UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

FORTRAN SORTING PROGRAM TO CODE HYDROCARBON PRODUCTION AND SHOW DATA USING WELL DATA FROM PETROLEUM INFORMATION'S WELL HISTORY CONTROL SYSTEM

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This report is preliminary and has not been edited for conformity to U.S.G.S. editorial standards or stratigraphic nomenclature.

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TABLE OF CONTENTS

ILLUSTRATIONS

APPENDICES

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C ---------------------------------------------------------------------
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C
C       This Fortran program is designed for use as part of the
C       U.S. Geological Survey's Lands Assessment Project.  The program
C       reads data from well history files generated from Petroleum
C       Information's Well History Control System (WHCS) database with
C       PI's Tech/sys database retrieval system.  Data files
C       are created which list API no., drill hole location, producing
C       formations, well class, elevation, drill depth, formation at TD,
C       as well as listing hydrocarbon shows both by formation and age,
C       and by type of show; whether oil and/or gas, and the
C       type of borehole test which resulted in the show.  Depth to the
C       hydrocarbon show may also be listed for wells in which the
C       geologic formation is not given.
C
C       This Fortran 77 program is designed for the VAX 11/780 computer
C       system and uses some conventions specific to the DEC computer.
C       The software package consists of the main program, the include
C       file; Commonh, and subroutines Coresho, Drillsn, and Depthshow.
C       Sample input and output data files are also included in the
C       appendices.
C
C       Specifically formatted data which is retrieved from the WHCS
C       database is read into the main program which assigns portions or
C       all of each line of character data to different variables, based
C       on whether the line is composed of header information, core, drill
C       stem, wireline, drill sample, or production test show data.
C       Subroutines Coresho and Drillsh analyze core and drill sample test
C       records, respectively, for geologic formations and associated
C       shows, assigning appropriate show codes.  Codes in the main
C       program and subroutines are based on the type of show test run and
C       the type of hydrocarbon show present.
C
C       The main program assigns show codes to geologic formations, sorts
C       the geologic formation and show data to remove duplicates and
C       delete show formations which also produce petroleum, and ranks
C       show test data to arrive at the highest degree of show and test
C       for each formation.  The ranking is heirarchal with production
C       tests assigned code no. 5, followed by drill stem tests (no. 4),
C       wire line tests (no. 3), core tests (no. 2), sample tests
C       (no. 1), and no tests run (no. 0).  The highest rank of show is
C       oil and gas shows (no. 3), followed by oil (no. 2), gas or
C       undifferentiated (no. 1), and no shows (0).  Specific examples of
C       the code are included in the appendices.
C
C       Some portions of the U.S. list few producing or tested formations;
C       the Gulf Coast region being an example, and for that reason a
C       subroutine which assigns show codes based on tested depth may be
C       specified.  This subroutine, Depthshow, lists tested depth to the
C       nearest 500 ft if the geologic formation is absent.  The depths are
C       then sorted in the main program.
C
C       Input data files are frequently very large with variable length
C       drill hole records.  Output files are created which concisely
C       list drill hole location, production, and show data in a single
C       line record.  The output can be used by a number of mapping
C       packages.  The program is currently being used by the U.S.G.S.
```

PROGRAM FLOWCHART

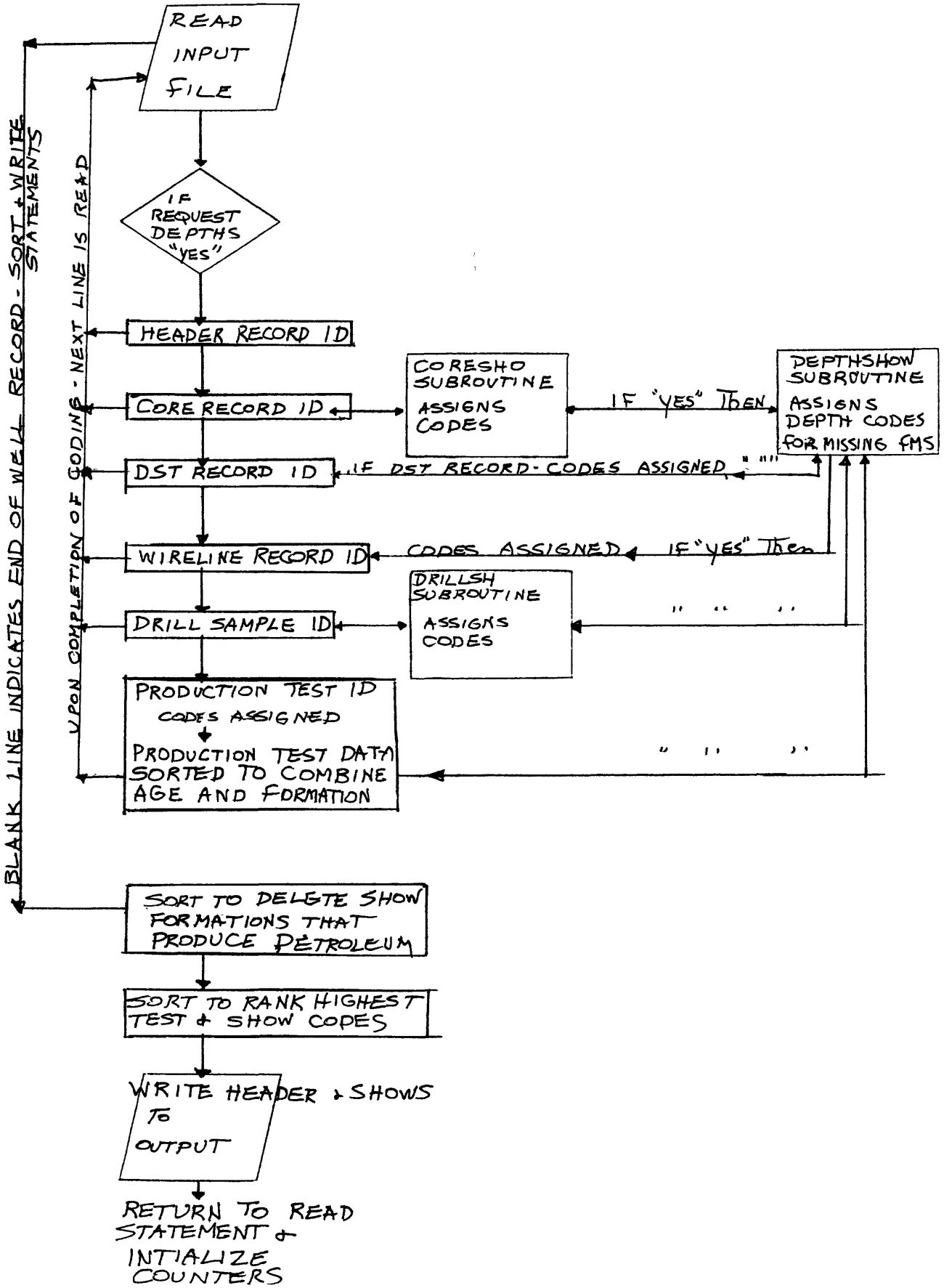

FIGURE 1. PROGRAM FLOWCHART

```
C       to map petroleum production and shows for plays in major producing
C       regions of the United States.  The maps will be published as
C       U.S.G.S. Open-File reports.
C
C -------------------------------------------------------------------
C
C       PETROLEUM INFORMATION'S TECH/SYS RETRIEVAL PROGRAMS FOR THIS
C       PROGRAM ARE SET UP AS FOLLOWS USING WHCS VOCABULARY AND CODE:
C
C       RANGE LAT 3800000,3900000    (OR OTHER LOCATION SPECIFIER)
C       RANGE LON 10100000,10400000  ("   "       "          "    )
C       WRITE HEADER   (API#,WELL LOC,PROD FM,WELL CLASS,TD,ELEV,FM @ TD)
C       WRITE DRL1     (DRILL SAMPLE SHOW DATA)
C       WRITE COR1     (CORE  SAMPLE SHOW DATA)
C       WRITE FT03     (WIRELINE TEST DATA)
C       WRITE FT01     (DRILL STEM TEST DATA)
C       WRITE PRZ1     (PRODUCING AGE AND FORMATIONS NO. 2-7)
C       WRITE PT01     (PRODUCTION TEST VOLUMES)
C       WRITE PT02     (    "       "   FORMATION AND AGE)
C       WRITE          (BLANK LINE AT THE END OF EACH WELL RECORD)
C -------------------------------------------------------------------
C -------------------------------------------------------------------
C       ENCODE AND DECODE STATEMENTS ARE VAX CONVENTIONS WHICH
C       INTERCHANGE INTEGER AND CHARACTER FUNCTIONS
C -------------------------------------------------------------------
C
C **** COMMONH.INC CONTAINS ALL THE PROGRAM VARIABLES ****
C
      INCLUDE 'COMMONH.INC'

 10   WRITE(6,20)
 20   FORMAT(' ',' ENTER INPUT DATA FILE NAME')
 30   READ(5,35)INPUT
 35   FORMAT(A30)
 40   FORMAT(A15)

 50   WRITE(6,60)
 60   FORMAT(' ',' ENTER OUTPUT DATA FILE NAME')
 70   READ(5,40)OUTPUT

 72   WRITE (6,74)
 74   FORMAT('     FILE NAME FOR UNUSED RECORDS IS JUNK.OUT')

      PRINT*,'                                          '
      WRITE(6,75)
 75   FORMAT(' ',' ENTER OUTPUT DATA FILE NAME FOR WELLS WITH
     * GREATER THAN 5 SHOWS')
 77   READ(5,40)OUTPUT2
C
      OPEN(UNIT=1,STATUS='OLD',FILE=INPUT,FORM='FORMATTED',
     * CARRIAGECONTROL='LIST')
C
      OPEN(UNIT=2,STATUS='NEW',FILE=OUTPUT,FORM='FORMATTED',
     * CARRIAGECONTROL='LIST')
C
      OPEN(UNIT=3,STATUS='NEW',FILE='JUNK.OUT',FORM='FORMATTED',
     * CARRIAGECONTROL='LIST')
C
      OPEN(UNIT=4,STATUS='NEW',FILE=OUTPUT2,FORM='FORMATTED',
     * CARRIAGECONTROL='LIST')
```

```
C
C ***************************************************************************
C       THE DEPTH TEST WILL PUT SHOW DEPTHS IN THE OUTPUT FILE IN THE
C       FORM "999 DEPTHXXX" WHERE 999 IS THE AGE CODE ASSIGNED, DEPTH
C       IS TO THE NEAREST 500 FEET AND XXX IS THE TEST AND SHOW CODE
C       INFORMATION FOR TESTS WITH NO LISTED FORMATION
C ***************************************************************************

      WRITE(6,76)
 76   FORMAT(' ',' DO YOU WANT TO INCLUDE DEPTHS FOR SHOWS NOT
     * ASSIGNED FORMATIONS?[N] ')
      READ(5,78)DEP
 78   FORMAT(A1)
      IF(DEP.EQ.'Y' .OR. DEP.EQ.'y')DEP='Y'

C **** INITIALIZE COUNTERS ****

 79   N=0
      H=0
      MM=1
      Q=0
      J=0
      P=1
      P2=1
 81   DO 82,Q=1,7
      PRODAG(Q)=0
      PRODFM(Q)='     '
 82   CONTINUE
      TD=0
      TDFM=0
      ELEV=0
 80   READ(1,90,END=999)DATA
 85   IF (DATA(1:10).EQ.'          ') GO TO 600
 90   FORMAT(A70)

C -------------------------------------------------------------------
C      **** BLANK LINES FOLLOWING EACH RECORD SEND EACH WELL RECORD
C      TO THE SORTING DO-LOOP AND WRITE STATEMENT ****
C -------------------------------------------------------------------

C -------------------------------------------------------------------
C      **** HEADER INFORMATION-PUTS HEADER RECORD IN VARIABLE "HEADER"
C      WHEN J=0, INDICATING A PRECEDING BLANK LINE, DATA IS ASSIGNED
C      TO THE HEADER VARIABLE WHICH INCLUDES DRILL HOLE LOCATION AND
C      OTHER GENERAL DATA.  THE PRIMARY PRODUCING AGE AND FORMATION
C      IS ASSIGNED TO THE PRODAG AND PRODFM VARIABLES ****
C -------------------------------------------------------------------

        IF(J.EQ.0)THEN
        HEADER=DATA(1:70)
        J=1
        H=1
        PRODFM(P)=DATA(40:44)
C
C **** CHARACTER DATA IS DECODED AND ASSIGNED TO INTEGER VARIABLES ****
C
        DECODE(3,95,HEADER(37:39),ERR=560)PRODAG(P)
 91     DECODE(3,95,HEADER(62:64),ERR=561)TDFM
 92     DECODE(5,100,HEADER(56:60),ERR=562)TD
 93     DECODE(5,100,HEADER(49:53),ERR=563)ELEV
```

```
 94       CONTINUE
 95       FORMAT(I3)
 100      FORMAT(I5)
            GO TO 80
          ELSE
            YUP = .TRUE.
            GO TO 105
          ENDIF

C ------------------------------------------------------------------
C        **** CORE INFORMATION-WHCS RECORD 3XX01 ****
C ------------------------------------------------------------------

 105      IF (DATA(1:1) .EQ. '3'.AND.DATA(4:5).EQ.'01') THEN
          CALL CORESHO
          GO TO 80
          ELSE
          GO TO 150
          ENDIF

C ------------------------------------------------------------------
C       **** DRILL STEM TEST DATA-WHCS RECORD 4XX01 ****
C ------------------------------------------------------------------

 150      IF (.NOT.(DATA(6:6) .EQ. 'D'.OR. (DATA(1:1).EQ.'4' .AND.
     *    DATA(4:5) .EQ.'01')))GO TO 170
 160     DST=DATA(56:56)
          IF (DATA(50:55).EQ.'MISRUN'.OR. DATA(50:55).EQ.'PIPFLR'
     *    .OR.DATA(50:55).EQ.'PKRFLR'.OR. DATA(50:55).EQ.'TSTPLG'
     *    )GO TO 80
          IF (DST.EQ.'S' .OR. DST.EQ.'T' .OR. DST.EQ.'U'.OR. DST.EQ.
     *    'V')THEN
          DATA(55:56)=DSTSH
          DATA(57:57)=UNDIFF
            ELSE
          IF (.NOT.(DST.EQ.'S'.OR. DST.EQ.'T'.OR. DST.EQ.'U' .OR. DST
     *    .EQ.'V'))THEN
          DATA(55:56)=NADA4
          DATA(57:57)=UNDIFF
            ENDIF
              ENDIF

C ------------------------------------------------------------------
C     **** ARRAY EXPLANATION; LIST(1) IS FORMATION AGE CODE, LIST(2) IS
C     IS TEST TYPE, LIST(3) IS TEST TYPE WITH SHOW, LIST(4) IS SHOW
C     TYPE ( OIL AND/OR GAS) ****
C ------------------------------------------------------------------

          IF(DATA(30:37).EQ.'        ' .AND. DEP.EQ.'Y' .AND.
     *  DATA(18:22).NE.'     ')THEN
          DDEP=1
          CALL DEPTHSHOW
          ENDIF
          DDEP=0
          N=N+1
          FMCO(N,1)=DATA(33:37)
          DECODE(3,162,DATA(30:32),ERR=550)LIST(N,1)
 162      FORMAT(I3)
          DECODE(1,166,DATA(55:55),ERR=550)LIST(N,2)
 166      FORMAT(I1)
```

```
        DECODE(1,166,DATA(56:56),ERR=550)LIST(N,3)
        DECODE(1,166,DATA(57:57),ERR=550)LIST(N,4)
        GO TO 80

C -----------------------------------------------------------------
C       **** DRILL SAMPLE SHOW DATA-WHCS RECORD 610XX ****
C -----------------------------------------------------------------

 170     IF (DATA(1:3) .EQ. '610')THEN
         CALL DRILLSH
         GO TO 80
         ELSE
         GO TO 190
         ENDIF

C -----------------------------------------------------------------
C       **** WIRELINE TEST DATA-WHCS RECORD 4XX05 ****
C -----------------------------------------------------------------

 190     IF (DATA(6:6) .EQ. 'W'.OR.(DATA(1:1).EQ.'4' .AND. DATA
     *   (4:5).EQ.'05')) GO TO 200
         GO TO 275
 200   WIRE=DATA(56:56)
         IF (DATA(50:55).EQ.'MISRUN'.OR.DATA(50:55).EQ.'PIPFLR'
     *   .OR.DATA(50:55).EQ.'PKRFLR'.OR. DATA(50:55).EQ.'TSTPLG'
     *   ) GO TO 80
         DATA(57:57)=UNDIFF
         IF (WIRE.EQ.'S') DATA(55:56)=WIRELN
         IF (WIRE.NE.'S') DATA(55:56)=NADA3

C -----------------------------------------------------------------
C    **** ARRAY EXPLANATION; LIST(1) IS FORMATION AGE CODE, LIST(2) IS
C    IS TEST TYPE, LIST(3) IS TEST TYPE WITH SHOW, LIST(4) IS SHOW
C    TYPE ( OIL AND/OR GAS) ****
C -----------------------------------------------------------------

        IF(DATA(30:37).EQ.'        ' .AND. DEP.EQ.'Y'.AND.
     * DATA(18:22).NE.'     ')THEN
        DDEP=1
        CALL DEPTHSHOW
        ENDIF
        DDEP=0
        N=N+1
        FMCD(N,1)=DATA(33:37)
        DECODE(3,250,DATA(30:32),ERR=550)LIST(N,1)
 250    FORMAT(I3)
        DECODE(1,270,DATA(55:55),ERR=550)LIST(N,2)
 270    FORMAT(I1)
        DECODE(1,270,DATA(56:56),ERR=550)LIST(N,3)
        DECODE(1,270,DATA(57:57),ERR=550)LIST(N,4)
        MM=N+1
        GO TO 80

C -----------------------------------------------------------------
C       **** MULTIPLE PRODUCING ZONES 2 THROUGH 7-WHCS RECORD
C       10011 ****
C -----------------------------------------------------------------

 275    IF(DATA(1:5).EQ.'10011')THEN
         HCPROD(1:60)=DATA(1:60)
```

```
          ELSE
          GO TO 300
          ENDIF

          IF(HCPROD(6:13).NE.'         ')THEN
          P=P+1
          PRODFM(P)=HCPROD(9:13)
          DECODE(3,95,HCPROD(6:8),ERR=565)PRODAG(P)
          ELSE
          GO TO 80
          ENDIF

 277      IF(HCPROD(14:21).NE.'         ')THEN
          P=P+1
          PRODFM(P)=HCPROD(17:21)
          DECODE(3,95,HCPROD(14:16),ERR=565)PRODAG(P)
          ELSE
          GO TO 286
          ENDIF

 279      IF(HCPROD(22:29).NE.'         ')THEN
          P=P+1
          PRODFM(P)=HCPROD(25:29)
          DECODE(3,95,HCPROD(22:24),ERR=566)PRODAG(P)
          ELSE
          GO TO 286
          ENDIF

 281      IF(HCPROD(30:37).NE.'         ')THEN
          P=P+1
          PRODFM(P)=HCPROD(33:37)
          DECODE(3,95,HCPROD(30:32),ERR=567)PRODAG(P)
          ELSE
          GO TO 286
          ENDIF

 283      IF(HCPROD(38:45).NE.'      ')THEN
          P=P+1
          PRODFM(P)=HCPROD(41:45)
          DECODE(3,95,HCPROD(38:40),ERR=568)PRODAG(P)
          ELSE
          GO TO 286
          ENDIF

 285      IF(HCPROD(46:53).NE.'         ')THEN
          P=P+1
          PRODFM(P)=HCPROD(49:53)
          DECODE(3,95,HCPROD(46:48),ERR=571)PRODAG(P)
          ELSE
          GO TO 286
          ENDIF

C ------------------------------------------------------------------
C       **** SORT PRODUCING FM AND AGE TO DELETE DUPLICATES ****
C ------------------------------------------------------------------

 286        DO 290 Q=1,P
            IF(Q.EQ.1)GO TO 290
            DO 287 I=1,Q-1
            IF((PRODFM(Q).EQ.PRODFM(I) .AND. PRODAG(Q).EQ.
```

```
     *     PRODAG(I)) .OR. (PRODAG(Q).EQ.0 .AND. PRODFM(Q)
     *     .EQ. '      '))GO TO 290
 287       CONTINUE
 288          P2=P2+1
              PRODAG(P2)=PRODAG(Q)
              PRODFM(P2)=PRODFM(Q)
 290       CONTINUE
           GO TO 80

C ------------------------------------------------------------------
C      **** PRODUCTION TEST DATA-WHCS RECORD IS 5XX01 ****
C              PS IS BBLS OF OIL, PSS IS MCF GAS
C ------------------------------------------------------------------

 300     IF(DATA(6:6).NE.'P'.OR.(DATA(1:1).NE.'5'.AND.DATA
     *   (4:5).NE.'01'))THEN
           GO TO 340
           ENDIF
           IF(YUP) THEN
           JJ=N+1
           YUP = .FALSE.
           ENDIF
C  ------------------------------------------------------------------
C       ERROR CHECK FOR CHARACTERS WHERE THERE SHOULD BE NUMBERS
C       ERRORS ARE SENT TO THE UNIT 3 OUTPUT FILE "JUNK.OUT"
C  ------------------------------------------------------------------
           IF(DATA(11:11).EQ.'.' .OR. DATA(12:12).EQ.'/'
     *   .OR. DATA(12:12).EQ.'.'.OR. DATA(11:13).EQ.'TR'
     *   .OR. DATA(11:13).EQ.'SM')THEN
           PS=1
           IF(DATA(23:23).EQ.'.' .OR.DATA(24:24).EQ.'.'.OR.DATA
     *   (23:25).EQ.'TR'.OR.DATA(22:25).EQ.'SHOW'.OR.DATA(21:25).EQ.
     *   'SMALL'.OR. DATA(23:23).EQ.'/' .OR. DATA(24:24).EQ.'/')THEN
           PSS=1
           ELSE
           IF(DATA(11:13).EQ.'   '.OR. DATA(11:13).EQ.'NON')THEN
           PS=0
           IF(DATA(22:25).EQ.'NONE'.OR.DATA(23:25).EQ.'   ')THEN
           PSS=0
           GO TO 80
           ELSE
           DECODE(3,312,DATA(11:13),ERR=550)PS
           DECODE(3,312,DATA(23:25),ERR=550)PSS
 312       FORMAT(I3)
           ENDIF
           ENDIF
           ENDIF
           ENDIF
           IF (PS.GT.0 .OR. PSS.GT.0)THEN
             DATA(55:56)=PRODSH
           ELSE
             DATA(55:56)=NADA5
           END IF
           IF(PS.GT.0 .AND. PSS.LT.1)THEN
             DATA(57:57)=OIL3
           ELSE IF(PS.LT.1 .AND. PSS.GT.0)THEN
             DATA(57:57)=GAS1
           ELSE IF(PS.GT.0 .AND. PSS.GT.0)THEN
           DATA(57:57)=OILGAS
             ELSE
```

```
      DATA(57:57)=UNDIFF
      ENDIF

C -----------------------------------------------------------------
C       **** AGENO IS THE RECORD FOR PROD TEST NO., AGENO1 FOR THE
C       PERF INTERVAL ****
C -----------------------------------------------------------------

      N=N+1
      LIST(N,1)=-1
      FMCD(N,1)='-2'
      DECODE(1,320,DATA(55:55),ERR=550)LIST(N,2)
 320  FORMAT(I1)
      DECODE(1,320,DATA(56:56),ERR=550)LIST(N,3)
      DECODE(1,320,DATA(57:57),ERR=550)LIST(N,4)
      AGENO(N,2)=DATA(2:3)
      ZZ=N
      GO TO 80

C -----------------------------------------------------------------
C      **** PRODUCTION DATA - AGE CODES-WHCS RECORD IS 5XX02-09 ****
C -----------------------------------------------------------------

 340  IF(.NOT.(DATA(1:1).EQ.'5' .AND.(DATA(5:5).EQ.'2'.OR.
     *  DATA(5:5).EQ.'3'.OR. DATA(5:5).EQ.'4'.OR.DATA(5:5).EQ.'5'
     *  .OR. DATA(5:5).EQ.'6' .OR. DATA(5:5).EQ.'7'.OR.DATA(5:5)
     *  .EQ.'8'.OR.DATA(5:5).EQ.'9')))
     *  GO TO 550
      IF(DATA(6:13).EQ.'        ' .AND. DEP.EQ.'Y'.AND.
     *  DATA(39:43).NE.'     ')THEN
      PDEP=1
      CALL DEPTHSHOW
      PDEP=0
      ENDIF
      N=N+1
      LIST(N,2)=0
      LIST(N,3)=0
      LIST(N,4)=0
      DECODE(3,380,DATA(6:8),ERR=550)LIST(N,1)
 380  FORMAT(I3)
      AGENO1(N,2)=DATA(2:3)
      FMCD(N,1)=DATA(9:13)
      GO TO 80


C -----------------------------------------------------------------
C       **** UNIT 3 FILE, JUNK.OUT, IS AN OUTPUT RECORD FOR ERRORS
C       AND INCLUDES DRILL HOLE API NO. AND ERRONEOUS DATA ****
C -----------------------------------------------------------------

 550  WRITE(3,590)HEADER(1:10),DATA
       GO TO 80
 560  WRITE(3,590)HEADER(1:10),DATA
       GO TO 91
 561  WRITE(3,590)HEADER(1:10),DATA
       GO TO 92
 562  WRITE(3,590)HEADER(1:10),DATA
       GO TO 93
 563  WRITE(3,590)HEADER(1:10),DATA
       GO TO 94
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```
 564     WRITE(3,590)HEADER(1:10),DATA
          GO TO 277
 565    WRITE(3,590)HEADER(1:10),DATA
         GO TO 279
 566    WRITE(3,590)HEADER(1:10),DATA
          GO TO 281
 567    WRITE(3,590)HEADER(1:10),DATA
          GO TO 283
 568    WRITE(3,590)HEADER(1:10),DATA
          GO TO 285
 571    WRITE(3,590)HEADER(1:10),DATA
          GO TO 286
 590    FORMAT(A10,A70)

 600    CONTINUE
        K=0
        A(1,1)=-1

C ---------------------------------------------------------------------
C     **** DO-LOOP FOR COMBINING PRODUCING FORMATION AND AGE CODES ****
C ---------------------------------------------------------------------
         DO 630,M=1,N
          IF(LIST(M,1).EQ.-1 .OR. LIST(M,2).EQ.0)THEN
           DO 620,PP=ZZ+1,N
             IF(AGENO(M,2) .EQ. AGENO1(PP,2))THEN
             LIST(M,1)=LIST(PP,1)
             FMCD(M,1)=FMCD(PP,1)
             ENDIF
 620       CONTINUE
         ENDIF
 630     CONTINUE

C ---------------------------------------------------------------------
C       **** IF WELL IS PRODUCING, SHOW DATA WILL NOT BE
C       INCLUDED FOR THAT AGE CODE ****
C ---------------------------------------------------------------------
           M2=0
           DO 650 M=1,N
             DO 640,Q=1,P2
            IF((LIST(M,1) .EQ. PRODAG(Q).AND. FMCD(M,1)
     *      .EQ. PRODFM(Q)) .OR. LIST(M,1).EQ.-1
     *      .OR. LIST(M,2).EQ.0 .OR. FMCD(M,1) .EQ. '  '
     *      .OR. FMCD(M,1).EQ.'-2')GO TO 650
 640        CONTINUE
            M2=M2+1
            LIST1(M2,1)=LIST(M,1)
            FMCD1(M2,1)=FMCD(M,1)
            LIST1(M2,2)=LIST(M,2)
            LIST1(M2,3)=LIST(M,3)
            LIST1(M2,4)=LIST(M,4)
 650     CONTINUE

C ---------------------------------------------------------------------
C       **** DO-LOOP FOR SORTING SORT TESTS AND AGES ****
C ---------------------------------------------------------------------
          DO 700, M=1,M2
            IF(M.EQ.1)THEN
            A(1,1)=LIST1(1,1)
            A(1,2)=LIST1(1,2)
            A(1,3)=LIST1(1,3)
```

```
            A(1,4)=LIST1(1,4)
            B(1,1)=FMCD1(1,1)
            K=1
            ELSE

           DO 680, J=1,K
           IF (LIST1(M,1) .EQ. A(J,1) .AND. FMCD1(M,1)
     *     .EQ. B(J,1))THEN
            IF(LIST1(M,2).GT.A(J,2)) A(J,2)=LIST1(M,2)
            IF(LIST1(M,3).GT.A(J,3)) A(J,3)=LIST1(M,3)
            IF(LIST1(M,4).GT.A(J,4)) A(J,4)=LIST1(M,4)
            GO TO 700
            ENDIF
 680      CONTINUE
          K=K+1
          A(K,1)=LIST1(M,1)
          B(K,1)=FMCD1(M,1)
          A(K,2)=LIST1(M,2)
          A(K,3)=LIST1(M,3)
          A(K,4)=LIST1(M,4)
          ENDIF
 700    CONTINUE

C ---------------------------------------------------------------------
C       **** DO-LOOPS FOR SORTING SHOWS AND SHOW TESTS ****
C ---------------------------------------------------------------------

        IF(K.NE.1)THEN
          DO 830, I=1,K
 830      NUMBER(I)=(10*A(I,3))+A(I,2)
          DO 845,I=2,K
            DO 840,JK=2,I
            J=I+2-JK
            IF(NUMBER(J-1).GE.NUMBER(J))GO TO 845
            C=A(J-1,1)
            A(J-1,1)=A(J,1)
            A(J,1)=C

            C=A(J-1,2)
            A(J-1,2)=A(J,2)
            A(J,2)=C

            C=A(J-1,3)
            A(J-1,3)=A(J,3)
            A(J,3)=C

            C=A(J-1,4)
            A(J-1,4)=A(J,4)
            A(J,4)=C

            D=B(J-1,1)
            B(J-1,1)=B(J,1)
            B(J,1)=D

            E=NUMBER(J-1)
            NUMBER(J-1)=NUMBER(J)
            NUMBER(J)=E
 840      CONTINUE
 845      CONTINUE
          ENDIF
```

```
 850      IF(.NOT.(TDFM.GT.0))THEN
            HEADER(62:64)='   '
            ENDIF
          IF(.NOT.(TD.GT.0))THEN
            HEADER(56:60)='     '
            ENDIF
          IF(.NOT.(ELEV.GT.0))THEN
            HEADER(49:53)='     '
            ENDIF
C ------------------------------------------------------------------
C       **** SEQUENTIAL WRITE STATEMENT-MULTIPLE WELL HEADER LISTINGS
C       FOR MULTIPLE PRODUCING ZONES ****
C ------------------------------------------------------------------
        DO 925,Q=1,P2
        F=MIN(5,K)
 900    WRITE(2,910)HEADER(1:36),PRODAG(Q),PRODFM(Q),HEADER(45:70),
     * (A(I,1),B(I,1),A(I,3),A(I,2),A(I,4),I=1,F)
 910    FORMAT(A36,I3,A5,A26,1X,5(1X,I3,A5,I1,I1,I1))
        IF(K.LT.6)GO TO 925
        WRITE(4,920)HEADER(1:36),PRODAG(Q),PRODFM(Q),HEADER(45:70),
     * (A(I,1),B(I,1),A(I,3),A(I,2),A(I,4),I=6,K)
 920    FORMAT(A36,I3,A5,A26,1X,5(1X,I3,A5,I1,I1,I1)/
     * 10(1X,I3,A5,I1,I1,I1))
 925    CONTINUE
 930    IF (STPCHK.EQ.1)STOP
        GO TO 79
 999    IF (H.EQ.0)STOP
        STPCHK=1
        GO TO 600
        END
```

```
C            **** COMMONH.INC INCLUDE FILE ****
C ---------------------------------------------------------------
C
C       THIS FILE TO BE USED WITH THE MAIN PROGRAM, DRILLSH,
C       CORESHO, AND DEPTHSHOW CONTAINS THE VARIABLES USED IN
C       THE SOFTWARE PACKAGE.  REFER TO THE VARIABLE DICTIONARY
C       FOR VARIABLE EXPLANATIONS.
C ---------------------------------------------------------------
C
        INTEGER I,N,LIST(400,6),LIST1(400,6),A(400,6),CDEP,
     * AGECD,L,K,PRODAG(7),H,STPCHK,PS,PSS,NN,F,C,ODEP,
     * NUMBER(400),TD,ELEV,TOFM,P,P2,Q,M,ZZ,MM,JJ,J,M2,
     * IDEPTH,BDEPTH,DSDEP1,DSDEP2,PDEP
        LOGICAL YUP
        CHARACTER*15 OUTPUT,JUNK,OUTPUT2,DEPTH,DEPTH1
        CHARACTER*30 INPUT
        CHARACTER*5 FMCD(400,5),FMCD1(400,5),PRODFM(7),B(400,5)
     *,CDEPTH,D,DSS,DSSS1,DSS1,DSSS
        CHARACTER DATA*70,HEADER*70,HCPROD*60,DST*1,OILGAS*1,
     * WIRE*1,AGEFM*3,TEST*1,SHOW*1,OIL3*1,GAS1*1,DEP*1,CS,
     * UNDIFF*1
        CHARACTER*2 NADA1,NADA2,NADA3,NADA4,NADA5,AGENO(400,2),
     * WIRELN,DSTSH,PRODSH,AGENO1(400,2),CORESH,DSSH
C
        COMMON DATA,DEP,CDEP,ODEP,FMCD,LIST,N,DSDEP1,DSDEP2,PDEP
     * ,HEADER
C ---------------------------------------------------------------
C       CODES FOR TEST AND HYDROCARBON SHOW TYPE
C ---------------------------------------------------------------
        DSSH='11'
        CORESH ='22'
        WIRELN='33'
        DSTSH='44'
        PRODSH='55'
C ---------------------------------------------------------------
C       INITIALIZATION OF VARIABLES FOR OIL,GAS, OR OIL AND GAS SHOWS
C ---------------------------------------------------------------
        NADA1='10'
        NADA2='20'
        NADA3='30'
        NADA4='40'
        NADA5='50'
        OIL3='1'
        GAS1='2'
        OILGAS='3'
        UNDIFF='0'
```

```
C
C
C
C
C              **** SUBROUTINE CORESHO.FOR ****
C
C ---------------------------------------------------------------

       SUBROUTINE CORESHO

C      THIS PROGRAM TO BE USED IN CONJUNCTION WITH THE MAIN PROGRAM,
C      SUBROUTINES DEPTHSHOW, AND COMMONH ASSIGNS CODES FOR OIL
C      AND/OR GAS SHOWS BASED ON OPERATORS REPORTS ON TESTED CORE.
C
       INCLUDE 'COMMONH.INC'
C
C ---------------------------------------------------------------
C      ***CORE INFORMATION-WHCS RECORD 3XX01***
C ---------------------------------------------------------------

 110   CS=DATA(52:55)
         IF (CS.EQ.'GODR'  .OR. CS.EQ.'SODR'
     *   .OR. CS.EQ.'FODR' .OR. CS.EQ.'GAS' .OR. CS.EQ.'G-W'
     *   .OR. CS.EQ.'CUT'.OR. CS.EQ.'ODOR'.OR. CS.EQ.'QSTO'
     *   .OR. CS.EQ.'G&C'.OR. CS.EQ.'G&W' .OR. CS.EQ.'SGAS'
     *   .OR. CS.EQ.'W&G'.OR. CS.EQ.'G' .OR. CS .EQ.'ZG'
     *   .OR. DATA(54:55).EQ.'DG')THEN
         DATA(55:56)=CORESH
         DATA(57:57)=GAS1

         ELSE IF (CS.EQ.'OIL'.OR.CS.EQ.'OSTN'.OR.CS.EQ.'FLRN'
     *   .OR.CS.EQ.'GFLU' .OR.CS.EQ.'FFLU'
     *   .OR. CS.EQ.'DOIL' .OR. CS.EQ. 'SFLU'.OR.CS.EQ.'O&W'
     *   .OR. CS.EQ.'SATN'.OR. CS.EQ.'OST' .OR. CS.EQ.'SCFL'
     *   .OR. CS.EQ.'OFLU' .OR. CS.EQ.'STAN'.OR.CS.EQ.'BLO'
     *   .OR. CS.EQ.'O-W' .OR. CS.EQ.'OFLU' .OR. CS.EQ.'FCFL'
     *   .OR. CS.EQ.'O&SW'.OR. CS.EQ.'ASTN' .OR. CS.EQ.'O'
     *   .OR. CS.EQ.'H' .OR. CS.EQ.'S' .OR. CS.EQ.'SOCW'
     *   .OR. CS.EQ.'OIH'.OR.CS.EQ.'HFW'.OR.CS.EQ.'O&M'
     *   .OR. CS.EQ.'W-SSO'.OR.CS.EQ.'BLOI'.OR.CS.EQ.'SLFU'
     *   .OR. CS.EQ.'COND'.OR.CS.EQ.'FODR'.OR.DATA(54:55).EQ.'DO'
     *   .OR. CS.EQ.'GCFL' .OR. CS.EQ.'K'  .OR.  CS.EQ.'N'
     *   .OR. CS.EQ.'M'.OR.CS.EQ.'D'.OR.CS.EQ.'E'.OR.CS.EQ.'C'
     *   .OR. CS.EQ.'F'.OR.CS.EQ.'G'.OR.CS.EQ.'H'.OR.CS.EQ.'R'
     *   .OR. CS.EQ.'I'.OR.CS.EQ.'T'.OR.CS.EQ.'Q'.OR.CS.EQ.'O&WTR'
     *   .OR. CS.EQ.'O&SUW')THEN
         DATA(55:56)=CORESH
         DATA(57:57)=OIL3

         ELSE IF (CS.EQ.'O&G'.OR. CS.EQ.'GCFL' .OR. CS.EQ.'O-G'
     *   .OR.CS.EQ.'O-GW'.OR.CS.EQ.'O&GW'.OR. CS.EQ.'O-G&W'
     *   .OR.CS.EQ.'OG&W' .OR.CS.EQ.'O&GAS' .OR.CS.EQ.'O-G-W'
     *   .OR.CS.EQ.'O&GCS'.OR.CS.EQ.'GSOCW' .OR.CS.EQ.'O&G&W'
     *   .OR.CS.EQ.'GSOCW'.OR.CS.EQ.'O&GCW'.OR.CS.EQ.'OG&SW')THEN
         DATA(55:56)=CORESH
         DATA(57:57)=OILGAS

         ELSE IF (CS.EQ.'   '  .OR. CS.EQ.'WET' .OR. CS.EQ.'COAL'
     *   .OR.CS.EQ.'WTR' .OR. CS.EQ.'SWTR'.OR.CS.EQ.'P'.OR. CS.EQ.
     *   'WATE' .OR. CS.EQ.'SULF' .OR. CS.EQ.'SULW' .OR. CS.EQ.'AIR'
```

```
     *    .OR. CS.EQ.'FW' .OR. CS.EQ.'SUL'.OR. CS.EQ.'FWTR' .OR. CS
     *    .EQ.'U' .OR. CS.EQ.'UNKN' .OR. CS.EQ.'W' .OR. CS.EQ.'A'
     *    .OR. CS.EQ.'L' .OR. CS.EQ.'Y' .OR. CS.EQ.'Z'
     *    .OR. CS.EQ.'N' .OR .CS.EQ.'SSWTR'.OR. DATA(52:52).EQ.'0'
     *    .OR. CS.EQ.'BLKW'.OR.CS.EQ.'BRKW'.OR.CS.EQ.'BS&W'.OR.CS.EQ.
     *    'BSUM'.OR.CS.EQ.'BS&W'.OR.CS.EQ.'BSUM'.OR.CS.EQ.'MUDF'.OR.
     *    CS.EQ.'SSUM'.OR.CS.EQ.'CO2'.OR.CS.EQ.'CUT'.OR.CS.EQ.'SMOK'
     *    .OR.CS.EQ.'J'.OR.CS.EQ.'BW'.OR.CS.EQ.'F'.OR.CS.EQ.'NS'.OR.
     *    CS.EQ.'PW'.OR.CS.EQ.'XW'.OR.CS.EQ.'XW'.OR.CS.EQ.'XZ'.OR.CS
     *    .EQ.'ZW'.OR.CS.EQ.'ZX'
     *    )THEN
          DATA(55:56)=NADA2
          DATA(57:57)=UNDIFF
          ENDIF

C ---------------------------------------------------------------------
C     **** ARRAY EXPLANATION: LIST(1) IS FORMATION AGE, LIST(2) IS
C          HIGHEST RANK OF TEST TYPE, LIST(3) IS TEST TYPE WITH SHOW,
C          AND LIST(4) IS OIL AND/OR GAS SHOW TYPE OR NO SHOW ****
C ---------------------------------------------------------------------
          IF (DATA(55:56).NE.NADA2 .AND. DATA(55:56).NE. CORESH)
     *    GO TO 550

C         TEST FOR SHOWS BY DEPTH

          IF(DATA(38:45).EQ.'        ' .AND. DEP.EQ.'Y' .AND.
     *    DATA(14:18).NE.'     ')THEN
          CDEP=1
          CALL DEPTHSHOW
          CDEP=0
          ENDIF
 115      N=N+1
C
C    *** DECODE AND ENCODE STATEMENTS ARE VAX CONVENTIONS WHICH
C         CHANGE FROM CHARACTER TO INTEGER FUNCTIONS ***
C
          FMCD(N,1)=DATA(41:45)
          DECODE(3,120,DATA(38:40),ERR=550)LIST(N,1)
 120      FORMAT(I3)
          DECODE(1,130,DATA(55:55),ERR=550)LIST(N,2)
 130      FORMAT(I1)
          DECODE(1,130,DATA(56:56),ERR=550)LIST(N,3)
          DECODE(1,130,DATA(57:57),ERR=550)LIST(N,4)
          GO TO 700
 550      WRITE(3,551)HEADER(1:10),DATA
 551      FORMAT(A10,A70)
 700      RETURN
          END
```

```
C
C
C
C
C             **** SUBROUTINES DRILLSH.FOR ****
C
C ---------------------------------------------------------------

      SUBROUTINE DRILLSH

C     THIS PROGRAM IS TO BE USED IN CONJUNCTION WITH THE MAIN
C     PROGRAM, SUBROUTINE DEPTHSHOW, AND COMMONH.  CODES ARE
C     ASSIGNED FOR OIL AND/OR GAS OR NO SHOWS BASED ON DRILL
C     SAMPLE OPERATOR REPORTS.
C
      INCLUDE 'COMMONH.INC'
C
C ---------------------------------------------------------------
C     **** DRILL SAMPLE SHOW DATA-WHCS RECORD 610XX ****
C ---------------------------------------------------------------

 10   DSSS1=DATA(27:31)
      DSS1=DATA(27:30)
        IF (DSS1.EQ.'GODR' .OR. DSS1.EQ.'ODOR'.OR. DSS1.EQ.'SODR'
     *   .OR. DSS1.EQ.'FODR'.OR. DSS1.EQ.'G&W'
     *   .OR. DSS1.EQ.'GAS' .OR. DSS1.EQ.'CUT' .OR. DSS1.EQ.'G-W'
     *   .OR. DSS1.EQ.'BLDG'.OR. DSS1.EQ.'G&SW'.OR.DSS1.EQ.'GSUW'
     *   .OR. DSS1.EQ.'G&C' .OR. DSS1.EQ.'SGAS'.OR.DSS1.EQ.'AGAS'
     *   .OR. DSS1.EQ.'G'   .OR.DSS1.EQ.'W&G' .OR. DSS1.EQ.'G&W'
     *   .OR. DSS1.EQ.'ZG')THEN
          DATA(27:28)=DSSH
          DATA(29:29)=GAS1

        ELSE IF(DSS1.EQ.'OIL ' .OR. DSS1.EQ.'OSTN'.OR. DSS1.EQ. 'FFLU'
     *   .OR. DSS1.EQ.'GFLU'.OR. DSS1.EQ.'ODIL'.OR. DSS1.EQ. 'SFLU'
     *   .OR. DSS1.EQ.'SATN'.OR. DSS1.EQ.'BLDO'.OR. DSS1.EQ.'O&W '
     *   .OR. DSS1.EQ.'SCFL'.OR.DSS1.EQ.'FLRN' .OR. DSS1.EQ.'STAN'
     *   .OR. DSS1.EQ.'OFLU'.OR.DSS1.EQ.'O-W'  .OR. DSS1.EQ.'FCFL'
     *   .OR. DSS1.EQ.'O&SW'.OR.DSS1.EQ.'ASTN' .OR. DSS1.EQ.'O'
     *   .OR. DSS1.EQ.'H' .OR. DSS1.EQ.'QSTO'  .OR. DSS1.EQ.'S'
     *   .OR. DSS1.EQ.'SOCW'.OR.DSS1.EQ.'OIH'  .OR. DSS1.EQ.'HFW'
     *   .OR. DSS1.EQ.'O&M'.OR.DSSS1.EQ.'W-SSO'.OR.DSSS1.EQ.'O&WTR'
     *   .OR. DSS1.EQ.'COND'.OR.DSS1.EQ.'DOIL' .OR. DSS1.EQ.'FODR'
     *   .OR. DSS1.EQ.'GCFL'.OR.DSS1.EQ.'K'    .OR. DSS1.EQ.'N'
     *   .OR. DSS1.EQ.'M'.OR.DSS1.EQ.'D'.OR.DSS1.EQ.'E'.OR.DSS1.EQ.'C'
     *   .OR. DSS1.EQ.'F'.OR.DSS1.EQ.'G'.OR.DSS1.EQ.'H'.OR.DSS1.EQ.'R'
     *   .OR. DSS1.EQ.'I'.OR.DSS1.EQ.'T'.OR.DSS1.EQ.'Q'
     *   )THEN
          DATA(27:28)=DSSH
          DATA(29:29)=OIL3

        ELSE IF(DSS1.EQ.'O&G '.OR. DSS1.EQ.'GCFL' .OR. DSS1.EQ.'O-G'
     *   .OR.DSS1.EQ.'O-G&'.OR.DSS1.EQ.'OG&W' .OR. DSSS1.EQ.'O&GAS'
     *   .OR.DSSS1.EQ.'O-G-W'.OR.DSSS1.EQ.'O&GCW'.OR.DSSS1.EQ.'GSOCW'
     *   .OR. DSS1.EQ.'GSOC' .OR.DSS1.EQ.'O&G&' .OR.DSS1.EQ.'O&GC'
     *   .OR.DSSS1.EQ.'O&GCM')THEN
          DATA(27:28)=DSSH
          DATA(29:29)=OILGAS

        ELSE IF(DSS1.EQ.'    '.OR. DSS1.EQ.'WET '.OR. DSS1.EQ.'COAL'
```

```
     *    .OR.DSS1.EQ.'P' .OR. DSS1.EQ.'WATE'.OR. DSS1 .EQ.'U'
     *    .OR. DSS1.EQ.'UNKN' .OR. DSS1.EQ.'SULF'.OR.DSS1.EQ.'W'
     *    .OR.DSS1.EQ.'SULW' .OR. DSS1.EQ.'SUL' .OR. DSS1.EQ.'AIR' .OR.
     *    DSS1.EQ.'FW' .OR. DSS1.EQ.'FWTR' .OR. DSS1.EQ.'SWTR'
     *    .OR. DSS1.EQ.'Q' .OR. DSS1.EQ.'Y' .OR. DSS1.EQ.'L'
     *    .OR. DSS1.EQ.'Z' .OR. DSS1.EQ.'Z' .OR. DSS1.EQ.'N'
     *    .OR. DSS1.EQ.'A' .OR. DSS1.EQ.'GCMW'.OR.DSSS1.EQ.'SSWTR'
     *    .OR. DSS1.EQ.'SSWT'.OR.DSS1.EQ.'0000'.OR.DSS1.EQ.'100'
     *    .OR.DSS1.EQ.'111'  .OR. DSS1.EQ.'WTR '
     *    .OR. DSS1.EQ.'110' .OR.DSS1.EQ.'112'.OR.DSS1.EQ.'113'
     *    .OR. DSS1.EQ.'BLKW'.OR.DSS1.EQ.'BRKW'.OR.DSS1.EQ.'BS&W'
     *    .OR .DSS1.EQ.'BSUM'.OR.DSS1.EQ.'BS&W'.OR.DSS1.EQ.'BSUM'
     *    .OR. DSS1.EQ.'MUDF'.OR.DSS1.EQ.'SSUM'.OR.DSS1.EQ.'CO2'
     *    .OR. DSS1.EQ.'CUT' .OR.DSS1.EQ.'SMOK'.OR.DSS1.EQ.'J'
     *    .OR. DSS1.EQ.'BW'  .OR.DSS1.EQ.'F'   .OR.DSS1.EQ.'NS'
     *    .OR. DSS1.EQ.'PW'  .OR.DSS1.EQ.'XW'  .OR.DSS1.EQ.'XW'
     *    .OR.DSS1.EQ.'ZW'   .OR.DSS1.EQ.'ZX'  .OR.DSS1.EQ.'XZ' )THEN
           DATA(27:28)=NADA1
           DATA(29:29)=UNDIFF
         ENDIF

C        TEST FOR DRILL SAMPLE SHOWS BY DEPTH

         IF(DEP.EQ.'Y' .AND. DATA(18:25).EQ.'        '.AND.
     *   DATA(6:10).NE.'     ')THEN
         DSDEP1=1
         CALL DEPTHSHOW
         DSDEP1=0
         ENDIF
 20      N=N+1
         FMCD(N,1)=DATA(21:25)
C ---------------------------------------------------------------------
C       **** DRILL SAMPLE FM AGE AND SHOW INFORMATION IS DECODED
C       FROM CHARACTER TO INTEGER DATA ****
C ---------------------------------------------------------------------
         DECODE(3,183,DATA(18:20),ERR=550)LIST(N,1)
         DECODE(1,186,DATA(27:27),ERR=550)LIST(N,2)
         DECODE(1,186,DATA(28:28),ERR=550)LIST(N,3)
         DECODE(1,186,DATA(29:29),ERR=550)LIST(N,4)

          IF(DATA(45:52).EQ.'              '.AND. DEP.NE.'Y')GO TO 900
C
          DSSS=DATA(54:58)
          DSS=DATA(54:57)
          IF(DSS.EQ.'GODR' .OR. DSS.EQ.'ODOR' .OR. DSS.EQ.'SODR'
     *    .OR. DSS.EQ.'FODR'.OR. DSS.EQ.'GAS' .OR. DSS.EQ.'G&W'
     *    .OR. DSS.EQ.'W&G' .OR. DSS.EQ.'CUT'.OR. DSS.EQ.'G-W'
     *    .OR. DSS.EQ.'BLDG'.OR. DSS.EQ.'G&SW'.OR.DSS.EQ.'GSUW'
     *    .OR. DSS.EQ.'G&C' .OR. DSS.EQ.'SGAS'.OR.DSS.EQ.'G'
     *    .OR. DSS.EQ.'ZG'
     *    )THEN
           DATA(55:56)=OSSH
           DATA(57:57)=GAS1

         ELSE IF(DSS.EQ.'OIL '.OR. DSS.EQ.'OSTN'.OR.DSS.EQ. 'FFLU'
     *    .OR. DSS.EQ.'GFLU'.OR. DSS.EQ.'DOIL'.OR.DSS.EQ. 'SFLU'
     *    .OR. DSS.EQ.'SATN'.OR. DSS.EQ.'BLDO'.OR.DSS.EQ.'O&W '
     *    .OR. DSS.EQ.'SCFL'.OR.DSS.EQ.'FLRN'.OR. DSS.EQ.'STAN'
     *    .OR. DSS.EQ.'OFLU'.OR.DSS.EQ.'O-W' .OR. DSS.EQ.'FCFL'
     *    .OR. DSS.EQ.'O&SW'.OR.DSS.EQ.'ASTN'.OR. DSS.EQ.'O'
```

```
     *    .OR. DSS.EQ.'H'    .OR.DSS.EQ.'QSTO'.OR. DSS.EQ.'S'
     *    .OR. DSS.EQ.'HFW'  .OR.DSS.EQ.'SOCW'.OR. DSS.EQ.'OIH'
     *    .OR. DSS.EQ.'O'    .OR.DSS.EQ.'O&M' .OR. DSSS.EQ.'W-SSO'
     *    .OR. DSS.EQ.'COND'.OR. DSS.EQ.'DOIL'.OR. DSS.EQ.'FODR'
     *    .OR. DSS.EQ.'GCFL'.OR. DSS.EQ.'K'  .OR.  DSS.EQ.'N'
     *    .OR. DSS.EQ.'M'.OR.DSS.EQ.'D'.OR.DSS.EQ.'E'.OR.DSS.EQ.'C'
     *    .OR. DSS.EQ.'F'.OR.DSS.EQ.'G'.OR.DSS.EQ.'H'.OR.DSS.EQ.'R'
     *    .OR. DSS.EQ.'I'.OR.DSS.EQ.'T'.OR.DSS.EQ.'Q'.OR.DSSS.EQ.
     *    'O&WTR'.OR.DSS.EQ.'O&SUW')THEN
            DATA(55:56)=DSSH
            DATA(57:57)=OIL3

          ELSE IF(DSS.EQ.'O&G ' .OR. DSS.EQ.'GCFL' .OR. DSS.EQ.'O-G'
     *    .OR. DSS.EQ.'O-G&'.OR. DSS.EQ.'OG&W' .OR.DSS.EQ.'O&GAS'
     *    .OR. DSS.EQ.'O-G-'.OR. DSS.EQ.'O&GC'
     *    .OR. DSS.EQ.'GSOCW'.OR. DSS.EQ.'O&G&'.OR.DSS.EQ.'O&GC'
     *    .OR. DSS.EQ.'GSOC')THEN
            DATA(55:56)=DSSH
            DATA(57:57)=OILGAS

          ELSE IF(DSS.EQ.'    ' .OR. DSS.EQ.'WET ' .OR. DSS.EQ.'COAL'
     *    .OR.DSS.EQ.'P'.OR.DSS.EQ.'WATE'.OR.DSS.EQ.'WTR ' .OR. DSS.EQ.
     *    'U' .OR. DSS.EQ.'UNKN' .OR. DSS.EQ.'SULF' .OR.DSS.EQ.'SWTR'
     *    .OR.DSS.EQ.'SULW' .OR. DSS.EQ.'SUL' .OR. DSS.EQ.'AIR' .OR.
     *    DSS.EQ.'FW' .OR. DSS.EQ.'FWTR' .OR. DSS.EQ.'W'.OR. DSS.EQ.
     *    'Q' .OR. DSS.EQ.'Y' .OR. DSS.EQ.'L' .OR. DSS.EQ.'Z'
     *    .OR. DSS.EQ.'N' .OR. DSS.EQ.'A' .OR. DSS.EQ.'GCMW' .OR.
     *    DSS.EQ.'SSWT'.OR.DSS.EQ.'SWTR' .OR. DSS.EQ.'0000' .OR.
     *    DSS.EQ.'100' .OR.DSS.EQ.'ZW'.OR.DSS.EQ.'ZX'
     *    .OR.DSS.EQ.'110'.OR.DSS.EQ.'111'.OR.DSS.EQ.'112'
     *    .OR.DSS.EQ.'113'.OR. DSS.EQ.'BLKW'.OR.DSS.EQ.'BRKW'
     *    .OR.DSS.EQ.'BS&W'.OR.DSS.EQ.'BSUM'.OR.DSS.EQ.'BS&W'
     *    .OR.DSS.EQ.'BSUM'.OR.DSS.EQ.'MUDF'.OR.DSS.EQ.'SSUM'
     *    .OR.DSS.EQ.'CO2'.OR.DSS.EQ.'CUT'.OR.DSS.EQ.'SMOK'
     *    .OR.DSS.EQ.'J'.OR.DSS.EQ.'BW'.OR.DSS.EQ.'F'.OR.DSS.EQ.'NS'
     *    .OR.DSS.EQ.'PW'.OR.DSS.EQ.'XW'.OR.DSS.EQ.'XW'.OR.DSS.EQ.'XZ'
     *    )THEN
            DATA(55:56)=NADA1
            DATA(57:57)=UNDIFF
          ENDIF

C ------------------------------------------------------------------
C       **** ARRAY EXPLANATION; LIST(1) IS FORMATION AGE,LIST(2) IS
C       TEST TYPE,LIST(3) IS TYPE OF TEST CONTAINING THE SHOW, LIST(4)
C       IS OIL AND/OR GAS OR NO SHOW ****
C ------------------------------------------------------------------
          IF(DATA(45:52).EQ.'        '.AND.DEP.EQ.'Y'.AND.
     *    DATA(33:37).NE.'        ')THEN
            OSDEP2=1
          CALL DEPTHSHOW
            DSDEP2=0
          ENDIF
 50       N=N+1
          FMCD(N,1)=DATA(48:52)
          DECODE(3,183,DATA(45:47),ERR=550)LIST(N,1)
 183      FORMAT(I3)
          DECODE(1,186,DATA(55:55),ERR=550)LIST(N,2)
 186      FORMAT(I1)
          DECODE(1,186,DATA(56:56),ERR=550)LIST(N,3)
          DECODE(1,186,DATA(57:57),ERR=550)LIST(N,4)
```

```
      GO TO 900
550   WRITE(3,700)HEADER(1:10),DATA
700   FORMAT(A10,A70)
900   RETURN
      END
```

```
C
C
C
C       **** SUBROUTINE DEPTHSHOW.FOR ****
C
C ---------------------------------------------------------------
C
        SUBROUTINE DEPTHSHOW
C
C       THIS PROGRAM IS TO BE USED IN CONJUNCTION WITH THE MAIN
C       PROGRAM, SUBROUTINES CORESHO AND DRILLSH, AND COMMONH.
C       IF FORMATIONS AND AGES ARE MISSING FOR SHOW TESTS THIS
C       PROGRAM CAN BE SPECIFIED AND WILL SUBSTITUTE '999'
C       FOR THE AGE CODE AND THE DEPTH TO THE TESTED INTERVAL
C       FOR THE FORMATION CODE.
C
        INCLUDE 'COMMONH.INC'
C
C       **** INITIALIZE DEPTH VARIABLES AND ASSIGN DEPTH
C       FOR FORMATION CODES ****
C
        IDEPTH=0
        BDEPTH=0

 20     FORMAT(I2)
 30     FORMAT(I5)
        IF(CDEP.EQ.1)THEN
          DECODE(2,20,DATA(14:15),ERR=770)IDEPTH
          DECODE(2,20,DATA(16:17),ERR=770)BDEPTH
        ELSE IF(DDEP.EQ.1)THEN
          DECODE(2,20,DATA(18:19),ERR=770)IDEPTH
          DECODE(2,20,DATA(20:21),ERR=770)BDEPTH
        ELSE IF(PDEP.EQ.1)THEN
          DECODE(2,20,DATA(39:40),ERR=770)IDEPTH
          DECODE(2,20,DATA(41:42),ERR=770)BDEPTH
        ELSE IF(DSDEP1.EQ.1)THEN
          DECODE(2,20,DATA(6:7),ERR=770)IDEPTH
          DECODE(2,20,DATA(8:9),ERR=770)BDEPTH
        ELSE IF(DSDEP2.EQ.1)THEN
          DECODE(2,20,DATA(33:34),ERR=770)IDEPTH
          DECODE(2,20,DATA(35:36),ERR=770)BDEPTH
        ENDIF
C
        IF(IDEPTH.EQ.0.AND.BDEPTH.EQ.0)GO TO 770
        IDEPTH=IDEPTH*100
        IF(BDEPTH.LT.25)BDEPTH=0
        IF(BDEPTH.GE.25 .AND. BDEPTH.LE.75)BDEPTH=50
        IF(BDEPTH.GT.75)BDEPTH=100
        BDEPTH=BDEPTH*10
        IDEPTH=IDEPTH+BDEPTH
C CORE TEST
        IF(CDEP.EQ.1)THEN
          DATA(38:40)='999'
          ENCODE(5,30,CDEPTH,ERR=770)IDEPTH
          DATA(41:45)=CDEPTH
C DRILL STEM AND WIRELINE TESTS
        ELSE IF(DDEP.EQ.1)THEN
          DATA(30:32)='999'
          ENCODE(5,30,CDEPTH,ERR=770)IDEPTH
          DATA(33:37)=CDEPTH
```

```
C DRILL SAMPLE
      ELSE IF(DSDEP1.EQ.1)THEN
        DATA(18:20)='999'
        ENCODE(5,30,CDEPTH,ERR=770)IDEPTH
        DATA(21:25)=CDEPTH
      ELSE IF(DSDEP2.EQ.1)THEN
        DATA(45:47)='999'
        ENCODE(5,30,CDEPTH,ERR=770)IDEPTH
        DATA(48:52)=CDEPTH
C PRODUCTION TEST
      ELSE IF(PDEP.EQ.1)THEN
        DATA(6:8)='999'
        ENCODE(5,30,CDEPTH,ERR=770)IDEPTH
        DATA(9:13)=CDEPTH
          ELSE
          GO TO 770
      ENDIF
 770  RETURN
      END
```

APPENDIX A

Shown below is an example of a data file which is ready for input to the main program. This file is in the retrieved WHCS format, including a blank line blank line between well records followed by a header record. Below tne header record line are core, drill sample, drill stem, wireline, and production test records.

Following the input data file is an example of the output data file. The break-down for the input and output header records are indicated below.

```
COLUMNS 1:10     DRILL HOLE API NUMBER
COLUMNS 11:18    LONGITUDE
COLUMNS 18:26    LATITUDE
COLUMNS 26:36    TOWNSHIP, RANGE, AND SECTION LOCATION
COLUMNS 37:44    PRODUCING GEOLOGIC AGE AND FORMATION
COLUMNS 45:46    WELL CLASS
COLUMNS 49:53    KB OR GROUND SURFACE ELEVATION
COLUMNS 54:55    WELL COMPLETION YEAR
COLUMNS 56:60    TOTAL DRILL DEPTH
COLUMNS 62:69    GEOLOGIC AGE AND FORMATION AT TOTAL DEPTH


COLUMNS 73:83    OUTPUT FILE AGE, FORMATION, AND SHOW DATA
        85:95       FILE LOCATIONS
        97:107
        109:119
        121:131

602DKOTJ451      AGE AND FORMATION SHOW CODE EXAMPLE
602              AGE CODE FOR CRETACEOUS J SST OF THE DAKOTA GROUP
   DKOTJ         FORMATION CODE FOR J SANDSTONE
        4        HIGHEST LEVEL OF TEST RUN WITH A SHOW- DST
         5       HIGHEST LEVEL OF TEST RUN IN THE HOLE- PRODUCTION
          1      TYPE OF SHOW- GAS OR UNDIFFERENTIATED
```

```
05001050031039143003974873S  3W 5831        50   505156 6088 602SKCK
30101CORE 01  5860- 5881 REC 21.00FT 602DKOTD          002
30201CORE 02  5890- 5945 REC 55.00FT 602DKOTJ          003
30301CORE 03  5945- 6000 REC 54.00FT 602DKOTJ     WET  004
40101DST 01       5952- 6000 602DKOTJ                 S005

05001050051037170203975295S  3W 5736        50   490355 5415 602SKCK
30101CORE 01  5182- 5194 REC 12.00FT 602DKOTD     OIL  002
40101DST 01       5234- 5239 602DKOTJ                 004

05001050221037173503977076S  3W 5724        50   485464 5287 602DKOTJ
61001           602DKOTJ WET
30101CORE 01  5180- 5230 REC 42.00FT 602DKOTD     OSTN 002

05001050241048195303977334S  3W 6619        60   535848 5702
40101DST 01       5406- 5427 604HYGN                  002

05001050361039360703978554S  3W 5913        60   516959 6248 602DKOTJ
30101CORE 01  6078- 6117 REC 37.00FT 602DKOTD     OSTN 002
```

```
30201CORE 02  6142- 6199 REC 50.00FT 602DKOTJ       GAS  003
30301CORE 03  6199- 6221 REC 04.00FT 602DKOTJ            004
40101DST 01        6166- 6199 602DKOTJ                   005
40201DST 02        6198- 6209 602DKOTJ                   006

05001050421041456103978807S  3W 6018602DKOTJ51   505359 6625 602DKOTJ
30101CORE 01  6496- 6521 REC 25.00FT 602DKOTD            002
40301DST 03        6572- 6578 602DKOTJ                  S005
50101PTS    780
50201PTP   8880                                        21HRS
50301PTF   3580PD
50102602DKOTJ PERF           W/  4/FT  6572- 6578
50202602DKOTJ PERF                     6572- 6578
50302602DKOTJ PERF                     6572- 6578

05001052151048529903985402S  2W 6726         09   52026112045 109PCMB
30101CORE 01  8492- 8519 REC 27.00FT 602DKOTJ      OSTN 003
30201CORE 02  8521- 8556 REC 35.00FT 602DKOTJ           004
30301CORE 03  8623- 8658 REC 35.00FT 602DKOT            006
30401CORE 04  8660- 8672 REC 10.00FT 602DKOT            007
30501CORE 05  8675- 8681 REC 06.00FT 602DKOT            008
30601CORE 06  9604- 9614 REC 00.00FT 452LYNS            010
30701CORE 07  9616- 9639 REC 23.00FT 452LYNS            011
32601CORE 26 11827-11829 REC 02.00FT 419FNTN            042
32701CORE 27 11872-11885 REC 13.00FT 109PCMB            043
32801CORE 28 11976-11985 REC 06.50FT 109PCMB            044
40101DST 01        8482- 8556 602DKOTJ                  S005
40201DST 02        8628- 8821 602DKOT                   S009
40301DST 03        9662- 9729 452LYNS             MISRUN 018
40401DST 04        9485-10016 419FNTN             MISRUN 020
40501DST 05        9836-10021 419FNTN  CUSH  2000 WTR    021
40601DST 06        9862-10057 419FNTN  CUSH   540 WTR    022
40701DST 07       10070-10317 419FNTN             MISRUN 024
40801DST 08       10130-10339 419FNTN  CUSH  1395 CUSH   026
40901DST 09       10336-10542 419FNTN  CUSH  1560 WTR    028
41001DST 10       10510-10729 419FNTN  CUSH  1547 WTR    030
41101DST 11       10755-10962 419FNTN  CUSH  2000 WTR    032
41201DST 12       11172-11439 419FNTN  CUSH  3043 WTR    041
41301DST 13 STRD 11172-11985 209ODVC                     045
41401DST 14 STRD 11172-11985 209ODVC
50102604PIRR  PERF           W/  2/FT  4531- 4534        036
50202419FNTN  PERF                    11172-12045 GROSS 048
```

**** EXAMPLE OUTPUT DATA FILE FROM ABOVE INPUT DATA FILE ****

```
05001050031039143003974873S  3W 5831  0     50   505156 6088 602SKCK
    602DKOTJ440 602DKOTD020
05001050051037170203975295S  3W 5736  0     50   490355 5415 602SKCK
    602DKOTD221 602DKOTJ040
05001050221037173503977076S  3W 5724  0     50   485464 5287 602DKOTJ
    602DKOTD221 602DKOTJ010
05001050241048195303977334S  3W 6619  0     60   535848 5702
    604HYGN 040
05001050361039360703978554S  3W 5913  0     60   516959 6248 602DKOTJ
    602DKOTJ242 602DKOTD221
```

```
05001050421041456103978807S  3W 6018602DKOTJ51   505359 6625 602DKOTJ
    602DKOTD020
05001052151048529903985402S  2W 6726  0     09   52026112045 109PCMB
    602DKOTJ441 602DKOT 440 419FNTN 040 2090DVC 040 452LYNS 020


     **** OVERFLOW OUTPUT DATA FILE TO LIST DRILL HOLES WITH
     MORE THAN 5 FORMATIONS WITH SHOWS ****


05001052151048529903985402S  2W 6726  0     09   52026112045 109PCMB
    109PCMB 020
```

APPENDIX B

VARIABLE VOCABULARY

AGECD	Production test formation age code
AGEFM	Production test formation code
CORESH	Core test show variable
COUNTERS	Most single and double alpha character integer functions serve either as counters or as temporary storage areas for sort procedures.
DATA	Each record is read and initially assigned to this character variable.
DSSH	Drill sample show variable
DSTSH	Drill stem test show variable
ELEV	Kelly bushing or surface elevation of drill hole
FMCD	Formation code
GAS1	Gas show code; 1
HCPROD	Oil production record
HEADER	Header record. Data is assigned to this variable when API, drill hole location, elevation, and depth criteria are met.
INPUT	Input data file variable.
JUNK	Junk.dat output file which lists erroneous data
LIST	Primary array location for age and show code integers. Variable is used in most sorting and ranking routines.
NADA(1-5)	No show variable for drill sample(1) through production(5) tests.
OIL3	Oil show code; 2
OILGAS	Oil and gas show code; 3
OUTPUT	Output data file variable
OUTPUT2	Output data file variable for wells with more than five show formations.

PRODAG	Age of formation in which production test run
PRODFM	Formation code of production test
PRODSH	Show in production test
TD	Total drill depth
TDFM	Formation at total depth
UNDIFF	Undifferentiated oil and/or gas show code; 1
WIRELN	Show in wireline test
UNIT(1-4)	Input and output data file locations
UNIT 5	Terminal input data is read to the screen.
UNIT 6	Data is read from the terminal.