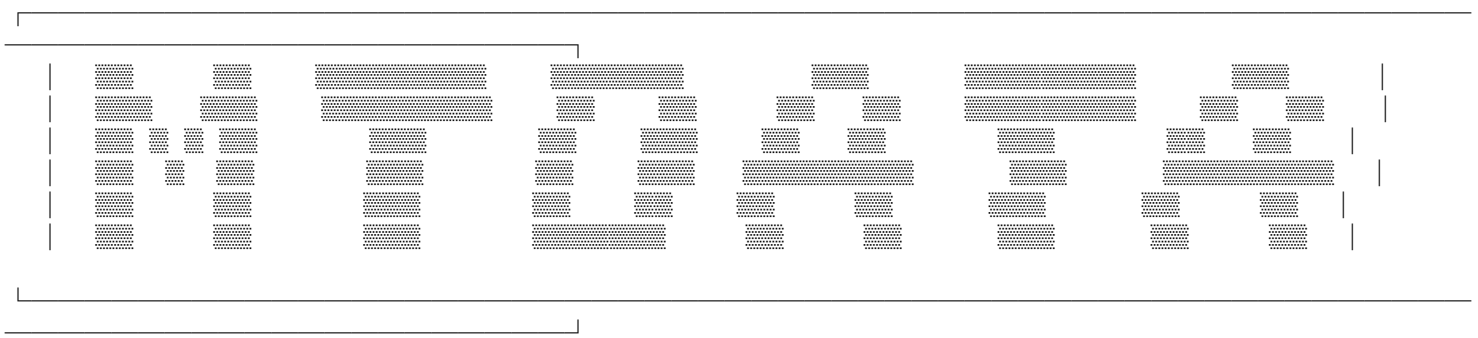
```
Last login: Fri Feb 17 15:04:15 on console
harshad-bhadeshias-macbook-pro:~ harshadbhadeshia$ ssh hkdb@ptlin4.msm.cam.ac.ukPassword:
Linux ptlin4 2.6.32-5-686 #1 SMP Mon Jan 16 16:04:25 UTC 2012 i686

You have new mail.
Last login: Sun Jan 22 13:13:30 2012 from 141.223.237.123
hkdb@ptlin4:~$ mtdata
                        ******************************
                        * USING DEFAULT MTSIGNON FILE *
                        ******************************
```



```
                  - THERMODYNAMICS AND PROCESS MODELLING GROUP -
                            - NPL MATERIALS CENTRE -
                         - NATIONAL PHYSICAL LABORATORY -

                    Authorised for use by Dr H K D H Bhadeshia
                            at University of Cambridge
                        under the terms and conditions of NPL 79/199-3

                          ┌──────────────────────────────┐
                          │ VERSION 4.73   FOR LNX RH 7.3 │
                          │          2002-11-15          │
                          └──────────────────────────────┘
                          ******************************
                          * USING DEFAULT MTCONFIG FILE *
                          ******************************
                         19 of 32 DATABASES ARE AVAILABLE

 WHICH MODULE ? multiphase
 MULTIPHASE OPTION ? define system
 ENTER <'SYSTEM ELEMENTS'> : Fe,C,Si,Mn,Mo,Cr,Co,Nb,V
 FE  KEYWORD NOT RECOGNISED
 DEFINE WHAT ? ?

 DATA_INPUT_FILE
 OUTPUT_DATA/RESULTS
 SYSTEM
 SOURCE
 STOP
```

```
DEFINE WHAT ? stop
MULTIPHASE OPTION ? define system
ENTER <'SYSTEM ELEMENTS'> : 'Fe,C,Si,Mn,Mo,Cr,Co,Nb,V' !

SEARCHING FOR SYSTEM Fe,C,Si,Mn,Mo,Cr,Co,Nb,V

SEARCHING DATABASE(S) :

sgte_sol        - SGTE Solution Database v4.2 6/12/2006

SIMPLIFIED MODEL USED FOR PHASE CR2VC2:2:1:2
SIMPLIFIED MODEL USED FOR PHASE FECN_CHI:5:2
SIMPLIFIED MODEL USED FOR PHASE FE8SI2C:8:2:1
SIMPLIFIED MODEL USED FOR PHASE MC_ETA:1:1
SIMPLIFIED MODEL USED FOR PHASE MC_SHP:1:1
SIMPLIFIED MODEL USED FOR PHASE AL4C3:4:3
SIMPLIFIED MODEL USED FOR PHASE SIC:1:1
SIMPLIFIED MODEL USED FOR PHASE CR3MN5:3:5
SIMPLIFIED MODEL USED FOR PHASE CR5SI3:5:3
SIMPLIFIED MODEL USED FOR PHASE CRSI:1:1
SIMPLIFIED MODEL USED FOR PHASE HCP_ZN:1:.5
SIMPLIFIED MODEL USED FOR PHASE FE2U:2:1
SIMPLIFIED MODEL USED FOR PHASE FESB:1:1
SIMPLIFIED MODEL USED FOR PHASE FEU6:1:6
SIMPLIFIED MODEL USED FOR PHASE FEUZR_DELTA:1:2
SIMPLIFIED MODEL USED FOR PHASE FEZN4:.25:.75
SIMPLIFIED MODEL USED FOR PHASE FEZN_DELTA:.125:.875
SIMPLIFIED MODEL USED FOR PHASE FEZN_GAMMA_D82:.3:.7
SIMPLIFIED MODEL USED FOR PHASE FEZN_ZETA:.072:0.928
SIMPLIFIED MODEL USED FOR PHASE FEZR2:1:2
SIMPLIFIED MODEL USED FOR PHASE FEZR3:1:3
SIMPLIFIED MODEL USED FOR PHASE FESI:1:1
SIMPLIFIED MODEL USED FOR PHASE FE2SI:2:1
SIMPLIFIED MODEL USED FOR PHASE FESI2_H:3:7
SIMPLIFIED MODEL USED FOR PHASE FESI2_L:1:2
SIMPLIFIED MODEL USED FOR PHASE MN2ZR:2:1
SIMPLIFIED MODEL USED FOR PHASE MN11SI19:11:19
SIMPLIFIED MODEL USED FOR PHASE MN6SI:.85:.15
SIMPLIFIED MODEL USED FOR PHASE MN9SI2:.825:.175
SIMPLIFIED MODEL USED FOR PHASE AL8MN5_D810:12:4:10
SIMPLIFIED MODEL USED FOR PHASE AL3M_D022:3:1
SIMPLIFIED MODEL USED FOR PHASE AL3NB:.25:.75
SIMPLIFIED MODEL USED FOR PHASE ALNB3:.75:.25
SIMPLIFIED MODEL USED FOR PHASE NB3SN_C15:3:1
SIMPLIFIED MODEL USED FOR PHASE NBNI_MU:7:6
SIMPLIFIED MODEL USED FOR PHASE NI3NB:3:1
SIMPLIFIED MODEL USED FOR PHASE ALNB2:.533:.333:.134
SIMPLIFIED MODEL USED FOR PHASE SI2V:2:1
SIMPLIFIED MODEL USED FOR PHASE SI3V5:3:5
SIMPLIFIED MODEL USED FOR PHASE SI5V6:5:6
ERROR: NO DATA FOR BINARY INTERACTION Co,Mo<LIQUID>
ERROR: NO DATA FOR BINARY INTERACTION Co,Si<LIQUID>
ERROR: NO DATA FOR BINARY INTERACTION Co,V<LIQUID>
ERROR: NO DATA FOR BINARY INTERACTION Mn,Mo<LIQUID>
ERROR: NO DATA FOR BINARY INTERACTION Mn,Nb<LIQUID>
ERROR: NO DATA FOR BINARY INTERACTION Nb,Si<LIQUID>
MISSING DATA ASSUMED ZERO: PHASE MAGNETIC BUT NO MAGNETIC DATA FOR
                           Mn:C<BCC_A2:1:3>
MISSING DATA ASSUMED ZERO: PHASE MAGNETIC BUT NO MAGNETIC DATA FOR
                           Mo:C<BCC_A2:1:3>
MISSING DATA ASSUMED ZERO: PHASE MAGNETIC BUT NO MAGNETIC DATA FOR
                           Mo:Va<BCC_A2:1:3>
MISSING DATA ASSUMED ZERO: PHASE MAGNETIC BUT NO MAGNETIC DATA FOR
                           Nb:C<BCC_A2:1:3>
MISSING DATA ASSUMED ZERO: PHASE MAGNETIC BUT NO MAGNETIC DATA FOR
```

```
 MULTIPHASE OPTION ? lis sys co !

 NUMBER    COMPONENT               STATUS      AMOUNT     DELTA    REF.P
    1      Fe                      NORMAL     undefined
    2      C                       NORMAL     undefined
    3      Si                      NORMAL     undefined
    4      Mn                      NORMAL     undefined
    5      Mo                      NORMAL     undefined
    6      Cr                      NORMAL     undefined
    7      Co                      NORMAL     undefined
    8      Nb                      NORMAL     undefined
    9      V                       NORMAL     undefined

 MULTIPHASE OPTION ? set w=100 !
 MULTIPHASE OPTION ? set w(1)=92.9 w(2)=0.8 w(3)=1.5 !
 MULTIPHASE OPTION ? set w(4)=1.8 w(5)=0.23 w(6)=1.3 !
 MULTIPHASE OPTION ? set w(7)=1.3 w(8)=0.013 w(9)=0.09 !
 MULTIPHASE OPTION ? ls sys com !
 LS  KEYWORD NOT RECOGNISED
 MULTIPHASE OPTION ? lis sys com !

 NUMBER    COMPONENT               STATUS      AMOUNT     DELTA    REF.P
    1      Fe                      NORMAL      1663.47
    2      C                       NORMAL      66.6056
    3      Si                      NORMAL      53.4083
    4      Mn                      NORMAL      32.7642
    5      Mo                      NORMAL      2.39733
    6      Cr                      NORMAL      25.0019
    7      Co                      NORMAL      22.0589
    8      Nb                      NORMAL     0.139926
    9      V                       NORMAL      1.76673

 MULTIPHASE OPTION ? step temp 773 1273 20 !
 MULTIPHASE OPTION ? comp pr br pr mole !
 NUMBER OF STEPS =  26

     773.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   773.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -2.892568E+04 1.110268E-02 1.663473E+03 9.290000E+01
C                           -3.948315E+03 5.410079E-01 6.660561E+01 8.000000E-01
Si                          -1.479112E+05 1.012309E-10 5.340834E+01 1.500000E+00
Mn                          -5.918490E+04 1.001718E-04 3.276421E+01 1.800000E+00
Mo                          -5.820132E+04 1.167368E-04 2.397332E+00 2.300000E-01
Cr                          -5.492515E+04 1.943507E-04 2.500192E+01 1.300000E+00
Co                          -6.637225E+04 3.274010E-05 2.205887E+01 1.300000E+00
Nb                          -1.821935E+05 4.884102E-13 1.399258E-01 1.300000E-02
V                           -1.375907E+05 5.043031E-10 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                 Fe              C               Si
 1.6081E+03 BCC_A2              0.9482248       0.0000197       0.0332127
 2.5222E+02 CEMENTITE           0.5497588       0.2500000       0.0000000
 7.3257E+00 FCC_A1              0.0000741       0.4803758       0.0000000

                                 Mn              Mo              Cr
 1.6081E+03 BCC_A2              0.0041831       0.0001096       0.0008447
 2.5222E+02 CEMENTITE           0.1031516       0.0013888       0.0935458
```

```
 7.3257E+00 FCC_A1             0.0028090       0.2553747       0.0067616

                                Co              Nb              V
 1.6081E+03 BCC_A2             0.0134043       0.0000000       0.0000011
 2.5222E+02 CEMENTITE          0.0019972       0.0000000       0.0001579
 7.3257E+00 FCC_A1             0.0000022       0.0191005       0.2355021

Gibbs Energy = -6.1464467475E+07 J   System Enthalpy =  2.0103742741E+07 J
     793.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   793.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -3.005763E+04 1.047525E-02 1.663473E+03 9.290000E+01
C                           -4.941672E+03 4.726090E-01 6.660561E+01 8.000000E-01
Si                          -1.489600E+05 1.542778E-10 5.340834E+01 1.500000E+00
Mn                          -6.080714E+04 9.879967E-05 3.276421E+01 1.800000E+00
Mo                          -5.942073E+04 1.219202E-04 2.397332E+00 2.300000E-01
Cr                          -5.623636E+04 1.976166E-04 2.500192E+01 1.300000E+00
Co                          -6.794727E+04 3.345408E-05 2.205887E+01 1.300000E+00
Nb                          -1.830589E+05 8.755410E-13 1.399258E-01 1.300000E-02
V                           -1.377459E+05 8.451844E-10 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 1.6079E+03 BCC_A2             0.9474988       0.0000275       0.0332167
 2.5267E+02 CEMENTITE          0.5541316       0.2500000       0.0000000
 7.0709E+00 FCC_A1             0.0000974       0.4799954       0.0000000

                                Mn              Mo              Cr
 1.6079E+03 BCC_A2             0.0047336       0.0001411       0.0009961
 2.5267E+02 CEMENTITE          0.0994736       0.0016337       0.0924107
 7.0709E+00 FCC_A1             0.0027264       0.2485737       0.0071999

                                Co              Nb              V
 1.6079E+03 BCC_A2             0.0133844       0.0000000       0.0000017
 2.5267E+02 CEMENTITE          0.0021307       0.0000000       0.0002198
 7.0709E+00 FCC_A1             0.0000027       0.0197885       0.2416160

Gibbs Energy = -6.3593508535E+07 J   System Enthalpy =  2.1560608863E+07 J
     813.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   813.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -3.120958E+04 9.882309E-03 1.663473E+03 9.290000E+01
C                           -5.918716E+03 4.166166E-01 6.660561E+01 8.000000E-01
Si                          -1.500348E+05 2.294131E-10 5.340834E+01 1.500000E+00
Mn                          -6.249057E+04 9.663383E-05 3.276421E+01 1.800000E+00
Mo                          -6.074134E+04 1.251736E-04 2.397332E+00 2.300000E-01
Cr                          -5.758468E+04 1.996736E-04 2.500192E+01 1.300000E+00
Co                          -6.953539E+04 3.408128E-05 2.205887E+01 1.300000E+00
Nb                          -1.839470E+05 1.519990E-12 1.399258E-01 1.300000E-02
V                           -1.379069E+05 1.379774E-09 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
```

compnt moles

		Fe	C	Si
1.6077E+03	BCC_A2	0.9467241	0.0000381	0.0332208
2.5315E+02	CEMENTITE	0.5587424	0.2500000	0.0000000
6.7884E+00	FCC_A1	0.0001265	0.4797153	0.0000000

		Mn	Mo	Cr
1.6077E+03	BCC_A2	0.0053109	0.0001773	0.0011625
2.5315E+02	CEMENTITE	0.0956271	0.0018849	0.0911738
6.7884E+00	FCC_A1	0.0026376	0.2408635	0.0076894

		Co	Nb	V
1.6077E+03	BCC_A2	0.0133635	0.0000000	0.0000027
2.5315E+02	CEMENTITE	0.0022698	0.0000000	0.0003019
6.7884E+00	FCC_A1	0.0000033	0.0206116	0.2483528

Gibbs Energy = -6.5759756672E+07 J System Enthalpy = 2.3054641449E+07 J
     833.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   833.0000 K

Fixed pressure = 1.013250E+05 Pa,   1.000000E+00 atm

Component	Ref.Phase	Chem.Pot.	Activity	Amount/mol	Mass/kg
Fe		-3.238240E+04	9.320929E-03	1.663473E+03	9.290000E+01
C		-6.878295E+03	3.704214E-01	6.660561E+01	8.000000E-01
Si		-1.511383E+05	3.333191E-10	5.340834E+01	1.500000E+00
Mn		-6.423786E+04	9.374762E-05	3.276421E+01	1.800000E+00
Mo		-6.216433E+04	1.264682E-04	2.397332E+00	2.300000E-01
Cr		-5.897169E+04	2.005285E-04	2.500192E+01	1.300000E+00
Co		-7.113515E+04	3.463106E-05	2.205887E+01	1.300000E+00
Nb		-1.848478E+05	2.565117E-12	1.399258E-01	1.300000E-02
V		-1.380826E+05	2.195427E-09	1.766732E+00	9.000000E-02
Total				1.867616E+03	9.993300E+01

Amount Phase Mole fraction of component within phase
compnt moles

		Fe	C	Si
1.6075E+03	BCC_A2	0.9459041	0.0000521	0.0332249
2.5366E+02	CEMENTITE	0.5635618	0.2500000	0.0000000
6.4795E+00	FCC_A1	0.0001623	0.4795279	0.0000000

		Mn	Mo	Cr
1.6075E+03	BCC_A2	0.0059119	0.0002178	0.0013434
2.5366E+02	CEMENTITE	0.0916370	0.0021359	0.0898410
6.4795E+00	FCC_A1	0.0025443	0.2323313	0.0082383

		Co	Nb	V
1.6075E+03	BCC_A2	0.0133416	0.0000000	0.0000042
2.5366E+02	CEMENTITE	0.0024150	0.0000000	0.0004092
6.4795E+00	FCC_A1	0.0000041	0.0215937	0.2555981

Gibbs Energy = -6.7963239997E+07 J System Enthalpy = 2.4588290686E+07 J
     853.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   853.0000 K

Fixed pressure = 1.013250E+05 Pa,   1.000000E+00 atm

Component	Ref.Phase	Chem.Pot.	Activity	Amount/mol	Mass/kg
Fe		-3.357408E+04	8.792175E-03	1.663473E+03	9.290000E+01
C		-7.820769E+03	3.319682E-01	6.660561E+01	8.000000E-01
Si		-1.522667E+05	4.742092E-10	5.340834E+01	1.500000E+00

```
Mn                          -6.604877E+04 9.026381E-05 3.276421E+01 1.800000E+00
Mo                          -6.368575E+04 1.259543E-04 2.397332E+00 2.300000E-01
Cr                          -6.039574E+04 2.002977E-04 2.500192E+01 1.300000E+00
Co                          -7.274336E+04 3.512138E-05 2.205887E+01 1.300000E+00
Nb                          -1.857622E+05 4.215803E-12 1.399258E-01 1.300000E-02
V                           -1.382805E+05 3.407331E-09 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe             C              Si
 1.6073E+03 BCC_A2             0.9450419      0.0000705      0.0332289
 2.5418E+02 CEMENTITE          0.5685596      0.2500000      0.0000000
 6.1453E+00 FCC_A1             0.0002062      0.4794228      0.0000000

                                Mn             Mo             Cr
 1.6073E+03 BCC_A2             0.0065336      0.0002621      0.0015384
 2.5418E+02 CEMENTITE          0.0875266      0.0023805      0.0884193
 6.1453E+00 FCC_A1             0.0024478      0.2230962      0.0088541

                                Co             Nb             V
 1.6073E+03 BCC_A2             0.0133183      0.0000000      0.0000064
 2.5418E+02 CEMENTITE          0.0025671      0.0000001      0.0005469
 6.1453E+00 FCC_A1             0.0000050      0.0227671      0.2632007

Gibbs Energy = -7.0204049111E+07 J   System Enthalpy =  2.6164444936E+07 J
     873.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   873.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -3.478621E+04 8.292239E-03 1.663473E+03 9.290000E+01
C                           -8.744740E+03 2.997677E-01 6.660561E+01 8.000000E-01
Si                          -1.534254E+05 6.610830E-10 5.340834E+01 1.500000E+00
Mn                          -6.792752E+04 8.625054E-05 3.276421E+01 1.800000E+00
Mo                          -6.530421E+04 1.237996E-04 2.397332E+00 2.300000E-01
Cr                          -6.185925E+04 1.989931E-04 2.500192E+01 1.300000E+00
Co                          -7.435913E+04 3.555869E-05 2.205887E+01 1.300000E+00
Nb                          -1.866723E+05 6.776778E-12 1.399258E-01 1.300000E-02
V                           -1.385129E+05 5.158170E-09 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe             C              Si
 1.6071E+03 BCC_A2             0.9441405      0.0000945      0.0332325
 2.5472E+02 CEMENTITE          0.5737053      0.2500000      0.0000000
 5.7867E+00 FCC_A1             0.0002596      0.4793896      0.0000000

                                Mn             Mo             Cr
 1.6071E+03 BCC_A2             0.0071732      0.0003095      0.0017469
 2.5472E+02 CEMENTITE          0.0833172      0.0026135      0.0869166
 5.7867E+00 FCC_A1             0.0023493      0.2132928      0.0095432

                                Co             Nb             V
 1.6071E+03 BCC_A2             0.0132936      0.0000000      0.0000094
 2.5472E+02 CEMENTITE          0.0027270      0.0000001      0.0007203
 5.7867E+00 FCC_A1             0.0000061      0.0241768      0.2709825

Gibbs Energy = -7.2482344383E+07 J   System Enthalpy =  2.7786556058E+07 J
     893.000
*** MULTIPHASE - Stage 1* Results ***
```

Temperature =   893.0000 K

Fixed pressure = 1.013250E+05 Pa,   1.000000E+00 atm

Component	Ref.Phase	Chem.Pot.	Activity	Amount/mol	Mass/kg
Fe		-3.601911E+04	7.819366E-03	1.663473E+03	9.290000E+01
C		-9.649665E+03	2.726291E-01	6.660561E+01	8.000000E-01
Si		-1.546164E+05	9.040340E-10	5.340834E+01	1.500000E+00
Mn		-6.987706E+04	8.180008E-05	3.276421E+01	1.800000E+00
Mo		-6.701553E+04	1.202624E-04	2.397332E+00	2.300000E-01
Cr		-6.336278E+04	1.966920E-04	2.500192E+01	1.300000E+00
Co		-7.598091E+04	3.595235E-05	2.205887E+01	1.300000E+00
Nb		-1.875631E+05	1.069211E-11	1.399258E-01	1.300000E-02
V		-1.387904E+05	7.618613E-09	1.766732E+00	9.000000E-02
Total				1.867616E+03	9.993300E+01

Amount compnt moles	Phase	Mole fraction of component within phase		
		Fe	C	Si
1.6070E+03	BCC_A2	0.9432024	0.0001254	0.0332357
2.5525E+02	CEMENTITE	0.5789697	0.2500000	0.0000000
5.4040E+00	FCC_A1	0.0003242	0.4794192	0.0000000
		Mn	Mo	Cr
1.6070E+03	BCC_A2	0.0078285	0.0003593	0.0019680
2.5525E+02	CEMENTITE	0.0790276	0.0028308	0.0853415
5.4040E+00	FCC_A1	0.0022493	0.2030548	0.0103100
		Co	Nb	V
1.6070E+03	BCC_A2	0.0132671	0.0000000	0.0000136
2.5525E+02	CEMENTITE	0.0028959	0.0000001	0.0009344
5.4040E+00	FCC_A1	0.0000075	0.0258871	0.2787479

Gibbs Energy = -7.4798365714E+07 J   System Enthalpy = 2.9458786388E+07 J
     913.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   913.0000 K

Fixed pressure = 1.013250E+05 Pa,   1.000000E+00 atm

Component	Ref.Phase	Chem.Pot.	Activity	Amount/mol	Mass/kg
Fe		-3.727202E+04	7.372990E-03	1.663473E+03	9.290000E+01
C		-1.053524E+04	2.496159E-01	6.660561E+01	8.000000E-01
Si		-1.558397E+05	1.214251E-09	5.340834E+01	1.500000E+00
Mn		-7.190001E+04	7.701122E-05	3.276421E+01	1.800000E+00
Mo		-6.881429E+04	1.156352E-04	2.397332E+00	2.300000E-01
Cr		-6.490581E+04	1.935070E-04	2.500192E+01	1.300000E+00
Co		-7.760540E+04	3.631992E-05	2.205887E+01	1.300000E+00
Nb		-1.884231E+05	1.660317E-11	1.399258E-01	1.300000E-02
V		-1.391221E+05	1.098339E-08	1.766732E+00	9.000000E-02
Total				1.867616E+03	9.993300E+01

Amount compnt moles	Phase	Mole fraction of component within phase		
		Fe	C	Si
1.6068E+03	BCC_A2	0.9422296	0.0001651	0.0332381
2.5578E+02	CEMENTITE	0.5843254	0.2500000	0.0000000
4.9973E+00	FCC_A1	0.0004017	0.4795063	0.0000000
		Mn	Mo	Cr
1.6068E+03	BCC_A2	0.0084973	0.0004111	0.0022012
2.5578E+02	CEMENTITE	0.0746735	0.0030295	0.0837029
4.9973E+00	FCC_A1	0.0021479	0.1924973	0.0111572

```
                                  Co             Nb             V
 1.6068E+03 BCC_A2              0.0132386      0.0000000      0.0000192
 2.5578E+02 CEMENTITE           0.0030751      0.0000002      0.0011934
 4.9973E+00 FCC_A1              0.0000090      0.0279910      0.2862896

Gibbs Energy = -7.7152445023E+07 J   System Enthalpy =  3.1186186990E+07 J
     933.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   933.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -3.854472E+04 6.951877E-03 1.663473E+03 9.290000E+01
C                           -1.140089E+04 2.300008E-01 6.660561E+01 8.000000E-01
Si                          -1.570971E+05 1.603363E-09 5.340834E+01 1.500000E+00
Mn                          -7.400044E+04 7.196801E-05 3.276421E+01 1.800000E+00
Mo                          -7.069596E+04 1.101890E-04 2.397332E+00 2.300000E-01
Cr                          -6.648834E+04 1.895392E-04 2.500192E+01 1.300000E+00
Co                          -7.922944E+04 3.667733E-05 2.205887E+01 1.300000E+00
Nb                          -1.892336E+05 2.546224E-11 1.399258E-01 1.300000E-02
V                           -1.395169E+05 1.546147E-08 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                  Fe             C              Si
 1.6068E+03 BCC_A2              0.9412232      0.0002156      0.0332395
 2.5627E+02 CEMENTITE           0.5897480      0.2500000      0.0000000
 4.5668E+00 FCC_A1              0.0004941      0.4796506      0.0000000

                                  Mn             Mo             Cr
 1.6068E+03 BCC_A2              0.0091781      0.0004640      0.0024457
 2.5627E+02 CEMENTITE           0.0702674      0.0032074      0.0820100
 4.5668E+00 FCC_A1              0.0020445      0.1817054      0.0120842

                                  Co             Nb             V
 1.6068E+03 BCC_A2              0.0132076      0.0000000      0.0000264
 2.5627E+02 CEMENTITE           0.0032666      0.0000003      0.0015003
 4.5668E+00 FCC_A1              0.0000109      0.0306249      0.2933855

Gibbs Energy = -7.9545021893E+07 J   System Enthalpy =  3.2974908751E+07 J
     953.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   953.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -3.983882E+04 6.553298E-03 1.663473E+03 9.290000E+01
C                           -1.224513E+04 2.132320E-01 6.660561E+01 8.000000E-01
Si                          -1.583950E+05 2.081944E-09 5.340834E+01 1.500000E+00
Mn                          -7.618535E+04 6.673127E-05 3.276421E+01 1.800000E+00
Mo                          -7.265890E+04 1.041386E-04 2.397332E+00 2.300000E-01
Cr                          -6.811209E+04 1.848501E-04 2.500192E+01 1.300000E+00
Co                          -8.085081E+04 3.703552E-05 2.205887E+01 1.300000E+00
Nb                          -1.899621E+05 3.875252E-11 1.399258E-01 1.300000E-02
V                           -1.399855E+05 2.125601E-08 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
```

		Fe	C	Si
1.6068E+03	BCC_A2	0.9401834	0.0002794	0.0332395
2.5673E+02	CEMENTITE	0.5952172	0.2500000	0.0000000
4.1136E+00	FCC_A1	0.0006030	0.4798591	0.0000000

		Mn	Mo	Cr
1.6068E+03	BCC_A2	0.0098698	0.0005176	0.0027009
2.5673E+02	CEMENTITE	0.0658187	0.0033629	0.0802721
4.1136E+00	FCC_A1	0.0019383	0.1707239	0.0130864

		Co	Nb	V
1.6068E+03	BCC_A2	0.0131738	0.0000000	0.0000355
2.5673E+02	CEMENTITE	0.0034727	0.0000004	0.0018560
4.1136E+00	FCC_A1	0.0000131	0.0339909	0.2997852

Gibbs Energy = -8.1976662998E+07 J System Enthalpy = 3.4832476366E+07 J
     973.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   973.0000 K

Fixed pressure = 1.013250E+05 Pa,   1.000000E+00 atm

Component	Ref.Phase	Chem.Pot.	Activity	Amount/mol	Mass/kg
Fe		-4.115372E+04	6.176675E-03	1.663473E+03	9.290000E+01
C		-1.306706E+04	1.988493E-01	6.660561E+01	8.000000E-01
Si		-1.597351E+05	2.660614E-09	5.340834E+01	1.500000E+00
Mn		-7.846100E+04	6.137583E-05	3.276421E+01	1.800000E+00
Mo		-7.470079E+04	9.769127E-05	2.397332E+00	2.300000E-01
Cr		-6.977647E+04	1.795587E-04	2.500192E+01	1.300000E+00
Co		-8.246447E+04	3.741793E-05	2.205887E+01	1.300000E+00
Nb		-1.905854E+05	5.872857E-11	1.399258E-01	1.300000E-02
V		-1.405376E+05	2.854664E-08	1.766732E+00	9.000000E-02
Total				1.867616E+03	9.993300E+01

Amount Phase Mole fraction of component within phase
compnt moles

		Fe	C	Si
1.6069E+03	BCC_A2	0.9391099	0.0003596	0.0332378
2.5712E+02	CEMENTITE	0.6007167	0.2500000	0.0000000
3.6406E+00	FCC_A1	0.0007301	0.4801483	0.0000000

		Mn	Mo	Cr
1.6069E+03	BCC_A2	0.0105718	0.0005713	0.0029666
2.5712E+02	CEMENTITE	0.0613342	0.0034946	0.0784985
3.6406E+00	FCC_A1	0.0018280	0.1595485	0.0141530

		Co	Nb	V
1.6069E+03	BCC_A2	0.0131364	0.0000000	0.0000466
2.5712E+02	CEMENTITE	0.0036966	0.0000005	0.0022589
3.6406E+00	FCC_A1	0.0000158	0.0383944	0.3051818

Gibbs Energy = -8.4448086167E+07 J System Enthalpy = 3.6768108177E+07 J
     993.000
*** MULTIPHASE - Stage 1* Results ***

Temperature =   993.0000 K

Fixed pressure = 1.013250E+05 Pa,   1.000000E+00 atm

Component	Ref.Phase	Chem.Pot.	Activity	Amount/mol	Mass/kg
Fe		-4.248997E+04	5.820528E-03	1.663473E+03	9.290000E+01
C		-1.386512E+04	1.864977E-01	6.660561E+01	8.000000E-01
Si		-1.611225E+05	3.347398E-09	5.340834E+01	1.500000E+00
Mn		-8.083683E+04	5.595754E-05	3.276421E+01	1.800000E+00

```
Mo                          -7.682258E+04 9.099432E-05 2.397332E+00 2.300000E-01
Cr                          -7.148209E+04 1.737530E-04 2.500192E+01 1.300000E+00
Co                          -8.406557E+04 3.784619E-05 2.205887E+01 1.300000E+00
Nb                          -1.910700E+05 8.900735E-11 1.399258E-01 1.300000E-02
V                           -1.411861E+05 3.744517E-08 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 1.6071E+03 BCC_A2             0.9380013       0.0004598       0.0332336
 2.5740E+02 CEMENTITE          0.6062364       0.2500000       0.0000000
 3.1536E+00 FCC_A1             0.0008758       0.4805474       0.0000000

                                Mn              Mo              Cr
 1.6071E+03 BCC_A2             0.0112837       0.0006243       0.0032427
 2.5740E+02 CEMENTITE          0.0568180       0.0036010       0.0766985
 3.1536E+00 FCC_A1             0.0017122       0.1481183       0.0152631

                                Co              Nb              V
 1.6071E+03 BCC_A2             0.0130948       0.0000000       0.0000597
 2.5740E+02 CEMENTITE          0.0039422       0.0000008       0.0027032
 3.1536E+00 FCC_A1             0.0000190       0.0443023       0.3091619

Gibbs Energy = -8.6960190236E+07 J   System Enthalpy =  3.8793156431E+07 J
     1013.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1013.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -4.385153E+04 5.481299E-03 1.663473E+03 9.290000E+01
C                           -1.459597E+04 1.767616E-01 6.660561E+01 8.000000E-01
Si                          -1.623443E+05 4.256368E-09 5.340834E+01 1.500000E+00
Mn                          -8.380566E+04 4.772309E-05 3.276421E+01 1.800000E+00
Mo                          -7.890080E+04 8.543535E-05 2.397332E+00 2.300000E-01
Cr                          -7.302027E+04 1.717338E-04 2.500192E+01 1.300000E+00
Co                          -8.557316E+04 3.868929E-05 2.205887E+01 1.300000E+00
Nb                          -1.917269E+05 1.300129E-10 1.399258E-01 1.300000E-02
V                           -1.420214E+05 4.752820E-08 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 1.5045E+03 BCC_A2             0.9370302       0.0005839       0.0335696
 2.4657E+02 CEMENTITE          0.6123082       0.2500000       0.0000000
 1.1376E+02 FCC_A1             0.9030651       0.0241251       0.0255175
 2.7884E+00 FCC_A1             0.0010534       0.4808780       0.0000000

                                Mn              Mo              Cr
 1.5045E+03 BCC_A2             0.0113275       0.0006826       0.0036112
 2.4657E+02 CEMENTITE          0.0494629       0.0037290       0.0770556
 1.1376E+02 FCC_A1             0.0309590       0.0005674       0.0045950
 2.7884E+00 FCC_A1             0.0015119       0.1385686       0.0167755

                                Co              Nb              V
 1.5045E+03 BCC_A2             0.0131210       0.0000000       0.0000740
 2.4657E+02 CEMENTITE          0.0042643       0.0000011       0.0031788
 1.1376E+02 FCC_A1             0.0111355       0.0000000       0.0000355
 2.7884E+00 FCC_A1             0.0000231       0.0500760       0.3111133

Gibbs Energy = -8.9514671717E+07 J   System Enthalpy =  4.1268998940E+07 J
```

```
     1033.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1033.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -4.528521E+04 5.130595E-03 1.663473E+03 9.290000E+01
C                           -1.546649E+04 1.651741E-01 6.660561E+01 8.000000E-01
Si                          -1.619681E+05 6.458499E-09 5.340834E+01 1.500000E+00
Mn                          -8.903893E+04 3.146114E-05 3.276421E+01 1.800000E+00
Mo                          -8.005554E+04 8.953990E-05 2.397332E+00 2.300000E-01
Cr                          -7.293005E+04 2.052649E-04 2.500192E+01 1.300000E+00
Co                          -8.684652E+04 4.060997E-05 2.205887E+01 1.300000E+00
Nb                          -1.941925E+05 1.516067E-10 1.399258E-01 1.300000E-02
V                           -1.429262E+05 5.928966E-08 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                 Fe             C              Si
 7.6743E+02 BCC_A2              0.9348834      0.0007004      0.0368841
 1.6641E+02 CEMENTITE           0.6097945      0.2500000      0.0000000
 9.3048E+02 FCC_A1              0.9076341      0.0245949      0.0269778
 3.2978E+00 FCC_A1              0.0013458      0.4795982      0.0000000

                                 Mn             Mo             Cr
 7.6743E+02 BCC_A2              0.0087206      0.0007951      0.0047897
 1.6641E+02 CEMENTITE           0.0330460      0.0041566      0.0945286
 9.3048E+02 FCC_A1              0.0221061      0.0006776      0.0059385
 3.2978E+00 FCC_A1              0.0010472      0.1409918      0.0213648

                                 Co             Nb             V
 7.6743E+02 BCC_A2              0.0131354      0.0000000      0.0000913
 1.6641E+02 CEMENTITE           0.0047401      0.0000012      0.0037329
 9.3048E+02 FCC_A1              0.0120255      0.0000000      0.0000455
 3.2978E+00 FCC_A1              0.0000289      0.0423556      0.3132677

Gibbs Energy = -9.2139498655E+07 J   System Enthalpy =  4.5627009387E+07 J
     1053.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1053.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -4.677857E+04 4.781696E-03 1.663473E+03 9.290000E+01
C                           -1.689507E+04 1.451885E-01 6.660561E+01 8.000000E-01
Si                          -1.611592E+05 1.013471E-08 5.340834E+01 1.500000E+00
Mn                          -9.350670E+04 2.299674E-05 3.276421E+01 1.800000E+00
Mo                          -8.095996E+04 9.639145E-05 2.397332E+00 2.300000E-01
Cr                          -7.225854E+04 2.604151E-04 2.500192E+01 1.300000E+00
Co                          -8.851330E+04 4.067804E-05 2.205887E+01 1.300000E+00
Nb                          -1.963427E+05 1.822039E-10 1.399258E-01 1.300000E-02
V                           -1.432835E+05 7.807660E-08 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                 Fe             C              Si
 2.7734E+01 BCC_A2              0.9300241      0.0007861      0.0416045
 9.1670E+01 CEMENTITE           0.5913133      0.2500000      0.0000000
 1.7442E+03 FCC_A1              0.9078268      0.0239461      0.0299583
```

```
 3.9723E+00 FCC_A1             0.0016801       0.4779415       0.0000000

                                Mn              Mo              Cr
 2.7734E+01 BCC_A2             0.0074393       0.0009326       0.0067144
 9.1670E+01 CEMENTITE          0.0238206       0.0045732       0.1209462
 1.7442E+03 FCC_A1             0.0174123       0.0007991       0.0078082
 3.9723E+00 FCC_A1             0.0007715       0.1405714       0.0274795

                                Co              Nb              V
 2.7734E+01 BCC_A2             0.0123798       0.0000000       0.0001192
 9.1670E+01 CEMENTITE          0.0049217       0.0000014       0.0044235
 1.7442E+03 FCC_A1             0.0121911       0.0000000       0.0000581
 3.9723E+00 FCC_A1             0.0000328       0.0351774       0.3163458

Gibbs Energy = -9.4845438938E+07 J   System Enthalpy =  4.9478848253E+07 J
     1073.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1073.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -4.827228E+04 4.468067E-03 1.663473E+03 9.290000E+01
C                           -1.772429E+04 1.371471E-01 6.660561E+01 8.000000E-01
Si                          -1.621518E+05 1.277909E-08 5.340834E+01 1.500000E+00
Mn                          -9.576399E+04 2.178901E-05 3.276421E+01 1.800000E+00
Mo                          -8.319242E+04 8.916979E-05 2.397332E+00 2.300000E-01
Cr                          -7.362459E+04 2.606013E-04 2.500192E+01 1.300000E+00
Co                          -9.071142E+04 3.838794E-05 2.205887E+01 1.300000E+00
Nb                          -1.976262E+05 2.396710E-10 1.399258E-01 1.300000E-02
V                           -1.439759E+05 9.801526E-08 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 7.6636E+01 CEMENTITE          0.5895841       0.2500000       0.0000000
 1.7871E+03 FCC_A1             0.9055180       0.0255206       0.0298849
 3.8461E+00 FCC_A1             0.0020150       0.4778821       0.0000000

                                Mn              Mo              Cr
 7.6636E+01 CEMENTITE          0.0229685       0.0046095       0.1228617
 1.7871E+03 FCC_A1             0.0173468       0.0008628       0.0086556
 3.8461E+00 FCC_A1             0.0007576       0.1305385       0.0305668

                                Co              Nb              V
 7.6636E+01 CEMENTITE          0.0048863       0.0000018       0.0050881
 1.7871E+03 FCC_A1             0.0121335       0.0000001       0.0000777
 3.8461E+00 FCC_A1             0.0000363       0.0363213       0.3218824

Gibbs Energy = -9.7601130612E+07 J   System Enthalpy =  5.0936820647E+07 J
     1093.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1093.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -4.977883E+04 4.179476E-03 1.663473E+03 9.290000E+01
C                           -1.852254E+04 1.302649E-01 6.660561E+01 8.000000E-01
Si                          -1.632252E+05 1.583579E-08 5.340834E+01 1.500000E+00
Mn                          -9.796281E+04 2.081902E-05 3.276421E+01 1.800000E+00
Mo                          -8.554184E+04 8.166671E-05 2.397332E+00 2.300000E-01
```

```
Cr                          -7.509533E+04 2.577943E-04 2.500192E+01 1.300000E+00
Co                          -9.293400E+04 3.620611E-05 2.205887E+01 1.300000E+00
Nb                          -1.989349E+05 3.112512E-10 1.399258E-01 1.300000E-02
V                           -1.447264E+05 1.212490E-07 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 6.2893E+01 CEMENTITE          0.5887949       0.2500000       0.0000000
 1.8010E+03 FCC_A1             0.9030700       0.0272656       0.0296547
 3.7186E+00 FCC_A1             0.0024076       0.4778436       0.0000000

                                Mn              Mo              Cr
 6.2893E+01 CEMENTITE          0.0223970       0.0046060       0.1235527
 1.8010E+03 FCC_A1             0.0174085       0.0009216       0.0094980
 3.7186E+00 FCC_A1             0.0007522       0.1204369       0.0337174

                                Co              Nb              V
 6.2893E+01 CEMENTITE          0.0048491       0.0000023       0.0057980
 1.8010E+03 FCC_A1             0.0120787       0.0000001       0.0001028
 3.7186E+00 FCC_A1             0.0000401       0.0375547       0.3272475

Gibbs Energy = -1.0038262960E+08 J   System Enthalpy =  5.2326715661E+07 J
     1113.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1113.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -5.129975E+04 3.912841E-03 1.663473E+03 9.290000E+01
C                           -1.932413E+04 1.239123E-01 6.660561E+01 8.000000E-01
Si                          -1.643002E+05 1.946968E-08 5.340834E+01 1.500000E+00
Mn                          -1.001743E+05 1.989744E-05 3.276421E+01 1.800000E+00
Mo                          -8.795032E+04 7.455434E-05 2.397332E+00 2.300000E-01
Cr                          -7.658105E+04 2.547038E-04 2.500192E+01 1.300000E+00
Co                          -9.517444E+04 3.415415E-05 2.205887E+01 1.300000E+00
Nb                          -2.003060E+05 3.977386E-10 1.399258E-01 1.300000E-02
V                           -1.455124E+05 1.482763E-07 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 4.8352E+01 CEMENTITE          0.5880022       0.2500000       0.0000000
 1.8156E+03 FCC_A1             0.9005278       0.0290723       0.0294158
 3.6269E+00 FCC_A1             0.0028694       0.4777471       0.0000000

                                Mn              Mo              Cr
 4.8352E+01 CEMENTITE          0.0218552       0.0045791       0.1241915
 1.8156E+03 FCC_A1             0.0174621       0.0009774       0.0103889
 3.6269E+00 FCC_A1             0.0007473       0.1106724       0.0370799

                                Co              Nb              V
 4.8352E+01 CEMENTITE          0.0048126       0.0000028       0.0065565
 1.8156E+03 FCC_A1             0.0120211       0.0000001       0.0001346
 3.6269E+00 FCC_A1             0.0000441       0.0384897       0.3323501

Gibbs Energy = -1.0318969566E+08 J   System Enthalpy =  5.3731321751E+07 J
     1133.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1133.0000 K
```

Fixed pressure = 1.013250E+05 Pa, 1.000000E+00 atm

Component	Ref.Phase	Chem.Pot.	Activity	Amount/mol	Mass/kg
Fe		-5.283528E+04	3.666058E-03	1.663473E+03	9.290000E+01
C		-2.012850E+04	1.180431E-01	6.660561E+01	8.000000E-01
Si		-1.653775E+05	2.375770E-08	5.340834E+01	1.500000E+00
Mn		-1.024025E+05	1.901358E-05	3.276421E+01	1.800000E+00
Mo		-9.041458E+04	6.787762E-05	2.397332E+00	2.300000E-01
Cr		-7.808419E+04	2.512926E-04	2.500192E+01	1.300000E+00
Co		-9.742523E+04	3.224951E-05	2.205887E+01	1.300000E+00
Nb		-2.017542E+05	4.997718E-10	1.399258E-01	1.300000E-02
V		-1.463343E+05	1.793608E-07	1.766732E+00	9.000000E-02
Total				1.867616E+03	9.993300E+01

Amount compnt moles	Phase	Mole fraction of component within phase		
		Fe	C	Si
3.2965E+01	CEMENTITE	0.5872072	0.2500000	0.0000000
1.8311E+03	FCC_A1	0.8978888	0.0309422	0.0291677
3.5740E+00	FCC_A1	0.0034112	0.4775838	0.0000000
		Mn	Mo	Cr
3.2965E+01	CEMENTITE	0.0213416	0.0045320	0.1247782
1.8311E+03	FCC_A1	0.0175077	0.0010299	0.0113285
3.5740E+00	FCC_A1	0.0007427	0.1013271	0.0406462
		Co	Nb	V
3.2965E+01	CEMENTITE	0.0047769	0.0000035	0.0073606
1.8311E+03	FCC_A1	0.0119608	0.0000001	0.0001742
3.5740E+00	FCC_A1	0.0000485	0.0390425	0.3371980

Gibbs Energy = -1.0602213867E+08 J System Enthalpy = 5.5151217786E+07 J
1153.00
*** MULTIPHASE - Stage 1* Results ***

Temperature = 1153.0000 K

Fixed pressure = 1.013250E+05 Pa, 1.000000E+00 atm

Component	Ref.Phase	Chem.Pot.	Activity	Amount/mol	Mass/kg
Fe		-5.438333E+04	3.438117E-03	1.663473E+03	9.290000E+01
C		-2.093482E+04	1.126183E-01	6.660561E+01	8.000000E-01
Si		-1.664587E+05	2.877856E-08	5.340834E+01	1.500000E+00
Mn		-1.046497E+05	1.816142E-05	3.276421E+01	1.800000E+00
Mo		-9.293115E+04	6.166284E-05	2.397332E+00	2.300000E-01
Cr		-7.960288E+04	2.476409E-04	2.500192E+01	1.300000E+00
Co		-9.969044E+04	3.046588E-05	2.205887E+01	1.300000E+00
Nb		-2.032928E+05	6.171787E-10	1.399258E-01	1.300000E-02
V		-1.471921E+05	2.147287E-07	1.766732E+00	9.000000E-02
Total				1.867616E+03	9.993300E+01

Amount compnt moles	Phase	Mole fraction of component within phase		
		Fe	C	Si
1.6675E+01	CEMENTITE	0.5864100	0.2500000	0.0000000
1.8474E+03	FCC_A1	0.8951498	0.0328769	0.0289103
3.5626E+00	FCC_A1	0.0040452	0.4773474	0.0000000
		Mn	Mo	Cr
1.6675E+01	CEMENTITE	0.0208549	0.0044682	0.1253142
1.8474E+03	FCC_A1	0.0175458	0.0010790	0.0123169
3.5626E+00	FCC_A1	0.0007385	0.0924642	0.0444051
		Co	Nb	V

```
 1.6675E+01 CEMENTITE          0.0047419       0.0000042       0.0082067
 1.8474E+03 FCC_A1             0.0118977       0.0000002       0.0002231
 3.5626E+00 FCC_A1             0.0000531       0.0391501       0.3417964

Gibbs Energy = -1.0887978645E+08 J   System Enthalpy =  5.6587094479E+07 J
     1173.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1173.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -5.594557E+04 3.226720E-03 1.663473E+03 9.290000E+01
C                           -2.176167E+04 1.073890E-01 6.660561E+01 8.000000E-01
Si                          -1.675384E+05 3.463916E-08 5.340834E+01 1.500000E+00
Mn                          -1.069070E+05 1.735654E-05 3.276421E+01 1.800000E+00
Mo                          -9.549081E+04 5.595312E-05 2.397332E+00 2.300000E-01
Cr                          -8.115618E+04 2.432992E-04 2.500192E+01 1.300000E+00
Co                          -1.019693E+05 2.879657E-05 2.205887E+01 1.300000E+00
Nb                          -2.048761E+05 7.532359E-10 1.399258E-01 1.300000E-02
V                           -1.480649E+05 2.551040E-07 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 1.8640E+03 FCC_A1             0.8923941       0.0348161       0.0286520
 3.5785E+00 FCC_A1             0.0047699       0.4770390       0.0000000

                                Mn              Mo              Cr
 1.8640E+03 FCC_A1             0.0175756       0.0011247       0.0133203
 3.5785E+00 FCC_A1             0.0007337       0.0840777       0.0481956

                                Co              Nb              V
 1.8640E+03 FCC_A1             0.0118338       0.0000003       0.0002832
 3.5785E+00 FCC_A1             0.0000580       0.0389565       0.3461697

Gibbs Energy = -1.1176248405E+08 J   System Enthalpy =  5.8033585243E+07 J
     1193.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1193.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -5.748431E+04 3.041967E-03 1.663473E+03 9.290000E+01
C                           -2.314869E+04 9.693423E-02 6.660561E+01 8.000000E-01
Si                          -1.688408E+05 4.051486E-08 5.340834E+01 1.500000E+00
Mn                          -1.091576E+05 1.662400E-05 3.276421E+01 1.800000E+00
Mo                          -9.793979E+04 5.150930E-05 2.397332E+00 2.300000E-01
Cr                          -8.323813E+04 2.267624E-04 2.500192E+01 1.300000E+00
Co                          -1.042286E+05 2.732389E-05 2.205887E+01 1.300000E+00
Nb                          -2.047199E+05 1.088210E-09 1.399258E-01 1.300000E-02
V                           -1.483916E+05 3.183804E-07 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 1.8645E+03 FCC_A1             0.8921713       0.0349271       0.0286448
 3.1116E+00 FCC_A1             0.0050959       0.4768941       0.0000000

                                Mn              Mo              Cr
```

```
 1.8645E+03 FCC_A1             0.0175714       0.0011609       0.0133302
 3.1116E+00 FCC_A1             0.0007021       0.0748333       0.0474775

                                Co              Nb              V
 1.8645E+03 FCC_A1             0.0118309       0.0000004       0.0003631
 3.1116E+00 FCC_A1             0.0000605       0.0447159       0.3502207

Gibbs Energy = -1.1466835555E+08 J   System Enthalpy =  5.9308852915E+07 J
     1213.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1213.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -5.903725E+04 2.869334E-03 1.663473E+03 9.290000E+01
C                           -2.454215E+04 8.773719E-02 6.660561E+01 8.000000E-01
Si                          -1.701580E+05 4.707407E-08 5.340834E+01 1.500000E+00
Mn                          -1.114219E+05 1.592319E-05 3.276421E+01 1.800000E+00
Mo                          -1.004313E+05 4.734781E-05 2.397332E+00 2.300000E-01
Cr                          -8.533843E+04 2.114553E-04 2.500192E+01 1.300000E+00
Co                          -1.065022E+05 2.593467E-05 2.205887E+01 1.300000E+00
Nb                          -2.042077E+05 1.608997E-09 1.399258E-01 1.300000E-02
V                           -1.488394E+05 3.897518E-07 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 1.8650E+03 FCC_A1             0.8919299       0.0350471       0.0286370
 2.6051E+00 FCC_A1             0.0053723       0.4769073       0.0000000

                                Mn              Mo              Cr
 1.8650E+03 FCC_A1             0.0175669       0.0011931       0.0133411
 2.6051E+00 FCC_A1             0.0006710       0.0661233       0.0463164

                                Co              Nb              V
 1.8650E+03 FCC_A1             0.0118277       0.0000007       0.0004566
 2.6051E+00 FCC_A1             0.0000629       0.0532456       0.3513011

Gibbs Energy = -1.1759568148E+08 J   System Enthalpy =  6.0592983373E+07 J
     1233.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1233.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -6.059241E+04 2.711042E-03 1.663473E+03 9.290000E+01
C                           -2.593377E+04 7.968433E-02 6.660561E+01 8.000000E-01
Si                          -1.714705E+05 5.445421E-08 5.340834E+01 1.500000E+00
Mn                          -1.137429E+05 1.518907E-05 3.276421E+01 1.800000E+00
Mo                          -1.029787E+05 4.340447E-05 2.397332E+00 2.300000E-01
Cr                          -8.745560E+04 1.973043E-04 2.500192E+01 1.300000E+00
Co                          -1.088005E+05 2.459840E-05 2.205887E+01 1.300000E+00
Nb                          -2.032400E+05 2.455764E-09 1.399258E-01 1.300000E-02
V                           -1.494705E+05 4.656005E-07 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 1.8655E+03 FCC_A1             0.8916758       0.0351733       0.0286288
```

```
 2.0706E+00 FCC_A1             0.0055412       0.4772306       0.0000000

                                Mn              Mo              Cr
 1.8655E+03 FCC_A1             0.0175621       0.0012210       0.0133527
 2.0706E+00 FCC_A1             0.0006382       0.0577566       0.0444001

                                Co              Nb              V
 1.8655E+03 FCC_A1             0.0118243       0.0000010       0.0005611
 2.0706E+00 FCC_A1             0.0000652       0.0666367       0.3477314

Gibbs Energy = -1.2054424967E+08 J   System Enthalpy =  6.1885254575E+07 J
     1253.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1253.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -6.215762E+04 2.563654E-03 1.663473E+03 9.290000E+01
C                           -2.733890E+04 7.249935E-02 6.660561E+01 8.000000E-01
Si                          -1.728060E+05 6.256118E-08 5.340834E+01 1.500000E+00
Mn                          -1.160107E+05 1.458501E-05 3.276421E+01 1.800000E+00
Mo                          -1.055631E+05 3.975884E-05 2.397332E+00 2.300000E-01
Cr                          -8.957229E+04 1.845163E-04 2.500192E+01 1.300000E+00
Co                          -1.110893E+05 2.339176E-05 2.205887E+01 1.300000E+00
Nb                          -2.017235E+05 3.897894E-09 1.399258E-01 1.300000E-02
V                           -1.503532E+05 5.398662E-07 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
compnt moles
                                Fe              C               Si
 1.8661E+03 FCC_A1             0.8914255       0.0352975       0.0286207
 1.5434E+00 FCC_A1             0.0055060       0.4781228       0.0000000

                                Mn              Mo              Cr
 1.8661E+03 FCC_A1             0.0175573       0.0012438       0.0133641
 1.5434E+00 FCC_A1             0.0006001       0.0494341       0.0412193

                                Co              Nb              V
 1.8661E+03 FCC_A1             0.0118210       0.0000017       0.0006685
 1.5434E+00 FCC_A1             0.0000670       0.0885595       0.3364911

Gibbs Energy = -1.2351383296E+08 J   System Enthalpy =  6.3183559338E+07 J
     1273.00
*** MULTIPHASE - Stage 1* Results ***

Temperature =  1273.0000 K

Fixed pressure =  1.013250E+05 Pa,    1.000000E+00 atm

Component      Ref.Phase     Chem.Pot.    Activity     Amount/mol   Mass/kg
Fe                          -6.377130E+04 2.417447E-03 1.663473E+03 9.290000E+01
C                           -2.873977E+04 6.618495E-02 6.660561E+01 8.000000E-01
Si                          -1.743263E+05 7.032348E-08 5.340834E+01 1.500000E+00
Mn                          -1.183435E+05 1.393700E-05 3.276421E+01 1.800000E+00
Mo                          -1.082398E+05 3.620267E-05 2.397332E+00 2.300000E-01
Cr                          -9.176641E+04 1.716605E-04 2.500192E+01 1.300000E+00
Co                          -1.134296E+05 2.217145E-05 2.205887E+01 1.300000E+00
Nb                          -1.998512E+05 6.306239E-09 1.399258E-01 1.300000E-02
V                           -1.516641E+05 5.983683E-07 1.766732E+00 9.000000E-02
Total                                                  1.867616E+03 9.993300E+01

Amount      Phase               Mole fraction of component within phase
```

compnt moles

		Fe	C	Si
1.8665E+03	FCC_A1	0.8912095	0.0354045	0.0286137
1.0880E+00	FCC_A1	0.0051630	0.4798820	0.0000000

		Mn	Mo	Cr
1.8665E+03	FCC_A1	0.0175532	0.0012605	0.0133738
1.0880E+00	FCC_A1	0.0005532	0.0408941	0.0362403

		Co	Nb	V
1.8665E+03	FCC_A1	0.0118181	0.0000029	0.0007637
1.0880E+00	FCC_A1	0.0000678	0.1235559	0.3136437

Gibbs Energy = -1.2650416357E+08 J System Enthalpy = 6.4484074519E+07 J

****
* WARNING/ERRORS HAVE BEEN DETECTED *
****

2 Warnings: Multiphase, Stage 1 - Less accuracy than normal

MULTIPHASE OPTION ?