UR1986_58

1986/58. CONMAT - The Tasmanian construction materials register.

R. G. Richardson

Abstract

The program suite described is used for adding entries to a register of construction materials, changing entries, sorting the register, and searching. The data are entered onto coding forms and all the details, except the reference number, can be searched.

INTRODUCTION

Data on several thousand sources of Tasmanian construction materials are held by the Department of Mines in the construction materials register. To search through the data on the basis of one or more parameters using the existing manual system is extremely difficult and time consuming.

The programs used for CONMAT are written in FORTRAN 77 and are run on the Geological Survey Perkin-Elmer mini-computer. It is assumed that the user is familiar with the operating system and the standard editing facilities. Any grain size analyses that have been processed through the SEDSAM programs (Hudspeth, 1986) may be retrieved and printed during the search. Appendix 1 shows an input coding form.

USING THE PROGRAMS

Data-base maintenance

Data are input by typing CONADD. This program regards field data as consisting of production, reserves, operational status, rock name, rock unit, age, colour, generic environment, extractability, collector and year. Test data are assumed to consist of geophysics, drilling, test and laboratory. The program tests as many options as possible for valid data. The program requests the following:

(i) Reference number - the reference number in the register. The first two digits of the reference number are the quadrangle.
- to finish input type END here
- e.g. 01072
  75123

(ii) Map sheet - the 1:50 000 sheet number
- e.g. 83142

(iii) AMG co-ordinates - the AMG co-ordinates of the site to the nearest 100 m.
- e.g. EQ123456

(iv) Occupier - the occupier's name (up to 20 characters).

(v) Mineral lease - the mineral lease number.

(vi) Locality - a description of the locality (up to 12 characters).

(vii) Land tenure - a one-digit code to indicate the land tenure.

(viii) Land use - a one-digit code to indicate the land use allowed by the planning authority.

(ix) Report - a reference to any report (up to 12 characters).

(x) Annual Production - annual production (m^3x10^3)

(xi) Total production - total production (m^3x10^3)

(xii) Reserves - a one-digit code to indicate the estimated reserves.

(xiii) Operational status - a one-digit code to indicate the operational status of the site.

(xiv) Rock name - the dominant rock type involved (up to 10 characters)

(xv) Rock unit - the stratigraphic name of the rock unit (up to 8 characters)

(xvi) Age - the geological age of the material (up to 3 characters)

(xvii) Colour - up to two one-digit codes to indicate the colour.

(xviii) Generic environment - up to two one-character codes to indicate the generic environment.

(xix) Extractability - a one-digit code to indicate the method of extraction.

(xx) Data collected by/year - the data collector and year. The year must be a four digit integer.

(xxi) If there is no test data type N here - prompts (xxii) to (xxv) will not be issued.

(xxii) Geophysics - up to two one-digit codes to indicate geophysical testing methods.

(xxiii) Drilling - up to two one-digit codes to indicate drilling techniques used in testing.

(xxiv) Tests - a series of prompts for test types. Type Y if this test type was performed.

(xxv) Laboratory - a one-digit code to indicate the testing laboratory.

(xxvi) Soil classification symbol - a five-character soil classification.

(xxvii) Use - up to six one-character codes to indicate uses for the material.

(xxviii) Quality - a one-digit code to indicate the quality of the material.

(xxix) Standard - a one-digit code to indicate the standard to which testing has been performed.

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

The new data in CONTEMP.TMP must be added to the end of the existing data-base by typing CONMERGE. To ensure that the file remains in reference number order it should be sorted periodically using the CONSORT command.

Data may be changed by typing CONCHGE. The program requests:

(i) Reference number - the reference number of the entry to be altered
- type END if no further alterations are to be made

(ii) A series of opportunities to alter particular data values follows.

Data-base searching

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

The program requests the following data:

(i) Quadrangle - one or more quadrangle numbers on a single line, each terminated by a /. Leave blank if not required.
e.g. 01/27/33/

(ii) Map sheet - as for quadrangle.

(iii) Search by area - leave blank for no search by area
- Y for finding entries inside a specified area. Entries on the boundary of the area will not be found. The program prompts for the number of vertices. If 2 is entered a simple rectangle parallel to the grid may be entered by specifying the co-ordinates of any two diagonally opposite corners. Otherwise the program requires the co-ordinates of the vertices of the area in clockwise order.

(iv) Occupier - details as for quadrangle.

(v) Mineral lease - one or more mineral lease numbers on a single line each terminated by a ;. Leave blank if not required
e.g. 1234P/M;107P/M;

(vi) Land tenure - one or more land tenure codes on a single line, each terminated by a /. Leave blank if not required.
e.g. 1/2/

(vii) Land use - details as for land tenure.

(viii) Search on field data - type Y to search field data. Leave blank otherwise.

(ix) Annual Production range - blank if not used
- minimum and maximum if looking for certain ranges.

(x) Total production range - details as for annual production range.

(xi) Reserves - details as for land tenure.

(xii) Operation status - details as for land tenure.

(xiii) Rock name - details as for quadrangle.

(xiv) Rock unit - details as for quadrangle.

(xv) Age - details as for quadrangle.

(xvi) Colour - one or more colour codes on a single line, each group terminated by a /. Leave blank if not required.
e.g. 2/5/ white or yellow
04/ light and grey

(xvii) Generic environment - details as for colour.

(xviii) Extractability - details as for land tenure.

(xix) Collector - details as for quadrangle.

(xx) Range of years - details as for annual production range.

(xxi) Search on test data - type Y to search test data. Leave blank otherwise.

(xxii) Geophysics - details as for colour.

(xxiii) Drilling - details as for colour.

(xxiv) Test - type Y if a particular test is required. Leave blank otherwise.

(xxv) Print grain size analysis results - type Y to print available grain size analysis results for entries retrieved. Leave blank otherwise.

(xxvi) Laboratory - details as for land tenure.

(xxvii) Soil classification symbol - details as for quadrangle.

(xxviii) Use - details as for colour.

(xxix) Quality - details as for land tenure.

(xxx) Standard - details as for land tenure.

(xxxi) Listing option - 1 Full listing on the printer
2 Full listing on screen with option of printing
3 Abbreviated listing to printer

(xxxii) Print this entry - Y if an entry on the screen is to be printed.

(xxxiii) Stop searching - N if no more entries are to be searched.

(xxxiv) Printer only - Y if further entries are to go only to the printer.

(xxxv) Print found entries - Y to print the found entries.

Sample outputs for options 1 and 3 are shown in Appendices 2 and 3.

THE PROGRAMS

CONADD (Appendix 4)

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 and some verification is performed. The file created (CONTEMP.TMP) may then be edited using the standard edit facilities.

CONMERGE (Appendix 5)

The data from CONTEMP.TMP are read and the basic data converted to the format of the data-base and put in file CONIND.DAT.

CONSORT (Appendix 6)

The data are sorted into ascending reference number order using a temporary work file. An index file for use by CONCHGE is created.

CONCHGE (Appendix 7)

This pair of programs allows users to change entries in the data-base.

CONSRCH (Appendix 8)

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

REFERENCE

HUDSPETH, J.W. 1986. SEDSAM: A FORTRAN program for size of sediment analysis (Revision 2). *Unpubl. Rep. Dep. Mines Tasm.* 1986/57.

[16 September 1986]

APPENDIX 1

Data input sheet

CONSTRUCTIONAL MATERIALS REGISTER - INPUT DATA SHEET

GENERAL DATA

Reference No. (5) _ _ _ _ _

Map sheet (1:50 000) (5) _ _ _ _ _

AMG Co-ordinates (8) _ _ _ _ _ _ _ _

Occupier (20) _

Mineral Lease (7) _ _ _ _ _ _ _

Locality (12) _ _ _ _ _ _ _ _ _ _ _ _

Land tenure (1)	0 National Park	2 State Forest	4 Crown land
	1 Cons. Area	3 Freehold	5 Other
Planning Authority Land Use (1)	1 Quarrying permitted	2 Quarrying not permitted	3 Quarrying discretionary

Report (12) _ _ _ _ _ _ _ _ _ _ _ _

FIELD DATA

Production (4) _ _ _ _ (annual)

($m^3 \times 10^3$) (4) _ _ _ _ (total)

Reserves m^3 (1)	0 Not determined	2 10^3-10^4	4 10^6-10^9
	1 $<10^3$	3 10^4-10^6	5 $>10^9$
Operational Status (1)	0 fully operational	2 abandoned	
	1 occasionally	3 new area	

Rock name (10) _ _ _ _ _ _ _ _ _ _

Rock unit (8) _ _ _ _ _ _ _ _

Age (3) _ _ _

Colour (2)	0 Light	3 Black	6 Brown
	1 Dark	4 Grey	7 Red
	2 White	5 Yellow	8 Mottled

Generic-environment (2)	0 Igneous - intrusive	7 Alluvial
	1 - volcanic	8 Dune
	2 Sedimentary	9 Beach
	3 Metamorphic	A Offshore
	4 Duricrust	B Furnace slag
	5 Residual	C Mine waste
	6 Colluvial	D Fly ash

Extractability (1)	0 Backhoe
	1 Excavator
	2 Bulldozer (D9)
	3 Blasting required

Data collected by /year (7) _ _ _ _ _ _ _

TEST DATA

Geophysics (2)	0 E.M.	2 Seismic	4 Resistivity
	1 Gravity	3 Magnetic	
Drilling (2)	0 Auger	2 Diamond	4 Rotary
	1 Churn	3 Percussion	5 Test Pits

Test (1) each (tick for yes)

Grain size analysis	1
Atterberg limits	1
Strength properties	1
Petrology	1
Chemical analysis	1
X-ray diffraction	1
Ceramic	1
Other	1

Laboratory (1)

Department of Mines	0
Department of Main Roads	1
H.E.C.	2
Other	3

Unified soil classification symbol (5) _ _ _ _ _

Use (6) _ _ _ _ _ _

A Crushed aggregate	N Sand - mortar
Natural aggregate:	O - filtration
B Road - sub base	P - foundry
C - base course	Q - glass
D - admixture	R - brick
E - sealed road	S - bedding
F - unsealed road	T Clay - brick
G - hot mix sand	U - earthenware
H Concrete - coarse aggregate	V - porcelain
I - fine aggregate	W - filler
J - pipe	X Building stone
K - block	Y Heavy mineral
L - tile	Z Silica
M Light-weight aggregate	

Quality	0 Marginal
	1 Satisfactory
	2 Excellent
Standard	0 British standard
	1 Australian standard
	2 NAASRA
	3 ASTM
	4 Other

APPENDIX 2

Sample output, Option 1

```
SEARCH OPTIONS ARE:
QUADRANGLE          83/
OCCUPIER          SORELL/DMR/
GRAIN SIZE ANALYSIS MUST HAVE BEEN DONE
GRAIN SIZE ANALYSES TO BE PRINTED
```

```
                   TASMANIAN CONSTRUCTION MATERIALS REGISTER
REF: 83001  MAP: 84123  COORDS: 544252639  OCCUPIER: SORELL COUNCIL        LEASE:          LOCAL: PENNA         TEN: CL  USE:
            REPORT:               ANN PROD'N:    0  TOT:    3  RES: SML  STAT: ABN  ROCKNAME: DOLERITE    UNIT:           AGE: JU
            COLOUR:   ,    GEN TYPE: IN,RE  EXTRACT'N: DZ  COLLECTOR: RAM  YEAR: 1979  GEOPHYS:   ,    DRILL:   ,
            TEST: GS,AL,  ,  ,  ,  ,  ,    LAB: DMR  SOIL CLASS: GW-GC  USES: RS,RU,  ,  ,  ,    QUALITY: S  STANDARD: RA
REF: 83003  MAP: 84123  COORDS: 544352657  OCCUPIER: DMR                   LEASE:          LOCAL: SORELL        TEN: CL  USE:
            REPORT:               ANN PROD'N:    0  TOT:   14  RES: MED  STAT: ABN  ROCKNAME: DOLERITE    UNIT:           AGE: JU
            COLOUR:   ,    GEN TYPE: IN,    EXTRACT'N: DZ  COLLECTOR: RAM  YEAR: 1979  GEOPHYS:   ,    DRILL:   ,
            TEST: GS,AL,  ,  ,  ,  ,  ,    LAB: DMR  SOIL CLASS: GC     USES: RS,  ,  ,  ,  ,    QUALITY: M  STANDARD: RA
REF: 83005  MAP: 84123  COORDS: 556652548  OCCUPIER: SORELL COUNCIL        LEASE:          LOCAL: CARLTON       TEN: FH  USE:
            REPORT:               ANN PROD'N:    0  TOT:   25  RES: MED  STAT: OCC  ROCKNAME: DOLERITEG   UNIT:           AGE: JU
            COLOUR:   ,    GEN TYPE: IN,RE  EXTRACT'N: DZ  COLLECTOR: RAM  YEAR: 1979  GEOPHYS:   ,    DRILL:   ,
            TEST: GS,AL,  ,  ,  ,  ,  ,    LAB: DMR  SOIL CLASS: GW-GC  USES: RS,RB,RU,  ,  ,    QUALITY: S  STANDARD: RA
REF: 83013  MAP: 84123  COORDS: 555552656  OCCUPIER: DMR                   LEASE:          LOCAL: WATTLE HILL   TEN: CL  USE:
            REPORT:               ANN PROD'N:    0  TOT:    8  RES: MED  STAT: OCC  ROCKNAME: DOLERITE    UNIT:           AGE: JU
            COLOUR:   ,    GEN TYPE: IN,    EXTRACT'N: DZ  COLLECTOR: RAM  YEAR: 1979  GEOPHYS:   ,    DRILL:   ,
            TEST: GS,AL,  ,  ,  ,  ,  ,    LAB: DOM  SOIL CLASS: GW-SC  USES: RS,RW,  ,  ,  ,    QUALITY: M  STANDARD: RA
```

```
               GRAIN SIZE ANALYSES
         REF NO
          83001  PHI=    -5.229 PERCENT=     0.000       CALCULATIONS ARE FOR INCLUDED FRACTION
                 PHI=    -4.728 PERCENT=     7.000
                 PHI=    -4.248 PERCENT=    14.000
                 PHI=    -3.252 PERCENT=    36.000
                 PHI=    -2.251 PERCENT=    47.000
                 PHI=    -1.239 PERCENT=    60.000
                 PHI=     1.234 PERCENT=    82.000
                 PHI=     3.737 PERCENT=    91.000
                 MEAN=   -1.183
                 NO SORTING, SKEWNESS OR KURTOSIS CALCULATED
                 L.L.=   37.000 P.I.=   17.000 L.S.=   10.000
                 DUST RATIO=    0.500
          83003  PHI=    -5.229 PERCENT=     0.000       CALCULATIONS ARE FOR INCLUDED FRACTION
                 PHI=    -4.728 PERCENT=     8.000
                 PHI=    -4.248 PERCENT=    25.000
                 PHI=    -3.252 PERCENT=    38.000
                 PHI=    -2.251 PERCENT=    45.000
                 PHI=    -1.239 PERCENT=    52.000
                 PHI=     1.234 PERCENT=    74.000
                 PHI=     3.737 PERCENT=    84.000
                 MEAN=   -0.383
                 NO SORTING, SKEWNESS OR KURTOSIS CALCULATED
                 L.L.=   48.000 P.I.=   31.000 L.S.=   15.000
                 DUST RATIO=    0.615
          83013  PHI=    -5.229 PERCENT=     0.000       CALCULATIONS ARE FOR INCLUDED FRACTION
                 PHI=    -4.728 PERCENT=     3.000
                 PHI=    -4.248 PERCENT=     3.000
                 PHI=    -3.252 PERCENT=    11.000
                 PHI=    -2.251 PERCENT=    29.000
                 PHI=    -1.239 PERCENT=    62.000
                 PHI=     1.234 PERCENT=    84.000
                 PHI=     3.737 PERCENT=    91.000
                 MEAN=   -0.870
                 NO SORTING, SKEWNESS OR KURTOSIS CALCULATED
                 L.L.=   42.000 P.I.=   24.000 L.S.=   20.000
                 DUST RATIO=    0.563
```

LAND TENURE

0	NP	NATIONAL PARK	1	CA	CONSERVATION AREA	2	SF	STATE FOREST
3	FH	FREE-HOLD	4	CL	CROWN LAND	5	OT	OTHER

PLANNING AUTHORITY LAND USE

1	QP	QUARRYING PERMITTED	2	QN	QUARRYING NOT PERMITTED	3	QD	QUARRYING DISCRETIONARY

RESERVES

0	NOT	NOT DETERMINED	1	NIL	<1 000	2	SML	1 000-10 000
3	MED	10 000-1 000 000	4	LGE	1 000 000- 1 000 000 000	5	VST	>1 000 000 000

OPERATIONAL STATUS

0	FOP	FULLY OPERATIONAL	1	OCC	OCCASIONAL	2	ABN	ABANDONED
3	NEW	NEW AREA						

COLOUR

0	LT	LIGHT	1	DK	DARK	2	WH	WHITE
3	BK	BLACK	4	GR	GREY	5	YL	YELLOW
6	BR	BROWN	7	RD	RED	8	MO	MOTTLED

GENERIC ENVIRONMENT

0	IN	IGNEOUS INTRUSIVE	1	VO	IGNEOUS VOLCANIC	2	SE	SEDIMENTARY
3	ME	METAMORPHIC	4	DU	DURICRUST	5	RE	RESIDUAL
6	CO	COLLUVIAL	7	AL	ALLUVIAL	8	DN	DUNE
9	BC	BEACH	A	OS	OFFSHORE	B	FS	FURNACE SLAG
C	MW	MINE WASTE	D	FA	FLY ASH			

EXTRACTABILITY

0	BH	BACKHOE	1	EX	EXCAVATOR	2	DZ	BULLDOZER (D9)
3	BL	BLASTING						

GEOPHYSICS

0	EM	ELECTROMAGNETICS	1	GR	GRAVITY	2	SV	SEISMIC VELOCITY
3	MG	MAGNETICS	4	RE	RESISTIVITY			

DRILLING

0	AU	AUGER	1	CH	CHURN	2	DI	DIAMOND
3	PC	PERCUSSION	4	RO	ROTARY	5	TP	TEST PIT

TESTING

GS	GRAIN SIZE ANALYSIS	AL	ATTERBERG LIMITS	SP	STRENGTH PROPERTIES
PE	PETROLOGY	CA	CHEMICAL ANALYSIS	XR	X-RAY DIFFRACTION
CR	CERAMIC	OT	OTHER		

LABORATORY

0	DOM	DEPARTMENT OF MINES	1	DMR	DEPARTMENT OF MAIN ROADS	2	HEC	HYDRO-ELECTRIC COMMISSION

USE

A	CA	CRUSHED AGGREGATE	B	RS	ROAD SUB-BASE	C	RB	ROAD BASE COURSE
D	RA	ROAD ADMIXTURE	E	RW	ROAD WEARING (SEALED)	F	RU	ROAD UNSEALED
G	RH	ROAD HOTMIX SAND	H	CC	CONCRETE COARSE AGGREGATE	I	CF	CONCRETE FINE AGGREGATE
J	CP	CONCRETE PIPE	K	CB	CONCRETE BLOCK	L	CT	CONCRETE TILE
M	LW	LIGHT WEIGHT AGGREGATE	N	SM	SAND MORTAR	O	SF	SAND FILTRATION
P	SN	SAND FOUNDRY	Q	SG	SAND GLASS	R	SB	SAND BRICK
S	SD	SAND BEDDING	T	BC	BRICK CLAY	U	EC	EARTHENWARE CLAY
V	PC	PORCELAIN CLAY	W	FC	FILTER CLAY	X	BS	BUILDING STONE
Y	HM	HEAVY MINERAL	Z	SI	SILICA			

QUALITY

0	M	MARGINAL	1	S	SATISFACTORY	2	E	EXCELLENT

TESTING STANDARD

0	BS	BRITISH STANDARD	1	AS	AUSTRALIAN STANDARD	2	RA	NAASRA
3	AM	ASTM	4	OT	OTHER			

APPENDIX 3

Sample output, Option 3

```
SEARCH OPTIONS ARE:
QUADRANGLE           83/
OCCUPIER           SORELL/DMR/
GRAIN SIZE ANALYSIS MUST HAVE BEEN DONE
GRAIN SIZE ANALYSES TO BE PRINTED
```

```
                    TASMANIAN CONSTRUCTION MATERIALS REGISTER
     ¦         ¦            ¦                     ¦       ¦ LAND¦   ¦   ¦     ¦  ¦     ¦                      ¦  ¦  TESTS ¦
REFNO¦ CO-ORDS ¦  LOCALITY  ¦       OCCUPIER      ¦M LEASE¦TE¦US¦RES¦OPS¦ COL ¦EX¦ USCS¦        USES          ¦QU¦GP¦DR¦LA¦
------------------------------------------------------------------------------------------------------------------------
83001¦544252639¦PENNA       ¦SORELL COUNCIL       ¦       ¦CL¦  ¦SML¦ABN¦  ,  ¦DZ¦GW-GC¦RS,RU,   ,   ,   ,   ¦ S¦ N¦ N¦ Y¦
83003¦544352657¦SORELL      ¦DMR                  ¦       ¦CL¦  ¦MED¦ABN¦  ,  ¦DZ¦GC   ¦RS,   ,   ,   ,   ,  ¦ M¦ N¦ N¦ Y¦
83005¦556652548¦CARLTON     ¦SORELL COUNCIL       ¦       ¦FH¦  ¦MED¦OCC¦  ,  ¦DZ¦GW-GC¦RS,RB,RU,   ,   ,   ¦ S¦ N¦ N¦ Y¦
83013¦555552656¦WATTLE HILL ¦DMR                  ¦       ¦CL¦  ¦MED¦OCC¦  ,  ¦DZ¦GW-SC¦RS,RW,   ,   ,   ,   ¦ M¦ N¦ N¦ Y¦
```

LAND TENURE

0	NP	NATIONAL PARK	1	CA	CONSERVATION AREA	2	SF	STATE FOREST
3	FH	FREE-HOLD	4	CL	CROWN LAND	5	OT	OTHER

PLANNING AUTHORITY LAND USE

1	QP	QUARRYING PERMITTED	2	QN	QUARRYING NOT PERMITTED	3	QD	QUARRYING DISCRETIONARY

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3	NEW	NEW AREA						

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3	BK	BLACK	4	GR	GREY	5	YL	YELLOW
6	BR	BROWN	7	RD	RED	8	MO	MOTTLED

GENERIC ENVIRONMENT

0	IN	IGNEOUS INTRUSIVE	1	VO	IGNEOUS VOLCANIC	2	SE	SEDIMENTARY
3	ME	METAMORPHIC	4	DU	DURICRUST	5	RE	RESIDUAL
6	CO	COLLUVIAL	7	AL	ALLUVIAL	8	DN	DUNE
9	BC	BEACH	A	OS	OFFSHORE	B	FS	FURNACE SLAG
C	MW	MINE WASTE	D	FA	FLY ASH			

EXTRACTABILITY

0	BH	BACKHOE	1	EX	EXCAVATOR	2	DZ	BULLDOZER (D9)
3	BL	BLASTING						

GEOPHYSICS

0	EM	ELECTROMAGNETICS	1	GR	GRAVITY	2	SV	SEISMIC VELOCITY
3	MG	MAGNETICS	4	RE	RESISTIVITY			

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CR	CERAMIC	OT	OTHER		

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D	RA	ROAD ADMIXTURE	E	RW	ROAD WEARING (SEALED)	F	RU	ROAD UNSEALED
G	RH	ROAD HOTMIX SAND	H	CC	CONCRETE COARSE AGGREGATE	I	CF	CONCRETE FINE AGGREGATE
J	CP	CONCRETE PIPE	K	CB	CONCRETE BLOCK	L	CT	CONCRETE TILE
M	LW	LIGHT WEIGHT AGGREGATE	N	SM	SAND MORTAR	O	SF	SAND FILTRATION
P	SN	SAND FOUNDRY	Q	SG	SAND GLASS	R	SB	SAND BRICK
S	SD	SAND BEDDING	T	BC	BRICK CLAY	U	EC	EARTHENWARE CLAY
V	PC	PORCELAIN CLAY	W	FC	FILTER CLAY	X	BS	BUILDING STONE
Y	HM	HEAVY MINERAL	Z	SI	SILICA			

QUALITY

0	M	MARGINAL	1	S	SATISFACTORY	2	E	EXCELLENT

TESTING STANDARD

0	BS	BRITISH STANDARD	1	AS	AUSTRALIAN STANDARD	2	RA	NAASRA
3	AM	ASTM	4	OT	OTHER			

APPENDIX 4

Program CONADD

```
$TITL CONADD.FTN - ADD CONSTRUCTION MATERIALS TO REGISTER
      INTEGER*2 IBELL,ANNUAL,TOTAL
      CHARACTER*1 TENURE,LANDUSE,RESERVE,STATUS,EXTRACT,TEST,GRAIN,
     .    ATTBG,STRONG,PETROL,CHEM,XRD,CERAM,OTHERTEST,LAB,
     .    QUALITY,STANDARD
      CHARACTER*2 COLOUR,GENERIC,GEOPHYS,DRILL
      CHARACTER*3 AGE
      CHARACTER*5 REFNO,SHEET,CLASS
      CHARACTER*6 USE
      CHARACTER*7 LEASE,YEAR
      CHARACTER*8 UNIT,MAPREF
      CHARACTER*10 ROCK
      CHARACTER*12 LOCAL,REPORT
      CHARACTER*20 OCCUPY
      LOGICAL UNPRINT
      DATA IBELL/1792/
C
C INPUT IS REF NO,MAP SHEET,CO-ORDINATES,OCCUPIER,LEASE,LOCALITY,
C          LAND TENURE,LAND USE,REPORT,PRODUCTION ANNUAL,
C          PRODUCTION TOTAL,RESERVES,OPERATIONAL STATUS,ROCK NAME,
C          ROCK UNIT,AGE,COLOUR,GENERIC ENVIRONMENT,EXTRACTABILITY,
C          DATA COLLECTOR,YEAR,TEST TYPES,UNIFIED SOIL CLASSIFICATION
C          SYMBOL,USE,QUALITY,STANDARD FOR TESTING
C
      OPEN (UNIT=5,FILE='CON:')
C OPEN THE CONSOLE
C
   20 WRITE(5,100)
  100 FORMAT(' REF NO (TYPE END TO FINISH)')
      READ(5,200) REFNO
  200 FORMAT(A5)
      IF (REFNO .EQ. 'END ') GOTO 50
C END OF INPUT SO CLOSE FILES
      DO 21 I=1,5
      IF (REFNO(I:I) .GT. '9' .OR. REFNO(I:I) .LT. '0') THEN
      WRITE(5,101) IBELL
  101 FORMAT(1X,A1,' REF NO MUST HAVE FIVE NUMERIC CHARACTERS')
      GOTO 20
      ENDIF
C REFNO IS OF FORM 01001 OR 75023
   21 CONTINUE
      CALL ALPHA5(SHEET,'MAP SHEET')
   22 CALL ALPHA8(MAPREF,'CO-ORDINATES')
C NOW CHECK FOR VALID MAPREF
      IF (MAPREF(1:1) .LT. 'B' .OR. MAPREF(1:1) .GT. 'F') THEN
C MUST HAVE EAST OF B,C,D,E,F
      WRITE(5,104) IBELL
  104 FORMAT(1X,A1,' COORDINATES INCORRECT - FORM IS EQ123456')
      GOTO 22
      ENDIF
      IF (MAPREF(2:2) .LT. 'M' .OR. MAPREF(2:2) .GT. 'S'
     .  .OR. MAPREF(2:2) .EQ. 'O') THEN
C MUST HAVE NORTH OF M,N,P,Q,R,S
      WRITE(5,104)
      GOTO 22
      ENDIF
```

```
C CHECK FOR VALID MAP COORDINATES
C
C END OF MAP COORDS
      CALL ALPHA20(OCCUPY,'OCCUPIER')
      CALL ALPHA7(LEASE,'LEASE')
      CALL ALPHA12(LOCAL,'LOCALITY')
      CALL NUMB1(TENURE,'TENURE','0','5')
      CALL NUMB1(LANDUSE,'LAND USE','1','3')
      CALL ALPHA12(REPORT,'REPORT')
C
C NOW FIELD DATA
      WRITE(5,110)
  110 FORMAT(' ANNUAL PRODUCTION - MUST NOT BE BLANK')
      READ(5,*) ANNUAL
      WRITE(5,111)
  111 FORMAT(' TOTAL PRODUCTION - MUST NOT BE BLANK')
      READ(5,*) TOTAL
      CALL NUMB1(RESERVE,'RESERVES','0','5')
      CALL NUMB1(STATUS,'STATUS','0','3')
      CALL ALPHA10(ROCK,'ROCK NAME')
      CALL ALPHA8(UNIT,'ROCK UNIT')
      CALL ALPHA3(AGE,'AGE')
      CALL NUMB2(COLOUR,'COLOUR','0','8')
      CALL NUMB2(GENERIC,'GEN ENVIRONMENT','0','9')
      CALL NUMB1(EXTRACT,'EXTRACTABILITY','0','3')
   23 WRITE(5,120)
  120 FORMAT(' COLLECTED · YEAR')
      READ(5,203) YEAR
  203 FORMAT(A7)
      IF (UNPRINT(YEAR,7)) THEN
      WRITE(5,121) IBELL
  121 FORMAT(1X,A1,' KEYING ERROR - REENTER COLLECTED · YEAR')
      GOTO 23
      ENDIF
C NOW CHECK FOR 4 FIGURE YEAR IN 1800,1900 OR 2000 SERIES
      K=7
      DO 30 I=1,7
      IF (ICHAR(YEAR(K:K)) .LE. ICHAR('9') .AND.
     .    ICHAR(YEAR(K:K)) .GE. ICHAR('0')) GOTO 31
C FOUND THE LAST NUMERIC CHARACTER
      K=K-1
   30 CONTINUE
      I=10
C IF FALL THROUGH HAVENT FOUND NUMERIC CHARACTERS
   31 IF (I .NE. 10) THEN
      ITMP=CTOI(YEAR(K-3:K),J)
C GET THE FOUR DIGIT YEAR
      ELSE
      ITMP=0
      ENDIF
      IF (ITMP .LT. 1800 .OR. ITMP .GT. 2000) THEN
      WRITE(5,121) IBELL
      GOTO 23
      ENDIF
      WRITE(5,122)
  122 FORMAT(' IF THERE IS NO TEST DATA TYPE N HERE')
      READ(5,205) TEST
  205 FORMAT(A1)
      IF (TEST .EQ. 'N') THEN
      GEOPHYS=' '
      DRILL=' '
      GRAIN=' '
      ATTBG=' '
      STRONG=' '
      PETROL=' '
      CHEM=' '
      XRD=' '
      CERAM=' '
      OTHERTEST=' '
      LAB=' '
      ELSE
      CALL NUMB2(GEOPHYS,'GEOPHYSICS','0','4')
      CALL NUMB2(DRILL,'DRILLING','0','5')
      CALL ALPHA1(GRAIN,'GRAIN SIZE ANAL')
      CALL ALPHA1(ATTBG,'ATTERBERG LIMIT')
      CALL ALPHA1(STRONG,'STRENGTH PROP')
      CALL ALPHA1(PETROL,'PETROLOGY')
      CALL ALPHA1(CHEM,'CHEMICAL ANAL')
      CALL ALPHA1(XRD,'X-RAY')
      CALL ALPHA1(CERAM,'CERAMIC')
      CALL ALPHA1(OTHERTEST,'OTHER TEST')
      CALL NUMB1(LAB,'LABORATORY','0','3')
      ENDIF
      CALL ALPHA5(CLASS,'SOIL CLASSIFICATION')
      CALL NUMB6(USE,'USE','A','Z')
      CALL NUMB1(QUALITY,'QUALITY','0','2')
      CALL NUMB1(STANDARD,'STANDARD','0','4')
C READ ALL INPUT DATA
C
C NOW OUTPUT TO PROOF SHEET
      WRITE(6,400) REFNO,SHEET,MAPREF,OCCUPY,LEASE,LOCAL,TENURE,
     .    LANDUSE,REPORT,ANNUAL,TOTAL,RESERVE,STATUS,ROCK,
     .    UNIT,AGE,COLOUR,GENERIC,EXTRACT,YEAR,GEOPHYS,DRILL,
     .    GRAIN,ATTBG,STRONG,PETROL,CHEM,XRD,CERAM,OTHERTEST,
     .    LAB,CLASS,USE,QUALITY,STANDARD
  400 FORMAT(1X,2(A5,'@'),A8,'@',A20,'@',A7,'@',A12,'@',A1,'@',A1/
     .    6X,'@',A12,'@',2(I4,'@'),2(A1,'@'),A10,'@',A8,'@',A3,'@',
     .    2(A2,'@'),A1/6X,'@',A7,'@',2(A2,'@'),9(A1,'@'),A5,'@',
     .    A6,'@',2(A1,'@'))
C WRITE WITH DELIMITERS AFTER EACH FIELD AND REFNO ON ITS OWN
      GOTO 20
C BACK ROUND
C
C OTHERWISE STOP
   50 CLOSE(UNIT=6,STATUS='KEEP')
      STOP
      END

$INCLUDE ALPHA1.FTN
      SUBROUTINE ALPHA1(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *1 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A1)
      IF (.NOT. UNPRINT(SVAR,1)) RETURN
```

```
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA3.FTN
      SUBROUTINE ALPHA3(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *3 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A3)
      IF (.NOT. UNPRINT(SVAR,3)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA5.FTN
      SUBROUTINE ALPHA5(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *5 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A5)
      IF (.NOT. UNPRINT(SVAR,5)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA7.FTN
      SUBROUTINE ALPHA7(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *7 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A7)
      IF (.NOT. UNPRINT(SVAR,7)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END
```

```
$INCLUDE ALPHA8.FTN
      SUBROUTINE ALPHA8(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *8 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A8)
      IF (.NOT. UNPRINT(SVAR,8)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA10.FTN
      SUBROUTINE ALPHA10(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *10 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A10)
      IF (.NOT. UNPRINT(SVAR,10)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA12.FTN
      SUBROUTINE ALPHA12(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *12 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A12)
      IF (.NOT. UNPRINT(SVAR,12)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA20.FTN
      SUBROUTINE ALPHA20(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *20 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A20)
      IF (.NOT. UNPRINT(SVAR,20)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE NUMB1.FTN
      SUBROUTINE NUMB1(SVAR,PROMPT,LOW,UP)
      CHARACTER *(*) PROMPT
      CHARACTER*1 SVAR
      CHARACTER*1 UP,LOW
      INTEGER*2 IBELL
      LOGICAL UNPRINT
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A1)
      IF (UNPRINT(SVAR,1)) THEN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' KEYING ERROR - REENTER ',C20)
      GOTO 10
      ENDIF
      IF (SVAR .EQ. ' ' .OR.
     .   (SVAR .GE. LOW .AND. SVAR .LE. UP)) GOTO 11
C VALID CHARACTER
      WRITE(5,102) IBELL,PROMPT
      GOTO 10
   11 CONTINUE
      RETURN
      END

$INCLUDE CONNUMB2.FTN
      SUBROUTINE NUMB2(SVAR,PROMPT,LOW,UP)
      CHARACTER *(*) PROMPT
      CHARACTER*2 SVAR
      CHARACTER*1 UP,LOW
      INTEGER*2 IBELL
      LOGICAL UNPRINT
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A2)
      IF (UNPRINT(SVAR,2)) THEN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' KEYING ERROR - REENTER ',C20)
      GOTO 10
      ENDIF
      IF (PROMPT .NE. 'GEN ENVIRONMENT') THEN
      DO 11 I=1,2
      IF (SVAR(I:I) .EQ. ' ' .OR.
     .   (SVAR(I:I) .GE. LOW .AND. SVAR(I:I) .LE. UP)) GOTO 11
```

```
C VALID CHARACTER
      WRITE(5,102) IBELL,PROMPT
      GOTO 10
   11 CONTINUE
      ELSE
      DO 12 I=1,2
      IF(SVAR(I:I) .EQ. ' ' .OR.
     .   ((SVAR(I:I) .GE. '0' .AND. SVAR(I:I) .LE. '9') .OR.
     .  (SVAR(I:I) .GE. 'A' .AND. SVAR(I:I) .LE. 'D'))) GOTO 12
C VALID CHARACTER FOR GENERIC ENVIRONMENT
      WRITE(5,102) IBELL,PROMPT
      GOTO 10
   12 CONTINUE
      ENDIF
      RETURN
      END

$INCLUDE NUMB6.FTN
      SUBROUTINE NUMB6(SVAR,PROMPT,LOW,UP)
      CHARACTER *(*) PROMPT
      CHARACTER*6 SVAR
      CHARACTER*1 UP,LOW
      INTEGER*2 IBELL
      LOGICAL UNPRINT
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A6)
      IF (UNPRINT(SVAR,6)) THEN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' KEYING ERROR - REENTER ',C20)
      GOTO 10
      ENDIF
      DO 11 I=1,6
      IF (SVAR(I:I) .EQ. ' ' .OR.
     .   (SVAR(I:I) .GE. LOW .AND. SVAR(I:I) .LE. UP)) GOTO 11
C VALID CHARACTER
      WRITE(5,102) IBELL,PROMPT
      GOTO 10
   11 CONTINUE
      RETURN
      END

$INCLUDE UNPRINT.FTN
      LOGICAL FUNCTION UNPRINT(SVAR,NCHAR)
      CHARACTER* (*) SVAR
      DO 10 I=1,NCHAR
      IF (SVAR(I:I) .LT. ' ') THEN
      UNPRINT=.TRUE.
      RETURN
      ENDIF
   10 CONTINUE
      UNPRINT=.FALSE.
      RETURN
      END
```

APPENDIX 5

Program CONMERGE

```
$TITL CONMERGE.FTN - MERGE CONSTRUCTION MATERIALS INTO REGISTER
      CHARACTER*4 MREFE,MREFN
      CHARACTER*7 YEAR
      CHARACTER*8 MAPREF
      INTEGER*2 ANNUAL,TOTAL,IYEAR,EAST
      INTEGER*4 NORTH
      CHARACTER*1 TENURE,LANDUSE,RESERVE,STATUS,EXTRACT,TEST,GRAIN,
     .    ATTBG,STRONG,PETROL,CHEM,XRD,CERAM,OTHERTEST,LAB,
     .    QUALITY,STANDARD
      CHARACTER*2 COLOUR,GENERIC,GEOPHYS,DRILL
      CHARACTER*3 AGE,COLLECT
      CHARACTER*5 REFNO,SHEET,CLASS
      CHARACTER*6 USE
      CHARACTER*7 LEASE
      CHARACTER*8 UNIT
      CHARACTER*10 ROCK
      CHARACTER*12 LOCAL,REPORT
      CHARACTER*20 OCCUPY
C
      CHARACTER*1 BUFF(132)
C BUFFER ARRAY TO ALLOW BINARY WRITE
      EQUIVALENCE (BUFF(1),OCCUPY),(BUFF(21),LOCAL),(BUFF(33),REPORT),
     .       (BUFF(45),ROCK),(BUFF(55),UNIT),(BUFF(63),LEASE),
     .       (BUFF(70),USE),(BUFF(76),REFNO),(BUFF(81),SHEET),
     .       (BUFF(86),CLASS),(BUFF(91),NORTH),(BUFF(95),AGE),
     .       (BUFF(98),COLLECT),(BUFF(101),COLOUR),
     .       (BUFF(103),GENERIC),(BUFF(105),GEOPHYS),
     .       (BUFF(107),DRILL),(BUFF(109),ANNUAL),(BUFF(111),TOTAL),
     .       (BUFF(113),IYEAR),(BUFF(115),EAST),(BUFF(117),TENURE),
     .       (BUFF(118),LANDUSE),(BUFF(119),RESERVE),(BUFF(120),STATUS),
     .       (BUFF(121),EXTRACT),
     .       (BUFF(122),GRAIN),(BUFF(123),ATTBG),(BUFF(124),STRONG),
     .       (BUFF(125),PETROL),(BUFF(126),CHEM),(BUFF(127),XRD),
     .       (BUFF(128),CERAM),(BUFF(129),OTHERTEST),(BUFF(130),LAB),
     .       (BUFF(131),QUALITY),(BUFF(132),STANDARD)
C USED FOR BINARY OUTPUT FOR FASTER ACCESS
C
      OPEN(UNIT=4,FORM='BINARY',RECL=132)
C OPEN THE OUTPUT FILE FOR BINARY OPERATIONS
   10 READ(6,400,END=20) REFNO,SHEET,MAPREF,OCCUPY,LEASE,LOCAL,TENURE,
     .    LANDUSE,REPORT,ANNUAL,TOTAL,RESERVE,STATUS,ROCK,
     .    UNIT,AGE,COLOUR,GENERIC,EXTRACT,YEAR,GEOPHYS,DRILL,
     .    GRAIN,ATTBG,STRONG,PETROL,CHEM,XRD,CERAM,OTHERTEST,
     .    LAB,CLASS,USE,QUALITY,STANDARD
  400 FORMAT(1X,2(A5,1X),A8,1X,A20,1X,A7,1X,A12,1X,A1,1X,A1/
     .    6X,1X,A12,1X,2(I4,1X),2(A1,1X),A10,1X,A8,1X,A3,1X,
     .    2(A2,1X),A1/6X,1X,A7,1X,2(A2,1X),9(A1,1X),A5,1X,
     .    A6,1X,2(A1,1X))
C READ BACK IN IN SAME FORMAT
C
C NOW RETRIEVE AMG COORDINATES, THE YEAR AND THE COLLECTOR
C THEN PUT THE APPROPRIATE VALUES IN THE YES/NO TEST BOXES
C
      ITMP=ICHAR(MAPREF(1:1))
      MREFE(1:1)=CHAR(ITMP-16)
      ITMP=ICHAR(MAPREF(2:2))
      IF (ITMP .GT. 78) ITMP=ITMP-1
      MREFN(1:1)=CHAR(ITMP-28)
      MREFE(2:4)=MAPREF(3:5)
      MREFN(2:4)=MAPREF(6:8)
      EAST=CTOI(MREFE,J)
      NORTH=CTOI(MREFN,J)
      NORTH=NORTH+50000
C ABOVE CODE FROM GRID2.FTN GRID CONVERSION PROGRAM BY E.L. MARTIN
C NOW HAVE EAST AND NORTH SEPARATELY
C
C NOW FOR YEAR AND COLLECTOR
      K=7
      DO 25 I=1,7
      IF (YEAR(K:K) .LE. '9' .AND. YEAR(K:K) .GE. '0') GOTO 26
C FOUND THE LAST NUMERIC CHARACTER
      K=K-1
   25 CONTINUE
   26 IYEAR=CTOI(YEAR(K-3:K),J)
C CONVERT TO INTEGER
C
      COLLECT='    '
C FILL THE COLLECTOR WITH BLANKS
      IF (K .GT. 4) COLLECT(1:K-4)=YEAR(1:K-4)
C COPY THE COLLECTOR
C
C NOW FOR ALL THE TESTS
      IF (GRAIN .NE. ' ') GRAIN='1'
      IF (ATTBG .NE. ' ') ATTBG='1'
      IF (STRONG .NE. ' ') STRONG='1'
      IF (PETROL .NE. ' ') PETROL='1'
      IF (CHEM .NE. ' ') CHEM='1'
      IF (XRD .NE. ' ') XRD='1'
      IF (CERAM .NE. ' ') CERAM='1'
      IF (OTHERTEST .NE. ' ') OTHERTEST='1'
C THE TESTS ARE SET TO 1 IF CONDUCTED
C
C NOW WRITE OUT
      WRITE(4) BUFF
C BINARY WRITE TO OUTPUT FILE
      GOTO 10
C BACK ROUND
C
C AT END
   20 CLOSE(UNIT=4,STATUS='KEEP')
      CLOSE(UNIT=6,STATUS='KEEP')
      END
```

APPENDIX 6

Program CONSORT

```
$TITL CONSORT.FTN - SORT THE CONSTRUCTION MATERIAL REGISTER
C
      INTEGER*2 INDEX(8000),IQUAD(98),LQUAD,JQUAD
      INTEGER*4 IA(8000)
      INTEGER*2 ANNUAL,TOTAL,IYEAR,EAST
      INTEGER*4 NORTH
      CHARACTER*1 TENURE,LANDUSE,RESERVE,STATUS,EXTRACT,TEST,GRAIN,
     .    ATTBG,STRONG,PETROL,CHEM,XRD,CERAM,OTHERTEST,LAB,
     .    QUALITY,STANDARD
      CHARACTER*2 COLOUR,GENERIC,GEOPHYS,DRILL
      CHARACTER*3 AGE,COLLECT
      CHARACTER*5 REFNO,SHEET,CLASS
      CHARACTER*6 USE
      CHARACTER*7 LEASE
      CHARACTER*8 UNIT
      CHARACTER*10 ROCK
      CHARACTER*12 LOCAL,REPORT
      CHARACTER*20 OCCUPY
C
      CHARACTER*1 BUFF(132)
C BUFFER ARRAY TO ALLOW BINARY WRITE
      EQUIVALENCE (BUFF(1),OCCUPY),(BUFF(21),LOCAL),(BUFF(33),REPORT),
     .       (BUFF(45),ROCK),(BUFF(55),UNIT),(BUFF(63),LEASE),
     .       (BUFF(70),USE),(BUFF(76),REFNO),(BUFF(81),SHEET),
     .       (BUFF(86),CLASS),(BUFF(91),NORTH),(BUFF(95),AGE),
     .       (BUFF(98),COLLECT),(BUFF(101),COLOUR),
     .       (BUFF(103),GENERIC),(BUFF(105),GEOPHYS),
     .       (BUFF(107),DRILL),(BUFF(109),ANNUAL),(BUFF(111),TOTAL),
     .       (BUFF(113),IYEAR),(BUFF(115),EAST),(BUFF(117),TENURE),
     .       (BUFF(118),LANDUSE),(BUFF(119),RESERVE),(BUFF(120),STATUS),
     .       (BUFF(121),EXTRACT),
     .       (BUFF(122),GRAIN),(BUFF(123),ATTBG),(BUFF(124),STRONG),
     .       (BUFF(125),PETROL),(BUFF(126),CHEM),(BUFF(127),XRD),
     .       (BUFF(128),CERAM),(BUFF(129),OTHERTEST),(BUFF(130),LAB),
     .       (BUFF(131),QUALITY),(BUFF(132),STANDARD)
C USED FOR BINARY OUTPUT FOR FASTER ACCESS
C
      OPEN(UNIT=4,FORM='BINARY',ACCESS='DIRECT',RECL=132)
C OPEN THE INPUT FILE FOR BINARY,RANDOM AND SEQUENTIAL OPERATIONS
      REWIND 4
      DO 8 I=1,98
      IQUAD(I)=0
    8 CONTINUE
C FILL THE INDEX FOR THE STARTING RECORD OF EACH QUADRANGLE WITH 0
      LQUAD=0
C USED TO REMEMBER THE LAST QUADRANGLE
      IREC=0
C COUNTER FOR NUMBER OF RECORDS
   10 READ(4,END=20) BUFF
      IREC=IREC+1
      IF (IREC .GT. 8000) STOP 'MORE THAN 8000 ENTRIES'
      INDEX(IREC)=IREC
C FILL SORT INDEX
      IA(IREC)=CTOI(REFNO,I)
C CONVERT REFNO TO INTEGER AND STORE IN IA
      GOTO 10
```

```
C BACK ROUND
C
C NOW FOR THE WORK
   20 CONTINUE
      IF (IREC .EQ. 0) STOP 'NO RECORDS'
      CALL BUBSTI4(INDEX,IA,1,IREC)
C SORT INTO ASCENDING NUMBER - I.E. REFNO ORDER
      OPEN(UNIT=6,FORM='BINARY',RECL=132)
C OPEN OUTPUT FILE
      DO 30 I=1,IREC
      READ(4,REC=INDEX(I)) BUFF
      WRITE(6) BUFF
C COPY TO NEW ORDER
C
C NOW CHECK TO SEE IF IT WAS THE START OF A QUADRANGLE
      JQUAD=CTOI(REFNO(1:2),K)
C THE QUADRANGLE PART OF THE REFERENCE NO
      IF (JQUAD .GT. LQUAD) THEN
C HAVE A NEW AND LARGER QUADRANGLE NUMBER
      LQUAD=JQUAD
C SAVE AS THE NEW LAST QUAD NO
      IQUAD(JQUAD)=I
C NOW SAVE THE RECORD NUMBER
      ENDIF
   30 CONTINUE
      CLOSE(UNIT=6,STATUS='KEEP')
      CLOSE(UNIT=4,STATUS='KEEP')
      OPEN(UNIT=6,FILE='CONQUAD.IND',FORM='BINARY',RECL=2)
      DO 35 I=1,98
C NOT 98 QUADS BUT FOR SIMPLICITY USE NUMBERS THAT DONT EXIST AS WELL
      WRITE(6) IQUAD(I)
   35 CONTINUE
C THE INDEX IS WRITTEN TO A BINARY FILE
      END

      SUBROUTINE BUBSTI4(IR,IA,IBASE,N)
      INTEGER*4 IA(N)
      INTEGER*2 IR(N)
      LOGICAL NSWAP
      IF (N .LE. 1) RETURN
C NOTHING TO SORT
      NM1=N-1
      DO 30 J=IBASE,NM1
      NSWAP=.TRUE.
      IRI=IR(1)
      DO 40 I=IBASE,NM1
      IP1=I+1
      IRIP1=IR(IP1)
      IF (IA(IRI) .LE. IA(IRIP1)) GOTO 40
      NSWAP=.FALSE.
      IR(I)=IRIP1
      IR(IP1)=IRI
      IRIP1=IRI
   40 IRI=IRIP1
      IF (NSWAP) RETURN
   30 CONTINUE
      RETURN
      END
```

APPENDIX 7

Program CONCHGE

```
$TITL CONCHGE.FTN - CHANGE DETAILS IN THE CONSTRUCTION MATERIALS REGISTER
C
      INTEGER*2 IQUAD(98),IRECNO,IBELL
C THE ARRAY TO STORE THE STARTING RECORD FOR EACH QUADRANGLE AND THE
C COUNTER FOR THE ENTRY NUMBER TO BE REPLACED IN THE UPDATE
      LOGICAL CHGE,CHANGE
      INTEGER*2 ANNUAL,TOTAL,IYEAR,EAST
      INTEGER*4 NORTH
      CHARACTER*1 TENURE,LANDUSE,RESERVE,STATUS,EXTRACT,TEST,GRAIN,
     .    ATTBG,STRONG,PETROL,CHEM,XRD,CERAM,OTHERTEST,LAB,
     .    QUALITY,STANDARD
      CHARACTER*2 COLOUR,GENERIC,GEOPHYS,DRILL
      CHARACTER*3 AGE,COLLECT
      CHARACTER*4 MREFE,MREFN
      CHARACTER*5 REFNO,SHEET,CLASS,REFNO1
      CHARACTER*6 USE
      CHARACTER*7 LEASE
      CHARACTER*8 UNIT,MAPREF
      CHARACTER*10 ROCK
      CHARACTER*12 LOCAL,REPORT
      CHARACTER*20 OCCUPY
C
      CHARACTER*1 BUFF(132),BUFF2(134)
C BUFFER ARRAY TO ALLOW BINARY WRITE
      EQUIVALENCE (BUFF(1),OCCUPY),(BUFF(21),LOCAL),(BUFF(33),REPORT),
     .       (BUFF(45),ROCK),(BUFF(55),UNIT),(BUFF(63),LEASE),
     .       (BUFF(70),USE),(BUFF(76),REFNO),(BUFF(81),SHEET),
     .       (BUFF(86),CLASS),(BUFF(91),NORTH),(BUFF(95),AGE),
     .       (BUFF(98),COLLECT),(BUFF(101),COLOUR),
     .       (BUFF(103),GENERIC),(BUFF(105),GEOPHYS),
     .       (BUFF(107),DRILL),(BUFF(109),ANNUAL),(BUFF(111),TOTAL),
     .       (BUFF(113),IYEAR),(BUFF(115),EAST),(BUFF(117),TENURE),
     .       (BUFF(118),LANDUSE),(BUFF(119),RESERVE),(BUFF(120),STATUS),
     .       (BUFF(121),EXTRACT),
     .       (BUFF(122),GRAIN),(BUFF(123),ATTBG),(BUFF(124),STRONG),
     .       (BUFF(125),PETROL),(BUFF(126),CHEM),(BUFF(127),XRD),
     .       (BUFF(128),CERAM),(BUFF(129),OTHERTEST),(BUFF(130),LAB),
     .       (BUFF(131),QUALITY),(BUFF(132),STANDARD)
C USED FOR BINARY OUTPUT FOR FASTER ACCESS
      EQUIVALENCE (BUFF2(1),IRECNO),(BUFF2(3),BUFF(1))
C USED TO ADD THE RECORD NUMBER TO THE ENTRIES TO BE UPDATED
      DATA IBELL/1792/
C
      OPEN(UNIT=4,FORM='BINARY',ACCESS='DIRECT',RECL=132)
C OPEN THE INPUT FILE FOR BINARY,RANDOM AND SEQUENTIAL OPERATIONS
      REWIND 4
      OPEN(UNIT=3,FILE='CONQUAD.IND',RECL=2,FORM='BINARY',SHARE='ERO')
C OPEN THE FILE WITH THE INDEX TO THE QUADRANGLES
      DO 8 I=1,98
      READ(3) IQUAD(I)
    8 CONTINUE
      CLOSE(UNIT=3,STATUS='KEEP')
C READ THE STARTS OF THE QUADRANGLES AND CLOSE THE FILE
C
      OPEN(UNIT=6,FORM='BINARY',RECL=134)
C OPEN THE FILE TO HOLD THE CHANGED RECORDS
```

```
      CHGE=.FALSE.
C USED TO DECIDE WHEN THE OUTPUT LISTING NEEDS HEADING
      OPEN(UNIT=5,FILE='CON:')
C OPEN THE CONSOLE
      OPEN(UNIT=3,FILE='PR:')
C OPEN THE PRINTER FOR OUTPUT
   10 WRITE(5,100)
  100 FORMAT(' REF NO (TYPE END TO FINISH)')
      READ(5,200) REFNO1
  200 FORMAT(A5)
      IF (REFNO1 .EQ. 'END  ') GOTO 50
C THE END OF THE CHANGES
      DO 11 I=1,5
      IF (REFNO1(I:I) .GT. '9' .OR. REFNO1(I:I) .LT. '0') THEN
      WRITE(5,101) IBELL
  101 FORMAT(1X,A1,' REF NO MUST HAVE FIVE NUMERIC CHARACTERS')
      GOTO 10
      ENDIF
   11 CONTINUE
      IF (IQUAD(CTOI(REFNO1(1:2),K)) .EQ. 0) THEN
   12 WRITE(5,102) IBELL
  102 FORMAT(1X,A1,' REF NO NOT VALID')
      GOTO 10
      ENDIF
C NOW READY TO START LOOKING FOR A REFNO1
C
      IBASE=IQUAD(CTOI(REFNO1(1:2),K))
C THE FIRST ENTRY HAVING THIS QUADRANGLE NUMBER
      IF (IBASE .NE. 1) THEN
C IF NOT THE FIRST RECORD
      READ(4,REC=IBASE-1) BUFF
C POSITION THE FILE ONE RECORD BEFORE THE FIRST RECORD OF THE QUADRANGLE
      ELSE
      REWIND 4
C IF IBASE IS THE FIRST RECORD REWIND THE FILE
      ENDIF
C
C NOW SCAN THE FILE LOOKING FOR THE ENTRY
   13 READ(4,END=12) BUFF
C IF HIT END HAVE INVALID REF NO
      IF (REFNO .GT. REFNO1) GOTO 12
C REFNOS ARE IN ASCENDING ORDER SO IF THE ONE ON FILE IS BIGGER
C HAVE INVALID REFNO
      IF (REFNO .LT. REFNO1) THEN
      IBASE=IBASE+1
      GOTO 13
C INCREMENT RECORD COUNTER AND BACK ROUND
      ENDIF
C
C IF GET TO HERE HAVE FOUND A MATCHING REF NO
      WRITE(5,103) REFNO,SHEET,OCCUPY,LEASE
  103 FORMAT(1X,A5,2X,A5,2X,A20,2X,A7/' OK ?'/
     .   ' TYPE Y IF THIS IS TO BE CHANGED')
      READ(5,201) AOK
  201 FORMAT(A1)
      IF (AOK .NE. 'Y') GOTO 10
C BACK FOR ANOTHER REF NO
C
C NOW OFFER THE CHANGES
      IF (CHANGE('MAP SHEET')) CALL ALPHA5(SHEET,'MAP SHEET')
      IF (CHANGE('COORDS')) THEN
   14 CALL ALPHA8(MAPREF,'COORDS')
C NOW CHECK FOR VALID MAPREF
      IF (MAPREF(1:1) .LT. 'B' .OR. MAPREF(1:1) .GT. 'F') THEN
      WRITE(5,104) IBELL
  104 FORMAT(1X,A1,' COORDINATES INCORRECT - FORM IS EQ123456')
      GOTO 14
      ENDIF
      IF (MAPREF(2:2) .LT. 'M' .OR. MAPREF(2:2) .GT. 'S'
     .  .OR. MAPREF(2:2) .EQ. 'O') THEN
      WRITE(5,104)
      GOTO 14
      ENDIF
C CHECK FOR VALID MAP COORDINATES
      ENDIF
C END OF MAP COORDS
      IF (CHANGE('OCCUPIER')) CALL ALPHA20(OCCUPY,'OCCUPIER')
      IF (CHANGE('LEASE')) CALL ALPHA7(LEASE,'LEASE')
      IF (CHANGE('LOCALITY')) CALL ALPHA12(LOCAL,'LOCALITY')
      IF (CHANGE('TENURE')) CALL NUMB1(TENURE,'TENURE','0','5')
      IF (CHANGE('LAND USE')) CALL NUMB1(LANDUSE,'LAND USE','1','3')
      IF (CHANGE('REPORT')) CALL ALPHA12(REPORT,'REPORT')
      WRITE(5,105)
  105 FORMAT(' TO ALTER THE FIELD DATA TYPE Y HERE')
      READ(5,201) AOK
      IF (AOK .EQ. 'Y') THEN
      IF (CHANGE('ANNUAL PRODUCTION')) CALL INT2(ANNUAL,
     .   'ANNUAL PRODUCTION')
      IF (CHANGE('TOTAL PRODUCTION')) CALL INT2(TOTAL,
     .   'TOTAL PRODUCTION')
      IF (CHANGE('RESERVES')) CALL NUMB1(RESERVE,'RESERVES','0','5')
      IF (CHANGE('STATUS')) CALL NUMB1(STATUS,'STATUS','0','3')
      IF (CHANGE('ROCK NAME')) CALL ALPHA10(ROCK,'ROCK NAME')
      IF (CHANGE('ROCK UNIT')) CALL ALPHA8(UNIT,'ROCK UNIT')
      IF (CHANGE('AGE')) CALL ALPHA3(AGE,'AGE')
      IF (CHANGE('COLOUR')) CALL NUMB2(COLOUR,'COLOUR','0','8')
      IF (CHANGE('GEN ENVIRONMENT')) CALL NUMB2(GENERIC,
     .  'GEN ENVIRONMENT','0','9')
      IF (CHANGE('EXTRACTIBILITY')) CALL NUMB1(EXTRACT,
     .  'EXTRACTIBILITY','0','3')
      IF (CHANGE('COLLECTOR')) CALL ALPHA3(COLLECT,'COLLECTOR')
      IF (CHANGE('YEAR')) CALL INT2(IYEAR,'YEAR')
      ENDIF
C END OF DEALING WITH FIELD DATA IF REQUIRED
C
C
C
      WRITE(5,106)
  106 FORMAT(' TO CHANGE TEST DATA TYPE Y HERE')
      READ(5,201) AOK
      IF (AOK .EQ. 'Y') THEN
C CHANGE THE TEST DATA
      IF (CHANGE('GEOPHYSICS')) CALL NUMB2(GEOPHYS,'GEOPHYSICS',
     .   '0','4')
      IF (CHANGE('DRILLING')) CALL NUMB2(DRILL,'DRILLING','0','5')
      IF (CHANGE('GRAIN SIZE ANAL')) CALL ALPHA1(GRAIN,
     .  'GRAIN SIZE ANAL')
      IF (CHANGE('ATTERBERG LIM')) CALL ALPHA1(ATTBG,
     .  'ATTERBERG LIM')
      IF (CHANGE('STRENGTH PROP')) CALL ALPHA1(STRONG,
     . 'STRENGTH PROP')
      IF (CHANGE('PETROLOGY')) CALL ALPHA1(PETROL,'PETROLOGY')
      IF (CHANGE('CHEMICAL ANAL')) CALL ALPHA1(CHEM,
     . 'CHEMICAL ANAL')
      IF (CHANGE('XRD')) CALL ALPHA1(XRD,'XRD')
      IF (CHANGE('CERAMIC')) CALL ALPHA1(CERAM,'CERAMIC')
      IF (CHANGE('OTHER')) CALL ALPHA1(OTHERTEST,
     .   'OTHER')
      IF (CHANGE('LABORATORY')) CALL NUMB1(LAB,'LABORATORY','0','3')
      ENDIF
C END OF CHANGING TEST DETAILS
C
C
C
      IF (CHANGE('SOIL CLASSIFICATION')) CALL ALPHA5(CLASS,
     .   'SOIL CLASSIFICATION')
      IF (CHANGE('USE')) CALL NUMB6(USE,'USE','A','Z')
      IF (CHANGE('QUALITY')) CALL NUMB1(QUALITY,'QUALITY','0','2')
      IF (CHANGE('STANDARD')) CALL NUMB1(STANDARD,'STANDARD',
     .   '0','4')
C
C END READING CHANGES
C
      IRECNO=IBASE
C NOTE THE RECORD NUMBER
      IF (.NOT. CHGE) THEN
      WRITE(3,300)
  300 FORMAT(' THE FOLLOWING CHANGES ARE BEING MADE'/)
      CHGE=.TRUE.
      ENDIF
C HEAD UP ONLY ON THE FIRST TIME
      WRITE(3,301) REFNO,SHEET,MAPREF,OCCUPY,LEASE,LOCAL,TENURE,
     .        LANDUSE,REPORT,ANNUAL,TOTAL,RESERVE,STATUS,ROCK,
     .        UNIT,AGE,COLOUR,GENERIC,EXTRACT,COLLECT,IYEAR,GEOPHYS,DRILL,
     .        GRAIN,ATTBG,STRONG,PETROL,CHEM,XRD,CERAM,OTHERTEST,
     .        LAB,CLASS,USE,QUALITY,STANDARD
  301 FORMAT(1X,2(A5,'@'),A8,'@',A20,'@',A7,'@',A12,'@',A1,'@',A1/
     .        6X,'@',A12,'@',2(I4,'@'),2(A1,'@'),A10,'@',A8,'@',A3,'@',
     .        2(A2,'@'),A1/6X,'@',A3,I4,'@',2(A2,'@'),9(A1,'@'),A5,'@',
     .        A6,'@',2(A1,'@'))
C WRITE WITH DELIMITERS AFTER EACH FIELD AND REFNO ON ITS OWN
C
C NOW RETRIEVE AMG COORDINATES
C
      ITMP=ICHAR(MAPREF(1:1))
      MREFE(1:1)=CHAR(ITMP-16)
      ITMP=ICHAR(MAPREF(2:2))
      IF (ITMP .GT. 78) ITMP=ITMP-1
      MREFN(1:1)=CHAR(ITMP-28)
      MREFE(2:4)=MAPREF(3:5)
      MREFN(2:4)=MAPREF(6:8)
      EAST=CTOI(MREFE,J)
      NORTH=CTOI(MREFN,J)
      NORTH=NORTH+50000
C ABOVE CODE FROM GRID2.FTN GRID CONVERSION PROGRAM BY E.L. MARTIN
C NOW HAVE EAST AND NORTH SEPARATELY
C
      WRITE(6) BUFF2
C WRITE OUT TO THE FILE TO HOLD THE UPDATES
      GOTO 10
```

```
C BACK ROUND AGAIN
C
C
C
   50 CONTINUE
      CLOSE(UNIT=4,STATUS='KEEP')
      CLOSE(UNIT=6,STATUS='KEEP')
      WRITE(3,302)
  302 FORMAT(1X/)
C CLOSE ALL FILES ETC UP
      END

      LOGICAL FUNCTION CHANGE(STRING)
      CHARACTER* (*) STRING
      WRITE(5,100) STRING
  100 FORMAT(' TO CHANGE ',C20/' TYPE Y HERE')
      READ(5,102) AOK
  102 FORMAT(A1)
      CHANGE=AOK .EQ. 'Y'
      RETURN
      END

$INCLUDE ALPHA1.FTN
      SUBROUTINE ALPHA1(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *1 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A1)
      IF (.NOT. UNPRINT(SVAR,1)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA3.FTN
      SUBROUTINE ALPHA3(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *3 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A3)
      IF (.NOT. UNPRINT(SVAR,3)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END
```

```
$INCLUDE ALPHA5.FTN
      SUBROUTINE ALPHA5(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *5 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A5)
      IF (.NOT. UNPRINT(SVAR,5)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA7.FTN
      SUBROUTINE ALPHA7(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *7 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A7)
      IF (.NOT. UNPRINT(SVAR,7)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA8.FTN
      SUBROUTINE ALPHA8(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *8 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A8)
      IF (.NOT. UNPRINT(SVAR,8)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA10.FTN
      SUBROUTINE ALPHA10(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *10 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A10)
      IF (.NOT. UNPRINT(SVAR,10)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA12.FTN
      SUBROUTINE ALPHA12(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *12 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A12)
      IF (.NOT. UNPRINT(SVAR,12)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE ALPHA20.FTN
      SUBROUTINE ALPHA20(SVAR,PROMPT)
      CHARACTER * (*) PROMPT
      CHARACTER *20 SVAR
      LOGICAL UNPRINT
      INTEGER*2 IBELL
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A20)
      IF (.NOT. UNPRINT(SVAR,20)) RETURN
C LOOK FOR NON-PRINTING CHARCATERS AND IF NONE RETURN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' ERROR IN KEYING - PLEASE RE ENTER ',C20)
      GOTO 10
      END

$INCLUDE INT2.FTN
      SUBROUTINE INT2(IVAR,PROMPT)
      CHARACTER * (*) PROMPT
      INTEGER*2 IVAR
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
      READ(5,*) IVAR
      RETURN
      END
```

```
$INCLUDE NUMB1.FTN
      SUBROUTINE NUMB1(SVAR,PROMPT,LOW,UP)
      CHARACTER *(*) PROMPT
      CHARACTER*1 SVAR
      CHARACTER*1 UP,LOW
      INTEGER*2 IBELL
      LOGICAL UNPRINT
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A1)
      IF (UNPRINT(SVAR,1)) THEN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' KEYING ERROR - REENTER ',C20)
      GOTO 10
      ENDIF
      IF (SVAR .EQ. ' ' .OR.
     .   (SVAR .GE. LOW .AND. SVAR .LE. UP)) GOTO 11
C VALID CHARACTER
      WRITE(5,102) IBELL,PROMPT
      GOTO 10
   11 CONTINUE
      RETURN
      END

$INCLUDE CONNUMB2.FTN
      SUBROUTINE NUMB2(SVAR,PROMPT,LOW,UP)
      CHARACTER *(*) PROMPT
      CHARACTER*2 SVAR
      CHARACTER*1 UP,LOW
      INTEGER*2 IBELL
      LOGICAL UNPRINT
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A2)
      IF (UNPRINT(SVAR,2)) THEN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' KEYING ERROR - REENTER ',C20)
      GOTO 10
      ENDIF
      IF (PROMPT .NE. 'GEN ENVIRONMENT') THEN
      DO 11 I=1,2
      IF (SVAR(I:I) .EQ. ' ' .OR.
     .   (SVAR(I:I) .GE. LOW .AND. SVAR(I:I) .LE. UP)) GOTO 11
C VALID CHARACTER
      WRITE(5,102) IBELL,PROMPT
      GOTO 10
   11 CONTINUE
      ELSE
      DO 12 I=1,2
      IF(SVAR(I:I) .EQ. ' ' .OR.
     .   ((SVAR(I:I) .GE. '0' .AND. SVAR(I:I) .LE. '9') .OR.
     .  (SVAR(I:I) .GE. 'A' .AND. SVAR(I:I) .LE. 'D'))) GOTO 12
C VALID CHARACTER FOR GENERIC ENVIRONMENT
      WRITE(5,102) IBELL,PROMPT
      GOTO 10
   12 CONTINUE
      ENDIF
      RETURN
      END

$INCLUDE NUMB6.FTN
      SUBROUTINE NUMB6(SVAR,PROMPT,LOW,UP)
      CHARACTER *(*) PROMPT
      CHARACTER*6 SVAR
      CHARACTER*1 UP,LOW
      INTEGER*2 IBELL
      LOGICAL UNPRINT
      DATA IBELL/1792/
      WRITE(5,100) PROMPT
  100 FORMAT(1X,C20)
   10 READ(5,101) SVAR
  101 FORMAT(A6)
      IF (UNPRINT(SVAR,6)) THEN
      WRITE(5,102) IBELL,PROMPT
  102 FORMAT(1X,A1,' KEYING ERROR - REENTER ',C20)
      GOTO 10
      ENDIF
      DO 11 I=1,6
      IF (SVAR(I:I) .EQ. ' ' .OR.
     .    (SVAR(I:I) .GE. LOW .AND. SVAR(I:I) .LE. UP)) GOTO 11
C VALID CHARACTER
      WRITE(5,102) IBELL,PROMPT
      GOTO 10
   11 CONTINUE
      RETURN
      END

$INCLUDE UNPRINT.FTN
      LOGICAL FUNCTION UNPRINT(SVAR,NCHAR)
      CHARACTER* (*) SVAR
      DO 10 I=1,NCHAR
      IF (SVAR(I:I) .LT. ' ') THEN
      UNPRINT=.TRUE.
      RETURN
      ENDIF
   10 CONTINUE
      UNPRINT=.FALSE.
      RETURN
      END

$TITL CONCHGE2.FTN - PUT CHANGES INTO CONMAT REGISTER MAIN FILE
C
      INTEGER*2 IRECNO
C THE COUNTER FOR THE ENTRY NUMBER TO BE REPLACED IN THE UPDATE
      INTEGER*2 ANNUAL,TOTAL,IYEAR,EAST
      INTEGER*4 NORTH
      CHARACTER*1 TENURE,LANDUSE,RESERVE,STATUS,EXTRACT,TEST,GRAIN,
     .    ATTBG,STRONG,PETROL,CHEM,XRD,CERAM,OTHERTEST,LAB,
     .    QUALITY,STANDARD
      CHARACTER*2 COLOUR,GENERIC,GEOPHYS,DRILL
      CHARACTER*3 AGE,COLLECT
      CHARACTER*5 REFNO,SHEET,CLASS,REFNO1
      CHARACTER*6 USE
      CHARACTER*7 LEASE
      CHARACTER*8 UNIT
      CHARACTER*10 ROCK
      CHARACTER*12 LOCAL,REPORT
      CHARACTER*20 OCCUPY
C
      CHARACTER*1 BUFF(132),BUFF2(134)
C BUFFER ARRAY TO ALLOW BINARY WRITE
      EQUIVALENCE (BUFF(1),OCCUPY),(BUFF(21),LOCAL),(BUFF(33),REPORT),
     .         (BUFF(45),ROCK),(BUFF(55),UNIT),(BUFF(63),LEASE),
     .         (BUFF(70),USE),(BUFF(76),REFNO),(BUFF(81),SHEET),
     .         (BUFF(86),CLASS),(BUFF(91),NORTH),(BUFF(95),AGE),
     .         (BUFF(98),COLLECT),(BUFF(101),COLOUR),
     .         (BUFF(103),GENERIC),(BUFF(105),GEOPHYS),
     .         (BUFF(107),DRILL),(BUFF(109),ANNUAL),(BUFF(111),TOTAL),
     .         (BUFF(113),IYEAR),(BUFF(115),EAST),(BUFF(117),TENURE),
     .         (BUFF(118),LANDUSE),(BUFF(119),RESERVE),(BUFF(120),STATUS),
     .         (BUFF(121),EXTRACT),
     .         (BUFF(122),GRAIN),(BUFF(123),ATTBG),(BUFF(124),STRONG),
     .         (BUFF(125),PETROL),(BUFF(126),CHEM),(BUFF(127),XRD),
     .         (BUFF(128),CERAM),(BUFF(129),OTHERTEST),(BUFF(130),LAB),
     .         (BUFF(131),QUALITY),(BUFF(132),STANDARD)
C USED FOR BINARY OUTPUT FOR FASTER ACCESS
      EQUIVALENCE (BUFF2(1),IRECNO),(BUFF2(3),BUFF(1))
C USED TO ADD THE RECORD NUMBER TO THE ENTRIES TO BE UPDATED
C
      OPEN(UNIT=4,FORM='BINARY',SHARE='ERO',RECL=132)
C OPEN THE INPUT FILE FOR BINARY SEQUENTIAL OPERATIONS
C
      OPEN(UNIT=3,FORM='BINARY',RECL=134)
      REWIND 3
C OPEN THE UPDATE FILE AND REWIND IT
      OPEN(UNIT=6,FORM='BINARY',ACCESS='DIRECT',RECL=132)
C OPEN THE OUTPUT FILE  FOR SEQUENTIAL AND DIRECT BINARY
C
C COPY MAIN FILE TO OUTPUT FILE
   10 READ(4,END=11) BUFF
      WRITE(6) BUFF
      GOTO 10
C COPY ONE RECORD AT A TIME TO THE END
C
   11 CONTINUE
C
      CLOSE(UNIT=4,STATUS='KEEP')
C
C NOW UPDATE THE COPY OF THE MAIN FILE ON LU 6 FROM LU 3
C
   20 READ(3,END=21) BUFF2
      WRITE(6,REC=IRECNO) BUFF
      GOTO 20
C BACK ROUND
C
   21 CONTINUE
C AT THE END
      CLOSE(UNIT=3,STATUS='KEEP')
      CLOSE(UNIT=6,STATUS='KEEP')
      END
```

APPENDIX 8

Program CONSRCH

```
$TITL CONSRCH.FTN - SEARCH THE CONSTRUCTION MATERIAL REGISTER
      INTEGER*2 ANNUAL,TOTAL,IYEAR,EAST
      INTEGER*4 NORTH,FCOUNT
      CHARACTER*1 TENURE,LANDUSE,RESERVE,STATUS,EXTRACT,TEST,GRAIN,
     .    ATTBG,STRONG,PETROL,CHEM,XRD,CERAM,OTHERTEST,LAB,
     .    QUALITY,STANDARD
      CHARACTER*2 COLOUR,GENERIC,GEOPHYS,DRILL
      CHARACTER*3 AGE,COLLECT
      CHARACTER*5 REFNO,SHEET,CLASS
      CHARACTER*6 USE
      CHARACTER*7 LEASE
      CHARACTER*8 UNIT
      CHARACTER*10 ROCK
      CHARACTER*12 LOCAL,REPORT
      CHARACTER*20 OCCUPY
C
      CHARACTER*1 BUFF(132)
C BUFFER ARRAY TO ALLOW BINARY WRITE
      EQUIVALENCE (BUFF(1),OCCUPY),(BUFF(21),LOCAL),(BUFF(33),REPORT),
     .       (BUFF(45),ROCK),(BUFF(55),UNIT),(BUFF(63),LEASE),
     .       (BUFF(70),USE),(BUFF(76),REFNO),(BUFF(81),SHEET),
     .       (BUFF(86),CLASS),(BUFF(91),NORTH),(BUFF(95),AGE),
     .       (BUFF(98),COLLECT),(BUFF(101),COLOUR),
     .       (BUFF(103),GENERIC),(BUFF(105),GEOPHYS),
     .       (BUFF(107),DRILL),(BUFF(109),ANNUAL),(BUFF(111),TOTAL),
     .       (BUFF(113),IYEAR),(BUFF(115),EAST),(BUFF(117),TENURE),
     .       (BUFF(118),LANDUSE),(BUFF(119),RESERVE),(BUFF(120),STATUS),
     .       (BUFF(121),EXTRACT),
     .       (BUFF(122),GRAIN),(BUFF(123),ATTBG),(BUFF(124),STRONG),
     .       (BUFF(125),PETROL),(BUFF(126),CHEM),(BUFF(127),XRD),
     .       (BUFF(128),CERAM),(BUFF(129),OTHERTEST),(BUFF(130),LAB),
     .       (BUFF(131),QUALITY),(BUFF(132),STANDARD)
C USED FOR BINARY OUTPUT FOR FASTER ACCESS
C
      REAL X(100),Y(100),YINTVL(100),RSLOPE(100)
      INTEGER*2 SWATH(100,25)
C ABOVE 2 LINES USED FOR FSTJDN POINT IN POLYGON SEARCH
C
      LOGICAL NOTIN,INOUT,SEMIN
      CHARACTER*1 ITYPE,SFIELD,STEST,SGRAIN,GRANAL,SATTBG,SSTRONG,
     .    SPETROL,SCHEM,SXRD,SCERAM,SOTHERTEST
      INTEGER*2 BANNUAL,EANNUAL,BTOTAL,ETOTAL,BYEAR,EYEAR,FFEED
      CHARACTER*4 SANNUAL,FANNUAL,STOTAL,FTOTAL,SYEAR,FYEAR
      CHARACTER*80 SQUAD,SMAP,SOCCUPY,SLEASE,SLOCN,STEN,SLANDUSE,
     . SRESERVE,SSTATUS,SROCK,SUNIT,SAGE,SCOLOUR,SGENERIC,SLAB,
     . SEXTRACT,SCOLLECT,SGEOPHYS,SDRILL,SUSE,SQUALITY,SSTANDARD,
     . SCLASS
C THE ABOVE ARE USED TO READ SEARCH OPTIONS INTO
      CHARACTER*1 ARSRCH,AUSE,NG,ND,NT,APRINT
      CHARACTER*1 NQUAL,MNQUAL(3)
      CHARACTER*2 NTEN,MNTEN(6),NLUSE,MNLUSE(3),NCOL1,NCOL2,MNCOL(9),
     .  NEXTRACT,MNEXTRACT(4),NUSE(6),MNUSE(26),NGEN1,NGEN2,MNGEN(14),
     .  NGP1,NGP2,MNGP(5),NDRILL1,NDRILL2,MNDRILL(6),
     .  NSTD,MNSTD(5),NTEST(8)
      CHARACTER*3 NRES,MNRES(6),NSTAT,MNSTAT(4),NLAB,MNLAB(4)
      CHARACTER*5 GSRCH(4000)
      DATA MNTEN/'NP','CA','SF','FH','CL','OT'/
      DATA MNLUSE/'QP','QN','QD'/
      DATA MNRES/'NOT','NIL','SML','MED','LGE','VST'/
      DATA MNSTAT/'FOP','OCC','ABN','NEW'/
      DATA MNCOL/'LT','DK','WH','BK','GR','YL','BR','RD','MO'/
      DATA MNEXTRACT/'BH','EX','DZ','BL'/
      DATA MNUSE/'CA','RS','RB','RA','RW','RU','RH','CC','CF',
     .  'CP','CB','CT','LW','SM','SF','SN','SG','SB','SD','BD',
     .  'EC','PC','FC','BS','HM','SI'/
      DATA MNQUAL/'M','S','E'/
      DATA MNGEN/'IN','VO','SE','ME','DU','RE','CO','AL','DN',
     .  'BC','OS','FS','MW','FA'/
      DATA MNGP/'EM','GR','SV','MG','RE'/
      DATA MNDRILL/'AU','CH','DI','PC','RO','TP'/
      DATA MNLAB/'DOM','DMR','HEC','OTH'/
      DATA MNSTD/'BS','AS','RA','AM','OT'/
C THE ABOVE ARE USED IN THE EXPNASION OF NUMERIC CODES TO
C MNEMONICS
C
C
C
      DATA FFEED/3072/
C THE FORM FEED CHARACTER
      OPEN(UNIT=4,FORM='BINARY',RECL=132)
C OPEN THE INPUT FILE FOR BINARY SEQUENTIAL OPERATIONS
      REWIND 4
      WRITE(5,100)
  100 FORMAT(' SEARCHING CONSTRUCTION MATERIAL REGISTER')
C NOW FOR A FULL SEARCH
      WRITE(6,300)
  300 FORMAT(' SEARCH OPTIONS ARE:')
      WRITE(5,101)
  101 FORMAT(' FOR EACH OPTION ENTER EITHER A BLANK LINE OR'/
     . ' THE DESIRED VALUES FOR THE OPTION, EACH TERMINATED BY'
     . ,' A /'/' E.G. FRED/BILL/TOM/SMITH/')
      WRITE(5,102)
  102 FORMAT(' QUADRANGLE?')
      READ(5,201) SQUAD
  201 FORMAT(A80)
      IF (SQUAD(1:1) .NE. ' ') WRITE(6,301) SQUAD
  301 FORMAT(' QUADRANGLE',10X,A80)
      WRITE(5,103)
  103 FORMAT(' MAP SHEET?')
      READ(5,201) SMAP
      IF (SMAP(1:1) .NE. ' ') WRITE(6,302) SMAP
  302 FORMAT(' MAP SHEET',10X,A80)
      WRITE(5,104)
  104 FORMAT(' SEARCH FOR SITES WITHIN A SPECIFIED AREA (Y)?')
      READ(5,202) ITYPE
  202 FORMAT(A1)
      IF (ITYPE .EQ. 'Y') GOTO 10
C WANT TO READ COORDS
      NCOORD=0
      GOTO 12
C DONT WANT TO SEARCH FOR SITES IN AN AREA
C
   10 CONTINUE
C READ VERTICES
      WRITE(5,105)
  105 FORMAT(' NUMBER OF VERTICES OF AREA?'/
     .  ' ENTER 2 TO SPECIFY A RECTANGLE')
      READ(5,*) NCOORD
      IF (NCOORD .LT. 2) GOTO 10
C NEED AT LEAST 3 VERTICES TO DEFINE AN AREA
      IF (NCOORD .EQ. 2) THEN
      WRITE(5,106)
  106 FORMAT(' ENTER COORDS OF TWO DIAGONALLY OPPOSITE CORNERS OF ',
     .  'THE RECTANGLE'/' ONE PER LINE IN THE FORM EASTNORTH')
      ELSE
      WRITE(5,107)
  107 FORMAT(' ENTER VERTEX COORDS IN CLOCKWISE ORDER'/
     .' ONE PER LINE IN FORM EASTNORTH')
      ENDIF
      IXMAX=-999999999
      IXMIN=-IXMAX
      IYMAX=IXMAX
      IYMIN=IXMIN
C USE THESE TO STORE THE RANGE OF THE AREA
      DO 11 I=1,NCOORD
      READ(5,203) IX,IY
  203 FORMAT(I4,I5)
C GET INTO 100'S OF METRES EAST AND NORTH
      IXMAX=MAX0(IX,IXMAX)
      IXMIN=MIN0(IX,IXMIN)
      IYMAX=MAX0(IY,IYMAX)
      IYMIN=MIN0(IY,IYMIN)
C FIND THE RANGE
      X(I)=IX*0.1
      Y(I)=IY*0.1
C CONVERT TO KM BEFORE STORING
   11 CONTINUE
      IF (NCOORD .GT. 2) THEN
      IF (X(1) .NE. X(NCOORD) .OR. Y(1) .NE. Y(NCOORD)) THEN
       NCOORD=NCOORD+1
       X(NCOORD)=X(1)
       Y(NCOORD)=Y(1)
C CLOSE AREA
      ENDIF
      WRITE(6,303)
  303 FORMAT(' AREA COORDINATES (KM)')
      WRITE(6,304) (X(I),Y(I),I=1,NCOORD)
  304 FORMAT(20X,4(F14.2,F9.2))
      NCOORD=NCOORD-1
C ROUTINE FOR LOCATING POINTS DOESNT REQUIRE CLOSURE
      CALL PREPLY(X,Y,NCOORD,YINTVL,INTVLS,SWATH,RSLOPE)
C CUT THE SEARCH AREA UP INTO SWATHS
      ELSE
      WRITE(6,305) IXMIN,IXMAX,IYMIN,IYMAX
  305 FORMAT(' SEARCH RECTANGLE FROM',I5,'00ME TO',I5,'00ME AND FROM',
     .       I6,'00MN TO',I6,'00MN')
      ENDIF
C
   12 CONTINUE
      WRITE(5,108)
  108 FORMAT(' OCCUPIER?')
      READ(5,201) SOCCUPY
      IF (SOCCUPY(1:1) .NE. ' ') WRITE (6,306) SOCCUPY
  306 FORMAT(' OCCUPIER',10X,A80)
      WRITE(5,109)
  109 FORMAT(' MINERAL LEASE (USE ; TO SEPARATE OPTIONS HERE)?')
```

```
      READ(5,201) SLEASE
      IF (SLEASE(1:1) .NE. ' ') WRITE(6,307) SLEASE
  307 FORMAT(' MINERAL LEASE',10X,A80)
      WRITE(5,110)
  110 FORMAT(' LOCALITY?')
      READ(5,201) SLOCN
      IF (SLOCN(1:1) .NE. ' ') WRITE (6,308) SLOCN
  308 FORMAT(' LOCALITY',10X,A80)
      WRITE(5,111)
  111 FORMAT(' LAND TENURE (0-5)?')
      READ(5,201) STEN
      IF(STEN(1:1) .NE. ' ') WRITE(6,309) STEN
  309 FORMAT(' LAND TENURE',10X,A80)
      WRITE(5,112)
  112 FORMAT(' LAND USE (1-3)?')
      READ(5,201) SLANDUSE
      IF(SLANDUSE(1:1) .NE. ' ') WRITE(6,310) SLANDUSE
  310 FORMAT(' LAND USE',10X,A80)
      WRITE(5,113)
  113 FORMAT(' TO SEARCH THE FIELD DATA TYPE Y HERE')
      READ(5,202) SFIELD
C
C
      IF (SFIELD .NE. ' ') THEN
C SKIP ROUND FIELD DATA IF NOT NEEDED
      WRITE(5,114)
  114 FORMAT(' RANGE OF ANNUAL PRODUCTION'/
     .   ' ENTER START OF RANGE')
      READ(5,204) SANNUAL
  204 FORMAT(A4)
      IF (SANNUAL .NE. '    ') THEN
      WRITE(5,115)
  115 FORMAT(' ENTER END OF RANGE')
      READ(5,204) FANNUAL
      WRITE(6,311) SANNUAL,FANNUAL
  311 FORMAT(' LOOKING FOR ANNUAL PRODUCTION BETWEEN ',A4,' AND ',
     . A4)
      BANNUAL=CTOI(SANNUAL,K)
      EANNUAL=CTOI(FANNUAL,K)
      ENDIF
      WRITE(5,116)
  116 FORMAT(' RANGE OF TOTAL PRODUCTION'/
     .   ' ENTER START OF RANGE')
      READ(5,204) STOTAL
      IF (STOTAL .NE. '    ') THEN
      WRITE(5,117)
  117 FORMAT(' ENTER END OF RANGE')
      READ(5,204) FTOTAL
      WRITE(6,312) STOTAL,FTOTAL
  312 FORMAT(' LOOKING FOR TOTAL PRODUCTION BETWEEN ',A4,' AND ',
     . A4)
      BTOTAL=CTOI(STOTAL,K)
      ETOTAL=CTOI(FTOTAL,K)
      ENDIF
      WRITE(5,118)
  118 FORMAT(' RESERVES (0-5)?')
      READ(5,201) SRESERVE
      IF (SRESERVE(1:1) .NE. ' ') WRITE (6,313) SRESERVE
  313 FORMAT(' RESERVES',10X,A80)
      WRITE(5,119)
```

```
 119 FORMAT(' OPERATIONAL STATUS (0-3)?')
     READ(5,201) SSTATUS
     IF (SSTATUS(1:1) .NE. ' ') WRITE (6,314) SSTATUS
 314 FORMAT(' OPERATIONAL STATUS',10X,A80)
     WRITE(5,120)
 120 FORMAT(' ROCK NAME?')
     READ(5,201) SROCK
     IF (SROCK(1:1) .NE. ' ') WRITE (6,315) SROCK
 315 FORMAT(' ROCK NAME',10X,A80)
     WRITE(5,121)
 121 FORMAT(' ROCK UNIT?')
     READ(5,201) SUNIT
     IF (SUNIT(1:1) .NE. ' ') WRITE (6,316) SUNIT
 316 FORMAT(' ROCK UNIT',10X,A80)
     WRITE(5,122)
 122 FORMAT(' AGE?')
     READ(5,201) SAGE
     IF (SAGE(1:1) .NE. ' ') WRITE (6,317) SAGE
 317 FORMAT(' AGE',10X,A80)
     WRITE(5,123)
 123 FORMAT(' COLOUR (0-8)?')
     READ(5,201) SCOLOUR
     IF(SCOLOUR(1:1) .NE. ' ') WRITE(6,318) SCOLOUR
 318 FORMAT(' COLOUR',10X,A80)
     WRITE(5,124)
 124 FORMAT(' GENERIC ENVIRONMENT (0-D)?')
     READ(5,201) SGENERIC
     IF(SGENERIC(1:1) .NE. ' ') WRITE(6,319) SGENERIC
 319 FORMAT(' GENERIC ENVIRONMENT',10X,A80)
     WRITE(5,125)
 125 FORMAT(' EXTRACTABILITY (0-3)?')
     READ(5,201) SEXTRACT
     IF(SEXTRACT(1:1) .NE. ' ') WRITE(6,320) SEXTRACT
 320 FORMAT(' EXTRACTABILITY',10X,A80)
     WRITE(5,126)
 126 FORMAT(' COLLECTOR?')
     READ(5,201) SCOLLECT
     IF (SCOLLECT(1:1) .NE. ' ') WRITE (6,321) SCOLLECT
 321 FORMAT(' COLLECTOR',10X,A80)
     WRITE(5,127)
 127 FORMAT(' RANGE OF YEARS FOR FIELD DATA COLLECTION'/
    .   ' ENTER START OF RANGE')
     READ(5,204) SYEAR
     IF (SYEAR .NE. '    ') THEN
     WRITE(5,128)
 128 FORMAT(' ENTER END OF RANGE')
     READ(5,204) FYEAR
     WRITE(6,322) SYEAR,FYEAR
 322 FORMAT(' LOOKING FOR FIELD DATA COLLECTED BETWEEN ',A4,' AND ',
    . A4)
     BYEAR=CTOI(SYEAR,K)
     EYEAR=CTOI(FYEAR,K)
     ENDIF
     ENDIF
C END OF READING FIELD DATA IF REQUIRED
C
C
     WRITE(5,129)
 129 FORMAT(' TO SEARCH ON TEST DATA TYPE Y HERE')
     READ(5,202) STEST
```

```
      IF (STEST .NE. ' ') THEN
C SKIP ROUND IF TEST DATA NOT TO BE SEARCHED ON
      WRITE(5,130)
  130 FORMAT(' GEOPHYSICS (0-4)?')
      READ(5,201) SGEOPHYS
      IF(SGEOPHYS(1:1) .NE. ' ') WRITE(6,323) SGEOPHYS
  323 FORMAT(' GEOPHYSICS',10X,A80)
      WRITE(5,131)
  131 FORMAT(' DRILLING (0-5)?')
      READ(5,201) SDRILL
      IF(SDRILL(1:1) .NE. ' ') WRITE(6,324) SDRILL
  324 FORMAT(' DRILLING',10X,A80)
      WRITE(5,132)
  132 FORMAT(' TEST: GRAIN SIZE ANALYSIS')
      READ(5,202) SGRAIN
      WRITE(5,133)
  133 FORMAT(' DO YOU WANT THE GRAIN SIZE ANALYSES PRINTED')
      READ(5,202) GRANAL
      IF (GRANAL .EQ. 'Y' .AND. SGRAIN .NE. 'Y') SGRAIN='Y'
      IF (SGRAIN .EQ. 'Y') WRITE(6,325)
  325 FORMAT(' GRAIN SIZE ANALYSIS MUST HAVE BEEN DONE')
      IF (GRANAL .EQ. 'Y') WRITE(6,326)
  326 FORMAT(' GRAIN SIZE ANALYSES TO BE PRINTED')
      WRITE(5,134)
  134 FORMAT(' TEST: ATTERBERG LIMITS')
      READ(5,202) SATTBG
      IF (SATTBG .EQ. 'Y') WRITE(6,327)
  327 FORMAT(' ATTERBERG LIMITS MUST HAVE BEEN DONE')
      WRITE(5,135)
  135 FORMAT(' TEST: STRENGTH PROPERTIES')
      READ(5,202) SSTRONG
      IF (SSTRONG .EQ. 'Y') WRITE(6,328)
  328 FORMAT(' STRENGTH PROPERTIES MUST HAVE BEEN DONE')
      WRITE(5,136)
  136 FORMAT(' TEST: PETROLOGY')
      READ(5,202) SPETROL
      IF (SPETROL .EQ. 'Y') WRITE(6,329)
  329 FORMAT(' PETROLOGY MUST HAVE BEEN DONE')
      WRITE(5,137)
  137 FORMAT(' TEST: CHEMICAL ANALYSIS')
      READ(5,202) SCHEM
      IF (SCHEM .EQ. 'Y') WRITE(6,330)
  330 FORMAT(' CHEMICAL ANALYSIS MUST HAVE BEEN DONE')
      WRITE(5,138)
  138 FORMAT(' TEST: X-RAY DIFFRACTION')
      READ(5,202) SXRD
      IF (SXRD .EQ. 'Y') WRITE(6,331)
  331 FORMAT(' X-RAY DIFFRACTION MUST HAVE BEEN DONE')
      WRITE(5,139)
  139 FORMAT(' TEST: CERAMIC')
      READ(5,202) SCERAM
      IF (SCERAM .EQ. 'Y') WRITE(6,332)
  332 FORMAT(' CERAMIC TESTING MUST HAVE BEEN DONE')
      WRITE(5,140)
  140 FORMAT(' TEST: OTHER')
      READ(5,202) SOTHERTEST
      IF (SOTHERTEST .EQ. 'Y') WRITE(6,333)
  333 FORMAT(' OTHER TESTS MUST HAVE BEEN DONE')
      WRITE(5,141)
  141 FORMAT(' LABORATORY (0-3)?')
```

```
      READ(5,201) SLAB
      IF(SLAB(1:1) .NE. ' ') WRITE(6,334) SLAB
  334 FORMAT(' LABORATORY',10X,A80)
      ENDIF
C END OF INPUTTING OPTIONS FOR SEARCHING TESTING
C
C
C
      WRITE(5,142)
  142 FORMAT(' UNIFIED SOIL CLASSIFICATION?')
      READ(5,201) SCLASS
      IF (SCLASS(1:1) .NE. ' ') WRITE(6,335) SCLASS
  335 FORMAT(' UNIFIED SOIL CLASSIFICATION',5X,A80)
      WRITE(5,143)
  143 FORMAT(' USE (A-Z)?')
      READ(5,201) SUSE
      IF(SUSE(1:1) .NE. ' ') WRITE(6,336) SUSE
  336 FORMAT(' USE',10X,A80)
      WRITE(5,144)
  144 FORMAT(' QUALITY (0-2)?')
      READ(5,201) SQUALITY
      IF(SQUALITY(1:1) .NE. ' ') WRITE(6,337) SQUALITY
  337 FORMAT(' QUALITY',10X,A80)
      WRITE(5,145)
  145 FORMAT(' STANDARD (0-4)?')
      READ(5,201) SSTANDARD
      IF(SSTANDARD(1:1) .NE. ' ') WRITE(6,338) SSTANDARD
  338 FORMAT(' STANDARD',10X,A80)
C END OF INPUTTING SEARCH OPTIONS
C
C
C
C NOW TO INPUT THE DISPLAY OPTIONS
   18 WRITE(5,146)
  146 FORMAT(////' DISPLAY OPTIONS ARE :'/
     .    ' 1     FULL LISTING TO PRINTER ONLY'/
     .    ' 2     FULL LISTING TO SCREEN WITH OPTION OF PRINTING'/
     .    ' 3     ABBREVIATED LISTING TO PRINTER ONLY'/
     .    //' GRAIN SIZE ANALYSIS RESULTS ONLY APPEAR ON THE PRINTER'/
     .    //' ENTER OPTION NUMBER')
      READ(5,*) IDISPLAY
      IF (IDISPLAY .LT. 1 .OR. IDISPLAY .GT. 3) GOTO 18
C END OF DISPLAY OPTIONS
C
C
C ************************************************************
C NOW FOR THE SEARCH
C
      FCOUNT=0
C COUNTER FOR NUMBER OF FOUND ENTRIES
      IANAL=0
C COUNTER FOR NUMBER OF REFNOS TO CHECK THE GRAIN SIZE ANALYSES OF
      ASRCH='Y'
C INDICATE THAT WANT TO CONTINUE SEARCHING
C
   20 READ(4,END=40) BUFF
C READ ONE ENTRY
      IF (SQUAD(1:1) .NE. ' ' .AND. INDEX (SQUAD,REFNO(1:2)) .EQ. 0)
     .    GOTO 20
C NOT RIGHT QUADRANGLE
```

```
      IF (NOTIN(SMAP,SHEET)) GOTO 20
C NOT THE RIGHT SHEET
      IF (NCOORD .NE. 0) THEN
       IF (EAST .LT. IXMIN .OR. EAST .GT. IXMAX) GOTO 20
       IF (NORTH .LT. IYMIN .OR. NORTH .GT. IYMAX) GOTO 20
C CANT POSSIBLY BE IN AREA
      IF (NCOORD .GT. 2) THEN
       XTMP=EAST*0.1
       YTMP=NORTH*0.1
C CONVERT TO KM
       IF (.NOT. INOUT(XTMP,YTMP,X,Y,YINTVL,INTVLS,SWATH,RSLOPE))
     . GOTO 20
C NOT IN THE SPECIFIED AREA
      ENDIF
C FOR THE SIMPLE RECTANGLE DONT NEED THE POLYGON SEARCH
      ENDIF
      IF(NOTIN(SOCCUPY,OCCUPY)) GOTO 20
C NOT THE RIGHT OCCUPIER
      IF (SEMIN(SLEASE,LEASE)) GOTO 20
C NOT RIGHT LEASE
      IF(NOTIN(SLOCN,LOCAL)) GOTO 20
C NOT THE RIGHT LOCALITY
      IF (STEN(1:1) .NE. ' ' .AND. INDEX(STEN,TENURE) .EQ. 0) GOTO 20
C NOT THE RIGHT TENURE
      IF (SLANDUSE(1:1) .NE. ' ' .AND. INDEX(SLANDUSE,LANDUSE) .EQ. 0)
     . GOTO 20
C NOT THE RIGHT LANDUSE
C
      IF (SFIELD .NE. ' ') THEN
C SKIP ROUND SEARCHES ON FIELD DATA IF NOT NEEDED
      IF (SANNUAL .NE. '    ') THEN
      IF (ANNUAL .LT. BANNUAL .OR. ANNUAL .GT. EANNUAL) GOTO 20
C ANNUAL PRODUCTION FIGURES NOT IN RANGE
      ENDIF
      IF (STOTAL .NE. '    ') THEN
      IF (TOTAL .LT. BTOTAL .OR. TOTAL .GT. ETOTAL) GOTO 20
C TOTAL PRODUCTION FIGURES NOT IN RANGE SELECTED
      ENDIF
      IF (SRESERVE(1:1) .NE. ' ' .AND. INDEX(SRESERVE,RESERVE) .EQ. 0)
     .  GOTO 20
C NOT THE RIGHT RESERVES
      IF (SSTATUS(1:1) .NE. ' ' .AND. INDEX(SSTATUS,STATUS) .EQ. 0)
     .  GOTO 20
C NOT THE RIGHT STATUS
      IF (NOTIN(SROCK,ROCK)) GOTO 20
C NOT THE RIGHT ROCK NAME
      IF(NOTIN(SUNIT,UNIT)) GOTO 20
C NOT THE RIGHT UNIT
      IF(NOTIN(SAGE,AGE)) GOTO 20
C NOT THE RIGHT AGE
      IF(NOTIN(SCOLOUR,COLOUR)) GOTO 20
C NOT THE RIGHT COLOUR
      IF(NOTIN(SGENERIC,GENERIC)) GOTO 20
C NOT THE RIGHT GENERIC ENVIRONMENT
      IF (SEXTRACT(1:1) .NE. ' ' .AND. INDEX(SEXTRACT,EXTRACT) .EQ. 0)
     .  GOTO 20
C NOT THE RIGHT EXTRACTIBILITY
      IF(NOTIN(SCOLLECT,COLLECT)) GOTO 20
C NOT THE RIGHT COLLECTOR
      IF (SYEAR .NE. '    ') THEN
      IF (IYEAR .LT. BYEAR .OR. IYEAR .GT. EYEAR) GOTO 20
C YEAR NOT IN THE RANGE SELECTED
      ENDIF
      ENDIF
C
C END OF SEARCHING FIELD DATA
C
C
      IF (STEST .NE. ' ') THEN
C ONLY SEARCH ON TESTS IF NEEDED
      IF(NOTIN(SGEOPHYS,GEOPHYS)) GOTO 20
C NOT THE RIGHT GEOPHYSICAL TESTING
      IF(NOTIN(SDRILL,DRILL)) GOTO 20
C NOT THE RIGHT DRILL TYPE
      IF (SGRAIN .EQ. 'Y' .AND. GRAIN .NE. '1') GOTO 20
C NO GRAIN SIZE ANALYSIS DONE
      IF (SATTBG .EQ. 'Y' .AND. ATTBG .NE. '1') GOTO 20
C NO ATTERBERG LIMITS TEST DONE
      IF (SSTRONG .EQ. 'Y' .AND. STRONG .NE. '1') GOTO 20
C NO STRENGTH TESTS DONE
      IF (SPETROL .EQ. 'Y' .AND. PETROL .NE. '1') GOTO 20
C NO PETROLOGY DONE
      IF (SCHEM .EQ. 'Y' .AND. SCHEM .NE. '1') GOTO 20
C NO GRAIN SIZE ANALYSIS DONE
      IF (SXRD .EQ. 'Y' .AND. XRD .NE. '1') GOTO 20
C NO X-RAY DIFFRACTION DONE
      IF (SCERAM .EQ. 'Y' .AND. CERAM .NE. '1') GOTO 20
C NO CERAMIC TESTS DONE
      IF (SOTHERTEST .EQ. 'Y' .AND. OTHERTEST .NE. '1') GOTO 20
C NO OTHER TESTS DONE
      IF (SLAB(1:1) .NE. ' ' .AND. INDEX(SLAB,LAB) .EQ. 0) GOTO 20
C NOT THE RIGHT LABORATORY
      ENDIF
C END OF SEARCHING FOR TESTING IF REQUIRED
C
C
C
      IF(NOTIN(SCLASS,CLASS)) GOTO 20
C NOT THE RIGHT UNIFIED SOIL CLASSIFICATION
      IF(NOTIN(SUSE,USE)) GOTO 20
C NOT THE RIGHT USE
      IF (SQUALITY(1:1) .NE. ' ' .AND. INDEX(SQUALITY,QUALITY) .EQ. 0)
     .  GOTO 20
C NOT THE RIGHT QUALITY
      IF(SSTANDARD(1:1) .NE. ' ' .AND. INDEX(SSTANDARD,STANDARD) .EQ. 0)
     .  GOTO 20
C NOT THE RIGHT STANDARD
C
C IF FINALLY GET HERE HAVE FOUND AN ENTRY THAT MATCHES THE SEARCH OPTIONS
C
C EXPAND THE MNEMONICS COMMON TO ALL THE OUTPUT OPTIONS
      CALL MNABREV(NTEN,TENURE,MNTEN)
      IF (LANDUSE .NE. ' ') LANDUSE=CHAR(ICHAR(LANDUSE)-1)
C LANDUSE HAS VALUES 1-3 AND MNABREV ASSUMES 0-2
      CALL MNABREV(NLUSE,LANDUSE,MNLUSE)
      CALL MNABREV(NRES,RESERVE,MNRES)
      CALL MNABREV(NSTAT,STATUS,MNSTAT)
      CALL MNABREV(NCOL1,COLOUR(1:1),MNCOL)
      CALL MNABREV(NCOL2,COLOUR(2:2),MNCOL)
      CALL MNABREV(NEXTRACT,EXTRACT,MNEXTRACT)
      DO 25 I=1,6
      IF (USE(I:I) .EQ. ' ') THEN
      AUSE=' '
      ELSE
      AUSE=CHAR(ICHAR(USE(I:I))-17)
      ENDIF
C USE IS FORM A-Z AND NEED 0-
      CALL MNABREV(NUSE(I),AUSE,MNUSE)
   25 CONTINUE
      CALL MNABREV(NQUAL,QUALITY,MNQUAL)
C NOW EXPANDED MNEMONICS COMMON TO ALL THREE OUTPUT OPTIONS
C
C
      IF (IDISPLAY .EQ. 3) THEN
C THE ABBREVIATED LISTING TO THE PRINTER
      IF (MOD(FCOUNT,53) .EQ. 0) CALL HEAD3
C HEAD UP THE PAGE AS NEEDED
      FCOUNT=FCOUNT+1
C INCREMENT FOUND ENTRY COUNTER
C WANT A SIMPLE YES/NO INDICATION OF GEOPHYSICAL,DRILLING AND
C OTHER TESTING
      IF (GEOPHYS .NE. ' ') THEN
      NG='Y'
      ELSE
      NG='N'
      ENDIF
      IF (DRILL .NE. ' ') THEN
      ND='Y'
      ELSE
      ND='N'
      ENDIF
      IF (GRAIN .NE. ' ' .OR. ATTBG .NE. ' ' .OR. STRONG .NE. ' '
     . .OR. PETROL .NE. ' ' .OR. CHEM .NE. ' ' .OR. XRD .NE. ' '
     . .OR. CERAM .NE. ' ' .OR. OTHERTEST .NE. ' ') THEN
      NT='Y'
      ELSE
      NT='N'
      ENDIF
C CHECKED FOR TESTS ETC
C
      WRITE(6,400) REFNO,EAST,NORTH,LOCAL,OCCUPY,LEASE,NTEN,NLUSE,
     .  NRES,NSTAT,NCOL1,NCOL2,NEXTRACT,CLASS,NUSE,NQUAL,
     .  NG,ND,NT
  400 FORMAT(1X,A5,'¦',I4,I5,'¦',A12,'¦',A20,'¦',A7,'¦',2(A2,'¦'),
     .   2(A3,'¦'),A2,',',A2,'¦',A2,'¦',A5,'¦',5(A2,','),A2,'¦',
     .   4(1X,A1,'¦'))
C PRINT ONE LINE
      GOTO 20
C BACK ROUND TO READ ANOTHER RECORD
      ENDIF
C END OF ABBREVIATED PRINTING
C
C
C
C NOW TO EXPAND THE OTHER ABBREVIATIONS
      IF(GENERIC(1:1) .GT.'9') GENERIC(1:1)=CHAR(ICHAR(GENERIC(1:1))-7)
      IF(GENERIC(2:2) .GT.'9') GENERIC(2:2)=CHAR(ICHAR(GENERIC(2:2))-7)
C GENERIC ENVIRONMENT HAS VALUES 0-9,A-D
      CALL MNABREV(NGEN1,GENERIC(1:1),MNGEN)
      CALL MNABREV(NGEN2,GENERIC(2:2),MNGEN)
      CALL MNABREV(NGP1,GEOPHYS(1:1),MNGP)
      CALL MNABREV(NGP2,GEOPHYS(2:2),MNGP)
      CALL MNABREV(NDRILL1,DRILL(1:1),MNDRILL)
      CALL MNABREV(NDRILL2,DRILL(2:2),MNDRILL)
      CALL MNABREV(NLAB,LAB,MNLAB)
      CALL MNABREV(NSTD,STANDARD,MNSTD)
C NOW FOR THE TESTS WHICH WILL BE PUT INTO AN ARRAY AFTER EXPANSION
      IF (GRAIN .EQ. '1') THEN
      NTEST(1)='GS'
      ELSE
      NTEST(1)='  '
      ENDIF
      IF (ATTBG .EQ. '1') THEN
      NTEST(2)='AL'
      ELSE
      NTEST(2)='  '
      ENDIF
      IF (STRONG .EQ. '1') THEN
      NTEST(3)='SP'
      ELSE
      NTEST(3)='  '
      ENDIF
      IF (PETROL .EQ. '1') THEN
      NTEST(4)='PE'
      ELSE
      NTEST(4)='  '
      ENDIF
      IF (CHEM .EQ. '1') THEN
      NTEST(5)='CA'
      ELSE
      NTEST(5)='  '
      ENDIF
      IF (XRD .EQ. '1') THEN
      NTEST(6)='XR'
      ELSE
      NTEST(6)='  '
      ENDIF
      IF (CERAM .EQ. '1') THEN
      NTEST(7)='CR'
      ELSE
      NTEST(7)='  '
      ENDIF
      IF (OTHERTEST .EQ. '1') THEN
      NTEST(8)='OT'
      ELSE
      NTEST(8)='  '
      ENDIF
C END OF EXPANDING ABBREVIATIONS
C
      IF (IDISPLAY .EQ. 2) THEN
C LIST TO VDU WITH OPTION OF SENDING TO THE PRINTER
      WRITE(5,401) REFNO,SHEET,EAST,NORTH,OCCUPY,LEASE,NTEN,
     .  NLUSE,REPORT,ANNUAL,TOTAL,NRES,NSTAT,LOCAL,ROCK,
     .  UNIT,AGE,NCOL1,NCOL2,NGEN1,NGEN2,NEXTRACT,COLLECT,
     .  IYEAR,NGP1,NGP2,NDRILL1,NDRILL2,NTEST,NLAB,CLASS,
     .  NUSE,NQUAL,NSTD
  401 FORMAT(///' REF:',A5,'  MAP:',A5,'  COORDS:',I4,I5,
     .  '  OCCUPIER:',A20/12X,'LEASE:',A7,'  LAND TENURE:',A2,
     .  '  USE:',A2,'  REPORT:',A12/12X,11HANN PROD'N:,I4,
     .  15H  TOTAL PROD'N:,I4,'  RESERVES:',A3,'  OP STATUS:',
     .  A3/12X,'LOCAL:',A12,'  ROCK NAME:',A10,' ROCK UNIT:',A8,
     .  '  AGE:',A3/12X,'COL:',A2,',',A2,'  GENERIC TYPE:',
     .  A2,',',A2,'  EXTRACTN:',A2,'  COLLECTOR:',A3,'  YEAR:',
     .  I4/12X,'GEOPHYS:',A2,',',A2,'  DRILL:',A2,',',A2,
     .  '  TEST:',7(A2,','),A2,'  LAB:',A3/12X,'SOIL CLASS:',
     .  A5,'  USES:',5(A2,','),A2,'  QUALITY:',A1,'  STANDARD:',
     .  A2/////////)
      WRITE(5,147)
  147 FORMAT(//' TO PRINT THIS ENTRY TYPE Y NOW')
      READ(5,202) APRINT
      WRITE(5,148)
  148 FORMAT(' TO STOP THE SEARCH THROUGH MORE ENTRIES TYPE N NOW')
      READ(5,202) ASRCH
      WRITE(5,149)
  149 FORMAT(' TO SEND ENTRIES TO PRINTER ONLY TYPE Y NOW')
      READ(5,202) ITYPE
      IF (ITYPE .EQ. 'Y') IDISPLAY=1
      IF (ASRCH .EQ. 'N' .AND. APRINT .NE. 'Y') GOTO 40
C WANT NO FURTHER SEARCHING AND DONT WANT TO PRINT THIS ENTRY SO
C GO TO THE END
      IF (APRINT .NE. 'Y') GOTO 20
C DONT WANT TO PRINT
      ENDIF
C FINSIHED WITH THIS ENTRY ON SCREEN
C
C
C NOW FOR THE PRINTER
      IF (MOD(FCOUNT,14) .EQ. 0) CALL HEAD12
C HEAD THE PAGE TO LEAVE A GAP
      FCOUNT=FCOUNT+1
C INCREMENT THE COUNTER FOR THE NUMBER OF FOUND ENTRIES
      WRITE(6,402) REFNO,SHEET,EAST,NORTH,OCCUPY,LEASE,LOCAL,
     .  NTEN,NLUSE,REPORT,ANNUAL,TOTAL,NRES,NSTAT,ROCK,UNIT,
     .  AGE,NCOL1,NCOL2,NGEN1,NGEN2,NEXTRACT,COLLECT,IYEAR,
     .  NGP1,NGP2,NDRILL1,NDRILL2,NTEST,NLAB,CLASS,NUSE,
     .  NQUAL,NSTD
  402 FORMAT(' REF: ',A5,'  MAP: ',A5,'  COORDS: ',I4,I5,
     .  '  OCCUPIER: ',A20,'  LEASE: ',A7,'  LOCAL: ',A12,
     .  '  TEN: ',A2,'  USE: ',A2/13X,'REPORT: ',A12,
     .  14H  ANN PROD'N: ,I4,'  TOT: ',I4,'  RES: ',A3,
     .  '  STAT: ',A3,'  ROCKNAME: ',A10,'  UNIT: ',A8,
     .  '  AGE: ',A3/13X,'COLOUR: ',A2,',',A2,'  GEN TYPE: ',
     .  A2,',',A2,13H  EXTRACT'N: ,A2,'  COLLECTOR: ',A3,
     .  '  YEAR: ',I4,'  GEOPHYS: ',A2,',',A2,'  DRILL: ',
     .  A2,',',A2/13X,'TEST: ',7(A2,','),A2,'  LAB: ',A3,
     .  '  SOIL CLASS: ',A5,'  USES: ',5(A2,','),A2,
     .  '  QUALITY: ',A1,'  STANDARD: ',A2)
      IF (GRANAL .EQ. 'Y') THEN
C WANT ANY GRAINSIZE ANALYSIS PRINTED ALSO
      IANAL=IANAL+1
      GSRCH(IANAL)=REFNO
C STORE THE REF NO FOR USE IN SEARCHING THE GRAIN SIZE ANALYSIS
C DATA BASE
      ENDIF
C END OF PRINTING ENTRY AND NOTING THAT ANY GRAIN SIZE ANALYSIS SHOULD BE
C PRINTED
C
C
      IF (ASRCH .NE. 'N') GOTO 20
C BACK ROUND FOR THE NEXT ONE
```

```
C
C
C NOW APPROACHING THE END OF THE RUN WITH THE FINAL QUESTIONS RE THE PRINTOUT
C AND PRINTING OF THE ANALYSES IF REQUIRED
   40 CLOSE(UNIT=4,STATUS='KEEP')
      WRITE(5,150) FCOUNT
  150 FORMAT(I7,' RECORDS WERE SENT TO THE PRINTER'/
     .  ' TO PRINT THESE TYPE Y NOW')
      READ(5,202) APRINT
      IF (APRINT .NE. 'Y' .OR. FCOUNT .EQ. 0) THEN
      CLOSE(UNIT=6,STATUS='DELETE')
      STOP
      ENDIF
C IF NO ENTRIES OR PRINT NOT REQUIRED DELETE PRINT FILE AND STOP
C
      IF (IANAL .GT. 0 .AND. IDISPLAY .NE. 3) CALL PRGRAIN(IANAL,GSRCH)
C PRINT ANY GRAIN SIZE ANALYSES
C
C NOW PRINT THE FILE OF NMONICS
      OPEN (UNIT=4,FILE='CONNMON.TXT',SHARE='ERO')
      WRITE(6,403) FFEED
  403 FORMAT(1A1)
   45 READ(4,201,END=46) SQUAD
      WRITE(6,404) SQUAD
  404 FORMAT(1X,A80)
      GOTO 45
C COPY NMENOIC FILE
   46 CONTINUE
      CLOSE(UNIT=4,STATUS='KEEP')
      CLOSE(UNIT=6,STATUS='KEEP')
      STOP
      END
      LOGICAL FUNCTION NOTIN(SSTRNG,RSTRNG)
C SSTRNG CONTAINS A SERIES OF STRINGS TERMINATED BY /
C E.G.   FRED/BILL/TOM/
C AND RSTRNG IS SEARCHED FOR THE OCCURENCE OF ONE OF THESE STRINGS
C IF ONE IS FOUND TO MATCH NOTIN IS .FALSE.
C IF STRNG IS EMPTY NOTIN IS .FALSE.
      CHARACTER*80 SSTRNG
      CHARACTER* (*) RSTRNG
      NOTIN=.FALSE.
      IF (SSTRNG(1:2) .EQ. '  ') RETURN
C NO NEED TO LOOK
      ILAST=1
C COUNTER FOR POSITION IN SSTRNG
   20 ICHAR=INDEX(SSTRNG(ILAST:80),'/')
C LOOK FOR / AS TERMINATOR OF STRING
      IF (ICHAR .EQ. 0) GOTO 25
C HAVENT FOUND A MATCH BY THE END OF THE LINE
      IF (INDEX(RSTRNG,SSTRNG(ILAST:ILAST+ICHAR-2)) .NE. 0) RETURN
C LOOK BETWEEN /S IN SSTRNG AND IF FIND A MATCH RETURN
      ILAST=ILAST+ICHAR
C POSITION AFTER THE /
      IF (ILAST .LE. 79) GOTO 20
C BACK ROUND IF NOT AT END OF LINE
C
C ELSE END
   25 CONTINUE
      NOTIN=.TRUE.
C NO MATCH
```

```
      RETURN
      END

      SUBROUTINE HEAD12
C HEAD UP PAGES FROM SEARCH
      INTEGER*2 FFEED
      DATA FFEED/3072/
C USED TO PUT FORM FEEDS IN OUTPUT FILE
      WRITE(6,100) FFEED
  100 FORMAT(1A1/20X,'TASMANIAN CONSTRUCTION MATERIALS REGISTER')
      RETURN
      END

      SUBROUTINE HEAD3
C HEAD UP PAGES FOR ABBREVIATED SUMMARY
      CALL HEAD12
      WRITE(6,100)
  100 FORMAT(6X,'¦',9X,'¦',12X,'¦',20X,'¦',7X,'¦ LAND¦    ¦    ¦',
     .  5X,'¦  ¦',5X,'¦',17X,'¦   ¦  TESTS ¦'/
     .  1X,'REFNO¦ CO-ORDS ¦  LOCALITY  ¦',6X,'OCCUPIER',6X,
     .  '¦M LEASE¦TE¦US¦RES¦OPS¦ COL ¦EX¦ USCS¦',6X,'USES',7X,
     .  '¦QU¦GP¦DR¦LA¦'/1X,117('-'))
      RETURN
      END

      LOGICAL FUNCTION SEMIN(SSTRNG,RSTRNG)
C SSTRNG CONTAINS A SERIES OF STRINGS TERMINATED BY ;
C E.G.   FRED;BILL;TOM;
C AND RSTRNG IS SEARCHED FOR THE OCCURENCE OF ONE OF THESE STRINGS
C IF ONE IS FOUND TO MATCH SEMIN IS .FALSE.
C IF STRNG IS EMPTY SEMIN IS .FALSE.
      CHARACTER*80 SSTRNG
      CHARACTER* (*) RSTRNG
      SEMIN=.FALSE.
      IF (SSTRNG(1:2) .EQ. '  ') RETURN
C NO NEED TO LOOK
      ILAST=1
C COUNTER FOR POSITION IN SSTRNG
   20 ICHAR=INDEX(SSTRNG(ILAST:80),';')
C LOOK FOR ; AS TERMINATOR OF STRING
      IF (ICHAR .EQ. 0) GOTO 25
C HAVENT FOUND A MATCH BY THE END OF THE LINE
      IF (INDEX(RSTRNG,SSTRNG(ILAST:ILAST+ICHAR-2)) .NE. 0) RETURN
C LOOK BETWEEN ;S IN SSTRNG AND IF FIND A MATCH RETURN
      ILAST=ILAST+ICHAR
C POSITION AFTER THE ;
      IF (ILAST .LE. 79) GOTO 20
C BACK ROUND IF NOT AT END OF LINE
C
C ELSE END
   25 CONTINUE
      SEMIN=.TRUE.
C NO MATCH
      RETURN
      END

      SUBROUTINE MNABREV(NVAR,CVAR,CONST)
      CHARACTER * (*) NVAR,CVAR,CONST(2)
      IF (CVAR .EQ. ' ') THEN
      NVAR=' '
      ELSE
      NVAR=CONST(CTOI(CVAR,K)+1)
      ENDIF
      RETURN
      END

      SUBROUTINE PRGRAIN(IANAL,GRSRCH)
      INTEGER*4 IANAL
      CHARACTER*5 GRSRCH(2)
C USED TO SEARCH THE GRAIN SIZE ANALYSIS DATA BASE
C IANAL IS THE NUMBER OF REF NOS TO BE LOOKED FOR
C AND GRSRCH CONTAINS THE REF NOS
      INTEGER*2 IQUAD(98)
C THE ARRAY TO STORE THE STARTING RECORDS FOR EACH QUADRANGLE
      REAL PHI(30),PCENT(30),MEAN,SORT,SKEW,KURT,LL,PI,LS,DR
      INTEGER*4 N
      CHARACTER*5 SEDSID
      CHARACTER*1 IGNO,CL1,CL2,DL1,DL2
      CHARACTER*1 BIN(300)
      EQUIVALENCE (BIN(1),SEDSID),(BIN(6),PHI),(BIN(126),PCENT)
     -   ,(BIN(246),MEAN),(BIN(250),SORT),(BIN(254),SKEW),
     -   (BIN(258),KURT),(BIN(262),LL),(BIN(266),PI),(BIN(270),LS)
     -   ,(BIN(274),DR),(BIN(278),N),(BIN(282),IGNO),(BIN(283),CL1)
     -   ,(BIN(284),CL2),(BIN(285),DL1),(BIN(286),DL2)
C THE COMMON BLOCK FROM SEDMERGE TO ALLOW BINARY ACCESS USEING
C EQUIVALENCE
      LCOUNT=90
C COUNTER FOR NUMBER OF LINES PRINTED ON THE PAGE
      OPEN(UNIT=3,FILE='SEDQUAD.IND',RECL=2,FORM='BINARY',SHARE='SRO')
C THE BINARY FILE CONTAINING THE QUADRANGLE INDEX
      DO 8 I=1,98
      READ(3) IQUAD(I)
    8 CONTINUE
      CLOSE(UNIT=3,STATUS='KEEP')
C READ THE STARTING RECORD OF EACH QUADRANGLE IN THE GRAIN SIZE
C ANALYSIS FILE
C
      OPEN(UNIT=3,FILE='SEDIND.DAT',RECL=300,ACCESS='DIRECT',
     .  FORM='BINARY',SHARE='SRO')
C OPEN THE MAIN GRAIN SIZE ANALYSIS FILE
C
      DO 20 I=1,IANAL
C LOOP ONCE FOR EACH REF NO AS MAY HAVE MORE THAN ONE ANALYSIS
C FOR EACH REF NO
      IBASE=IQUAD(CTOI(GRSRCH(I)(1:2),J))
C THE FIRST RECORD WITH THIS QUADRANGLE NUMBER
      IF (IBASE .EQ. 0) GOTO 20
C NO ENTRIES FOR THIS QUADRANGLE
C
      IF (IBASE .NE. 1) THEN
C NOT THE FIRST RECORD
      READ(3,REC=IBASE-1) BIN
C POSITION TO THE RECORD BEFORE THE FIRST OF THE QUAD
      ELSE
      REWIND 3
C IF IBASE IS THE FIRST RECORD JUST REWIND THE FILE
      ENDIF
C
C NOW SCAN THE FILE LOOKING FOR MATCHING REF NOS
   12 READ(3,END=20) BIN
```

```
C IF HIT END LOOK FOR ANOTHER QUAD NO
      IF (SEDSID .GT. GRSRCH(I)) GOTO 20
C THE ANALYSIS FILE IS ORDERED IN ASCENDING REF NO ORDER
C SO IF THE REFNO IN THE FILE IS BIGGER THAN THAT BEING SOUGHT
C DONT HAVE A MATCH
      IF (SEDSID .LT. GRSRCH(I)) GOTO 12
C STILL TOO FAR DOWN THE ANALYSIS FILE
C
C AT THIS STAGE HAVE FOUND A MATCH
      CALL HEADSED(LCOUNT)
C HEADSED CHECK LINE COUNT AND HEADS PAGE IF NEEDED
C
C WAS IT INCLUDED FRACTION OR EXCLUDED FRACTION
      IF (IGNO .EQ. 'I') THEN
      WRITE(6,101) SEDSID,PHI(1),PCENT(1)
  101 FORMAT(3X,A5,'  PHI=',F10.3,' PERCENT=',F10.3,
     .  6X,'CALCULATIONS ARE FOR INCLUDED FRACTION')
      ELSE
      WRITE(6,102) SEDSID,PHI(1),PCENT(1)
  102 FORMAT(3X,A5,'  PHI=',F10.3,' PERCENT=',F10.3,
     .  6X,'CALCULATIONS ARE FOR EXCLUDED FRACTION')
      ENDIF
      CALL HEADSED(LCOUNT)
C THE FIRST LINE HAS THE REF NO ETC
      DO 14 J=2,N
C ALREADY PRINTED (1)
      WRITE(6,103) PHI(J),PCENT(J)
  103 FORMAT(10X,'PHI=',F10.3,' PERCENT=',F10.3)
      CALL HEADSED(LCOUNT)
   14 CONTINUE
C END PRINT OUT THE PHIS AND %S
C
C NOW FOR THE CALCULATIONS BASED ON THE ABOVE
      IF (CL1 .EQ. 'M') THEN
C ONLY THE MEAN CALCULATED
      WRITE(6,104) MEAN
  104 FORMAT(10X,'MEAN=',F9.3/10X,'NO SORTING, SKEWNESS OR ',
     .  'KURTOSIS CALCULATED')
      CALL HEADSED(LCOUNT)
      CALL HEADSED(LCOUNT)
      ELSE
      IF (CL1 .EQ. 'A') THEN
C MEAN, SORTING, SKEWNESS AND KURTOSIS CALCLUATED
      WRITE(6,105) MEAN,SORT,SKEW,KURT
  105 FORMAT(10X,'MEAN=',F9.3,' SORTING=',F9.3,' SKEWNESS=',F9.3,
     .  ' KURTOSIS=',F9.3)
      CALL HEADSED(LCOUNT)
      ELSE
C NONE OF MEAN,SORTING,SKEW OR KURT CALCULATED
      WRITE(6,106)
  106 FORMAT(10X,'NO MEAN, SORTING, SKEWNESS OR KURTOSIS CACULATED')
      CALL HEADSED(LCOUNT)
      ENDIF
      ENDIF
C
C NOW FOR THE PLASTICITY ETC
      IF (DL1 .EQ. 'X') THEN
C THE MATERIAL HAS NO PLASTICITY
      WRITE(6,107)
  107 FORMAT(10X,'THIS MATERIAL HAS NO PLASTICITY')
```

```
      CALL HEADSED(LCOUNT)
      ELSE
      IF (DL1 .EQ. 'A') THEN
C L.L.,P.I.,L.S. SUPPLIED
      WRITE(6,108) LL,PI,LS
  108 FORMAT(10X,'L.L.=',F9.3,' P.I.=',F9.3,' L.S.=',F9.3)
      CALL HEADSED(LCOUNT)
      ELSE
      WRITE(6,109)
  109 FORMAT(10X,'NO VALUES FOR L.L., P.I. OR L.S. SUPPLIED')
      CALL HEADSED(LCOUNT)
      ENDIF
      ENDIF
C
C NOW FOR THE DUST RATIO
      IF (DL2 .EQ. 'D') THEN
C DUST RATIO CALCULATED
      WRITE(6,110) DR
  110 FORMAT(10X,'DUST RATIO=',F9.3)
      CALL HEADSED(LCOUNT)
      ELSE
      WRITE(6,111)
  111 FORMAT(10X,'DUST RATIO NOT CALCULATED')
      ENDIF
C
C NOW GO ROUDN TO READ THE NEXT IN THE ANALYSIS FILE AS IT MAY HAVE THE
C SAME REF NO
      GOTO 12
C
   20 CONTINUE
C END OF LOOP FOR STEPPING THROUGH REF NOS
C
C NOW HAVE ALL DONE
      CLOSE(UNIT=3,STATUS='KEEP')
      RETURN
      END

      SUBROUTINE HEADSED(LCOUNT)
C TO INCREMENT LCOUNT AND HEAD PAGE IF NEEDED
      INTEGER*2 FFEED
      DATA FFEED/3072/
      LCOUNT=LCOUNT+1
      IF (LCOUNT .LT. 60) RETURN
C ENOUGH LEFT ON PAGE
      WRITE(6,100) FFEED
  100 FORMAT(A1,10X,'GRAIN SIZE ANALYSES'/'  REF NO')
      LCOUNT=0
      RETURN
      END

$INCLUDE FSTJDN.FTN,-
$TITL  FSTJDN.FTN - POINT IN POLYGON
C PROGRAM COLLECTION FASTJORDAN
C   SALOMON,K.B., 1978. AN EFFICIENT POINT-IN-POLYGON ALGORITHM
C     COMPUTERS AND GEOSCIENCES, V4, NO. 2, P. 173-178
C
C USE BY READING VERTICES OF POLYGON IN ORDER (BUT NOT CLOSING IT)
C AND CALLING PREPLY ONCE BEFORE THE SEARCH IS BEGUN.  THE ACTUAL
C SEARCHING IS DONE BY MEANS OF THE LOGICAL FUNCTION INOUT.
C
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      SUBROUTINE PREPLY(X,Y,NUVERT,YINTVL,INTVLS,SWATH,RSLOPE)
C
C*****************************************************************************
C  THIS ROUTINE PREPARES THE POLYGON CONSISTING OF THE NUVERT VERTICES
C  (X(I),Y(I)) BY FIRST SORTING THE SEGMENT Y-END POINTS INTO
C  DECREASING ORDER AND FORMING AN INTERVAL FOR EACH CONSECUTIVE PAIR:
C  (YINTVL(I),YINTVL(I+1)), I=1,INTVLS. THIS IS PERFORMED BY CALLING
C  SORT.
C       THE CODE CONSISTING OF THE DO 100 AND DO 200 LOOPS CONSTRUCTS,
C  FOR EACH INTERVAL I, THE LIST OF SEGMENTS TO BE TESTED BY INOUT.
C  THIS LIST IS PLACED IN THE I-TH ROW OF SWATH. THE FIRST ENTRY,
C  SWATH(I,1), WILL BE SET TO THE NUMBER OF SEGMENTS IN THE ROW. NOTE
C  THAT AS YINTVL CONTAINS NO REDUNDANCIES, I.E. YINTVL(I) IS STRICTLY
C  GREATER THAN YINTVL(I+1), NO HORIZONTAL SEGMENTS WILL BE PLACED IN
C  THE LIST.
C       THE CODE CONSISTING OF THE DO 300 LOOP ESTABLISHES THE
C  RECIPROCAL SLOPE FOR EACH NON-HORIZONTAL SEGMENT. THIS IS TO BE
C  USED BY INOUT. FINALLY, THE SEGMENTS WITHIN A ROW OF SWATH ARE
C  ORDERED FROM LEFT-TO-RIGHT.
C
C*****************************************************************************
C
      INTEGER*2 SWATH(100,25)
      REAL X(100),Y(100),YINTVL(100),RSLOPE(100)
      CALL SORT(Y,NUVERT,YINTVL,INTVLS)
      IF (INTVLS .LE. 0) GOTO 400
      X(NUVERT+1)=X(1)
      Y(NUVERT+1)=Y(1)
      DO 100 I=1,INTVLS
  100 SWATH(I,1)=0
      DO 200 I=1,INTVLS
         DO 200 J=1,NUVERT
         IF (Y(J).GE.YINTVL(I) .AND. YINTVL(I+1).GE.Y(J+1) .OR.
     *        Y(J+1).GE.YINTVL(I) .AND. YINTVL(I+1).GE.Y(J))
     *                                      CALL INCLUD(SWATH,I,J)
  200 CONTINUE
      DO 300 I=1,NUVERT
      IF (Y(I).EQ.Y(I+1)) GOTO 300
      RSLOPE(I)=(X(I+1)-X(I))/(Y(I+1)-Y(I))
  300 CONTINUE
      CALL ORDER(X,Y,YINTVL,INTVLS,SWATH,RSLOPE)
      RETURN
  400 WRITE(7,401)
  401 FORMAT(' ******* PREP OF POLYGON ABORTED SINCE NO INTERVALS',
     * ' CONSTRUCTED')
      STOP
      END

      SUBROUTINE SORT(Y,NUVERT,YINTVL,INTVLS)
C
C*****************************************************************************
C
C  ROUTINE ESTABLISHES THE INTERVALS OF THE Y-AXIS DEFINED BY THE
C  ENDPOINTS OF THE POLYGON'S SEGMENTS. THE DO 100 LOOP INITIALLISES
C  YSORT FROM THE SEGMENT Y-END POINTS. THE DO 200 LOOPS SORT YSORT
C INTO DESCENDING ORDER. THE DO 300 LOOP ELIMINATES REDUNDANCIES IN
C  YSORT AND PLACES IRREDUNDANT SORTED Y'S INTO YINTVL. IT ALSO SETS
C  INTVLS TO THE TRUE NUMBER OF Y INTERVALS. JUST PRIOR TO RETURNING
C  A FINAL INTERVAL EXTENDING TO '-INFINITY' IS ESTABLISHED.
C
```

```
C****************************************************************************
C
      REAL Y(100),YINTVL(100),YSORT(100)
      INTEGER*2 UPPER
      DO 100 I=1,NUVERT
  100 YSORT(I)=Y(I)
      UPPER=NUVERT-1
      DO 200 I=1,UPPER
         IPLS1=I+1
         DO 200 J=IPLS1,NUVERT
         IF (YSORT(I).GE.YSORT(J)) GOTO 200
             TEMP=YSORT(I)
             YSORT(I)=YSORT(J)
             YSORT(J)=TEMP
  200 CONTINUE
      YINTVL(1)=YSORT(1)
      INTVLS=0
      DO 300 I=1,UPPER
         IF (YSORT(I).EQ.YSORT(I+1)) GOTO 300
         INTVLS=INTVLS+1
         YINTVL(INTVLS+1)=YSORT(I+1)
  300 CONTINUE
      YINTVL(INTVLS+2)=-1.0E75
      RETURN
      END

      SUBROUTINE INCLUD(SWATH,I,J)
C
C****************************************************************************
C  ROUTINE PLACES THE J-TH POLYGON SEGMENT INTO THE NEXT AVAILABLE
C  LOCATION IN ROW I OF SWATH.
C
C****************************************************************************
C
      INTEGER*2 SWATH(100,25),POINTR
      SWATH(I,1)=SWATH(I,1)+1
      POINTR=SWATH(I,1)
      SWATH(I,POINTR+1)=J
      RETURN
      END

      SUBROUTINE ORDER(X,Y,YINTVL,INTVLS,SWATH,RSLOPE)
C
C****************************************************************************
C
C  FOR EACH INTERVAL, A HORIZONTAL LINE IS PASSED THROUGH THE MIDDLE
C  (YMID) OF THE INTERVAL. THE DO 100 LOOP PLACES THE X-INTERSECTION
C  OF EACH SEGMENT IN THIS SWATH SO THAT THESE INTERSECTIONS OCCUR
C  FROM LEFT-TO-RIGHT.
C
C****************************************************************************
C
      REAL X(100),Y(100),YINTVL(100),RSLOPE(100),XINTSC(25)
      INTEGER*2 SWATH(100,25),POINTR,SEGNO,UPPER
      LOGICAL VERTSG
      DO 200 INTVAL=1,INTVLS
         NMBSEG=SWATH(INTVAL,1)
         YMID=(YINTVL(INTVAL)+YINTVL(INTVAL+1))/2.0
         DO 100 POINTR=1,NMBSEG
            SEGNO=SWATH(INTVAL,POINTR+1)
            VERTSG=ABS(X(SEGNO+1)-X(SEGNO)) .LT. 1.0E-5
            IF (VERTSG) XINTSC(POINTR)=X(SEGNO)
            IF (.NOT. VERTSG) XINTSC(POINTR)=X(SEGNO)+
     *                                 RSLOPE(SEGNO)*(YMID-Y(SEGNO))
  100    CONTINUE
         IF (NMBSEG.LT.2 .OR. MOD(NMBSEG,2).NE.0) GOTO 300
         UPPER=NMBSEG-1
         DO 200 I=1,UPPER
            IPLS1=I+1
            DO 200 J=IPLS1,NMBSEG
               IF (XINTSC(I).LE.XINTSC(J)) GOTO 200
               TEMP=XINTSC(I)
               XINTSC(I)=XINTSC(J)
               XINTSC(J)=TEMP
               ITEMP=SWATH(INTVAL,I+1)
               SWATH(INTVAL,I+1)=SWATH(INTVAL,J+1)
               SWATH(INTVAL,J+1)=ITEMP
  200 CONTINUE
      RETURN
  300 WRITE(7,301) INTVAL
  301 FORMAT(' ** PREP OF POLYGON ABORTED. INTERVAL ',I5/
     * ' HAS EITHER LESS THAN TWO SEGMENTS OR AN ODD NUMBER OF THEM')
      STOP
      END

      LOGICAL FUNCTION INOUT(XP,YP,X,Y,YINTVL,INTVLS,SWATH,RSLOPE)
C
C************************************************************************
C
C  THE FOUR LINES ENCLOSED IN DASHES DETERMINE THE INTERVAL CONTAINING
C  YP. THE DO 400 LOOP CONTINUES UNTIL THE FIRST SEGMENT WITHIN THE
C  INTERVAL FALL TO THE LEFT OF (XP,YP). IN THIS EVENT, INOUT IS SET
C  .TRUE. IFF AN EVEN NUMBER OF SEGMENTS HAS BEEN TESTED.
C
C***************************************************************************
C
      REAL X(100),Y(100),YINTVL(100),RSLOPE(100)
      INTEGER*2 SWATH(100,25),SEGNO
      INOUT=.FALSE.
C---------------------------------------------------
      INTVAL=0
  100 INTVAL=INTVAL+1
      IF (YINTVL(INTVAL) .GT. YP) GOTO 100
      INTVAL=INTVAL-1
C-----------------------------------------------------
  300 IF (INTVAL.LT.1 .OR. INTVAL.GT.INTVLS) RETURN
      NMBSEG=SWATH(INTVAL,1)+1
      DO 400 I=2,NMBSEG
         SEGNO=SWATH(INTVAL,I)
         IF(XP-X(SEGNO).LE.(YP-Y(SEGNO))*RSLOPE(SEGNO)) GOTO 500
  400 CONTINUE
      RETURN
  500 INOUT=MOD(I,2) .EQ. 1
      RETURN
      END
```