

APPENDIX - II

DECLARE SUB FRFACT (REY!, ED!, FF!)

CLS

REM

REM * *
REM * **THIS PROGRAM CALCULATES THE FLOWRATES THROUGH**

REM * **VARIOUS POSSIBLE BOTTOMHOLE CHOKE SIZES FOR**

REM * **A GIVEN TUBINGHEAD PRESSURE** *
REM * *
REM * **- USING MIST FLOW** *
REM * *
REM * *
REM * **OPTIMUM CHOKE SIZE SELECTION** *
REM * *
REM * *
REM

REM *** DATA INPUT SECTION *******

REM INPUT " INSERT RESERVOIR PRESSURE IN KG/CM2 "; PTF
REM INPUT " INSERT GAS SPECIFIC GRAVITY "; DENG
REM INPUT " INSERT OIL SPECIFIC GRAVITY "; DENO
REM INPUT " INSERT PRODUCTIVITY INDEX "; PI
REM INPUT " INSERT TEMPERATURE IN DEG. F "; TEMP
REM INPUT " INSERT GAS OIL RATIO CU.F/BBL "; GOR
REM INPUT " INSERT SOLUTION GAS OIL RATIO CUF/BBL"; RS
REM INPUT " INSERT FORMATION VOLUME FACTOR "; BO
REM INPUT " INSERT THE DEPTH OF THE LAYER "; DEPTH

READ PTF, DENG, DENO, PI, TEMP, GOR, RS, BO, DEPTH, TNO

FW = 0: Z1 = .69: K = 1.4: ED = .0006

M = 1

VISL = 18

VISG = .018

$$\text{SURL} = 1.1$$

$$\text{PTF} = \text{PTF}$$

$$\text{DENO} = \text{DENO} * 62.4$$

$$\text{BG} = 14.7 * (\text{TEMP} + 460) * \text{Z1} / 144 * (\text{PTF} * 520)$$

$$\text{DENG} = .0765 * \text{DENG} / \text{BG} / 5.615$$

$$\text{DENL} = \text{DENO}$$

$$\text{FO} = 1 - \text{FW}$$

$$\text{AP} = 3.14 * (.249) ^ 2 / 4$$

$$\text{K1} = (\text{K} - 1) / \text{K}$$

$$\text{ALFA} = (\text{BO} + \text{FW})$$

$$\text{BETA1} = \text{DENO} + \text{RS} * \text{DENG} / 5.615 + \text{FWO} * \text{DENW}$$

$$\text{BETA11} = (\text{GOR} - \text{RS}) / 5.615 * (\text{TEMP} + 460) * \text{Z1} / (\text{PTF} * 198.6)$$

$$\text{FOR BS} = 6 \text{ TO } 20 \text{ STEP } 2$$

$$\text{QO1} = 4.2 * (\text{BS} / (12 * 64)) ^ 2 * 3.14 / 4$$

$$\text{QO2} = ((\text{K} * (2 / (\text{K} + 1)) ^ ((\text{K} + 1) / (\text{K} - 1)))) * (32.2 * \text{PTF} * 144 * \text{BETA1} * \text{ALFA} * (1 + \text{BETA11})) ^ .5$$

$$\text{QO3} = 1 / (\text{BETA1} * (\text{ALFA} + \text{BETA11}))$$

$$\text{QO} = \text{QO1} * \text{QO2} * \text{QO3} * 86400 / 5.615$$

$$\text{PINDEX} = 1 / (\text{PI} * 6.29 / 14.27)$$

$$\text{DELP} = \text{PINDEX} * \text{QO}$$

$$\text{FBHP} = \text{PTF} - \text{DELP}$$

ABP = FBHP * .528

IF ABP < 500 THEN END

AVP = (ABP + 750) / 2

REM VELOCITY CALCULATION

QOPT = QO * BO * 5.614 / 86400

QWPT = QW * BW * 5.614 / 86400

**QGPT = (QO * (GOR - RS) - QW * RSW) * Z1 * (TEMP + 460) * 14.7 * 5.614 /
(520 * ABP * 86400)**

QLPT = QOPT + QWPT

VSL = QLPT / AP

VSG = QGPT / AP

VM = VSL + VSG

HLNS = VSL / VM

A = 90 * 3.1416 / 180

REYNG = 1488 * DENG * VSG * .249 / VISG

REYNL = 1488 * DENL * VM * .249 / VISL

REM CALCULATION OF ED AND CORRECTED VSG

VSGP = VSG

EDG = ED

FOR I = 1 TO 30

REYG = 1488 * DENG * VSGP * .249 / VISG

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

EDC = EDG

NEXT I

IF EDC < .05 THEN

REYG = 1488 * DENG * VSG ^ 2 / VISG

IF REYG > 2000 THEN

FGI = .0056 + .5 / REYG ^ .32

FOR I = 1 TO 100

DEN = 1.14 - 2 * LOG(ED + 9.34 / (REYG * SQR(FGI)))

FF = (1 / DEN) ^ 2

DIFF = ABS(FGI - FF)

IF DIFF <= .00001 THEN I = 100

FGI = (FGI + FF) / 2

NEXT

FF = FGI

ELSE

FF = 64 / REYG

END IF

ELSE

FF = (1 / (4 * LOG(.27 * EDC)) ^ 2 + .67 * EDC ^ 1.73) * 4

END IF

FRGR = FF * DENG * VSGP ^ 2 / (2 * 32.2 * .249 * 144)

DENS = DENL * HLNS + DENG * (1 - HLNS)

ELGR = DENS * SIN(A) / 144

EKK = DENS * VM * VSGP / (2 * 32.2 * AVP * 144)

DPDL = INT((FRGR + ELGR) / (1 - EKK) * 1000) / 1000

ACCGR = DPDL * EKK

IF M = 1 OR I = 36 OR I = 71 THEN

TNO1 = TNO + 20

**PRINT ; " TABLE 5."; TNO1; TAB(16); " BOTTOMHOLE CHOKE SIZE
SELECTION, TEST NO. "; TNO**

PRINT

PRINT

PRINT

PRINT " RESERVOIR PRESSURE (PSI) = "; PTF

PRINT

PRINT " RESERVOIR TEMPERATURE (DEG. F) = "; TEMP

PRINT

PRINT " FORMATION VOLUME FACTOR = "; BO

PRINT

PRINT " TEST GAS OIL RATIO (SCF/BBL) = "; GOR

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PRINT

PRINT " SOLUTION GAS OIL RATIO (SCF/BBL) = "; RS

PRINT ""

PRINT " REQUIRED TUBING HEAD PRESSURE  = 750 PSI"

PRINT

PRINT

PRINT "-----"

PRINT "      CHOKE  FLOWRATE  AFTER  PREDICTED  "
PRINT "      SIZE    BBLs/D    CHOKE  AFTER CHOKE  "
PRINT "      1/64 IN                PR.PSI  PR. PSI.  "

PRINT "                                (FROM BOTTOM) (FROM SURFACE) "
PRINT "-----"

PRINT

ELSE

END IF

PRINT USING " #####.### "; BS; QO; ABP; 750 + DPDL * DEPTH * 3.28

PRINT

M = M + 1

NEXT BS

END

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