Supporting Information

table QprodIm_total_supply(PIm,Prov,tp) the supply amount of import materials(1000m3)

	tp1	tp2	tp3	tp4	tp5	tp6	tp7	tp8	tp9	tp10	tp11	tp12
f1.Pro1	12	11	11	12	12	13	12	11	13	13	12	11
f1.Pro2	22	21	21	22	22	23	22	21	23	23	22	21
f1.Pro3	32	31	31	32	32	33	32	31	33	33	32	31
f1.Pro4	2	1	1	2	2	3	2	1	3	3	2	1
f1.Pro5	2	1	1	2	2	3	2	1	3	3	2	1
f2.Pro1	1	1	11	2	12	3	2	11	13	11	2	1
f2.Pro2	21	21	1	12	22	13	2	21	23	13	11	11
f2.Pro3	32	31	31	32	32	33	32	31	33	33	32	31
f2.Pro4	21	21	21	2	2	3	12	11	3	3	12	11
f2.Pro5	11	21	21	2	12	13	2	1	3	3	2	1
f3.Pro1	1	1	2	2	2	3	2	1	3	3	2	1
f3.Pro2	1	1	2	2	2	3	2	1	3	3	2	1
f3.Pro3	32	31	31	32	32	33	32	31	33	33	32	31
f3.Pro4	1	1	2	2	2	3	2	1	3	3	2	1
f3.Pro5	1	1	2	2	2	3	2	1	3	3	2	1
Hf1.Pro1	1	11	1	2	21	3	2	1	3	3	2	1
Hf1.Pro2	11	11	1	2	2	3	2	1	3	3	2	1
Hf1.Pro3	32	31	31	32	32	33	32	31	33	33	32	31
Hf1.Pro4	1	11	1	2	2	3	2	1	3	3	2	1
Hf1.Pro5	1	1	11	21	21	31	2	1	3	3	2	1
Hf2.Pro1	3	1	3	2	21	3	2	1	3	3	21	1
Hf2.Pro2	32	1	3	2	2	31	21	11	31	31	2	1
Hf2.Pro3	32	31	31	32	32	33	32	31	33	33	32	31
Hf2.Pro4	32	1	3	2	2	3	2	1	3	3	21	1
Hf2.Pro5	3	1	3	2	2	3	2	1	3	3	21	1
Hf3.Pro1	3	1	35	22	2	3	2	1	3	3	2	1
Hf3.Pro2	34	11	3	25	2	3	2	1	3	3	2	1
Hf3.Pro3	32	31	31	32	32	33	32	31	33	33	32	31
Hf3.Pro4	3	1	3	2	2	3	2	1	3	3	2	1
Hf3.Pro5	3	1	3	2	2	3	2	1	3	3	2	1
Bz.Pro1	21	1	2	2	2	3	2	1	3	3	2	1
Bz.Pro2	2	11	21	21	21	31	11	13	23	3	33	22
Bz.Pro3	32	31	31	32	32	33	32	31	33	33	32	31
Bz.Pro4	21	1	2	2	2	3	2	1	3	3	2	1
Bz.Pro5	21	1	2	2	2	3	2	1	3	3	2	1
Tol.Pro1	21	11	2	21	2	3	2	1	3	3	21	11
Tol.Pro2	21	11	2	21	2	3	2	1	3	3	21	1
Tol.Pro3	32	31	31	32	32	33	32	31	33	33	32	31
Tol.Pro4	2	1	2	2	2	3	2	1	3	3	2	11
Tol.Pro5	2	1	2	2	2	3	2	1	3	3	2	11
mix-Xy.Pro1	12	11	12	2	2	13	2	11	13	3	2	1
mix-Xy.Pro2	22	21	22	12	12	12	2	11	3	3	2	1
mix-Xy.Pro3	32	31	31	32	32	33	32	31	33	33	32	31
mix-Xy.Pro4	42	41	42	2	2	3	2	21	22	32	21	11
mix-Xy.Pro5	2	1	2	2	2	3	2	1	3	3	32	11
pXy.Pro1	2	23	22	22	22	32	22	22	23	23	22	42
pXy.Pro2	2	1	2	2	2	3	2	1	3	3	2	1
pXy.Pro3	32	31	31	32	32	33	32	31	33	33	32	31
pXy.Pro4	2	1	2	2	2	3	2	1	3	3	2	1

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    pXy.Pro5  2    1    2      2    2      3     2    1    3    3     2    1
    oXy.Pro1  12   12  23   22   32   13    12   22   41  22   12   24
    oXy.Pro2  2     1    2      2    2   23     2   32    3  12   16   32
    oXy.Pro3  32   31   31   32   32   33   32   31   33  33   32   31
    oXy.Pro4  2     1    2      2    2    3    32    1   12    3    2   12
    oXy.Pro5  2     1    2      2    2    3     2    1    3    3    2    1
   c2ene.Pro1 12   11   22    5    7    3    12    6    3    3   42   41
   c2ene.Pro2 22   21   52   42   22   23   44   44   13  13   22   21
   c2ene.Pro3 32   31   31   32   32   33   32   31   33  33   32   31
   c2ene.Pro4 72   77   82   82   84   83   82   81   83  83   82   81
   c2ene.Pro5  6    6    5   12    2   13    2    7   33  23    2    5
   C3ene.Pro1  2    1   12    2    2    3   22   11   13  13   12   11
   C3ene.Pro2  2   21   22   12   12    3   12   11   13  13   12   11
   C3ene.Pro3 32   31   31   32   32   33   32   31   33  33   32   31
   C3ene.Pro4 22   22   12    2   22   23   21   11   13  11   12   11
   C3ene.Pro5  2    1   22    2    2    3    2    1    3    3    2    1
   c4ene.Pro1 12   11    2   32    2    3    2    1    3    3    2   11
   c4ene.Pro2  2   22   12   22    2    3    2   11   13    3   12   11
   c4ene.Pro3 32   31   31   32   32   33   32   31   33  33   32   31
   c4ene.Pro4  2    2   22    2   11   13   12   11    3   13   12   11
   c4ene.Pro5  2    1    2    2    2    3    2    1    3    3    2    1
                ;
parameters QPPImdIm_Jet_tankspace(PIm) the tank space of import materials
     /f1   25000,f2   25000,f3     25000, Hf1  10000,Hf2 10000,Hf3 10000,
      Bz   10000,Tol  15000,mix-Xy 25000, pXy  25000,oXy 25000,c2ene 25000,
     C3ene 25000,c4ene 25000/

table Crudeoil_provider_week(Ro,Prov,tp) the crude oil provide amount (1000m3)
                tp1   tp2   tp3  tp4  tp5   tp6   tp7   tp8   tp9   tp10  tp11  tp12
Ro1.Pro1      200   250  350  500                                300  350  350   400
Ro1.Pro2      600   300  400   0   150   800  400   600   350  450  500   200
Ro1.Pro3                                350   600  400   600
Ro1.Pro4      500   900  600  300
Ro1.Pro5                                450   700  500   400   650  650  600   600

Ro2.PRo1      400   550  650  500  400   550  350   450   500  450  300   400
Ro2.Pro2      600   300  400   0
Ro2.Pro3      800   200  400  600  250   700  400   600
Ro2.Pro4      800   600  300  600
Ro2.Pro5                                 250   950  550   450   850  450  400   600

Ro3.Pro1      900   450  650  500  450   900  500   550   100  250  350   400
Ro3.Pro2      700   100    0    0    350   300  700   700   450  250  100   500
Ro3.Pro3                                450   300  800   300
Ro3.Pro4      900   900  900  900
Ro3.Pro5                                 750   500 1000   300   750  550 1600   400

Ro4.Pro1      400   350  850  300                                500  350  100   150
Ro4.Pro2      400   400  400    0   550   500  550   400    750  700    0    200
Ro4.Pro3      350   900  400 600   350   900  400   600   350   900  400  600
Ro4.Pro4      400   800 1500  300  400   800 1500  300    400   800 1500  300
Ro4.Pro5      750   500  500  300  750   500  500   300   750  550  800   400

Ro5.Pro1      200   250  350  900                                300  750  350   400
Ro5.Pro2      400   400  400  100  550   500  500   400   750 1050    0   200
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Ro5.Pro3                          450   500  400  1300
Ro5.Pro4     500   900 1600  300
Ro5.Pro5                           1450   700  500   400   650 1650  600   600

Ro6.Pro1     400   350  150  300                          500  350  500   150
Ro6.Pro2     400   400  700  100  550   600  500   400   750  550  100   200
Ro6.Pro3                          550   600  400   600   550  600  400   600
Ro6.Pro4     400   800  400  100  750   500  500   300   750  550  800   400
Ro6.Pro5                           750   500  200   300   750  550  300   400

Ro7.Pro1     100   250  350  500                            0  350  350   400
Ro7.Pro2       0   400  400  100   450   500  500   400   750  250    0   200
Ro7.Pro3                          650   500  400   600
Ro7.Pro4     500   900  600  300                          850  300  500   300
Ro7.Pro5                          550   600  500     0   650  450  800   700

Ro8.Pro1     200   250  350  500                         400  350  350   400
Ro8.Pro2     700  1400  200   0   650   500  200  1600   850  550  300   200
Ro8.Pro3                         1450   500  400   600
Ro8.Pro4     400  1800  400  300
Ro8.Pro5                          350   600  500   400   550  350  800   700

Ro9.Pro1     200   250  350  500                          300  550  350   400
Ro9.Pro2     400   700  400  100  550   500  500   600   750  750    0   200
Ro9.Pro3                           650   500  400   600
Ro9.Pro4     500   900  600  500
Ro9.Pro5                           550   500  500   300   750  550  800   400

Ro10.Pro1     500   250  350  500                          300  350  350   400
Ro10.Pro2     600   400  400   0   250   800  400   600   450  450  500   200
Ro10.Pro3                         650   300  500   300
Ro10.Pro4     600   700  200 1800
Ro10.Pro5                         1750   500  500   300  1750  550  800   400

                ;
table Crudeoil_provider_Price(Ro,Prov,tp) the price of crude oil
              tp1    tp2    tp3  tp4    tp5   tp6    tp7    tp8    tp9   tp10   tp11  tp12
Ro1.Pro1     280   280  280  280                          280  280  280   280
Ro1.Pro2     340   340  340  340   300   300  300   300    250  250  250   250
Ro1.Pro3                           310   310  310   310
Ro1.Pro4     290   290  290  290
Ro1.Pro5                           220   220  220   220   350  350  350   350

Ro2.PRo1      312   312  312  312  310   310  310   310   320  320  320   320
Ro2.Pro2     313   313  313  313
Ro2.Pro3     290   290  290  290  295   295  295   295
Ro2.Pro4     330   330  330  330
Ro2.Pro5                           350   350  350   350   340  340  340   340

Ro3.Pro1     390   390  390  390  450   450  450   450   380  380  380   380
Ro3.Pro2     390   390  390  390  380   380  380   380   450  450  450   450
Ro3.Pro3                          340   340  340   340
Ro3.Pro4     230   230  230  230
Ro3.Pro5                           350   350  350   350   400  400  400   400
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Ro4.Pro1     310  310  310  310                          290  290  290  290
Ro4.Pro2     320  320  320  320  350  350  350  350  350  350  350  350
Ro4.Pro3     312  312  312  312  350  350  350  350  350  350  350  350
Ro4.Pro4     290  290  290  290  400  400  400  400  400  400  400  400
Ro4.Pro5     311  311  311  311  350  350  350  350  320  320  320  320

Ro5.Pro1     290  290  290  290                          300  300  300  300
Ro5.Pro2     400  400  400  400  550  550  550  550  267  267  267  267
Ro5.Pro3                          315  315  315  315
Ro5.Pro4     312  312  312  312
Ro5.Pro5                          400  400  400  400  350  350  350  350

Ro6.Pro1     288  288  288  288                          350  350  350  350
Ro6.Pro2     330  330  330  330  332  332  332  332  270  270  270  270
Ro6.Pro3                          290  290  290  290  280  280  280  280
Ro6.Pro4     300  300  300  300  277  277  277  277  288  288  288  288
Ro6.Pro5                          299  299  299  299  293  293  293  293

Ro7.Pro1     292  292  292  292                          291  291  291  291
Ro7.Pro2     278  278  278  278  277  277  277  277  287  287  287  287
Ro7.Pro3                          311  311  311  311
Ro7.Pro4     500  900  600  300                          350  350  350  350
Ro7.Pro5                          400  400  400  400  350  350  350  350

Ro8.Pro1     255  255  255  255                          311  311  311  311
Ro8.Pro2     270  270  270  270  266  266  266  266  310  310  310  310
Ro8.Pro3                          340  340  340  340
Ro8.Pro4     400  400  400  400
Ro8.Pro5                          350  350  350  350  280  282  280  280

Ro9.Pro1     299  299  299  299                          300  550  350  400
Ro9.Pro2     300  300  300  300  350  350  350  350  305  305  305  305
Ro9.Pro3                          330  330  330  330
Ro9.Pro4     380  380  380  380
Ro9.Pro5                          320  320  320  320  311  311  311  311

Ro10.Pro1    300  300  300  300                          300  300  300  300
Ro10.Pro2    277  277  277  277  299  299  299  299  450  450  450  450
Ro10.Pro3                         255  255  255  255
Ro10.Pro4    360  360  360  360
Ro10.Pro5                         350  350  350  350  330  330  330  330
                ;
 parameter Jet_Import_limit the crude oil import limitation
          /10000000/;
 parameter CvinJet_Crude(Ro) the storage cost of crude oils
   /Ro1 0.01, Ro2 0.01,  Ro3  0.015, Ro4 0.002, Ro5  0.01,
    Ro6 0.001,Ro7 0.002, Ro8  0.001, Ro9 0.015, Ro10 0.02/;
 parameter Cvin_Top(Top) the storage cost of feed or product at Top units
     /Top1 0.12,Top2 0.13, Top3 0.14/;
 table CTPTOPP(Top,T) product transportation cost from Topping unit to Terminals
                KSRTL     LIWRTL
          Top1    0.12      0.32
          Top2    0.25      0.23
          Top3    0.35      0.1   ;
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table CTPDieTopHTD(Top,HTD) material transportation cost from Topping unit to HTD units
                HTD1     HTD2    HTD3
        Top1    0.12     0.32    0.34
        Top2    0.35     0.13    0.33
        Top3    0.35     0.31    0.11    ;
parameter Crude_Top_tankspace(Top)  crude oil buffer tank space in Top unit
        / Top1 260000, Top2  260000, Top3 260000/;
parameter Crude_Jet_tankspace the buffer tank space of crude in the jet/ 800000/;
table Pt_top_tankspace(Top,Pt) initial inventory space of product at topping unit
                LPG    Ln     Hn     Ker    Die    ATR
        Top1  10000  10000  10000  10000  10000  10000
        Top2  10000  10000  10000  10000  10000  10000
        Top3  10000  10000  10000  10000  10000  10000
        ;
table TopQmin(Top,RO) the operatong limitation of topping units
        Ro1     Ro2     Ro3     Ro4     Ro5     Ro6     Ro7     Ro8     Ro9     Ro10
top1  250000  250000  251000  252000  255000  250200  250300  259800  259700  259500
top2  245000  253000  253000  256000  257000  256200  255300  259800  279700  259500
top3  225000  257000  260100  232000  245000  230200  220300  279800  269700  259500
;
table TopQmax(Top,RO) the operatong limitation of topping units
        Ro1     Ro2     Ro3     Ro4     Ro5     Ro6     Ro7     Ro8     Ro9     Ro10
top1  750000  750000  753100  763200  776050  774020  775030  700980  723970  783950
top2  751000  753000  756100  760200  776000  772020  770030  740980  773970  703950
top3  750300  752000  750100  766200  779050  775020  773030  720980  783970  723950
;

table CNF(PM,T,UOM) product transportation cost to cumstomers by pipeline or truck
                Kuco1  Kuco2  Kuco3  Kuco4  Kuco5  LIWRco1  LIWRco2  LIWRco3
    Bz.KSRTL    0.05   0.05   0.05   0.05   0.05   0.15     0.15     0.15
    Bz.LIWRTL   0.15   0.15   0.15   0.15   0.15   0.05     0.05     0.05
    Tol.KSRTL   0.05   0.05   0.05   0.05   0.05   0.15     0.15     0.15
    Tol.LIWRTL  0.15   0.15   0.15   0.15   0.15   0.05     0.05     0.05
mix-Xy.KSRTL    0.05   0.05   0.05   0.05   0.05   0.15     0.15     0.1
mix-Xy.LIWRTL   0.15   0.15   0.15   0.15   0.15   0.05     0.05     0.05
    pXy.KSRTL   0.05   0.05   0.05   0.05   0.05   0.15     0.15     0.15
    pXy.LIWRTL  0.15   0.15   0.15   0.15   0.15   0.05     0.05     0.05
    oXy.KSRTL   0.05   0.05   0.05   0.05   0.05   0.15     0.15     0.15
    oXy.LIWRTL  0.15   0.15   0.15   0.15   0.15   0.05     0.05     0.05
    c2ene.KSRTL 0.06   0.06   0.07   0.08   0.06   0.250    0.27     0.25
    c2ene.LIWRTL 0.16  0.17   0.17   0.28   0.19   0.050    0.07     0.08
    c3ene.KSRTL 0.06   0.06   0.07   0.18   0.06   0.250    0.27     0.25
    c3ene.LIWRTL 0.16  0.16   0.17   0.18   0.16   0.050    0.07     0.05
    c4ene.KSRTL 0.16   0.16   0.17   0.18   0.16   0.250    0.27     0.25
    c4ene.LIWRTL 0.06  0.06   0.07   0.08   0.06   0.150    0.17     0.15
    ;
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Table QDPn(T,Pn,Mn) the byproduct production limitation
                          Mn1       Mn2       Mn3
     KSRTL.c3    520000     520000    520000
     KSRTL.c4    550000     550000    550000
     KSRTL.Raf   950000     950000    950000
     KSRTL.c5    200000     200000    200000
     KSRTL.c9    200000     200000    200000
     KSRTL.c10   150000     150000    150000
     LIWRTL.c3   500000     500000    500000
     LIWRTL.c4   500000     500000    500000
     LIWRTL.Raf  900000     900000    900000
     LIWRTL.c9   120000     120000    120000
     LIWRTL.c10  150000     150000    150000                    ;
 parameter Nap_TankSpace(REF) total tank space of light Naphtha at reforming unit Ref
            /R1 30000, R2 30000,R3 30000/          ;
 parameter  QNapImUpper(Nf) the maximum import amount of light naphtha
          /f1 50000, f2 50000, f3  50000/;
  table  Compt(Ro,Pt) Crude oil composition fraction
              LPG    Ln      Hn       Ker       Die    ATR
     Ro1    0.013   0.154   0.066   0.041    0.155   0.571
     Ro2    0.021   0.132   0.072   0.048    0.166  0.561
     Ro3    0.012   0.126   0.079   0.050    0.178  0.555
     Ro4    0.013   0.132   0.101   0.050    0.186  0.528
     Ro5    0.012   0.138   0.043   0.070    0.213  0.524
     Ro6    0.020   0.152   0.063   0.042    0.203  0.52
     Ro7    0.016   0.162   0.084   0.057    0.166  0.515
     Ro8    0.012   0.147   0.074   0.058    0.210  0.501
     Ro9    0.013   0.174   0.065   0.080    0.195  0.473
     Ro10   0.012   0.164   0.071   0.053    0.230  0.47                    ;
 table  OPCostTop(Top,RO) the operating cost of topping units
          RO1    Ro2   Ro3    Ro4    Ro5    Ro6    Ro7    Ro8    Ro9   Ro10
  top1   0.01    0.12   0.07    0.07    0.08    0.09    0.11   0.123  0.078   0.08
  top2   0.02    0.12   0.073   0.11    0.098   0.091   0.10   0.13   0.088   0.082
  top3   0.03    0.112  0.08    0.137  0.078   0.087   0.13   0.17   0.0718  0.084    ;
*HTD units
   parameters HTD_Feed_tankspace(HTD) the feed tank space of HTD units
        /HTD1 25000,HTD2 25000,HTD3 25000 /;
   parameters HTD_Prod_tankspace(HTD) the feed tank space of HTD units
        /HTD1 25000,HTD2 25000,HTD3 25000 /;
   parameters Yeild_HTD(Pd) the yield of HTD units
         /Diesel 0.96, H2s 0.04/;
   parameter QHTD_Upper(HTD) the maximum operation limit of HTD units
        /HTD1 1500000,HTD2 1250000,HTD3 1350000 /;
   parameter QHTD_Lower(HTD) the minimum operation limit of HTD units
        /HTD1 350000,HTD2 250000,HTD3 350000 /;
   parameter OPcost_HTD(HTD) the operating cost of HTD units
        /HTD1 0.135,HTD2 0.025,HTD3 0.0125 /;
   parameter Storagecost_HTD(HTD) the storage cost of feed and product at HTD units
        /HTD1 0.0135,HTD2 0.0125,HTD3 0.0125 /;
  table CTPDieHTD(HTD,T) material transportation cost from HTD units to terminals
                 KSRTL      LIWRTL
           HTD1      0.12       0.32
           HTD2      0.31       0.33
           HTD3      0.36       0.13        ;
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*Reforming units

  TABLE CtR(Nf,REF) transportation of feed Nf of the specific unit REF
          R1     R2     R3
     f1  0.05    0.1    0.15
     f2  0.1     0.05   0.1
     f3  0.15    0.1    0.05;
   parameter CNapImTran(REF) coefficient of Import Naphtha transfer cost
       / R1   0.23, R2   0.35, R3   1.25 /          ;
  table CHNapIm(HNf,tp)  coefficient of Import  heavyNaphtha price
        tp1  tp2   tp3   tp4   tp5   tp6   tp7   tp8   tp9   tp10  tp11  tp12
Hf1    420  420   420   420   435   435   435   435   435   435   435   435
Hf2    430  430   430   430   410   410   410   410   435   435   435   435
Hf3    430  430   430   430   430   430   430   430   420   420   420   420;
*Naphtha cracker
   parameter HNap_TankSpace(Pyr) total tank space of heavy Naphtha at reforming unit Ref
              /Pyr1 130000, Pyr2 130000,Pyr3 130000/          ;
  parameter  QHNapImUpper(HNf) the maximum import amount of heavy naphtha
          /Hf1 350000, Hf2 350000, Hf3  350000/;
  parameter  QHNapImLower(HNf) the maximum import amount of heavy naphtha
          /Hf1 105000, Hf2 105000, Hf3  105000/;
  table  OPcostY(Pyr,HNf,task_y) operating cost of feed by operating task_y at cracker
                  y1     y2     y3     y4     y5     y6
   Pyr1.Hf1    23.5   22.7   21.8   25.7   20.7   23.1
   Pyr1.Hf2    22.3   20.7   20.8   21.7   18.7   19.1
   Pyr1.Hf3    27.5   26.7   27.8   28.7   29.7   27.1
   Pyr2.Hf1    20.5   18.7   19.8   23.7   21.7   21.1
   Pyr2.Hf2    22.5   21.7   20.8   24.7   19.7   22.1
   Pyr2.Hf3    23.8   22.5   21.4   24.1   21.7   23.3
   Pyr3.Hf1    17.5   22.7   21.8   23.7   20.7   23.6
   Pyr3.Hf2    19.5   21.7   21.5   22.7   20.5   23.5
   Pyr3.Hf3    18.5   20.7   21.4   24.7   21.7   23.9
      ;
  table  YdP(Pyr,HNf,task_y,Py) yield of feed by operating task_y at cracker
                  Ace      c2ene   c3      c3ene    c4s      FG       H2       Btx      Gas      PFO      PGO
Pyr1.Hf1.y1  0.0739  22.3641 0.2982 13.4741  7.8136  8.8852  0.8810  14.4692  6.3949 1.8515  2.0247
Pyr1.Hf1.y2  0.0750  23.3641 0.2982 15.4741  7.6366  8.3662  0.8820  14.0692  6.3949 1.8015  1.0247
Pyr1.Hf1.y3  0.0835  20.3641 0.2982 14.4741  8.6066  8.3352  0.8830  15.4692  6.3949 1.8005  3.0000
Pyr1.Hf1.y4  0.0900  21.0041 0.2982 13.4741  7.6300  8.5552  0.8830  11.5692  6.3949 1.8500  2.254
Pyr1.Hf1.y5  0.0367  21.3001 0.2982 12.4741  5.6606  8.3352  0.8831  11.5592  6.3949 1.7515  2.055
Pyr1.Hf1.y6  0.0780  23.3641 0.2982 11.4741  4.9366  8.3352  0.8130  11.4222  6.3949 1.8005  2.0547
Pyr1.Hf2.y1  0.0222  22.3641 0.2982 11.5241  8.6366  8.3352  0.8230  11.5692  6.3949 0.8515  3.0247
Pyr1.Hf2.y2  0.0334  21.5641 0.2982 11.4541  9.6126  8.3562  0.8930  14.4692  6.3949 1.0015  1.9999
Pyr1.Hf2.y3  0.0445  21.3541 0.2982 11.4071  9.3266  8.3352  0.9930  15.4692  6.3949 0.8005  2.5233
Pyr1.Hf2.y4  0.0876  21.7631 0.2982 11.4441  8.6360  8.3532  0.4530  13.4692  6.3949 1.8515  2.5558
Pyr1.Hf2.y5  0.0424  20.3641 0.2982 11.4234  7.6300  8.3352  0.8130  17.4692  6.3949 0.9515  3.1047
Pyr1.Hf2.y6  0.1023  21.1241 0.2982 10.4741  6.6301  8.3352  0.8800  18.4692  6.3949 1.9515  5.0247
Pyr1.Hf3.y1  0.0700  25.3641 0.2982 13.4741  7.8366  8.5552  0.8770  17.5692  6.3949 1.8515  6.0247
Pyr1.Hf3.y2  0.0343  23.3041 0.2982 15.4741  9.6026  8.3352  0.2220  11.4592  6.3949 1.2515  7.0247
Pyr1.Hf3.y3  0.0567  21.3000 0.2982 17.4741 10.6300  8.3552  0.8830  11.4552  6.3949 1.8215  8.0247
Pyr1.Hf3.y4  0.0466  20.9961 0.2982 16.4741  9.6360  7.3352  0.8830  11.4252  6.3949 1.8235  9.0247
Pyr1.Hf3.y5  0.0639  24.3641 0.2982 15.4741  8.0066  8.3352  0.8220  11.4622  6.3949 1.8510  1.0247
Pyr1.Hf3.y6  0.0439  25.3641 0.2982 14.4741  9.6000  8.3352  0.8810  11.4222  6.3949 1.0005  2.0700
Pyr2.Hf1.y1  0.0719  21.5551 0.2982 11.4541  5.6552  8.3352  0.8832  11.2292  6.3949 1.8515  3.1247
Pyr2.Hf1.y2  0.0839  21.3333 0.2982 11.4551  4.6999  5.3352  0.8845  11.4242  6.3949 1.0015  2.0047
Pyr2.Hf1.y3  0.0219  21.4341 0.2982 11.4521  6.6777  8.3352  0.8830  11.3292  6.3949 1.8500  1.0247
Pyr2.Hf1.y4  0.0439  21.3343 0.2982 10.4741  7.6366  6.3352  0.8847  11.4772  6.3949 1.8225  2.1247
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Pyr2.Hf1.y5  0.0639  21.5541 0.2982  9.4741  8.6399  8.3352  0.8830  15.4692  6.3949 1.8525  2.2247
Pyr2.Hf1.y6  0.0769  21.8881 0.2982 11.2241  5.6777  9.3352  0.8830  16.4692  6.3949 1.8015  2.4722
Pyr2.Hf2.y1  0.0786  21.2241 0.2982 17.4741  5.6360  8.3352  0.8877  11.5592  6.3949 1.8515  2.0222
Pyr2.Hf2.y2  0.0759  23.3641 0.2982 14.2221  7.6300  3.3352  0.8830  11.4562  6.3949 1.8125  2.0444
Pyr2.Hf2.y3  0.0767  22.3641 0.2982 12.4741  6.0666  8.3352  0.8855  17.4692  6.3949 1.8533  2.2544
Pyr2.Hf2.y4  0.0759  20.3641 0.2982 14.4741  9.6300  2.3352  0.8830  18.4692  6.3949 1.8577  2.3568
Pyr2.Hf2.y5  0.0749  19.3641 0.2982 15.4741  8.6311  8.3352  0.8889  19.4692  6.3949 1.8555  3.5666
Pyr2.Hf2.y6  0.0567  18.3641 0.2982 13.4741  7.6389  8.3352  0.8830  10.4692  6.3949 1.8565  1.9996
Pyr2.Hf3.y1  0.0867  17.3641 0.2982 11.4741  7.6006  8.3352  0.8837  17.4692  6.3949 1.7577  2.7777
Pyr2.Hf3.y2  0.0924  18.3641 0.2982 14.4741  6.6751  7.3352  0.8889  11.5592  6.3949 1.8015  2.0700
Pyr2.Hf3.y3  0.0900  18.2641 0.2982 11.2541  9.6314  8.3352  0.8830  12.3412  6.3949 2.8515  3.5687
Pyr2.Hf3.y4  0.0911  19.3641 0.2982 11.4741  9.6125  8.3352  0.8845  12.3692  6.3949 3.8515  2.3575
Pyr2.Hf3.y5  0.0429  20.3641 0.2982 11.2441  8.6066  5.3352  0.8878  11.4252  6.3949 1.8315  2.0222
Pyr2.Hf3.y6  0.0569  21.2221 0.2982 11.4331  7.6306  8.3352  0.8837  11.4632  6.3949 2.8215  2.1111
Pyr3.Hf1.y1  0.0290  21.3221 0.2982 10.4741  5.6325  8.3352  0.8124  17.4552  6.3949 1.2415  2.0227
Pyr3.Hf1.y2  0.0354  21.3271 0.2982 15.4741  8.6399  8.0352  0.8832  12.4692  6.3949 1.5415  3.1227
Pyr3.Hf1.y3  0.0439  21.4641 0.2982 11.3641  9.6300  8.3152  0.8811  11.7792  6.3949 1.6415  3.7778
Pyr3.Hf1.y4  0.0219  21.8721 0.2982 11.5551  9.6311  8.3352  0.8830  11.4772  6.3949 1.6425  2.2577
Pyr3.Hf1.y5  0.0259  21.2241 0.2982 11.4551  8.6000  8.1352  0.8830  11.4442  6.3949 1.7415  2.2563
Pyr3.Hf1.y6  0.0439  21.3671 0.2982 11.4221  8.6111  8.3352  0.8145  11.4644  6.3949 1.8245  2.3567
Pyr3.Hf2.y1  0.0345  21.5551 0.2982 11.4871  5.6322  8.3852  0.8830  14.4692  6.3949 1.8415  2.2378
Pyr3.Hf2.y2  0.0349  21.2221 0.2982 11.4671  6.6111  8.3352  0.8822  11.4442  6.3949 1.3515  2.2222
Pyr3.Hf2.y3  0.1039  27.3641 0.2982 11.7741  6.0000  8.3852  0.8845  11.4292  6.3949 1.8544  2.3333
Pyr3.Hf2.y4  0.1139  25.3641 0.2982 11.9591  7.6125  8.3382  0.8833  11.2222  6.3949 1.5644  2.0001
Pyr3.Hf2.y5  0.0949  25.2241 0.2982 11.4351  4.9999  8.3352  0.8834  14.4692  6.3949 1.8005  2.2578
Pyr3.Hf2.y6  0.0839  20.3641 0.2982 11.7741  5.1238  7.3352  0.8838  17.4692  6.3949 1.8500  2.3455
Pyr3.Hf3.y1  0.0439  22.5541 0.2982 15.4741 10.6000  8.3352  0.8838  18.4692  6.3949 1.8125  5.1122
Pyr3.Hf3.y2  0.0689  20.3241 0.2982 11.4741 12.0016  8.3352  0.8840  11.4232  6.3949 1.8123  5.2333
Pyr3.Hf3.y3  0.0346  21.3351 0.2982 18.4741 11.6580  8.4352  0.8560  11.4633  6.3949 1.8213  5.0247
Pyr3.Hf3.y4  0.0687  21.5200 0.2982 18.8881 12.6355  8.3352  0.5470  13.4692  6.3949 1.8333  4.0247
Pyr3.Hf3.y5  0.0739  21.0000 0.2982 10.1211 10.1366  5.3352  0.8870  11.4352  6.3949 1.8111  3.0247
Pyr3.Hf3.y6  0.0569  21.1041 0.2982 20.4741 10.7999  8.3352  0.8820  11.4600  6.3949 1.8555  1.9947
  ;
   parameter CPYRST(Pyr) storage cost of Naphtha cracker feed
            / Pyr1 0.02, Pyr2 0.01, Pyr3 0.03/;
  parameter  CHNapImTRan(Pyr)   transportation cost from Import to cracker
       /Pyr1     0.51 ,Pyr2   0.32, Pyr3    0.53/       ;
 table  CtY(HNF,Pyr)   transportation cost from topping  unit to cracker
                Pyr1    Pyr2    Pyr3
       Hf1     0.21    0.52   0.93
       Hf2     0.51    0.52   0.53
       Hf3     0.81    0.52   0.13
                          ;
 TABLE PYQmin(Pyr,HNf)  minimun capacity of feed  of the specific cracker
                Hf1        Hf2         Hf3
      Pyr1  350000   350000   325000
      Pyr2  340000   350000   310000
      Pyr3  320000   330000   300000;
 TABLE PYQmax(Pyr,HNf)  maximum  capacity of feed  at crackers
                 Hf1        Hf2          Hf3
      Pyr1  1150000   1151000    1112000
      Pyr2  1120000   1140000    1600000
      Pyr3  1140000   1150000    1100000;

 table Py_Pyr_tankspace(Pyr,Py) total buffer tank space of product at crackers
              c2ene    c3     c3ene    c4s         Btx     Gas      PFO    PGO
Pyr1         12000  12000  10000   25000     10000  10000  100000   100000
Pyr2         12000  12000  12000   25000     10000  10000  100000   100000
Pyr3         12000  12000  10200   25000     10000  10000  100000    100000
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parameters CHNST(Pyr) the storage cost of heavy naphtha
          /Pyr1 0.20,Pyr2 0.2,Pyr3 0.2/;
table CPStPyr(Pyr,Py) the storage cost of product at crackers
            Ace   c2ene   c3      c3ene   c4s    Btx    Gas   PFO   PGO
  Pyr1      0     0.012   0.012   0.010   0.025  0.005  0.005 0.005 0.005
  Pyr2      0     0.012   0.012   0.010   0.025  0.005  0.005 0.005 0.005
  Pyr3      0     0.012   0.012   0.010   0.025  0.005  0.005 0.005 0.005      ;

Table Cost_Pyn(Pyn,tp)  price of byproducts at crackers
          tp1  tp2   tp3   tp4   tp5   tp6   tp7   tp8   tp9   tp10   tp11   tp12
Ace       920  920   920   920   920   920   920   920   933   933    933   933
C4Raf     560  560   560   560   576   576   576   576   550   550    550   550
FG        377  377   377   377   345   345   345   345   322   222    322   322
H2        560  560   560   560   555   555   555   555   560   560    560   560
PFO       570  580   570   572   525   525   525   525   567   567    567   567
PGO       530  530   530   530   515   515   515   515   557   557    557   557
LPG       590  590   590   590   567   567   567   567   557   557    557   557
Ker       500  500   500   500   415   415   415   415   427   427    527   427
Die       400  400   400   400   415   415   415   415   427   427    427   427
Gas       520  520   520   520   515   515   515   515   527   527    527   527
Coke      200  200   200   200   190   190   190   190   210   210    210   210
          ;

Table TSpacePyn(T,Pyn)  Total tank space of byproduct at terminal T
            Ace   C4Raf  FG    H2    PFO   PGO   LPG   Ker   Die   Gas   Coke
KSRTL   25000 25000 15000 35000 35000 35000 30000 30000 30000 35000 5000
LIWRTL 20000 20000 15000 30000 35000 35000 30000 30000 30000 35000 5000
                    ;
Table QDPyn(T,Pyn,Mn) the byproduct production of product terminals
                        Mn1     Mn2     Mn3
    KSRTL.Ace           52000   22000   22000
    KSRTL.c4Raf         55000   25000   25000
    KSRTL.FG            95000   95000   95000
    KSRTL.H2            50000   20000   20000
    KSRTL.PFO           50000   20000   20000
    KSRTL.PGO           55000   55000   55000
    KSRTL.LPG           55000   35000   35000
    KSRTL.Ker           55000   55000   55000
    KSRTL.Die           55000   55000   55000
    KSRTL.Gas           35000   35000   35000
    KSRTL.Coke          55000   55000   55000
    LIWRTL.Ace          50000   20000   20000
    LIWRTL.c4Raf        50000   20000   20000
    LIWRTL.FG           90000   90000   90000
    LIWRTL.H2           32000   32000   32000
    LIWRTL.PFO          55000   55000   55000
    LIWRTL.PGO          55000   55000   55000
    LIWRTL.LPG          35000   35000   35000
    LIWRTL.Ker          55000   55000   55000
    LIWRTL.Die          55000   55000   55000
    LIWRTL.Gas          35000   35000   35000
    LIWRTL.Coke         35000   55000   55000                    ;
Table  CTPPyrP(Pyr,T,Py) transportion cost from cracker to product terminals
                Ace   c2ene   c3      c3ene   c4s     FG      H2      Btx     Gas     PFO     PGO
Pyr1.KSRTL      0.012 0.012   0.012   0.012   0.012   0.012   0.012   0.012   0.012   0.012   0.012
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Pyr1.LIWRTL   0.032   0.032   0.032   0.032   0.032   0.022  0.032   0.032  0.032   0.032   0.032
Pyr2.KSRTL    0.012   0.012   0.012   0.012   0.012   0.012  0.012   0.012  0.012   0.012   0.012
Pyr2.LIWRTL   0.032   0.032   0.032   0.032   0.032   0.022  0.032   0.032  0.032   0.032   0.032
Pyr3.KSRTL    0.032   0.032   0.032   0.032   0.032   0.022  0.032   0.032  0.032   0.032   0.032
Pyr3.LIWRTL   0.012   0.012   0.012   0.012   0.012   0.012  0.012   0.012  0.012   0.012   0.012          ;
*BD extraction units
    parameters QBD_Upper(BD) the maximum feed limitation of BD extraction units
        /BD1 30000,BD2 30000, BD3  32000/;
    parameters QBD_Lower(BD) the minimum feed limitation of BD extraction units
        /BD1 4000,BD2 4000, BD3  4500/;
    parameter comp_BD(Pbd) the composition of BD feed
         /c4Raf 0.58,c4ene 0.42 /
    parameter BD_Feed_tankspace(BD) total tank space of feed at BD unit
        /BD1 20000,BD2 20000, BD3  22000/;
    table BD_Prod_tankspace(BD,Pbd) total tank space of feed at BD unit
            c4Raf     c4ene
        BD1   5000      5000
        BD2   5000      5000
        BD3   5000      5000          ;
   parameter Storagecost_BD(BD) the storage cost of feed and product at BD units
        /BD1 0.0135,BD2 0.0125,BD3 0.0125 /;
   parameter OPcost_BD(BD) the operating cost of BD units
        /BD1 0.135,BD2 0.025,BD3 0.0125 /;
   table CTPPyrBD(Pyr,BD) the crude c4s transportion cost from crackers to BD units
            BD1      BD2     BD3
       Pyr1    0.01    0.023   0.035
       Pyr2    0.02    0.012   0.035
       Pyr3    0.03    0.023   0.012        ;
   table CTPBD_T(BD,T) the product transportion cost from BD units to product terminals
            KSRTL    LIWRTL
       BD1    0.024    0.056
       BD2    0.053    0.056
       BD3    0.054    0.026     ;
*VGO units
  parameter ATR_TankSpace(Vgo) total tank space of feed at VGO unit
             /Vgo1 530000, Vgo2 530000,Vgo3 530000/          ;
  parameter  QATRUpper(Vgo) the maximum feed amount of VGO
          /Vgo1 1700000, Vgo2 1800000, Vgo3  1600000/;
  parameter  QATRLower(Vgo) the maximum feed amount of VGO
          /Vgo1 350000, Vgo2 450000, Vgo3  432000/;
   parameters  OPcostV(Vgo) operating cost of feed at Vgo unit
            / Vgo1 1.2,Vgo2 2.3,Vgo3 1.3/;
  table  CompVgo(ATRF,Pv) yield of feed by operating at Vgo unit
              Vgoil   VR    PFO
       ATR1    0.65  0.25   0.1
       ATR2    0.52  0.28   0.2
       ATR3    0.58  0.30   0.12                ;
   parameters CVGOST(Vgo) the storage cost of VGO
            /Vgo1 0.20,vgo2 0.2,vgo3 0.2/;
   table CPStVGO(vgo,Pv) the storage cost of product at VGO unit
            Vgoil   VR   PFO
       Vgo1    0.15  0.25   0.3
       Vgo2    0.15  0.25   0.3
       Vgo3    0.15  0.25   0.3                          ;
   table Pv_VGO_tankspace(Vgo,Pv) total buffer tank space of product at VGO unit
            Vgoil   VR      PFO
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        Vgo1    15000  25000   35000
        Vgo2    15000  25000   35000
        Vgo3    15000  25000   35000                    ;
  table CTPVgo(Vgo,ATRF) transportation cost of materials from VGO to ATR unit
              ATR1    ATR2   ATR3
        Vgo1   0.1      0.2    0.3
        Vgo2   0.25     0.12   0.3
        Vgo3   0.35     0.2    0.13     ;
*Cok units
  parameter Cok_TankSpace(Cok) total tank space of feed at Cokeing units
            /Cok1 130000, Cok2 130000,Cok3 130000/          ;
  parameter  QCOKUpper(Cok) the maximum feed amount of Cokers
            /Cok1 375000, Cok2 425500, Cok3  450000/;
  parameter  QCOKLower(Cok) the minimum feed amount of Cokers
            /Cok1 150000, Cok2 125000, Cok3  132000/;
  parameters  OPcostCok(Cok) operating cost of feed at Cokers
            / Cok1 1.2,Cok2 2.3,Cok3 1.3/;
  table  CompCok(VGOF,Pk) yield of feed by operating at Cokers
              Vgoil  PFO   Coke
        VR1    0.65  0.25   0.1
        VR2    0.52  0.28   0.2
        VR3    0.58  0.30   0.12                    ;
  parameters CCokST(Cok) the product storage cost of Cokers
              /Cok1 0.20,Cok2 0.2,Cok3 0.2/;
  table CPStCok(Cok,Pk) the storage cost of product at Cokers
                Vgoil  PFO   Coke
        Cok1    0.15  0.25   0.3
        Cok2    0.15  0.25   0.3
        Cok3    0.15  0.25   0.3                    ;
  table Pk_Cok_tankspace(Cok,Pk) total buffer tank space of product at Cokers
                  Vgoil    PFO    Coke
        Cok1    15000  25000   35000
        Cok2    15000  25000   35000
        Cok3    15000  25000   35000                ;
  table CTPCok(VGoF,Cok) transfor cost of ATR from terminal to Cokers
              Cok1    Cok2   Cok3
        VR1    0.1      0.2     0.3
        VR2    0.25     0.12   0.3
        VR3    0.35     0.2     0.13     ;
*Fcc units
  parameter  Fcc_FeedTankSpace(Fcc) total tank space of VGO at reforming unit Ref
            /Fcc1 330000, Fcc2 330000/          ;
  parameter  QFccUpper(Fcc) the maximum feed amount of Fccing units
            /Fcc1 1650000, Fcc2 1625000/;
  parameter  QFccLower(Fcc) the maximum feed amount of Fccing units
            /Fcc1 250000, Fcc2 225000/;
  table  OPcostFcc(Fcc,task_c) operating cost of feed at Fccing units
                c1      c2     c3
        Fcc1 10.2   9.8    10.9
        Fcc2 12.3   11.3   10.7          ;
  table  YdFcc(Fcc,task_c,Pc) yield of feed by operating at Fcc units
                  LPG   c3ene   Gas    PFO
        Fcc1.c1    0.25    0.35   0.35   0.05
        Fcc1.c2    0.45    0.25   0.32   0.08
        Fcc1.c3    0.35    0.15   0.45   0.05
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      Fcc2.c1    0.15    0.45   0.25   0.15
      Fcc2.c2    0.13    0.40   0.40   0.07
      Fcc2.c3    0.18    0.37   0.30   0.25                    ;
  parameters CFccST(Fcc) the product storage cost of Fcc units
            /Fcc1 0.20,Fcc2 0.2/;
  table CPStFcc(Fcc,Pc) the storage cost of product at Fcc units
              LPG   c3ene   Gas    PFO
      Fcc1    0.15  0.25   0.3    0.7
      Fcc2    0.15  0.25   0.3    0.7             ;
  table Pc_Fcc_tankspace(Fcc,Pc) total buffer tank space of product at Fcc units
                LPG   c3ene    Gas     PFO
      Fcc1    50000  55000   50000   50000
      Fcc2    50000  55000   50000   50000                    ;
  table CTPFcc(UPFccF,Fcc) transportation cost of ATR from terminal to Fcc units
            Fcc1    Fcc2
      Vgo1   0.1      0.2
      Vgo2   0.25     0.23
      Vgo3   0.35     0.12
      Cok1   0.1      0.2
      Cok2   0.15     0.12
      Cok3   0.35     0.2     ;
  Table CTPFccP(Fcc,t) transportation cost from fcc unit to terminal
          KSRTL    LIWRTL
    Fcc1      0.15      0.28
    Fcc2      0.25      0.08                    ;
*Reformer
  parameters  OPcostR(REF,Nf,task_r) operating cost of feed by operating task_r at reformer unit  /
    R1.f1.k1  16.5,  R1.f1.k2  17.8, R1.f2.k1 17.8, R1.f2.k2  17.9, R1.f3.k1  21.7, R1.f3.k2 21.7,
    R2.f1.k1  22.4,  R2.f1.k2  18.7, R2.f2.k1 20.7, R2.f2.k2  23.1, R2.f3.k1  23.5, R2.f3.k2 21.5,
    R3.f1.k1  11.5,  R3.f1.k2  10.7, R3.f2.k1 11.8, R3.f2.k2  11.1, R3.f3.k1  10.4, R3.f3.k2 10.5
     /;
  parameters  Yd(Ref,Nf,task_r,Pr) yield of feed by operating task_r at reformer unit /
   R1.f1.k1.Reoil  0.70,  R1.f1.k1.c3  0.05, R1.f1.k1.c4  0.05,R1.f1.k1.C5 0.10, R1.f1.k1.c9 0.10,
   R1.f1.k2.Reoil  0.65,  R1.f1.k2.c3  0.10, R1.f1.k2.c4  0.10,R1.f1.k2.C5 0.10, R1.f1.k2.c9 0.05,
   R1.f2.k1.Reoil  0.60,  R1.f2.k1.c3  0.07, R1.f2.k1.c4  0.08,R1.f2.k1.C5 0.10, R1.f2.k1.c9 0.15,
   R1.f2.k2.Reoil  0.55,  R1.f2.k2.c3  0.15, R1.f2.k2.c4  0.15,R1.f2.k2.C5 0.10, R1.f2.k2.c9 0.05,
   R1.f3.k1.Reoil  0.55,  R1.f3.k1.c3  0.15, R1.f3.k1.c4  0.15,R1.f3.k1.C5 0.07, R1.f3.k1.c9 0.08,
   R1.f3.k2.Reoil  0.65,  R1.f3.k2.c3  0.20, R1.f3.k2.c4  0.10,R1.f3.k2.C5 0.05, R1.f3.k2.c9 0.05,
   R2.f1.k1.Reoil  0.55,  R2.f1.k1.c3  0.03, R2.f1.k1.c4  0.04,R2.f1.k1.C5 0.15, R2.f1.k1.c9 0.23,
   R2.f1.k2.Reoil  0.48,  R2.f1.k2.c3  0.12, R2.f1.k2.c4  0.10,R2.f1.k2.C5 0.10, R2.f1.k2.c9 0.20,
    R2.f2.k1.Reoil  0.45,  R2.f2.k1.c3  0.05, R2.f2.k1.c4  0.10,R2.f2.k1.C5 0.10, R2.f2.k1.c9 .30,
   R2.f2.k2.Reoil  0.65,  R2.f2.k2.c3  0.08, R2.f2.k2.c4  0.07,R2.f2.k2.C5 0.10, R2.f2.k.c9 0.10,
   R2.f3.k1.Reoil  0.39,  R2.f3.k1.c3  0.20, R2.f3.k1.c4  0.20,R2.f3.k1.C5 0.10, R2.f3.k1.c9 0.21,
   R2.f3.k2.Reoil  0.30,  R2.f3.k2.c3  0.25, R2.f3.k2.c4  0.10,R2.f3.k2.C5 0.18, R2.f3.k2.c9 0.17,
   R3.f1.k1.Reoil  0.33,  R3.f1.k1.c3  0.02, R3.f1.k1.c4  0.03,R3.f1.k1.C5 0.30, R3.f1.k1.c9 0.32,
   R3.f1.k2.Reoil  0.35,  R3.f1.k2.c3  0.10, R3.f1.k2.c4  0.10,R3.f1.k2.C5 0.20, R3.f1.k2.c9 0.25,
   R3.f2.k1.Reoil  0.38,  R3.f2.k1.c3  0.15, R3.f2.k1.c4  0.05,R3.f2.k1.C5 0.21, R3.f2.k1.c9 0.21,
   R3.f2.k2.Reoil  0.50,  R3.f2.k2.c3  0.15, R3.f2.k2.c4  0.05,R3.f2.k2.C5 0.10, R3.f2.k2.c9 0.20,
   R3.f3.k1.Reoil  0.45,  R3.f3.k1.c3  0.25, R3.f3.k1.c4  0.10,R3.f3.k1.C5 0.10, R3.f3.k1.c9 0.10,
   R3.f3.k2.Reoil  0.42,  R3.f3.k2.c3  0.22, R3.f3.k2.c4  0.12,R3.f3.k2.C5 0.18, R3.f3.k2.c9 0.06 /;
  TABLE RQmin(REF,Nf)  minimun capacity of feed  of the specific unit ref
                f1          f2          f3
      R1  305000   305000    305000
      R2  305000   310000    315000
      R3  300000   305000    295000;
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TABLE RQmax(REF,Nf)  maximum  capacity of feed  of the specific unit ref
                f1            f2            f3
     R1  1240000   1245000     1335000
     R2  1245000   1351000     1210000
     R3  1225000   1235000     1340000;
table Pr_REF_tankspace(REF,Pr) total buffer tank space of product at reforming unit
            Reoil      c3         c4        c5        c9
   R1       3000     1200     1200    1200   2500
   R2       3000     1200     1200    1200   2500
   R3       3000     1200     1200    1200   2500            ;
 parameters CNST(Ref) the storage cost of light naphtha
            /R1 0.20,R2 0.2,R3 0.2/;
 table CPStREF(REF,Pr) the storage cost of product at reforming unit
            Reoil     c3        c4         c5      c9
   R1       0.13     0.102    0.12     0.12   0.25
   R2       0.13     0.102    0.12     0.12   0.25
   R3       0.13     0.102    0.12     0.12   0.25 ;
 table Pb_BTX_tankspace(BTX,Pb) total buffer tank space of product at BTX unit
            Raf    Bz     Tol   mix-Xy
   B1   3000  2500   2400  3500
   B2   3000  2500   2400  3500
   B3   3000  2500   2400  3500                    ;
  table CPStBTX(BTX,Pb) the storage cost of product of BTX unit
         Raf   Bz    Tol   mix-Xy
   B1     0.3   0.2  0.25   0.3
   B2     0.3   0.2  0.25   0.3
   B3     0.3   0.2  0.25   0.3            ;
 parameters CBTXST(BTX) the storage cost of feed of BTX unit
            /B1 0.20,B2 0.2,B3 0.2/;
parameters VinReoil_tankSpace(BTX) the maximum capacity of Reoil
            /B1 10000,B2 10000,B3 10000/;
parameter VinPyoil_tankSpace maximum capacity of Pyoil  at unit BTX1
           /100000/  ;
 table  Compb(Bf,Pb) product composition fraction of Btx unit
              Raf      Bz   Tol     mix-Xy
     Reoil1    0.32    0.1   0.25    0.33
     Reoil2    0.32    0.1   0.25    0.33
     Reoil3    0.32    0.1   0.25    0.33
     Pyoil     0.32    0.42  0.12    0.14     ;
parameters  OPcostB(Bf) operating cost of feed at Btx unit    /
   Reoil1 12.5,Reoil2 12.5,Reoil3 12.5, Pyoil  12.5      /;
 parameters QprodIm_limit(Pm)  Import product limitation
   /      Bz   100000 ,     Tol   50000 ,    mix-Xy 135000 ,
       pXy     50000 ,     oXy     50000 ,   c2ene  245000 ,
       C3ene  250000 ,         c4ene  250000  /      ;
  parameters QprodExp_limit(Pm)  Import product limitation
 /       Bz    250000 ,    Tol   350000 ,     mix-Xy  150000 ,
       pXy     250000 ,   oXy     250000 ,  c2ene   245000 ,
       C3ene   250000 ,         c4ene   250000  /          ;
 Table TSpace(T,Pm)   Total tank space of specific oil material at terminal T
                      Bz       Tol    mix-Xy     pXy        oXy     c2ene   c3ene  c4ene
     KSRTL     30000   25000   4000      20000     20000   50000   50000  50000
     LIWRTL   30000  20000    4000     20000     20000   50000   50000  50000          ;
Table TSpacePn(T,Pn)  Total tank space of specific oil material at terminal T
                        c3            c4           c5        Raf              c9         c10
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    KSRTL     250000   250000  150000  350000     350000     350000
    LIWRTL   200000   200000   150000  300000     350000     350000          ;
table CuuprodIm(T,Pm) transportation of import product
                  Bz    Tol   mix-Xy   pXy   oXy   c2ene   c3ene  c4ene
    KSRTL     4.8    4.8    4.8        4.8    4.8     4.7      4.7    4.7
    LIWRTL   3.8     3.8    3.8        3.8    3.8     3.8      3.8    3.8                ;
table CuuprodEx(T,Pm) transportation of import product
                  Bz    Tol   mix-Xy   pXy    oXy   c2ene   c3ene  c4ene
    KSRTL     4.3    4.3     4.3       4.3     4.3     4        4       4
    LIWRTL   3.4    3.4     3.4       3.4     3.4     3        3       3                ;
table CVIN(T,Pm) inventory coefficient cost of product
                  Bz    Tol   mix-Xy   pXy   oXy   c2ene   c3ene  c4ene
    KSRTL     1.8    1.8    1.8        1.8    1.8    1.8      1.8     1.8
    LIWRTL   1.8    1.8    1.8        1.8    1.8    1.8      1.8     1.8                ;
table CVIPN(T,Pn) inventory coefficient cost of product
                  c3    c4   c5    Raf    c9     c10
    KSRTL     2.8   2.8   1.8    1.8    1.8     1.8
    LIWRTL   2.8   2.8   1.8    1.8    1.8     1.8    ;
  parameter Cvin_Pyr(Pyr) the storage cost of feed or product at Pyr units
    /Pyr1 0.012,Pyr2 0.013, Pyr3 0.014/;
 parameter Cvin_Vgo(Vgo) the storage cost of feed or product at Vgo units
    /Vgo1 0.12,Vgo2 0.13, Vgo3 0.14/;
 parameter Cvin_Cok(Cok) the storage cost of feed or product at Cok units
    /Cok1 0.12,Cok2 0.13, Cok3 0.14/;
 parameter Cvin_Fcc(Fcc) the storage cost of feed or product at Fcc units
    /Fcc1 0.12,Fcc2 0.13/;
 parameter Cvin_Pyn(T) the storage cost of feed or product at Top units
    /KSRTL 0.12,LIWRTL 0.13/;
table CprodImCost(PIm,tp)  coefficient of product price
          tp1    tp2    tp3    tp4    tp5    tp6    tp7    tp8    tp9   tp10   tp11   tp12
     f1   450    450    450    450    470    470    470    470    465   465    465    465
     f2   475    475    475    475    485    485    485    485    480   480    480    480
     f3   480    480    480    480    470    470    470    470    470   470    470    470
    hf1   450    450    450    450    470    470    470    470    465   465    465    465
    hf2   475    475    475    475    485    485    485    485    480   480    480    480
    hf3   480    480    480    480    470    470    470    470    470   470    470    470
     Bz  1000   1000   1000   1000    950    950    950    950    960   960    960    960
    Tol   700    700    700    700    720    720    720    720    750   750    750    750
 mix-Xy   600    600    600    600    570    570    570    570    570   570    570    570
    pXy   780    780    780    780    700    700    700    700    750   750    750    750
    oXy   780    780    780    780    700    700    700    700    720   720    720    720
  c2ene   880    880    880    880    850    850    850    850    870   870    870    870
  c3ene  1020   1020   1020   1020    990    990    990    990   1010  1010   1010   1010
  c4ene  1230   1230   1230   1230   1200   1200   1200   1200   1210  1210   1210   1210                ;


table CPM(Pm,tp)  coefficient of product price
          tp1    tp2    tp3    tp4    tp5    tp6    tp7    tp8    tp9   tp10   tp11   tp12
     Bz   910    910    910    910    850    850    850    850    880   880    880    880
    Tol   650    650    650    650    670    670    670    670    700   700    700    700
 mix-Xy   538    538    538    538    540    540    540    540    550   550    550    550
    pXy   720    720    720    720    680    680    680    680    700   700    700    700
    oXy   680    680    680    680    650    650    650    650    670   670    670    670
  c2ene  1080   1080   1080   1080   1085   1085   1085   1085   1027  1027   1027   1027
  c3ene   920    920    920    920    890    890    890    890    910   910    910    910
  c4ene  1130   1130   1130   1130   1100   1100   1100   1100   1110  1110   1110   1110          ;
table CPN(Pn,tp)  coefficient of product price
          tp1    tp2    tp3    tp4    tp5    tp6    tp7    tp8    tp9   tp10   tp11   tp12
    c3    230    230    230    230    232    232    232    232    235   235    235    235
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   c4   230   230   230   230   232   232   232   232   235   235   235   235
   c5   310   310   310   310   310   310   310   310   308   308   308   308
  Raf   300   300   300   300   310   310   310   310   308   308   308   308
   C9   310   310   310   310   312   312   312   312   315   315   315   315
  c10   312   312   312   312   320   320   320   320   318   318   318   318                    ;
  parameters CX(Uo) fixed operating cost of units
          /R1 250, R2 360, R3 470,B1 200,B2 220,B3 230
           ,Tat1 350,Tat2 350,Xyl1 170,Xyl2 170
           ,Par1 230,Par2 230,Iso1 240,Iso2 240,
            Pyr1 350,Pyr2 375, Pyr3 370, Top1 410,
            Top2 420,Top3 430,Vgo1 550, Vgo2 530,Vgo3 570,
            Cok1 230, Cok2 250,Cok3 270,Fcc1 450,Fcc2 490 ,
            HTD1 230, HTD2 240,HTD3 250,BD1 330, BD2 340,BD3 350   /        ;
  parameters CQmxXylIm(Xyl) Import mix-Xy raw material transportation cost
   /      Xyl1  4.5 ,  Xyl2  4.7  /     ;
 parameter CtImX(Xyl) Import mix-Xy transportation cost to xyl unit
  / Xyl1 4.5,Xyl2 4.7/;
 parameter CPStXyl(Xyl) storage of product at Xylene frac. unit
  / Xyl1 0.15,Xyl2 0.155/;
 table vin_prod_XyltankSpace(Xyl,Pxx) total buffer tank space at xyl. unit
       Parmx    oXy     C9
 Xyl1    5000     2500   1500
 Xyl2    5000     2500   1500;
 parameter CtImtol(Tat) import toluene transportation cost to tat unit
        / tat1 3.35,tat2 3.55/;
parameters  OPcostA(task_a) operating cost of feed by operating task_a  /
    ak1      1.8,  ak2   2.0, ak3  2.3/
table  OPcostI(Iso,tp) operating cost of feed at xylene iso unit
            tp1   tp2    tp3    tp4    tp5   tp6    tp7    tp8   tp9    tp10   tp11   tp12
    Iso1  1.87  1.87   1.87    1.87   1.87  1.87   1.87   1.87   1.87   1.87   1.87   1.87
    Iso2  1.77  1.77   1.77    1.77   1.77  1.77   1.77   1.77   1.77   1.77   1.77   1.77;
table  OPcostP(par,tp) operating cost of feed at xylene iso unit
            tp1    tp2    tp3    tp4    tp5    tp6    tp7     tp8   tp9    tp10   tp11   tp12
    par1  2.07   2.07  2.07    2.07   2.07  2.07   2.07    2.07  2.07   2.07   2.07   2.07
    par2  1.77   1.77  1.77    1.77   1.77  1.77   1.77    1.77  1.77   1.77   1.77   1.77;
parameters  OPcostX(Xf) operating cost of feed at Tatoray unit  /
  Btx_mix 1.7, Tra_mix  1.72 , Iso_mix  1.68 ,Im_mix 1.78  /;
TABLE CtB(REF,BTX)  transportation cost of feed Bf of the specific unit BTX
            B1       B2       B3
    R1   0.17     0.34     0.41
    R2   0.24     0.23     0.23
    R3   0.33     0.13     0.13   ;

TABLE CtX(BTX,Xyl)  transportation cost from unit BTX to unit xyl
        Xyl1     Xyl2
    B1   0.17      0.34
    B2   0.34      0.16
    B3   0.33      0.13     ;
TABLE CtBT(BTX,Tat)  transportation cost of from unit BTX to unit xyl
        Tat1     Tat2
    B1   0.17      0.34
    B2   0.34      0.16
    B3   0.33      0.13     ;
TABLE CtRT(REF,Tat)  transportation cost of from unit REF to unit xyl
        Tat1     Tat2
    R1   0.3      1.4
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    R2   0.6      0.6
    R3   1.4      0.3       ;
 TABLE CtA(Tat,Xyl)  transportation cost of feed Bf of the specific unit BTX
          Xyl1     Xyl2
    Tat1   0.17      0.34
    Tat2   0.34      0.16;
TABLE CtI(Iso,Xyl)  transportation cost of feed Bf of the specific unit BTX
         Xyl1       Xyl2
    Iso1   0.17      0.34
    Iso2   0.34      0.16;
TABLE CtXP(Xyl,Par)  transportation cost of feed Bf of the specific unit BTX
            Par1     Par2
    Xyl1   0.2      3.4
    Xyl2   3.4      0.6;
TABLE CtXI(Xyl,Iso)  transportation cost of feed Bf of the specific unit BTX
            Iso1      Iso2
    Xyl1   0.2      0.64
    Xyl2   0.74     0.18;
TABLE CtPI(Par,Iso)  transportation cost of feed Bf of the specific unit BTX
            Iso1      Iso2
    Par1   0.2       0.34
    Par2   0.34      0.16;
 parameters  Ydi(Iso)  feed yield of xylene iso unit/Iso1 .95, Iso2 .85/
parameter AFCompRatio(task_a) C9: Tol feed ratio by operating task_a at Tatoray unit
   / ak1      0.0 ,  ak2      0.5,   ak3     1/
table  AFComp(task_a,Af) composition fraction of feed by operating task_a at Tatoray unit
            Tol        C9
    ak1      1.0       0.0
    ak2     0.67      0.33
    ak3      0.5       0.5                ;
table  Yda(task_a,Pa) yield of feed by operating task_a at Tatoray unit
             Bz       mix-Xy     c10
    ak1      0.416      0.557    0.027
    ak2      0.275      0.641    0.084
    ak3      0.204      0.683    0.113          ;
table  CTPREFP(REF,T) product transportation cost from reforming unit to terminals
          KSRTL      LIWRTL
       R1    0.25       0.75
       R2    0.57       0.53
       R3    1.25       0.39;


table  CTPBTXP(BTX,T) product transportation cost from Btx unit to terminals
          KSRTL      LIWRTL
       B1    0.35       1.35
       B2    1.35       0.35
       B3    1.25       0.25;
table CTPTatP(Tat,T)  product transportation from tatory unit to terminals
            KSRTL    LIWRTL
       Tat1    0.2       1.41
       Tat2    1.45      0.21               ;
 table   CTPParP(Par,T)  product transportation from parex unit to terminals
           KSRTL    LIWRTL
       Par1    0.12       1.64
       Par2    1.56       0.13     ;
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 table   CTPXylP(Xyl,T)  product transportation from xylene unit to terminals
            KSRTL    LIWRTL
       Xyl1    0.4       1.42
       Xyl2    1.43      0.31          ;
 table  vinfmx_tankSpace(Xyl,Xf) buffer tank space
            Btx_mix  Tra_mix   Iso_mix  Im_mix
       Xyl1    2000      2000       2000      2000
       Xyl2    2000      2000       2000      2000                              ;
parameter vinfIso_tankSpace(Iso)   tankspace of feed buffer tank of isomar
       / Iso1 3000, Iso2 3000/
parameter Prod_Iso_tankspace(Iso)   tankspace of product buffer tank of isomar
       / Iso1 3000, Iso2 3000/
 parameter  CvinIso(Iso)   storage cost of feed of isomar
       / Iso1 0.23, Iso2 0.21/
 parameter CPStIso(Iso)  storage cost of product at isomar
       / Iso1 0.21,Iso2 0.2/
 table  CVinfmx(Xyl,Xf) the storage cost of buffer tank at xylene frac
            Btx_mix  Tra_mix   Iso_mix  Im_mix
       Xyl1    0.12       0.12          0.12      0.12
       Xyl2    0.12       0.12          0.12      0.12              ;
  table vinfTat_tankSpace(Tat,Af)  tankspace of feed buffer tank of tatory unit
            tol         c9
    Tat1   2500     1500
    Tat2   4500     3500            ;
  table Pa_Tat_tankspace(Tat,Pa)  tankspace of product buffer tank of tatory unit
            Bz    mix-Xy     c10
    Tat1    2000   2500      1000
    Tat2    5000   4500      2000            ;
  table  CPStTat(Tat,Pa)   the storage cost of product buffer tank at Tatory unit
            Bz    mix-Xy    c10
    Tat1    0.12    0.125     0.1
    Tat2    0.15    0.145     0.120            ;
   parameter vin_feed_PartankSpace(Par)  tankspace of feed buffer tank of Parex unit
    / par1 3000,par2 5000/   ;
  parameter Prod_Par_tankspace(Par) tankspace of product buffer tank of Parex unit
    / par1 3000,par2 5000/   ;
  parameter CPStPar(Par) storage cost of product buffer tank of Parex unit
    / par1 0.3 ,par2 0.3/   ;
  parameter CVinPar(Par) storage cost of feed buffer tank of Parex unit
    / par1 0.25 ,par2 0.27/   ;
  parameter Ini_Prod_inven_Par(Par) initial inventory of product of Parex unit
    / par1  0,par2  0/   ;
  table CVinfTat(Tat,Af)    the storage cost of buffer tank at Tatory unit
           tol       c9
    Tat1    0.17     0.25
    Tat2    0.15     0.22         ;
 table  CTPPar(Par,T,Pm) product transportation from Btx unit to terminals
                        Bz      Tol   mix-Xy    pXy      oXy
      Par1.KSRTL      0       0     0           1.35      0
      Par1.LIWRTL    0       0     0           4.35      0
      Par2.KSRTL      0       0     0           4.2        0
      Par2.LIWRTL    0       0     0           1.         0              ;
 table  CTPTat(Tat,T,Pm) product transportation from Btx unit to terminals
                         Bz      Tol   mix-Xy   pXy     oXy
      Tat1.KSRTL      2.0      0     0           1.35      0
```

```
    Tat1.LIWRTL   4.1    0    0        4.35    0
    Tat2.KSRTL    5.1    0    0        4.2     0
    Tat2.LIWRTL   1.9    0    0        1.      0                    ;
table  CTPNC3(REF,T) byproduct transfer cost from REF unit to terminal T
        KSRTL  LIWRTL
    R1    0.5    4.5
    R2    1.7    2.3
    R3    0.5    4.3                ;
table  CTPNC4(REF,T) byproduct transfer cost from REF unit to terminal T
        KSRTL  LIWRTL
    R1    0.6    4.3
    R2    1.6    2.2
    R3    0.4    4.2                ;
table  CTPNC5(REF,T) byproduct transfer cost from REF unit to terminal T
        KSRTL  LIWRTL
    R1    0.5    4.5
    R2    1.8    2.8
    R3    0.4    4.       ;
table  CTPNRaf(BTX,T) byproduct transfer cost from REF unit to terminal T
        KSRTL    LIWRTL
    B1    0.4       4.7
    B2    4.8       0.8
    B3    4.4       0.7       ;
table  CTPNc9(Xyl,T) byproduct transfer cost from Xyl unit to terminal T
         KSRTL  LIWRTL
    Xyl1    0.4    4.2
    Xyl2    4.3    0.3       ;
 table CTPNREFC9(REF,T)  byproduct transfer cost from REF unit to terminal T
         KSRTL    LIWRTL
    R1      0.5        3.8
    R2      1.5        1.6
    R3      4.6        0.6            ;
table  CTPNc10(Tat,T) byproduct transfer cost from REF unit to terminal T
         KSRTL    LIWRTL
    Tat1    0.3      4.7
    Tat2    4.3      0.3    ;
table  Compx(Xf,Px)  feed composition fraction of xylene recover unit
                   EB    pXy    mXy      oXy        C9
    Btx_mix    0.17   0.143   0.3175   0.19442   0.17314
    Tra_mix    0.021  0.203   0.437    0.204     0.126
    Iso_mix    0      0.5     0.0      0.5       0.00
    Im_mix     0.2056 0.1729  0.38398  0.235     0                    ;
 parameters  Qmxmax the maximum import amount of mix-xylene   /200000/;
 parameters BQ1pyoilmin  minimum capacity of feed  of the specific unit/40000/;
 parameters BQ1pyoilmax  maximum capacity of feed  of the specific unit/250000/;
 parameters BQmin(BTX)  minimum capacity of feed  of the specific unit ref
    /B1 45000, B2 30000, B3 45000/;
 parameters BQmax(BTX)  maximum  capacity of feed  of the specific unit ref
    /B1 200000, B2 220000, B3 220000/;
 parameters Qparexmin(Par)  minimun capacity of feed  of the specific unit ref
    /Par1 25000,Par2 30000/;
 parameters Qparexmax(Par)  maximum  capacity of feed  of the specific unit ref
    /Par1 150000,Par2 160000/;
 parameters XQmin(Xyl)  minimun capacity of feed  of the specific unit ref
    /Xyl1 25000, Xyl2 20000 /;
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parameters XQmax(Xyl)  maximum  capacity of feed  of the specific unit ref
    /Xyl1 110000,Xyl2 100000/;
parameters IQmin(Iso)  minimun capacity of feed  of the specific unit ref
    /Iso1 10000, Iso2 12000/;
parameters AAQ(Iso)  maximum  capacity of feed  of the Tatory unit
    /Iso1 100000, Iso2 120000/;
parameters AQmin(Tat)  minimun capacity of feed  of the specific unit ref
    /Tat1 20000, Tat2 35000/;
parameters AQmax(Tat)  maximum  capacity of feed  of the specific unit ref
    /Tat1 108000, Tat2 120000/;
```