

APPENDIX - III

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DECLARE SUB FRFACT (REY!, ED!, FF!)
CLS
REM
*****
REM *
REM * THIS PROGRAM CALCULATES THE FLOWRATE FOR A
PARTICULAR
REM * UPPER CHOKE AND VARIOUS BOTTOM CHOKE SIZES FOR THE
REM
REM * SELECTION OF CHOKE SIZES FOR COMINGLING FLOW
PRODUCTION
REM *
REM *
REM *
REM
*****

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READ PR1, DENG1, DENO1, PI1, TEMP1, GOR1, RS1, BO1, PB1
READ PR2, DENG2, DENO2, PI2, TEMP2, GOR2, RS2, BO2, PB2
Z1 = .89: K = 1.4: ED = .0006
RS2 = RS2 / 5.615
RS1 = RS1 / 5.615
M = 0
N = 1
VISL = 18
VISG = .018
SURL = 1.1
PTF1 = PR1 * 14.22
PTF2 = PR2 * 14.22
DENO1 = DENO1 * 62.4
DENO2 = DENO2 * 62.4
BO = (1 + (.0033 * (TEMP1 - 60)) / DENO1 ^ 1.8297) * (1 + .00048 * RS1)
BG1 = 14.7 * (TEMP1 + 460) * Z1 / (PTF1 * 520)
BG2 = 14.7 * (TEMP2 + 460) * Z1 / (PTF2 * 520)
DENG1 = .0765 * DENG1 / BG1 / 5.615
DENG2 = .0765 * DENG2 / BG2 / 5.615
DENL1 = DENO1
DENL2 = DENO2
FO1 = 1 - FW1
FO2 = 1 - FW2
AP = 3.14 * (.249) ^ 2 / 4
K1 = (K - 1) / K
ALFA1 = (BO1 + FW1)
ALFA2 = (BO2 + FW2)

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BETA1 = DENO1 + RS1 * DENG1 / 5.615 + FWO1 * DENW1
BETA2 = DENO2 + RS2 * DENG2 / 5.615 + FWO2 * DENW2
BETA11 = (GOR1 - RS1) / 5.615 * (TEMP1 + 460) * 14.7 * Z1 / 144*(PTF1 * 520)
BETA22 = (GOR2 - RS2) / 5.615 * (TEMP2 + 460) * 14.7 * Z1 / 144*(PTF2 * 520)
FOR BS2 = 6 TO 20 STEP 2
FOR BS1 = 6 TO 20 STEP 2
REM BS2 = 16
QO1 = 3.35 * (BS1 / (12 * 64)) ^ 2 * 3.14 / 4
QO2 = 3.35 * (BS2 / (12 * 64)) ^ 2 * 3.14 / 4
QO12 = ((K * (2 / (K + 1)) ^ ((K + 1) / (K - 1))) * (32.2 * PTF1 * 144 * BETA1 *
(ALFA1 * (1 + BETA11)))) ^ .5
QO22 = ((K * (2 / (K + 1)) ^ ((K + 1) / (K - 1))) * (32.2 * PTF2 * 144 * BETA2 *
(ALFA2 * (1 + BETA22)))) ^ .5
QO13 = (1 / (BETA1 * (ALFA1 + BETA11)))
QO23 = (1 / (BETA2 * (ALFA2 + BETA22)))
Q1O = QO1 * QO12 * QO13 * 86400 / 5.615
Q2O = QO2 * QO22 * QO23 * 86400 / 5.615 / 4
PINDEX1 = 1 / (PI1 * 6.29 / 14.22)
PINDEX2 = 1 / (PI2 * 6.29 / 14.22)
DELP1 = PINDEX1 * Q1O
REM PRINT PINDEX1, PI1, DELP1, Q1O
DELP2 = PINDEX2 * Q2O
FBHP1 = PTF1 - DELP1
FBHP2 = PTF2 - DELP2
ABP1 = FBHP1 * .528
REM PRINT ABP1
ABP2 = FBHP2 * .528
AVP1 = (ABP1 + 750) / 2
REM VELOCITY CALCULATION
QOPT1 = Q1O * BO1 * 5.615 / 86400
QOPT2 = Q2O * BO2 * 5.615 / 86400
QWPT1 = QW1 * BW1 * 5.615 / 86400
QWPT2 = QW2 * BW2 * 5.615 / 86400
QGPT1 = (Q1O * (GOR1 - RS1) - QW1 * RSW1) * Z1 * (TEMP1 + 460) * 14.7 /
(520 * 86400 * ABP1)
QGPT2 = (Q2O * (GOR2 - RS2) - QW2 * RSW2) * Z1 * (TEMP2 + 460) * 14.7 /
(520 * 86400 * ABP2)
QLPT = QOPT1 + QWPT1 + QLPT2 + QWPT2
VSL = QLPT / AP
VSG = (QGPT1 + QGPT2) / AP
VM = VSL + VSG
HLNS = VSL / VM
A = 90 * 3.1416 / 180

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DENG = (DENG1 + DENG2) / 2
DENL = (DENL1 + DENL2) / 2
DELP = DEN1 * VM1 ^ 2 / 18
ABP11 = ABP1 + DELP
REYNG = 1488 * DENG * VSG * .249 / VISG
REYNL = 1488 * DENL * VM * .249 / VISL
VBG = .5 * SQR(32.2 * .249)
REM CALCULATION OF ED AND CORRECTED VSG
VSGP = VSG
EDG = ED
REYG = 1488 * DENG * VSGP * .249 / VISG
FOR I = 1 TO 30
XWEB = 454 * DENG * VSGP ^ 2 * (EDG * .249) / SURL
XVIS = .0002048# * VISL ^ 2 / (DENL * SURL * (EDG * .249))
PR = XWEB * XVIS
EDC = .0749 * SURL / (DENG * VSGP ^ 2 * .249)
IF PR > .005 THEN EDC = .3713 * SURL * PR * .302 / (DENG * VSGP ^ 2 * .249)
VSGP = VSG / (1 - EDC) ^ 2
IF ABS(EDC - EDG) < .00001 THEN I = 30
NEXT I
IF EDC < .005 THEN
IF REYG > 2000 THEN
FGI = .0056 + .5 / REYG ^ .32
FOR I = 1 TO 10
DEN = 1.14 - 2 * LOG(ED + 9.34 / (REYG * SQR(FGI))) / 2.312
FF = (1 / DEN) ^ 2
DIFF = ABS(FGI - FF)
IF DIFF <= .0001 THEN I = 10
FGI = (FGI + FF) / 2
NEXT I
FF = FGI
ELSE
FF = 64 / REYG
END IF
ELSE
FF = (1 / (4 * LOG(.27 * EDC) / 2.31) ^ 2 + .67 * EDC ^ 1.73)
END IF
FRGR = FF * DENG * VSGP ^ 2 / (32.2 * .249 * 144)
DENS = DENL * HLNS + DENG * (1 - HLNS)
ELGR = DENS * SIN(A) / 144
EKK = DENS / 62.4 * VM * VSGP / (32.2 * AVP1 * 144)
DPDL = (FRGR + ELGR) / (1 - EKK)
ACCGR = DPDL * EKK

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THP = ABP11 - (DPDL * 2816 * 3.28)
IF THP > -100 THEN
IF M = 0 OR M = 9 THEN
PRINT CHR$(12)
PRINT " TABLE 6."; TAB(11); N + 3; " COMINGLING CHOKESIZE
                                SELECTION (TEST NO.1)"
PRINT ""
PRINT " UPPER BOTTOMHOLE CHOKE SIZE = "; BS2; "/64 INCH "
PRINT
PRINT " UPPER ZONE FLOWRATE      = "; Q2O
PRINT "-----"
PRINT "  BOTTOM    BOTTOM    TOTAL    AFTER    AFTER
PREDICTED "
PRINT "  CHOKE    FLOWRATE FLOWRATE CHOKE    CHOKE
TUBINGHEAD"
PRINT "  SIZE      BBL/D    BBL/D    PRESSUE  PRESSURE
PRESSURE "
PRINT "                                (BOTTOM) (SURFACE) "
PRINT "  1/64 IN.          PSI      PSI      PSI"
PRINT "-----"
PRINT
N = N + 1
M = 1
END IF
PRINT USING "#####.###"; BS1; Q1O; Q1O + Q2O; ABP11; 750 + (DPDL *
2816 * 3.28); ABP11 - (DPDL * 2816 * 3.28)
PRINT
END IF
M = M + 1
NEXT BS1
NEXT BS2
PRINT CHR$(12)
END
DATA 313.7,0.8021,0.8338,2.95,281,3500,1773,2.4267,257
DATA 276.60,0.8240,0.8160,8.82,262,629,87,2.4787,235
SUB FRFACT (REY, ED, FF)
END SUB
SUB HEAD
END SUB
SUB VELOCITY
V1 = QO1 / 4.8695
V2 = QO2 / .5944
W1 = DEN1

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W2 = DEN2  
W = W1 + W2  
P = W1 * V1 + W2 * V2 + ABP1 * 4.8695 + ABP2 * .5944  
PRINT W1, W2, W, P  
END SUB
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