Figure B-27 Simulated Groundwater Tables (Case 2)

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Figure B-28 Deviation of Groundwater Level (Case 2)

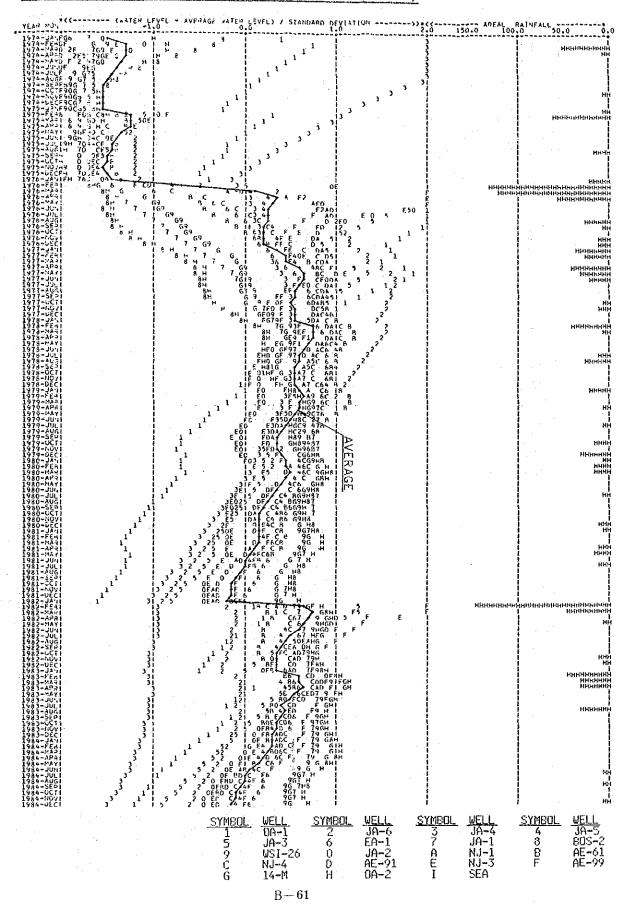


Figure B-29 Deviation of Groundwater Level (Case 2)
(12-months Moving Average)

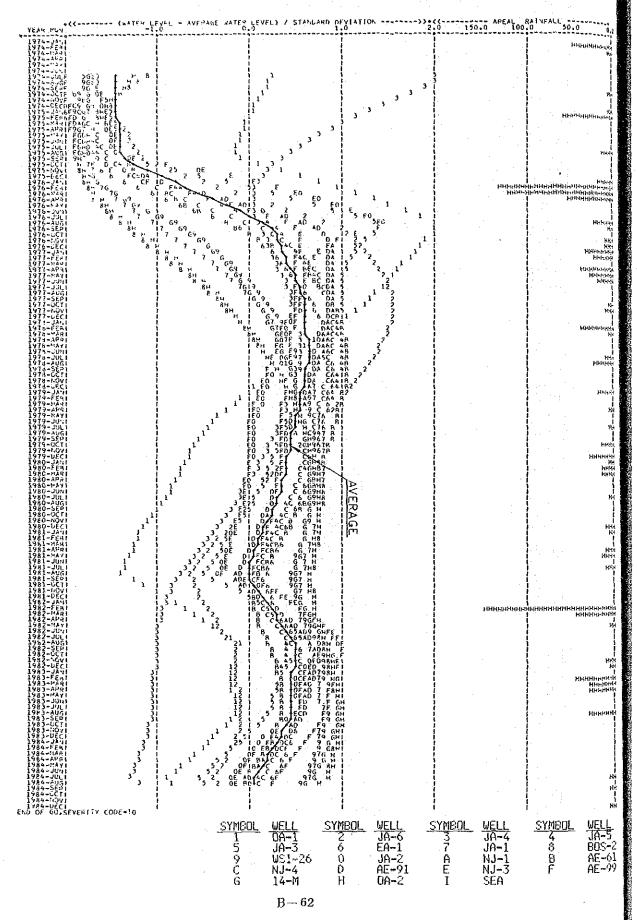


Figure B-30 Simulated Groundwater Tables (Case 3)

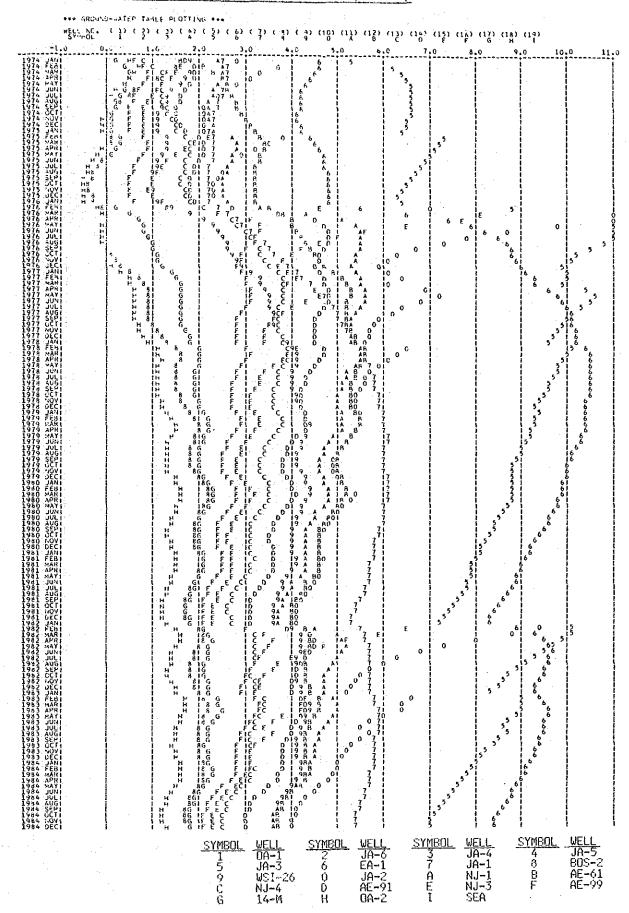


Figure B-31 Deviation of Groundwater Level (Case 3)

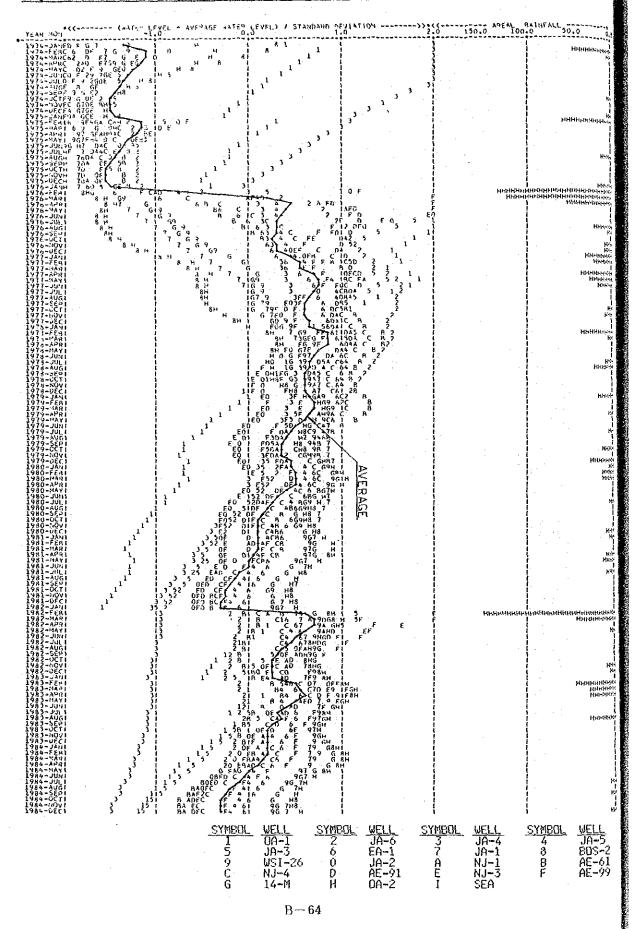


Figure B-32 Deviation of Groundwater Level (Case 3)
(12-months Moving Average)

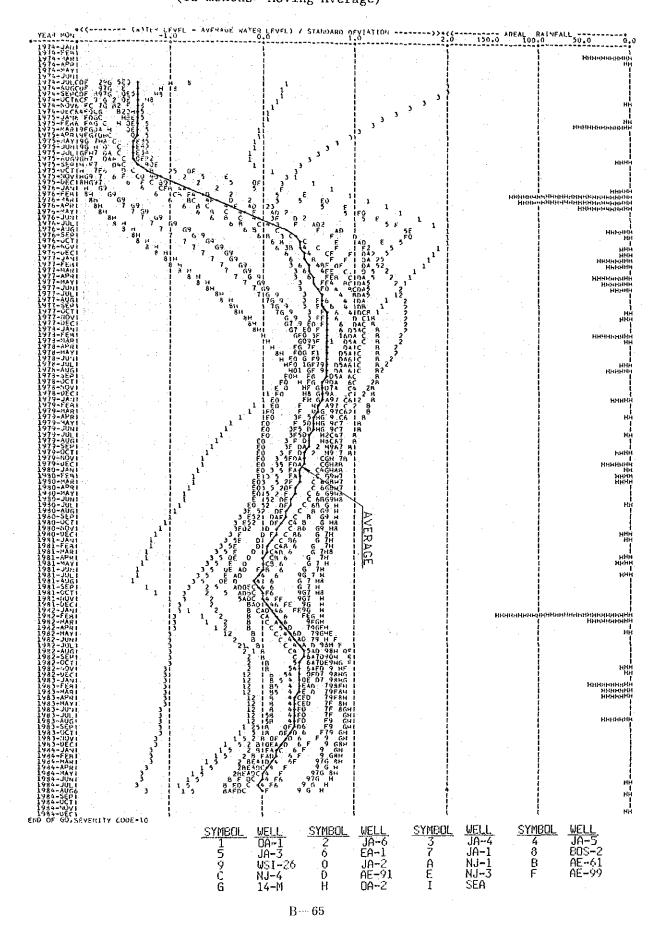


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Table B-9 Simulated Groundwater Tables (Case 0)

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Table B-10 Deviation of Groundwater Level (Case 0)

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Table B-11 Input Data for Groundwater Simulation (Case 1)

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Table B-13 Simulated Groundwater Tables (Case 1)

Table B-14 Deviation of Groundwater Level (Case 1)

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Table B-15 Input Data for Groundwater Simulation (Case 2)

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Table B-17 Simulated Groundwater Tables (Case 2)

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Table B-18 Deviation of Groundwater Level (Case 2)

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Table B-19 Input Data for Groundwater Simulation (Case 3)

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Table B-21 Simulated Groundwater Tables (Case 3)

Table B-22 Deviation of Groundwater Level (Case 3)

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                                                               # 00000400
Ċ
      (KASE=2 : PROPOSED CONDITION...AFTER PROJECT)
                                                               * 00000500
C
                                                               # 00000600
00000700
     CHARACTER*36 TITLE(6),TITLE2(3)
                                                                 00000800
     CHARACTER*40 DESC(15)
                                                                 00000900
     CHARACTER*10 UNI(15)
                                                                 00001000
     CHARACTER*8 UA(6),NDAM
                                                                 00001100
     CHARACTER*3 MMON(12)
                                                                 00001200
                                                                 00001300
     CHARACTER*1 SYM(23),G(120)
     DIMENSION QOUT(30),NOIJ(50,2),DIS(50),ETC(12),XR(4),HH(15,12,20), 00001400
              WID(50), DEP(50), UNIT(2), UNIT2(2), NDAY(12), QP(20),
                                                                 00001500
              R(12.31),Y(15),RT(12),RM(15.12),CA(3.6),RA(3.15.12.31), 00001600
              A(30), A2(30), A3(30), HO(30), CON(50), QDAM(20), QRED(20),
                                                                 00001700
              RDAM(20), RRED(20), ROI(30), WRJ(12), ROIA(30), RR(3,15,12), 00001800
              CAT(3), RELAX(30), H(30), QT(30,30), ST(30), RES(30), Q(30),
                                                                 00001900
              XE(10),QY(20),X(4,10),DEPP(30),ROSA(30),CAP(50),QIN(30),00002000
                                                                 00002100
              HP(20,132)
*** 00002200
                                                               * 00002300
  DATA STATEMENT
C
     NDAY ... NO. OF DAYS IN THE MONTHS
                                                               * 00002400
C
     MMON...NAME OF MONTH
                                                                00002500
C
     XR....RAIN COORDINATE FOR EFFECTIVE RAIN CALCULATION
                                                               * 00002600
XE....ET~CROP COORDINATE FOR EFFECTIVE RAIN CALCULATION
                                                                 00002700
                                                               * 00002800
     ETC....AVERAGE MONTHLY ET-CROP
     X....EFFECTIVE RAIN DATA BY FAO PUBLICATION
                                                               * 00002900
     DESC...DESCRIPTION FOR INPUT DATA
                                                                 00003000
                                                               * 00003100
     UNI....UNIT FOR INPUT DATA
                                                                 00003200
  00003300
     DATA NDAY/31,28,31,30,31,30,31,30,31,30,31/
     DATA MMON/3HJAN,3HFEB,3HMAR,3HAPR,3HMAY,3HJUN,
                                                                 00003400
                                                                 00003500
              3HJUL, 3HAUG, 3HSEP, 3HOCT, 3HNOV, 3HDEC/
                                                                 00003600
     DATA XR/12.5,25.0,37.5,50.0/
     DATA XE/25.0,50.0,75.0,100.0,125.0,150.0,175.0,200.0,225.0,250.0/ 00003700
                                                                 00003800
     DATA ETC/ 64.0, 68.8, 97.4,115.3,152.4,143.6,
                                                                 00003900
              138.3,130.5,126.8,106.1, 72.2, 63.8/
                                                                 00004000
     DATA X/ 8.,16.,24.,32., 8.,17.,25.,32., 9.,18.,27.,34.,
             9.,19.,28.,35.,10.,20.,30.,37.,10.,21.,31.,39.,
                                                                 00004100
                                                                 00004200
            11.,23.,32.,42.,11.,24.,33.,44.,12.,25.,35.,47.,
                                                                 00004300
            13.,25.,38.,50./
     DATA SYM/1H ,1H1,1H+,1HH,1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8,1H9,
                                                                 00004400
                                                                 00004500
              1H0,1HA,1HB,1HC,1HD,1HE,1HF,1HG,1HH,1HI/
                                                                 00004600
                                                    1,
     DATA DESC/40H1 CAT : CATCHMENT AREA
                                                                 00004700
              40HI A : AREA OF BLOCK
              40H1 A2 : ADDITIONAL AREA FOR EACH BLOCK 1,
                                                                 00004800
```

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```
40H1 A3 : ADDITIONAL AREA FOR EACH BLOCK 1.40H1 ROI : RATE OF INFILTRATION 1.
                                                                        0000490
                                                                        0000500
0000510
                40HI DEPP: ELEVATION OF ROCK FOUNDATION
                                                          1,
                40HI WRI : IRRIGATION WATER REQUIREMENT
                                                                        0000520
                                                                        0000530
                40HI WRO : OTHER WATER REQUIREMENT
                40H1 ROIA: RATE OF IRRIGATION APPLICATION 1.40H1 ROSA: RATE OF SUPPLY EXTRACTION 1.
                                                                        0000540
0000550
                                                                        0000560
                40H1 H
                        : WATER TABLE ELEVATION
                                                                        000051
                40HI DIS : DISTANCE BETWEEN BLOCKS
                40H1 WID : CROSS-SECTIONAL WIDTH
                                                                        0000580
                                                          1 /
                40HI DEP : DEPTH OF IMPERMEABLE FOUNDATION!
                                                                        0000590
                40HI CON : PERMEABILITY COEFFICIENT
                                                          17
                                                                        9000000
                                         1,10H SQ.KM
      DATA UNI/10H SQ.KM
                           1,10H SQ.KM
                                                                        0000610
               10H SQ.KM
                                                                        000062@
                          1,10H
                                         1,10H M. AMSL
               10H MCM/MON. 1, 10H MCM/YEAR 1, 10H
                                                                        000063@
                                                       1,
                                                                        0000640
0000650
                       1,10H M.AMSL 1,10H KM
                           1,10H M
                                         1,10H M/MIN.
               10H KM
    **** 000066E
                                                                      * 000067@
    BASIC PARAMETERS FOR COMPUTATION
NOB ... NO. OF POLYGONAL ZONES (GROUND-WATER BLOCK)
                                                                      * 000068g
      NOA ... NO. OF WATER PASSES
                                                                      * 000069k
                                                                        0000706
      KASE...NO. OF COMPUTATION CASES
         KASE=1..PRESENT CONDITION
                                                                        0000710
         KASE = 2 . . PROPOSED CONDITION
                                                                        0000720
                                                                       0000730
      NENS...FIRST YEAR FOR RAIN COMPUTATION
      MONS...FIRST MONTH FOR RAIN COMPUTATION
                                                                        0000740
      NENE...LAST YEAR FOR RAIN COMPUTATION
                                                                       0000750
      MONE...LAST MONTH FOR RAIN COMPUTATION
                                                                      # 000076@
                                                                      # 0000176
      NENSA..FIRST YEAR FOR GROUND-WATER SIMULATION
      MONSA.. -DO- MONTH
                                                                        0000780
      NENEA..LAST YEAR FOR GROUND-WATER SIMULATION
                                                                        0000790
                                                                       0000800
      MONEA.. -DO- MONTH
      NOSEA..NODAL NO. ASSIGNED FOR OPEN SEA BLOCK
                                                                        0000810
                                                                       0000820
      IRSM...PARAMETER FOR MONTHLY SPOT RAINFALL LISTING
      IRSY... -DO- YEARLY SPOT RAINFALL I IRSM/IRSY/IRAM/IRAY
                                                                      * 00008303
      IRAM... -DO- MONTHLY AREAL RAIN
                                                                      * 0000840
                                         i ≠1 PRINTING RESULTS
      IRAY... -DO- YEARLY AREAL RAIN
                                                                        0000850
                                         I =0 NO PRINTING
     0000860
      READ(5,1) KASE, NOB, NOA
                                                                        0000876
                                                                        0000880
      READ(5,1) NENS, MONS, NENE, MONE
     READ(5,1) NENSA, MONSA, NENEA, MONEA
READ(5,1) NOSEA
                                                                        0000890
                                                                        0000900
                                                                        0000916
      READ(5:1) IRSM, IRSY, IRAM, IRAY
                                                                        0000920
   ************************
                                                                      * 000093M
    S...STORATIVITY
Č
                                                                      * 000094E
    AOI . AREA OF IRRIGATION APPLICATION (HA)
    A012. AREA OF ADDITIONAL IRRIGATION APPLICATION(HA)
                                                                      * 0000956
    DAMCAP..CAPACITY OF DAM(MCM)
                                                                      * 0000960
                                                                       0000976
C******************
                                                                        0000980
      READ(5,2) S,AOI,AOI2,DAMCAP
                                                                        00009961
      NOB1=NOB-1
                                                                        0001000
【张铃娟格技农技术格技计减强改强技计标技格技能够被的转移的特殊的特殊的特殊的特殊的特殊的特殊的技术
                                                                      * 0001010
   INPUT DATA FORMAT
                                                                        0001020
0001030
   1 FORMAT(1615)
                                                                        0001040
    2 FORMAT(6F10.0)
                                                                        0001050
    3 FORMAT(1514)
```

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```
4 FORMAT(10F5.1/10F5.1/11F5.1)
                                                             00010600
   5 FORMAT(A36)
                                                             00010700
   6 FORMAT(20A4)
                                                             00010800
   7 FORMAT(6A8)
                                                             00010900
   8 FORMAT(12F5.0)
                                                             00011000
   INPUT DATA
                                                            * 00011200
     CAT ... CATCHMENT AREA (SO.KM) AT DAM + BELOW DAM + ENTIRE
C
                                                            * 00011300
       CAT(1)...AT DAM
* 00011400
       CAT(2) ... BELOW DAM
                                                            * 00011500
      CAT(3) ... ENTIRE BASIN(AT RIVER-MOUTH)
                                                            * 00011600
     A....AREA OF GROUND-WATER BLOCK (SQ.KM)
                                                            * 00011700
     A2....AREAL CONTRIBUTION OF RECHARGE FROM UPSTREAM DAM(SQ.KM)
                                                           * 00011800 S
     A3.... -DO- FROM RESIDUAL AREA BELOW DAM(SQ.KM)
ROI.... -DO- OF DIRECT RECHARGE FROM SURFACE FLOW (*100%)
                                                            * 00011900
                                                            * 00012000
     DEPP. . . ELEVATION OF ROCK FOUNDATION (M. AMSL)
                                                            * 00012100
     WRI....MONTHLY IRRIGATION WATER REQUIREMENT (MCM/MONTH)
                                                            * 00012200
     WRO. . . . WATER REQUIREMENT FOR OTHER USES (MCM/YEAR)
                                                            * 00012300
     ROIA...RATE OF IRRIGATION APPLICATION
                                                            * 00012400
     ROSA...RATE OF SUPPLY EXTRACTION
                                                            * 00012500
     H.... GROUND-WATER TABLE (M. AMSL)
                                                            * 00012600
     DIS....DISTANCE BETWEEN GROUND-WATER BLOCKS(KM)
                                                            * 00012700
     WID ... CROSS-SECTIONAL WIDTH BETWEEN BLOCKS (KM)
                                                            * 00012800
     DEP....DEPTH OF IMPERMEABLE FOUNDATION AT MID-POINT OF PASS
                                                            * 00012900
     CON. . . PERMEABILITY COEFFICIENT(M/MIN.)
                                                            * 00013000
READ(5,2) (CAT(1),1=1,3)
                                                             00013200
     READ(5,2) (A(1),1=1,NOB)
READ(5,2) (A2(1),1=1,NOB)
                                                             00013300
                                                             00013400
     READ(5,2) (A3(1),1=1,NOB)
                                                             00013500
     READ(5,2) (ROI(1),1=1,NOB)
                                                             00013600
                                                             00013700
     READ(5,2) (DEPP(1),1=1,NOB)
     READ(5,2) (WRI(1), I=1,12)
                                                             00013800
                                                             00013900
     READ(5/2) WRO
                                                             00014000
     READ(5,2) (ROIA(1),1=1,NOB)
READ(5,2) (ROSA(1),1=1,NOB)
                                                             00014100
     READ(5/2) (H(1)/I=1/NOB)
                                                             00014200
                                                             00014300
     READ(5,2) (DIS(1),1=1,NOA)
    READ(5,2) (WID(1),1=1,NOA)
READ(5,2) (DEP(1),1=1,NOA)
                                                             00014400
                                                             00014500
                                                             00014600
     READ(5/2) (CON(1), l=1, NOA)
* 00014800
   TITLE DATA FOR RAINFALL LISTING
C
                                                            * 00014900
     TITLE, TITLE2... HEADING TITLE OF RAINFALL TABLE
C
                                                            * 00015000
     UNIT, UNIT2 .... UNITS
00015200
     READ(5,5) (TITLE(1),1=1,6)
                                                             00015300
     READ(5,5) (TITLE2(1),1=1,3)
                                                             00015400
     READ(5,6) UNIT
                                                             00015500
     READ(5/6) UNIT2
* 00015700
   UA...NAME OF RAINFALL STATION(SPOT)
                                                            * 00015800
   CA... AREAL RATIO BY THIESSEN
C
                                                            * 00015900
     I=1...ABOVE DAM
C
                                                            * 00016000
¢
     1=2...BELOW DAM
                                                            * 00016100
     1=3...ENTIRE BASIN(AT RIVER-MOUTH)
```

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```
READ(5,7) (UA(1),1=1,6)
                                                              0001630
                                                              0001640
     READ(5,2) ((CA(1,J),J=1,6),1=1,3)
* 0001660
  NOIJ...NO. OF POLYGONAL ZONES TO BE CONNECTED BY EACH PASS
  ** 000167<sub>01</sub>
     READ(5,3) ((NOIJ(1,J),J=1,2),1=1,NOA)
                                                              0001686
                                                            * 0001698
DELTA...TIME INTERVAL FOR COMPUTATION (YEAR)
Ċ
                                                            * 0001700
                                                            * 00017100
   ERROR...ALLOWABLE ERROR FOR RELAXATION
0001730
     DELTA=1.0/12.0
     ERROR*0.002
                                                              00017400
# 00017600
   AREAL RAIN - RUNOFF RELATION (FROM HYDROLOGICAL ANALYSIS)
Č
     NOQD...NO. OF DATA AT DAM-SITE
                                                            * 00017700
C
     RDAM . . . AREAL RAIN DATA AT DAM-SITE(MM)
                                                            * 00017800
Ĉ
     QDAM...RUNOFF DATA AT DAM-SITE(MM)
NOQR...NO. OF DATA AT RIVER-MOUTH
                                                            * 00017900
                                                            * 00018000
     RRED...AREAL RAIN DATA AT RIVER-MOUTH(MM)
C
                                                            * 00018100
C
     QRED...RUNOFF DATA AT RIVER-MOUTH(MM)
                                                            * 00018200
00018300
     READ(5,1) NOQD
                                                              00018400
                                                              00018500
     READ(5/8) (RDAM(1),QDAM(1), [=1,NOQD)
                                                              00018600
     READ(5:1) NOOR
     READ(5,8) (RRED(1), QRED(1), 1=1, NOQR)
                                                              00018700
*** 00018800
  PRINTING OF INPUT DATA AND PARAMETER
                                                            * 00018900
C好好帮好证好帮来投口都表现你好找好好的根本好好好的证据者看到我的的事情的要求的事情的要求的要求的要求的的证明的的事情的。 00019000
     WRITE(6,90) (1,1=1,50)
                                                              00019100
     WRITE(6,91)
                                                              00019200
     WRITE(6,92) DESC(1), UNI(1), (CAT(1), 1=1,3)
                                                              00019300
     WRITE(6,91)
                                                              00019400
     WRITE(6,93) DESC(2), UNI(2), (A(1), 1=1, NOB)
                                                              00019500
     WRITE(6,91)
                                                              00019600
     WRITE(6,92) DESC(3), UNI(3), (A2(1), 1=1, NOB)
                                                              00019700
     WRITE(6,91)
                                                              00019800
     WRITE(6,93) DESC(4), UNI(4), (A3(1), 1=1, NOB)
                                                              00019900
     WRITE(6,91)
                                                              00020000
     WRITE(6,93) DESC(5), UNI(5), (RQ1(1), I=1, NOB)
                                                              00020100
     WRITE(6,91)
                                                             00020200
     WRITE(6,92) DESC(6), UNI(6), (DEPP(1), 1=1, NOB)
                                                              00020300
                                                             00020400
     WRITE(6,91)
     WRITE(6,94) DESC(7), UNI(7), (WRI(M), M=1,12)
                                                             00020500
     WRITE(6,91)
                                                              00020600
     WRITE(6,94) DESC(8), UNI(8), WRO
                                                              00020700
     WRITE(6,91)
                                                              00020800
     WRITE(6,93) DESC(9), UNI(9), (ROIA(1), 1=1, NOB)
                                                             00020900
     WRITE(6,91)
                                                             00021000
     WRITE(6,93) DESC(10), UNI(10), (ROSA(1), I=1, NOB)
                                                             00021100
     WRITE(6,91)
                                                             00021200
     WRITE(6,93) DESC(11), UNI(11), (H(I), I=1, NOB)
                                                             00021300
     WRITE(6/91)
                                                             00021400
     WRITE(6,92) DESC(12), UNI(12), (DIS(J), J=1, NOA)
                                                             00021500
     WRITE(6,91)
                                                             00021600
     WRITE(6,92) DESC(13), UNI(13), (WID(J), J=1, NOA)
                                                             00021700
                                                             00021800
     WRITE(6,91)
                                                             00021900
     WRITE(6,92) DESC(14), UNI(14), (DEP(J), J=1, NOA)
```

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```
WRITE(6,91)
                                            00022000
   WRITE(6,94) DESC(15), UNI(15), (CON(J), J=1, NOA)
                                            00022100
   WRITE(6,91)
                                            00022200
C 
  NEN=NO.OF YEARS FOR RAINFALL COMPUTATION
                                          * 00022400
【我我想的我好的我的事就是我我我我我的的事情的我们的我们的我们的我们的事故我们会的我们的的人们的人们
                                    ******** 00022500
   NEN=NENE=NENS+1
                                            00022600
   DO 101 [=1,31
                                            00022700
   DO 101 M=1,12
DO 101 N=1,NEN
                                            00022800
                                            00022900
   DO 101 L=1.3
                                            00023000
                                            00023100
 101 RA(L,N,M,I)=0.0
C*******************
                                            00023200
  LOOP FOR RAIN STATION
                                           * 00023300
                                            00023400
   DO 200 K=1.6
* 00023700
  LOOP FOR YEAR
                                            00023800
   DO 180 N=NENS, NENE
00024000
   NN=N=NENS+1
* 00024200
  LOOP FOR COMPUTATION CASE
C
                                           # 00024300
   L=1...AREAL RAIN AT DAM-SITE
C
                                            00024400
   L=2...AREAL RAIN BELOW DAM
C
   L=3...AREAL RAIN AT RIVER-MOUTH
                                            00024500
                                            00024600
   DO 100 L=1.3
00024700
                                            00024800
   IF(L.EQ.1) READ(8,7) NDAM
* 00024900
                                           * 00025000
  LOOP FOR MONTH
                                            00025100
   DO 100 M=1,12
                                            00025200
00025300
   IF(N.EQ.NENS.AND.M.LT.MONS) GO TO 110
   IF(N.EQ.NENE.AND.M.GT.MONE) GO TO 110
                                            00025400
                                            00025500
   IF(L.EQ.1) READ(8,4) (R(M,1),1=1,31)
                                            00025600
   DO 130 [=1,31
                                            00025700
 130 RA(L,NN,M,1)=RA(L,NN,M,1)+R(M,1)*CA(L,K)
                                            00025800
   GO TO 100
                                            00025900
 110 DO 120 I=1,31
                                            00026000
 120 RA(L,NN,M,1)=999999.0
                                            00026100
 100 CONTINUE
# 00026200
                                           * 00026300
  SUBROUTINE CALL FOR MONTHLY SPOT RAINFALL LISTING
                                            00026400
   CALL KTBLM(N,NN,TITLE(K),UNIT,R,RT,Y(NN), IRSM)
00026500
                                            00026600
   DO 115 M=1.12
                                            00026700
 115 RM(NN,M)=RT(M)
                                            00026800
180 CONTINUE
                                           * 00027000
  SUBROUTINE CALL FOR YEARLY SPOT RAINFALL LISTING
r
                                            00027100
   CALL KTBLY(NENS, NENE, TITLE(K), UNIT2, RM, Y, IRSY)
00027300
 200 CONTINUE
                                            00027400
   DO 300 L=1.3
                                            00027500
   DO 319 N=NENS, NENE
                                            00027600
   NN=N-NENS+1
```

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0002770
    DO 310 l=1,31
                                                  00027800
    DO 310 M#1,12
                                                  00027900
 310 R(M,I)*RA(L,NN,M,I)
* 0002810j
  SUBROUTINE CALL FOR MONTHLY AREAL RAINFALL LISTING
                                                  00028200
    CALL KTBLM(N, NN, TITLE2(L), UNIT, R, RT, Y(NN), IRAM)
                                                  00028300
    DO 311 M=1.12
                                                  0002840
                                                  0002850
 311 RR(L,NN,M)=RT(M)
    IF(IRAM.GT.O) WRITE(6,61) (UA(1),CA(L,1),1=1,6)
                                                  00028600
                                                  0002870
    DO 315 M=1,12
 315 RM(NN,M)=RT(M)
                                                  00028800
                                                  00028900
 319 CONTINUE
                                                *** 00029000
SUBROUTINE CALL FOR YEARLY AREAL RAINFALL LISTING
                                                 * 00029100
                                                  00029200
    CALL KTBLY(NENS, NENE, TITLE2(L), UNIT2, RM, Y, IRAY)
0002940
    IF(IRAY, GT. 0) WRITE(6,61) (UA(1), CA(L,1), 1=1,6)
                                                  00029500
 300 CONTINUE
  61 FORMAT(1H0,5X, *** AREAL RATIO ****/6X,6(A8, *=*, F5.3,4X))
                                                 00029600
SINGLE EVENT FLOOD RUNOFF CALCULATION
                                                * QQQ29800
    SRMA....ACCUMULATED RAINFALL AT DAM(MM)
                                                 * 00029900
C
    SRMB....ACCUMULATED RAINFALL AT RIVER-MOUTH(MM)
                                                 * 00030000°
C
    SR....MONTHLY TOTAL RAINFALL BELOW DAM(MM)
                                                 * 00030100
00030300
    SRMA=0.
    SRMB#0.
                                                  00030400
                                                  00030500
    K@=KASE+17
    IF(KASE.E0.1) WRITE(6,621)
                                                  00030600
                                                  00030700
    1F(KASE_EQ.2) WRITE(6,622) (1,1=1,KQ)
                                                  00030800
    VOLO ... O.
                                                  00030900
    DO 395 1=1/KQ
 395 QP(1)=0.
                                                  0003100
    QSEAP=0.
                                                  00031100
                                                ** 00031200
INITIAL STORAGE OF GROUND-WATER BASIN
                                                 * 00031300
00031500
   DO 390 1=1,NOB1
 390 VOL0=VOL0+(H(I)=DEPP(I))*S*A(I)
                                                  00031600
    MP≈0
                                                  00031700
* 00031900
C
  LOOP FOR COMPUTATION YEAR
    NN...ORDERING NO.OF YEAR FOR RAIN ANALYSIS
                                                 * 00032000
                  FOR GROUND-WATER SIMULATION
                                                * 00032100
C
    NM... -DO-
                                                  00032200
    DO 400 N=NENS, NENE
00032300
                                                  00032400
    NN=N-NENS+1
                                                  00032500
    NM=N-NENSA+1
                                                  00032600
    NDAY(2)=28
    IF (MOD(N,4),EQ.0) NDAY(2)=29
                                                  00032700
                                                  00032800
    IF (N.LT. NENSA. OR. N. GT. NENEA) GO TO 400
    DO 408 1=1.KQ
                                                  00032900
 408 QY(1)=0.0
                                                  00033000
                                                  00033100
    QSEAY=0.
* 00033300
  LOOP FOR COMPUTATION MONTH
```

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```
DO 410 M=1.12
                                                        00033400
IF(N.EQ.NENSA.AND.M.LT.MONSA) GO TO 410
                                                        00033600
    IF(N.EQ.NENEA.AND.M.GT.MONEA) GO TO 410
                                                        00033700
    MP=MP+1
                                                        00033800
Q(15)....MONTHLY TOTAL OF IRRIGATION WATER USE (MCM/MONYH) * 00034000
C
    Q(16)... -DO- OTHER WATER USES (MCM/MONTH)
Q(17)... -DO- ADDITIONAL WATER USES (WHEN KASE=2)
Q(18)... -DO- GROUND-WATER EXTRACTION (MCM/MONTH)
C
                                                       * 00034100
C
                                                       * 00034200
                                                      * 00034300
  C**
    Q(15)=WRI(M)
                                                        00034500
                                                        00034600
    Q(16)=WRO*DELTA
    IF(KASE-1), 411,411,412
                                                        00034700
                                                        00034800
 411 \ Q(18) = Q(15) + Q(16)
                                                        00034900
    GO TO 413
                                                        00035000
 412 Q(17)=Q(15)*AO12/AO1
                                                        00035100
    Q(18)=Q(15)+Q(16)+Q(17)
                                                         00035200
 413 CONTINUE
                                                      ** 00035300
* 00035400
    ND....NO. OF DAYS IN THE MONTH
    RUNA..MONTHLY RUNOFF AT DAM (MM)
RUNB.. -DO- AT RIVER-MOUTH (MM)
                                                       * 00035500
č
                                                       * 00035600
                                                       * 00035700
    SR. . . MONTHLY AREAL RAINFALL BELOW DAM (MM)
Ċ
                                                       # 00035800
    SPILL..SPILLAGE FROM DAM(MCM) (WHEN KASE=2)
 *******************************
    ND=NDAY(M)
                                                         00036100
    RUNA=0.
                                                         00036200
    RUNB=0.
                                                         00036300
    SPILL=0.
                                                         00036400
    SR#0.0
                                                       ×× 00036500
* 00036600
   LOOP FOR DAY
                                                         00036700
    DO 420 I=1.ND
****** 00036800
                                                         00036900
    SR=SR+RA(2,NN,M,1)
                                                         00037000
    SRMA=SRMA+RA(1,NN,M,I)
                                                         00037100
     IF(RA(1,NN,M,1)-0.1) 421,422,422
                                                         00037200
 421 IF(SRMA-RDAM(1)) 423,423,424
                                                         00037300
 423 SRMA=0.
                                                         00037400
    GO TO 422.
                                                         00037500
 424 QAD=FUNQ(NOQD, RDAM, QDAM, SRMA)
                                                         00037600
    IF(KASE.EQ.1) GO TO 428
                                                         00037700
     YY=@AD*CAT(1)*0.001
                                                         00037800
     IF(YY.GT.DAMCAP) SPILL=SPILL+YY-DAMCAP
                                                         00037900
 428 RUNA=RUNA+QAD
                                                         00038000
    SRMA=0.
                                                         00038100
 422 SRMB=SRMB+RA(3,NN,M,1)
                                                         00038200
     IF(RA(3,NN,M,1)-0.1) 425,420,420
                                                         00038300
 425 |F(SRMB-RRED(1)) 426,426,427
                                                         00038400
 426 SRMB=0.
                                                         00038500
    GO TO 420
                                                         00038600
 427 QAD=FUNQ(NOOR, RRED, ORED, SRMB)
                                                         00038700
     RUNB=RUNB+QAD
                                                         00038800
     SRMB=0.
                                                         00038900
 420 CONTINUE
```

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```
~~!!!=#====1===#;:au=#;:au=2====#==au=3::nu=#===#==#u=#==================7=R======
                                                                       * 00039100
    CALCULATION OF EFFECTIVE RAINFALL
                                                                       # 000392<sub>00</sub>
      XX...MONTHLY EFFECTIVE RAINFALL (MCM/MONTH)
                                                                         00039300
C 朴朴钦钦钦钦赫法法格钦张农镇联络福禄铉标称称新新校钦禄钦福禄籍张校禄禄辅辅籍陈锡禄张禄禄禄禄禄禄禄禄禄禄禄禄禄禄禄禄禄禄禄禄
      DO 431 1=1,4
                                                                         00039400
                                                                         00039500
      1 = 1
                                                                         00039600
      1F(SR-XR(I)) 432,431,431
  431 CONTINUE
                                                                         00039700
                                                                         00039800
  432 DO 433 J=1,10
      ل≖لل
                                                                         00039900
                                                                         00040000
      1F(ETC(M)=XE(J)) 434,433,433
  433 CONTINUE
                                                                         00040100
  434 1=MAXO(11-1,1)
                                                                         00040200
                                                                         00040300
      J=MAX0(JJ-1,1)
      X1=X(1,J)+(XR(1)-SR)*(X(1+1,J)-X(1,J))/(XR(1)-XR(1+1))
                                                                         00040400
                                                                         00040500
      X2=x(1,J+1)+(XR(1)-SR)*(X(1+1,J+1)-X(1,J+1))/(XR(1)-XR(1+1))
                                                                         00040600
      XX=X1+(X1-X2)+(XE(J)-ETC(M))/(XE(J+1)-XE(J))
      XX=AMAX1(XX/0.)*(AOI+AOI2)*1.0E=5
                                                                         00040700
                                                                      ** 0004080g
* 00040900
    INITIALIZING INFLOW RATE INTO EACH POLYGONAL ZONE
00041000
                                                                         00041100
     DO 430 I=1.NOB
                                                                         00041200
  430 QIN(1)=0.
   * 00041400
    WHEN KASE = 1 (PRESENT CONDITION)
                                                                       * 00041500
      Q(1)...AREAL RAINFALL AT DAM (MM)
                                                                       * 00041600
C
      @(2)...MONTHLY TOTAL RAIN WATER ABOVE DAM (MCM/MONTH)
Ċ
     @(3)...FALAJ USES ABOVE DAM (MCM/MONTH)
@(4)...BASE FLOW FROM UPSTREAM OF DAM (MCM/MONTH)
                                                                       # 00041700
                                                                       * 00041800
Ċ
      Q(5)...DIRECT RUNOFF FROM DAM CATCHMENT (MCM/MONTH)
                                                                       * 00041900
      Q(6)...EVAPOTRANSPIRATION LOSSES FROM DAM CATCHMENT (MCM/MONTH) * 00042000
C
      Q(7) ... AREAL RAINFALL BELOW DAM (MM)
                                                                        00042100
      Q(8)...MONTHLY TOTAL RAIN WATER BELOW DAM (MCM/MONTH)
                                                                       * 00042200
      0(9)...DIRECT RUNOFF FROM CATCHMENT BELOW DAM (MCM/MONTH)
                                                                       * 00042300
Q(10)..DIRECT RECHARGE FROM CATCHMENT BELOW DAM (MCM/MONTH)
                                                                       * 00042400
                                                                       * OOO42500
      Q(11)..DIRECT RUNOFF INTO SEA (MCM/MONTH)
      @(12)..TOTAL RECHARGE INTO GROUND-WATER (MCM/MONTH)
                                                                       * 00042600
                                                                       * 00042700
    WHEN KASE=2 (PROPOSED CONDITION)
      Q(1)...MONTHLY TOTAL RAIN WATER ABOVE DAM (MCM/MONTH)
                                                                         00042800
                                                                        00042900
      Q(2)...FALAJ USES ABOVE DAM (MCM/MONTH)
      Q(3)...BASE FLOW FROM UPSTREAM OF DAM (MCM/MONTH)
                                                                         00043000
      Q(4)...DIRECT RUNOFF FROM DAM CATCHMENT (MCM/MONTH)
                                                                        00043100
      Q(5) ... EVAPOTRANSPIRATION LOSSES FROM DAM CATCHMENT (MCM/MONTH)
                                                                      * 00043200
      @(6)...DIRECT RECHARGE FROM DAM STORAGE (MCM/MONTH)
                                                                       * 00043300
                                                                       * 00043400
      Q(7)...SPILLAGE FROM DAM (MCM/MONTH)
     @(8)...MONTHLY TOTAL RAIN WATER BELOW DAM (MCM/MONTH)
@(9)...DIRECT RUNOFF FROM CATCHMENT BELOW DAM (MCM/MONTH)
                                                                        00043500
                                                                       * 00043600
                                                                       * 00043700
      Q(10)..DIRECT RECHARGE FROM CATCHMENT BELOW DAM (MCM/MONTH)
Ċ
                                                                       * 00043800
      Q(11)..DIRECT RUNOFF INTO SEA (MCM/MONTH)
                                                                       * 00043900
      @(12)..TOTAL RECHARGE INTO GROUND-WATER (MCM/MONTH)
                                                                        00044000
     00044100
      IF(KASE-1) 435,435,436
                                                                         00044200
  435 Q(1)=RR(1,NN,M)
                                                                         00044300
      Q(2)=Q(1)*CAT(1)*0*001
                                                                         00044400
      Q(3)=Q(2)*0.029565
                                                                         00044500
      Q(4)=Q(2)*0.032029
                                                                         00044600
      Q(5) = RUNA * CAT(1) * 0.001
                                                                         00044700
      Q(6)=Q(2)=Q(3)=Q(4)=Q(5)
```

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Q(7) = RR(2,NN,M)
                                            00044800
   Q(8) = Q(7) * CAT(2) * 0.001
                                            00044900
   Q(9) = 0.
                                            00045000
   IF(0(1).LT.0.001) GO TO 438
                                            00045100
   Q(9)=Q(5)*CAT(2)/CAT(1)*Q(7)/Q(1)
                                            00045200
 438 CONTINUE
                                            00045300
   Q(10) = Q(8) * 0.0718182
                                            00045400
   Q(11) = RUNB * CAT(3) * 0.001
                                            00045500
                                            00045600
   Q(12)=Q(5)+Q(9)-Q(11)
                                            00045700
   GO TO 439
 436 Q(1)=RR(1,NN,M)*CAT(1)*0.001
                                            00045800
   Q(2) = Q(1) *0.029565
                                            00045900
                                            00046000
   Q(3) = Q(1) *0.032029
   Q(4)=RUNA*CAT(1)*0.001
                                            00046100
                                            00046200
   Q(5) = Q(1) - Q(2) - Q(3) - Q(4)
                                            00046300
   Q(7)=SPILL
                                            00046400
   Q(6) = Q(4) - Q(7)
                                            00046500
   Q(8) = RR(2,NN,M) + CAT(2) + 0.001
                                            00046600
   0(9)=0
    IF(Q(1).LT.0.001) GO TO 437
                                            00046700
                                            00046800
   Q(9)=Q(4)*CAT(2)/CAT(1)*RR(2,NN,M)/RR(1,NN,M)
                                            00046900
 437 CONTINUE
                                            00047000
   Q(10) = Q(8) + 0.0718182
                                            00047100
   0(11)=0.0
                                            00047200
   Q(12) = Q(7) + Q(9)
                                            00047300
 439 CONTINUE
* 00047500
 WATER EXTRACTION FOR IRRIGATION (MCM/MONTH)
00047700
   DO 440 [=1.NOB
                                             00047800
 440 QIN(1)=QIN(1)=WRI(M)#ROIA(1)
WATER EXTRACTION FOR OTHER WATER USES (MCM/MONTH)
                                           * 00048000
00048200
   DO 442 I=1.NOB
                                             00048300
 442 @IN(1)=@IN(1)-WRO*ROSA(1)*DELTA
                                             00048400
    IF(KASE.EQ.1) GO TO 445
WATER EXTRACTION FOR ADDITIONAL WATER USES (MCM/MONTH) (WHEN KASE=2)* 00048600
00048800
   DO 443 J=1.NOB
                                             00048900
 443 QIN(1)=QIN(1)-WRI(M)*ROIA(1)*A012/A01
* 00049100
 SUBSURFACE FLOW ABOVE DAM (MCM/MONTH)
00049300
 445 DO 444 I=1,NOB
   IF(KASE.E0.1) @IN(1) = @IN(1) + @(4) * A2(1) / CAT(1)
                                             00049400
                                             00049500
    IF(KASE.EQ.2) QIN(1) =QIN(1)+Q(3) *A2(1)/CAT(1)
                                             00049600
444 CONTINUE
C SUBSURFACE FLOW BELOW DAM (MCM/MONTH)
                                           * 00049800
00050000
   DO 446 1=1,NOB
 446 @IN(1)*@IN(1)+(A(1)+AMAX1(A3(1),0.))*@(10)/CAT(2)
                                             00050100
RECHARGE FROM SURFACE FLOW (MCM/MONTH)
                                          * 00050300
```

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```
00050300
    DO 448 1=1,NOB
    IF(KASE.EQ.1) @IN(1)=@IN(1)+@(12)*ROI(1)
                                                     00050600
                                                     00050700
    IF(KASE.E0.2) @IN(1) = @IN(1) + RO1(1) * (@(6) + @(12)) .
                                                     00050800
 448 CONTINUE
                                                  **** 00050900
* 0005100g
  CALCULATION OF CONDUCTANCE OF PASS BETWEEN NODES J1 & J2
C
                                                    * 00051100
    UNIT...MCM/MONTH/M
C
                                                    * 00051200
    TCON...NO. OF MINUTES IN THE MONTH
                                                    * 00051300
    CAP...CONDUCTANCE
00051400
    TCON=FLOAT(NDAY(M))*1440.
                                                     00051500
                                                     00051600
    DO 451 J=1,NOA
    J1=NOIJ(J,1)
                                                     00051700
                                                     00051800
    J2=N0[J(J,2)
                                                     00051900
    DEPS=0.5*(DEPP(J1)+DEPP(J2))
                                                     00052000
    IF(J1.EQ.NOSEA.OR.J2.EQ.NOSEA) DEPS=DEP(J)
 451 CAP(J)=WID(J)*CON(J)*(0.5*(H(J1)+H(J2))-DEPS)*TCON*1.0E-6/DIS(J)
                                                     00052100
* 00052300
 RELAXATION COEFFICIENT AT THE NODE I...RELAX(I)
00052400
    DO 450 l=1,NOB
                                                     00052500
                                                     00052600
    SY=0.
    DO 452 J=1.NOA
                                                     00052700
    J1=NO[J(J,1)
                                                     00052800
                                                     00052900
    J2=NO[J(J,2)
                                                     00053600
    IF(J1.NE.1.AND.J2.NE.1) GO TO 452
    SY=SY+CAP(J)
                                                     00053100
                                                     00053200
 452 CONTINUE
    RELAX(1)=1.0/(SY+A(1)*S)
                                                     00053300
                                                     00053400
 450 CONTINUE
** 00053500
  INITIAL GROUND-WATER TABLE FOR RELAXATION (M.AMSL)
                                                    * 00053600
DO 460 I=1,NOB
                                                     00053800
                                                     00053900
 460 HO([)=H([)
                                                     00054000
    NCOUNT ≠ 0
 530 CONTINUE
                                                     00054100
SUB-SURFACE FLOW RATE ALONG NODE-TO-NODE BRANCH : BETWEEN 1 & J * 00054300
                                                   * 00054400
    QT...SUB~SURFACE FLOW RATE (MCM/MONTH)
                                                   ** 00054500
                                                     00054600
    DO 70 J=1,NO8
                                                     00054700
    DO 70 I=1,NO8
                                                     00054800
  70 QT([,J)=0.
                                                     00054900
    NCOUNT=NCOUNT+1
    IF(NCOUNT.GT.20) GO TO 520
                                                     00055000
                                                     00055100
    QSEA=0.
                                                     00055200
    DO 470 J=1,NOA
                                                     00055300
    J1=NO[J(J,1)
                                                     00055400
    J2=NOIJ(J,2)
                                                     00055500
    QT(J1,J2)=CAP(J)*(H(J1)-H(J2))
                                                     00055600
    QT(J2,J1)=-QT(J1,J2)
                                                     00055700
    IF(J2.E0.NOSEA) QSEA=QSEA+QT(J1,J2)
                                                     00055800
 470 CONTINUE
                                                    * 00055900
* 00056000
 STORAGE FLOW RATE AT NODE 1 (MCM/MONTH)
```

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```
DO 480 [=1.NOB
                                                  00056200
 480 ST(1) = A(1) + S*(H(1) - HO(1))
                                                 00056300
C
  NODAL FLOW RESIDUAL (MCM/MONTH)
                                                * 00056500
    RES...NODAL FLOW RESIDUAL
                                                * 00056600
    QOUT .. OUTFLOW FROM EACH NODAL ZONE (MCM/MONTH)
                                                * 00056700
DO 490 1=1.NOB
                                                  00056900
    RES(1)=0.
                                                  00057000
                                                  00057100
    QCUT([)=0.
    DO 492 J=1.NOB
                                                  00057200
 492 @OUT(1)=@OUT(1)+@T(1,J)
                                                  00057300
                                                  00057400
    1F().EQ.NOSEA) GO TO 490
    RES(1)=Q1N(1)=QOUT(1)=5T(1)
                                                  00057500
                                                  00057600
 490 CONTINUE
GROUND-WATER TABLE AFTER MODIFICATION (M.AMSL)
                                                * 00057800
00058000
    DO 500 I=1.NOB
                                                  00058100
    H(I) = H(I) + RES(I) + RELAX(I)
                                                  00058200
 500 CONTINUE
#******* 00058300
                                                * 00058400
  SUM OF NODAL IMBALANCE (MCM/MONTH)
00058600
    SUM=0.
                                                  00058700
    00 510 I=1.NOB1
                                                  00058800
 510 SUM=SUM+ABS(RES([))
                                                  00058900
    IF(SUM-ERROR) 520,520,530
                                                  00059000
 520 CONTINUE
* 00059200
   AFTER RELAXATION
                                                 * 00059300
    HH... GROUND-WATER TABLE FOR MEMORY
C
                                                * 00059400
    VOL. ... GROUND-WATER STORAGE AT T=T+1
C
    @(13) . . GROUND-WATER STORAGE INCREMENTATION (MCM/MONTH)
                                                * 00059500
Ċ
    @(14)..GROUND-WATER RUNOFF INTO THE SEA (MCM/MONTH)
                                                 * 00059600
    Q(17) .. EVAPOTRANSPIRATION FROM AREA BELOW DAM (WHEN KASE=1)
                                                * 00059700
C
    Q(19) . EVAPOTRANSPIRATION FROM AREA BELOW DAM (WHEN KASE=2)
                                                 * 00059800
00060000
    DO 525 [=1,NOB
                                                  00060100
    HH(NM,M,I)=H(I)
                                                  00060200
 525 HP(],MP)=H(1)
                                                  00060300
    VOL=0.
                                                  00060400
    DO 418 [=1,NOB1
                                                  00060500
 418 VOL=VOL+(H(1)-DEPP(1))*A(1)*S
                                                  00060600
    Q(13)=VOL=VOL0
                                                  00060700
    VOLo≖VOI
                                                  00060800
    IF(KASE-1) 414,414,415
                                                  00060900
 414 Q(17)=Q(18)-Q(9)-Q(10)-XX
                                                  00061000
    0(14)=0(4)+0(10)+0(12)-0(13)-0(18)
                                                  00061100
    WRITE(6,631) N,MMON(M),(Q(1),1=1,KQ)
                                                  00061200
    GO TO 416
                                                  00061300
 415 Q(19)=Q(8)-Q(9)-Q(10)-XX
                                                  00061400
    Q(14)=Q(3)+Q(6)+Q(10)+Q(12)-Q(13)-Q(18)
                                                  00061500
    WRITE(6,632) N,MMON(M),(Q(1),1*1,KQ)
                                                  00061600
C ANNUAL TOTAL OF EACH ELEMENT
```

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```
00062000
     DO 419 I=1.KQ
                                                              00062100
 419 \text{ QY(1)} = \text{QY(1)} + \text{Q(1)}
                                                              00062200
     QSEAY=QSEAY+QSEA
                                                              00062300
 410 CONTINUE
     IF(KASE.EQ.1) WRITE(6,641) (QY(1),1=1,KQ)
IF(KASE.EQ.2) WRITE(6,642) (QY(1),1=1,KQ)
                                                              00062400]
                                                              00062500
** 00062600
                                                              00062700
   ANNUAL AVERAGE OF EACH ELEMENT
00062800
                                                              00062900
     DO 660 I=1.KQ
                                                              000630001
 660 QP(1)=QP(1)+QY(1)
     QSEAP=QSEAP+QSEAY
                                                              00063100
                                                              00063200
 400 CONTINUE
                                                              00063300
     DN=1.0/FLOAT(NENEA-NENSA+1)
                                                              00063400
     DO 670 I=1.KQ
 670 QP(1) = OP(1) *DN
                                                              00063500
     IF(KASE.EQ.1) WRITE(6,651) (QP(1),1=1,KQ)
                                                              00063600
                                                              00063700
     1F(KASE.EQ.2) WRITE(6,652) (QP(1),1=1,KQ).
     WRITE(6,189) (T,1=1,NOB)
                                                              00063800
                                                             • 00063900
PRINTING SIMULATED GROUND-WATER TABLE
                                                            * 00064000
00064100
                                                              00064200
     DO 600 N=NENS, NENE
                                                              00064300
     IF(N.LT.NENSA.OR.N.GT.NENEA) GO TO 600
                                                              00064400
     NM=N-NENSA+1
     NN=N-NENS+1
                                                              00064500
                                                              00064600
     DO 650 M=1,12
     IF(N.EQ.NENSA.AND.M.LT.MONSA) GO TO 650
                                                              00064700
     IF (N.EQ.NENEA.AND.M.GT.MONEA) GO TO 650
                                                              00064800
                                                              00064900
     WRITE(6,88) N,MMON(M),(HH(NM,M,1), =1,NOB)
 650 CONTINUE
                                                              00065000
 600 CONTINUE
                                                              00065100
* 00065200
C . PLOTTING SIMULATED GROUND-WATER TABLE
                                                           * 00065300
1F(KASE.EQ.1) WRITE(6,951) (1,1=1,NOB),(SYM(1),1=5,NOB+4),
                                                              00065500
                                                              00065600
                            (J_{i}J_{i}=-1,11)
     IF(KASE.EQ.2) WRITE(6,952) (1,1=1,NOB),(SYM(1),1=5,NOB+4),
                                                              00065700
                                                              00065800
                            (J,J*~1,11)
                                                              00065900
     DO 700 N=NENS, NENE
                                                              00066000
     IF (N.LT.NENSA.OR.N.GT.NENEA) GO TO 700
     NM=N=NENSA+1
                                                              00066100
                                                              00066200
     DO 750 M=1,12
                                                              00066300
     IF (N.EQ.NENSA. AND. M.LT. MONSA) GO TO 750
                                                              00066400
     IF(N.E@.NENEA.AND.M.GT.MONEA) GO TO 750
                                                              00066500
     DO 760 I=1,120
                                                              00066600
 760 G(1)=SYM(1)
                                                              00066700
     DO 762 I=10,120,10
                                                              00066800
 762 G(1) = SYM(2)
                                                              00066900
     DO 770 1 5, NOB
                                                              00067000
     IG*HH(NM,M,I)*10.0+0.4
                                                              00067100
     1G=1G+10
                                                              00067200
     IG≖MINO(IG,120)
                                                              00067300
     IG=MAXO(IG,1)
                                                              00067400
 770 G(1G)=SYM(1+4)
                                                              00067500
    WRITE(6,96) N,MMON(M),(G(1), [=1,120)
```

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```
750 CONTINUE
                                                                    00067600
  700 CONTINUE
                                                                    00067700
      CALL SPLOT (NENS, NENSA, MONSA, NENEA, MONEA, NOB1, MP, HP, SYM, MMON, RR)
                                                                    00067800
          IPLOT(NENS, NENSA, MONSA, NENEA, MONEA, NOB1, MP, HP, SYM, MMON, RR)
                                                                     00067900
                                                                     00068000
00068100
    FORMATTING FOR OUTPUT LISTING
                                                                   * 00068200
621 FORMAT(1H1, *** SURFACE AND SUB-SURFACE WATER BALANCE STUDY ****, 00068400
             * *** WADI JIZZI BASIN *** PRESENT CONDITION = BEFORE *.
             *PROJECT ****//1X,1H*,2(5H~~~~*),2H(<,7(1H-), A B O V E*, 00068600
             3X, 1D A M 1,7(1H-),1>>*(<1,27(1H-),1 B E L O W
                                                          DAMI
                                                                    00068700
            27(1H-),3H>>*/13X,*AREAL AREAL FALAJ BASE
     +
                                                       RUN EVAPO 1,00068800
             * AREAL AREAL RUN DRCT RUN RECHA STORA
                                                         G.W IRRIGA 1,00068900
            2X, OTHER EVAPO EXTRAC'/2X, YEAR MON
                                                   RAIN
                                                          RAIN
                                                                1,
                                                                    00069000
                                    RAIN RAIN -OFF RECHR -SFA 1,00069100
             'USE FLOW -OFF -TRANS
                                     USES -TRANS -TION'/14X, (MM)', 00069200
                    -GE
                        -SEA -TION
            2X, 1 (MCM) 1, 3 (1X, 5H (MCM)), 2X, 1 (MCM) 1, 3X, 1 (MM) 1, 2X, 1 (MCM) 1,
                                                                    00069300
            6(1x,5H(MCM)),4(2x,5H(MCM))/1x,1H*,2(5H----*),2(7H----*),00069400
            3(6H----+),3(7H-----+),6(6H----+),4(7H-----+))
                                                                     00069500
  622 FORMAT(1H1,'*** SURFACE AND SUB-SURFACE WATER BALANCE STUDY ***', 00069600
              WADI JIZZI BASIN *** PROPOSED CONDITION = AFTER .
                                                                     00069700
             *PROJECT ****/115X; *(UNIT = MCM/MONTH) */1X; 2(5H----*); **<< *00069800
             10(1H-), A B O V E D A M 1,10(1H-), 1>>+(<1,27(1H-),
                                                                     00069900
                    O W D A M 1,27(1H-),1)>*1/13X,1AREAL FALAJ 1,
RUN EVAPO DRCT SPILL AREAL RUN DRCT RUN
             BELOW
                                                                     00070000
                                                             RUN ', 00070100
            BASE
                          G.W IRRIGA OTHER 1.5HADD-L. EXTRAC
                                                                     00070200
             RECHA STORA
             'EVAPO'/2X, YEAR MON RAIN USE FLOW -OFF -TRANS ',
                                                                     00070300
             *RECHR -AGE RAIN -OFF RECHR -SEA -RGE
                                                       -GE
                                                                     00070400
                      USES USES -TION -TRANS'/14x,1H(,12,1H),
                                                                     00070500
               -TION
            3(2X,1H(,[2,1H)),3X,1H(,[2,1H),2(2X,1H(,[2,1H)),3X,1H(,[2,
                                                                    00070600
            1H),6(2X,1H(,12,1H)),5(3X,1H(,12,1H))/1X,1H*,2(5H----*),
                                                                     00070700
            6(1H-),1H*,3(6H----*),6(1H-),1H*,2(6H----*),6(1H-),1H*,
                                                                     00070800
            6(6H----*),5(7H-----*))
                                                                     00070900
 631 FORMAT(1H ,15,2X,A3,F7.1,F7.2,3F6.2,F7.2,F7.1,F7.2,6F6.2,4F7.2)
                                                                     00071000
                                                                     00071100
  632 FORMAT(1H ,15,2X,A3,F7.2,3F6.2,2F7.2,2F6.2,F7.2,6F6.2,4F7.2)
  641 FORMAT(1HO, '+T', 8X, F7.1, F7.2, 3F6.2, F7.2, F7.1, F7.2, 6F6.2, 4F7.2/)
                                                                     00071200
  642 FORMAT(1H , **T',8X,F7.2,3F6.2,2F7.2,2F6.2,F7.2,6F6.2,4F7.2/)
                                                                     00071300
  651 FORMAT(1HO, I*MI, 8X, F7.1, F7.2, 3F6.2, F7.2, F7.1, F7.2, 6F6.2, 4F7.2/)
                                                                     00071400
                                                                     00071500
  652 FORMAT(1H , **M*,8X,F7.2,3F6.2,2F7.2,2F6.2,F7.2,6F6.2,4F7.2/)
                                                                     00071600
  473 FORMAT(1H0,10X,19(2X,1H(,12,1H)))
                                                                     00071700
   88 FORMAT(1H , 14, 2X, A3, 2X, 20F6.2)
  189 FORMAT(1H1,10X, *** GROUND-WATER TABLE *** / 12X,19(1X,1H(,12,2H) )00071800
                                                                     00071900
            /11X,1H*,19(6H----+))
00072000
  90 FORMAT(1H1,1H*,38(1H-),1H*,9(1H-),3H*<</,29(1H-),1 NUMBER OF
                                                                     00072100
            'DATA ',28(1H-),3H>>*/2H 1,38X,1H1,9X,1H1,
                                                                     00072200
            10(3x,1H(,[2,2H)])/2H [,38x,1H1,9x,1H1,10(3x,1H(,[2,2H)]), 00072300
/2H [,9x,'D E S C R [ P T ] O N',8x,1H1,4x,'UNIT [', 00072400
            10(3X,1H(,[2,2H)])/2H [,38X,1H[,9X,1H],10(3X,1H(,[2,2H)])/ 00072500
            2H 1,38X,1H1,9X,1H1,10(3X,1H(,12,2H)1))
                                                                     00072600
                                                                     00072700
  91 FORMAT(1H ,1H*,38(1H-),1H*,9(1H-),1H*,10(8H-----*))
  92 FORMAT(1H ,A40,A10,10(F7.1,1HI)/(1X,1HI,38X,1HI,9X,1HI,10(F7.1,1HI00072800
                                                                     00072900
            )))
  93 FORMAT(1H ,A40,A10,10(F7.2,1H1)/(1X,1H1,38X,1H1,9X,1H1,10(F7.2,1H100073000
                                                                     00073100
            )))
   94 FORMAT(1H ,A40,A10,10(F7.3,1HI)/(1X,1HI,38X,1HI,9X,1HI,10(F7.3,1HI00073200
```

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0007330
            )))
  951 FORMAT(1H1,10X, *** GROUND-WATER TABLE PLOTTING ***///11X,
                                                                    0007346
            WELL NO. 1,16(1X,1H(,12,1H))/12X, SYMBOL 1,16(3X,A1,1X) 0007350
            //2X,13(6X,12,2H,0)/1X,13(10H----+))
                                                                    0007360
  952 FORMAT(1H1,10X, *** GROUND-WATER TABLE PLOTTING ****//11X,
                                                                    0007376
            'WELL NO. 1,19(1X,1H(,12,1H))/12X,'SYMBOL 1,19(2X,A1,2X) 000738
            //2X,13(6X,12,2H.0)/1X,13(10H-----+))
                                                                    000739
  96 FORMAT(1H ,15,1X,A3,1H1,120A1)
                                                                    0007400
000741
                                                                    000742
  0007436
                                                                  * 0007446
   SUBROUTINE FOR DAILY RAINFALL TABLE MAKING
000745g
     SUBROUTINE KTBLM(NEN,N,T,U,X,XT,Y,IC)
                                                                    0007460
     CHARACTER*36 T
                                                                    0007476
     DIMENSION U(2),X(12,31),XT(12),XM(12),NDAY(12)
                                                                    0007480
                                                                    0007490
     DATA NDAY/31,28,31,30,31,30,31,30,31,30,31/
     IF([C.EQ.0) GO TO 1
                                                                    0007500
     WRITE(6,60)
                                                                    0007510
                                                                    0007520
     WRITE(6,61)
     WRITE(6,62) T
                                                                    0007530
     WRITE(6,61)
                                                                    0007540
     WRITE(6,63) U.NEN
                                                                    00075%
     WRITE (6,64)
                                                                    0007560
     WRITE(6,65)
                                                                    0007576
     WRITE(6,64)
                                                                    0007580
                                                                    0007590
   1 CONTINUE
     NDAY(2)=28
                                                                    0007600
     IF(MOD(NEN,4).EQ.0) NDAY(2)=29
                                                                    0007616
     Y=0.
                                                                    0007626
     NY=0
                                                                    0007630
                                                                    0007640
     DO 100 M=1,12
     (M)YAGN=QN
                                                                    0007650
                                                                    0007660
     XT(M)=0
     NY = NY + ND
                                                                    0007610
     DO 200 I=1.ND
                                                                    0007680
     IF(X(M,1).GT.9000.0) GO TO 200
                                                                    0007690
                                                                    0007700
     XT(M)=XT(M)+X(M,I)
                                                                    0007710
 200 CONTINUE
                                                                    0007720
     Y=Y+XT(M)
                                                                    0007730
     XM(M)=XT(M)/FLOAT(ND)
                                                                    0007740
     NDD±ND+1
                                                                    000775
     IF(NDD.GT.31) GO TO 110
     DO 120 1=NDD,31
                                                                    0007760
                                                                    0007776
 120 X(M,1)=99999999
 110 CONTINUE
                                                                    0007780
                                                                    0007796
 100 CONTINUE
     YM=Y/FLOAT(NY)
                                                                    0007800
                                                                    0007810
     IF(IC.EQ.O) RETURN
                                                                    0007820
     DO 300 I=1,31
 300 WRITE(6,66) 1,(X(M,1),M=1,12)
                                                                   0007836
                                                                    0007846
     WRITE(6,64)
     WRITE(6,67) (XT(M),M=1,12),Y
WRITE(6,68) (XM(M),M=1,12),YM
                                                                    0007850
                                                                    0007860
  60 FORMAT(1H1////)
                                                                   0007870
                                                                   0007886
  61 FORMAT(1H ,37X,42(1H*))
                                                                    0007890
  62 FORMAT(1H ,37X,3H***,A36,3H***)
```

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63 FORMAT(1H ,102X, UNIT * ',2A4/7X, 'YEAR * ',14)
                                                                    00079000
   64 FORMAT( 1H ,1H*,9(1H-),1H*,12(8H----*),9(1H-),1H*)
                                                                     00079100
   65 FORMAT(1H ,6X, DAY',5X, JAN, ,4X, FEB. ,4X, MAR. ,4X, APR. )
                                                                     00079200
            4X, MAY 1,4X, JUNE 1,4X, JULY 1,4X, AUG. 1,4X, SEP. 1,4X,
                                                                     00079300
            'OCT.',4X,'NOV.',4X,'DEC.',4X,'ANNUAL')
                                                                     00079400
   66 FORMAT(1H ,18,2X,12(2X,F6.1))
                                                                     00079500
   67 FORMAT(1H ,5X, 'TOTAL', 12F8.1, F10.1)
                                                                     00079600
   68 FORMAT(1H ,5x, MEAN ',12F8.1,F10.1)
                                                                     00079700
      RETURN
                                                                     00079800
                                                                     00079900
C - SUBROUTINE FOR MONTHLY RAINFALL TABLE MAKING
                                                                   * 00080100
SUBROUTINE KTBLY(NYS, NYE, T, U, XT, Y, IC)
                                                                     00080300
      CHARACTER*36 T
                                                                     00080400
      DIMENSION U(2), XT(15,12), Y(15), XX(12)
                                                                     00080500
      IF(1C.EQ.0) GO TO 1
                                                                     00080600
      WRITE(6,60)
                                                                     00080700
      WRITE(6,61)
                                                                     00080800
      WRITE(6,62) T
                                                                     00080900
      WRITE(6,61)
                                                                     00081000
      WRITE(6,63) U
                                                                     00081100
      WRITE (6,64)
                                                                     00081200
                                                                     00081300
      WRITE(6,65)
                                                                     00081400
      WRITE(6,64)
                                                                     00081500
    1 CONTINUE
      NN=0
                                                                     00081600
                                                                     00081700
      YY=0.
      DO 90 M=1,12
                                                                     00081800
                                                                     00081900
   90 XX(M)=0.
                                                                     00082000
      DO 100 N=NYS,NYE
                                                                     00082100
      NN=NN+1
                                                                     00082200
      IF(IC.GT.O) WRITE(6,66) N,(XT(NN,M),M*1,12),Y(NN)
                                                                     00082300
      DO 110 M=1,12
                                                                     00082400
  110 XX(M)=XX(M)+XT(NN/M)
                                                                     00082500
  100 YY=YY+Y(NN)
                                                                     00082600
      IF(1c.EQ.O) GO TO 2
                                                                     00082700
      WRITE(6,64)
      WRITE(6,67) (XX(M),M=1,12),YY
                                                                     00082800
                                                                     00082900
      WRITE(6764)
                                                                     00083000
    2 CONTINUE
                                                                     00083100
      DD=NYE-NYS+1
                                                                     00083200
      DO 200 M=1,12
                                                                     00083300
  200 XX(M)=XX(M)/DD
                                                                     00083400
      YY=YY/DD
                                                                     00083500
      IF(IC.EQ.O) RETURN
                                                                     00083600
      WRITE(6,68) (XX(M),M=1,12),YY
                                                                     00083700
      WRITE(6,64)
                                                                     00083800
   60 FORMAT(1H1////)
                                                                     00083900
   61 FORMAT(1H ,37X,42(1H*))
                                                                     00084000
  62 FORMAT(1H ,37X,3H***,A36,3H***)
63 FORMAT(1H ,102X,'UNIT = ',2A4)
                                                                     00084100
                                                                     00084200
   64 FORMAT(1H ,1H*,9(1H=),1H*,12(8H----*),9(1H*),1H*)
   65 FORMAT(1H ,5X,'YEAR',5X,'JAN.',4X,'FEB.',4X,'MAR.',4X,'APR.',
+ 4X,'MAY ',4X,'JUNE',4X,'JULY',4X,'AUG.',4X,'SEP.',4X,
                                                                     00084300
                                                                     00084400
                                                                     00084500
            'OCT.',4x, 'NOV.',4x, 'DEC.',4x, 'ANNUAL')
                                                                     00084600
   66 FORMAT(1H ,18,2x,12(2x,F6.1),F10.1)
```

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```
67 FORMAT(1H ,5X, TOTAL +,12F8.1,F10.1)
                                                                          00084700
   68 FORMAT(1H ,5X, MEAN 1,12F8.1,F10.1)
                                                                          00084800
                                                                          00084900
      RETURN
                                                                          00085000
     END
   00085100
                                                                         00085200
   FUNCTION FOR RUNOFF INTERPOLATION
                                                                          OO085300
C 林林林林江水林都都林江北州村林林村林港北部城市城市北部城市城市城市城市城市城市城市城市城市城市
     FUNCTION FUNG(N.R.Q.S)
                                                                          00085400
                                                                          00085500
      DIMENSION R(N),Q(N)
                                                                          00085600
      J=1
   11 J=J+1
                                                                          00085700
      1F(J.EQ.N) GO TO 12
                                                                          00085800
      1F(R(J)-S) 11,12,12
                                                                          00085900
                                                                          00086000
   12 FUNQ=0(J-1)+(0(J)-0(J-1))*(S-R(J-1))/(R(J)-R(J-1))
      RETURN
                                                                          00086100
      END
                                                                          00086200
      SUBROUTINE SPLOT(NSS.NS.MS.NE.ME.NOB.MP.HP.SY.MMON.RR)
                                                                          00086300
                                                                          00086400
      CHARACTER*1 SY(23),A(121)
      CHARACTER*3 MMON(12)
                                                                          00086500
                                                                          00086680
      DIMENSION HP(20,132),HM(20),S2(20),DD(8),XX(20,132),RR(3,15,12)
                                                                          00086700
      DATA DD/-1.0,0.0,1.0,2.0,150.0,100.0,50.0,0.0/
                                                                          00086800
     DMP=FLOAT (MP)
                                                                          00086900
      DO 100 1=1.NOB
                                                                          00087000
      HM(])=0.
     DO 110 N=1,MP
                                                                          00087100
 110 HM(I)=HM(I)+HP(I+N)
                                                                          00087200
                                                                          00087300
  100 HM(I)=HM(I)/DMP
     WRITE(6,64) (1,1=1,NOB)
                                                                          00087400
                                                                         00087500
     DO 120 N=1.MP
  120 WRITE(6,63) N, (HP(I,N), I=1,NOB)
                                                                          00087600
                                                                         00087700
     WRITE(6,65) (HM(1),1=1,NOB)
                                                                         00087800
     DO 200 I=1,NOB
                                                                         00087900
     S2(1)=0.
                                                                         00088000
     DO 210 N=1,MP
 210 S2(1)=S2(1)+(HP(1,N)=HM(1))**2
                                                                         00088100
  200 S2(1)=SORT(S2(1)/DMP)
                                                                         00088200
     WRITE(6,66) ($2(1),1=1,NOB)
                                                                         00088300
                                                                         00088400
     WRITE(6,64) (1,1=1,NOB)
                                                                         00088500
     DO 220 N=1.MP
                                                                         00088600
     DO 230 I=1,NO8
 230 XX(1,N)=(HP(1,N)-HM(1))/S2(1)
                                                                         00088700
  220 WRITE(6,67) N,(XX(1,N),1=1,NOB)
                                                                         00088800
                                                                         00088900
     WRITE(6,61) (DD(J),J=1,8)
                                                                         00089000
     NEN-NS
                                                                         00089100
     MON=MS
                                                                         00089200
     NN=NS=NSS+1
                                                                         00089300
     DO 300: N=1,MP
                                                                         00089400
     DO 310 K=1,121
                                                                         00089500
 310 A(K) = SY(1)
                                                                         00089600
     DO 320 K=1,121,20
 320 A(K)*SY(2)
                                                                         00089700
                                                                         00089800
     SS=0.
                                                                         00089900
     DO 330 I=1.NOB
                                                                         00090000
     X=XX(1/N)*20.0+0.4
                                                                         00090100
      1P=x+41.
                                                                         00090200
      IP=MINO(IP,81)
                                                                         00090300
      IP=MAXO(IP,1)
```

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A(IP)=SY(I+4)
                                                                       00090400
 330 SS=SS+XX(1,N)
                                                                        00090500
      SS=(SS/FLOAT(NOB))*20.0+0.4
                                                                        00090600
      IP=IFIX(SS)+41
                                                                        00090700
      IP=MAXO(IP.1)
                                                                        00090800
      IP=MINO(IP/81)
                                                                        00090900
      A(IP)=SY(3)
                                                                        00091000
      IR=RR(3,NN,MON)*0.2+0.4
                                                                        00091100
      IRR=121=IR
                                                                        00091200
      IF(IR.LE.O) GO TO 331
                                                                        00091300
 00 333 K=IRR,121
333 A(K)=SY(4)
                                                                        00091400
                                                                        00091500
                                                                        00091600
 331 CONTINUE
                                                                        00091700
      WRITE(6,62) NEN, MMON(MON), (A(K), K*1,121)
                                                                        00091800
      MON*MON+1
                                                                        00091900
      IF(MON.LE.12) GO TO 300
                                                                        00092000
      MON=1
                                                                        00092100
      NEN=NEN+1
                                                                        00092200
      NN=NN+1
                                                                        00092300
  300 CONTINUE
   61 FORMAT(1H1,10X,3H*<</8(1H-),' (WATER LEVEL - AVERAGE WATER LEVEL' 00092400
        /1) / STANDARD DEVIATION 1,8(1H-),5H>>*(<,10(1H-),
AREAL RAINFALL 1,10(1H-),1H*/3X,1YEAR MON!,
                                                                        00092500
                                                                        00092600
             2X,4(16X,F4.1),4(5X,F5.1)/2H */9(1H-),1H*,6(19(1H-),1H*))
                                                                        00092700
                                                                        00092800
   62 FORMAT(1H ,16,1H-,A3,121A1)
                                                                        00092900
   63 FORMAT(1H ,4X,14,2X,18F6.2)
                                                                        00093000
   64 FORMAT(1H1,2x,'DATA NO.',18(2x,1H(,12,1H)))
   65 FORMAT(1H0,4X, MEAN',2X,18F6.2)
                                                                        00093100
                                                                        00093200
   66 FORMAT(1H0,5X,'S.D',2X,18F6.2)
                                                                        00093300
   67 FORMAT(1H ,4X,14,2X,18F6,2)
                                                                        00093400
      RETURN
                                                                        00093500
      END
      SUBROUTINE IPLOT(NSS.NS.MS.NE.ME.NOB.MP.HP.SY.MMON.RR)
                                                                        00093600
                                                                        00093700
      CHARACTER*1 SY(23)/A(121)
                                                                        00093800
      CHARACTER#3 MMON(12)
      DIMENSION HP(20,132),HM(20),S2(20),DD(8),XX(20,132),RR(3,15,12)
                                                                        00093900
                                                                        00094000
      DIMENSION YY(20,132)
                                                                        00094100
      DATA DD/-1.0,0.0,1.0,2.0,150.0,100.0,50.0,0.0/
                                                                        00094200
      DMP=FLOAT (MP)
                                                                        00094300
      DO 100 1=1.NOB
                                                                        00094400
      HM(I)=0.
                                                                        00094500
      DO 110 N=1.MP
                                                                        00094600
  110 HM(I)=HM(I)+HP(I,N)
                                                                        00094700
  100 HM(1)=HM(1)/DMP
                                                                        00094800
      DO 200 I=1.NOB
                                                                        00094900
      S2(1)=0.
                                                                        00095000
      DO 210 N=1.MP
                                                                        00095100
  210 S2(1)=S2(1)+(HP(I,N)+HM(1))**2
                                                                        00095200
  200 S2(1)=SQRT(S2(1)/DMP)
                                                                        00095300
                                                                        00095400
      DO 220 N=1,MP
      DO 230 1=1.NOB
                                                                        00095500
  230 XX(1,N)=(HP(1,N)-HM(1))/S2(1)
                                                                        00095600
  220 CONTINUE
                                                                        00095700
      DO 240 N=1,MP
                                                                        00095800
      IF(N.LT.7.OR.N.GT.MP-4) GO TO 240
                                                                        00095900
      DO 245 I=1, NOB
                                                                        00096000
      YY(I,N)=0.
```

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#พพพ๚ไนเหมหนายน2คเทษทหนายน3นากนหูนพนะ4พยะพหูนพพ<sup>๛</sup>5พพะผ<sub>ู้</sub>มาและ6พยะพหูนพน<sub>า</sub>น7พ<sub>โรกนหูนยน</sup></sub>
    DO 250 L==6,5
                                                                                     00096100
                                                                                     00096300
250 YY(1,N)=YY(1,N)+XX(1,N+L)
245 YY(1,N)=YY(1,N)/12.0
                                                                                     00096300
240 CONTINUE
                                                                                     00096400
    WRITE(6,61) (DD(J),J=1,8)
                                                                                     00096500
                                                                                     00096600
    NEN-NS
    MON=MS
                                                                                     00096700
    NN=NS-NSS+1
                                                                                     00096800
    DO 300 N=1,MP
DO 310 K=1,121
                                                                                     00096900
                                                                                     00097000
310 A(K)=SY(1)
                                                                                    00097100
    DO 320 K=1,121,20
                                                                                     00097200
320 A(K)=SY(2)
                                                                                    00097300
    IF(N.LT.7.OR.N.GT.MP=4) GO TO 335
                                                                                    00097400
    SS=0.
                                                                                     00097500
    DO 330 I=1.NOB
                                                                                    00097600
    X=YY(1,N)*20.0+0.4
                                                                                    00097700
    IP=X+41.
                                                                                    00097800
    IP≈MINO(IP,81)
                                                                                    00097900
    IP#MAXO(IP/1)
                                                                                    00098000
    A(IP)*SY(I+4)
                                                                                    00098100
330 SS=SS+YY(1,N)
                                                                                     00098200
    SS=(SS/FLOAT(NOB)) +20.0+0.4
                                                                                    00098300
    IP=IFIX(SS)+41
                                                                                    00098400
    IP=MAXO(IP,1)
                                                                                    00098506
    IP≈MINO(IP,81)
                                                                                    00098600
    A(1P)=SY(3)
                                                                                    00098700
335 1R=RR(3,NN,MON)+0.2+0.4
                                                                                    00098800
    IRR=121-IR
                                                                                    00098900
                                                                                    00099000
    IF(IR.LE.0) GO TO 331
    DO 333 K=1RR,121
                                                                                    00099100
333 A(X)=SY(4)
                                                                                    00099200
331 CONTINUE
                                                                                    00099300
    WRITE(6,62) NEN, MMON(MON), (A(K), K=1,121)
                                                                                    00099400
    MON=MON+1
                                                                                    00099500
    IF(MON.LE.12) GO TO 300
                                                                                    00099600
    MON=1
                                                                                    00099700
    NEN=NEN+1
                                                                                    00099800
    NN=NN+1
                                                                                    00099900
300 CONTINUE
                                                                                    00100000
 61 FORMAT(1H1,10x,3H*<</8(1H-),' (WATER LEVEL - AVERAGE WATER LEVEL' 00100100 + ,') / STANDARD DEVIATION ',8(1H-),5H>)*<<,10(1H-), 00100200
             * AREAL RAINFALL ',10(1H-),1H*/3X,'YEAR MON',
                                                                                    00100300
             2X,4(16X,F4.1),4(5X,F5.1)/2H *,9(1H-),1H*,6(19(1H-),1H*))
                                                                                    00100400
 62 FORMAT(1H ,16,1H-,A3,121A1)
                                                                                    00100500
 63 FORMAT(1H ,4X,!4,2X,18F6.2)
                                                                                    00100600
 64 FORMAT(1H1,2x, DATA NO.1,18(2x,1H(,12,1H)))
                                                                                    0010070
 65 FORMAT(1H0,4X, MEAN',2X,18F6.2)
                                                                                    00100800
 66 FORMAT (1H0,5X,'S.D',2X,18F6.2)
                                                                                    00100900
 67 FORMAT(1H ,4x,14,2x,18F6.2)
                                                                                    00101000
                                                                                    00101100
    RETURN
    END
                                                                                    00101200
```

ANNEX C GEOLOGY AND EMBANKMENT MATERIALS

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C-1 GEOLOGY

C-1-1 Introduction

The WADI JIZZI area is covered by the WADI JIZZI 1:10000,000 geological sheet (DEPARTMENT OF MINERAL, OMAN OPHIOLITE PROJECT, 1980). The area has also been mapped by JICA (THE WADI JIZZI AGRICULTURAL DEVELOPMENT PROJECT, 1982,83).

Figure C-1 is a geological plan of the project area. The geological units are based on existing geological maps above mentioned.

Geological investigations shown as follows was carried out;

- * Geological mapping of the dam area, scale 1:4000
- * Core drilling, 6 holes, total 208 meters
- * Water pressure test, 41 stages
- * Standard Penetration Test, 34 numbers
- * Test pits excavating, 9 holes

The locations of the holes and the pits are shown FIGURE C-1. The exploration aimed at obtaining general information for the detailed design of the dam.

C-1-2 Topography

The dam site is located in the conference of the WADI JIZZI and the WADI AWAINA. Near the dam site the streams are youthful U shaped vallies which are accumulating sands and gravels at present. They cut the wide spread terraces which is steep at the banks.

The terraces consist of cemented sand and gravels, and range in altitude from 160 - 175 meters. Gullies are formed on the terrace near the both banks. The terrace is recognized three faces around the dam area, namely, upper, middle and lower terrace.

The WADI JIZZI runs eastwards and the gradient is 1/140 near the dam axis.

The remnant hills of limestone lie at 1.5 kilometers upper stream of the dam axis. Because bed rocks are overlain widely by sands and gravels, the outcrops of them are very few except these hills.

C-1-3 Investigation

1) Geological Mapping

The mapping carried out at ascale of 1:2,000 and later compiled on contour plans on the scale of 1:4000.

Because bed rocks are overlain by terraces and alluvial deposits, the outcrops in the area are very few. But stratigraphic information can be obtained in bore-hole drilling and from few surface exposure, and from the relationship between geology and topography.

The main geological information is presented in the following figures;

- * geological plans, FIGURE C-2
- * geological section, FIGURE 4-1

2) Core Drilling

Core drilling carried out on the dam axis. Six bore holes were put down, numbered from BH-1 to BH-6, and of these, total length of 208 meters, are located as follows;

- * BH-l on the left bank, near the emergency spill way area
- * BH-2,3,4,6 on the WADI bed
- * BH-5 on the right bank, in the spill way area near the dam crest

Drilling machines used hydraulically driven type. The type of the drilling equipments were shown as follows; Drilling machine

Wirth - 81

reelius D 750

Core barrel

single tube and double tube

Casing tube

innerdiameter 116, 101, 86mm

Core losses were high in upper part of terrace deposits and recent river deposits, but useful information was obtained for determining the thickness of foundation stripping and permeability. The core recovery in middle and lower part of terrace deposits and bed rock was high.

Detailed log of all boreholes are shown FIGURE C-2.

Cores are stored at the office of SOHAR BRANCH of the WATER RESOURCES AND IRRIGATION, MAP

Water pressure test, such as lugeon test and permeability test, and Standard Penetration Test were carried out in the boreholes. The data sheets and summary are shown in Figure C-3, C-4, C-6 and Table C-2, C-3.

3) Test Pits and Permeability Test

Nine test pits, numbered from TP-1 to TP-9, were dug by a back hoe shovel in a depth of five meters in order to obtain samples of embankment materials. They are located as follows;

- * TP-1 in the emergency spill way area
- * TP-2,3 on the dam axis in the river bed
- * TP-4,9 on the left bank in the spill way area near the dam crest
- * TP-5,8 in the reservoir area
- * TP-6,7 on the upper terrace in the reservoir area

The test pit logs are shown in Figure C-3.

Permeability test was carried out in the test pits in a depth of two and five meters. The data sheets and the summary are shown in TABLE C-1 and TABLE C-2.

C-1-4 Rock Types and Stratigraphy

Rocks around the dam site consist of bed rocks, terrace deposits and recent river deposits.

1) Bed Rocks

Bed rocks consist of limestone, chert, sandstone and sepentine. The out-crops of these rocks are very few, and are overlain by widespread terrace deposits.

It seems that limestone constitutes the bed rock of the dam axis in the right bank. This is infered from borehole BH-6 that it occurs in the depth 33.25 meters and a small outcrop in a gullie on the terrace of the right bank. It seems that limestone in the dam axis dips gently from the right bank to center of the WADI JIZZI. It unconformably overlies serpentine, and is overlain by terrace deposits.

It seems that surface of the bed is generally rolling from the investigation of topography and core drilling.

Limestone is pinkish white colour, silicous and hard, giving a clear ring when stuck with the hammer. The limestone constituting remnant hills in the upperstream of the dam area is also hard and siliceous, and has opened joints.

There are few outstrops of serpentine. They occurs as scattered exposure being overlain by limestone in the upper stream of the dam axis. Sperpentine constitues the bed rock of the dam axis that was identified by boreholes of BH-1 and BH-2 on the left bank and BH-3 on the center of the WADI JIZZI. It dips gently from the left bank to center of the WADI JIZZI, and unconformably overlain

by the terrace deposits. The vertical scale of the geological section (FIGURE C-7) is greatly exaggerated, so that the surface appear to dip steeply; actually the surface mostly has dips of less than 10 degree. Serpentine is dark greenish grey and phenocrysts of pyroxenite and chlorite are embeded in abundance. It is generally slightly hard to hard. Partly it is soft by strong altered and weathered, especially in borehole BH-3.

There are few outcrops of sandstone in the floor of the gullies where the emergency spill way has been planning. Because it is overlain by terrace deposits, the distribution and the relation between other bed rocks are not clear. It seems that sandstone unconformably overlies serpentine. Sandstone is brownish grey and hard, giving a clear ring when it is stuck by a hammer.

2) Terrace Deposits

Terrace deposits are widespread around the dam area and consist of cemented sands and gravels. Gravels come from the Oman Ophiolite Composition that consists of mafic to ultramafic rocks and HAWASINA sediments. The quantities and the diameters of gravels have a wide veriety, and also sands from fine to coarse. There are thin silt beds in the terrace deposit.

The terraces around the dam area have been divided into three faces, namely, upper terrace, middle terrace and lower terrace. In spite of the deposits of Quanternary age, they are regarded as soft rock from the consolidated conditions.

Upper terrace deposits directly overlie the bed rocks, and are overlain by middle terrace deposits in the WADI channel. They are divided into four parts as shows FIGURE C-7 GEOLOGICAL SECTION, namely, breccia (Tu-br), gravely silt (Tu-sl), sand, silty sand (Tu-sd), sands and gravels (Tu-sg).

Breccia (TU-br)

Breccia consists of gravels and silt. It is greyish brown coloured, very dence and varies from moderately strong to strong. The distribution is limited.

Gravely Silt (Tu-s1)

Gravely silt consists of gravels and silt. It is well consolidated and strong. Gravels are weakly weathered. Core recovery is 95% and R.Q.D is 80%. Water leakage in the pressure tests is few.

Sand and Gravels (Tu-sg)

The both abutments consist of sand and gravel, and vary from weakly cemented to well cemented.

The upper part (0 to 5m) is weakly cemented, and weakly weathered. Rock classification is C1.

The middle part (5 to 15m) is very dense and well cemented. Joints are sparse, but opened and weathered.

The lower part below 15.0m is very dense and strong consolidated.

Middle terrace deposits overlie on the upper terrace deposits in the river bed, and are overlain by recent river deposits. They are divided into two parts as shows in FIGURE C-3, namely, porosity sands and gravels (Tm-pr) and sands and gravels (Tm-sg).

Porosity Sands and Gravels (Tm-pr)

This layer is distributed in the lower part of middle terrace deposits in the river bed. It is weakly to well cemented, and porosity lacking fine grain size. Core recovery is 65%, R.Q.D is 25% and water leakage is high.

Sand and Gravels (Tm-sg)

This layer is directly overlain by recent river deposits, and 6 to 8 meters thick.

Gravels are granule to coble, occasionaly including boulders. Sands are fine to coarse and occasionaly including thin silt beds. The sand and gravel varies from dense to very dense.

Joints are sparse, but opened and weathered.

Core recovery is 40%, R.Q.D 0% and water leakage is high. This layer constitutes the dam foundation after the stripping of recent river bed.

Sand Silty Sand (Tu-sd)

The distribution of this layers are narrowly limited. They vary from moderately strong to strong and medium sand and medium silty sand.

3) Recent River Deposits

Recent river deposits have been explored by four boreholes, namely, BH-2, -3, -4, -6, and four test pits, namely, Tp-2, -3, -5, -8. Summary logs of these holes are shown in GEOLOGICAL SECTION. Recent river deposits unconformably overlie on the upper terrace deposits. The average depth of the deposits is 3.08 meter in all holes and 3.10 meter at the dam axis. The deposits consist of sands and gravels, and they are very loose.

C-1-5 Faults and Shears

No faults and shears have been revealed by the field investigation, reading of aereal photographs, and core drilling.

C-1-6 Groundwater and Permeability

Water pressure test was performed in the section of boreholes which were drilled through rocks. The water pressure test was made in principle 5 m stage in descending order using paker, but the section length was altered less than 5 m in case of strongly weathered rock.

^{1/} R.Q.D : Rock Quality Designation

The detail of the test is as follows,

After the deep of 5 meter has been drilled into rock bed, the hole is washed by flushing water through srilled rod inserted to the bottom till the returning water becomes clean. The packer is installed at the top of the section of the 5 meters and water is injected into the section through injected pipe. Under a certain water pressure that is kept constant by controlling return diversion flow at the neck of the hole, the inejected water quantity is observed for ten minutes to obtain injection rate in terms of litres every minute. The ten minutes observation is started after the injection rate becomes nearly constant. During the ten minutes observation the injected water quantity is observed and recorded every minutes. The observation in the same procedure is made, in each stage of 5 m section for seven different pressures, that is, 1 kg/cm², 4 kg/cm², 7 kg/cm², 10 kg/cm², 7 kg/cm², 4 kg/cm², 1 kg/cm² in order.

After the above observation has been completed, the hole is drilled by another 5 m, and test is repeated with same procedures. In the same manner, the boreholes are drilled and water-pressure-tests are conducted up to the planned depths.

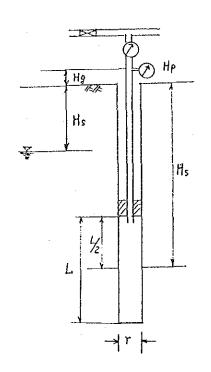
In case that the pressure cannot rise up to $10~{\rm kg/cm^2}$ because of much leakage from the test section, the test is made only for the attainable pressures.

The results are presented by dimensions of coefficient of permeability and Lugeon unit as calculated by the following formula.

Coefficient of permeability $k = 2.3/2 \times 1/60 \times 1/L \times logL/r \times Q/H$ Lugeon unit $Lu = Q'/LH \times 10$

where,

K: Coefficient of permeability (cm/sec.)



Lu: Injection rate (cu.cm/min)

Q: Injection rate (sq.cm/min)

(liter/min.)

L: Length of test section (cm)

r: Radius of hole (cm)

H: Water pressure in head (cm)

H = Hp + Hs + Hg

Hp: Pumping head (cm)

Hs: Static water head from middle part of test section up to top of hole. If ground water level is higher than the middle part of test section, this is the head water level to top of hole.

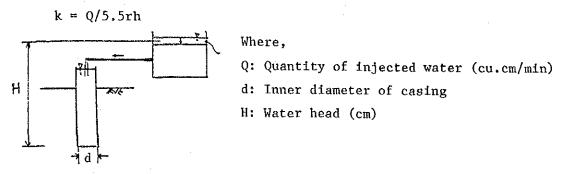
(cm)

Hg: Height of water pressure gauge from the top of hole. (cm)

Permeability test by means of injection method was performed in the section of the test pits in order to evaluate seepage condition of alluvial depost and surface area of terrace deposit. The detail of the test is as follows.

The permeability test is performed in 2 m and 5 m deep in each test pits. When test pit is dug into 2 m and 5 m deep, a casing pipe is installed at the bottom of the hole and the space between the casing pipe and the hole is cemented, and water is injected into the casing pipe. After injection of water is continued more than 30 minutes, quantity of water is measured during ten minutes. Quantity of injected water is measured from the water level of a water tank.

The result is presented in coefficient of permeability as calculated by the following formula.



The observation of groundwater table were made during and after completion of works.

The water pressure test of 39 numbers was carried out and the result is as follows;

- * leakage rate less than 1 Lugeon 4 nos
- * leakage rates from 1 to 10 Lugeons 21
- * leakage rates from 10 to 100 Lugeons 9 "
- * leakage rates greater than 100 Lugeons ... 5 "

FIGURE 4 LUGEON MAP shows the distribution of Lugeon value.

- * Zone 1 Recent river deposits
- * Zone 2 Leakage rates greater than 100 Lugeons
- * Zone 3 Leakage rate from 50 to 100 Lugeons
- * Zone 4 Leakage rates from 10 to 50 Lugeons
- * Zone 5 Leakage rates less than 10 Lugeons

FIGURE 4-3 SUMMARY OF PERMEABILITY made on the basis of the above mentioned zone, shows the distribution of permeabilities and its average values in each zone.

The features of each zone are as follows:

* Zone 1 Average of permeability $k=9.77x10^{-3}$ cm/sec.

The data of this zone depended on the permeability test in the test pits (shown FIG G-5).

This zone consists of very loose sands and gravels in the WADI.

- * Zone 2 Average of permeability k=1.89x10⁻³ cm/sec.

 This zone is distributed in the upper part of middle terrace deposits (Tm-sq) and the both abutment (Tu-sg), and consists of weakly to well cemented sands and gravels. It varies from weakly to strong weathered, and core recovery and R.Q.D are poor, and water leakage is high. Complete losses of water returns were recorded at a depth of 5.0m in BH-1 and 8.5m in BH-4.
- * Zone 3 Average of permeability k=5.12x10⁻⁴ cm/sec.

 This zone is distributed in lower part of middle terrace deposits (Tm-pr), and has abundant vesiculors. Core recovery is 65%, and R.Q.D is 25% and water leakage is high.
- * Zone 4 Average of permeability k=1.30x10⁻⁴ cm/sec.

 This zone is narrowly distributed in surrounding Zone-2 and Zone-3.
- * Zone 5 Average of permeability k=1.82x10⁻⁵ cm/sec.

 Both core recovery and R.Q.D are rich. This zone is impermeable layer.

Groundwater was mostly observed between 12m and 20m below the surface of the WADI bed. There are relatively small fluctuations with time. In general the water table in the river bed is found at or near the weathered base.

C-1-7 Standard Penetration Test

Standard Penetration Test was carried out in all boreholes (hereinafter reffered to as SPT" in the following). SPT was carried out at every two meters of depth in the section of boreholes. The detail of the test is as follows,

SPT is carried out in accordance with JIS A-1219, that is the weight of hammer is 63.5kg and the dropping height is 75 cm above top collar of the rod. The hammer is dropped by the same drilling machine along the guide pipe or rod, vertically without any appreciable friction loss.

The knocking number by the hammer to penetrate the SPT sampler is counted for 30 cm penetration (recognized as "N value).

The penetration depth by each hammering is measured and recorded as accumulated number. The record is taken for every 10 cm of penetration. Because the layer consists of sand and gravel, SPT sampler shoes were broken by hammering. Therefore, cone shoes were used instead of SPT sampler and sampler shoe.

The result of the test is shown in Fig. C-6.

All of "N-value" are more than 100, and the average of "N-value" in each layers is as follows,

Middle terrace deposit (Tm) N value = 209.6
Upper terrace deposit (Tu) N average = 146.4

The data indicates that the layers are very dense and angle of internal friction is more than 50 degrees. This internal diameter, however, is high, because "N-value" in the layer is including not only hammering numbers of matrix part, but also hammering numbers of gravel part. The rocks are anisotropical because they consist of soft matrix of sand and hard gravel. Then shear strength of rocks is subject to the strength of matrix and it is infered to be lower than 50 degrees.

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 - C-1-9 Profile of Sampling Point

TABLE C-1-1 SUMMARY OF PERMEABILITY TEST IN THE TEST PITS

*9.77×10⁻³ 3.61×10⁻³ *3.06×10⁻³ 1.87×10⁻³ 1.78×10⁻³ 6.84×10⁻⁴ AVERAGE (Unit: cm/sec) 1.63×10-3 4.95×10⁻³ 6.73×10⁻³ 2.25×10⁻³ TP-9 6.20×10⁻³ 2.37×10⁻³ 4.10×10⁻⁴ 3.21×10⁻³ 1.33×10⁻⁴ TP-8 *5.68×10⁻³ *1.51×10⁻² 1.15×10-4 1.65×10⁻⁵ TP-5 2.08×10⁻³ 4.05×10⁻⁴ 1.60×10⁻³ 5.83×10⁻⁴ TP-4 *4.92×10³ *1.19×10⁻³ |3.01×10⁻⁴ 2.10×1.0⁻⁴ TP-3 *2.30×10³ *9.3×10⁻³ 1,20×10⁻³ 5.00×10⁻⁴ TP-2 3.10×10⁻³ 1.22×10⁻³ 1.27×10⁻³ 5.62×10⁻⁴ TP-1 TESTING METHOD CONSTANT CONSTANT HEAD FALLING HEAD FALL ING HEAD DEPTH 5.0m 2.0m

RECENT RIVER DEPOSITS

TABLE C-1-2 Record of Permeability Test

Sheet No1 to 4

No.1.		ILITY	FALLING HEAD k(cm/sec)		5.62×10^{-4}		1.27×10^{-3}					LITY	FALLING HEAD k(cm/sec)		2.50×10^{-3}		5.00×10^{-4}	
етнор)		PERMEABILITY	CONSTANT HEAD k(cm/sec)	1.22×10^{-3}		3.10×10^{-3}						PERMEABILITY	CONSTANT HEAD k(cm/sec)	9.30×10^{-3}		1.20×10^{-3}		
(HOLE BOTTOM METHOD)		WATER	LEAKAGE q(cm ³ /min)	72.1	70.6	169.6						5	WAIEK LEAKAGE q(cm ³ /min)	878.8	440.0	113.7	113.1	
		WATER	HEAD H(cm)	22.9	21.1	21.0	17.6	-					WAIEK HEAD H(cm)	49.5	43.3	49.5	49.8	
RECORD OF PERMEABILITY TEST	DATE 11/Apr.	HOLE	RADIUS r(cm)	7.9	=	11	11			:	15/Apr11		role RADIUS r(cm)	5.8	-	=	16	
RECORD	DATE	HEAD	DEFFERENCE (cm)		3.6		6.8		-	((DALE		HEAD DEFFERENCE (cm)		12.5		1.5	
		TIME	(mim)	14 ' 7"	10.001	612511	10401			. •	P-2		TIME (min)	913911	3,001	10'20"	21 '00"	
	HOLE NO TP-1		STAGE		Z.0m		5.0m			:	HOLE NO TP-2		STAGE	2.0m			5.0m	

RECORD OF PERMEABILITY TEST (HOLE BOTTOM METHOD)

TATE 18/Any		
	ì	
4	7.	
2	2	
<u>.</u>	<u>∃</u>	

	TIME	EIFAN	HOH	WATER	WATER	PERMEABILITY	BILITY
STAGE	(min)	DEFFERENCE (cm)	RADIUS r(cm)	H(cm)	LEAKAGE q(cm ³ /min)	CONSTANT HEAD k(cm/sec)	FALLING HEAD k(cm/sec)
	14'12"		5.9	46.8	447.9	4.92×10^{-3}	
7.Cm	5,00"	11.5	11	41.1	187.9		1.19 × 10 ⁻³
	41,12011		5.1	50.5	25.6	3.01×10^{-4}	
5.0m	1,00,1	3.5	£	50.5	40.3		2.10×10^{-4}

HOLE NO TP-4

DATE 19/Apr.

	· ·		· 		i	
IL ITY	FALLING HEAD k(cm/sec)		1.60×10^{-3}		4.05×10^{-4}	
PERMEABIL ITY	CONSTANT HEAD k(cm/sec)	2.08×10^{-3}		5.83×10^{-4}		
d rest	WALEK LEAKAGE q(cm ³ /min)	226.8	363.8	42.0	76.2	
11.00	MAIER HEAD H(cm)	56.9	52.0	50.7	48.0	
	NOLLE RADIUS r(cm)	5.8	- - -	5.2	1	
	HEAD DEFFERENCE (cm)		17.2		4.5	
	TIME (min)	2010011	5,00,,	20,00,,	5,00"	
	STAGE	C C	÷		5.0m	

RECORD OF PERMEABILITY TEST (HOLE BOTTOM METHOD)

	I//Apr	
5 6 5	27.0	
		į
	7 H	
	2	
77.7	12011	

	 					ıI
BILITY	FALLING HEAD k(cm/sec)		5.68 × 10 ⁻³		1.65 x 10 ⁻⁵	
PERMEABILITY	CONSTANT HEAD k(cm/sec)	1.51×10^{-2}		1.15×10^{-4}		
WATER	LEAKAGE q(cm ³ /min)	1,582.1	1,104.5	23.1	3.8	
WATER	H(cm)	53.8	43.7	45.2	51.7	
HOLE	RADIUS r(cm)	5.9	11		11	
HEAD	DEFFERENCE (cm)		20.2		0.7	
TIME	(mim)	6142"	. 2,00"	5 '00"	20,00"	
	STAGE		7.0111	· · ·	5.0m	

HOLE NO TP-8

DATE 15/April.

						PERMEABILITY	ILITY
-	TIME (min)	HEAD DEFFERENCE (cm)	NADIUS r(cm)	WAIER HEAD H(cm)	WAIER LEAKAGE q(cm ³ /min)	CONSTANT HEAD k(cm/sec)	FALLING HEAD k(cm/sec)
	10,001		7.7	21.5	338.7	6.20×10^{-3}	
'	4.517	8.4	1.	17.3	322.6		3.21 x 10-3
7	0.00.0	11.6	=	15.7	216.1		01 X /C.7
	10,001	·	5.9	55.6	44.4	4.10×10^{-4}	
	16.20"	4.7	5.9	53.3	34.17		1.33 x 10-4

RECORD OF PERMEABILITY TEST (HOLE SOTTOM WETHOD)

HOLE NO TP-9

	TIME	HEAD	HOLE	WATER	WATER	PERMEABILITY	зилту
STAGE	(min)	DEFFERENCE (cm)	RADIUS r(cm)	HEAD H(cm)	LEAKAGE q(cm ³ /min)	CONSTANT HEAD k(cm/sec)	FALLING HEAD k(cm/sec)
n) c	10'26"		5.2	47.8	406.4	4.95×10^{-3}	
10.1	310011	10.8	-	47.8	305.8		1.63 x 10 ⁻³
	7115"		5.9	55.8	731.0	6.73×10^{-3}	
5. Om	3,00,,	15.3		55.8	557.7		2.25×10^{-3}

	HEAD LEAKAGE CONSTANT HEAD FALLING HEAD H(cm) q(cm ³ /min) k(cm/sec) k(cm/sec)				
c i	MADIUS r(cm)				
ζ.	DEFFERENCE (cm)				
T.Y.F.	(min)				
	STAGE	2 Om	1	5.0m	

HOLE NO

TABLE C-1-3 Record of Water Pressure Test

Sheet No1 to 20

RECORD OF WATER PRESSURE TEST

25.85 m

GROUND WATER LEVEL

HOLE NO 1

SHEET NO I

LUGEON UNIT Lu 1/min/m			35.6								1.4					0.94			
PERMEABILITY k cm/sec	3.02 x 10 ⁻⁴	×	2.58×10^{-4}	3.44 x 10-4	3.97×10^{-4}		t l	1		1.08×10^{-5}	1.27 x 10 ⁻⁵	1.36 x 10-5	le	l	4.45×10^{-6}	7.54 x 10 ⁻⁶	8.89 x 10 ⁻⁶	×	1.29×10^{-5}
WATER LEAKAGE Q 1/min	1.9	4.6	7.0	4.6	2.5		0	0	0	0.76	1,14	0.95	0	0	0.38	0.83	0.76	0.46	0.08
guage HEIGHT Hg cm	80.0					·	0						0						
PRESSURE kg/cm ³	0	1	3	1	0		1	2	3	5	7	3	0	3	55	7	\$	3	1
HOLE RADIUS r cm	3.3						3.3				·		5.0						
SECTION LENGTH L cm	50.0						100.0						100.0			-			
DEPTHI	8.0-8.5						13.0- 14.0						17.4- 18.4						
DATE	14/Apr.						16/Apr.						17/Apr.						
STAGE	1						2						3						

RECORD OF WATER PRESSURE TEST

GROUND WATER LEVEL 25.85

HOLE NO 1

SHEET NO

. [T		1	<u> </u>	·	······································		 -			····	·	·		r-1		4.5		
	LUGEON	Lu 1/min/m				1.7									2.0		-				
-	PERMEABILITY	k cm/sec		2.97×10^{-6}	1.52×10^{-5}	1.46 x 10 ⁻⁵	1.49×10^{-5}	1.50×10^{-5}	6.90 × 10 ⁻⁶			t	2.17×10^{-6}	1.17×10^{-5}	1.78×10^{-5}	1.65 x 10 ⁻⁵	1	•			
	WATER LEAKAGE	Q 1/min	0	0.49	3.71	4.74	3.64	2.50	0.61		0	0	0.38	3.03	90.9	4.27	0	0		-	
	GUAGE HE IGHT	Hg cm	0								0										
	PRESSURE	kg/cm ³	1	4	7	10	7	4	П	-	0	1	4	7	10	7	4	1			
	HOLE	r cm	5.0								5.0										
	SECTION	Lcm	280								300										-
	DEPTH		22.0- 24.8								27.0- 30.0										
	DATE		19/Apr.								21/Apr.	:									
	STAGE		4		:						S										

RECORD OF WATER PRESSURE TEST

	,	· · · · · · · · · · · · · · · · · · ·		} •	······································					<u> </u>	<u> </u>	* - 1 - 12 - 12 - 12 - 12 - 12 - 12 - 12	·····					مدمونيون	-	
	LUGEON	Lu 1/min/m					5.0								0.3					
SHEET NO 3	PERMEABILITY	k cm/sec		•	3.59 × 10-6	4.35×10^{-6}	4.44×10^{-6}	2.45×10^{-6}	1.81 x 10 ⁻⁶	V		8.65×10^{-7}	2.71 x 10 ⁻⁶	3.05 × 10 ⁻⁶	×	3.38 × 10 ⁻⁶	3.35 x 10 ⁻⁶	1		
	WATER LEAKAGE	Q 1/min	0	0	0.76	1.35	1.82	0.76	0.38	0	0.	0.07	0.46	0.76	08.0	0.85	0.57	0		
;	GUAGE HEIGHT	Hg cm	0								0						! !			
	PRESSURE	kg/cm ³	0		4	7	10	7	\$	1	0	-1	4	7	10	7	4			
25.85	HOLE	r cm	5.0								4.25					·	i			
- 1	SECTION LENGTH	L cm	380.0					,		,	300.0							-		
GROUND WATER LEVEL	33	m- m	32.0- 35.8								37.0- 40.0				·					
HOLE NO I	DATE		26/Apr.								27/Apr.						į			
1011	STAGE	O.	9								7									

RECORD OF WATER PRESSURE TEST

GROUND WATER LEVEL 18:80 m

HOLE NO 2

SHEET NO

t	·			 	·																
	LUGEON UNIT	Lu 1/min/m					2.9									81.9				÷	
	PERMEABILITY	k cm/sec	1	l	8.13 × 10 ⁻⁶	2.13 x 10 ⁻⁵	1.95 x 10 ⁻⁵	2.42×10^{-5}	1.35×10^{-5}	2.48×10^{-5}		4.81 x 10 ⁻⁴	3.11 x 10 ⁻⁴	3.51 x 10 ⁻⁴	4.07×10^{-4}	4.61 x 10 ⁻⁴	4.74×10^{-4}	4.15×10^{-4}	3.65 x 10 ⁻⁴		
	WATER LEAKAGE	Q 1/min	0	0	0.38	1.67	2.14	1.89	0.63	0.04		3.25	7.20	13.87	26.49	40.93	30.38	16.43	5.46		
	GUAGE HEIGHT	Hg cm	30									0									
	PRESSURE	kg/cm ³	0	r	4	7	10	7	4	p-u-4		0	2	4	7	10	7	4	1		
	HOLE	r Cm	5.0									5.0									
	SECTION LENGTH	C C	75.0									50.0									
	:	æ .	4.0- 4.75								,	8.0-8.5									
	DATE		29/Apr									30/Apr.									
	STAGE	D.	1					-				2									

RECORD OF WATER PRESSURE TEST

GROUND WATTER LEVEL 18.80 m

NOLE NO 2

SHEET NO 'S

LUGEON	Lu 1/min/m					10.8									2.5					
PERMEAB IL ITY	k cm/sec		4.03×10^{-6}	2.20×10^{-5}	5.53×10^{-5}	5.75×10^{-5}	7.04×10^{-5}	7.89×10^{-5}	2.97×10^{-4}	, ,		1	5.12 x 10 ⁻⁶	5.00 x 10 ⁻⁶	1.34 x 10 ⁻⁵	1.11×10^{-5}	1.04×10^{-5}	7.81×10^{-6}		
WATER	Q 1/min	0	0.77	0.95	3.75	5.31	4.78	3.41	3.11		0	0	0.23	0.34	1.25	0.76	0.46	0.15		
GUAGE	ilg cm	0									30.0									
PRESSURE	kg/cm^3	0	1	4	7	10	7	4	1		0	F-1	4	7	10	7	4			
HOLE	r Cill	5.0									5.0									
SECTION	L cm	50.0									50.0									
DEPYTH	m -m	12.5- 13.0							·		17.6- 18.1									
DATE		1/May									3/May				·					
STAGE	ON I	3									4				-					

RECORD OF WATER PRESSURE TEST

GROUND WATER LEVEL 18,80 in

HOLE NO 2

SHEET NO 6

1				 		,					٨.										
	LUGEON	Lu 1/min/m					2.5									0.5					
	PERMEABILITY	k cm/sec	1	1	1.24×10^{-5}	1.90 x 10 ⁻⁵	1.84×10^{-5}	2.13×10^{-5}	2.24×10^{-5}	3.22×10^{-5}			I	2.68 x 10-6	5.03×10^{-6}	5.06 x 10 ⁻⁶ .	5.49 x 10 ⁻⁶	3.92 × 10 ⁻⁶	•		
	WATER	Q 1/min	0	0	08.0	1.90	2.50	2.12	1.44	0.91		0	0	0.57	1.67	2.27	1.82	0.83			
	GUAGE	Hg cm	30.0									30.0									
	PRESSURE	kg/cm ³	0	1	4	7	10	7	4	1		0	1	4	7	10	7	4	T,		
	HOLE RADIUS	r Cin	4.25			-						4.25					!				
	SECTION	L cm	100.0	-								500.0									
	Ξ	E - E	22.6- 23.6									25.0- 30.0	-								
	DATE		4/May									5/May									
	STAGE	NO	5									9									

RECORD OF WATER PRESSURE TEST

GROUND WATER LEVEL 19.45 m

HOLE NO 3

SHEET NO 7

LUGEON UNIT Lu.1/min/m				269.0						401.4							41.8	
PERMEABILITY k cm/sec	3.54 x 10 ⁻⁵	1.55 x 10 ⁻⁴	7.65×10^{-4}	1.67×10^{-3}	1.03×10^{-3}	8.40×10^{-4}	1.75×10^{-4}	6.63×10^{-4}	6.83 x 10 ⁻⁴	2.45×10^{-3}	9.23 x 10 ⁻³	1.15×10^{-4}	 	3	2.54×10^{-4}	2.51×10^{-4}	2.31×10^{-4}	2.49×10^{-4}
MATER LEAKAGE Q 1/min	1.40	1.59	22.40	80.70	30.01	8.64	1.22	10.05	27.14	157.55	36.69	1.74	0	0	10.54	16.56	20.88	16.45
GUAGE HEIGHT Hg cm	0					:	25						25	-				
PRESSURE kg/cm ³	0		4	7	4	Ī	<i>§</i> 0	. 1	4	7	4	11	0		4		10	7
HOLE RADIUS r cm	5.0						5.0						5.0		:			
SECTION LENGTH L cm	30.0						50.0						50.0		:			
DEPTH	6.0- 6.3						8.0-8.5						10.0- 10.5					
DATE	6/May						7/May						7/May					
STAGE							2						٣					