 65
   64 CONTINUE
      WRITE(6,207) MODIF2,LINE
  207 FORMAT(' MODIFIER ERROR ',A4,' ON LINE',I4,' COLUMN 9')
   65 CONTINUE
C CHECKED MODIFIERS
C
      ICOL=11
      DO 70 J=1,4
      ICOL=ICOL+2
      TREAT=TRTMNT(J)
      DO 66 I=1,NTRTMT
      IF (TREAT .EQ. ATREAT(I)) GOTO 70
   66 CONTINUE
      WRITE(6,208) TREAT,LINE,ICOL
  208 FORMAT(' TREATMENT ERROR ',A2,' ON LINE',I4,' COLUMN',I3)
   70 CONTINUE
C CHECKED TREATMENTS
C
C NOW GO AND GET THE NEXT ONE
      GOTO 48
C
   80 CONTINUE
C PREPARE TO CLOSE OFF
      CLOSE(UNIT=7,STATUS='KEEP')
      STOP
      END
```

APPENDIX 7

Program ROCKMRGE

```
*ROCKMRGE.CSS - FOR PUTTING NEW ROCK DATA ON THE END OF ROCKDAT
L ROCKMRGE; REP ROCCAT.DAT,0; AS 7,ROCCAT.DAT; AS 6,ROCKTMP.TMP,ERO
AL SYSF:ROCKMRGE.DAT,IN,80/5/5; AS 4,SYSF:ROCKMRGE.DAT; ST
$IFE 0; DEL ROCKTMP.TMP; REP ROCCAT.DAT,FF00; DE SYSF:ROCKMRGE.DAT; $ENDC
$EXIT
```

```
C ROCKMRGE.FTN - FOR ADDING NEW ENTRIES TO THE END OF THE FILE
C WOULD PREFERABLY DONE USING SYSTEM UTILITIES
C MAIN FILE LU 7
C NEW DATA  LU 6
C COMBINED DATA LU 4
C
      REAL A(159),ZERO,AM
C
      DATA ZERO/1H0/,AM/1HM/
C TO BE USED IN SETTING THE CENTURY CODE FOR THE MINES DEPT
C ROCK CATALOGUE
C ASSUMES FILES ARE OPEN
   10 READ(7,100,END=20) A
  100 FORMAT(79A1/80A1)
      WRITE(4,100) A
C READ AND WRITE ONE DATA SET - I.E.  TWO RECORDS
      GOTO 10
C COPY ORIGINAL FILE  .
C
C NOW COPY THE NEW DATA CHANGING IT IF WE NEED TO AS WE GO
   20 CONTINUE
      READ(6,100,END=30) A
      IF (A(75) .EQ. AM) A(1)=ZERO
C FOR THE MINES DEPT. ROCK CATALOGUE NEED TO PUT IN THE
C CODE FOR THE CENTURY
C  0 FOR 19__      1 FOR 20__ ETC.
      WRITE(4,100) A
      GOTO 20
C COPY NEW FILE
C
   30 REWIND 7
C REWIND OLD MAIN FILE
C
C NOW USE THE OPEN STATEMENT OR SOME OTHER DEVICE TO
C ENSURE THAT THE COMBINED FILE - LU 4 - IS WRITE PROTECTED
      OPEN(UNIT=4,SHARE='ERO')
      REWIND 4
   40 READ(4,100,END=50) A
      WRITE(7,100) A
      GOTO 40
C COPY THE COMBINED FILE BACK
C
   50 CONTINUE
      CLOSE(UNIT=7,STATUS='KEEP')
C CLOSE OFF THE NEW COMBINED FILE
      STOP
      END
```

APPENDIX 8

Program ROCKSORT

```
*ROCKSORT.CSS
* FOR SORTING ROCK CATALOGUE INTO REGISTERED NUMBER ORDER
PRE ETM
L ROCKSORT,10; AS 4,ROCCAT.DAT,ERO; AL SYSF:ROCTMP.DAT,IN,80/5/2
AS 5,CON:; AS 6,SYSF:ROCTMP.DAT; ST
$IFNE 0; $WRITE SORT ERROR; ENA ETM; $EXIT; $ENDC
$BUILD WCOPY.CMD
IN SYSF:ROCTMP.DAT
AL ROCCAT.DAT,IN,80/10/5
OUT ROCCAT.DAT
COPY *,*
REW I
REW O
VERIFY *,*
END
$ENDB
REP SYSF:ROCTMP.DAT,FF00; REP ROCCAT.DAT,0; DE ROCCAT.DAT
L COPY32,50; ST ,COM=WCOPY.CMD,LI=NULL:,LO=NULL:
$IFNE 0; $WRITE SORT-COPY ERROR; ENA ETM; $EXIT; $ENDC
REP ROCCAT.DAT,FF00; REP SYSF:ROCTMP.DAT,0; DE SYSF:ROCTMP.DAT,WCOPY.CMD
ENA ETM; $EXIT
```

```
$TITL  ROCKSORT.FTN - SORT THE ROCK CATALOGUE
C INTO ASCENDING REGISTERED NUMBER ORDER
C USES FORTRAN 77 HEAVILY BUT COULD BE RE-WRITTEN
      CHARACTER*8 REGNO,REGNUM(32000)
      CHARACTER*1 HOLDER,HOLD,IA(159),IHOLD(6)
      INTEGER*2 FREC
      INTEGER*4 IREC,RECNUM(32000)
      EQUIVALENCE (IA(1),REGNO),(IA(75),HOLD)
C USED TO MAKE I/O SIMPLER
      DATA IHOLD/'H','M','N','Q','T','U'/
C USED TO CHECK TO SELECT A VALID ONE
C
C ASSUMES  LU 5 IS THE USER TERMINAL
C          LU 4 IS THE INPUT FILE
C          LU 6 IS THE OUTPUT FILE
C
C THE PROGRAM REQUESTS THE USER TO NOMINATE THE HOLDER WHOSE DATA IS
C TO BE SORTED.  THE INPUT DATA FILE IS SCANNED FOR A MATCHING HOLDER.
C NON-MATCHING DATA IS TRANSFERRED DIRECT TO THE OUTPUT FILE WHILST
C THE RECORD NUMBERS OF THE FIRST RECORD OT THE MATCHING DATA SETS
C ARE NOTED.  AFTER BEING SORTED THE DATA FROM THE HOLDER SPECIFIED
C WILL BE AT THE BACK OF THE FILE.
C
   10 WRITE(5,102)
  102 FORMAT(' HOLDER WHOSE DATA IS TO BE SORTED'// H    H. E. C. '/
     .              ' M    MINES DEPT. ROCK CATALOGUE'/
     .              ' N    MINES DEPT. MINERAL CATALOGUE'/
     .              ' Q    QUEEN VICTORIA MUSEUM'// T    TASMANIAN MUSEUM'/
     .              ' U    UNIVERSITY OF TASMANIA')
      READ(5,101) HOLDER
  101 FORMAT(A1)
C NOW CHECK THAT IT IS A VALID HOLDER AND GET THE HOLDER NUMBER
      DO 11 IH=1,6
      IF (HOLDER .EQ. IHOLD(IH)) GOTO 12
C FOUND A MATCH
   11 CONTINUE
C IF FALL OUT NO MATCH
      GOTO 10
C NOW HAVE THE HOLDER NAME FOR THE BATCH SO START READING
   12 CONTINUE
      OPEN(UNIT=4,ACCESS='DIRECT',RECL=80)
C OPEN THE INPUT FILE FOR DIRECT ACCESS TO ALLOW THE RANDOM
C READS AFTER THE BASIC SORT
      REWIND 4
      IREC=-1
C COUNTER FOR THE NUMBER OF RECORDS READ - NOTE THAT EACH DATA
C ENTRY CONSISTS OF TWO LOGICAL RECORDS AND IREC MUST BE
C INCREMENTED BY 2.
      FREC=0
C COUNTER FOR THE NUMBER OF RECORDS FOUND THAT MATCH THE SPECIFIED
C HOLDER
   15 READ(4,200,END=20) IA
  200 FORMAT(79A1/80A1)
C TWO RECORDS PER DATA ENTRY
      IREC=IREC+2
C INCREMENT THE RECORD NUMBER IN THE FILE
      IF (HOLD .NE. HOLDER) THEN
      WRITE(6,200) IA
      GOTO 15
```

```
      ENDIF
C IF NOT THE RIGHT HOLDER SIMPLY COPY TO THE OUTPUT FILE
C
      FREC=FREC+1
C INCREMENT THE COUNTER FOR THE NUMBER OF FOUND RECORDS
      IF (FREC .GT. 32000) PAUSE 'MORE THAN 32000 ENTRIES SO CANCEL'
      REGNUM(FREC)=REGNO
      RECNUM(FREC)=IREC
      GOTO 15
C STORE THE REGISTRATION NUMBER AND THE RECORD NUMBER AND GO BACK
C FOR ANOTHER
C
C NOW TO SORT THE ONES WE HAVE FOUND
   20 CONTINUE
      IF (FREC .EQ. 0) STOP 'NO RECORDS'
      CALL BBSSTR(RECNUM,REGNUM,FREC)
C SORT INTO ASCENDING REG. NO. ORDER
      DO 30 I=1,FREC
      READ(4,200,REC=RECNUM(I)) IA
      WRITE(6,200) IA
   30 CONTINUE
C COPY IN NEW ORDER WHICH IS IN RECNUM AT THE END OF THE SORT
      CLOSE(UNIT=6,STATUS='KEEP')
      CLOSE(UNIT=4,STATUS='KEEP')
      END
      SUBROUTINE BBSSTR(IR,CVAR,N)
C SORT A NUMBER OF STRINGS INTO ASCENDING ORDER AND AT THE SAME TIME
C FOLLOW THE CHANGES WITH THE INDEX IR
      CHARACTER *8 CVAR(N),CTEMP
      INTEGER*4 IR(N),IT,IRI,IP1
      INTEGER*2 N
      LOGICAL NSWAP
      IF (N .LE. 1) RETURN
C NOTHING TO SORT
      NM1=N-1
      DO 30 J=1,NM1
      NSWAP=.TRUE.
      IRI=1
      DO 40 I=1,NM1
      IP1=I+1
      IF (CVAR(IRI) .LE. CVAR(IP1)) GOTO 40
      NSWAP=.FALSE.
      CTEMP=CVAR(IRI)
      IT=IR(IRI)
      CVAR(IRI)=CVAR(IP1)
      IR(IRI)=IR(IP1)
      CVAR(IP1)=CTEMP
      IR(IP1)=IT
   40 IRI=IP1
      IF (NSWAP) RETURN
   30 CONTINUE
      RETURN
      END
```

APPENDIX 9

Program ROCKSRCH

```
*ROCKSRCH. CSS - FOR SEARCHING THE ROCCAT. DAT FILE
L SEARCHER: AS 7, ROCCAT. DAT, ERO: AS 5, CON:: AS 6, PR:: ST
$EXIT
```

```
$NDEBUG
C SEARCHER. FTN - USE FOR SEARCHING THE ROCK CATALOGUE FILE
C ISSUES PROMPTS ON LU 5 AND PRINTS ON LU 6.   IF DESIRED A SMALL NUMBER
C OF ENTRIES MAY BE LISTED TO LU 5.
C IF MORE THAN 1000 ENTRIES ARE FOUND THERE IS A CHANCE TO CUT OFF THE
C PRINTOUT AT THAT POINT.
        CHARACTER*1 IYES, IY, HOLD, HOLDER(6), SREGNO(8), FREGNO(8), GTYPE(72),
     .             RAGE(72), NAME(72), UNIT(72), STATE(72), IC, IL,
     .             LATS(5), LATN(5), LONW(6), LONE(6), CLCT(72),
     .             SHOLD(72), IMINRL(72), IMODIF(72), ITREAT(72),
     .             ITAS, IA(159), SPACE, ZERO
      CHARACTER*4 SYEAR, FYEAR, YEAR
      CHARACTER*6 CORDW, CORDE, CORDS, CORDN, COORDE, COORDN
      CHARACTER*8 SREGN, FREGN, REGNO
      INTEGER ILATS, ILATN, ILONW, ILONE, IILAT, IILON, IHOLD, LINE, PAGE
      REAL ANSWER(6)
      REAL*8 ACORDE, ACORDN
      LOGICAL RNO, LTYPE, LAGE, LNAME, LUNIT, LSTATE, SLOCN, LCOORD, LCLCT,
     .        LYEAR, LHOLD, LMINRL, LMODIF, LTREAT, INTAS, FOUND, VDU, PRNTR
      EQUIVALENCE (IA(1), REGNO), (IA(38), COORDE), (IA(44), COORDN),
     .   (IA(59), YEAR)
C USED TO ALLOW USE OF THE FORTRAN 77 CHARACTER COMPARISONS
C CAN EASILY BE ADAPTED TO NON FORTRAN 77 WITH THE EXCEPTION
C OF REGNO WHICH WOULD REQUIRE A DIFFERENT SEARCHING PART FOR
C EACH HOLDER
      DATA HOLDER/'H', 'M', 'N', 'Q', 'T', 'U'/, IY/'Y'/, IC/'C'/, IL/'L'/,
     .     ITAS/'0'/, SPACE/' '/, ZERO/'0'/
C ASSUMES LU 5 IS THE USER CONSOLE
C ASSUMES LU 6 IS THE LINE PRINTER
C ASSUMES LU 7 IS THE MAIN DATA FILE
      FOUND=. FALSE.
C USED TO DETERMINE IF ANY MATCHING DATA FOUND
      WRITE(5, 90)
   90 FORMAT(' SEND OUTPUT TO VDU?')
      READ(5, 101) IYES
      VDU=IYES . EQ. IY
C SEND OUTPUT TO THE VDU
      WRITE(5, 91)
   91 FORMAT(' SEND OUTPUT TO PRINTER?')
      READ(5, 101) IYES
      PRNTR=IYES . EQ. IY
C SEND OUTPUT TO PRINTER
      LINE=0
      PAGE=0
C USED TO KEEP COUNT OF LINES AND PAGES ON PRINTOUT
      WRITE(5, 100)
  100 FORMAT(' SEARCH BY REGISTRATION NUMBER?')
      READ(5, 101) IYES
  101 FORMAT(A1)
      RNO=IYES . EQ. IY
      IF (. NOT. RNO) GOTO 13
C
   10 WRITE(5, 102)
  102 FORMAT(' HOLDER'/' H    H. E. C. '/
     .          ' M    MINES DEPT. ROCK CATALOGUE'/
     .          ' N    MINES DEPT. MINERAL CATALOGUE'/
     .          ' Q    QUEEN VICTORIA MUSEUM'/' T    TASMANIAN MUSEUM'/
     .          ' U    UNIVERSITY OF TASMANIA')
      READ(5, 101) HOLD
```

```
C NOW CHECK THAT IT IS A VALID HOLDER AND GET THE HOLDER NUMBER
      DO 11 IHOLD=1,6
      IF (HOLD .EQ. HOLDER(IHOLD)) GOTO 12
C FOUND A MATCH
   11 CONTINUE
C IF FALL OUT NO MATCH
      GOTO 10
C NOW HAVE THE HOLDER NAME FOR THE BATCH SO START READING
C REGISTERED NUMBERS
C
   12 CONTINUE
C IHOLD IS THE HOLDER NUMBER
      WRITE(5,104)
  104 FORMAT(' STARTING REGISTRATION NUMBER (USE - AS DELIMITER)')
      READ(5,105) SREGNO
  105 FORMAT(8A1)
      WRITE(5,106)
  106 FORMAT(' FINISHING REGISTRATION NUMBER (USE - AS DELIMITER)')
      READ(5,105) FREGNO
      CALL JUSTIF(SREGN,SREGNO,IHOLD)
      CALL JUSTIF(FREGN,FREGNO,IHOLD)
C JUSTIFY THE REGISTRATION NUMBER TO MATCH THE FORMAT USED BY ROCKADD
C AND RETURN IN FORTRAN 77 CHARACTER*8 FORMAT
C OTHER METHODS MAY BE REQUIRED HERE IF NOT FORTRAN77
   13 WRITE(5,107)
  107 FORMAT(' GENERIC TYPE')
      READ(5,108) GTYPE
  108 FORMAT(72A1)
      CALL YESRCH(LTYPE,GTYPE)
      WRITE(5,109)
  109 FORMAT(' AGE')
      READ(5,108) RAGE
      CALL YESRCH(LAGE,RAGE)
      WRITE(5,110)
  110 FORMAT(' ROCK NAME')
      READ(5,108) NAME
      CALL YESRCH(LNAME,NAME)
      WRITE(5,111)
  111 FORMAT(' ROCK UNIT')
      READ(5,108) UNIT
      CALL YESRCH(LUNIT,UNIT)
      WRITE(5,113)
  113 FORMAT(' STATE')
      READ(5,108) STATE
      CALL YESRCH(LSTATE,STATE)
   14 WRITE(5,114)
  114 FORMAT(' SEARCH BY (C)OORDINATES OR (L)AT/LONG'/
     .        ' LEAVE BLANK FOR NEITHER')
      READ(5,101) IYES
      SLOCN=IYES .NE. SPACE
C IF NOT A SPACE THEN NEED TO LOOK FOR C OR L
      IF ( .NOT. SLOCN) GOTO 16
C NOT WORRIED ABOUT COORDS OR LAT/LONG
      IF (IYES .NE. IC .AND. IYES .NE. IL) GOTO 14
C WASNT A VALID CHOICE
      LCOORD=IYES .EQ. IC
C TO INDICATE IF LOOKING FOR COORDS OR LAT/LONG
      IF (LCOORD) GOTO 15
C
C NOW GET LAT/LONG DATA
```

```
      WRITE(5,115)
  115 FORMAT(' SOUTHERNMOST LATITUDE')
      READ(5,116) LATS
  116 FORMAT(5A1)
      WRITE(5,117)
  117 FORMAT(' NORTHERNMOST LATITUDE')
      READ(5,116) LATN
      WRITE(5,118)
  118 FORMAT(' WESTERNMOST LONGITUDE')
      READ(5,119) LONW
  119 FORMAT(6A1)
      WRITE(5,120)
  120 FORMAT(' EASTERNMOST LONGITUDE')
      READ(5,119) LONE
C GET LATS AND LONGS AS DEGREES WITH + N,E  - S,W
C USING ENCODE/DECODE ETC IN SUBROUTINE ILAT,ILON
      ILATS=ILAT(LATS)
      ILATN=ILAT(LATN)
      ILONW=ILON(LONW)
      ILONE=ILON(LONE)
C NOW DECIDE IF IT IS LIKELY TO FALL ON TAS.
C CHECK THE EDGES OF TAS AND THE AREA TO SEE IF THE AREA AND TAS COULD
C BE OVERLAPPED IN A SIMPLE MINDED WAY
C TAS HAS EDGES 143.75E,148.50E,39.50S,43.75S
      INTAS=ILONE .GE. 14345 .AND. ILONW .LE. 14830 .AND.
     .           ILATS .LE. -3930 .AND. ILATN .GE. -4345
C EASTERN EDGE IS EAST OF WEST OF TAS AND WESTERN EDGE IS WEST OF
C EASTERN EDGE OF TAS AND SOUTHERN EDGE IS SOUTH OF NORTHERN EDGE
C OF TAS AND NORTHERN EDGE IS NORTH OF SOUTHERN EDGE OF TAS
      GOTO 16
C GOT LATS AND LONGS AS SIGNED INTEGERS SO BRANCH ROUND
C
C
C
C NOW FOR COORDINATES
C ONCE AGAIN INVOKE FORTRAN 77 BY USING CHARACTER*6 FOR HOLDING
C THE COORDINATES
   15 WRITE(5,121)
  121 FORMAT(' WESTERNMOST EASTING IN METRES')
      READ(5,122) CORDW
  122 FORMAT(A6)
      WRITE(5,123)
  123 FORMAT(' EASTERNMOST EASTING IN METRES')
      READ(5,122) CORDE
      WRITE(5,124)
  124 FORMAT(' SOUTHERNMOST NORTHING IN METRES')
      READ(5,122) CORDS
      WRITE(5,125)
  125 FORMAT(' NORTHERNMOST NORTHING IN METRES')
      READ(5,122) CORDN
C FINISH READING COORDINATES
      DO 9 I=1,6
      IF (CORDW(I:I) .EQ. SPACE) CORDW(I:I)=ZERO
      IF (CORDE(I:I) .EQ. SPACE) CORDE(I:I)=ZERO
      IF (CORDS(I:I) .EQ. SPACE) CORDS(I:I)=ZERO
      IF (CORDN(I:I) .EQ. SPACE) CORDN(I:I)=ZERO
    9 CONTINUE
C ZERO FILL COORDS IF THEY HAVE NOT BEEN ZERO FILLED BY THE USER
C
C NOW FOR THE OTHER SEARCH OPTIONS
   16 WRITE(5,126)
```

```
    126 FORMAT(' COLLECTOR')
        READ(5,108) CLCT
        CALL YESRCH(LCLCT,CLCT)
        WRITE(5,127)
    127 FORMAT(' SEARCH BY YEAR? (Y OR N)')
        READ(5,101) IYES
        LYEAR=IYES .EQ. IY
        IF (.NOT. LYEAR) GOTO 8
C DONT ASK FOR YEAR IF NOT LOOKING FOR YEAR
        WRITE(5,128)
    128 FORMAT(' STARTING YEAR')
        READ(5,129) SYEAR
    129 FORMAT(A4)
C ANOTHER USE OF FORTRAN 77 ALTHOUGH A TRUE 32 BIT INTEGER WOULD BE OK
        WRITE(5,130)
    130 FORMAT(' FINISHING YEAR')
        READ(5,129) FYEAR
      8 WRITE(5,131)
    131 FORMAT(' HOLDER')
        READ(5,108) SHOLD
        CALL YESRCH(LHOLD,SHOLD)
        WRITE(5,132)
    132 FORMAT(' MINERAL')
        READ(5,108) IMINRL
        CALL YESRCH(LMINRL,IMINRL)
        WRITE(5,133)
    133 FORMAT(' MODIFIER')
        READ(5,108) IMODIF
        CALL YESRCH(LMODIF,IMODIF)
        WRITE(5,134)
    134 FORMAT(' TREATMENT')
        READ(5,108) ITREAT
        CALL YESRCH(LTREAT,ITREAT)
C END OF GETTING OPTIONS
C
        IF (PRNTR) THEN
C IF OUTPUT TO PRINTER PRINT THE SEARCH OPTIONS
        WRITE(6,400)
    400 FORMAT(' SEARCH OPTIONS ARE:')
        IF (RNO) WRITE(6,401) SREGNO,FREGNO
    401 FORMAT(' STARTING REGISTRATION NUMBER',10X,8A1/
       '          ' FINISHING REGISTRATION NUMBER',10X,8A1)
        IF (LTYPE) WRITE(6,402) GTYPE
    402 FORMAT(' GENERIC TYPE',10X,72A1)
        IF (LAGE) WRITE(6,403) RAGE
    403 FORMAT(' AGE',10X,72A1)
        IF (LNAME) WRITE(6,404) NAME
    404 FORMAT(' ROCK NAME',10X,72A1)
        IF (LUNIT) WRITE(6,405) UNIT
    405 FORMAT(' ROCK UNIT',10X,72A1)
        IF (LSTATE) WRITE(6,406) STATE
    406 FORMAT(' STATE',10X,72A1)
        IF (SLOCN .AND. LCOORD) WRITE(6,407) CORDW,CORDE,CORDS,CORDN
    407 FORMAT(' COORDINATE LIMITS',10X,2(A6,'ME '),2(A6,'MN '))
        IF (SLOCN .AND. .NOT. LCOORD) WRITE(6,408) LATS,LATN,LONW,LONE
    408 FORMAT(' LAT/LONG LIMITS',10X,2(5A1,1X),2(6A1,1X))
        IF (LCLCT) WRITE(6,409) CLCT
    409 FORMAT(' COLLECTOR',10X,72A1)
        IF (LYEAR) WRITE(6,410) SYEAR,FYEAR
    410 FORMAT(' YEAR RANGE',10X,A4,'-',A4)
```

```
      IF (LHOLD) WRITE(6,411) SHOLD
  411 FORMAT(' HOLDER',10X,72A1)
      IF (LMINRL) WRITE(6,412) IMINRL
  412 FORMAT(' MINERAL',10X,72A1)
      IF (LMODIF) WRITE(6,413) IMODIF
  413 FORMAT(' MODIFIER',10X,72A1)
      IF (LTREAT) WRITE(6,414) ITREAT
  414 FORMAT(' TREATMENT',10X,72A1)
      ENDIF
C HAVE NOW PRINTED OPTIONS
C
C NOW FOR THE SEARCH
   17 READ(7,200,END=40) IA
  200 FORMAT(79A1/80A1)
      IF (.NOT. RNO) GOTO 18
      IF (IA(75) .NE. HOLD) GOTO 17
C NOT THE RIGHT HOLDER FOR THE SORT OF REGISTRATION NUMBER
C SPECIFIED
C
      IF (REGNO .LT. SREGN .OR. REGNO .GT. FREGN) GOTO 17
C USE FORTRAN 77 STRING COMPARISON HERE TO MAKE LIFE EASIER
C FOR THE MINES DEPT. - OTHERS WILL NEED EITHER FORTRAN 77
C OR A DIFFERENT APPROACH
C
   18 CONTINUE
      IF (.NOT. LTYPE) GOTO 19
      IF (ISITIN(GTYPE,IA,9,10) .EQ. 0) GOTO 17
C CHECK GENERIC TYPE
   19 CONTINUE
      IF (.NOT. LAGE) GOTO 20
      IF (ISITIN(RAGE,IA,11,13) .EQ. 0) GOTO 17
C CHECK AGE
   20 CONTINUE
      IF (.NOT. LNAME) GOTO 21
      IF (ISITIN(NAME,IA,14,23) .EQ. 0) GOTO 17
C CHECK ROCK NAME
   21 CONTINUE
      IF (.NOT. LUNIT) GOTO 22
      IF (ISITIN(UNIT,IA,24,31) .EQ. 0) GOTO 17
C CHECK ROCK UNIT
   22 CONTINUE
      IF (.NOT. LSTATE) GOTO 23
      IF (ISITIN(STATE,IA,32,32) .EQ. 0) GOTO 17
C CHECK STATE
   23 CONTINUE
      IF (.NOT. SLOCN) GOTO 26
      IF (LCOORD) GOTO 25
C DEAL WITH SEARCH BY LAT/LONG FIRST
C
C LOOK TO SEE IF TAS COULD BE INVOLVED  AND IF SO CONVERT TAS COORDS
C TO LAT AND LONG
      IF (IA(32) .NE. ITAS) GOTO 24
C NOT IN TAS SO DATA MUST ALREADY BE LAT/LONG
C
      IF (.NOT. INTAS) GOTO 17
C THE AREA DOES NOT INCLUDE TAS SO GO AND GET ANOTHER DATA SET
C NOW LOOK MORE CLOSELY BY CONVERTING TO LATS AND LONGS
C USE FORTRAN 77 CHARACTER VARIABLES
      ENCODE(BUFF,135) COORDE
  135 FORMAT(A6,'.0')
```

```
      DECODE(BUFF,136) ACORDE
  136 FORMAT(F8.1)
      ENCODE(BUFF,135) COORDN
      DECODE(BUFF,136) ACORDN
C NOW HAVE THE COORDINATES IN DOUBLE PRECISION READY FOR PASSING TO GEOGRF
      CALL GEOGRF(ACORDE,ACORDN,ANSWER)
      IILAT=-(ANSWER(1)*100.0+ANSWER(2)+(ANSWER(3)/60.0))
      IF (IILAT .LT. ILATS .OR. IILAT .GT. ILATN) GOTO 17
      IILON=ANSWER(4)*100.0+ANSWER(5)+(ANSWER(6)/60.0)
      IF (IILON .LT. ILONW .OR. IILON .GT. ILONE) GOTO 17
      GOTO 26
   24 CONTINUE
C NOW LOOK FOR ALL BUT TAS
      IILAT=ILAT(IA(39))
      IF (IILAT .LT. ILATS .OR. IILAT .GT. ILATN) GOTO 17
      IILON=ILON(IA(44))
      IF (IILON .LT. ILONW .OR. IILON .GT. ILONE) GOTO 17
C CHECK LAT/LONG
      GOTO 26
C NOW FOR THE COORDS
   25 CONTINUE
C USE FORTRAN 77 CHARACTER VARIABLES HERE
      IF (IA(32) .NE. ITAS) GOTO 17
C NOT IN TAS SO NOT COORDS
      IF (COORDN .GT. CORDN .OR. COORDN .LT. CORDS) GOTO 17
      IF (COORDE .GT. CORDE .OR. COORDE .LT. CORDW) GOTO 17
C CHECK COORDS OF TAS USING FORTRAN 77 CHARACTER VARIABLES
   26 CONTINUE
      IF (.NOT. LCLCT) GOTO 27
      IF (ISITIN(CLCT,IA,50,52) .EQ. 0) GOTO 17
C CHECKED COLLECTOR
   27 CONTINUE
      IF (.NOT. LYEAR) GOTO 28
C USE FORTRAN 77 CHARACTER VARIABLES HERE
      IF (YEAR .LT. SYEAR .OR. YEAR .GT. FYEAR) GOTO 17
C CHECKED YEAR
   28 CONTINUE
      IF (.NOT. LHOLD) GOTO 29
      IF (ISITIN(SHOLD,IA,75,75) .EQ. 0) GOTO 17
C CHECKED HOLDER
   29 CONTINUE
      IF (.NOT. LMINRL) GOTO 30
      IF (ISITIN(IMINRL,IA,76,83) .EQ. 0) GOTO 17
C CHECKED MINERAL
   30 CONTINUE
      IF (.NOT. LMODIF) GOTO 31
      IF (ISITIN(IMODIF,IA,84,87) .EQ. 0 .AND. ISITIN(IMODIF,IA,88,91)
     .       .EQ. 0) GOTO 17
C CHECKED BOTH MODIFIERS
   31 CONTINUE
      IF (.NOT. LTREAT) GOTO 32
      IF (ISITIN(ITREAT,IA,92,93) .EQ. 0 .AND. ISITIN(ITREAT,IA,94,95)
     .   .EQ. 0 .AND. ISITIN(ITREAT,IA,96,97) .EQ. 0 .AND.
     .  ISITIN(ITREAT,IA,98,99) .EQ. 0) GOTO 17
C CHECKED ALL FOUR TREATMENTS
   32 CONTINUE
C
C IF GET TO HERE HAVE SATISFIED ALL THE CHECKS
      IA(1)=' '
C MASK OUT THE CODE FOR YEARS 19__ AND 20__ UNTIL NEEDED
```

```
      IF (.NOT. VDU) GOTO 33
      WRITE(5,300) IA
  300 FORMAT(///1X,'REG NO',5X,8A1/
     .            1X,'TYPE',7X,2A1/
     .            1X,'AGE',8X,3A1/
     .            1X,'ROCK NAME  ',10A1/
     .            1X,'ROCK UNIT  ',8A1/
     .            1X,'STATE,QUAD ',A1,1X,5A1/
     .            1X,'COORDS OR'/
     .            1X,'LAT/LONG',3X,6A1,1X,6A1/
     .            1X,'COLLECTOR',2X,3A1/
     .            1X,'FIELD NO',3X,6A1/
     .            1X,'YEAR',7X,4A1/
     .            1X,'LOCALITY',3X,12A1/
     .            1X,'HOLDER',5X,A1/
     .            1X,'MINERAL',4X,8A1/
     .            1X,'MODIFIER',3X,4A1,1X,4A1/
     .            1X,'TREATMENT',2X,4(2A1,1X)/
     .            1X,'REFERENCE',2X,10A1/12X,10A1/12X,40A1/
     .            1X,'OUTPUT MORE TO VDU?')
      READ(5,101) IYES
      VDU=IYES .EQ. IY
C RESET VDU OPTION IF DONT WANT MORE OUTPUT
   33 CONTINUE
      IF (.NOT. PRNTR .AND. .NOT. VDU) GOTO 40
C IF ENDED UP NOT WANTING ANY OUTPUT WHY BOTHER LOOKING ANY MORE
      IF (.NOT. PRNTR) GOTO 17
C OFF TO THE READ IF ONLY VDU OUTPUT
      IF (MOD(LINE,18) .EQ. 0) CALL HEAD(PAGE)
      LINE=LINE+1
      WRITE(6,301) (IA(I),I=1,37),(IA(I),I=50,99),(IA(I),I=1,8)
  301 FORMAT(1X,8A1,'|',1X,2A1,'|',3A1,'|',10A1,'|',8A1,'|',
     .            1X,A1,'|',5A1,'|',3A1,'|',6A1,'|',4A1,'|',12A1,'|',
     .            2X,A1,'|',8A1,'|',2(4A1,'|'),3(2A1,',',),2A1,'|',8A1)
C WRITE THE FIRST LINE
C
C NOW USE DIFFERENT FORMATS FOR LAT/LONG AND COORDS
      IF (IA(38) .EQ. SPACE) GOTO 34
C DEAL WITH COORDS FIRST WHICH DONT HAVE SPACE FILL AT THE FRONT
      WRITE(6,302) (IA(I),I=100,159),(IA(I),I=38,49)
  302 FORMAT(9X,2(10A1,1X),'|',40A1,'|',6A1,'ME ',6A1,'MN'/)
      GOTO 35
C
C NOW FOR LAT/LONG
   34 WRITE(6,303) (IA(I),I=100,159),(IA(I),I=39,49)
  303 FORMAT(9X,2(10A1,1X),'|',40A1,'|',2A1,'D',2A1,'M ',A1,
     .            2X,3A1,'D',2A1,'M ',A1/)
   35 CONTINUE
      FOUND=.TRUE.
C REMEMBER THAT HAVE FOUND AT LEAST ONE ENTRY AND WRITTEN IT TO THE
      IF (LINE .NE. 1000) GOTO 17
      WRITE(5,304)
  304 FORMAT(' 1000 ENTRIES SENT TO PRINTER - DO YOU'
     .            ' WANT TO SEND MORE?')
      READ(5,101) IYES
      IF (IYES .NE. IY) GOTO 40
      GOTO 17
C IF DONT WANT MORE STOP OTHERWISE READ ANOTHER ENTRY
C PRINTER
C
```

```
C NOW CLOSE OFF
   40 CONTINUE
      CLOSE(UNIT=7,STATUS='KEEP')
      IF (FOUND) WRITE(6,306)
  306 FORMAT(1X)
      STOP
      END
      SUBROUTINE GEOGRF(EAST,NORTH,ANSWER)
      DOUBLE PRECISION NORTH,EAST
      REAL ANSWER(6)
      DOUBLE PRECISION TMD1,ORTH,DEG,TMD2,CON,Q1,DOG,SIND,COSD,
     . TAND,TANSQ,SINSEC,C,D,DTAN,R,P,PCUBE,POR,PFIVE,P1,P2,P3,P4,
     . P5,GLAT,TEMPL,DLONG,DC,SLO,SLA
      DOUBLE PRECISION VAL(16),Q(5)
      INTEGER*2 I,IDLA,MLA,IDLO,MLO
C CONVERTS AMG GRID COORDS (IN METRES) TO LATS AND LONGS
C INPUT OF NORTH COORDINATE EXCLUDES LEADING 5 FOR USE IN TASMANIA
C E.G.  5326446.014 BECOMES 326446.014
      VAL(1)=9.033D-06
      VAL(2)=1.1117334878D05
      VAL(3)=3.4906585D-02
      VAL(4)=6.981317D-02
      VAL(5)=1.04719755D-01
      VAL(6)=9.008D-06
      VAL(7)=1.745329252D-02
      VAL(8)=0.66945418546D-02
      VAL(9)=1.99840032D-08
      VAL(10)=23.96162303D-20
      VAL(11)=5.9928028794D-14
      VAL(12)=119.76019192D-26
      VAL(13)=2.9964014397D-14
      VAL(14)=14.970023989D-26
      VAL(15)=6.3354611409D06
      VAL(16)=1.60389546D04
C
      ORTH=NORTH+5.0D06
C ADD THE LEADING 5 TO THE NORTH COORDINATE
      TMD1=1.0D07-ORTH
      DEG=VAL(1)*TMD1
C
      DO 10 I=1,10
      TMD2=VAL(2)*DEG-VAL(16)*DSIN(VAL(3)*DEG)+
     . 16.83310D00*DSIN(VAL(4)*DEG)-0.0218D00*DSIN(VAL(5)*DEG)
      CON=TMD1-0.9996D00*TMD2
      IF (DABS(CON) .LT. 1.0D-03) GOTO 14
      DEG=DEG+VAL(6)*CON
   10 CONTINUE
      GOTO 16
C
   14 CONTINUE
      Q1=(EAST-500000.0D00)*1.0D-06
      Q(1)=Q1
      DO 11 I=2,5
      Q(I)=Q(I-1)*Q1
   11 CONTINUE
      DOG=VAL(7)*DEG
      SIND=DSIN(DOG)
      COSD=DCOS(DOG)
      TAND=SIND/COSD
      TANSQ=TAND*TAND
```

```
      SINSEC=0.48481368111D-05
      C=1.0D00-VAL(8)*SIND*SIND
      D=0.27777777778D01
      DTAN=D*TAND
      R=VAL(15)/C**1.5
      P=637816.0D01/C**0.5
      PCUBE=P**3
      POR=P/R
      PFIVE=PCUBE*P*P
      P1=DTAN/(VAL(9)*R*P*SINSEC)
      P2=DTAN*(5.0D00+3.0D00*TANSQ)/(VAL(10)*R*PCUBE*SINSEC)
      P3=D/(P*COSD*SINSEC*.9996D-02)
      P4=D*(POR+2.0D00*TANSQ)/(VAL(11)*PCUBE*SINSEC*COSD)
      P5=D*(5.0D00+TANSQ*(28.0D00+24.0D00*TANSQ))/(VAL(12)*
     .      COSD*PFIVE*SINSEC)
      GLAT=DEG-P1*Q(2)+P2*Q(4)
      TEMPL=P3*Q1-P4*Q(3)+P5*Q(5)
      DLONG=TEMPL+7.0D00
      CALL DECDEG(DLONG,IDLO,MLO,SLO)
      IDLO=IDLO+140
      CALL DECDEG(GLAT,IDLA,MLA,SLA)
      GOTO 18
   16 CONTINUE
      WRITE(5,100)
  100 FORMAT(' ***************** GEOGRAPHICAL ERROR ***************')
      STOP 9998
   18 CONTINUE
      ANSWER(1)=IDLA
      ANSWER(2)=MLA
      ANSWER(3)=SLA
      ANSWER(4)=IDLO
      ANSWER(5)=MLO
      ANSWER(6)=SLO
C STORE LAT AND LONG READY TO RETURN
      RETURN
      END
      SUBROUTINE DECDEG(ANGLE,IDEG,MIN,SEC)
      DOUBLE PRECISION ANGLE,SEC
      INTEGER*2 IDEG,MIN
      DOUBLE PRECISION DEGI,RMIN
      IDEG=IFIX(SNGL(ANGLE))
      DEGI=IDEG
      ANGLE=60.0D00*(ANGLE-DEGI)
      MIN=IFIX(SNGL(ANGLE))
      RMIN=MIN
      SEC=60.0D00*(ANGLE-RMIN)
      RETURN
      END
      SUBROUTINE JUSTIF(REGN,REGNO,IHOLD)
C FOR SETTING UP REGISTRATION NUMBERS IN THE FORMAT USED BY ROCKADD
C USES FORTRAN 77 CHARACTER VARIABLES
      CHARACTER*1 REGNO(8),SPACE,AMINUS
      CHARACTER*8 REGN
      INTEGER IHOLD,I,K,KUP,IUP,J,JUP
      DATA SPACE/' '/,AMINUS/'-'/
      GOTO (201,202,205,203,204,205),IHOLD
  201 RETURN
C DONT YET HAVE A FORMAT FOR THE H.E.C.
  202 CONTINUE
C THE MINES DEPT AS HOLDER - REG NO HAS FORM 67-1234
```

```
      DO 210 I=1,8
      IF (REGNO(I) .NE.  SPACE) GOTO 211
C FIND THE FIRST NON-BLANK CHARACTER
  210 CONTINUE
  211 K=2
C COUNTER FOR POSITION IN TEMPORARY ARRAY
      REGN(1:1)='0'
C INITIALLY SET UP WITH THE CODE FOR THE YEARS 19__ . LATER ON
C WILL NEED TO REMOVE THIS WITH THE YEARS 20__ AND REQUEST
C EXTRA DIGIT IN SEARCHES
      REGN(K:K)=REGNO(I)
      K=K+1
      I=I+1
      REGN(K:K)=REGNO(I)
C NOW HAVE TRANSFERRED THE FIRST TWO CHARACTERS - THE YEAR CODE
      K=K+1
      REGN(K:K)=AMINUS
C NOW PUT THE MINUS THERE
C
C NOW COPY THE NUMBER FROM THE RIGHT HAND SIDE
      KUP=8
      IUP=8
      DO 212 J=1,8
      IF (REGNO(IUP) .NE.  SPACE) GOTO 213
C FIND THE RIGHT-HAND MOST NON-BLANK
      IUP=IUP-1
  212 CONTINUE
  213 REGN(KUP:KUP)=REGNO(IUP)
      KUP=KUP-1
      IUP=IUP-1
      IF (REGNO(IUP) .NE.  SPACE .AND. REGNO(IUP) .NE. AMINUS) GOTO 213
C SECOND HALF OF NUMBER MAY BE TERMINATED BY MINUS OR SPACE
      K=K+1
      IF (K .GT. KUP) GOTO 250
C NO BLANK FILL REQUIRED - MOST UNLIKELY
      DO 214 J=K,KUP
      REGN(J:J)=SPACE
  214 CONTINUE
C FILLED WITH BLANKS
      GOTO 250
C NOW IN FORMAT I2,A1,I5
C
  203 CONTINUE
C QUEEN VIC
      RETURN
C WE KNOW NOTHING
  204 CONTINUE
C TAS MUSEUM
      RETURN
C WE DONT KNOW THIS EITHER
C
  205 CONTINUE
C THE UNIVERSITY AND MINES MINERAL CATALOGUE HAVE NUMBERS ONLY SO
C WANT TO RIGHT JUSTIFY
      KUP=8
      JUP=8
      DO 220 J=1,8
      IF (REGNO(JUP) .NE.  SPACE) GOTO 221
      JUP=JUP-1
  220 CONTINUE
```

```
C LOOK FOR THE LAST NON-BLANK CHARACTER IN THE FIELD
  221 CONTINUE
C NOW COPY UNITL THE NEXT BLANK - STILL READING FROM RIGHT TO LEFT
      REGN(KUP:KUP)=REGNO(JUP)
      KUP=KUP-1
      JUP=JUP-1
      IF (JUP .EQ. 0) GOTO 222
      IF (REGNO(JUP) .NE. SPACE) GOTO 221
C GO BACK FOR THE NEXT CHARACTER ONLY IF THERE IS A NON-BLANK LEFT
  222 CONTINUE
      IF (KUP .EQ. 0) GOTO 250
C HAVE FILLED REGTMP
      DO 223 J=1,KUP
      REGN(J:J)=SPACE
  223 CONTINUE
C NOW IN I8 FORMAT
      GOTO 250
C
C
  250 CONTINUE
      RETURN
      END
      SUBROUTINE YESRCH(SRCH,VARIAB)
      LOGICAL SRCH
      CHARACTER*1 VARIAB(72)
      SRCH=VARIAB(1) .NE. ' ' .OR. VARIAB(2) .NE. ' '
C USE FORTRAN 77 CHARACTER COMPARISON
C SRCH IS TRUE IF THERE IS A STRING SPECIFIED TO SEARCH FOR
C AND FALSE OTHERWISE
      RETURN
      END
      INTEGER FUNCTION ILAT(LAT)
C TO CONVERT FROM FORTRAN 77 CHARACTER VARIABLE TO INTEGER VARIABLE
C LAT IS OF THE FORM 4330S
      INTEGER I
      CHARACTER*1 LAT(5)
      REAL BUFF(2)
      ENCODE(BUFF,100) (LAT(I),I=1,4)
  100 FORMAT(4A1)
      DECODE(BUFF,101) ILAT
  101 FORMAT(I4)
      IF (LAT(5) .EQ. 'S') ILAT=-ILAT
C MAKE NEGATIVE FOR SOUTH
      RETURN
      END
      INTEGER FUNCTION ILON(LON)
C TO CONVERT FORM FORTRAN 77 CHARACTER VARIABLE TO INTEGER VARIABLE
      INTEGER I
      CHARACTER*1 LON(6)
      REAL BUFF(2)
      ENCODE(BUFF,100) (LON(I),I=1,5)
  100 FORMAT(5A1)
      DECODE(BUFF,101) ILON
  101 FORMAT(I5)
      IF (LON(6) .EQ. 'W') ILON=-ILON
C MAKE NEGATIVE IF WEST
      RETURN
      END
      INTEGER FUNCTION ISITIN(AKEYS,A,IS,IE)
C SEARCH FOR CHARACTERS IN FIELDS IS TO IE OF A STARTING AT FIELD
```

```
C IS FOR MATCHING WITH STRINGS IN AKEYS.  THE STRINGS IN AKEYS
C ARE STORED AS STRING1/STRING2/ . . /STRINGN/ WITH A SPACE FOLLOWING
C A / ACTING AS A TERMINATOR.
C ISITIN TAKES A VALUE OF 1 IF ANY OF THE STRINGS MATCH AND ZERO
C OTHERWISE.
C BASED ON A ROUTINE ORIGINALLY WRITTEN BY R. J. G. LEWIS, TAS UNI
C USES CAHRACTER*1 FOR FORTRAN 77 BUT COULD EQUALLY WELL USE A1 FORMAT
C FOR ANY TYPE OF VARIABLE
      CHARACTER*1 A(72), AKEYS(72), AEND, SPACE
      INTEGER IS, IE, I, IBASE, KEYST
      AEND='/'
      SPACE=' '
      KEYST=1
    8 IBASE=IS-1
      DO 10 I=KEYST, 72
      IF (AKEYS(I) .EQ. AEND) GOTO 12
C FOUND A MATCH IF HIT A /
      IF (AKEYS(I) .NE. A(IBASE+1)) GOTO 14
      IBASE=IBASE+1
      IF (IBASE .GE. IE) GOTO 12
C HAVE FOUND A MATCH TO THE END OF THE FIELD
   10 CONTINUE
   12 ISITIN=1
      RETURN
C FOUND SO RETURN
   14 CONTINUE
      I=I+1
      DO 16 KEYST=I, 72
      IF (AKEYS(KEYST) .EQ. AEND) GOTO 18
C SCAN FOR A /
   16 CONTINUE
      ISITIN=0
      RETURN
C DID NOT FIND /
   18 KEYST=KEYST+1
      IF (AKEYS(KEYST) .NE. SPACE) GOTO 8
C NOT / SO BACK ROUND
      ISITIN=0
      RETURN
      END
      SUBROUTINE HEAD(PAGE)
C TO HEAD UP A PAGE
      INTEGER PAGE
      PAGE=PAGE+1
      WRITE(6, 100) PAGE
  100 FORMAT(1H1, 120X, 'PAGE', I4/2X, 'REG NO |TYP|AGE| ROCK NAME|',
     .        'ROCKUNIT|ST| QUAD|COL|FLD NO|YEAR|  LOCALITY  |',
     .        'HLD| MINERAL|MOD1|MOD2| TREATMENT | REG NO'/
     .        16X, 'REFERENCE', 6X, '|', 12X, 'EXTRA REFERENCE',
     .        13X, '|  LOCATION'/1X, 118('-'))
      RETURN
      END
```

APPENDIX 10

Program GUIDER

```
* GUIDER.CSS
* FOR RUNNING GUIDER
L GUIDER: AS 6.PR:; ST
$EXIT
```

```fortran
C GUIDER.FTN - FOR PRINTING THE GUIDE TO THE ROCK CATALOGUE
C PROGRAMS
      INTEGER IDATE(3), IMNTH(12), A(20), LINE, PAGE
      INTEGER*2 IRA(200), IRB(200), IA(25), IIA(25)
      CHARACTER*30 ROCK(30), MINRL(150)
      CHARACTER*3 ICLCT(150), TCLCT(150)
      CHARACTER*35 COLECT(150)
      CHARACTER*4 IMODIF(200)
      CHARACTER*24 AMODIF(200)
      EQUIVALENCE (A(1), IA(1)), (A(1), IIA(1)), (A(1), IRA(1)),
     .          (ROCK(1), MINRL(1)), (ROCK(1), COLECT(1)),
     .          (ROCK(1), AMODIF(1))
C TO SAVE SPACE
      DATA IMNTH/'JAN', 'FEB', 'MAR', 'APR', 'MAY', 'JUN', 'JUL',
     .          'AUG', 'SEP', 'OCT', 'NOV', 'DEC'/
      CALL DATE(IDATE)
      IDATE(1)=IDATE(1)+1900
C PUT THE CENTURY IN
      WRITE(6, 100) IDATE(2), IMNTH(IDATE(3)), IDATE(1)
  100 FORMAT(///////30X, 'TASMANIAN ROCK CATALOGUE'/30X, 24('-')
     .       /////30X, 'GUIDE TO INFORMATION STORED'//////
     .       35X, 'DATE', I3, 1X, A3, I5)
C WRITE TITLE PAGE AND DATE
C
      PAGE=1
C PAGE COUNTER
      CALL HEAD(LINE, PAGE)
C HEADS PAGE, RESET LINE COUNTER AND INCREMENTS PAGE COUNTER
      WRITE(6, 103)
  103 FORMAT(34X, 'INTRODUCTION'/34X, 12('-'))
      LINE=LINE+2
      OPEN(UNIT=4, FILE='INTRODUC.DAT', SHARE='ERO')
   10 READ(4, 104, END=11) A
  104 FORMAT(20A4)
      IF (LINE .GT. 55) THEN
      CALL HEAD(LINE, PAGE)
      WRITE(6, 103)
      LINE=LINE+2
      ENDIF
C HEAD UP A NEW PAGE AS NEEDED
      WRITE(6, 105) A
  105 FORMAT(1X, 20A4)
      LINE=LINE+1
      GOTO 10
C GET NEXT LINE OF INTRODUCTION
   11 CLOSE(UNIT=4, STATUS='KEEP')
C
      CALL HEAD(LINE, PAGE)
      WRITE(6, 106)
  106 FORMAT(30X, 'REGISTRATION NUMBERS'/30X, 20('-')//
     .       15X, 'FOR THE MINES DEPT. ROCK CATALOGUE'/
     .       15X, 'ASSUMED TO BE OF THE FORM 77-127'//
     .       15X, 'FOR THE MINES DEPT. MINERAL CATALOGUE'/
     .       15X, 'ASSUMED TO BE OF THE FORM 12345'//
     .       15X, 'FOR THE UNIVERSITY ASSUMED TO BE OF THE FORM'/
     .       15X, '12345')
C
      CALL HEAD(LINE, PAGE)
      WRITE(6, 107)
```

```
  107 FORMAT(15X,'GENERIC TYPE'/15X,12('-'))
      LINE=LINE+2
      OPEN(UNIT=4,FILE='ROCKTYPE.DAT',SHARE='ERO')
   12 READ(4,930,END=13) IA
  930 FORMAT(25A2)
      IF (LINE .GT. 55) THEN
      CALL HEAD(LINE,PAGE)
      WRITE(6,107)
      LINE=LINE+2
      ENDIF
      WRITE(6,931) IA
  931 FORMAT(10X,25A2)
      LINE=LINE+1
      GOTO 12
CC COPY GENERIC TYPE AND LET USER KEEP THIS FILE IN ORDER
   13 CLOSE(UNIT=4,STATUS='KEEP')
C
      CALL HEAD(LINE,PAGE)
      WRITE(6,108)
  108 FORMAT(20X,'AGE'/20X,'---')
      LINE=LINE+2
      OPEN(UNIT=4,FILE='ROCKAGES.DAT',SHARE='ERO')
   14 READ(4,930,END=15) IA
      IF (LINE .GT. 55) THEN
      CALL HEAD(LINE,PAGE)
      WRITE(6,108)
      LINE=LINE+2
      ENDIF
      WRITE(6,931) IA
      LINE=LINE+1
      GOTO 14
C COPY AGES IN CHRONOLGICAL ORDER NOT ALPHABETICAL ORDER
   15 CLOSE(UNIT=4,STATUS='KEEP')
      CALL HEAD(LINE,PAGE)
      WRITE(6,109)
  109 FORMAT(30X,'ROCK NAMES'/30X,10('-'))
      LINE=LINE+2
      NVAR=1
C COUNTER FOR NUMBER OF ENTRIES TO BE SORTED
      OPEN(UNIT=4,FILE='ROCKNAME.DAT',SHARE='ERO')
   16 READ(4,110,END=17) ROCK(NVAR)
  110 FORMAT(A30)
      IRA(NVAR)=NVAR
C INITIALISE THE INDEX FOR THE SORT
      NVAR=NVAR+1
      IF (NVAR .GT. 30) STOP 'TOO MANY ROCK NAMES'
      GOTO 16
C READ AND STORE MORE
   17 CLOSE(UNIT=4,STATUS='KEEP')
      NVAR=NVAR-1
C HAD A VALUES OF 1 MORE THAN THE NUMBER READ
      CALL ALFSRT(IRA,ROCK,NVAR,10)
      DO 18 I=1,NVAR
      IF (LINE .GT. 55) THEN
      CALL HEAD(LINE,PAGE)
      WRITE(6,109)
      LINE=LINE+1
      ENDIF
      WRITE(6,111) ROCK(IRA(I))
  111 FORMAT(30X,A30)
```

```
      LINE=LINE+1
   18 CONTINUE
C SORTED AND PRINTED ROCK NAMES
C
      CALL HEAD(LINE,PAGE)
      WRITE(6,112)
  112 FORMAT(30X,'ROCK UNITS'/30X,10('-'))
      LINE=LINE+2
      NVAR=1
      OPEN(UNIT=4,FILE='ROCKUNIT.DAT',SHARE='ERO')
   19 READ(4,110,END=20) ROCK(NVAR)
      IRA(NVAR)=NVAR
      NVAR=NVAR+1
      IF (NVAR .GT. 30) STOP 'TOO MANY ROCK UNITS'
      GOTO 19
C ROUND FOR MORE
   20 CLOSE(UNIT=4,STATUS='KEEP')
      NVAR=NVAR-1
      CALL ALFSRT(IRA,ROCK,NVAR,3)
      DO 21 I=1,NVAR
      IF (LINE .GT. 55) THEN
      CALL HEAD(LINE,PAGE)
      WRITE(6,112)
      LINE=LINE+2
      ENDIF
      WRITE(6,111) ROCK(IRA(I))
      LINE=LINE+1
   21 CONTINUE
C SORTED AND PRINTED ROCK UNITS
C
      CALL HEAD(LINE,PAGE)
      WRITE(6,113)
  113 FORMAT(15X,'LOCATION DATA'/15X,13('-'))
      WRITE(6,114)
  114 FORMAT(' STATE'/
     .             '     0          TASMANIA'/
     .             '     1          VICTORIA'/
     .             '     2          NEW SOUTH WALES (INCLUDING A. C. T. )'/
     .             '     3          QUEENSLAND'/
     .             '     4          NORTHERN TERRITORY'/
     .             '     5          WESTERN AUSTRALIA'/
     .             '     6          SOUTH AUSTRALIA'/
     .             '     9          OVERSEAS'//)
      WRITE(6,115)
  115 FORMAT(' FOR ALL AREAS OUTSIDE TASMANIA'/
     .          ' LATITUDE AND LONGITUDE ARE USED.'///
     .          ' WITHIN TASMANIA THE AUSTRALIAN MAP GRID'/
     .          ' IS USED WITH AT LEAST THREE (3) DIGITS'/
     .          ' IN EACH COORDINATE.   THE ASSUMED DIGIT 5 IN'/
     .          ' NORTHINGS IS OMITTED')
C
      CALL HEAD(LINE,PAGE)
      WRITE(6,116)
  116 FORMAT(35X,'COLLECTORS'/35X,10('-'))
      LINE=LINE+2
      NVAR=1
      OPEN(UNIT=4,FILE='COLECTOR.DAT',SHARE='ERO')
   22 READ(4,117,END=26) ICLCT(NVAR),COLECT(NVAR)
  117 FORMAT(A3,2X,A35)
      IRA(NVAR)=NVAR
```

```fortran
      IRB(NVAR)=NVAR
C
C NOW REVERSE ICLCT TO PUT THE LETTER STANDING FOR THE SURNAME FIRST
C AND STRIP OFF ANY NUMERIC CHARACTERS THAT MAY APPEAR
      K=3
      J=1
      DO 24 I=1,3
      IF (ICLCT(NVAR)(K:K) .GE. '0' .AND. ICLCT(NVAR)(K:K) .LE. '9'
     .      .OR. ICLCT(NVAR)(K:K) .EQ. ' ') GOTO 23
C SKIP NUMERIC VALUES
      TCLCT(NVAR)(J:J)=ICLCT(NVAR)(K:K)
      J=J+1
   23 K=K-1
   24 CONTINUE
      IF (J .NE. 4) THEN
      DO 25 I=J,3
      TCLCT(NVAR)(I:I)=' '
   25 CONTINUE
C FILL WITH BLANKS
      ENDIF
      NVAR=NVAR+1
      IF (NVAR .GT. 150) STOP ' TOO MANY COLLECTORS'
      GOTO 22
C BACK ROUND
C
   26 CLOSE(UNIT=4,STATUS='KEEP')
      NVAR=NVAR-1
      CALL ALFSRT(IRA,ICLCT,NVAR,3)
      CALL ALFSRT(IRB,TCLCT,NVAR,3)
      DO 27 I=1,NVAR
      IF (LINE .GT. 55) THEN
      CALL HEAD(LINE,PAGE)
      WRITE(6,116)
      LINE=LINE+2
      ENDIF
      WRITE(6,118) ICLCT(IRA(I)),COLECT(IRA(I)),ICLCT(IRB(I)),
     .             COLECT(IRB(I))
  118 FORMAT(1X,A3,2X,A35,2X,'!',2X,A3,2X,A35)
      LINE=LINE+1
   27 CONTINUE
C SORTED AND PRINTED COLLECTORS
C
      CALL HEAD(LINE,PAGE)
      WRITE(6,119)
  119 FORMAT(15X,'HOLDERS'/15X,7('-'))
      WRITE(6,122)
  122 FORMAT(1X,'M',6X,'DEPARTMENT OF MINES (ROCK CATALOGUE)'/
     .         8X,'P.O. BOX 56'/8X,'ROSNY PARK'/
     .         8X,'TASMANIA   7018'/8X,'AUSTRALIA'/)
      WRITE(6,123)
  123 FORMAT(1X,'N',6X,'DEPARTMENT OF MINES (MINERAL CATALOGUE)'/
     .         8X,'P.O. BOX 56'/8X,'ROSNY PARK'/
     .         8X,'TASMANIA   7018'/8X,'AUSTRALIA'/)
      WRITE(6,126)
  126 FORMAT(1X,'U',6X,'GEOLOGY DEPARTMENT'/
     .         8X,'UNIVERSITY OF TASMANIA'/
     .         8X,'G.P.O. BOX 252C'/8X,'HOBART'/
     .         8X,'TASMANIA   7001'/8X,'AUSTRALIA'/)
C LIST HOLDERS
C
```

```fortran
      CALL HEAD(LINE,PAGE)
      WRITE(6,130)
  130 FORMAT(30X,'MINERALS'/30X,8('-'))
      LINE=LINE+2
      NVAR=1
      OPEN(UNIT=4,FILE='MINERALS.DAT',SHARE='ERO')
   28 READ(4,110,END=29) MINRL(NVAR)
      IRA(NVAR)=NVAR
      NVAR=NVAR+1
      IF (NVAR .GT. 150) STOP 'TOO MANY MINERALS'
      GOTO 28
C READ AND STORE ANOTHER MINERAL
   29 CLOSE(UNIT=4,STATUS='KEEP')
      NVAR=NVAR-1
      CALL ALFSRT(IRA,MINRL,NVAR,8)
      DO 30 I=1,NVAR
      IF (LINE .GT. 55) THEN
      CALL HEAD(LINE,PAGE)
      WRITE(6,130)
      LINE=LINE+2
      ENDIF
      WRITE(6,111) MINRL(IRA(I))
      LINE=LINE+1
   30 CONTINUE
C SORTED AND PRINTED MINERALS
C
      CALL HEAD(LINE,PAGE)
      WRITE(6,131)
  131 FORMAT(29X,'MODIFIERS'/29X,9('-'))
      LINE=LINE+2
      OPEN(UNIT=4,FILE='MODIFIER.DAT',SHARE='ERO')
      NVAR=1
   31 READ(4,132,END=32) IMODIF(NVAR),AMODIF(NVAR)
  132 FORMAT(A4,2X,A24)
      IRA(NVAR)=NVAR
      IRB(NVAR)=NVAR
      NVAR=NVAR+1
      IF (NVAR .GT. 200) STOP 'TOO MANY MODIFIERS'
      GOTO 31
C BACK ROUND
   32 CLOSE(UNIT=4,STATUS='KEEP')
      NVAR=NVAR-1
      CALL ALFSRT(IRA,IMODIF,NVAR,4)
      CALL ALFSRT(IRB,AMODIF,NVAR,24)
      DO 33 I=1,NVAR
      IF (LINE .GT. 55) THEN
      CALL HEAD(LINE,PAGE)
      WRITE(6,131)
      LINE=LINE+2
      ENDIF
      WRITE(6,133) IMODIF(IRA(I)),AMODIF(IRA(I)),IMODIF(IRB(I)),
     *         AMODIF(IRB(I))
  133 FORMAT(1X,A4,2X,A24,2X,'!',2X,A4,2X,A24)
      LINE=LINE+1
   33 CONTINUE
C SORT AND PRINT MODIFIERS
C
      CALL HEAD(LINE,PAGE)
      WRITE(6,134)
  134 FORMAT(20X,'TREATMENTS'/20X,10('-'))
```

```
      LINE=LINE+2
      OPEN(UNIT=4,FILE='TRTMENT. DAT', SHARE='ERO')
  35  READ(4,950,END=36) IIA
 950  FORMAT(25A2)
      IF (LINE . GT. 55) THEN
      CALL HEAD(LINE, PAGE)
      WRITE(6,134)
      LINE=LINE+2
      ENDIF
      WRITE(6,951) IIA
 951  FORMAT(10X,25A2)
      LINE=LINE+1
      GOTO 35
C BACK ROUND
C
  36  CLOSE(UNIT=4,STATUS='KEEP')
      WRITE(6,135)
 135  FORMAT(1X)
      STOP
      END
      SUBROUTINE ALFSRT(IR, CVAR, NVAR, NCHAR)
      INTEGER NVAR, NCHAR, NLEN
      CHARACTER*(*) CVAR(NVAR)
      INTEGER*2 IR(NVAR)
      LOGICAL NSWAP
      IF (NVAR . LE. 1) RETURN
C NOTHING TO SORT
      NM1=NVAR-1
      DO 30 J=1, NM1
      NSWAP=. TRUE.
      IRI=IR(1)
      DO 40 I=1, NM1
      IP1=I+1
      IRIP1=IR(IP1)
      IF (CVAR(IRI)(1:NCHAR) . LE.  CVAR(IRIP1)(1:NCHAR)) GOTO 40
      NSWAP=. FALSE.
      IR(I)=IRIP1
      IR(IP1)=IRI
      IRIP1=IRI
  40  IRI=IRIP1
      IF (NSWAP) RETURN
  30  CONTINUE
      RETURN
      END
      SUBROUTINE HEAD(LINE, PAGE)
      INTEGER LINE, PAGE
      LINE=0
      WRITE(6,100) PAGE
 100  FORMAT(1H1/70X, 'PAGE', I3)
      PAGE=PAGE+1
      RETURN
      END
```