```
$LARGE
      PROGRAM CPT
*
* Read CPT data from Hogy output
* Depth (m), Tip (bars), Local Friction (bars), Pore Pressure (m of water)
* Data will be read from ConeTec standard output renamed CPTIN
*
* Compute Parameters for Soil Type Identification and Strength
*
*
* This revision March 7, 1995
*

************************************************
***                                          ***
***       Initialization and Dimensions      ***
***                                          ***
************************************************

      DIMENSION D(2000),F(2000),P(2000),RELDEN(2000)
      DIMENSION TITLE(20),SU(2000)
      DIMENSION RPHI(2000),PPR(2000),SPT(2000)
      DIMENSION BASE(10),WC(10),CF(10),FRC(2000)
      DIMENSION Q(2000),SIGVO(2000)
      INTEGER SOILTYPE(2000)
      COMMON/BLOCK1/ NLINES
      COMMON/BLOCK2/SIGVE(2000),QT(2000)
      COMMON DR,I
      CHARACTER C(13)*28

      OPEN(2,FILE='CPTSTUBC',STATUS='NEW')
      OPEN(3,FILE='CPTHG',STATUS='NEW')
      OPEN(4,FILE='CPTSTEP',STATUS='NEW')
      OPEN(5,FILE='CPTIN',STATUS='OLD')
      OPEN(6,FILE='CPTOUT',STATUS='NEW')
*
*  Constants selected for computations
*
      AREARATIO=0.85
      GW=9.7885
      G=2.65
      SAT=0.25
      EMAX=0.912
      EMIN=0.477
      SIGVO(0)=0.0
      SIGVE(0)=0.0
*
*  Constants for Printing and Average Soil Properties
*
      NLINES=15
      SOILTYPE(0)=13
      D(0)=0.00
      TOP=0.00
      SUMQ=Q(1)
      SUMSIGVE=SIGVE(1)
```

```
      SUMSU=SU(1)
      SUMRPHI=RPHI(1)
      SUMRD=RELDEN(1)
      SUMSPT=SPT(1)
      SUMPPR=PPR(1)
      M=1
*
*  Initialization of Soiltype strings and Campy zone boundaries
*
      C(1)='sensitive fine grained'
      C(2)='organic material'
      C(3)='clay'
      C(4)='silty clay to clay'
      C(5)='clayey silt to silty clay'
      C(6)='sandy silt to clayey silt'
      C(7)='silty sand to sandy silt'
      C(8)='sand to silty sand'
      C(9)='sand'
      C(10)='gravelly sand to sand'
      C(11)='very stiff fine grained oc/c'
      C(12)='sand to clayey sand oc/c'
      C(13)='Oops! no class for me'

      C1H= -0.3
      C1K= -1.0
      CR1= 4.33
      S2X1= 0.0
      S2X2=12.0
      S2Y1= 0.0
      S2Y2= 1.0
      S3X1= 4.5
      S3X2=12.0
      S3Y1= 0.0
      S3Y2= 2.3
      C4H= -0.9
      C4K= 12.3
      CR4= 10.9
      S5X1= 0.0
      S5X2=12.0
      S5Y1= 5.8
      S5Y2= 5.8
      C6H= -0.2
      C6K= 10.6
      CR6= 8.35
      C7H= -1.2
      C7K= 11.0
      CR7=  8.2
      C8H= -2.6
      C8K= 12.1
      CR8= 8.65
      C9H= -2.9
      C9K= 11.5
      CR9= 7.15
      C10H= -1.7
      C10K=10.25
```

```
      CR10= 4.45
      C11H= -1.6
      C11K= 10.5
      CR11= 3.45
      C12H=  4.9
      C12K= 10.0
      CR12=  2.2
      S13X1= 1.0
      S13X2=12.0
      S13Y1=10.0
      S13Y2= 2.6
      S14X1=2.33
      S14X2= 7.5
      S14Y1= 0.0
      S14Y2=10.0
      S15X1= 5.6
      S15X2= 7.0
      S15Y1= 0.0
      S15Y2=10.0

***********************************************
***                                         ***
***   Interact with Screen & Read Cone Data   ***
***                                         ***
***********************************************

*
*  State Unit System understood to be read from disk
*
      WRITE(*,*)'Input expected in the following units:'
      WRITE(*,*)'           Depth            m'
      WRITE(*,*)'           Tip resistance   bars'
      WRITE(*,*)'           Friction         bars'
      WRITE(*,*)'           Pore pressure    m of water'
      WRITE(*,*)
      WRITE(*,28) AREARATIO
   28 FORMAT(' Qt computed using Net Area Ratio = ',F3.2)
      WRITE(*,*)
*
* Input from Screen
*
      WRITE(*,24)
   24 FORMAT(' Input Ground Elevation (m)              :  ',\)
      READ(*,*)GEM
      WRITE(*,*)'Input Watertable Depth (m)      '
      WRITE(*,25)
   25 FORMAT(' If ground submerged use negative value  :  ',\)
      READ(*,*)W
      IF(W.GE.0.0) GOTO 605
      WRITE(*,26)
   26 FORMAT(' Density ratio (free water/fresh water)  :  ',\)
      READ(*,*) H2OFAC
  605 WRITE(*,27)
   27 FORMAT(' How many soil strata to differentiate?  :  ',\)
      READ(*,*) NS
```

```
      WRITE(*,*)
        DO 20 M=1,NS
      WRITE(*,21) M
   21 FORMAT(' Input depth to base of stratum #',I2,'  :  ',\)
      READ(*,*) BASE(M)
      WRITE(*,22) M
   22 FORMAT(' % Moisture Content (sat) stratum #',I2,':  ',\)
      READ(*,*) WC(M)
*  Change moisture content from % to decimal
      WC(M)=WC(M)/100
      WRITE(*,23) M
   23 FORMAT(' Input Cone Factor for stratum #',I2,'   :  ',\)
      READ(*,*) CF(M)
      WRITE(*,*)
   20 CONTINUE
*
*  Write Headings to File "CPTOUT"
*
      WRITE(6,1004)
 1004 FORMAT( 15X,'CONE INTERPRETATION OUTPUT    written by W.E. Hodge,
     &P.Eng., Phoenix Engineering Ltd.')
      WRITE(6,1015)
 1015 FORMAT( 15X,'                              based on research publi
     &cations of U.B.C.',/)
      READ(5,1000)TITLE
 1000 FORMAT(20A4)
      WRITE(6,1001)TITLE
 1001 FORMAT(5X,20A4)
      READ(5,1002)TITLE
 1002 FORMAT(20A4)
      WRITE(6,1003)TITLE
 1003 FORMAT(7X,20A4,/)
*
* Print Mirror Input to File CPTOUT
*
      WRITE(6,6001) W
 6001 FORMAT(6X,' Watertable Depth (m)  ',F7.2)
      WRITE(6,6005) (M,M=1,NS)
 6005 FORMAT(6X,' Stratum Number        ',10I7)
      WRITE(6,6002) (BASE(M),M=1,NS)
 6002 FORMAT(6X,' Depth to Stratum Base ',10(F7.2))
      WRITE(6,6004) (WC(M),M=1,NS)
 6004 FORMAT(6X,' Moisture Content      ',10(F7.2))
      WRITE(6,6003) (CF(M),M=1,NS)
 6003 FORMAT(6X,' Cone Factor           ',10(F7.2))
      WRITE(6,6006)
 6006 FORMAT(6X,'                       ')
*
*  Print Headings
*
      WRITE(6,1006)
 1006 FORMAT(6X,' TOP OF SOIL    THICKNESS              SOILTYPE
     &     AVE Q     Bq     COHESION      SVE    PHI      DR    N    TOP
     & EL')
      WRITE(6,1007)
```

```
 1007 FORMAT(6X,'     m    ft       m   ft                UBC
     &       MPa           kPa     psf    kPa    deg       %
     &  m',/)
*
*  Read Cone Data from File
*
      IPD=0
        DO 113 I=1,2000
      READ (5,*,END=112) D(I),Q(I),F(I),P(I)
      IPD=IPD+1
      IF(Q(I).LE.0.0) Q(I)=0.0001
      IF(I.GT.1000) GOTO 114
      GOTO 113
  114 WRITE(*,1010)
 1010 FORMAT(6X,' THE PROGRAM ARRAY IS SET FOR A MAXIMUM OF 2000, THIS H
     &AS BEEN EXCEEDED BY THE INPUT FILE')
      GOTO 112
  113 CONTINUE

***********************************************
***                                         ***
***  Computations based on Cone Data in Bars  ***
***                                         ***
***********************************************

*
*  Determine Soil Type according to Campy chart
*

  112   DO 121 I=1,IPD

      FRC(I)=100.*F(I)/Q(I)
      IF(FRC(I).GE.8.0) FRC(I)=7.99
      Y=3.3333*LOG10(Q(I))
      X=1.5*FRC(I)
      SOILTYPE(I)=13

      YC2=S2Y1+(S2Y2-S2Y1)*(X-S2X1)/(S2X2-S2X1)
      YC3=S3Y1+(S3Y2-S3Y1)*(X-S3X1)/(S3X2-S3X1)
      IF((Y.LE.YC2).OR.(Y.LE.YC3)) GOTO 2
      D1=SQRT((X-C1H)**2+(Y-C1K)**2)
      IF(D1.LE.CR1) GOTO 1
      D4=SQRT((X-C4H)**2+(Y-C4K)**2)
      YC5=S5Y1+(S5Y2-S5Y1)*(X-S5X1)/(S5X2-S5X1)
      IF((Y.LE.YC5).AND.(D4.GE.CR4)) GOTO 3
      D6=SQRT((X-C6H)**2+(Y-C6K)**2)
      IF((Y.LE.YC5).AND.(D4.LT.CR4).AND.(D6.GE.CR6)) GOTO 4
      YC13=S13Y1+(S13Y2-S13Y1)*(X-S13X1)/(S13X2-S13X1)
      IF((Y.LE.YC13).AND.(D4.LT.CR4).AND.(D6.GE.CR6)) GOTO 4
      D7=SQRT((X-C7H)**2+(Y-C7K)**2)
      IF((Y.LE.YC13).AND.(D7.GE.CR7)) GOTO 5
      D8=SQRT((X-C8H)**2+(Y-C8K)**2)
      IF((Y.LE.YC13).AND.(D8.GE.CR8)) GOTO 6
      D9=SQRT((X-C9H)**2+(Y-C9K)**2)
      IF((Y.LE.YC13).AND.(D9.GE.CR9)) GOTO 7
```

```
      D10=SQRT((X-C10H)**2+(Y-C10K)**2)
      IF((Y.LE.YC13).AND.(D9.LT.CR9).AND.(D10.GE.CR10)) GOTO 8
      D12=SQRT((X-C12H)**2+(Y-C12K)**2)
      IF((D12.GE.CR12).AND.(D9.LT.CR9).AND.(D10.GE.CR10)) GOTO 8
      D11=SQRT((X-C11H)**2+(Y-C11K)**2)
      IF((D10.LT.CR10).AND.(D11.GE.CR11)) GOTO 9
      IF(D11.LT.CR11) GOTO 10
      YC14=S14Y1+(S14Y2-S14Y1)*(X-S14X1)/(S14X2-S14X1)
      YC15=S15Y1+(S15Y2-S15Y1)*(X-S15X1)/(S15X2-S15X1)
      IF((Y.GT.YC5).AND.(Y.GT.YC13).AND.(Y.LE.YC14)) GOTO 11
      IF((Y.GT.YC5).AND.(Y.GT.YC13).AND.(Y.LE.YC15)) GOTO 11
      IF((Y.GT.YC13).AND.(Y.GT.YC14).AND.(Y.GT.YC15))
     & GOTO 12
*
*  Go separate ways on basis of Soiltype
*
      GOTO 111
   1  SOILTYPE(I)=1
      FSPT=2.0
      GOTO 111
   2  SOILTYPE(I)=2
      FSPT=1.0
      GOTO 111
   3  SOILTYPE(I)=3
      FSPT=1.0
      GOTO 111
   4  SOILTYPE(I)=4
      FSPT=1.5
      GOTO 111
   5  SOILTYPE(I)=5
      FSPT=2.0
      GOTO 111
   6  SOILTYPE(I)=6
      FSPT=2.5
      GOTO 111
   7  SOILTYPE(I)=7
      FSPT=3.0
      GOTO 111
   8  SOILTYPE(I)=8
      FSPT=4.0
      GOTO 111
   9  SOILTYPE(I)=9
      FSPT=5.0
      GOTO 111
  10  SOILTYPE(I)=10
      FSPT=6.0
      GOTO 111
  11  SOILTYPE(I)=11
      FSPT=1.0
      GOTO 111
  12  SOILTYPE(I)=12
      FSPT=2.0
      GOTO 111
      SOILTYPE(I)=13
*
```

```
*  Write data to File " CPTSTUBC "
*
  111 WRITE(2,31) FRC(I),Q(I),D(I)
   31 FORMAT( 5X,3F10.3)
*
*  Calculate Equivalent SPT Blow Count
*
      SPT(I)=Q(I)/FSPT

 121  CONTINUE

************************************************
***                                          ***
***         Enter main computation loop      ***
***                                          ***
************************************************

*
*  Compute free water pressure
*
      FREEH2O=W*(-1.0)*GW*H2OFAC
      IF(W.LT.0.0) SIGVO(0)=FREEH2O
*
* Convert Units to kPa
*
        DO 131 I=1,IPD
      Q(I)=Q(I)*100.
      F(I)=F(I)*100.
      P(I)=P(I)*9.7885
*
*  Determine what stratum the cone tip is in
*
      IF(D(I).LE.BASE(1)) GOTO 301
      IF(D(I).LE.BASE(2)) GOTO 302
      IF(D(I).LE.BASE(3)) GOTO 303
      IF(D(I).LE.BASE(4)) GOTO 304
      IF(D(I).LE.BASE(5)) GOTO 305
      IF(D(I).LE.BASE(6)) GOTO 306
      IF(D(I).LE.BASE(7)) GOTO 307
      IF(D(I).LE.BASE(8)) GOTO 308
      IF(D(I).LE.BASE(9)) GOTO 309
      IF(D(I).LE.BASE(10)) GOTO 310
 301  NS=1
      GOTO 311
 302  NS=2
      GOTO 311
 303  NS=3
      GOTO 311
 304  NS=4
      GOTO 311
 305  NS=5
      GOTO 311
 306  NS=6
      GOTO 311
 307  NS=7
```

```
      GOTO 311
 308  NS=8
      GOTO 311
 309  NS=9
      GOTO 311
 310  NS=10
      GOTO 311
 311  CONTINUE
*
*  Compute the Stratum Unit Weights
*
      NFLAGRD=0
      GOTO 671
  670 E=EMAX-(RELDEN(I)/100.)*(EMAX-EMIN)
      NFLAGRD=1

  671 E=G*WC(NS)
      GWO1PE=GW/(1+E)
      IF(D(I).LT.W) GT=(G+(SAT*E))*GWO1PE
      GE=(G-1.)*GWO1PE
      GS=(G+E)*GWO1PE
*
*  Compute Vertical Total and Effective Stresses and Pore Water Pressures
*
      IF(W.LT.0.0) GOTO 600
      IF(D(I).LT.W) GOTO 601
* tip below watertable
      DELSVO=(D(I)-D(I-1))*GS
      DELSVE=(D(I)-D(I-1))*GE
      UO=(D(I)-W)*GW
      GOTO 602
* groundlevel under sea or river or lake
 600  DELSVO=(D(I)-D(I-1))*GS
      DELSVE=(D(I)-D(I-1))*GE
      UO=FREEH2O+(GW*D(I))
      GOTO 602
* tip above watertable
 601  DELSVO=(D(I)-D(I-1))*GT
      DELSVE=(D(I)-D(I-1))*GT
      UO=0.0

  602 SIGVO(I)=SIGVO(I-1)+DELSVO
      SIGVE(I)=SIGVE(I-1)+DELSVE
*
* Introduce Qt into calculations
* Qc used for Soiltype & N-value
* Qt used for Relative Density, Friction, Cohesion & Bq
*
      QT(I)=Q(I)+P(I)*(1.0-AREARATIO)
*
*  Calculate Relative Density for Sand Strata
*
      IF((SOILTYPE(I).EQ.8).OR.(SOILTYPE(I).EQ.9).OR.(SOILTYPE(I).EQ.10)
     &) GOTO 668
      GOTO 667
```

```
  668 CALL RDENSITY
      RELDEN(I)=DR
      IF(RELDEN(I).GT.100.0) RELDEN(I)=100.0
      IF(NFLAGRD.EQ.0) GOTO 670
  667 CONTINUE
*
*  Calculate PHI for Sand Strata
*
      IF((SOILTYPE(I).EQ.8).OR.(SOILTYPE(I).EQ.9).OR.(SOILTYPE(I).EQ.10)
     &) RPHI(I)=57.3*ATAN(LOG(QT(I)/(SIGVE(I)*0.2797))/6.779)
*
* Compute Qc, Su, Pore Pressure Ratio (now using Bq)
*
      QC=QT(I)-SIGVO(I)
      SU(I)=QC/CF(NS)
      PPR(I)=(P(I)-UO)/QC
      IF(PPR(I).LT.-0.2) PPR(I)=-0.2
      IF(PPR(I).GT.+1.4) PPR(I)=+1.4
 131  CONTINUE

************************************************
***                                          ***
***           Main Printing Section          ***
***                                          ***
************************************************

*
*  Calculate Stratum Thickness & Average Soil Parameters
*
        DO 222 N=1,IPD
      IF(N.EQ.IPD) GOTO 444
      IF(SOILTYPE(N).EQ.SOILTYPE(N-1)) GOTO 333
 444  AVQ=SUMQ/(M*1000.)
      AVSIGVE=SUMSIGVE/M
      AVSU=SUMSU/M
      AVSUf=AVSU*20.886
      AVRPHI=SUMRPHI/M
      AVRRD=SUMRD/M
      AVSPT=SUMSPT/M
      AVPPR=SUMPPR/M
      THICK=D(N-1)-TOP
      THICKf=THICK*3.281
      NSPT=INT(AVSPT+0.5)
      IF(N.EQ.1) GOTO 555
*
* Write to File " CPTSTEP "
*
      WRITE(4,7000) TOP,AVQ,AVPPR
      WRITE(4,7000) D(N-1),AVQ,AVPPR
 7000 FORMAT(6X,F7.2,6X,F7.2,6X,F7.2)
*
*  Selectively Print Results for Sands and Clays
*
      NLINES=NLINES+1
      IF(NLINES.EQ.61) CALL TITLES
```

```
      IF((SOILTYPE(N-1).EQ.3).OR.(SOILTYPE(N-1).EQ.4).OR.(SOILTYPE(N-1)
     &.EQ.5).OR.(SOILTYPE(N-1).EQ.1)) GOTO 455
      IF((SOILTYPE(N-1).EQ.8).OR.(SOILTYPE(N-1).EQ.9).OR.(SOILTYPE(N-1)
     &.EQ.10)) GOTO 466
      WRITE(6,1005) TOP,TOPf,THICK,THICKf,C(SOILTYPE(N-1)),AVQ,AVPPR,
     &AVSIGVE,NSPT,TOPEL
 1005 FORMAT(6X,F6.2,F6.1,F8.2,F5.1,3X,A30,F7.1,F7.3,15X,F7.0,15X,I5,F10
     &.2)
      GOTO 555
  455 WRITE(6,1008) TOP,TOPf,THICK,THICKf,C(SOILTYPE(N-1)),AVQ,AVPPR,
     &AVSU,AVSUf,AVSIGVE,NSPT,TOPEL
 1008 FORMAT(6X,F6.2,F6.1,F8.2,F5.1,3X,A30,F7.1,F7.3,F7.0,F8.0,F7.0,15X,
     &I5,F10.2)
      GOTO 555
  466 WRITE(6,1009) TOP,TOPf,THICK,THICKf,C(SOILTYPE(N-1)),AVQ,AVPPR,
     &AVSIGVE,AVRPHI,AVRRD,NSPT,TOPEL
 1009 FORMAT(6X,F6.2,F6.1,F8.2,F5.1,3X,A30,F7.1,F7.3,14X,F8.0,F7.0,F8.1,
     &I5,F10.2)
 555  TOP=D(N-1)
      TOPf=TOP*3.281
      TOPEL=GEM-TOP
*
*  Summate parameters for averaging elsewhere
*
      M=1
      SUMQ=Q(N)
      SUMSIGVE=SIGVE(N)
      SUMSU=SU(N)
      SUMRPHI=RPHI(N)
      SUMRD=RELDEN(N)
      SUMSPT=SPT(N)
      SUMPPR=PPR(N)
      GOTO 222

 333  M=M+1
      SUMQ=SUMQ+Q(N)
      SUMSIGVE=SUMSIGVE+SIGVE(N)
      SUMSU=SUMSU+SU(N)
      SUMRPHI=SUMRPHI+RPHI(N)
      SUMRD=SUMRD+RELDEN(N)
      SUMSPT=SUMSPT+SPT(N)
      SUMPPR=SUMPPR+PPR(N)
 222  CONTINUE
*
*  Write to File " CPTHG "
*
      RMAX=REAL(IPD)
      IPLOT=INT(RMAX/1000.0)+1
        DO 777 I=1,IPD,IPLOT
      QMPA=Q(I)/1000.
      WRITE(3,8000) D(I),QMPA,PPR(I)
 8000 FORMAT(6X,F7.2,6X,F7.2,6X,F7.2)
  777 CONTINUE
*
*  List output files
```

```
*
      WRITE(*,*)
      WRITE(*,*)
      WRITE(*,*)
      WRITE(*,*)'****************************************'
      WRITE(*,*)' '
      WRITE(*,*)'The following output files were created:'
      WRITE(*,*)' '
      WRITE(*,*)'     CPTOUT   Interpretation tabulation '
      WRITE(*,*)'     CPTHG    Input for HG full Qc & ppr'
      WRITE(*,*)'     CPTSTEP               stepped plot '
      WRITE(*,*)'     CPTSTUBC              soiltype plot'
      WRITE(*,*)' '
      WRITE(*,*)'****************************************'
      WRITE(*,*)
      WRITE(*,*)
      WRITE(*,*)

      STOP 'Program successfully completed !'

      END

************************************************
***                                          ***
***               Subroutines                ***
***                                          ***
************************************************

************************************************

      SUBROUTINE TITLES

************************************************

      COMMON/BLOCK1/ NLINES

      WRITE(6,1006)
 1006 FORMAT(6X,' TOP OF SOIL    THICKNESS              SOILTYPE
     &     AVE Q     Bq     COHESION      SVE    PHI      DR    N    TOP
     & EL')
      WRITE(6,1007)
 1007 FORMAT(6X,'     m    ft       m   ft               UBC
     &       MPa           kPa     psf    kPa    deg       %
     &  m',/)
      NLINES=4
      RETURN
      END

************************************************

      SUBROUTINE RDENSITY
*  Compute Relative Density of Sands using Baldi et al, 1982

************************************************
```

```
      COMMON/BLOCK2/ SIGVE(2000),QT(2000)
      COMMON DR,I
      IF(SIGVE(I).GT.50.) GOTO 444
      CALL EQN1(SIGVE(I),QT(I))
      IF(DR.GT.43.0) CALL EQN2(SIGVE(I),QT(I))
      IF(DR.GT.65.0) CALL EQN3(SIGVE(I),QT(I))
      GOTO 555
  444 CALL EQN4(SIGVE(I),QT(I))
      IF(DR.GT.39.0) CALL EQN5(SIGVE(I),QT(I))
      IF(DR.GT.60.0) CALL EQN6(SIGVE(I),QT(I))
  555 CONTINUE
      RETURN
      END

      SUBROUTINE EQN1(X1,QC)
      COMMON DR,I
      B1=QC+0.12915*X1**2-10.94414*X1+292.65547
      B2=0.001097*X1**2+1.30427*X1+23.6539
      DR=B1/B2
      RETURN
      END

      SUBROUTINE EQN2(X1,QC)
      COMMON DR,I
      B1=0.02*QC+0.0024*X1**2-0.54*X1+71.
      B2=0.00001*X1**2+0.019*X1+2.025
      DR=B1/B2
      RETURN
      END

      SUBROUTINE EQN3(X1,QC)
      COMMON DR,I
      B1=0.02*QC-0.0244*X1**2+5.9*X1+94.
      B2=-(.00036*X1**2)+0.11*X1+2.6
      DR=B1/B2
      RETURN
      END

      SUBROUTINE EQN4(X1,QC)
      COMMON DR,I
      A4=QC/(34.5*X1**0.78)
      B4=1.06/X1**0.0035
      DR=LOG(A4)/LOG(B4)
      RETURN
      END

      SUBROUTINE EQN5(X1,QC)
      COMMON DR,I
      A5=QC/(56.26*X1**0.772)
      B5=1.039/X1**0.00225
      DR=LOG(A5)/LOG(B5)
      RETURN
      END

      SUBROUTINE EQN6(X1,QC)
```

```
      COMMON DR,I
      A6=QC/(29.96*X1**0.922)
      B6=1.050/X1**0.00475
      DR=LOG(A6)/LOG(B6)
      RETURN
      END
```

→