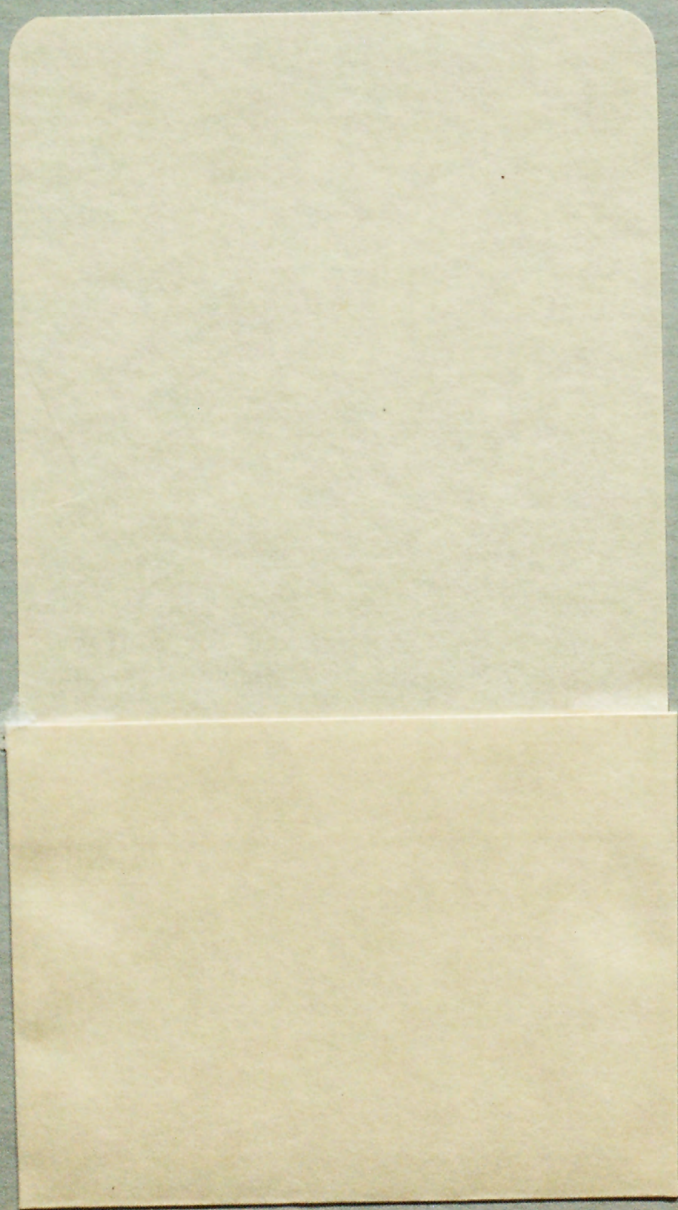
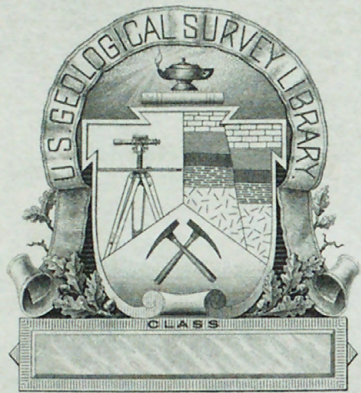


U. S. Geological Survey.

Reports-Open file series, no. 75-110: 1975.



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no. 75-110



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[Reports - Open file]

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COMPUTER PROGRAM DESIGNED TO COMPUTE OIL SHALE THICKNESS (FT.),  
AVERAGE VALUE (GAL. PER TON), AND RESOURCE (BARRELS PER ACRE) FROM  
FISCHER ASSAY DATA

By

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Open-file report 75-110

1975

This report is preliminary and has not  
been edited or reviewed for conformity  
with U.S. Geological Survey standards

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OIL SHALE ANALYSIS PROGRAM

```

C          (MAXIMUM 20 CARDS)
C
C          6. NO. OF SELECTED ZONES CARD FOR COMPUTING MAJOR THICKNESSES,
C             (USED ONLY IF OPT(5)=3 OR 4)
C
C          7. SELECTED ZONES CARDS(USED ONLY IF OPT(5)=3 OR 4),
C             (MAXIMUM 10 CARDS)
C
C          8. DATA CARDS(USED ONLY IF OPT(1)=1 OR 2),
C             (MAXIMUM 2500 DATA CARDS)
C             FOLLOWED BY NINE'S CARD
C
C          9. STEPS 1 THRU 8 MAYBE REPEATED AS MANY TIMES AS NECESSARY.
C -----
1  REAL*8 DATE,DATENW
2  INTEGER ID(2),RID(2),VID(2,10),A(10),OPTION(6),TAPE,TAPE01,TAPE03
3  DIMENSION GALND(10),GALM(10),DISTM(10),GALFIX(7),XINT(20,2), X(10
3  1),ZONES(10,2)
4  COMMON /INFO/ IYR,IMO,IDY,TITLE(14),DATE
5  COMMON /DATFIL/ XX(2500,3)
6  DATA GALFIX/10,0,15,0,20,0,25,0,30,0,35,0,40,0/,THKMIN/0.0/
7  DATA VID /'DEPT','H-ST','DEPT','H-ED','OIL ','WT %','WTR ','WT %',
7  1      'SPT ','SHAL','GAS+','LOSS','OIL ','GPT ','WTR ','GPT ',
7  2      'SPEC','GRAV','TEND','COKE','DATENW/'(02/23/75)'/
8  DATA INPUT,LIST,TAPE01,TAPE03/4,3,10,12/,M/10/
9  CALL JULDAT(IYR,IMO,IDY)
10 DATE=DATENW
11 CALL OPENC (INPUT)
C -----
C ... READ DATA FOR NEW CORE.
C -----
12 110 READ (INPUT,330,END=270) TITLE,NAME,ID,OPTION
13 WRITE (LIST,300) DATE,IMO,IDY,IYR
14 WRITE (LIST,310) TITLE,ID,OPTION
15 CALL OPEN(OPTION,NAME,TAPE01,TAPE03)
16 NRUN=7
17 DO 120 I=1,NRUN
18 GALND(I)=GALFIX(I)
19 GALM(I)=15,0
20 120 DISTM(I)=10,0
21 GALM(1)=5,0
22 GALM(2)=10,0
23 IF (OPTION(5),NE,1.AND.OPTION(5),NE,4) GO TO 130
C
C ... READ OIL YIELD CARDS FOR COMPUTING MAJOR THICKNESSES.
C
24 READ (INPUT,350) NRUN,(GALND(I),GALM(I),DISTM(I),I=1,NRUN)
25 130 IF (OPTION(5),EQ,2) GO TO 140
26 WRITE (LIST,360) (GALND(I),GALM(I),DISTM(I),I=1,NRUN)

```

## OIL SHALE ANALYSIS PROGRAM

## MAIN PROGRAM

```

27 140 IF (OPTION(3),NE,1) GO TO 150
C
C ... READ SELECTED INTERVALS FOR COMPUTING AVERAGES.
C
28 READ (INPUT,370) NNN,(XINT(I,1),XINT(I,2),I=1,NNN)
29 WRITE (LIST,380) (I,XINT(I,1),XINT(I,2),I=1,NNN)
30 150 IF (OPTION(5),NE,3.AND.OPTION(5),NE,4) GO TO 153
C
C ... READ SELECTED ZONES FOR COMPUTING MAJOR THICKNESSES.
C
31 READ (INPUT,370) NZONES,(ZONES(I,1),ZONES(I,2),I=1,NZONES)
32 WRITE (LIST,450) (ZONES(I,1),ZONES(I,2),I=1,NZONES)
33 153 IF (OPTION(1),EQ,0) GO TO 200
C
C .....
C ... READ DATA FROM CARDS.
C
C .....
34 N=2500
35 WT=1.0
C
C ... COPY DATA FROM CARDS TO SCRATCH FILE.
C
36 IF(OPTION(1),NE,2) GO TO 155
37 WRITE (TAPE03) ID,N,M
38 155 DO 160 I=1,2500
39 II=I
40 READ (INPUT,340,END=280) RID,(X(J),A(J),J=1,10)
41 IF (X(1),GT,9000,0) GO TO 170
42 IF(OPTION(4),EQ,0) CALL PRINT (II,RID,X,A,VID,LIST)
43 IF (X(2),LE,X(1)) WRITE (LIST,410) X(1),X(2),I
44 IF (I,NE,1.AND,X2,NE,X(1)) WRITE (LIST,420) X(1),I,X2
45 X2=X(2)
46 CALL SET(X,II)
47 IF (OPTION(1),NE,2) GO TO 160
48 CALL PACK(0,A,IA)
49 WRITE(TAPE03)RID,X,IA
50 160 CONTINUE
51 N=2500
52 GO TO 180
53 170 N=I-1
54 180 IF (OPTION(1),NE,2) GO TO 225
C
C ... COPY DATA FROM SCRATCH FILE TO PERMANENT FILE.
C
55 REWIND TAPE03
56 READ (TAPE03)
57 WRITE (TAPE01) ID,N,M
58 DO 190 I=1,N
59 READ(TAPE03) RID,X,IA
60 190 WRITE(TAPE01) RID,X,IA

```

## OIL SHALE ANALYSIS PROGRAM

## MAIN PROGRAM

```

61     IF(OPTION(3).EQ.0.AND.OPTION(5).EQ.2) WRITE(LIST,430) N
62     REWIND TAPE03
63     GO TO 225
C     .....
C     READ DATA FROM DISK,
C     .....
64     200 READ(TAPE01,END=290) ID,N
65     IF(OPTION(4).EQ.0) WRITE(LIST,430) N
66     DO 210 I=1,N
67     II=I
68     READ(TAPE01,END=290) RID,X,IA
69     CALL PACK(1,A,IA)
70     IF (X(2).LE.X(1)) WRITE (LIST,410) X(1),X(2),I
71     IF (I.NE.1.AND.X2.NE.X(1)) WRITE (LIST,420) X(1),I,X2
72     X2=X(2)
73     CALL SET(X,II)
74     IF(OPTION(4).EQ.0) CALL PRINT(II,RID,X,A,VID,LIST)
75     210 CONTINUE
76     225 DIST=0.0
77     YIELD=0.0
78     BARREL=0.0
79     DO 230 I=1,N
80     DIF1=XX(I,2)-XX(I,1)
81     DIF2=XX(I,3)
82     DIF3=ABS((3.263625-1.584284E-02*SQRT(1203.49+126.24*DIF2))*DIF2+DI
82     1F1*32.32)
83     DIST=DIST+DIF1
84     YIELD=YIELD+DIF1*DIF2
85     230 BARREL=BARREL+DIF3
86     BARREL=BARREL/1000.0
87     AVER=YIELD/DIST
C     .....
C     ... COMPUTE MAJOR THICKNESSES FOR SELECTED AVERAGES,
C     .....
88     260 IF (OPTION(5).GT.2) GO TO 265
89     NZONES=-1
90     ZONES(1,1)=XX(1,1)
91     ZONES(1,2)=XX(N,2)
92     265 IF (OPTION(5).NE.2) CALL MAJOR(XX,2500,N,3,' SHALE',NRUN,GALND,G
92     1ALM,DISTM,LIST,THKMIN,OPTION,NZONES,ZONES)
C     .....
C     ... COMPUTE AVERAGES FOR SELECTED INTERVALS,
C     .....
93     IF (OPTION(3).EQ.1) CALL SELECT(XX,2500,N,3,NNN,XINT,LIST)
94     CALL SHUT
95     GO TO 110
96     270 CALL SHUTCD
97     STOP
98     280 WRITE (LIST,390)

```

## OIL SHALE ANALYSIS PROGRAM

## MAIN PROGRAM

```

99      STOP
100    290 WRITE (LIST,400) TAPE
101    STOP
C      -----
C
102    300 FORMAT ('ID0102 OIL SHALE DATA ANALYSIS - U S G S STATPAC ',A10,
102      1T67,'DATE',I3,'/',I2,'/',I2/)
103    310 FORMAT (7X,'TITLE',T59,'CORE I D',3X,'* OPTIONS *'/1X,13A4
103      1,A3,1X,'-',2A4,'-',1X,6I2//)
104    320 FORMAT (15X,13A4,A3/)
105    330 FORMAT(13A4,A3,A5,2A4,6X,6I1)
106    340 FORMAT (2A4,2X,F7.1,A1,F9.1,A1,4(F5.1,A1),F6.1,A1,F5.1,A1,F6.3,A1,
106      1F3.1,A1)
107    350 FORMAT (I5/(3F10.0))
108    360 FORMAT ('OSELECTED AVERAGE YIELDS'//6X,'YIELD      MINIMUM      MAXI
108      1MUM'/14X,'AVERAGE GPT  DISTANCE'//,(F10.1,F11.1,F13.1))
109    370 FORMAT (I5/(10X,F7.0,1X,F9.0))
110    380 FORMAT ('OSELECTED THICKNESSES'//,6X,'NO',7X,'START',9X,'END'/13X,
110      1'INTERVAL',5X,'INTERVAL'/(3X,I5,2F13.1))
111    390 FORMAT ('OERROR...AN END-OF-FILE WAS ENCOUNTERED ON THE CARD READE
111      1R,')
112    400 FORMAT ('OERROR...AN END-OF-FILE WAS ENCOUNTERED ON MAGNETIC DEVIC
112      1E NO.',I3)
113    410 FORMAT ('OWARNING...THE START DEPTH ',F7.1,' IS EQUAL TO OR GREATE
113      1R THAN THE END DEPTH ',F7.1,' FOR THE ',I4,'TH INTERVAL,')
114    420 FORMAT ('OWARNING...THE START DEPTH ',F7.1,' FOR THE ',I4,'TH INTE
114      1RVAL DOES NOT EQUAL THE END DEPTH ',F7.1,' FOR THE PREVIOUS INTERV
114      2AL,')
115    430 FORMAT ('OTHE NO. OF OBSERVATIONS FOR THIS CORE IS ',I5)
116    440 FORMAT ('////' THE AVERAGE YIELD FROM',F7.1,' FT TO',F7.1,' FT IS',
116      1F9.2,' GALLONS PER TON'////' THE BARRELS PER ACRE(IN THOU) ',16X,'IS
116      2',F9.2)
117    450 FORMAT ('OSELECTED ZONES'//6X,' MINIMUM      MAXIMUM'/14X,
117      1' DISTANCE'//,(F11.1,F13.1))
118    END

```



## OIL SHALE ANALYSIS PROGRAM

## MAJOR SUBROUTINE

```

1      SUBROUTINE MAJOR(X,NMAX,N,NCOL,NAME,NRUN,GALND,GALM,DISTM,LIST,
1      1 THKMIN,OPTION,NZONES,ZONES)
      C
      C      THIS SUBROUTINE COMPUTES THE MAJOR THICKNESSES FOR GIVEN
      C      OIL YIELDS WITHIN SELECTED ZONES.
      C
2      INTEGER OPTION(6)
3      REAL*8 NAME,DATE
4      LOGICAL START,LAST,FIRST,USED(2100),FTZN,NOZN
5      DIMENSION INDEX(2000),OIL(2000),X(NMAX,3),ITAB(100,2),TABLE(10
5      10,3),GALND(1),GALM(1),DISTM(1),ZONES(10,2)
6      COMMON /INFO/ IYR,IMO,IDY,TITLE(14),DATE
7      NO=N
8      DO 250 JJ=1,NRUN
9      GALS=GALND(JJ)
10     GALMIN=GALM(JJ)
11     DISMAX=DISTM(JJ)
12     NLINES=0
13     DO 250 KK=1,NZONES
14     NS=1
15     NE=NO
16     NOZN=.TRUE.
17     FTZN=.FALSE.
18     DO 5 LL=1,NO
19     IF (ZONES(KK,1).GE.X(LL,1).AND.ZONES(KK,1).LT.X(LL,2)) NS=LL
20     IF (ZONES(KK,1).GE.X(LL,1).AND.ZONES(KK,1).LT.X(LL,2)) NOZN=.FALSE.
21     IF (ZONES(KK,2).GT.X(LL,1).AND.ZONES(KK,2).LE.X(LL,2)) NOZN=.FALSE.
22     5 IF (ZONES(KK,2).GT.X(LL,1).AND.ZONES(KK,2).LE.X(LL,2)) NE=LL
23     IF (NOZN) GO TO 250
24     J=0
25     DO 10 K=NS,NE
26     USED(K)=.FALSE.
27     IF (X(K,NCOL).LT.GALS) GO TO 10
28     J=J+1
29     IF (J.GT.2000) GO TO 260
30     OIL(J)=X(K,NCOL)
31     INDEX(J)=K
32     10 CONTINUE
33     NUM=J
34     IF (NUM.LT.1) GO TO 250
35     CALL SORT(OIL,INDEX,NUM,-1)
36     II=0
37     DO 230 J=1,NUM
38     I=INDEX(J)
39     IF (USED(I)) GO TO 230
40     IS=I
41     IE=I
42     START=.TRUE.
43     LAST=.TRUE.

```

## OIL SHALE ANALYSIS PROGRAM

## MAJOR SUBROUTINE

```

44     FIRST=.FALSE.
45     IN=+1
46     DIST=0.0
47     YIELD=0.0
48     TONS=0.0
49     GO TO 80
50     20 IF (,.NOT,START,AND,.,NOT,LAST) GO TO 190
51     IF (IN) 30,40,40
52     30 IN=+1
53     IF (,.NOT,START) GO TO 40
54     IS=IS+1
55     I=IS
56     IF (I,GE,NS)GO TO 50
57     AVER=AVERSV
58     DIST=DISTSV
59     YIELD=YIELSV
60     TONS=TONSV
61     GO TO 160
62     40 IN=-1
63     IF (,.NOT,LAST) GO TO 30
64     IE=IE+1
65     I=IE
66     IF (I,LE,NE) GO TO 50
67     AVER=AVERSV
68     DIST=DISTSV
69     YIELD=YIELSV
70     TONS=TONSV
71     GO TO 170
72     50 CONTINUE
73     IF (X(I,NCOL),GE,GALMIN) GO TO 80
74     L=I
75     D1=0.0
76     Y1=0.0
77     60 D1=D1+X(L,2)-X(L,1)
78     Y1=Y1+X(L,NCOL)*(X(L,2)-X(L,1))
79     IF (D1,GT,DISMAX) GO TO 70
80     L=L-IN
81     IF (L,LT,1,OR,L,GT,NO) GO TO 80
82     GO TO 60
83     70 IF (Y1/D1,LT,GALMIN) GO TO 150
84     80 DIF1=X(I,2)-X(I,1)
85     DIF2=X(I,NCOL)
86     DIF3=ABS((3.263625-1.584284E-02*SQRT(1203.49+126.24*DIF2))*DIF2+DIF1*32.32)
87     DIST=DIST+DIF1
88     YIELD=YIELD+DIF1+DIF2
89     TONS=TONS+DIF3
90     AVER=YIELD/DIST
91     IF (AVER,LT,(GALS-0.1)) GO TO 120

```

## OIL SHALE ANALYSIS PROGRAM

## MAJOR SUBROUTINE

```

92      AVERSV=AVER
93      DISTSV=DIST
94      YIELSV=YIELD
95      TONSV=TONS
96      IF (FIRST) GO TO 90
97      FIRST=.TRUE.
98      ISSAVE=IS
99      IESAVE=IE
100     GO TO 20
101     90 IF (IN) 110,100,100
102     100 ISSAVE=IS
103     GO TO 20
104     110 IESAVE=IE
105     GO TO 20
106     120 DISTTP=0.0
107     YIELTP=0.0
108     DIST=DIST-DIF1
109     YIELD=YIELD-DIF2
110     TONS=TONS-DIF3
111     L=I
112     130 DISTTP=DISTTP+X(L,2)*X(L,1)
113     YIELTP=YIELTP+X(L,NCOL)*(X(L,2)*X(L,1))
114     IF (DISTTP.GT.DISMAX) GO TO 140
115     L=L+IN
116     IF (L.LT.1.OR.L.GT.NO) GO TO 140
117     GO TO 130
118     140 AVERTP=YIELTP/DISTTP
119     IF (AVERTP.LT.GALMIN) GO TO 150
120     DIST=DIST+DIF1
121     YIELD=YIELD+DIF2
122     TONS=TONS+DIF3
123     IF (IN) 40,40,30
124     150 IF (IN) 170,160,160
125     160 START=.FALSE.
126     GO TO 180
127     170 LAST=.FALSE.
128     180 AVER=AVERSV
129     DIST=DISTSV
130     YIELD=YIELSV
131     TONS=TONSV
132     GO TO 20
133     190 IS=ISSAVE
134     IE=IESAVE
135     IK=II
136     II=II+1
137     IJ=II
138     IF (IK.EQ.0) GO TO 210
139     DO 200 K=1,IK
140     IF (IS.GE.ITAB(K,1).AND.IE.LE.ITAB(K,2)) GO TO 225

```

## OIL SHALE ANALYSIS PROGRAM

## MAJOR SUBROUTINE

```

141     IF (IS, EQ, ITAB(K, 1), AND, IE, GT, ITAB(K, 2)) GO TO 205
142     IF (IS, LT, ITAB(K, 1), AND, IE, EQ, ITAB(K, 2)) GO TO 205
143     200 CONTINUE
144     GO TO 206
145     205 IJ=K
146     206 IF (IJ, NE, II) II=II-1
147     IF (IJ, GT, 100) GO TO 270
148     210 OIL(IJ)=X(IS, 1)
149     INDEX(IJ)=IJ
150     ITAB(IJ, 1)=ISSAVE
151     ITAB(IJ, 2)=IESAVE
152     TABLE(IJ, 1)=AVERSV
153     TABLE(IJ, 2)=DISTSX
154     TABLE(IJ, 3)=TONSV
155     DO 220 K=IS, IE
156     220 USED(K)=.TRUE.
157     GO TO 230
158     225 II=II-1
159     230 CONTINUE
160     CALL SORT(OIL, INDEX, II, 1)
161     CALL FIX(II, N, NMAX, INDEX, ITAB, TABLE, X, GALS, LIST)
162     THKSUM=0.0
163     CALL COMMER(II, INDEX, ITAB, TABLE, X, NMAX, THKMIN, GALS)
164     CALL FIX(II, N, NMAX, INDEX, ITAB, TABLE, X, 0.0, LIST)
165     IF (II, LT, 1) GO TO 250
166     DO 240 I=1, II
167     K=INDEX(I)
168     IS=ITAB(K, 1)
169     IE=ITAB(K, 2)
170     AVERSV=TABLE(K, 1)
171     DISTSX=TABLE(K, 2)
172     BARREL=TABLE(K, 3)/1000.0
173     IF(DISTSX, GE, THKMIN) THKSUM=THKSUM+DISTSX
174     IF (MOD(NLINES, 40), NE, 0) GO TO 238
175     WRITE (LIST, 280) DATE, IMO, IDY, IYR
176     WRITE (LIST, 290) NAME, GALS
177     WRITE (LIST, 300) TITLE
178     WRITE (LIST, 320) GALS, GALMIN, DISMAX
179     WRITE (LIST, 330)
180     238 IF (FTZN) GO TO 235
181     IF (NZONES, EQ, -1) GO TO 235
182     WRITE (LIST, 370) ZONES(KK, 1), ZONES(KK, 2)
183     FTZN=.TRUE.
184     235 WRITE (LIST, 310) IS, X(IS, 1), X(IS, 2), IE, X(IE, 1), X(IE, 2), AVERSV, DIST
184     ISV, BARREL
185     240 NLINES=NLINES+1
186     IF (OPTION(6), NE, 2) WRITE (LIST, 360) THKSUM
187     250 CONTINUE
188     LIST=3

```

## OIL SHALE ANALYSIS PROGRAM

## MAJOR SUBROUTINE

```

189     RETURN
190     260 WRITE (LIST,340)
191     STOP
192     270 WRITE (LIST,350)
193     STOP

C
194     280 FORMAT (1D0102 SHALE DATA ANALYSIS = U S G S STATPAC 1,A10,
194     1T79,'DATE',14,'/',12,'/',12/)
195     290 FORMAT (T77,'ELEMENT',A8/T77,'AVER GPT  =',F5.2)
196     300 FORMAT (15X,13A4,A3/)
197     310 FORMAT (1X,15,2F10.1,5X,15,2F10.1,F11.2,F12.1,F12.1)
198     320 FORMAT (' THE DATA BELOW IS COMPUTED FOR AN AVERAGE OF',F5.1,' GPT
198     1 1/6X,'WITH A MINIMUM AVERAGE OF',F5.1,' GPT 1/6X,'OVER A MAXIMUM
198     2DISTANCE OF',F5.1,' FT.1/)
199     330 FORMAT (3X,'S T A R T = D E P T H',11X,'E N D = D E P T H',9X,'AVE
199     1RAGE',6X,'TOTAL',7X,'BARRELS',61X,'GALLONS',4X,'INTERVAL',8X,'PER'/
199     2,3X,'OBS',6X,'TOP',7X,'BTM',8X,'OBS',6X,'TOP',7X,'BTM',6X,' PER
199     3',7X,'IN',10X,'ACRE',4X,'NO',5X,'(FT)',6X,'(FT)',9X,'NO',5X,'(FT)'
199     4,6X,'(FT)',8X,'TON',8X,'FEET',6X,'(THOUSAND)1/)
200     340 FORMAT (///10THE INITIAL "GPT" TABLE IS FULL.1)
201     350 FORMAT (///10THE FINAL "GPT" TABLE IS FULL.1)
202     360 FORMAT (52X,'TOTAL THICKNESS',F12.1)
203     370 FORMAT(' ZONE =',F7.1,' - ',F7.1)
204     END

```

## OIL SHALE ANALYSIS PROGRAM

## SORT SUBROUTINE

```
1      SUBROUTINE SORT(KEYS,INDEX,K,ORDER)
      C
      C      THIS SUBROUTINE SORTS THE OIL YIELD VALUES, GREATER THAN
      C      REQUIRED, IN ASCENDING ORDER.
      C
2      INTEGER TEMP,D,ORDER
3      REAL KEYS
4      DIMENSION KEYS(K), INDEX(K)
5      MO=K
6      10 IF (MO,LE,1) GO TO 60
7      D=4
8      IF (MO,GT,15) D=8
9      MO=MO/D
10     MO=2*MO+1
11     KO=K-MO
12     JO=1
13     20 I=JO
14     30 IF (ORDER*(KEYS(I)-KEYS(I+MO))) 50,50,40
15     40 ATEMP=KEYS(I)
16         KEYS(I)=KEYS(I+MO)
17         KEYS(I+MO)=ATEMP
18         TEMP=INDEX(I)
19         INDEX(I)=INDEX(I+MO)
20         INDEX(I+MO)=TEMP
21     I=I+MO
22     IF (I=1) 50,30,30
23     50 JO=JO+1
24     IF (JO=KO) 20,20,10
25     60 RETURN
26     END
```

## OIL SHALE ANALYSIS PROGRAM

## FIX SUBROUTINE

```

1      SUBROUTINE FIX(II,N,NMAX,INDEX,ITAB,TABLE,X,GALS,LIST)
      C
      C      THIS SUBROUTINE IS A FIRST ATTEMPT AT ELIMINATING ANY OVERLAPS
      C      WHICH MAY EXIST IN THE MAJOR THICKNESS TABLE BY MAINTAINING THE
      C      REQUIRED OIL YIELD.
      C
2      DIMENSION INDEX(1),ITAB(100,2),TABLE(100,3),X(NMAX,3),XINT(20,2)
3      IF (II,LE,1) RETURN
4      I=1
5      10 K=INDEX(I)
6          IS1=ITAB(K,1)
7          IE1=ITAB(K,2)
8          IS2=ITAB(INDEX(I+1),1)
9          IE2=ITAB(INDEX(I+1),2)
10         AVER=TABLE(INDEX(I+1),1)
11         DIST=TABLE(INDEX(I+1),2)
12         BARREL=TABLE(INDEX(I+1),3)
13         IF (IS1,GE,IS2,AND,IE1,LE,IE2) GO TO 40
14         IF (IS2,GE,IS1,AND,IE2,LE,IE1) GO TO 28
15         IF(IE1,GE,IS2) GO TO 20
16     15 I=I+1
17         IF(I,GE,II) GO TO 100
18         GO TO 10
19     20 KK=ITAB(INDEX(I),1)
20         XINT(1,1)=X(KK,1)
21         KK=ITAB(INDEX(I+1),2)
22         XINT(1,2)=X(KK,2)
23         CALL SELSUB(X,NMAX, N,3,1,XINT,LIST,AVER,DIST,BARREL)
24         IF(AVER,LT,(GALS=0.1)) GO TO 15
25         K=INDEX(I)
26     25 ITAB(K,2)=ITAB(INDEX(I+1),2)
27         TABLE(K,1)=AVER
28         TABLE(K,2)=DIST
29         TABLE(K,3)=BARREL
30     28 NI=I+1
31         II=II-1
32         IF(NI,GT,II) GO TO 100
33         DO 30 J=NI,II
34     30 INDEX(J)=INDEX(J+1)
35         GO TO 10
36     40 ITAB(K,1)=ITAB(INDEX(I+1),1)
37         GO TO 25
38     100 RETURN
39     END

```

## OIL SHALE ANALYSIS PROGRAM

## SELECT SUBROUTINE

```

1      SUBROUTINE SELECT(X,NMAX,N,NCOL,NNN,XINT,LIST)
      C
      C      THIS SUBROUTINE COMPUTES THE AVERAGE OIL YIELDS FOR SELECTED
      C      INTERVALS.
      C
2      REAL*8 DATE
3      DIMENSION X(NMAX,3), XINT(20,2)
4      COMMON /INFO/ IYR,IMO,IDY,TITLE(14),DATE
5      WRITE (LIST,40) DATE,IMO,IDY,IYR
6      WRITE (LIST,50) TITLE
7      WRITE (LIST,60)
8      MM=0
9      GO TO 5
10     ENTRY SELSUB(X,NMAX,N,NCOL,NNN,XINT,LIST,AVER,DIST,BARREL)
11     MM=1
12     5 DO 30 J=1,NNN
13       DIST=0.0
14       YIELD=0.0
15       BARREL=0.0
16       DO 20 I=1,N
17         IF (X(I,1).GE.XINT(J,1).AND.X(I,2).LE.XINT(J,2)) GO TO 10
18         GO TO 20
19       10 YIELD=YIELD+X(I,NCOL)*(X(I,2)-X(I,1))
20         DIST=DIST+X(I,2)-X(I,1)
21         DIF1=X(I,2)-X(I,1)
22         DIF2=X(I,NCOL)
23         DIF3=ABS((3.263625-1.584284E-02*SQRT(1203.49+126.24*DIF2))*DIF2+DI
23         1F1*32.32)
24         BARREL=BARREL+DIF3
25       20 CONTINUE
26       IF (DIST.LE.0.0) GO TO 30
27       AVER=YIELD/DIST
28       IF(MM.EQ.1) RETURN
29       BARREL=BARREL/1000.0
30       WRITE (LIST,70) XINT(J,1),XINT(J,2),AVER,DIST,BARREL
31     30 CONTINUE
32     RETURN
      C
33     40 FORMAT (1D0102 OIL SHALE DATA ANALYSIS - U S G S STATPAC 1,A10,
33     150X,'DATE',I4,'/',I,I2,'/',I,I2/)
34     50 FORMAT (15X,13A4,A3/)
35     60 FORMAT (3X,'INTERVAL      AVERAGE THICKNESS BARRELS/ACRE',/,2X,'S
35     1TART  END          GPT          (FEET)          (IN THOU)',/)
36     70 FORMAT (1X,F6.1,'-',F6.1,F8.1,F11.1,F12.1)
37     END

```



## OIL SHALE ANALYSIS PROGRAM

## PRINT SUBROUTINE

```

1      SUBROUTINE PRINT(I, ID, X, A, VID, LIST)
      C
      C      THIS SUBROUTINE CREATES A PUBLICATION LISTING OF THE INPUT DATA
      C
2      REAL*8 DATE
3      COMMON /INFO/ IY, IM, IDY, TITLE(14), DATE
4      INTEGER ID(2), A(10), VID(2,10)
5      DIMENSION X(10)
6      DATA IBLK/' '/
7      IF (MOD(I-1,50).NE.0) GO TO 10
8      WRITE (LIST,20) DATE, IM, IDY, IY
9      WRITE (LIST,30) TITLE
10     WRITE (LIST,40) VID
11     10 WRITE (LIST,50) I, ID, (X(J), A(J), J=1,10)
12     ID(1)=IBLK
13     ID(2)=IBLK
14     RETURN
      C
15     20 FORMAT (11D0102 SHALE DATA ANALYSIS - U S G S STATPAC ,A10,
16     150X,'DATE',I4,'/',I2,'/',I2,/)
17     30 FORMAT (15X,13A4,A3/)
18     40 FORMAT ('OBS',5X,'SAMPLE',10(3X,2A4)/3X,'NO',6X,' I D '/')
19     50 FORMAT (1X,I4,5X,2A4,8(F10.1,A1),F10.3,A1,F10.1,A1)
      END

```

OIL SHALE ANALYSIS PROGRAM

SET SUBROUTINE

```
1      SUBROUTINE SET(X,I)
      C
      C      THIS SUBROUTINE BUILDS THE ARRAY 'XX' FOR FURTHER PROCESSING BY
      C      THE SUBROUTINE 'MAJOR'.
      C
2      DIMENSION X(1)
3      COMMON /DATFIL/ XX(2500,3)
4      XX(I,1)=X(1)
5      XX(I,2)=X(2)
6      XX(I,3)=X(7)
7      RETURN
8      END
```

## OIL SHALE ANALYSIS PROGRAM

## FILES SUBROUTINE

```

1      SUBROUTINE FILES
      C
      C      THIS SUBROUTINE IS USED TO OPEN AND CLOSE INPUT FILES. IT IS
      C      MACHINE DEPENDENT, AND WOULD REQUIRE MODIFICATION IF THIS PROGRAM
      C      WERE EXECUTED ON A NON "DEC" MACHINE.
      C
2      INTEGER OPTION(6),TAPE01,TAPE03
3      DATA NAMFL1,NAMFL2/'T018:', 'DSKB:' /
4      ENTRY OPEN (OPTION,NAME,TAPE01,TAPE03)
5      NAMFLE=NAMFL1
6      IF(OPTION(2).EQ.1) NAMFLE=NAMFL2
7      IF(OPTION(1)=1) 30,10,20
8      20 OPEN (UNIT=TAPE03,DEVICE='DSK:',ACCESS='SEQOUT',FILE='SHALE',
8      1 DISPOSE='DELETE')
9      OPEN (UNIT=TAPE01,DEVICE=NAMFLE,ACCESS='SEQOUT',FILE=NAME,
9      1 DISPOSE='SAVE',PROTECTION='255')
10     RETURN
11     30 OPEN (UNIT=TAPE01,DEVICE=NAMFLE,ACCESS='SEQIN',FILE=NAME)
12     10 RETURN
13     ENTRY SHUT
14     IF(OPTION(1)=1) 50,10,40
15     40 CLOSE(UNIT=TAPE03,FILE='SHALE')
16     CLOSE(UNIT=TAPE01,FILE=NAME)
17     RETURN
18     50 CLOSE(UNIT=TAPE01,FILE=NAME)
19     RETURN
20     ENTRY OPENC (INPUT)
21     TYPE 60
22     60 FORMAT (' INPUT FILE = ',8)
23     ACCEPT 70,NAMCRD
24     70 FORMAT (A5)
25     OPEN (UNIT=INPUT,DEVICE='DSKB:',ACCESS='SEQIN',FILE=NAMCRD,
25     1 DISPOSE='SAVE')
26     RETURN
27     ENTRY SHUTCD
28     CLOSE (UNIT=INPUT,FILE=NAMCRD)
29     RETURN
30     END

```

## OIL SHALE ANALYSIS PROGRAM

## COMMER SUBROUTINE

```

1      SUBROUTINE COMMER(II,INDEX,ITAB,TABLE,X,NMAX,COMTHK,GALS)
      C
      C      THIS SUBROUTINE ELIMINATES ANY OVERLAPS WHICH MAY EXIST IN THE
      C      MAJOR THICKNESS TABLE BY MAINTAINING THE REQUIRED OIL YIELD AND
      C      SPLITTING THE THICKNESSES AS NECESSARY.
      C
2      DIMENSION INDEX(1),ITAB(100,2),TABLE(100,3),IFLAG(100),X(NMAX,3)
3      DO 180 I=1,II
4      K=INDEX(I)
5      IS=ITAB(K,1)
6      IE=ITAB(K,2)
7      DISTSV=TABLE(K,2)
8      IFLAG(K)=0
9      IF (DISTSV,LT,COMTHK) GO TO 10
10     GO TO 20
11     10 IFLAG(K)=1
12     GO TO 180
13     20 IF (I,EQ,1) GO TO 180
14     MM=I-1
15     DO 170 MMM=1,MM
16     KK=INDEX(MMM)
17     IF (IFLAG(KK),EQ,1) GO TO 170
18     ISS=ITAB(KK,1)
19     IEE=ITAB(KK,2)
20     IF (X(IS,1),GE,X(ISS,1),AND,X(IS,1),LT,X(IEE,2)) GO TO 30
21     IF (X(IE,2),GT,X(ISS,1),AND,X(IE,2),LE,X(IEE,2)) GO TO 40
22     GO TO 170
23     30 IF (TABLE(K,3),GE,TABLE(KK,3)) GO TO 60
24     GO TO 50
25     40 IF (TABLE(K,3),GE,TABLE(KK,3)) GO TO 70
26     GO TO 80
27     50 IS=IEE+1
28     ITAB(K,1)=IS
29     GO TO 100
30     60 IEE=IS-1
31     ITAB(KK,2)=IEE
32     GO TO 90
33     70 ISS=IE+1
34     ITAB(KK,1)=ISS
35     GO TO 90
36     80 IE=ISS-1
37     ITAB(K,2)=IE
38     GO TO 100
39     90 K1=KK
40     K2=K
41     GO TO 110
42     100 K1=K
43     K2=KK
44     110 ISSS=ITAB(K1,1)

```

## OIL SHALE ANALYSIS PROGRAM

## COMMER SUBROUTINE

```

45      IEEB=ITAB(K1,2)
46      120  DISTSV=X(IEEB,2)-X(ISSS,1)
47      IF (DISTSV,LE,0.0) GO TO 130
48      IF (ITAB(K1,1),EQ,(ITAB(K2,2)+1)) GO TO 140
49      IF (ITAB(K1,2),EQ,(ITAB(K2,1)-1)) GO TO 140
50      IF (DISTSV,GE,COMTHK) GO TO 140
51      130  IFLAG(K1)=1
52      GO TO 170
53      140  DIST=0.0
54      YIELD=0.0
55      BARREL=0.0
56      DO 150  KJ=ISSS,IEEB
57      DIF1=X(KJ,2)-X(KJ,1)
58      DIF2=X(KJ,3)
59      DIF3=ABS((3.263625-1.584284E-02*SQRT(1203.49+126.24*DIF2))*DIF2+DI
59      1F1*32.32)
60      BARREL=BARREL+DIF3
61      DIST=DIST+DIF1
62      150  YIELD=YIELD+DIF2*DIF1
63      AVER=YIELD/DIST
64      TABLE(K1,1)=AVER
65      TABLE(K1,2)=DIST
66      TABLE(K1,3)=BARREL
67      IF (AVER,GE,(GALS=0.1)) GO TO 170
68      IF (X(ISSS,3),GT,X(IEEB,3)) GO TO 160
69      ISSS=ISSS+1
70      ITAB(K1,1)=ISSS
71      GO TO 120
72      160  IEEB=IEEB-1
73      ITAB(K1,2)=IEEB
74      GO TO 120
75      170  CONTINUE
76      180  CONTINUE
77      I=1
78      190  IF (IFLAG(INDEX(I)),NE,0) GO TO 210
79      200  I=I+1
80      IF (I,GT,II) GO TO 230
81      GO TO 190
82      210  II=II-1
83      IF (I,GT,II) GO TO 230
84      DO 220  J=I,II
85      220  INDEX(J)=INDEX(J+1)
86      GO TO 190
87      230  CONTINUE
88      RETURN
89      END

```





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