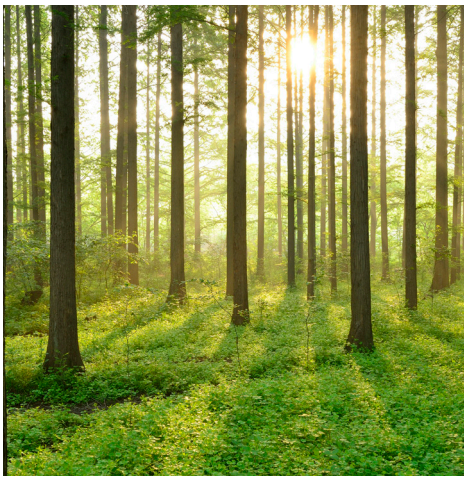
APPENDIX I AND APPENDIX II TO REPORT 2015:219

TECHNICAL AND ECONOMICAL POTENTIAL FOR COMBINED HEAT, POWER AND BIO-OIL PRODUCTION IN POWER PLANTS-CHPO APPENDIX I AND APPENDIX II



BRÄNSLEBASERAD EL- OCH VÄRMEPRODUKTION

Energiforsk

Appendix I and Appendix II

Technical and economic potential for combined heat, power and bio-oil production in power plants-CHPO

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Appendix I

Table 1 Components specified in AspenPlus-standalone pyrolysis unit

Component ID	Type	Component name	Alias
PYRFUEL	Nonconventional		
CHAR	Nonconventional		
ASH	Nonconventional		
N2	Conventional	NITROGEN	N2
O2	Conventional	OXYGEN	O2
AIR	Conventional	AIR	AIR
H2O	Conventional	WATER	H2O
C	Solid	CARBON-GRAPHITE	C
H2	Conventional	HYDROGEN	H2
CO	Conventional	CARBON-MONOXIDE	CO
CO2	Conventional	CARBON-DIOXIDE	CO2
CATA	Solid	ALUMINIUM-OXIDE-ALPHA-CORUNDUM	AL2O3
SAND	Solid	SILICON-DIOXIDE	SIO2
COKE	Solid	CARBON-GRAPHITE	C
CH4	Conventional	METHANE	CH4
C2H4	Conventional	ETHYLENE	C2H4
C2H6	Conventional	ETHANE	C2H6
C3H8	Conventional	PROPANE	C3H8
C3H6	Conventional	CYCLOPROPANE	C3H6-1
C2H2	Conventional	ACETYLENE	C2H2
IC4H10	Conventional	ISOBUTANE	C4H10-2
1-C4H8	Conventional	1-BUTENE	C4H8-1
CH3C2H	Conventional	METHYL-ACETYLENE	C3H4-2
NC6H14	Conventional	N-HEXANE	C6H14-1
CARB-ACI	Conventional	ACETIC-ACID	C2H4O2-1
KETONES	Conventional	ACETOL	C3H6O2-D1
FURANS	Conventional	FURAN	C4H4O
SUGARS	Conventional	DEXTROSE	C6H12O6
PHENOLS	Conventional	PHENOL	C6H6O
CATECHOL	Conventional	P-TERT-BUTYLCATECHOL	C10H14O2
GUAIACOL	Conventional	GUAIACOL	C7H8O2-E1
ALCOHOL	Conventional	METHANOL	CH4O
AROMATIC	Conventional	BENZENE	C6H6

Table 2 Components specified in AspenPlus-integrated unit

Component ID	Type	Component name	Alias
N2	Conventional	NITROGEN	N2
O2	Conventional	OXYGEN	O2
CHPFUEL	Nonconventional		
ASH	Nonconventional		
H2O	Conventional	WATER	H2O
CHLOR	Conventional	CHLORINE	CL2
C	Solid	CARBON-GRAPHITE	C
H2	Conventional	HYDROGEN	H2
S	Conventional	SULFUR	S
CO	Conventional	CARBON-MONOXIDE	CO
CO2	Conventional	CARBON-DIOXIDE	CO2
NO	Conventional	NITRIC-OXIDE	NO
NO2	Conventional	NITROGEN-DIOXIDE	NO2
N2O	Conventional	NITROUS-OXIDE	N2O
SO2	Conventional	SULFUR-DIOXIDE	O2S
NH3	Conventional	AMMONIA	H3N
PYRFUEL	Nonconventional		
CATA	Solid	ALUMINIUM-OXIDE-ALPHA-CORUNDUM	AL2O3
SAND	Solid	SILICON-DIOXIDE	SIO2
CH4	Conventional	METHANE	CH4
C2H4	Conventional	ETHYLENE	C2H4
C2H6	Conventional	ETHANE	C2H6
C3H8	Conventional	PROPANE	C3H8
C3H6	Conventional	CYCLOPROPANE	C3H6-1
C2H2	Conventional	ACETYLENE	C2H2
IC4H10	Conventional	ISOBUTANE	C4H10-2
1-C4H8	Conventional	1-BUTENE	C4H8-1
CH3C2H	Conventional	METHYL-ACETYLENE	C3H4-2
NC6H14	Conventional	N-HEXANE	C6H14-1
CHAR	Nonconventional		
COKE	Solid	CARBON-GRAPHITE	C
CARB-ACI	Conventional	ACETIC-ACID	C2H4O2-1
KETONES	Conventional	ACETOL	C3H6O2-D1
FURANS	Conventional	FURAN	C4H4O
SUGARS	Conventional	DEXTROSE	C6H12O6
PHENOLS	Conventional	PHENOL	C6H6O
CATECHOL	Conventional	P-TERT-BUTYLCATECHOL	C10H14O2
GUAIACOL	Conventional	GUAIACOL	C7H8O2-E1
ALCOHOL	Conventional	METHANOL	CH4O
AROMATIC	Conventional	BENZENE	C6H6
CARBON	Solid	CARBON-GRAPHITE	C

Appendix II

Aspen Plus BLOCK REPORT for reference case scenario

BLOCK: AIRMIX MODEL: MIXER

INLET STREAMS: PAIR1 RECY
OUTLET STREAM: A1+REC
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 8434.98 8434.98 0.00000
(KG/HR) 242697. 242697. 0.359755E-15
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 242697. 242697. 0.359755E-15
ENTHALPY(MMKCAL/H) -60.6596 -60.6596 -0.221800E-09

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 19313.7 KG/HR
PRODUCT STREAMS CO2E 19313.7 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000
OUTLET PRESSURE BAR 1.10000

BLOCK: AIRSP MODEL: FSPLIT

INLET STREAM: AIRCHP
OUTLET STREAMS: AIR1 AIR2
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 7611.68 7611.68 0.00000
(KG/HR) 219600. 219600. 0.132531E-15
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 219600. 219600. 0.132531E-15
ENTHALPY(MMKCAL/H) -0.201803E-02 -0.201805E-02 0.785557E-05

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

OUTLET PRESSURE BAR 1.10000

FRACTION OF FLOW STRM=AIR1 FRAC= 0.40000

*** RESULTS ***

STREAM= AIR1 SPLIT= 0.40000 KEY= 0 STREAM-ORDER= 1
AIR2 0.60000 0 2

BLOCK: ASH-EX MODEL: HEATER

INLET STREAM: SOLIDS
OUTLET STREAM: ASHOUT
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.

CONV. COMP.(KMOL/HR) 0.00000 0.00000 0.00000
(KG/HR) 0.00000 0.00000 0.00000
NONCONV. COMP(KG/HR) 648.000 648.000 0.00000
TOTAL BALANCE
MASS(KG/HR) 648.000 648.000 0.00000
ENTHALPY(MMKCAL/H) 0.998441E-03 -0.104594 1.00955

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 182.000
SPECIFIED PRESSURE BAR 1.10000
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***
OUTLET TEMPERATURE C 182.00
OUTLET PRESSURE BAR 1.1000
HEAT DUTY MMKCAL/HR -0.10559
OUTLET VAPOR FRACTION 0.0000

BLOCK: B-2 MODEL: COMPR

INLET STREAM: PYAIR2
OUTLET STREAM: AIR25
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 3275.52 3275.52 0.00000
(KG/HR) 94500.0 94500.0 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 94500.0 94500.0 0.00000
ENTHALPY(MMKCAL/H) -0.552484 -0.356853 -0.354094

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

ISENTROPIC COMPRESSOR USING ASME METHOD
OUTLET PRESSURE BAR 1.10000
ISENTROPIC EFFICIENCY 0.88000
MECHANICAL EFFICIENCY 0.90000

*** RESULTS ***

INDICATED HORSEPOWER REQUIREMENT KW 227.519
BRAKE HORSEPOWER REQUIREMENT KW 252.799
NET WORK REQUIRED KW 252.799
POWER LOSSES KW 25.2799
ISENTROPIC HORSEPOWER REQUIREMENT KW 200.217
CALCULATED OUTLET TEMP C 9.35878
ISENTROPIC TEMPERATURE C 8.32947
EFFICIENCY (POLYTR/ISENTR) USED 0.88000
OUTLET VAPOR FRACTION 1.00000
HEAD DEVELOPED, METER 777.769

MECHANICAL EFFICIENCY USED 0.90000
INLET HEAT CAPACITY RATIO 1.39971
INLET VOLUMETRIC FLOW RATE , CUM/HR 74,601.4
OUTLET VOLUMETRIC FLOW RATE, CUM/HR 69,943.4
INLET COMPRESSIBILITY FACTOR 1.00000
OUTLET COMPRESSIBILITY FACTOR 1.00000
AV. ISENT. VOL. EXPONENT 1.39908
AV. ISENT. TEMP EXPONENT 1.39908
AV. ACTUAL VOL. EXPONENT 1.47829
AV. ACTUAL TEMP EXPONENT 1.47829

BLOCK: B-CHP MODEL: COMPR

INLET STREAM: AIRIN
OUTLET STREAM: AIRCHP
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 7611.68 7611.68 0.00000
(KG/HR) 219600. 219600. 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 219600. 219600. 0.00000
ENTHALPY(MMKCAL/H) -1.28387 -0.201803E-02 -0.998428

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

ISENTROPIC COMPRESSOR USING ASME METHOD
OUTLET PRESSURE BAR 1.30000
ISENTROPIC EFFICIENCY 0.88000
MECHANICAL EFFICIENCY 0.90000

*** RESULTS ***

INDICATED HORSEPOWER REQUIREMENT KW 1,490.79
BRAKE HORSEPOWER REQUIREMENT KW 1,656.44
NET WORK REQUIRED KW 1,656.44
POWER LOSSES KW 165.644
ISENTROPIC HORSEPOWER REQUIREMENT KW 1,311.90
CALCULATED OUTLET TEMP C 24.9619
ISENTROPIC TEMPERATURE C 22.0614
EFFICIENCY (POLYTR/ISENTR) USED 0.88000
OUTLET VAPOR FRACTION 1.00000
HEAD DEVELOPED, METER 2,193.05
MECHANICAL EFFICIENCY USED 0.90000
INLET HEAT CAPACITY RATIO 1.39971
INLET VOLUMETRIC FLOW RATE , CUM/HR 173,359.
OUTLET VOLUMETRIC FLOW RATE, CUM/HR 145,126.
INLET COMPRESSIBILITY FACTOR 1.00000
OUTLET COMPRESSIBILITY FACTOR 1.00000
AV. ISENT. VOL. EXPONENT 1.39894
AV. ISENT. TEMP EXPONENT 1.39894
AV. ACTUAL VOL. EXPONENT 1.47588
AV. ACTUAL TEMP EXPONENT 1.47588

BLOCK: BLOWER MODEL: COMPR

INLET STREAM: FRESHAIR
OUTLET STREAM: AIR45
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 6687.97 6687.97 0.00000
(KG/HR) 187380. 187380. 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 187380. 187380. 0.00000
ENTHALPY(MMKCAL/H) -1.12665 0.235137 -1.20870

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

ISENTROPIC COMPRESSOR USING ASME METHOD
OUTLET PRESSURE BAR 1.37000
ISENTROPIC EFFICIENCY 0.88000
MECHANICAL EFFICIENCY 0.90000

*** RESULTS ***

INDICATED HORSEPOWER REQUIREMENT KW 1,583.76
BRAKE HORSEPOWER REQUIREMENT KW 1,759.74
NET WORK REQUIRED KW 1,759.74
POWER LOSSES KW 175.974
ISENTROPIC HORSEPOWER REQUIREMENT KW 1,393.71
CALCULATED OUTLET TEMP C 30.0536
ISENTROPIC TEMPERATURE C 26.5415
EFFICIENCY (POLYTR/ISENTR) USED 0.88000
OUTLET VAPOR FRACTION 1.00000
HEAD DEVELOPED, METER 2,730.43
MECHANICAL EFFICIENCY USED 0.90000
INLET HEAT CAPACITY RATIO 1.40025
INLET VOLUMETRIC FLOW RATE , CUM/HR 152,322.
OUTLET VOLUMETRIC FLOW RATE, CUM/HR 123,065.
INLET COMPRESSIBILITY FACTOR 1.00000
OUTLET COMPRESSIBILITY FACTOR 1.00000
AV. ISENT. VOL. EXPONENT 1.39960
AV. ISENT. TEMP EXPONENT 1.39960
AV. ACTUAL VOL. EXPONENT 1.47605
AV. ACTUAL TEMP EXPONENT 1.47605

BLOCK: CHR-COMB MODEL: RSTOIC

INLET STREAMS: OXYG CARBON CRGAS SPEN+COK
INLET HEAT STREAMS: QCHRDEC QDECO
OUTLET STREAM: COMBPRO
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT GENERATION RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 3554.59 3368.78 -185.801 0.00000
(KG/HR) 101359. 101359. -0.143569E-15
NONCONV COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 101359. 101359. -0.143569E-15
ENTHALPY(MMKCAL/H) -16.7108 -16.7109 0.172367E-05

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 7595.10 KG/HR
NET STREAMS CO2E PRODUCTION 7595.10 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR

TOTAL CO2E PRODUCTION 7595.10 KG/HR

*** INPUT DATA ***
STOICHIOMETRY MATRIX:

REACTION # 1:
SUBSTREAM MIXED :
O2 -1.00 CO2 1.00
SUBSTREAM CIPSD :
CARBON -1.00
SUBSTREAM NCPSD :
NO PARTICIPATING COMPONENTS

REACTION # 2:
SUBSTREAM MIXED :
O2 -0.500 CO 1.00
SUBSTREAM CIPSD :
CARBON -1.00
SUBSTREAM NCPSD :
NO PARTICIPATING COMPONENTS

REACTION # 3:
SUBSTREAM MIXED :
CO 2.00 CO2 -1.00
SUBSTREAM CIPSD :
CARBON -1.00
SUBSTREAM NCPSD :
NO PARTICIPATING COMPONENTS

REACTION # 4:
SUBSTREAM MIXED :
O2 -1.00 CO -2.00 CO2 2.00
SUBSTREAM CIPSD :
NO PARTICIPATING COMPONENTS
SUBSTREAM NCPSD :
NO PARTICIPATING COMPONENTS

REACTION # 5:
SUBSTREAM MIXED :
O2 -1.00 CO2 1.00
SUBSTREAM CIPSD :
COKE -1.00
SUBSTREAM NCPSD :
NO PARTICIPATING COMPONENTS

REACTION # 6:
SUBSTREAM MIXED :
O2 -0.500 CO 1.00
SUBSTREAM CIPSD :
COKE -1.00
SUBSTREAM NCPSD :
NO PARTICIPATING COMPONENTS

REACTION # 7:
SUBSTREAM MIXED :
CO 2.00 CO2 -1.00
SUBSTREAM CIPSD :
COKE -1.00
SUBSTREAM NCPSD :
NO PARTICIPATING COMPONENTS

REACTION # 8:
SUBSTREAM MIXED :
O2 -1.00 CO -2.00 CO2 2.00
SUBSTREAM CIPSD :
NO PARTICIPATING COMPONENTS
SUBSTREAM NCPSD :
NO PARTICIPATING COMPONENTS

REACTION # 9:
SUBSTREAM MIXED :
O2 -0.500 H2O 1.00 H2 -1.00
SUBSTREAM CIPSD :
NO PARTICIPATING COMPONENTS
SUBSTREAM NCPSD :
NO PARTICIPATING COMPONENTS

REACTION CONVERSION SPECS:
NUMBER= 9
REACTION # 1:
SUBSTREAM:CIPSD KEY COMP:CARBON CONV FRAC: 1.000
REACTION # 2:
SUBSTREAM:CIPSD KEY COMP:CARBON CONV FRAC: 1.000
REACTION # 3:
SUBSTREAM:CIPSD KEY COMP:CARBON CONV FRAC: 1.000
REACTION # 4:
SUBSTREAM:MIXED KEY COMP:CO CONV FRAC: 1.000
REACTION # 5:
SUBSTREAM:CIPSD KEY COMP:COKE CONV FRAC: 1.000
REACTION # 6:
SUBSTREAM:CIPSD KEY COMP:COKE CONV FRAC: 1.000
REACTION # 7:
SUBSTREAM:CIPSD KEY COMP:COKE CONV FRAC: 1.000
REACTION # 8:
SUBSTREAM:MIXED KEY COMP:CO CONV FRAC: 1.000
REACTION # 9:
SUBSTREAM:MIXED KEY COMP:H2 CONV FRAC: 1.000

TWO PHASE PQ FLASH
SPECIFIED PRESSURE BAR 1.10000
DUTY FROM INLET HEAT STREAM(S) MMKCAL/H -5.08902
MAXIMUM NO. ITERATIONS 30

CONVERGENCE TOLERANCE 0.000100000
SERIES REACTIONS
GENERATE COMBUSTION REACTIONS FOR FEED SPECIES NO

*** RESULTS ***
OUTLET TEMPERATURE C 699.63
OUTLET PRESSURE BAR 1.1000
VAPOR FRACTION 1.0000

REACTION EXTENTS:

REACTION NUMBER	REACTION EXTENT KMOL/HR
1	116.78
2	0.0000
3	0.0000
4	0.0000
5	55.797
6	0.0000
7	0.0000
8	0.0000
9	26.447

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
N2	0.78562	0.22226E-02	0.78562	4988.1
O2	0.15396	0.55067E-03	0.15396	5602.9
H2O		0.80295E-02	0.99476	0.80295E-02 2375.8
CO2		0.52395E-01	0.24658E-02	0.52395E-01 6911.0

BLOCK: CHRDECOM MODEL: RYIELD

INLET STREAM: CHAR
OUTLET STREAM: CHRPROD
OUTLET HEAT STREAM: QCHRDEC
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	GENERATION	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	0.00000	148.267	148.267	0.00000
(KG/HR)	0.00000	1617.22		-1.00000
NONCONV COMP(KG/HR)	1645.52	28.3030	0.982800	
TOTAL BALANCE				
MASS(KG/HR)	1645.52	1645.52	0.138177E-15	
ENTHALPY(MMKCAL/H)	0.321625	0.321625	0.00000	

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 500.000
SPECIFIED PRESSURE BAR 1.10000
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

MASS-YIELD
SUBSTREAM MIXED :
O2 0.980E-01 H2 0.324E-01
SUBSTREAM CISOLID :
CARBON 0.852
SUBSTREAM NC :
ASH 0.172E-01

*** RESULTS ***
OUTLET TEMPERATURE C 500.00
OUTLET PRESSURE BAR 1.1000
HEAT DUTY MMKCAL/HR -0.27774E-02
VAPOR FRACTION 1.0000

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
O2	0.16005	0.36059	0.16005	4431.1
H2	0.83995	0.63941	0.83995	13114.

BLOCK: COMBUSTI MODEL: RGIBBS

INLET STREAMS: COMP A1+REC PAIR2 COMPRGAS FGBOILER
INLET HEAT STREAM: QDECOM
OUTLET STREAM: COMBPROD
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	GENERATION	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	18348.8	17388.1	-960.718	-0.396536E-15
(KG/HR)	499538.	499538.		0.104871E-14
NONCONV COMP(KG/HR)	648.000	648.000	0.00000	
TOTAL BALANCE				
MASS(KG/HR)	500186.	500186.		0.104735E-14
ENTHALPY(MMKCAL/H)	-121.826	-121.826	-0.437455E-09	

*** CO2 EQUIVALENT SUMMARY ***

FEED STREAMS CO2E	29529.0	KG/HR
PRODUCT STREAMS CO2E	62302.3	KG/HR
NET STREAMS CO2E PRODUCTION	32773.3	KG/HR
UTILITIES CO2E PRODUCTION	0.00000	KG/HR
TOTAL CO2E PRODUCTION	32773.3	KG/HR

*** INPUT DATA ***

EQUILIBRIUM SPECIFICATIONS:
ONLY CHEMICAL EQUILIBRIUM IS CONSIDERED, THE FLUID PHASE IS VAPOR
CALCULATED TEMPERATURE C 831.37
TEMPERATURE FOR FREE ENERGY EVALUATION C 831.37
SYSTEM PRESSURE BAR 1.1000
DUTY FROM INLET HEAT STREAM(S) MMKCAL/HR -19.065

FLUID PHASE SPECIES IN PRODUCT LIST:
N2 O2 H2O CHLOR H2 CO2 NO2 SO2

SOLIDS IN PRODUCT LIST:
C

ATOM MATRIX:

ELEMENT	H	C	N	O	AL	SI	S	CL
N2	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
O2	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
H2O	2.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
CHLOR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
C	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
H2	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
CO	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
CO2	0.00	1.00	0.00	2.00	0.00	0.00	0.00	0.00
NO	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00
NO2	0.00	0.00	1.00	2.00	0.00	0.00	0.00	0.00
N2O	0.00	0.00	2.00	1.00	0.00	0.00	0.00	0.00
SO2	0.00	0.00	0.00	2.00	0.00	0.00	1.00	0.00
NH3	3.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CATA	0.00	0.00	0.00	3.00	2.00	0.00	0.00	0.00
SAND	0.00	0.00	0.00	2.00	0.00	1.00	0.00	0.00
CH4	4.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
C2H4	4.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
C2H6	6.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
C3H8	8.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00
C3H6	6.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00
C2H2	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
IC4H10	10.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00
1-C4H8	8.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00
CH3C2H	4.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00
NC6H14	14.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00
COKE	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
CARB-ACI	4.00	2.00	0.00	2.00	0.00	0.00	0.00	0.00
KETONES	6.00	3.00	0.00	2.00	0.00	0.00	0.00	0.00
FURANS	4.00	4.00	0.00	1.00	0.00	0.00	0.00	0.00
SUGARS	12.00	6.00	0.00	6.00	0.00	0.00	0.00	0.00
PHENOLS	6.00	6.00	0.00	1.00	0.00	0.00	0.00	0.00
CATECHOL	14.00	10.00	0.00	2.00	0.00	0.00	0.00	0.00
GUAIACOL	8.00	7.00	0.00	2.00	0.00	0.00	0.00	0.00
ALCOHOL	4.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
AROMATIC	6.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00
CARBON	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
AIR	0.00	0.00	1.53	0.47	0.00	0.00	0.00	0.00

*** RESULTS ***

TEMPERATURE	C	831.37

```
 PRESSURE          BAR                 1.1000
 VAPOR                                 FRACTION
1.0000
 NUMBER       OF       FLUID       PHASES
1

 FLUID PHASE MOLE FRACTIONS:

 PHASE           VAPOR
 OF TYPE         VAPOR
 PHASE FRACTION    1.000000
 PLACED IN STREAM   COMBPROD
  N2           0.7171134
  O2           0.1019964
  CHLOR        0.7617189E-05
  H2           0.4357477E-09
  CO2          0.8141475E-01
  NO2          0.1284618E-05
  SO2          0.1263253E-04
  H2O          0.9945395E-01

 KMOL/HR          17388.09

 NO SOLIDS PRESENT AT EQUILIBRIUM

 BLOCK:  COMPRES  MODEL: COMPR
 ------------------------------
 INLET STREAM:         GASES
 OUTLET STREAM:        COMPRGAS
 PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS

                ***       MASS       AND       ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
    CONV.  COMP.(KMOL/HR  )        77.3878
77.3878       0.00000
           (KG/HR    )     1941.88          1941.88
0.00000
    NONCONV.  COMP(KG/HR    )   0.00000
0.00000       0.00000
  TOTAL BALANCE
    MASS(KG/HR    )        1941.88          1941.88
0.00000
    ENTHALPY(MMKCAL/H)   -0.677477    -
0.562999      -0.168978

                ***          CO2          EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                  2620.19
KG/HR
  PRODUCT STREAMS CO2E               2620.19
KG/HR
  NET    STREAMS    CO2E    PRODUCTION
0.00000    KG/HR
  UTILITIES CO2E PRODUCTION     0.00000
KG/HR
  TOTAL CO2E PRODUCTION         0.00000
KG/HR


                        *** INPUT DATA ***

 ISENTROPIC                CENTRIFUGAL
COMPRESSOR
  OUTLET       PRESSURE              BAR
5.00000
  ISENTROPIC                 EFFICIENCY
0.72000
  MECHANICAL                 EFFICIENCY
1.00000

                        *** RESULTS ***

  INDICATED                 HORSEPOWER
REQUIREMENT  KW            133.138
  BRAKE    HORSEPOWER REQUIREMENT
KW            133.138
  NET WORK REQUIRED                  KW
133.138
  POWER LOSSES              KW          0.0
  ISENTROPIC                HORSEPOWER
REQUIREMENT  KW             95.8596
  CALCULATED    OUTLET    TEMP        C
181.557
  ISENTROPIC    TEMPERATURE           C
140.623
  EFFICIENCY    (POLYTR/ISENTR)   USED
0.72000
  OUTLET        VAPOR       FRACTION
1.00000
  HEAD   DEVELOPED,                 METER
18,121.6
  MECHANICAL    EFFICIENCY    USED
1.00000
  INLET    HEAT    CAPACITY    RATIO
1.30320
  INLET   VOLUMETRIC   FLOW   RATE   ,
CUM/HR          1,743.98
  OUTLET   VOLUMETRIC   FLOW   RATE,
CUM/HR          585.142
  INLET     COMPRESSIBILITY     FACTOR
1.00000
  OUTLET    COMPRESSIBILITY     FACTOR
1.00000
  AV.      ISENT.      VOL.      EXPONENT
1.27623
  AV.      ISENT.      TEMP      EXPONENT
1.27623
  AV.      ACTUAL      VOL.      EXPONENT
1.38647
  AV.      ACTUAL      TEMP      EXPONENT
1.38647

 BLOCK:  COND1   MODEL: HEATX
 ------------------------------
  HOT SIDE:
  ---------
  INLET STREAM:         EXHAUST
  OUTLET STREAM:        CONDENS1
```

PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS
COLD SIDE:

INLET STREAM: MIXRETUR
OUTLET STREAM: DHOUT1
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 54455.2 54455.2 0.00000
(KG/HR) 981026. 981026. 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 981026. 981026. 0.00000
ENTHALPY(MMKCAL/H) -3684.99 -3684.99 -0.382739E-07

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

FLASH SPECS FOR HOT SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLASH SPECS FOR COLD SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLOW DIRECTION AND SPECIFICATION:
COCURRENT HEAT EXCHANGER
SPECIFIED HOT VAPOR FRACTION
SPECIFIED VALUE 0.0000
LMTD CORRECTION FACTOR 1.00000

PRESSURE SPECIFICATION:
HOT SIDE PRESSURE DROP BAR 0.0000
COLD SIDE PRESSURE DROP BAR 0.0000

HEAT TRANSFER COEFFICIENT SPECIFICATION:
HOT LIQUID COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT LIQUID COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT LIQUID COLD VAPOR KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD VAPOR KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD VAPOR KCAL/HR-SQM-K 730.8684

*** OVERALL RESULTS ***

STREAMS:

```
                ---------------------------------------
                |                     |
EXHAUST -----> |        HOT          |---> CONDENS1
T= 9.5143D+01  |                     |     T= 9.5164D+01
P= 8.5000D-01  |                     |     P= 8.5000D-01
V= 9.9600D-01  |                     |     V= 0.0000D+00
                |                     |
MIXRETUR -----> |        COLD         |----> DHOUT1
T= 4.2434D+01  |                     |     T= 5.7062D+01
P= 3.0000D+00  |                     |     P= 3.0000D+00
V= 0.0000D+00  |                     |     V= 0.0000D+00
                ---------------------------------------
```

DUTY AND AREA:
CALCULATED HEAT DUTY MMKCAL/HR 13.4054
CALCULATED (REQUIRED) AREA SQM 407.4033
ACTUAL EXCHANGER AREA SQM 407.4033

```
   PER CENT OVER-DESIGN
0.0000

  HEAT TRANSFER COEFFICIENT:
   AVERAGE COEFFICIENT (DIRTY)
KCAL/HR-SQM-K        730.8684
   UA (DIRTY)                 CAL/SEC-K
82710.6208

  LOG-MEAN TEMPERATURE DIFFERENCE:
   LMTD CORRECTION FACTOR
1.0000
   LMTD (CORRECTED)                C
45.0210
   NUMBER OF SHELLS IN SERIES
1

  PRESSURE DROP:
   HOTSIDE, TOTAL                  BAR
0.0000
   COLDSIDE, TOTAL                 BAR
0.0000

                *** ZONE RESULTS ***

  TEMPERATURE LEAVING EACH ZONE:

                      HOT
      ------------------------------------------------------
------
      |                                  |
 HOT IN |              COND               |
HOT OUT
 ------> |                                  |------
>
  95.1 |                                  |  95.2
      |                                  |
 COLDIN |              LIQ                |
COLDOUT
 ------> |                                  |------
>
  42.4 |                                  |  57.1
      |                                  |
      ------------------------------------------------------
------
                      COLD

  ZONE HEAT TRANSFER AND AREA:

  ZONE    HEAT DUTY     AREA     LMTD
AVERAGE U      UA
         MMKCAL/HR          SQM          C
KCAL/HR-SQM-K   CAL/SEC-K
   1      13.405     407.4033     45.0210  730.8684
82710.6208

 BLOCK:  COND2    MODEL: HEATX
 ------------------------------
  HOT SIDE:
  ---------
  INLET STREAM:          MB
  OUTLET STREAM:         CONDENS2
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS
  COLD SIDE:
  ----------
  INLET STREAM:          DHOUT1
  OUTLET STREAM:         DHOUT2
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS

                *** MASS AND ENERGY
BALANCE ***
                          IN                   OUT
RELATIVE DIFF.
    CONV. COMP.(KMOL/HR )        54831.6
54831.6        0.00000
             (KG/HR    )     987807.          987807.
0.00000
    NONCONV. COMP(KG/HR    )  0.00000
0.00000        0.00000
  TOTAL BALANCE
    MASS(KG/HR    )          987807.          987807.
0.00000
    ENTHALPY(MMKCAL/H)      -3692.71      -
3692.71      -0.786703E-08

                *** CO2 EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                0.00000
KG/HR
  PRODUCT STREAMS CO2E             0.00000
KG/HR
  NET STREAMS CO2E PRODUCTION
0.00000     KG/HR
  UTILITIES CO2E PRODUCTION        0.00000
KG/HR
  TOTAL CO2E PRODUCTION            0.00000
KG/HR

                *** INPUT DATA ***

  FLASH SPECS FOR HOT SIDE:
  TWO PHASE FLASH
  MAXIMUM NO. ITERATIONS
30
  CONVERGENCE TOLERANCE
0.000100000

  FLASH SPECS FOR COLD SIDE:
  TWO PHASE FLASH
  MAXIMUM NO. ITERATIONS
30
  CONVERGENCE TOLERANCE
0.000100000

  FLOW DIRECTION AND SPECIFICATION:
   COUNTERCURRENT HEAT
EXCHANGER
   SPECIFIED HOT VAPOR FRACTION
```

SPECIFIED VALUE 0.0000
LMTD CORRECTION FACTOR 1.00000

PRESSURE SPECIFICATION:
HOT SIDE PRESSURE DROP BAR 0.0000
COLD SIDE PRESSURE DROP BAR 0.0000

HEAT TRANSFER COEFFICIENT SPECIFICATION:
HOT LIQUID COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT LIQUID COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT LIQUID COLD VAPOR KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD VAPOR KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD VAPOR KCAL/HR-SQM-K 730.8684

*** OVERALL RESULTS ***

STREAMS:

```
          ---------------------------------------
          |                     |
 MB    ----->|        HOT        |-----> CONDENS2
  T= 1.1441D+02 |                     |    T= 1.1059D+02
  P= 1.4600D+00 |                     |    P= 1.4600D+00
  V= 1.0000D+00 |                     |    V= 0.0000D+00
          |                     |
 DHOUT2 <-----|        COLD       |<---- DHOUT1
  T= 7.4963D+01 |                     |    T= 5.7062D+01
  P= 3.0000D+00 |                     |    P= 3.0000D+00
  V= 0.0000D+00 |                     |    V= 0.0000D+00
          ---------------------------------------
```

DUTY AND AREA:
CALCULATED HEAT DUTY MMKCAL/HR 16.9673
CALCULATED (REQUIRED) AREA SQM 527.8094
ACTUAL EXCHANGER AREA SQM 527.8094
PER CENT OVER-DESIGN 0.0000

HEAT TRANSFER COEFFICIENT:
AVERAGE COEFFICIENT (DIRTY) KCAL/HR-SQM-K 730.8684
UA (DIRTY) CAL/SEC-K 107155.3414

LOG-MEAN TEMPERATURE DIFFERENCE:
LMTD CORRECTION FACTOR 1.0000
LMTD (CORRECTED) C 43.9841
NUMBER OF SHELLS IN SERIES 1

PRESSURE DROP:
HOTSIDE, TOTAL BAR 0.0000
COLDSIDE, TOTAL BAR 0.0000

*** ZONE RESULTS ***

TEMPERATURE LEAVING EACH ZONE:

```
                    HOT
      ---------------------------------------------------
      |                |                |
 HOT IN |       VAP      |       COND     | HOT OUT
 ------> |                |                |------>
  114.4 |             110.6|                |  110.6
      |                |                |
 COLDOUT |       LIQ      |       LIQ      | COLDIN
 <------ |                |                |<------
  75.0 |             74.9|                |  57.1
      |                |                |
      ---------------------------------------------------
                    COLD
```

ZONE HEAT TRANSFER AND AREA:

ZONE	HEAT DUTY MMKCAL/HR	AREA SQM	LMTD C	AVERAGE U KCAL/HR-SQM-K	UA CAL/SEC-K
1	0.055	1.9904	37.5345	730.8684	404.0947

2 16.913 525.8190 44.0085 730.8684 106751.2467

BLOCK: CONMIX1 MODEL: MIXER

INLET STREAMS: CONDENS1 CONDENS2
OUTLET STREAM: COND1+2
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 3137.11 3137.11 0.00000
(KG/HR) 56515.9 56515.9 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 56515.9 56515.9 0.00000
ENTHALPY(MMKCAL/H) -209.634 -209.634 -0.406733E-15

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000
OUTLET PRESSURE: MINIMUM OF INLET STREAM PRESSURES

BLOCK: COOL80 MODEL: HEATER

INLET STREAMS: PYROVAP RECOIL
OUTLET STREAM: HOTVAP
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 946.362 946.362 0.00000
(KG/HR) 20429.3 20429.3 0.356153E-15
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 20429.3 20429.3 0.356153E-15
ENTHALPY(MMKCAL/H) -49.2668 -55.9556 0.119538

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 2620.19 KG/HR
PRODUCT STREAMS CO2E 2620.19 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 80.0000
SPECIFIED PRESSURE BAR 1.10000
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***
OUTLET TEMPERATURE C 80.000
OUTLET PRESSURE BAR 1.1000
HEAT DUTY MMKCAL/HR -6.6888
OUTLET VAPOR FRACTION 0.15296

V-L PHASE EQUILIBRIUM :

COMP F(I) X(I) Y(I) K(I)
H2O 0.86689 0.94959 0.40891 0.43062
H2 0.78434E-02 0.39086E-05 0.51257E-01 13114.
CO 0.33077E-01 0.17192E-03 0.21530 1252.3

CO2	0.11226E-02	0.41575E-04	0.71092E-02	171.00
CH4	0.67801E-02	0.74010E-04	0.43917E-01	593.39
C2H4	0.30869E-01	0.12465E-02	0.19491	156.36
C2H6	0.57664E-03	0.35173E-04	0.35751E-02	101.64
C3H8	0.17792E-03	0.34233E-04	0.97362E-03	28.441
C3H6	0.11741E-02	0.27058E-03	0.61775E-02	22.830
C2H2	0.62294E-05	0.29936E-06	0.39069E-04	130.51
IC4H10	0.55812E-05	0.20563E-05	0.25102E-04	12.207
1-C4H8	0.28331E-04	0.11139E-04	0.12354E-03	11.091
CH3C2H	0.21335E-04	0.53718E-05	0.10974E-03	20.429
NC6H14	0.92227E-04	0.88291E-04	0.11402E-03	1.2914
CARB-ACI	0.22225E-02	0.25111E-02	0.62418E-03	0.24857
KETONES	0.30026E-02	0.34917E-02	0.29390E-03	0.84170E-01
FURANS	0.16337E-01	0.11068E-01	0.45517E-01	4.1124
SUGARS	0.12346E-03	0.14576E-03	0.14947E-12	0.10254E-08
PHENOLS	0.70921E-02	0.83447E-02	0.15521E-03	0.18599E-01
CATECHOL	0.13382E-03	0.15798E-03	0.16593E-07	0.10503E-03
GUAIACOL	0.39416E-03	0.46468E-03	0.36244E-05	0.77997E-02
ALCOHOL	0.69418E-03	0.63207E-03	0.10381E-02	1.6424
AROMATIC	0.21339E-01	0.21612E-01	0.19829E-01	0.91749

BLOCK: CYSLD MODEL: SSPLIT

INLET STREAM: PYROPROD

OUTLET STREAMS: SOL PYROVAP

PROPERTY OPTION SET: NRTL-2 RENON (NRTL) / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONVENTIONAL COMPONENTS (KMOL/HR)			
N2	0.00000	0.00000	0.00000
O2	0.00000	0.00000	0.00000
H2O	492.233	492.233	0.00000
CHLOR	0.00000	0.00000	0.00000
C	0.00000	0.00000	0.00000
H2	7.42267	7.42267	0.00000
S	0.00000	0.00000	0.00000
CO	31.3025	31.3025	0.00000
CO2	1.06240	1.06240	0.00000
NO	0.00000	0.00000	0.00000
NO2	0.00000	0.00000	0.00000
N2O	0.00000	0.00000	0.00000
SO2	0.00000	0.00000	0.00000
NH3	0.00000	0.00000	0.00000
CATA	1.54612	1.54612	0.00000
SAND	73.4568	73.4568	0.00000
CH4	6.41644	6.41644	0.00000
C2H4	29.2131	29.2131	0.00000
C2H6	0.545706	0.545706	0.00000
C3H8	0.168376	0.168376	0.00000
C3H6	1.11111	1.11111	0.00000
C2H2	0.589527E-02	0.589527E-02	0.00000
IC4H10	0.528188E-02	0.528188E-02	0.00000
1-C4H8	0.268111E-01	0.268111E-01	0.00000
CH3C2H	0.201910E-01	0.201910E-01	0.00000
NC6H14	0.872797E-01	0.872797E-01	0.00000
COKE	55.7974	55.7974	0.00000
CARB-ACI	1.26195	1.26195	0.00000
KETONES	1.70493	1.70493	0.00000
FURANS	9.27652	9.27652	0.00000
SUGARS	0.701053E-01	0.701053E-01	0.00000
PHENOLS	4.02699	4.02699	0.00000
CATECHOL	0.759837E-01	0.759837E-01	0.00000

GUAIACOL 0.223810 0.223810 0.00000
ALCOHOL 0.394169 0.394169 0.00000
AROMATIC 12.1167 12.1167 0.00000
CARBON 0.00000 0.00000 0.00000
AIR 0.00000 0.00000 0.00000
SUBTOTAL(KMOL/HR) 729.572 729.572 0.00000
(KG/HR) 18275.8 18275.8 0.00000
NON-CONVENTIONAL COMPONENTS (KG/HR)
CHPFUEL 0.00000 0.00000 0.00000
ASH 0.00000 0.00000 0.00000
PYRFUEL 0.00000 0.00000 0.00000
CHAR 1645.52 1645.52 0.00000
SUBTOTAL(KG/HR) 1645.52 1645.52 0.00000
TOTAL BALANCE
MASS(KG/HR) 19921.3 19921.3 0.00000
ENTHALPY(MMKCAL/H) -42.1776 -42.1776 0.00000

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 2620.19 KG/HR
PRODUCT STREAMS CO2E 2620.19 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

FRACTION OF FLOW
SUBSTRM= STRM= FRAC=
MIXED PYROVAP 1.00000
CIPSD PYROVAP 0.0
NCPSD PYROVAP 0.0

*** RESULTS ***

STRM= SOL SUBSTRM= MIXED SPLIT FRACT= 0.0
CIPSD 1.00000
NCPSD 1.00000
STRM= PYROVAP SUBSTRM= MIXED SPLIT FRACT= 1.00000
CIPSD 0.0
NCPSD 0.0

BLOCK: DECO MODEL: RYIELD

INLET STREAMS: STOUT LES1,4MM CAT+SAND
OUTLET STREAM: PYROPROD
OUTLET HEAT STREAM: QDECO
PROPERTY OPTION SET: NRTL-2 RENON (NRTL) / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT GENERATION RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 369.953 729.572 359.620 0.155827E-15
(KG/HR) 9884.84 18275.8 -0.459128
NONCONV COMP(KG/HR) 10036.4 1645.52 0.836045
TOTAL BALANCE
MASS(KG/HR) 19921.3 19921.3 0.182618E-15
ENTHALPY(MMKCAL/H) -47.2694 -47.2694 0.126063E-09

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 2620.19 KG/HR
NET STREAMS CO2E PRODUCTION 2620.19 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 2620.19 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 500.000
SPECIFIED PRESSURE BAR 1.10000
MAXIMUM NO. ITERATIONS 50
CONVERGENCE TOLERANCE 0.000100000

MASS-YIELD
SUBSTREAM MIXED :
H2O 0.578 H2 0.975E-03 CO 0.571E-01
CO2 0.305E-02 CH4 0.671E-02 C2H4 0.534E-01

C2H6 0.107E-02 C3H8 0.484E-03 C3H6 0.305E-02
C2H2 0.100E-04 IC4H10 0.200E-04 1-C4H8 0.980E-04
CH3C2H 0.527E-04 NC6H14 0.490E-03 CARB-ACI 0.494E-02
KETONES 0.823E-02 FURANS 0.411E-01 SUGARS 0.823E-03
PHENOLS 0.247E-01 CATECHOL 0.823E-03 GUAIACOL 0.181E-02
ALCOHOL 0.823E-03 AROMATIC 0.617E-01
SUBSTREAM CISOLID :
COKE 0.437E-01
SUBSTREAM NC :
CHAR 0.107

INERTS: SAND CATA

*** RESULTS ***
OUTLET TEMPERATURE C 500.00
OUTLET PRESSURE BAR 1.1000
HEAT DUTY MMKCAL/HR 5.0918
VAPOR FRACTION 1.0000

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
H2O	0.82207	0.82207	0.82207	MISSING
H2	0.12396E-01	0.12396E-01	0.12396E-01	MISSING
CO	0.52278E-01	0.52278E-01	0.52278E-01	MISSING
CO2	0.17743E-02	0.17743E-02	0.17743E-02	MISSING
CH4	0.10716E-01	0.10716E-01	0.10716E-01	MISSING
C2H4	0.48788E-01	0.48788E-01	0.48788E-01	MISSING
C2H6	0.91138E-03	0.91138E-03	0.91138E-03	MISSING
C3H8	0.28120E-03	0.28120E-03	0.28120E-03	MISSING
C3H6	0.18556E-02	0.18556E-02	0.18556E-02	MISSING
C2H2	0.98456E-05	0.98456E-05	0.98456E-05	MISSING
IC4H10	0.88212E-05	0.88212E-05	0.88212E-05	MISSING
1-C4H8	0.44777E-04	0.44777E-04	0.44777E-04	MISSING
CH3C2H	0.33721E-04	0.33721E-04	0.33721E-04	MISSING
NC6H14	0.14576E-03	0.14576E-03	0.14576E-03	MISSING
CARB-ACI	0.21076E-02	0.21076E-02	0.21076E-02	MISSING
KETONES	0.28474E-02	0.28474E-02	0.28474E-02	MISSING
FURANS	0.15493E-01	0.15493E-01	0.15493E-01	MISSING
SUGARS	0.11708E-03	0.11708E-03	0.11708E-03	MISSING
PHENOLS	0.67254E-02	0.67254E-02	0.67254E-02	MISSING
CATECHOL	0.12690E-03	0.12690E-03	0.12690E-03	MISSING
GUAIACOL	0.37378E-03	0.37378E-03	0.37378E-03	MISSING
ALCOHOL	0.65829E-03	0.65829E-03	0.65829E-03	MISSING
AROMATIC	0.20236E-01	0.20236E-01	0.20236E-01	MISSING

BLOCK: DECOMP MODEL: RYIELD

INLET STREAM: FUEL-CHP
OUTLET STREAM: COMP
OUTLET HEAT STREAM: QDECOM
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	GENERATION	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	0.00000	1975.65	1975.65	0.00000
(KG/HR)	0.00000	26352.0	-1.00000	
NONCONV COMP(KG/HR)	27000.0	648.000	0.976000	
TOTAL BALANCE				
MASS(KG/HR)	27000.0	27000.0	-0.134740E-15	
ENTHALPY(MMKCAL/H)	-59.8750	-59.8750	0.00000	

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C
25.0000
SPECIFIED PRESSURE BAR
1.10000
MAXIMUM NO. ITERATIONS
30
CONVERGENCE TOLERANCE
0.000100000

MASS-YIELD
SUBSTREAM MIXED :
N2 0.300E-02 O2 0.225 H2O
0.400
CHLOR 0.240E-03 C 0.312 H2
0.360E-01
S 0.180E-03
SUBSTREAM NC :
ASH 0.240E-01

*** RESULTS ***
OUTLET TEMPERATURE C
25.000
OUTLET PRESSURE BAR
1.1000
HEAT DUTY MMKCAL/HR
19.065
VAPOR FRACTION
0.54492

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
N2	0.22691E-02	0.46377E-05	0.41602E-02	897.04
O2	0.14871	0.38030E-03	0.27258	716.75
H2O	0.47045	0.99928	0.28801E-01	0.28822E-01
CHLOR	0.71718E-04	0.16594E-04	0.11775E-03	7.0960
H2	0.37838	0.52947E-04	0.69434	13114.
S	0.11894E-03	0.26136E-03	0.30823E-10	0.11793E-06

BLOCK: DEJONPH MODEL: HEATER

INLET STREAM: DEJON1
OUTLET STREAM: DEJON2
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	1993.51	1993.51	0.00000
(KG/HR)	35913.6	35913.6	0.00000
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	35913.6	35913.6	0.00000
ENTHALPY(MMKCAL/H)	-134.954	-134.225	-0.540518E-02

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000
KG/HR
PRODUCT STREAMS CO2E 0.00000
KG/HR
NET STREAMS CO2E PRODUCTION
0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000
KG/HR
TOTAL CO2E PRODUCTION 0.00000
KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C
77.0000
SPECIFIED PRESSURE BAR
11.5000
MAXIMUM NO. ITERATIONS
30
CONVERGENCE TOLERANCE
0.000100000

*** RESULTS ***
OUTLET TEMPERATURE C
77.000
OUTLET PRESSURE BAR
11.500
HEAT DUTY MMKCAL/HR
0.72945
OUTLET VAPOR FRACTION
0.0000

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
H2O	1.0000	1.0000	1.0000	0.36438E-01

BLOCK: DHMIX MODEL: MIXER

```
 ------------------------------
  INLET STREAMS:         DHIN      DH45
  OUTLET STREAM:         MIXRETUR
  PROPERTY OPTION SET:   IDEAL     IDEAL
LIQUID / IDEAL GAS

                 ***  MASS  AND  ENERGY
BALANCE  ***
                        IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )        53074.9
53074.9        0.00000
               (KG/HR    )     956159.
956159.        0.00000
     NONCONV. COMP(KG/HR    )   0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )           956159.
956159.        0.00000
     ENTHALPY(MMKCAL/H)        -3605.92   -
3605.92       -0.186192E-07

                 ***  CO2  EQUIVALENT
SUMMARY ***
   FEED STREAMS CO2E                0.00000
KG/HR
   PRODUCT STREAMS CO2E             0.00000
KG/HR
   NET  STREAMS  CO2E  PRODUCTION
0.00000     KG/HR
   UTILITIES CO2E PRODUCTION        0.00000
KG/HR
   TOTAL CO2E PRODUCTION            0.00000
KG/HR

                  ***  INPUT DATA  ***
  TWO  PHASE  FLASH
  MAXIMUM        NO.        ITERATIONS
30
  CONVERGENCE              TOLERANCE
0.000100000
  OUTLET PRESSURE:  MINIMUM OF INLET
STREAM PRESSURES

 BLOCK:  DHSPL    MODEL: FSPLIT
 ------------------------------
  INLET STREAM:          DHOUT
  OUTLET  STREAMS:                 DHNET
PYDHW85
  PROPERTY OPTION SET:   IDEAL     IDEAL
LIQUID / IDEAL GAS

                 ***  MASS  AND  ENERGY
BALANCE  ***
                        IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )        53074.9
53074.9        0.00000
               (KG/HR    )     956159.
956159.        0.00000
     NONCONV. COMP(KG/HR    )   0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )           956159.
956159.        0.00000
     ENTHALPY(MMKCAL/H)        -3571.04   -
3571.04       -0.127343E-15

                 ***  CO2  EQUIVALENT
SUMMARY ***
   FEED STREAMS CO2E                0.00000
KG/HR
   PRODUCT STREAMS CO2E             0.00000
KG/HR
   NET  STREAMS  CO2E  PRODUCTION
0.00000     KG/HR
   UTILITIES CO2E PRODUCTION        0.00000
KG/HR
   TOTAL CO2E PRODUCTION            0.00000
KG/HR

                  ***  INPUT DATA  ***

 MASS-FLOW          (KG/HR          )
STRM=PYDHW85 FLOW=  48,924.0     KEY=
0

                  ***  RESULTS  ***

 STREAM= DHNET      SPLIT=       0.94883
KEY= 0   STREAM-ORDER=  2
       PYDHW85                 0.051167      0
1

 BLOCK:  DRY-FLSH MODEL: FLASH2
 ------------------------------
  INLET STREAM:          IN-DRIER
  OUTLET VAPOR STREAM:   MOISTAIR
  OUTLET LIQUID STREAM:  DRY-BIOM
  PROPERTY OPTION SET:   IDEAL     IDEAL
LIQUID / IDEAL GAS

                 ***  MASS  AND  ENERGY
BALANCE  ***
                        IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )        6875.03
6875.03        0.00000
               (KG/HR    )     190750.
190750.       0.305152E-15
     NONCONV. COMP(KG/HR    )   10036.4
10036.4        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )           200786.
200786.       0.289898E-15
     ENTHALPY(MMKCAL/H)        -26.4076   -
26.4076       0.586496E-10

                 ***  CO2  EQUIVALENT
SUMMARY ***
```

FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE PQ FLASH
SPECIFIED PRESSURE BAR 1.01353
SPECIFIED HEAT DUTY MMKCAL/H 0.0
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***
OUTLET TEMPERATURE C 25.669
OUTLET PRESSURE BAR 1.0135
VAPOR FRACTION 1.0000

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
N2	0.97182	0.10176E-02	0.97182	978.98
O2	0.97279E-03	0.12798E-05	0.97279E-03	783.09
H2O	0.27209E-01	0.99898	0.27209E-01	0.32551E-01

BLOCK: DRY-REAC MODEL: RSTOIC

INLET STREAMS: WET-BIOM AIR80
OUTLET STREAM: IN-DRIER
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	GENERATION	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	6687.97	6875.03	187.061	0.132290E-15
(KG/HR)	187380.	190750.		-0.176669E-01
NONCONV COMP(KG/HR)	13406.4	10036.4		0.251370
TOTAL BALANCE				
MASS(KG/HR)	200786.	200786.		0.106015E-07
ENTHALPY(MMKCAL/H)	-26.4076	-26.4076		-0.105822E-07

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
STOICHIOMETRY MATRIX:

REACTION # 1:
SUBSTREAM MIXED :
H2O 0.555E-01
SUBSTREAM CIPSD :
NO PARTICIPATING COMPONENTS
SUBSTREAM NCPSD :
PYRFUEL -1.00

REACTION CONVERSION SPECS: NUMBER= 1
REACTION # 1:
SUBSTREAM:NCPSD KEY COMP:PYRFUEL CONV FRAC: 0.2514

TWO PHASE PQ FLASH
SPECIFIED PRESSURE BAR 1.10000
SPECIFIED HEAT DUTY MMKCAL/H 0.0
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000
SIMULTANEOUS REACTIONS
GENERATE COMBUSTION REACTIONS FOR FEED SPECIES NO

*** RESULTS ***
OUTLET TEMPERATURE C 25.669
OUTLET PRESSURE BAR 1.1000
VAPOR FRACTION 1.0000

REACTION EXTENTS:

REACTION NUMBER	REACTION EXTENT KMOL/HR
1	3370.0

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
N2	0.97182	0.10919E-02	0.97182	902.02
O2	0.97279E-03	0.13701E-05	0.97279E-03	721.53
H2O	0.27209E-01	0.99891	0.27209E-01	0.29992E-01

BLOCK: DUMPCOND MODEL: HEATX

HOT SIDE:

INLET STREAM: DKONIN
OUTLET STREAM: DCONDOUT
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

COLD SIDE:

INLET STREAM: DHOUT2
OUTLET STREAM: DHOUT
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	53527.8	53527.8	0.00000
(KG/HR)	964318.	964318.	0.00000
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	964318.	964318.	0.00000
ENTHALPY(MMKCAL/H)	-3601.02	-3601.02	-0.691278E-09

*** CO2 EQUIVALENT SUMMARY ***

FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

FLASH SPECS FOR HOT SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLASH SPECS FOR COLD SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLOW DIRECTION AND SPECIFICATION:
COUNTERCURRENT HEAT EXCHANGER
SPECIFIED HOT VAPOR FRACTION
SPECIFIED VALUE 0.0000
LMTD CORRECTION FACTOR 1.00000

PRESSURE SPECIFICATION:
HOT SIDE PRESSURE DROP BAR 0.0000
COLD SIDE PRESSURE DROP BAR 0.0000

HEAT TRANSFER COEFFICIENT SPECIFICATION:

HOT LIQUID	COLD LIQUID	KCAL/HR-SQM-K	730.8684
HOT 2-PHASE	COLD LIQUID	KCAL/HR-SQM-K	730.8684
HOT VAPOR	COLD LIQUID	KCAL/HR-SQM-K	730.8684
HOT LIQUID	COLD 2-PHASE	KCAL/HR-SQM-K	730.8684
HOT 2-PHASE	COLD 2-PHASE	KCAL/HR-SQM-K	730.8684
HOT VAPOR	COLD 2-PHASE	KCAL/HR-SQM-K	730.8684
HOT LIQUID	COLD VAPOR	KCAL/HR-SQM-K	730.8684
HOT 2-PHASE	COLD VAPOR	KCAL/HR-SQM-K	730.8684
HOT VAPOR	COLD VAPOR	KCAL/HR-SQM-K	730.8684

*** OVERALL RESULTS ***

STREAMS:

```
                |                    |
  DKONIN  ----->|        HOT         |---
--> DCONDOUT
  T= 2.1176D+02 |                    |    T=
1.3549D+02
  P= 3.1700D+00 |                    |    P=
3.1700D+00
  V= 1.0000D+00 |                    |    V=
0.0000D+00
                |                    |
  DHOUT   <-----|        COLD        |<-
---- DHOUT2
  T= 7.9605D+01 |                    |    T=
7.4963D+01
  P= 3.0000D+00 |                    |    P=
3.0000D+00
  V= 0.0000D+00 |                    |    V=
0.0000D+00
          ----------------------------------------

  DUTY AND AREA:
    CALCULATED HEAT DUTY
MMKCAL/HR          4.5083
    CALCULATED (REQUIRED) AREA  SQM
103.4594
    ACTUAL EXCHANGER AREA       SQM
103.4594
    PER CENT OVER-DESIGN
0.0000

  HEAT TRANSFER COEFFICIENT:
    AVERAGE COEFFICIENT (DIRTY)
KCAL/HR-SQM-K      730.8684
    UA (DIRTY)                  CAL/SEC-K
21004.2319

  LOG-MEAN TEMPERATURE DIFFERENCE:
    LMTD CORRECTION FACTOR
1.0000
    LMTD (CORRECTED)            C
59.6217
    NUMBER OF SHELLS IN SERIES
1

  PRESSURE DROP:
    HOTSIDE, TOTAL              BAR
0.0000
    COLDSIDE, TOTAL             BAR
0.0000

          *** ZONE RESULTS ***

  TEMPERATURE LEAVING EACH ZONE:

                HOT
      ------------------------------------------------
------
      |                |                |
 HOT IN |      VAP      |      COND
| HOT OUT
 ------> |                |                |-----
->
 211.8  |          135.5|                |
135.5
      |                |                |
 COLDOUT |      LIQ      |      LIQ
| COLDIN
 <------ |                |                |<----
--
  79.6  |          79.3|                |
75.0
      |                |                |
      ------------------------------------------------
------
                COLD

  ZONE HEAT TRANSFER AND AREA:

  ZONE  HEAT DUTY  AREA  LMTD
AVERAGE U  UA
        MMKCAL/HR  SQM  C
KCAL/HR-SQM-K  CAL/SEC-K
   1  0.286  4.4091  88.8128  730.8684
895.1411
   2  4.222  99.0503  58.3223  730.8684
20109.0908

 BLOCK:  FG-AIR  MODEL: HEATX
 ------------------------------
  HOT SIDE:
  ---------
  INLET STREAM:       FGTOAIR
  OUTLET STREAM:      FGBOILER
  PROPERTY OPTION SET:  IDEAL  IDEAL
LIQUID / IDEAL GAS
  COLD SIDE:
  ----------
  INLET STREAM:       AIR25
  OUTLET STREAM:      OXYG
  PROPERTY OPTION SET:  IDEAL  IDEAL
LIQUID / IDEAL GAS

          ***  MASS  AND  ENERGY
BALANCE  ***
                IN              OUT
RELATIVE DIFF.
    CONV.  COMP.(KMOL/HR )    6569.30
6569.30     0.00000
          (KG/HR  )    191287.
191287.
0.00000
    NONCONV.  COMP(KG/HR  )   0.00000
0.00000     0.00000
  TOTAL BALANCE
    MASS(KG/HR  )     191287.
191287.
0.00000
    ENTHALPY(MMKCAL/H)  -4.73211  -
4.73211     -0.169191E-06

          ***  CO2  EQUIVALENT
SUMMARY ***
```

FEED STREAMS CO2E 7595.10 KG/HR
PRODUCT STREAMS CO2E 7595.10 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

FLASH SPECS FOR HOT SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLASH SPECS FOR COLD SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLOW DIRECTION AND SPECIFICATION:
COUNTERCURRENT HEAT EXCHANGER
SPECIFIED COLD OUTLET TEMP
SPECIFIED VALUE C 200.0000
LMTD CORRECTION FACTOR 1.00000

PRESSURE SPECIFICATION:
HOT SIDE PRESSURE DROP BAR 0.0000
COLD SIDE PRESSURE DROP BAR 0.0000

HEAT TRANSFER COEFFICIENT SPECIFICATION:
HOT LIQUID COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT LIQUID COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT LIQUID COLD VAPOR KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD VAPOR KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD VAPOR KCAL/HR-SQM-K 730.8684

*** OVERALL RESULTS ***

STREAMS:

```
          ---------------------------------------
          |                     |
FGTOAIR -----> |        HOT          |---
--> FGBOILER
T= 5.6927D+02 |                     |    T=
3.9813D+02
P= 1.1000D+00 |                     |    P=
1.1000D+00
V= 1.0000D+00 |                     |    V=
1.0000D+00
          |                     |
OXYG <----- |        COLD         |<---
-- AIR25
T= 2.0000D+02 |                     |    T=
9.3588D+00
P= 1.1000D+00 |                     |    P=
1.1000D+00
V= 1.0000D+00 |                     |    V=
1.0000D+00
          ---------------------------------------
```

DUTY AND AREA:
CALCULATED HEAT DUTY MMKCAL/HR 4.3827
CALCULATED (REQUIRED) AREA SQM 15.8245
ACTUAL EXCHANGER AREA SQM 15.8245
PER CENT OVER-DESIGN 0.0000

HEAT TRANSFER COEFFICIENT:
AVERAGE COEFFICIENT (DIRTY) KCAL/HR-SQM-K 730.8685
UA (DIRTY) CAL/SEC-K 3212.6787

LOG-MEAN TEMPERATURE DIFFERENCE:
LMTD CORRECTION FACTOR 1.0000
LMTD (CORRECTED) C 378.9371
NUMBER OF SHELLS IN SERIES 1

PRESSURE DROP:
HOTSIDE, TOTAL BAR 0.0000
COLDSIDE, TOTAL BAR 0.0000

*** ZONE RESULTS ***

TEMPERATURE LEAVING EACH ZONE:

```
                              HOT
        ------------------------------------------------------
------
        |                                    |
 HOT IN  |                VAP                 |
HOT OUT
 ------> |                                    |------
>
  569.3  |                                    |  398.1
        |                                    |
 COLDOUT |                VAP                 |
COLDIN
 <------ |                                    |<-----
-
  200.0  |                                    |   9.4
        |                                    |
        ------------------------------------------------------
------
                              COLD

  ZONE HEAT TRANSFER AND AREA:

  ZONE     HEAT DUTY      AREA      LMTD
AVERAGE U      UA
           MMKCAL/HR          SQM             C
KCAL/HR-SQM-K   CAL/SEC-K
    1       4.383       15.8245     378.9371   730.8684
3212.6784

 BLOCK:  FG-AIR1  MODEL: HEATX
 ------------------------------
  HOT SIDE:
  ---------
  INLET STREAM:          FG-SP1
  OUTLET STREAM:         FG1
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS
  COLD SIDE:
  ----------
  INLET STREAM:          A1
  OUTLET STREAM:         PAIR1
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS

              ***      MASS     AND     ENERGY
BALANCE  ***
                          IN                  OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )        7243.90
7243.90        0.00000
              (KG/HR  )    208478.      208478.      -
0.279202E-15
     NONCONV.  COMP(KG/HR  )    0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR  )        208478.      208478.
-0.279202E-15
     ENTHALPY(MMKCAL/H)    -47.0972     -
47.0972        0.183704E-08

              ***          CO2          EQUIVALENT
SUMMARY ***
   FEED  STREAMS  CO2E                  15046.0
KG/HR
   PRODUCT  STREAMS  CO2E               15046.0
KG/HR
   NET   STREAMS   CO2E   PRODUCTION
0.00000     KG/HR
   UTILITIES  CO2E  PRODUCTION      0.00000
KG/HR
   TOTAL  CO2E  PRODUCTION           0.00000
KG/HR

                        ***  INPUT DATA  ***

  FLASH SPECS FOR HOT SIDE:
  TWO     PHASE     FLASH
  MAXIMUM          NO.          ITERATIONS
30
  CONVERGENCE                   TOLERANCE
0.000100000

  FLASH SPECS FOR COLD SIDE:
  TWO     PHASE     FLASH
  MAXIMUM          NO.          ITERATIONS
30
  CONVERGENCE                   TOLERANCE
0.000100000

  FLOW DIRECTION AND SPECIFICATION:
    COUNTERCURRENT                    HEAT
EXCHANGER
    SPECIFIED HOT OUTLET TEMP
    SPECIFIED  VALUE                        C
166.0000
    LMTD        CORRECTION        FACTOR
1.00000

  PRESSURE SPECIFICATION:
    HOT   SIDE OUTLET PRESSURE        BAR
1.0000
    COLD SIDE OUTLET PRESSURE         BAR
1.0000

  HEAT        TRANSFER        COEFFICIENT
SPECIFICATION:
    HOT   LIQUID          COLD   LIQUID
KCAL/HR-SQM-K       730.8684
    HOT   2-PHASE         COLD   LIQUID
KCAL/HR-SQM-K       730.8684
    HOT   VAPOR           COLD   LIQUID
KCAL/HR-SQM-K       730.8684
    HOT   LIQUID          COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
    HOT   2-PHASE         COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
    HOT   VAPOR           COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
```

```
   HOT    LIQUID              COLD    VAPOR
KCAL/HR-SQM-K        730.8684
   HOT    2-PHASE             COLD    VAPOR
KCAL/HR-SQM-K        730.8684
   HOT    VAPOR               COLD    VAPOR
KCAL/HR-SQM-K        730.8684

                *** OVERALL RESULTS ***

  STREAMS:
                ---------------------------------------
                |                     |
  FG-SP1   ----->|          HOT        |-----> FG1
  T= 2.7500D+02  |                     |    T= 1.6600D+02
  P= 1.1000D+00  |                     |    P= 1.0000D+00
  V= 1.0000D+00  |                     |    V= 1.0000D+00
                |                     |
  PAIR1    <-----|          COLD       |<----- A1
  T= 2.4978D+02  |                     |    T= 9.0000D+01
  P= 1.0000D+00  |                     |    P= 1.0000D+00
  V= 1.0000D+00  |                     |    V= 1.0000D+00
                ---------------------------------------

  DUTY AND AREA:
   CALCULATED HEAT DUTY MMKCAL/HR          3.4422
   CALCULATED (REQUIRED) AREA SQM          102.3072
   ACTUAL EXCHANGER AREA SQM               102.3072
   PER CENT OVER-DESIGN                    0.0000

  HEAT TRANSFER COEFFICIENT:
   AVERAGE COEFFICIENT (DIRTY) KCAL/HR-SQM-K  730.8685
   UA (DIRTY)                  CAL/SEC-K      20770.3007

  LOG-MEAN TEMPERATURE DIFFERENCE:
   LMTD CORRECTION FACTOR                  1.0000
   LMTD (CORRECTED)                    C   46.0354
   NUMBER OF SHELLS IN SERIES              1

  PRESSURE DROP:
   HOTSIDE, TOTAL                  BAR     0.1000
   COLDSIDE, TOTAL                 BAR     0.0000

                *** ZONE RESULTS ***

  TEMPERATURE LEAVING EACH ZONE:

                        HOT
        ------------------------------------------------------
------
        |                                    |
 HOT IN |              VAP                   | HOT OUT
 ------> |                                    |------>
  275.0 |                                    | 166.0
        |                                    |
 COLDOUT |              VAP                   | COLDIN
 <------ |                                    |<-----
  249.8 |                                    | 90.0
        |                                    |
        ------------------------------------------------------
------
                        COLD

  ZONE HEAT TRANSFER AND AREA:

  ZONE    HEAT DUTY    AREA    LMTD    AVERAGE U    UA
          MMKCAL/HR    SQM          C  KCAL/HR-SQM-K  CAL/SEC-K
    1       3.442   102.3072   46.0354   730.8684   20770.3005

 BLOCK:  FG-AIR2  MODEL: HEATX
 ------------------------------
  HOT SIDE:
  ---------
  INLET STREAM:          FG-SP2
  OUTLET STREAM:         FG2
  PROPERTY OPTION SET:   IDEAL    IDEAL LIQUID / IDEAL GAS
  COLD SIDE:
  ----------
  INLET STREAM:          A2
  OUTLET STREAM:         PAIR2
  PROPERTY OPTION SET:   IDEAL    IDEAL LIQUID / IDEAL GAS

                *** MASS AND ENERGY BALANCE ***
                            IN                  OUT  RELATIVE DIFF.
     CONV. COMP.(KMOL/HR )        12365.6     12365.6     0.00000
                (KG/HR )      355803.     355803.     -0.327191E-15
     NONCONV. COMP(KG/HR )        0.00000     0.00000     0.00000
   TOTAL BALANCE
```

```
    MASS(KG/HR )          355803.      355803.
-0.327191E-15
    ENTHALPY(MMKCAL/H)    -88.2793     -
88.2793      0.218672E-08

                *** CO2 EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                  27942.6
KG/HR
  PRODUCT STREAMS CO2E               27942.6
KG/HR
  NET STREAMS CO2E PRODUCTION
0.00000    KG/HR
  UTILITIES CO2E PRODUCTION          0.00000
KG/HR
  TOTAL CO2E PRODUCTION              0.00000
KG/HR

                *** INPUT DATA ***

  FLASH SPECS FOR HOT SIDE:
  TWO PHASE FLASH
  MAXIMUM NO. ITERATIONS
30
  CONVERGENCE TOLERANCE
0.000100000

  FLASH SPECS FOR COLD SIDE:
  TWO PHASE FLASH
  MAXIMUM NO. ITERATIONS
30
  CONVERGENCE TOLERANCE
0.000100000

  FLOW DIRECTION AND SPECIFICATION:
   COUNTERCURRENT HEAT
EXCHANGER
   SPECIFIED HOT OUTLET TEMP
   SPECIFIED VALUE                   C
168.0000
   LMTD CORRECTION FACTOR
1.00000

  PRESSURE SPECIFICATION:
   HOT SIDE OUTLET PRESSURE          BAR
1.0000
   COLD SIDE OUTLET PRESSURE         BAR
1.0000

  HEAT TRANSFER COEFFICIENT
SPECIFICATION:
   HOT LIQUID COLD LIQUID
KCAL/HR-SQM-K       730.8684
   HOT 2-PHASE COLD LIQUID
KCAL/HR-SQM-K       730.8684
   HOT VAPOR COLD LIQUID
KCAL/HR-SQM-K       730.8684
   HOT LIQUID COLD 2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT 2-PHASE COLD 2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT VAPOR COLD 2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT LIQUID COLD VAPOR
KCAL/HR-SQM-K       730.8684
   HOT 2-PHASE COLD VAPOR
KCAL/HR-SQM-K       730.8684
   HOT VAPOR COLD VAPOR
KCAL/HR-SQM-K       730.8684

                *** OVERALL RESULTS ***

  STREAMS:
                ---------------------------------------
                |                     |
  FG-SP2   ----->|          HOT        |----->
FG2
  T= 2.7500D+02 |                     |     T=
1.6800D+02
  P= 1.1000D+00 |                     |     P=
1.0000D+00
  V= 1.0000D+00 |                     |     V=
1.0000D+00
                |                     |
  PAIR2   <-----|          COLD       |<----
- A2
  T= 2.7396D+02 |                     |     T=
8.0000D+01
  P= 1.0000D+00 |                     |     P=
1.1000D+00
  V= 1.0000D+00 |                     |     V=
1.0000D+00
                ---------------------------------------

  DUTY AND AREA:
   CALCULATED HEAT DUTY
MMKCAL/HR           6.2768
   CALCULATED (REQUIRED) AREA    SQM
438.0281
   ACTUAL EXCHANGER AREA         SQM
438.0281
   PER CENT OVER-DESIGN
0.0000

  HEAT TRANSFER COEFFICIENT:
   AVERAGE COEFFICIENT (DIRTY)
KCAL/HR-SQM-K       730.8685
   UA (DIRTY)                    CAL/SEC-K
88928.0301

  LOG-MEAN TEMPERATURE DIFFERENCE:
   LMTD CORRECTION FACTOR
1.0000
   LMTD (CORRECTED)                  C
19.6064
   NUMBER OF SHELLS IN SERIES
1

  PRESSURE DROP:
```

HOTSIDE, TOTAL BAR 0.1000
COLDSIDE, TOTAL BAR 0.1000

*** ZONE RESULTS ***

TEMPERATURE LEAVING EACH ZONE:

HOT

HOT IN	VAP HOT OUT
275.0	168.0
COLDOUT	VAP COLDIN
274.0	80.0

COLD

ZONE HEAT TRANSFER AND AREA:

ZONE	HEAT DUTY MMKCAL/HR	AREA SQM	LMTD C	AVERAGE U KCAL/HR-SQM-K	UA CAL/SEC-K
1	6.277	438.0281	19.6064	730.8684	88928.0289

BLOCK: FG-SIDE MODEL: HEATER

INLET STREAM: FLUEGAS
OUTLET STREAM: FG
OUTLET HEAT STREAM: QB2
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	17388.1	17388.1	-0.152080E-10
(KG/HR)	499538.	499538.	-0.182696E-10
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	499538.	499538.	-0.182696E-10
ENTHALPY(MMKCAL/H)	-121.827	-121.827	0.589073E-10

*** CO2 EQUIVALENT SUMMARY ***

FEED STREAMS CO2E	62302.3 KG/HR
PRODUCT STREAMS CO2E	62302.3 KG/HR
NET STREAMS CO2E PRODUCTION	0.00000 KG/HR
UTILITIES CO2E PRODUCTION	0.00000 KG/HR
TOTAL CO2E PRODUCTION	0.00000 KG/HR

*** INPUT DATA ***

TWO PHASE TP FLASH	
SPECIFIED TEMPERATURE	C 275.000
SPECIFIED PRESSURE	BAR 1.10000
MAXIMUM NO. ITERATIONS	30
CONVERGENCE TOLERANCE	0.000100000

*** RESULTS ***

OUTLET TEMPERATURE	C 275.00
OUTLET PRESSURE	BAR 1.1000
HEAT DUTY	MMKCAL/HR -78.914
OUTLET VAPOR FRACTION	1.0000

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
N2	0.71711	0.11780	0.71711	2772.3
O2	0.10200	0.16761E-01	0.10200	2771.2
H2O	0.99454E-01	0.83794	0.99454E-01	54.049
CHLOR	0.76172E-05	0.11989E-04	0.76172E-05	289.33
H2	0.43575E-09	0.15132E-10	0.43575E-09	13114.
CO2	0.81415E-01	0.27469E-01	0.81415E-01	1349.7
NO2	0.12846E-05	0.62251E-06	0.12846E-05	939.75

SO2 0.12633E-04 0.19905E-04 0.12633E-04 289.02

BLOCK: FGCATSEP MODEL: SSPLIT

INLET STREAM: COMBPRO
OUTLET STREAMS: PY-FG CAT+SAND
PROPERTY OPTION SET: NRTL-2 RENON (NRTL) / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 3368.78 3368.78 0.00000
(KG/HR) 101359. 101359. 0.143569E-15
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 101359. 101359. 0.143569E-15
ENTHALPY(MMKCAL/H) -16.7109 -16.7109 0.179045E-08

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 7595.10 KG/HR
PRODUCT STREAMS CO2E 7595.10 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

FRACTION OF FLOW
SUBSTRM= STRM= FRAC=
MIXED PY-FG 1.00000
CIPSD PY-FG 0.0
NCPSD PY-FG 0.0

*** RESULTS ***

STRM= PY-FG SUBSTRM= MIXED SPLIT FRACT= 1.00000
CIPSD 0.0
NCPSD 0.0

STRM= CAT+SAND SUBSTRM= MIXED SPLIT FRACT= 0.0
CIPSD 1.00000
NCPSD 1.00000

BLOCK: FGHEAT MODEL: HEATER

INLET STREAM: RECY1
OUTLET STREAM: RECY
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 5390.31 5390.31 0.00000
(KG/HR) 154857. 154857. 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 154857. 154857. 0.00000
ENTHALPY(MMKCAL/H) -62.2297 -65.4835 0.496893E-01

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 19313.7 KG/HR
PRODUCT STREAMS CO2E 19313.7 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 195.000
SPECIFIED PRESSURE BAR 1.13000
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***
OUTLET TEMPERATURE C 195.00
OUTLET PRESSURE BAR 1.1300
HEAT DUTY MMKCAL/HR -3.2538
OUTLET VAPOR FRACTION 1.0000

```
 V-L PHASE EQUILIBRIUM :

    COMP            F(I)          X(I)          Y(I)
K(I)
    N2          0.71711      0.39099E-01   0.71711
2144.3
    O2          0.10200      0.58230E-02   0.10200
2047.8
    H2O                      0.99454E-01   0.94133
0.99454E-01    12.352
    CHLOR          0.76172E-05   0.67994E-05
0.76172E-05    130.97
    H2             0.43576E-09   0.39908E-11
0.43576E-09    12766.
    CO2            0.81415E-01   0.13731E-01
0.81415E-01    693.22
    NO2            0.12846E-05   0.71042E-06
0.12846E-05    211.41
    SO2            0.12633E-04   0.12608E-04
0.12633E-04    117.14

 BLOCK:  FGSP     MODEL: FSPLIT
 ------------------------------
  INLET STREAM:         FG-SP
  OUTLET STREAMS:       FG-SP1     FG-SP2
  PROPERTY OPTION SET:   IDEAL     IDEAL
LIQUID / IDEAL GAS

                 ***      MASS     AND     ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR )        11997.8
11997.8        0.00000
            (KG/HR    )     344681.          344681.
0.00000
     NONCONV.  COMP(KG/HR     )    0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )          344681.          344681.
0.00000
     ENTHALPY(MMKCAL/H)     -138.511      -
138.511        0.00000

                 ***          CO2          EQUIVALENT
SUMMARY ***
   FEED  STREAMS  CO2E                  42988.6
KG/HR
   PRODUCT  STREAMS  CO2E              42988.6
KG/HR
   NET    STREAMS    CO2E    PRODUCTION
0.00000     KG/HR
   UTILITIES CO2E PRODUCTION      0.00000
KG/HR
   TOTAL CO2E PRODUCTION          0.00000
KG/HR

                    ***  INPUT DATA  ***

  FRACTION OF FLOW              STRM=FG-SP1
FRAC=        0.35000

                    ***  RESULTS  ***

 STREAM= FG-SP1          SPLIT=          0.35000
KEY=  0    STREAM-ORDER=   1
       FG-SP2                       0.65000          0
2

 BLOCK:  FW-FG    MODEL: HEATX
 ------------------------------
  HOT SIDE:
  ---------
  INLET STREAM:          PY-FG
  OUTLET STREAM:         FGTOAIR
  PROPERTY OPTION SET:   IDEAL     IDEAL
LIQUID / IDEAL GAS
  COLD SIDE:
  ----------
  INLET STREAM:          FW1BAR
  OUTLET STREAM:         STOUT
  PROPERTY OPTION SET:   IDEAL     IDEAL
LIQUID / IDEAL GAS

                 ***      MASS     AND     ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR )        3588.73
3588.73        0.00000
            (KG/HR    )     102101.          102101.
0.00000
     NONCONV.  COMP(KG/HR     )    0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )          102101.          102101.
0.00000
     ENTHALPY(MMKCAL/H)     -20.2152      -
20.2152        -0.478597E-08

                 ***          CO2          EQUIVALENT
SUMMARY ***
   FEED  STREAMS  CO2E                  7595.10
KG/HR
   PRODUCT  STREAMS  CO2E              7595.10
KG/HR
   NET    STREAMS    CO2E    PRODUCTION
0.00000     KG/HR
   UTILITIES CO2E PRODUCTION      0.00000
KG/HR
   TOTAL CO2E PRODUCTION          0.00000
KG/HR

                    ***  INPUT DATA  ***

  FLASH SPECS FOR HOT SIDE:
  TWO    PHASE     FLASH
  MAXIMUM          NO.          ITERATIONS
30
```

```
  CONVERGENCE                TOLERANCE
0.000100000

  FLASH SPECS FOR COLD SIDE:
  TWO   PHASE   FLASH
  MAXIMUM          NO.          ITERATIONS
30
  CONVERGENCE                TOLERANCE
0.000100000

  FLOW DIRECTION AND SPECIFICATION:
   COUNTERCURRENT                HEAT
EXCHANGER
   SPECIFIED COLD OUTLET TEMP
   SPECIFIED  VALUE                        C
500.0000
   LMTD        CORRECTION        FACTOR
1.00000

  PRESSURE SPECIFICATION:
   HOT  SIDE PRESSURE DROP          BAR
0.0000
   COLD SIDE PRESSURE DROP          BAR
0.0000

  HEAT        TRANSFER        COEFFICIENT
SPECIFICATION:
   HOT   LIQUID          COLD   LIQUID
KCAL/HR-SQM-K       730.8684
   HOT   2-PHASE         COLD   LIQUID
KCAL/HR-SQM-K       730.8684
   HOT   VAPOR           COLD   LIQUID
KCAL/HR-SQM-K       730.8684
   HOT   LIQUID          COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT   2-PHASE         COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT   VAPOR           COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT   LIQUID          COLD   VAPOR
KCAL/HR-SQM-K       730.8684
   HOT   2-PHASE         COLD   VAPOR
KCAL/HR-SQM-K       730.8684
   HOT   VAPOR           COLD   VAPOR
KCAL/HR-SQM-K       730.8684

                *** OVERALL RESULTS ***

  STREAMS:
                ---------------------------------------
                |                     |
  PY-FG    ----->|          HOT        |-----> FGTOAIR
  T= 6.9963D+02 |                     |    T= 5.6927D+02
  P= 1.1000D+00 |                     |    P= 1.1000D+00
  V= 1.0000D+00 |                     |    V= 1.0000D+00
                |                     |
  STOUT   <-----|          COLD       |<---- FW1BAR
  T= 5.0000D+02 |                     |    T= 1.0234D+02
  P= 1.1000D+00 |                     |    P= 1.1000D+00
  V= 1.0000D+00 |                     |    V= 1.4987D-01
                ---------------------------------------

  DUTY AND AREA:
   CALCULATED        HEAT        DUTY
MMKCAL/HR          3.4488
   CALCULATED (REQUIRED) AREA    SQM
10.4794
   ACTUAL EXCHANGER AREA         SQM
10.4794
   PER          CENT          OVER-DESIGN
0.0000

  HEAT TRANSFER COEFFICIENT:
   AVERAGE      COEFFICIENT      (DIRTY)
KCAL/HR-SQM-K       730.8684
   UA (DIRTY)                    CAL/SEC-K
2127.5235

  LOG-MEAN TEMPERATURE DIFFERENCE:
   LMTD        CORRECTION        FACTOR
1.0000
   LMTD  (CORRECTED)                   C
450.2942
   NUMBER   OF   SHELLS   IN   SERIES
1

  PRESSURE DROP:
   HOTSIDE,  TOTAL                  BAR
0.0000
   COLDSIDE,  TOTAL                 BAR
0.0000

                *** ZONE RESULTS ***

  TEMPERATURE LEAVING EACH ZONE:

                        HOT
        ------------------------------------------------------
------
        |                |                |
 HOT IN  |        VAP     |        VAP
| HOT OUT
 ------> |                |                |----
->
  699.6  |          661.8|                 |
569.3
        |                |                |
 COLDOUT |        VAP     |        BOIL
| COLDIN
 <------ |                |                |<----
--
```

```
 500.0  |                102.3|                    |
102.3
      |                  |                  |
      ------------------------------------------------------
------
                          COLD

  ZONE HEAT TRANSFER AND AREA:

  ZONE     HEAT DUTY     AREA     LMTD
AVERAGE U      UA
           MMKCAL/HR          SQM            C
KCAL/HR-SQM-K   CAL/SEC-K
    1       1.011       3.9624    349.1609   730.8684
804.4510
    2       2.438       6.5170    511.7850   730.8684
1323.0724

 BLOCK:  FWMIX    MODEL: MIXER
 ------------------------------
  INLET  STREAMS:                CONDENSA
DCONDOUT    DEJON2
  OUTLET STREAM:        MIXEDFW
  PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS

                ***       MASS     AND     ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )        5906.41
5906.41        0.00000
            (KG/HR    )     106406.          106406.
0.136759E-15
     NONCONV.  COMP(KG/HR    )     0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )          106406.          106406.
0.136759E-15
     ENTHALPY(MMKCAL/H)     -392.082      -
392.082       0.305608E-07

                ***          CO2          EQUIVALENT
SUMMARY ***
   FEED  STREAMS  CO2E                  0.00000
KG/HR
   PRODUCT  STREAMS  CO2E               0.00000
KG/HR
   NET   STREAMS   CO2E   PRODUCTION
0.00000     KG/HR
   UTILITIES  CO2E  PRODUCTION      0.00000
KG/HR
   TOTAL  CO2E  PRODUCTION           0.00000
KG/HR

                  ***  INPUT DATA  ***
  TWO    PHASE     FLASH
  MAXIMUM          NO.          ITERATIONS
30
  CONVERGENCE                TOLERANCE
0.000100000
  OUTLET PRESSURE:  MINIMUM OF INLET
STREAM PRESSURES

 BLOCK:  FWSPLIT  MODEL: FSPLIT
 ------------------------------
  INLET STREAM:         FW7BAR
  OUTLET STREAMS:     FWBOILER  PFWIN
  PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS

                ***       MASS     AND     ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )        7589.80
7589.80        0.00000
            (KG/HR    )     136732.          136732.
0.00000
     NONCONV.  COMP(KG/HR    )     0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )          136732.          136732.
0.00000
     ENTHALPY(MMKCAL/H)     -496.348      -
496.348       -0.199822E-08

                ***          CO2          EQUIVALENT
SUMMARY ***
   FEED  STREAMS  CO2E                  0.00000
KG/HR
   PRODUCT  STREAMS  CO2E               0.00000
KG/HR
   NET   STREAMS   CO2E   PRODUCTION
0.00000     KG/HR
   UTILITIES  CO2E  PRODUCTION      0.00000
KG/HR
   TOTAL  CO2E  PRODUCTION           0.00000
KG/HR

                  *** INPUT DATA  ***

 MASS-FLOW  (KG/HR    )       STRM=PFWIN
FLOW=    5,313.60       KEY= 0

                  *** RESULTS  ***

 STREAM= FWBOILER     SPLIT=       0.96114
KEY=  0    STREAM-ORDER=   2
        PFWIN                    0.038861          0
1

 BLOCK:  FWT      MODEL: MIXER
 ------------------------------
  INLET STREAMS:        MIX12     MIXEDFW
STAIR-KO    STEOUT
  OUTLET STREAM:        FW7BAR
  PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS
```

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 7589.80 7589.80 0.261313E-06
(KG/HR) 136732. 136732. 0.261313E-06
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 136732. 136732. 0.261313E-06
ENTHALPY(MMKCAL/H) -496.349 -496.348 -0.255648E-06

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000
OUTLET PRESSURE BAR 8.10000

BLOCK: HEAT1 MODEL: HEATX

HOT SIDE:

INLET STREAM: MY
OUTLET STREAM: Y-OUT
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS
COLD SIDE:

INLET STREAM: FW141BAR
OUTLET STREAM: FW1
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 7642.29 7642.29 0.00000
(KG/HR) 137678. 137678. 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 137678. 137678. 0.00000
ENTHALPY(MMKCAL/H) -495.806 -495.806 0.216413E-09

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

FLASH SPECS FOR HOT SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLASH SPECS FOR COLD SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLOW DIRECTION AND SPECIFICATION:
COUNTERCURRENT HEAT EXCHANGER
SPECIFIED HOT VAPOR FRACTION
SPECIFIED VALUE 0.0000
LMTD CORRECTION FACTOR 1.00000

PRESSURE SPECIFICATION:
HOT SIDE PRESSURE DROP BAR 0.0000
COLD SIDE PRESSURE DROP BAR 0.0000

HEAT TRANSFER COEFFICIENT SPECIFICATION:
HOT LIQUID COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD LIQUID KCAL/HR-SQM-K 730.8684

```
   HOT  VAPOR          COLD  LIQUID
KCAL/HR-SQM-K      730.8684
   HOT  LIQUID         COLD  2-PHASE
KCAL/HR-SQM-K      730.8684
   HOT  2-PHASE        COLD  2-PHASE
KCAL/HR-SQM-K      730.8684
   HOT  VAPOR          COLD  2-PHASE
KCAL/HR-SQM-K      730.8684
   HOT  LIQUID         COLD  VAPOR
KCAL/HR-SQM-K      730.8684
   HOT  2-PHASE        COLD  VAPOR
KCAL/HR-SQM-K      730.8684
   HOT  VAPOR          COLD  VAPOR
KCAL/HR-SQM-K      730.8684

                *** OVERALL RESULTS ***

  STREAMS:
                ---------------------------------------
                |                     |
  MY      ----->|         HOT         |----->
Y-OUT
  T= 2.6831D+02 |                     |     T=
2.0252D+02
  P= 1.6350D+01 |                     |     P=
1.6350D+01
  V= 1.0000D+00 |                     |     V=
0.0000D+00
                |                     |
  FW1     <-----|         COLD        |<-----
FW141BAR
  T= 1.9186D+02 |                     |     T=
1.7451D+02
  P= 1.4000D+02 |                     |     P=
1.4000D+02
  V= 0.0000D+00 |                     |     V=
0.0000D+00
                ---------------------------------------

  DUTY AND AREA:
   CALCULATED  HEAT  DUTY
MMKCAL/HR          3.0803
   CALCULATED (REQUIRED) AREA   SQM
218.9703
   ACTUAL EXCHANGER AREA        SQM
218.9703
   PER  CENT  OVER-DESIGN
0.0000

  HEAT TRANSFER COEFFICIENT:
   AVERAGE  COEFFICIENT  (DIRTY)
KCAL/HR-SQM-K      730.8684
   UA (DIRTY)                   CAL/SEC-K
44455.1402

  LOG-MEAN TEMPERATURE DIFFERENCE:
   LMTD  CORRECTION  FACTOR
1.0000
   LMTD  (CORRECTED)            C
19.2470
   NUMBER  OF  SHELLS  IN  SERIES
1

  PRESSURE DROP:
   HOTSIDE,  TOTAL              BAR
0.0000
   COLDSIDE,  TOTAL             BAR
0.0000

                *** ZONE RESULTS ***

  TEMPERATURE LEAVING EACH ZONE:

                      HOT
          ------------------------------------------------------
------
          |                   |                   |
 HOT IN   |        VAP        |        COND
| HOT OUT
 ------>  |                   |                   |-----
->
  268.3   |                202.5|                 |
202.5
          |                   |                   |
 COLDOUT  |        LIQ        |        LIQ
| COLDIN
 <------  |                   |                   |<----
--
  191.9   |                190.8|                 |
174.5
          |                   |                   |
          ------------------------------------------------------
------
                      COLD

  ZONE HEAT TRANSFER AND AREA:

  ZONE     HEAT DUTY     AREA     LMTD
AVERAGE U      UA
           MMKCAL/HR        SQM          C
KCAL/HR-SQM-K   CAL/SEC-K
    1       0.193       7.6453     34.5140   730.8684
1552.1389
    2       2.887      211.3250     18.6947   730.8684
42903.0013

 BLOCK:  HEAT2    MODEL: HEATX
 ------------------------------
  HOT SIDE:
  ---------
  INLET STREAM:          MX
  OUTLET STREAM:         X-OUT
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS
  COLD SIDE:
  ----------
  INLET STREAM:          FW1
  OUTLET STREAM:         FW2
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS
```

```
                *** MASS AND ENERGY BALANCE ***
                          IN                  OUT              RELATIVE DIFF.
    CONV. COMP.(KMOL/HR )      7951.38          7951.38          0.00000
          (KG/HR )      143246.          143246.          0.00000
    NONCONV. COMP(KG/HR )      0.00000          0.00000          0.00000
  TOTAL BALANCE
    MASS(KG/HR )      143246.          143246.          0.00000
    ENTHALPY(MMKCAL/H)      -509.604         -509.604         -0.539527E-07

                *** CO2 EQUIVALENT SUMMARY ***
  FEED STREAMS CO2E                0.00000  KG/HR
  PRODUCT STREAMS CO2E             0.00000  KG/HR
  NET STREAMS CO2E PRODUCTION      0.00000  KG/HR
  UTILITIES CO2E PRODUCTION        0.00000  KG/HR
  TOTAL CO2E PRODUCTION            0.00000  KG/HR

                    *** INPUT DATA ***

  FLASH SPECS FOR HOT SIDE:
  TWO PHASE FLASH
  MAXIMUM NO. ITERATIONS                   30
  CONVERGENCE TOLERANCE            0.000100000

  FLASH SPECS FOR COLD SIDE:
  TWO PHASE FLASH
  MAXIMUM NO. ITERATIONS                   30
  CONVERGENCE TOLERANCE            0.000100000

  FLOW DIRECTION AND SPECIFICATION:
    COUNTERCURRENT HEAT EXCHANGER
    SPECIFIED HOT APPROACH TEMP
    SPECIFIED VALUE                        C  5.1000
    TEMPERATURE TOLERANCE                  C  0.01000
    LMTD CORRECTION FACTOR           1.00000

  PRESSURE SPECIFICATION:
    HOT SIDE PRESSURE DROP           BAR  0.0000
    COLD SIDE PRESSURE DROP          BAR  0.0000

  HEAT TRANSFER COEFFICIENT SPECIFICATION:
    HOT LIQUID COLD LIQUID  KCAL/HR-SQM-K    730.8684
    HOT 2-PHASE COLD LIQUID  KCAL/HR-SQM-K   730.8684
    HOT VAPOR COLD LIQUID  KCAL/HR-SQM-K     730.8684
    HOT LIQUID COLD 2-PHASE  KCAL/HR-SQM-K   730.8684
    HOT 2-PHASE COLD 2-PHASE  KCAL/HR-SQM-K  730.8684
    HOT VAPOR COLD 2-PHASE  KCAL/HR-SQM-K    730.8684
    HOT LIQUID COLD VAPOR  KCAL/HR-SQM-K     730.8684
    HOT 2-PHASE COLD VAPOR  KCAL/HR-SQM-K    730.8684
    HOT VAPOR COLD VAPOR  KCAL/HR-SQM-K      730.8684

                    *** OVERALL RESULTS ***

  STREAMS:
                ---------------------------------------
                |                                     |
  MX      ----->|              HOT                    |-----> X-OUT
    T= 3.3097D+02 |                                   |     T= 1.9696D+02
    P= 2.8340D+01 |                                   |     P= 2.8340D+01
    V= 1.0000D+00 |                                   |     V= 0.0000D+00
                |                                     |
    FW2   <-----|              COLD                   |<----- FW1
    T= 2.2429D+02 |                                   |     T= 1.9186D+02
    P= 1.4000D+02 |                                   |     P= 1.4000D+02
    V= 0.0000D+00 |                                   |     V= 0.0000D+00
                ---------------------------------------

  DUTY AND AREA:
    CALCULATED HEAT DUTY  MMKCAL/HR          6.2683
    CALCULATED (REQUIRED) AREA  SQM          428.0424
    ACTUAL EXCHANGER AREA  SQM               428.0424
    PER CENT OVER-DESIGN             0.0000

  HEAT TRANSFER COEFFICIENT:
```

AVERAGE COEFFICIENT (DIRTY) KCAL/HR-SQM-K 730.8684
UA (DIRTY) CAL/SEC-K 86900.7476

LOG-MEAN TEMPERATURE DIFFERENCE:
LMTD CORRECTION FACTOR 1.0000
LMTD (CORRECTED) C 20.0364
NUMBER OF SHELLS IN SERIES 1

PRESSURE DROP:
HOTSIDE, TOTAL BAR 0.0000
COLDSIDE, TOTAL BAR 0.0000

*** ZONE RESULTS ***

TEMPERATURE LEAVING EACH ZONE:

HOT

HOT IN	VAP	COND	LIQ	HOT OUT
------>			|----->
331.0	230.8	230.8		197.0
COLDOUT	LIQ	LIQ	LIQ	COLDIN
<------			|<-----
224.3	221.5	195.1		191.9

COLD

ZONE HEAT TRANSFER AND AREA:

ZONE	HEAT DUTY MMKCAL/HR	AREA SQM	LMTD C	AVERAGE U KCAL/HR-SQM-K	UA CAL/SEC-K
1	0.563	19.3041	39.8793	730.8684	3919.0921
2	5.104	356.3964	19.5960	730.8684	72355.2491
3	0.601	52.3419	15.7174	730.8684	10626.4064

BLOCK: HEX1 MODEL: HEATX

HOT SIDE:

INLET STREAM: HOTVAP
OUTLET STREAM: 50DEG
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS
COLD SIDE:

INLET STREAM: PKRVC1IN
OUTLET STREAM: PKRVC1OU
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	1989.88	1989.88	0.00000
(KG/HR)	39228.5	39228.5	0.00000
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	39228.5	39228.5	0.00000
ENTHALPY(MMKCAL/H)	-127.511	-127.511	-0.272194E-07

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 2620.19 KG/HR
PRODUCT STREAMS CO2E 2620.19 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

FLASH SPECS FOR HOT SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLASH SPECS FOR COLD SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLOW DIRECTION AND SPECIFICATION:

```
   COUNTERCURRENT                HEAT
EXCHANGER
   SPECIFIED HOT OUTLET TEMP
   SPECIFIED  VALUE                    C
50.0000
   LMTD        CORRECTION        FACTOR
1.00000

  PRESSURE SPECIFICATION:
   HOT  SIDE PRESSURE DROP        BAR
0.0000
   COLD SIDE PRESSURE DROP        BAR
0.0000

  HEAT        TRANSFER        COEFFICIENT
SPECIFICATION:
   HOT   LIQUID          COLD   LIQUID
KCAL/HR-SQM-K       730.8684
   HOT   2-PHASE         COLD   LIQUID
KCAL/HR-SQM-K       730.8684
   HOT   VAPOR           COLD   LIQUID
KCAL/HR-SQM-K       730.8684
   HOT   LIQUID          COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT   2-PHASE         COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT   VAPOR           COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT   LIQUID          COLD   VAPOR
KCAL/HR-SQM-K       730.8684
   HOT   2-PHASE         COLD   VAPOR
KCAL/HR-SQM-K       730.8684
   HOT   VAPOR           COLD   VAPOR
KCAL/HR-SQM-K       730.8684

                *** OVERALL RESULTS ***

  STREAMS:
              ---------------------------------------
              |                       |
  HOTVAP   ----->|          HOT          |---
--> 50DEG
  T= 8.0000D+01  |                       |    T=
5.0000D+01
  P= 1.1000D+00  |                       |    P=
1.1000D+00
  V= 1.5296D-01  |                       |    V=
9.0221D-02
              |                       |
  PKRVC1OU <-----|          COLD         |<-
---- PKRVC1IN
  T= 6.4069D+01  |                       |    T=
4.0000D+00
  P= 3.0000D+00  |                       |    P=
3.0000D+00
  V= 0.0000D+00  |                       |    V=
0.0000D+00
              ---------------------------------------

  DUTY AND AREA:
   CALCULATED        HEAT        DUTY
MMKCAL/HR          1.0517
   CALCULATED (REQUIRED) AREA    SQM
50.7435
   ACTUAL EXCHANGER AREA         SQM
50.7435
   PER         CENT        OVER-DESIGN
0.0000

  HEAT TRANSFER COEFFICIENT:
   AVERAGE     COEFFICIENT     (DIRTY)
KCAL/HR-SQM-K       730.8684
   UA (DIRTY)                    CAL/SEC-K
10301.8976

  LOG-MEAN TEMPERATURE DIFFERENCE:
   LMTD        CORRECTION        FACTOR
1.0000
   LMTD  (CORRECTED)                   C
28.3570
   NUMBER   OF   SHELLS   IN   SERIES
1

  PRESSURE DROP:
   HOTSIDE,  TOTAL                     BAR
0.0000
   COLDSIDE,  TOTAL                    BAR
0.0000

                *** ZONE RESULTS ***

  TEMPERATURE LEAVING EACH ZONE:

                        HOT
        ---------------------------------------------------
------
        |                                   |
 HOT IN |              COND                 |
HOT OUT
 ------> |                                   |------
>
  80.0  |                                   |  50.0
        |                                   |
 COLDOUT |              LIQ                  |
COLDIN
 <------ |                                   |<-----
-
  64.1  |                                   |  4.0
        |                                   |
        ---------------------------------------------------
------
                        COLD

  ZONE HEAT TRANSFER AND AREA:

  ZONE      HEAT DUTY      AREA      LMTD
AVERAGE U      UA
            MMKCAL/HR          SQM          C
KCAL/HR-SQM-K   CAL/SEC-K
```

```
   1       1.052       50.7435      28.3570   730.8684
10301.8976

 BLOCK:  HEX2    MODEL: HEATX
 ------------------------------
  HOT SIDE:
  ---------
  INLET STREAM:          50DEG
  OUTLET STREAM:         BOIL+GAS
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS
  COLD SIDE:
  ----------
  INLET STREAM:          KRVC2IN
  OUTLET STREAM:         KRVC2OUT
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS

                ***    MASS    AND    ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
    CONV.  COMP.(KMOL/HR  )        1641.97
1641.97        0.00000
           (KG/HR    )      32960.9          32960.9
0.00000
    NONCONV.  COMP(KG/HR    )    0.00000
0.00000        0.00000
   TOTAL BALANCE
    MASS(KG/HR    )        32960.9          32960.9
0.00000
    ENTHALPY(MMKCAL/H)     -104.705      -
104.705      -0.826559E-10

                ***          CO2          EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                2620.19
KG/HR
  PRODUCT STREAMS CO2E             2620.19
KG/HR
  NET    STREAMS    CO2E    PRODUCTION
0.00000    KG/HR
  UTILITIES CO2E PRODUCTION        0.00000
KG/HR
  TOTAL CO2E PRODUCTION            0.00000
KG/HR

                    *** INPUT DATA ***

  FLASH SPECS FOR HOT SIDE:
  TWO    PHASE    FLASH
  MAXIMUM          NO.          ITERATIONS
30
  CONVERGENCE                   TOLERANCE
0.000100000

  FLASH SPECS FOR COLD SIDE:
  TWO    PHASE    FLASH
  MAXIMUM          NO.          ITERATIONS
30
  CONVERGENCE                   TOLERANCE
0.000100000

  FLOW DIRECTION AND SPECIFICATION:
   COUNTERCURRENT                HEAT
EXCHANGER
   SPECIFIED HOT OUTLET TEMP
   SPECIFIED  VALUE                        C
25.0000
   LMTD        CORRECTION        FACTOR
1.00000

  PRESSURE SPECIFICATION:
   HOT   SIDE  PRESSURE  DROP          BAR
0.0000
   COLD SIDE PRESSURE DROP          BAR
0.0000

  HEAT        TRANSFER        COEFFICIENT
SPECIFICATION:
   HOT   LIQUID          COLD   LIQUID
KCAL/HR-SQM-K       730.8684
   HOT   2-PHASE         COLD   LIQUID
KCAL/HR-SQM-K       730.8684
   HOT   VAPOR           COLD   LIQUID
KCAL/HR-SQM-K       730.8684
   HOT   LIQUID          COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT   2-PHASE         COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT   VAPOR           COLD   2-PHASE
KCAL/HR-SQM-K       730.8684
   HOT   LIQUID          COLD   VAPOR
KCAL/HR-SQM-K       730.8684
   HOT   2-PHASE         COLD   VAPOR
KCAL/HR-SQM-K       730.8684
   HOT   VAPOR           COLD   VAPOR
KCAL/HR-SQM-K       730.8684

                *** OVERALL RESULTS ***

  STREAMS:
              ---------------------------------------
              |                     |
  50DEG    ----->|          HOT          |----->
BOIL+GAS
  T=  5.0000D+01  |                     |     T=
2.5000D+01
  P=  1.1000D+00  |                     |     P=
1.1000D+00
  V=  9.0221D-02  |                     |     V=
7.8199D-02
              |                     |
  KRVC2OUT <-----|          COLD         |<-
---- KRVC2IN
  T=  4.6608D+01  |                     |     T=
4.1181D+00
  P=  5.0000D+00  |                     |     P=
5.0000D+00
```

```
  V= 0.0000D+00 |                    |     V=
0.0000D+00
                ---------------------------------------

  DUTY AND AREA:
    CALCULATED HEAT DUTY
MMKCAL/HR            0.4876
    CALCULATED (REQUIRED) AREA    SQM
69.3269
    ACTUAL EXCHANGER AREA         SQM
69.3269
    PER CENT OVER-DESIGN
0.0000

  HEAT TRANSFER COEFFICIENT:
    AVERAGE COEFFICIENT (DIRTY)
KCAL/HR-SQM-K       730.8684
    UA (DIRTY)                    CAL/SEC-K
14074.6786

  LOG-MEAN TEMPERATURE DIFFERENCE:
    LMTD CORRECTION FACTOR
1.0000
    LMTD (CORRECTED)              C
9.6235
    NUMBER OF SHELLS IN SERIES
1

  PRESSURE DROP:
    HOTSIDE, TOTAL                BAR
0.0000
    COLDSIDE, TOTAL               BAR
0.0000

                *** ZONE RESULTS ***

  TEMPERATURE LEAVING EACH ZONE:

                      HOT
        ------------------------------------------------------
------
        |                                    |
 HOT IN |              COND                  |
HOT OUT
 ------> |                                    |------
>
  50.0  |                                    |  25.0
        |                                    |
 COLDOUT |              LIQ                  |
COLDIN
 <------ |                                    |<-----
-
  46.6  |                                    |  4.1
        |                                    |
        ------------------------------------------------------
------
                      COLD

  ZONE HEAT TRANSFER AND AREA:

  ZONE    HEAT DUTY    AREA    LMTD
AVERAGE U      UA
          MMKCAL/HR          SQM          C
KCAL/HR-SQM-K   CAL/SEC-K
    1       0.488      69.3269     9.6235   730.8684
14074.6786

 BLOCK:  HEXDRYER MODEL: HEATX
 ------------------------------
  HOT SIDE:
  ---------
  INLET STREAM:          PREDUC
  OUTLET STREAM:         DH45
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS
  COLD SIDE:
  ----------
  INLET STREAM:          AIR45
  OUTLET STREAM:         AIR80
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS

                *** MASS AND ENERGY
BALANCE ***
                          IN                    OUT
RELATIVE DIFF.
     CONV. COMP.(KMOL/HR )        9403.67
9403.67        0.00000
           (KG/HR    )     236304.          236304.
0.00000
     NONCONV. COMP(KG/HR    )  0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )          236304.        236304.
0.00000
     ENTHALPY(MMKCAL/H)      -182.485      -
182.485      -0.200044E-07

                *** CO2 EQUIVALENT
SUMMARY ***
   FEED STREAMS CO2E                0.00000
KG/HR
   PRODUCT STREAMS CO2E             0.00000
KG/HR
   NET STREAMS CO2E PRODUCTION
0.00000     KG/HR
   UTILITIES CO2E PRODUCTION        0.00000
KG/HR
   TOTAL CO2E PRODUCTION            0.00000
KG/HR

                *** INPUT DATA ***

  FLASH SPECS FOR HOT SIDE:
  TWO PHASE FLASH
  MAXIMUM NO. ITERATIONS
30
  CONVERGENCE TOLERANCE
0.000100000
```

```
  FLASH SPECS FOR COLD SIDE:
  TWO PHASE FLASH
  MAXIMUM NO. ITERATIONS
30
  CONVERGENCE TOLERANCE
0.000100000

  FLOW DIRECTION AND SPECIFICATION:
   COUNTERCURRENT HEAT
EXCHANGER
   SPECIFIED COLD APPROACH TEMP
   SPECIFIED VALUE C
10.0000
   TEMPERATURE TOLERANCE C
0.01000
   LMTD CORRECTION FACTOR
1.00000

  PRESSURE SPECIFICATION:
   HOT SIDE PRESSURE DROP BAR
0.0000
   COLD SIDE PRESSURE DROP BAR
0.0000

  HEAT TRANSFER COEFFICIENT
SPECIFICATION:
   HOT LIQUID COLD LIQUID
KCAL/HR-SQM-K 730.8684
   HOT 2-PHASE COLD LIQUID
KCAL/HR-SQM-K 730.8684
   HOT VAPOR COLD LIQUID
KCAL/HR-SQM-K 730.8684
   HOT LIQUID COLD 2-PHASE
KCAL/HR-SQM-K 730.8684
   HOT 2-PHASE COLD 2-PHASE
KCAL/HR-SQM-K 730.8684
   HOT VAPOR COLD 2-PHASE
KCAL/HR-SQM-K 730.8684
   HOT LIQUID COLD VAPOR
KCAL/HR-SQM-K 730.8684
   HOT 2-PHASE COLD VAPOR
KCAL/HR-SQM-K 730.8684
   HOT VAPOR COLD VAPOR
KCAL/HR-SQM-K 730.8684

          *** OVERALL RESULTS ***

  STREAMS:
            ---------------------------------------
            |                     |
  PREDUC  ----->|        HOT          |----
-> DH45
  T= 7.9605D+01 |                     |    T=
4.1211D+01
  P= 3.0000D+00 |                     |    P=
3.0000D+00
  V= 0.0000D+00 |                     |    V=
0.0000D+00
            |                     |
  AIR80   <-----|        COLD         |<----
- AIR45
  T= 6.9605D+01 |                     |    T=
3.0054D+01
  P= 1.3700D+00 |                     |    P=
1.3700D+00
  V= 1.0000D+00 |                     |    V=
1.0000D+00
            ---------------------------------------

  DUTY AND AREA:
   CALCULATED HEAT DUTY
MMKCAL/HR 1.8412
   CALCULATED (REQUIRED) AREA SQM
238.3749
   ACTUAL EXCHANGER AREA SQM
238.3749
   PER CENT OVER-DESIGN
0.0000

  HEAT TRANSFER COEFFICIENT:
   AVERAGE COEFFICIENT (DIRTY)
KCAL/HR-SQM-K 730.8684
   UA (DIRTY) CAL/SEC-K
48394.6437

  LOG-MEAN TEMPERATURE DIFFERENCE:
   LMTD CORRECTION FACTOR
1.0000
   LMTD (CORRECTED) C
10.5683
   NUMBER OF SHELLS IN SERIES
1

  PRESSURE DROP:
   HOTSIDE, TOTAL BAR
0.0000
   COLDSIDE, TOTAL BAR
0.0000

          *** ZONE RESULTS ***

  TEMPERATURE LEAVING EACH ZONE:

                HOT
      ---------------------------------------------------
------
      |                                 |
 HOT IN |              LIQ                |
HOT OUT
 ------> |                                 |------
>
  79.6 |                                 |  41.2
      |                                 |
 COLDOUT |              VAP                |
COLDIN
 <------ |                                 |<-----
-
  69.6 |                                 |  30.1
      |                                 |
```


COLD

ZONE HEAT TRANSFER AND AREA:

ZONE HEAT DUTY AREA LMTD AVERAGE U UA
MMKCAL/HR SQM C KCAL/HR-SQM-K CAL/SEC-K
1 1.841 238.3749 10.5683 730.8684 48394.6437

BLOCK: HOPPER MODEL: MIXER

INLET STREAMS: DRY-BIOM COARSE
OUTLET STREAM: MIXIN
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 0.00000 0.00000 0.00000
(KG/HR) 0.00000 0.00000 0.00000
NONCONV. COMP(KG/HR) 39279.4 39279.4 0.00000
TOTAL BALANCE
MASS(KG/HR) 39279.4 39279.4 0.00000
ENTHALPY(MMKCAL/H) -61.2203 -61.2292 0.144186E-03

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
ONE PHASE FLASH SPECIFIED PHASE IS SOLID
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000
OUTLET PRESSURE: MINIMUM OF INLET STREAM PRESSURES

BLOCK: HPT1 MODEL: COMPR

INLET STREAM: SH-ST1
OUTLET STREAM: EXTOT1
OUTLET WORK STREAM: W1
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS
FREE WATER OPTION SET: SYSOP12 ASME STEAM TABLE
SOLUBLE WATER OPTION: THE MAIN PROPERTY OPTION SET (IDEAL).

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 7294.82 7294.82 0.00000
(KG/HR) 131418. 131418. 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 131418. 131418. 0.00000
ENTHALPY(MMKCAL/H) -389.067 -389.615 0.140644E-02

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

ISENTROPIC TURBINE
OUTLET PRESSURE BAR 28.3400
ISENTROPIC EFFICIENCY 0.87000
MECHANICAL EFFICIENCY 0.96000

*** RESULTS ***

INDICATED HORSEPOWER REQUIREMENT KW -15,932.3
BRAKE HORSEPOWER REQUIREMENT KW -15,295.0
NET WORK REQUIRED KW -15,295.0
POWER LOSSES KW 637.291

ISENTROPIC HORSEPOWER REQUIREMENT KW -18,313.0
CALCULATED OUTLET TEMP C 358.140
ISENTROPIC TEMPERATURE C 330.379
EFFICIENCY (POLYTR/ISENTR) USED 0.87000
OUTLET VAPOR FRACTION 1.00000
HEAD DEVELOPED, METER -51,154.6
MECHANICAL EFFICIENCY USED 0.96000
INLET HEAT CAPACITY RATIO 1.37991
INLET VOLUMETRIC FLOW RATE , CUM/HR 3,496.54
OUTLET VOLUMETRIC FLOW RATE, CUM/HR 12,838.1
INLET COMPRESSIBILITY FACTOR 0.92951
OUTLET COMPRESSIBILITY FACTOR 0.95023
AV. ISENT. VOL. EXPONENT 1.28297
AV. ISENT. TEMP EXPONENT 1.29486
AV. ACTUAL VOL. EXPONENT 1.22814
AV. ACTUAL TEMP EXPONENT 1.24932

BLOCK: HPT2 MODEL: COMPR

INLET STREAM: EXTR1
OUTLET STREAM: EX-TOT2
OUTLET WORK STREAM: W2
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 6638.28 6638.28 0.00000
(KG/HR) 119591. 119591. 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 119591. 119591. 0.00000
ENTHALPY(MMKCAL/H) -366.517 -366.660 0.390511E-03

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

ISENTROPIC TURBINE
OUTLET PRESSURE BAR 16.3500
ISENTROPIC EFFICIENCY 0.87000
MECHANICAL EFFICIENCY 0.96000

*** RESULTS ***

INDICATED HORSEPOWER REQUIREMENT KW -4,163.04
BRAKE HORSEPOWER REQUIREMENT KW -3,996.52
NET WORK REQUIRED KW -3,996.52
POWER LOSSES KW 166.521
ISENTROPIC HORSEPOWER REQUIREMENT KW -4,785.10
CALCULATED OUTLET TEMP C 268.310
ISENTROPIC TEMPERATURE C 258.841
EFFICIENCY (POLYTR/ISENTR) USED 0.87000
OUTLET VAPOR FRACTION 1.00000
HEAD DEVELOPED, METER -14,688.5
MECHANICAL EFFICIENCY USED 0.96000
INLET HEAT CAPACITY RATIO 1.29660
INLET VOLUMETRIC FLOW RATE , CUM/HR 11,765.5
OUTLET VOLUMETRIC FLOW RATE, CUM/HR 18,278.1
INLET COMPRESSIBILITY FACTOR 1.00000
OUTLET COMPRESSIBILITY FACTOR 1.00000
AV. ISENT. VOL. EXPONENT 1.30067
AV. ISENT. TEMP EXPONENT 1.30067

AV. ACTUAL VOL. EXPONENT 1.24858
AV. ACTUAL TEMP EXPONENT 1.24858

BLOCK: HPT3 MODEL: COMPR

INLET STREAM: EXTR2
OUTLET STREAM: EXTOT2
OUTLET WORK STREAM: W3
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS
FREE WATER OPTION SET: SYSOP12 ASME STEAM TABLE
SOLUBLE WATER OPTION: THE MAIN PROPERTY OPTION SET (IDEAL).

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 6290.84 6290.84 0.00000
(KG/HR) 113331. 113331. 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 113331. 113331. 0.00000
ENTHALPY(MMKCAL/H) -350.726 -350.846 0.342648E-03

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

ISENTROPIC TURBINE
OUTLET PRESSURE BAR 9.48000
ISENTROPIC EFFICIENCY 0.87000
MECHANICAL EFFICIENCY 0.96000

*** RESULTS ***

INDICATED HORSEPOWER REQUIREMENT KW -3,495.30
BRAKE HORSEPOWER REQUIREMENT KW -3,355.49
NET WORK REQUIRED KW -3,355.49
POWER LOSSES KW 139.812
ISENTROPIC HORSEPOWER REQUIREMENT KW -4,017.59
CALCULATED OUTLET TEMP C 231.670
ISENTROPIC TEMPERATURE C 224.404
EFFICIENCY (POLYTR/ISENTR) USED 0.87000
OUTLET VAPOR FRACTION 1.00000
HEAD DEVELOPED, METER -13,013.6
MECHANICAL EFFICIENCY USED 0.96000
INLET HEAT CAPACITY RATIO 1.35468
INLET VOLUMETRIC FLOW RATE , CUM/HR 17,253.4
OUTLET VOLUMETRIC FLOW RATE, CUM/HR 26,744.4
INLET COMPRESSIBILITY FACTOR 0.95596
OUTLET COMPRESSIBILITY FACTOR 0.96022
AV. ISENT. VOL. EXPONENT 1.29458
AV. ISENT. TEMP EXPONENT 1.29966
AV. ACTUAL VOL. EXPONENT 1.24349
AV. ACTUAL TEMP EXPONENT 1.25623

BLOCK: KRV1+2UT MODEL: MIXER

INLET STREAMS: KRVC2OUT PKRVC1OU
OUTLET STREAM: QWAT-UT
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 1739.12 1739.12 0.00000
(KG/HR) 31330.8 31330.8 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 31330.8 31330.8 0.00000

```
     ENTHALPY(MMKCAL/H)     -117.714     -
117.714       0.272369E-07

                  ***  CO2  EQUIVALENT
SUMMARY ***
   FEED STREAMS CO2E              0.00000
KG/HR
   PRODUCT STREAMS CO2E           0.00000
KG/HR
   NET  STREAMS  CO2E  PRODUCTION
0.00000    KG/HR
   UTILITIES CO2E PRODUCTION      0.00000
KG/HR
   TOTAL CO2E PRODUCTION          0.00000
KG/HR

                  *** INPUT DATA ***
  TWO  PHASE  FLASH
  MAXIMUM        NO.        ITERATIONS
30
  CONVERGENCE              TOLERANCE
0.000100000
  OUTLET PRESSURE:  MINIMUM OF INLET
STREAM PRESSURES

 BLOCK:  KRVMIX   MODEL: MIXER
 ------------------------------
  INLET STREAMS:      PHKRV     KRVC26B
  OUTLET STREAM:      TAVSMIX
  PROPERTY OPTION SET:  IDEAL   IDEAL
LIQUID / IDEAL GAS

                  ***     MASS     AND     ENERGY
BALANCE  ***
                        IN                  OUT
RELATIVE DIFF.
    CONV.  COMP.(KMOL/HR  )       1993.51
1993.51       0.00000
           (KG/HR    )    35913.6        35913.6
0.00000
    NONCONV.  COMP(KG/HR    )    0.00000
0.00000       0.00000
   TOTAL BALANCE
    MASS(KG/HR    )       35913.6       35913.6
0.00000
    ENTHALPY(MMKCAL/H)    -134.960     -
134.960      -0.227862E-12

                  ***  CO2  EQUIVALENT
SUMMARY ***
   FEED STREAMS CO2E              0.00000
KG/HR
   PRODUCT STREAMS CO2E           0.00000
KG/HR
   NET  STREAMS  CO2E  PRODUCTION
0.00000    KG/HR
   UTILITIES CO2E PRODUCTION      0.00000
KG/HR
   TOTAL CO2E PRODUCTION          0.00000
KG/HR

                  *** INPUT DATA ***
  TWO  PHASE  FLASH
  MAXIMUM        NO.        ITERATIONS
30
  CONVERGENCE              TOLERANCE
0.000100000
  OUTLET PRESSURE:  MINIMUM OF INLET
STREAM PRESSURES

 BLOCK:  KRVSPL   MODEL: FSPLIT
 ------------------------------
  INLET STREAM:       KRV
  OUTLET  STREAMS:            KRVEXTRA
KRVC1-3B   KRVC23B
  PROPERTY OPTION SET:  IDEAL   IDEAL
LIQUID / IDEAL GAS

                  ***     MASS     AND     ENERGY
BALANCE  ***
                        IN                  OUT
RELATIVE DIFF.
    CONV.  COMP.(KMOL/HR  )       1993.51
1993.51       0.00000
           (KG/HR    )    35913.6        35913.6
0.00000
    NONCONV.  COMP(KG/HR    )    0.00000
0.00000       0.00000
   TOTAL BALANCE
    MASS(KG/HR    )       35913.6       35913.6
0.00000
    ENTHALPY(MMKCAL/H)    -136.699     -
136.699      0.207915E-15

                  ***  CO2  EQUIVALENT
SUMMARY ***
   FEED STREAMS CO2E              0.00000
KG/HR
   PRODUCT STREAMS CO2E           0.00000
KG/HR
   NET  STREAMS  CO2E  PRODUCTION
0.00000    KG/HR
   UTILITIES CO2E PRODUCTION      0.00000
KG/HR
   TOTAL CO2E PRODUCTION          0.00000
KG/HR

                  *** INPUT DATA ***

 MASS-FLOW (KG/HR    )      STRM=KRVC1-
3B FLOW=   18,799.2       KEY= 0
                        STRM=KRVC23B   FLOW=
12,531.6       KEY= 0

                  *** RESULTS ***

 STREAM= KRVEXTRA    SPLIT=      0.12761
KEY= 0   STREAM-ORDER=  3
       KRVC1-3B                0.52346        0
1
```

KRVC23B 0.34894 0
2

BLOCK: LPT1 MODEL: COMPR

INLET STREAM: EX-ST3
OUTLET STREAM: EX-ST5
OUTLET WORK STREAM: W4
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS
FREE WATER OPTION SET: SYSOP12 ASME STEAM TABLE
SOLUBLE WATER OPTION: THE MAIN PROPERTY OPTION SET (IDEAL).

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 3459.96 3459.96 0.00000
(KG/HR) 62332.1 62332.1 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 62332.1 62332.1 0.00000
ENTHALPY(MMKCAL/H) -194.552 -194.592 0.203603E-03

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

ISENTROPIC TURBINE
OUTLET PRESSURE BAR 4.15000
ISENTROPIC EFFICIENCY 0.62000
MECHANICAL EFFICIENCY 0.96000

*** RESULTS ***

INDICATED HORSEPOWER REQUIREMENT KW -1,151.94
BRAKE HORSEPOWER REQUIREMENT KW -1,105.86
NET WORK REQUIRED KW -1,105.86
POWER LOSSES KW 46.0774
ISENTROPIC HORSEPOWER REQUIREMENT KW -1,857.96
CALCULATED OUTLET TEMP C 189.528
ISENTROPIC TEMPERATURE C 170.633
EFFICIENCY (POLYTR/ISENTR) USED 0.62000
OUTLET VAPOR FRACTION 1.00000
HEAD DEVELOPED, METER -10,942.2
MECHANICAL EFFICIENCY USED 0.96000
INLET HEAT CAPACITY RATIO 1.34355
INLET VOLUMETRIC FLOW RATE , CUM/HR 20,218.0
OUTLET VOLUMETRIC FLOW RATE, CUM/HR 31,285.2
INLET COMPRESSIBILITY FACTOR 0.97032
OUTLET COMPRESSIBILITY FACTOR 0.97546
AV. ISENT. VOL. EXPONENT 1.30531
AV. ISENT. TEMP EXPONENT 1.30499
AV. ACTUAL VOL. EXPONENT 1.16456
AV. ACTUAL TEMP EXPONENT 1.17883

BLOCK: LPT2 MODEL: COMPR

INLET STREAM: EXTR4
OUTLET STREAM: EX-ST6
OUTLET WORK STREAM: W5
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS
FREE WATER OPTION SET: SYSOP12 ASME STEAM TABLE
SOLUBLE WATER OPTION: THE MAIN PROPERTY OPTION SET (IDEAL).

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 3137.11 3137.11 0.00000
(KG/HR) 56515.9 56515.9 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE

MASS(KG/HR) 56515.9 56515.9 0.00000
ENTHALPY(MMKCAL/H) -177.297 -177.362 0.366448E-03

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

ISENTROPIC TURBINE
OUTLET PRESSURE BAR 1.46000
ISENTROPIC EFFICIENCY 0.62000
MECHANICAL EFFICIENCY 0.96000

*** RESULTS ***

INDICATED HORSEPOWER REQUIREMENT KW -1,889.71
BRAKE HORSEPOWER REQUIREMENT KW -1,814.12
NET WORK REQUIRED KW -1,814.12
POWER LOSSES KW 75.5885
ISENTROPIC HORSEPOWER REQUIREMENT KW -3,047.92
CALCULATED OUTLET TEMP C 122.448
ISENTROPIC TEMPERATURE C 110.553
EFFICIENCY (POLYTR/ISENTR) USED 0.62000
OUTLET VAPOR FRACTION 1.00000
HEAD DEVELOPED, METER -19,797.7
MECHANICAL EFFICIENCY USED 0.96000
INLET HEAT CAPACITY RATIO 1.34257
INLET VOLUMETRIC FLOW RATE , CUM/HR 28,366.0
OUTLET VOLUMETRIC FLOW RATE, CUM/HR 69,456.0
INLET COMPRESSIBILITY FACTOR 0.97546
OUTLET COMPRESSIBILITY FACTOR 0.98277
AV. ISENT. VOL. EXPONENT 1.24341
AV. ISENT. TEMP EXPONENT 1.21826
AV. ACTUAL VOL. EXPONENT 1.16657
AV. ACTUAL TEMP EXPONENT 1.17638

BLOCK: LPT3 MODEL: COMPR

INLET STREAM: EXTR5
OUTLET STREAM: EXHAUST
OUTLET WORK STREAM: W6
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS
FREE WATER OPTION SET: SYSOP12 ASME STEAM TABLE
SOLUBLE WATER OPTION: THE MAIN PROPERTY OPTION SET (IDEAL).

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 1380.33 1380.33 0.00000
(KG/HR) 24867.0 24867.0 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 24867.0 24867.0 0.00000
ENTHALPY(MMKCAL/H) -78.7255 -78.7390 0.172615E-03

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

ISENTROPIC TURBINE
OUTLET PRESSURE BAR 0.85000
ISENTROPIC EFFICIENCY 0.62000

MECHANICAL EFFICIENCY 0.96000

*** RESULTS ***

INDICATED HORSEPOWER REQUIREMENT KW -395.183
BRAKE HORSEPOWER REQUIREMENT KW -379.375
NET WORK REQUIRED KW -379.375
POWER LOSSES KW 15.8073
ISENTROPIC HORSEPOWER REQUIREMENT KW -637.391
CALCULATED OUTLET TEMP C 95.1433
ISENTROPIC TEMPERATURE C 95.1433
EFFICIENCY (POLYTR/ISENTR) USED 0.62000
OUTLET VAPOR FRACTION 0.99600
HEAD DEVELOPED, METER -9,409.45
MECHANICAL EFFICIENCY USED 0.96000
INLET HEAT CAPACITY RATIO 1.34412
INLET VOLUMETRIC FLOW RATE , CUM/HR 30,560.7
OUTLET VOLUMETRIC FLOW RATE, CUM/HR 48,852.8
INLET COMPRESSIBILITY FACTOR 0.98277
OUTLET COMPRESSIBILITY FACTOR 0.98244
AV. ISENT. VOL. EXPONENT 1.19292
AV. ISENT. TEMP EXPONENT 1.15235
AV. ACTUAL VOL. EXPONENT 1.15318
AV. ACTUAL TEMP EXPONENT 1.15235

BLOCK: MILL MODEL: CRUSHER

INLET STREAM: MIXIN
OUTLET STREAM: TOSCREEN
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 0.00000 0.00000 0.00000
(KG/HR) 0.00000 0.00000 0.00000
NONCONV. COMP(KG/HR) 39279.4 39279.4 0.00000
TOTAL BALANCE
MASS(KG/HR) 39279.4 39279.4 0.00000
ENTHALPY(MMKCAL/H) -61.2292 -61.2295 0.562303E-05

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
PSD CALCULATION METHOD: DISTRIBUTION FUNCTION
COMMINUTION LAW: BOND'S LAW
BOND WORK INDEX FOR SUBSTREAM NCPSD ,KWHR/TON 20.0000
MAXIMUM NO. OF FLASH ITERATIONS 30
FLASH TOLERANCE 0.000100000

*** RESULTS ***

POWER REQUIREMENT KW 61.8551
PARTICLE DIAMETER WHICH IS
LARGER THAN 80% OF INLET MASS METER 0.0048667
PARTICLE DIAMETER WHICH IS
LARGER THAN 80% OF OUTLET MASS METER 0.0025859
D80 REDUCTION RATIO 1.88202
PARTICLE DIAMETER WHICH IS
LARGER THAN 50% OF INLET MASS METER 0.0021996
PARTICLE DIAMETER WHICH IS
LARGER THAN 50% OF OUTLET MASS METER 0.0014073
D50 REDUCTION RATIO 1.56299
SAUTER DIAMETER AT INLET METER 0.0015087
SAUTER DIAMETER AT OUTLET METER 0.00078782

```
 BLOCK:  MIX     MODEL: MIXER
 ------------------------------
  INLET STREAMS:        X-OUT      Y-OUT
  OUTLET STREAM:        MIX12
  PROPERTY OPTION SET:  IDEAL     IDEAL
LIQUID / IDEAL GAS

                 ***       MASS     AND     ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )        1003.98
1003.98        0.00000
            (KG/HR    )     18087.0          18087.0
0.00000
     NONCONV.  COMP(KG/HR    )   0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )        18087.0          18087.0
0.00000
     ENTHALPY(MMKCAL/H)    -64.9683      -
64.9683        0.240808E-07

                 ***          CO2       EQUIVALENT
SUMMARY ***
   FEED  STREAMS  CO2E                  0.00000
KG/HR
   PRODUCT  STREAMS  CO2E               0.00000
KG/HR
   NET    STREAMS    CO2E    PRODUCTION
0.00000     KG/HR
   UTILITIES CO2E PRODUCTION      0.00000
KG/HR
   TOTAL CO2E PRODUCTION          0.00000
KG/HR

                  *** INPUT DATA  ***
  TWO    PHASE     FLASH
  MAXIMUM          NO.          ITERATIONS
30
  CONVERGENCE                   TOLERANCE
0.000100000
  OUTLET PRESSURE:  MINIMUM OF INLET
STREAM PRESSURES

 BLOCK:  MIX2     MODEL: MIXER
 ------------------------------
  INLET STREAMS:        COND1+2     COND3
  OUTLET STREAM:        COND123
  PROPERTY OPTION SET:  IDEAL     IDEAL
LIQUID / IDEAL GAS

                 ***       MASS     AND     ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )        3459.96
3459.96        0.193536E-08
            (KG/HR    )     62332.1          62332.1
0.193536E-08
     NONCONV.  COMP(KG/HR    )   0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )        62332.1          62332.1
0.193536E-08
     ENTHALPY(MMKCAL/H)    -230.313      -
230.313        -0.536381E-09

                 ***          CO2       EQUIVALENT
SUMMARY ***
   FEED  STREAMS  CO2E                  0.00000
KG/HR
   PRODUCT  STREAMS  CO2E               0.00000
KG/HR
   NET    STREAMS    CO2E    PRODUCTION
0.00000     KG/HR
   UTILITIES CO2E PRODUCTION      0.00000
KG/HR
   TOTAL CO2E PRODUCTION          0.00000
KG/HR

                  *** INPUT DATA  ***
  TWO    PHASE     FLASH
  MAXIMUM          NO.          ITERATIONS
30
  CONVERGENCE                   TOLERANCE
0.000100000
  OUTLET       PRESSURE                 BAR
3.00000

 BLOCK:  MIXER    MODEL: MIXER
 ------------------------------
  INLET STREAMS:        W1        W2        W3
W4        W5
                W6
  OUTLET STREAM:        POWER
  PROPERTY OPTION SET:  IDEAL     IDEAL
LIQUID / IDEAL GAS

                 ***       MASS     AND     ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
   TOTAL BALANCE
     ENTHALPY(MMKCAL/H)          22.3098
22.3098        0.00000

 BLOCK:  OILSPL    MODEL: SEP2
 ------------------------------
  INLET STREAM:         ORGLIQW
  OUTLET STREAMS:       EXWAT     BOIL30
  PROPERTY OPTION SET:  IDEAL     IDEAL
LIQUID / IDEAL GAS

                 ***       MASS     AND     ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )         521.384
521.384        0.00000
```

(KG/HR) 11092.5 11092.5 0.327969E-15
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 11092.5 11092.5 0.327969E-15
ENTHALPY(MMKCAL/H) -34.1049 -34.1049 0.208340E-15

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

FLASH SPECS FOR STREAM EXWAT
TWO PHASE TP FLASH
PRESSURE DROP BAR 0.0
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLASH SPECS FOR STREAM BOIL30
TWO PHASE TP FLASH
PRESSURE DROP BAR 0.0
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

MASS FRACTION
SUBSTREAM= MIXED
STREAM= BOIL30 CPT= H2O FRACTION= 0.30000

*** RESULTS ***

HEAT DUTY MMKCAL/HR -0.64063E-14

STREAM= EXWAT SUBSTREAM= MIXED
COMPONENT = H2O SPLIT FRACTION = 0.89248

STREAM= BOIL30 SUBSTREAM= MIXED
COMPONENT = H2O SPLIT FRACTION = 0.10752

COMPONENT = CARB-ACI SPLIT FRACTION = 1.00000
COMPONENT = KETONES SPLIT FRACTION = 1.00000
COMPONENT = FURANS SPLIT FRACTION = 1.00000
COMPONENT = SUGARS SPLIT FRACTION = 1.00000
COMPONENT = PHENOLS SPLIT FRACTION = 1.00000
COMPONENT = CATECHOL SPLIT FRACTION = 1.00000
COMPONENT = GUAIACOL SPLIT FRACTION = 1.00000
COMPONENT = ALCOHOL SPLIT FRACTION = 1.00000
COMPONENT = AROMATIC SPLIT FRACTION = 1.00000

BLOCK: P-3 MODEL: PUMP

INLET STREAM: KRVC1-3B
OUTLET STREAM: PKRVC1IN
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 1043.51 1043.51 0.00000
(KG/HR) 18799.2 18799.2 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 18799.2 18799.2 0.00000
ENTHALPY(MMKCAL/H) -71.5557 -71.5557 0.00000

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
OUTLET PRESSURE BAR 3.00000
DRIVER EFFICIENCY 1.00000

FLASH SPECIFICATIONS:
LIQUID PHASE CALCULATION
NO FLASH PERFORMED
MAXIMUM NUMBER OF ITERATIONS 30
TOLERANCE 0.000100000

*** RESULTS ***
VOLUMETRIC FLOW RATE CUM/HR 18.5398
PRESSURE CHANGE BAR 0.0
NPSH AVAILABLE METER 30.0876
FLUID POWER KW 0.0
BRAKE POWER KW 0.0
ELECTRICITY KW 0.0
PUMP EFFICIENCY USED 0.50864
NET WORK REQUIRED KW 0.0
HEAD DEVELOPED METER 0.0

BLOCK: P-4 MODEL: PUMP

INLET STREAM: QWAT-UT
OUTLET STREAM: KRVC26B
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	1739.12	1739.12	0.00000
(KG/HR)	31330.8	31330.8	0.00000
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	31330.8	31330.8	0.00000
ENTHALPY(MMKCAL/H)	-117.714	-117.710	-0.341313E-04

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
OUTLET PRESSURE BAR 6.00000
DRIVER EFFICIENCY 1.00000

FLASH SPECIFICATIONS:
LIQUID PHASE CALCULATION
NO FLASH PERFORMED
MAXIMUM NUMBER OF ITERATIONS 30
TOLERANCE 0.000100000

*** RESULTS ***
VOLUMETRIC FLOW RATE CUM/HR 32.5559
PRESSURE CHANGE BAR 3.00000
NPSH AVAILABLE METER 29.9373
FLUID POWER KW 2.71299
BRAKE POWER KW 4.67271
ELECTRICITY KW 4.67271
PUMP EFFICIENCY USED 0.58060
NET WORK REQUIRED KW 4.67271
HEAD DEVELOPED METER 31.7877

BLOCK: P-5 MODEL: PUMP

INLET STREAM: KRVC23B
OUTLET STREAM: KRVC2IN
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	695.610	695.610	0.00000
(KG/HR)	12531.6	12531.6	0.00000
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	12531.6	12531.6	0.00000
ENTHALPY(MMKCAL/H)	-47.6992	-47.6979	-0.273769E-04

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
OUTLET PRESSURE BAR 5.00000
DRIVER EFFICIENCY 1.00000

FLASH SPECIFICATIONS:
LIQUID PHASE CALCULATION
NO FLASH PERFORMED
MAXIMUM NUMBER OF ITERATIONS 30
TOLERANCE 0.000100000

*** RESULTS ***
VOLUMETRIC FLOW RATE CUM/HR 12.3587
PRESSURE CHANGE BAR 2.00000
NPSH AVAILABLE METER 30.0876
FLUID POWER KW 0.68659
BRAKE POWER KW 1.51872
ELECTRICITY KW 1.51872
PUMP EFFICIENCY USED 0.45209
NET WORK REQUIRED KW 1.51872
HEAD DEVELOPED METER 20.1129

BLOCK: P-6 MODEL: PUMP

INLET STREAM: RECOILW
OUTLET STREAM: RECOIL
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 347.590 347.590 0.00000
(KG/HR) 7394.97 7394.97 -0.614942E-15
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 7394.97 7394.97 -0.614942E-15
ENTHALPY(MMKCAL/H) -22.7366 -22.7366 -0.206279E-06

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
OUTLET PRESSURE BAR 1.11000
DRIVER EFFICIENCY 1.00000

FLASH SPECIFICATIONS:
LIQUID PHASE CALCULATION
NO FLASH PERFORMED
MAXIMUM NUMBER OF ITERATIONS 30
TOLERANCE 0.000100000

*** RESULTS ***
VOLUMETRIC FLOW RATE CUM/HR 7.40032
PRESSURE CHANGE BAR 0.010000
NPSH AVAILABLE METER 10.7423
FLUID POWER KW 0.0020556
BRAKE POWER KW 0.0054826
ELECTRICITY KW 0.0054826
PUMP EFFICIENCY USED 0.37494
NET WORK REQUIRED KW 0.0054826
HEAD DEVELOPED METER 0.10205

BLOCK: PDEJON MODEL: PUMP

INLET STREAM: TAVSMIX

OUTLET STREAM: DEJON1
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	1993.51	1993.51	0.00000
(KG/HR)	35913.6	35913.6	0.00000
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	35913.6	35913.6	0.00000
ENTHALPY(MMKCAL/H)	-134.960	-134.954	-0.459429E-04

*** CO2 EQUIVALENT SUMMARY ***

FEED STREAMS CO2E	0.00000 KG/HR
PRODUCT STREAMS CO2E	0.00000 KG/HR
NET STREAMS CO2E PRODUCTION	0.00000 KG/HR
UTILITIES CO2E PRODUCTION	0.00000 KG/HR
TOTAL CO2E PRODUCTION	0.00000 KG/HR

*** INPUT DATA ***

OUTLET PRESSURE	BAR 11.5000
PUMP EFFICIENCY	0.79000
DRIVER EFFICIENCY	1.00000

FLASH SPECIFICATIONS:
LIQUID PHASE CALCULATION
NO FLASH PERFORMED
MAXIMUM NUMBER OF ITERATIONS 30
TOLERANCE 0.000100000

*** RESULTS ***

VOLUMETRIC FLOW RATE	CUM/HR 37.2872
PRESSURE CHANGE	BAR 5.50000
NPSH AVAILABLE	METER 61.7422
FLUID POWER	KW 5.69665
BRAKE POWER	KW 7.21095
ELECTRICITY KW	7.21095
PUMP EFFICIENCY USED	0.79000
NET WORK REQUIRED	KW 7.21095
HEAD DEVELOPED	METER 58.2294

BLOCK: PREH1 MODEL: HEATX

HOT SIDE:

INLET STREAM: MA
OUTLET STREAM: COND3
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS
COLD SIDE:

INLET STREAM: COND123
OUTLET STREAM: CONDENSA
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	3782.81	3782.81	0.00000
(KG/HR)	68148.3	68148.3	0.00000
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	68148.3	68148.3	0.00000
ENTHALPY(MMKCAL/H)	-248.559	-248.559	-0.233783E-10

*** CO2 EQUIVALENT SUMMARY ***

FEED STREAMS CO2E	0.00000 KG/HR
PRODUCT STREAMS CO2E	0.00000 KG/HR
NET STREAMS CO2E PRODUCTION	0.00000 KG/HR
UTILITIES CO2E PRODUCTION	0.00000 KG/HR
TOTAL CO2E PRODUCTION	0.00000 KG/HR

*** INPUT DATA ***

FLASH SPECS FOR HOT SIDE:
TWO PHASE FLASH

MAXIMUM NO. ITERATIONS	30
CONVERGENCE TOLERANCE	0.000100000

FLASH SPECS FOR COLD SIDE:
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

FLOW DIRECTION AND SPECIFICATION:
COUNTERCURRENT HEAT EXCHANGER
SPECIFIED MIN OUTLET TEMP APPR
SPECIFIED VALUE C 10.0000
LMTD CORRECTION FACTOR 1.00000

PRESSURE SPECIFICATION:
HOT SIDE PRESSURE DROP BAR 0.0000
COLD SIDE PRESSURE DROP BAR 0.0000

HEAT TRANSFER COEFFICIENT SPECIFICATION:
HOT LIQUID COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD LIQUID KCAL/HR-SQM-K 730.8684
HOT LIQUID COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD 2-PHASE KCAL/HR-SQM-K 730.8684
HOT LIQUID COLD VAPOR KCAL/HR-SQM-K 730.8684
HOT 2-PHASE COLD VAPOR KCAL/HR-SQM-K 730.8684
HOT VAPOR COLD VAPOR KCAL/HR-SQM-K 730.8684

*** OVERALL RESULTS ***

STREAMS:

```
                ---------------------------------------
                |                                     |
  MA      ----->|              HOT                    |-----> COND3
  T= 1.7741D+02 |                                     |     T= 1.4502D+02
  P= 4.1500D+00 |                                     |     P= 4.1500D+00
  V= 1.0000D+00 |                                     |     V= 2.0944D-01
                |                                     |
  CONDENSA <----|              COLD                   |<---- COND123
  T= 1.3360D+02 |                                     |     T= 1.1694D+02
  P= 3.0000D+00 |                                     |     P= 3.0000D+00
  V= 3.8611D-02 |                                     |     V= 0.0000D+00
                ---------------------------------------
```

DUTY AND AREA:
CALCULATED HEAT DUTY MMKCAL/HR 2.4333
CALCULATED (REQUIRED) AREA SQM 231.6001
ACTUAL EXCHANGER AREA SQM 231.6001
PER CENT OVER-DESIGN 0.0000

HEAT TRANSFER COEFFICIENT:
AVERAGE COEFFICIENT (DIRTY) KCAL/HR-SQM-K 730.8684
UA (DIRTY) CAL/SEC-K 47019.2261

LOG-MEAN TEMPERATURE DIFFERENCE:
LMTD CORRECTION FACTOR 1.0000
LMTD (CORRECTED) C 14.3755
NUMBER OF SHELLS IN SERIES 1

PRESSURE DROP:
HOTSIDE, TOTAL BAR 0.0000
COLDSIDE, TOTAL BAR 0.0000

*** ZONE RESULTS ***

TEMPERATURE LEAVING EACH ZONE:

```
                                HOT
        ------------------------------------------------------------
        |             |             |             |
 HOT IN |      VAP    |      COND   |      COND   | HOT OUT
 ------>|             |             |             |------>
  177.4 |      145.0  |      145.0  |             | 145.0
        |             |             |             |
 COLDOUT|      BOIL   |      BOIL   |      LIQ    | COLDIN
 <------|             |             |             |<------
  133.6 |      133.6  |      133.6  |             | 116.9
        |             |             |             |
```

```
------------------------------------------------------
------
                          COLD

  ZONE HEAT TRANSFER AND AREA:

  ZONE     HEAT DUTY     AREA     LMTD
AVERAGE U     UA
           MMKCAL/HR          SQM          C
KCAL/HR-SQM-K   CAL/SEC-K
    1        0.086        4.9008      24.0962   730.8684
994.9620
    2        1.162      139.1760      11.4259   730.8684
28255.3695
    3        1.185       87.5233      18.5217   730.8684
17768.8945

 BLOCK:  PUMP1    MODEL: PUMP
 ------------------------------
  INLET STREAM:         FWBOILER
  OUTLET STREAM:        FW141BAR
  OUTLET WORK STREAM:   W-PUMP1
  PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS

                 ***    MASS    AND    ENERGY
BALANCE  ***
                            IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR )          7294.85
7294.85        0.00000
            (KG/HR    )     131419.          131419.
0.00000
     NONCONV.  COMP(KG/HR    )    0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )          131419.          131419.
0.00000
     ENTHALPY(MMKCAL/H)     -477.060      -
477.060       -0.201917E-08

                 ***          CO2          EQUIVALENT
SUMMARY ***
   FEED  STREAMS  CO2E                    0.00000
KG/HR
   PRODUCT  STREAMS  CO2E                 0.00000
KG/HR
   NET    STREAMS    CO2E    PRODUCTION
0.00000     KG/HR
   UTILITIES  CO2E  PRODUCTION      0.00000
KG/HR
   TOTAL  CO2E  PRODUCTION          0.00000
KG/HR

                    *** INPUT DATA ***
   EQUIPMENT TYPE: PUMP
   OUTLET        PRESSURE                  BAR
140.000
   PUMP                                EFFICIENCY
0.79000
   DRIVER                              EFFICIENCY
1.00000

   FLASH SPECIFICATIONS:
   LIQUID PHASE CALCULATION
   NO FLASH PERFORMED
   MAXIMUM  NUMBER  OF  ITERATIONS
30
   TOLERANCE
0.000100000

                    *** RESULTS ***
   VOLUMETRIC  FLOW  RATE     CUM/HR
156.694
   PRESSURE       CHANGE              BAR
131.900
   NPSH      AVAILABLE                METER
0.35874
   FLUID POWER KW                      574.108
   BRAKE          POWER                 KW
726.719
   ELECTRICITY KW                      726.719
   PUMP           EFFICIENCY          USED
0.79000
   NET     WORK     REQUIRED          KW
726.719
   HEAD          DEVELOPED            METER
1,603.68

 BLOCK:  RECIRK   MODEL: FSPLIT
 ------------------------------
  INLET STREAM:         FG
  OUTLET STREAMS:       FG-SP      RECY1
  PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS

                 ***    MASS    AND    ENERGY
BALANCE  ***
                            IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR )         17388.1
17388.1        0.00000
            (KG/HR    )     499538.          499538.
0.00000
     NONCONV.  COMP(KG/HR    )    0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR    )          499538.          499538.
0.00000
     ENTHALPY(MMKCAL/H)     -200.741      -
200.741       0.406740E-09

                 ***          CO2          EQUIVALENT
SUMMARY ***
   FEED  STREAMS  CO2E                    62302.3
KG/HR
   PRODUCT  STREAMS  CO2E                 62302.3
KG/HR
   NET    STREAMS    CO2E    PRODUCTION
0.00000     KG/HR
```

UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

FRACTION OF FLOW STRM=RECY1 FRAC= 0.31000

*** RESULTS ***

STREAM= FG-SP SPLIT= 0.69000 KEY= 0 STREAM-ORDER= 2
RECY1 0.31000 0
1

BLOCK: SCREEN MODEL: SCREEN

INLET STREAM: TOSCREEN
OUTLET STREAMS: COARSE LES1,4MM
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 0.00000 0.00000 0.00000
(KG/HR) 0.00000 0.00000 0.00000
NONCONV. COMP(KG/HR) 39279.4 39279.4 -0.185236E-15
TOTAL BALANCE
MASS(KG/HR) 39279.4 39279.4 -0.185236E-15
ENTHALPY(MMKCAL/H) -61.2295 -61.2295 0.232092E-15

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

NUMBER OF SCREEN DECKS 1

SCREEN DECK 1
COARSE OUTLET COARSE
SEPARATION MODEL BUREAU OF MINES
UPPER LEVEL SCREEN IN DRY OPERATION MODE
SCREEN OPENING SIZE METER 0.0014000
SEPARATION STRENGTH OF SCREEN MISSING
FLUID SPLIT FACTOR TO COARSE 0.50000

MAXIMUM NO. OF FLASH ITERATIONS 30
FLASH TOLERANCE 0.000100000

*** RESULTS ***

DRY OPERATION MODE

OVERALL EFFICIENCY 0.75026
TAGGART OVERALL EFFICIENCY 0.50195
SEPARATION STRENGTH OF SCREEN (CALC) 1.7525
OVERSIZE EFFICIENCY 0.99225
UNDERSIZE EFFICIENCY 0.50581
FINES PSD MEAN VALUE METER 0.00055739

DECK 1

EDER SEPARATION SHARPNESS 0.24882
COARSE PSD MEAN VALUE METER 0.18208E-02

COARSE SOLID MASS FLOW KG/HR 29243.
FINES SOLID MASS FLOW KG/HR 10036.

OVERFLOW FLUID MASS FLOW KG/HR 0.0000
UNDERFLOW FLUID MASS FLOW KG/HR 0.0000

SEPARATION EFFICIENCY FOR SUBSTREAM NCPSD

SIZE DECK 1
METER
0.11590E-03 0.20040

```
 0.15275E-03     0.20986
 0.20131E-03     0.22301
 0.26532E-03     0.24161
 0.34967E-03     0.26852
 0.46085E-03     0.30862
 0.60737E-03     0.37075
 0.80048E-03     0.47214
 0.10550E-02     0.64928
 0.13904E-02     0.93813
 0.18325E-02     1.0000
 0.24151E-02     1.0000
 0.31830E-02     1.0000
 0.41950E-02     1.0000
 0.55288E-02     1.0000
 0.72867E-02     1.0000
 0.96034E-02     1.0000
 0.12657E-01     1.0000
 0.16681E-01     1.0000
 0.21984E-01     1.0000

 OVERALL SEPARATION EFFICIENCY


 SIZE          DECK  1
 METER
 0.11590E-03     0.20040
 0.15275E-03     0.20986
 0.20131E-03     0.22301
 0.26532E-03     0.24161
 0.34967E-03     0.26852
 0.46085E-03     0.30862
 0.60737E-03     0.37075
 0.80048E-03     0.47214
 0.10550E-02     0.64928
 0.13904E-02     0.93813
 0.18325E-02     1.0000
 0.24151E-02     1.0000
 0.31830E-02     1.0000
 0.41950E-02     1.0000
 0.55288E-02     1.0000
 0.72867E-02     1.0000
 0.96034E-02     1.0000
 0.12657E-01     1.0000
 0.16681E-01     1.0000
 0.21984E-01     1.0000

 BLOCK:  SEP2     MODEL: SEP
 ------------------------
  INLET STREAM:         BOIL+GAS
  OUTLET STREAMS:     GASES     RECOILW
ORGLIQW
  PROPERTY OPTION SET:   IDEAL     IDEAL
LIQUID / IDEAL GAS

                ***       MASS     AND     ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )        946.362
946.362        0.00000

                (KG/HR    )     20429.3          20429.3
0.00000
     NONCONV.  COMP(KG/HR    )     0.00000
0.00000        0.00000
   TOTAL BALANCE
     MASS(KG/HR  )          20429.3          20429.3
0.00000
     ENTHALPY(MMKCAL/H)     -57.4949     -
57.5190        0.419306E-03

                ***          CO2          EQUIVALENT
SUMMARY ***
   FEED  STREAMS  CO2E                  2620.19
KG/HR
   PRODUCT  STREAMS  CO2E               2620.19
KG/HR
   NET     STREAMS     CO2E     PRODUCTION
0.00000     KG/HR
   UTILITIES  CO2E  PRODUCTION          0.00000
KG/HR
   TOTAL  CO2E  PRODUCTION              0.00000
KG/HR


                    ***  INPUT DATA  ***

   FLASH SPECS FOR STREAM GASES
   TWO    PHASE   TP   FLASH
   PRESSURE DROP       BAR                    0.0
   MAXIMUM          NO.          ITERATIONS
30
   CONVERGENCE                  TOLERANCE
0.000100000

   FLASH SPECS FOR STREAM RECOILW
   TWO    PHASE   TP   FLASH
   PRESSURE DROP       BAR                    0.0
   MAXIMUM          NO.          ITERATIONS
30
   CONVERGENCE                  TOLERANCE
0.000100000

   FLASH SPECS FOR STREAM ORGLIQW
   TWO    PHASE   TP   FLASH
   PRESSURE DROP       BAR                    0.0
   MAXIMUM          NO.          ITERATIONS
30
   CONVERGENCE                  TOLERANCE
0.000100000

   FRACTION OF FEED
     SUBSTREAM= MIXED
       STREAM=    GASES                CPT=    N2
FRACTION=        0.0
                  O2                    0.0
                  H2O                    0.0
                  CHLOR                    0.0
                  C                   0.0
                  H2                    1.00000
                  S                   0.0
```

```
                CO              1.00000
                CO2             1.00000
                NO              0.0
                NO2             0.0
                N2O             0.0
                SO2             0.0
                NH3             0.0
                CATA            0.0
                SAND            0.0
                CH4             1.00000
                C2H4            1.00000
                C2H6            1.00000
                C3H8            1.00000
                C3H6            1.00000
                C2H2            1.00000
                IC4H10          1.00000
                1-C4H8          1.00000
                CH3C2H          1.00000
                NC6H14          1.00000
                COKE            0.0
                CARB-ACI        0.0
                KETONES         0.0
                FURANS          0.0
                SUGARS          0.0
                PHENOLS         0.0
                CATECHOL        0.0
                GUAIACOL        0.0
                ALCOHOL         0.0
                AROMATIC        0.0
                CARBON          0.0
                AIR             0.0
     STREAM=    RECOILW    CPT=    N2
FRACTION=       0.0
                O2              0.0
                H2O             0.40000
                H2              0.0
                CO              0.0
                CO2             0.0
                CATA            0.0
                SAND            0.0
                CH4             0.0
                C2H4            0.0
                C2H6            0.0
                C3H8            0.0
                C3H6            0.0
                C2H2            0.0
                IC4H10          0.0
                1-C4H8          0.0
                CH3C2H          0.0
                NC6H14          0.0
                COKE            0.0
                CARB-ACI        0.40000
                KETONES         0.40000
                FURANS          0.40000
                SUGARS          0.40000
                PHENOLS         0.40000
                CATECHOL        0.40000
                GUAIACOL        0.40000
                ALCOHOL         0.40000
                AROMATIC        0.40000
                CARBON          0.0
                AIR             0.0
     SUBSTREAM= CIPSD
      STREAM=   GASES       CPT=    C
FRACTION=       0.0
                CATA            0.0
                SAND            0.0
                COKE            0.0
                CARBON          0.0
     SUBSTREAM= NCPSD
      STREAM=  GASES     CPT=  CHPFUEL
FRACTION=       0.0
                ASH             0.0
                PYRFUEL         0.0
                CHAR            0.0
      STREAM=   RECOILW     CPT=   ASH
FRACTION=       0.0
                PYRFUEL         0.0
                CHAR            0.0


                    *** RESULTS ***

  HEAT DUTY       MMKCAL/HR           -
0.24118E-01

 COMPONENT = H2O
   STREAM       SUBSTREAM       SPLIT
FRACTION
   RECOILW    MIXED          0.40000
   ORGLIQW    MIXED          0.60000

 COMPONENT = H2
   STREAM       SUBSTREAM       SPLIT
FRACTION
   GASES      MIXED          1.00000

 COMPONENT = CO
   STREAM       SUBSTREAM       SPLIT
FRACTION
   GASES      MIXED          1.00000

 COMPONENT = CO2
   STREAM       SUBSTREAM       SPLIT
FRACTION
   GASES      MIXED          1.00000

 COMPONENT = CH4
   STREAM       SUBSTREAM       SPLIT
FRACTION
   GASES      MIXED          1.00000

 COMPONENT = C2H4
   STREAM       SUBSTREAM       SPLIT
FRACTION
   GASES      MIXED          1.00000

 COMPONENT = C2H6
   STREAM       SUBSTREAM       SPLIT
FRACTION
```

```
   GASES     MIXED          1.00000

 COMPONENT = C3H8
   STREAM          SUBSTREAM         SPLIT
FRACTION
   GASES     MIXED          1.00000

 COMPONENT = C3H6
   STREAM          SUBSTREAM         SPLIT
FRACTION
   GASES     MIXED          1.00000

 COMPONENT = C2H2
   STREAM          SUBSTREAM         SPLIT
FRACTION
   GASES     MIXED          1.00000

 COMPONENT = IC4H10
   STREAM          SUBSTREAM         SPLIT
FRACTION
   GASES     MIXED          1.00000

 COMPONENT = 1-C4H8
   STREAM          SUBSTREAM         SPLIT
FRACTION
   GASES     MIXED          1.00000

 COMPONENT = CH3C2H
   STREAM          SUBSTREAM         SPLIT
FRACTION
   GASES     MIXED          1.00000

 COMPONENT = NC6H14
   STREAM          SUBSTREAM         SPLIT
FRACTION
   GASES     MIXED          1.00000

 COMPONENT = CARB-ACI
   STREAM          SUBSTREAM         SPLIT
FRACTION
   RECOILW   MIXED          0.40000
   ORGLIQW   MIXED          0.60000

 COMPONENT = KETONES
   STREAM          SUBSTREAM         SPLIT
FRACTION
   RECOILW   MIXED          0.40000
   ORGLIQW   MIXED          0.60000

 COMPONENT = FURANS
   STREAM          SUBSTREAM         SPLIT
FRACTION
   RECOILW   MIXED          0.40000
   ORGLIQW   MIXED          0.60000

 COMPONENT = SUGARS
   STREAM          SUBSTREAM         SPLIT
FRACTION
   RECOILW   MIXED          0.40000
   ORGLIQW   MIXED          0.60000

 COMPONENT = PHENOLS
   STREAM          SUBSTREAM         SPLIT
FRACTION
   RECOILW   MIXED          0.40000
   ORGLIQW   MIXED          0.60000

 COMPONENT = CATECHOL
   STREAM          SUBSTREAM         SPLIT
FRACTION
   RECOILW   MIXED          0.40000
   ORGLIQW   MIXED          0.60000

 COMPONENT = GUAIACOL
   STREAM          SUBSTREAM         SPLIT
FRACTION
   RECOILW   MIXED          0.40000
   ORGLIQW   MIXED          0.60000

 COMPONENT = ALCOHOL
   STREAM          SUBSTREAM         SPLIT
FRACTION
   RECOILW   MIXED          0.40000
   ORGLIQW   MIXED          0.60000

 COMPONENT = AROMATIC
   STREAM          SUBSTREAM         SPLIT
FRACTION
   RECOILW   MIXED          0.40000
   ORGLIQW   MIXED          0.60000

 BLOCK:  SOLSEP   MODEL: SEP
 ------------------------------
  INLET STREAM:         SOL
  OUTLET   STREAMS:                    CHAR
SPEN+COK
  PROPERTY OPTION SET:   IDEAL    IDEAL
LIQUID / IDEAL GAS

                 ***       MASS    AND    ENERGY
BALANCE  ***
                          IN                   OUT
RELATIVE DIFF.
  CONVENTIONAL            COMPONENTS
(KMOL/HR )
     N2                 0.00000         0.00000
0.00000
     O2                 0.00000         0.00000
0.00000
     H2O                0.00000         0.00000
0.00000
     CHLOR              0.00000         0.00000
0.00000
     C                  0.00000         0.00000
0.00000
     H2                 0.00000         0.00000
0.00000
     S          0.00000      0.00000      0.00000
     CO                 0.00000         0.00000
0.00000
```

CO2	0.00000	0.00000	0.00000	SUBTOTAL(KMOL/HR)	130.800	130.800	0.00000
NO	0.00000	0.00000	0.00000	(KG/HR)	5241.43	5241.43	0.00000
NO2	0.00000	0.00000	0.00000	NON-CONVENTIONAL COMPONENTS (KG/HR)			
N2O	0.00000	0.00000	0.00000	CHPFUEL	0.00000	0.00000	0.00000
SO2	0.00000	0.00000	0.00000	ASH	0.00000	0.00000	0.00000
NH3	0.00000	0.00000	0.00000	PYRFUEL	0.00000	0.00000	0.00000
CATA	1.54612	1.54612	0.00000	CHAR	1645.52	1645.52	0.00000
SAND	73.4568	73.4568	0.00000	SUBTOTAL(KG/HR)	1645.52	1645.52	0.00000
CH4	0.00000	0.00000	0.00000	TOTAL BALANCE			
C2H4	0.00000	0.00000	0.00000	MASS(KG/HR)	6886.95	6886.95	0.00000
C2H6	0.00000	0.00000	0.00000	ENTHALPY(MMKCAL/H)	-15.6473	-15.6473	0.00000
C3H8	0.00000	0.00000	0.00000				
C3H6	0.00000	0.00000	0.00000				
C2H2	0.00000	0.00000	0.00000				
IC4H10	0.00000	0.00000	0.00000				
1-C4H8	0.00000	0.00000	0.00000				
CH3C2H	0.00000	0.00000	0.00000				
NC6H14	0.00000	0.00000	0.00000				
COKE	55.7974	55.7974	0.00000				
CARB-ACI	0.00000	0.00000	0.00000				
KETONES	0.00000	0.00000	0.00000				
FURANS	0.00000	0.00000	0.00000				
SUGARS	0.00000	0.00000	0.00000				
PHENOLS	0.00000	0.00000	0.00000				
CATECHOL	0.00000	0.00000	0.00000				
GUAIACOL	0.00000	0.00000	0.00000				
ALCOHOL	0.00000	0.00000	0.00000				
AROMATIC	0.00000	0.00000	0.00000				
CARBON	0.00000	0.00000	0.00000				
AIR	0.00000	0.00000	0.00000				

*** CO2 EQUIVALENT SUMMARY ***			
FEED STREAMS CO2E	0.00000	KG/HR	
PRODUCT STREAMS CO2E	0.00000	KG/HR	
NET STREAMS CO2E PRODUCTION	0.00000	KG/HR	
UTILITIES CO2E PRODUCTION	0.00000	KG/HR	
TOTAL CO2E PRODUCTION	0.00000	KG/HR	

*** INPUT DATA ***

FLASH SPECS FOR STREAM CHAR			
TWO PHASE TP FLASH			
PRESSURE DROP	BAR	0.0	
MAXIMUM NO. ITERATIONS		30	
CONVERGENCE TOLERANCE		0.000100000	
FLASH SPECS FOR STREAM SPEN+COK			
TWO PHASE TP FLASH			
PRESSURE DROP	BAR	0.0	
MAXIMUM NO. ITERATIONS		30	
CONVERGENCE TOLERANCE		0.000100000	
FRACTION OF FEED			
SUBSTREAM= MIXED			
STREAM= CHAR	CPT=	N2	FRACTION= 0.0
		O2	0.0
		H2O	0.0

```
                    H2                  0.0
                    CO                  0.0
                    CO2                 0.0
                    CATA                0.0
                    SAND                0.0
                    CH4                 0.0
                    C2H4                0.0
                    C2H6                0.0
                    C3H8                0.0
                    C3H6                0.0
                    C2H2                0.0
                    IC4H10              0.0
                    1-C4H8              0.0
                    CH3C2H              0.0
                    NC6H14              0.0
                    COKE                0.0
                    CARB-ACI            0.0
                    KETONES             0.0
                    FURANS              0.0
                    SUGARS              0.0
                    PHENOLS             0.0
                    CATECHOL            0.0
                    GUAIACOL            0.0
                    ALCOHOL             0.0
                    AROMATIC            0.0
                    CARBON              0.0
   SUBSTREAM= CIPSD
    STREAM=  SPEN+COK     CPT=  CATA
FRACTION=      1.00000
                    SAND                1.00000
                    COKE                1.00000
                    CARBON              0.0
   SUBSTREAM= NCPSD
    STREAM=  CHAR         CPT=  ASH
FRACTION=      0.0
                    PYRFUEL             0.0
                    CHAR                1.00000


                 *** RESULTS ***

  HEAT  DUTY                    MMKCAL/HR
0.0000

 COMPONENT = CATA
  STREAM          SUBSTREAM         SPLIT
FRACTION
  SPEN+COK  CIPSD           1.00000

 COMPONENT = SAND
  STREAM          SUBSTREAM         SPLIT
FRACTION
  SPEN+COK  CIPSD           1.00000

 COMPONENT = COKE
  STREAM          SUBSTREAM         SPLIT
FRACTION
  SPEN+COK  CIPSD           1.00000

 COMPONENT = CHAR
  STREAM          SUBSTREAM         SPLIT
FRACTION
  CHAR      NCPSD           1.00000

 BLOCK:  SP-STA   MODEL: FSPLIT
 ------------------------------
  INLET STREAM:         QSTA-RE
  OUTLET STREAMS:       QAIR-1     QAIR-2
  PROPERTY OPTION SET:  IDEAL     IDEAL
LIQUID / IDEAL GAS

              ***       MASS    AND    ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
  TOTAL BALANCE
    ENTHALPY(MMKCAL/H)          1.01468
1.01468       0.00000

              ***  INPUT DATA  ***

 FRACTION OF FLOW             STRM=QAIR-
1  FRAC=       0.44070

              ***  RESULTS  ***

 STREAM= QAIR-1       SPLIT=       0.44070
       QAIR-2                 0.55930

 BLOCK:  SP1     MODEL: FSPLIT
 ------------------------------
  INLET STREAM:         EXTOT1
  OUTLET STREAMS:       MX        EXTR1
  PROPERTY OPTION SET:  IDEAL     IDEAL
LIQUID / IDEAL GAS

              ***       MASS    AND    ENERGY
BALANCE  ***
                          IN                    OUT
RELATIVE DIFF.
    CONV.  COMP.(KMOL/HR  )       7294.82
7294.82       0.00000
           (KG/HR    )    131418.         131418.
0.00000
    NONCONV.  COMP(KG/HR    )   0.00000
0.00000       0.00000
  TOTAL BALANCE
    MASS(KG/HR  )       131418.       131418.
0.00000
    ENTHALPY(MMKCAL/H)    -402.766    -
402.766       0.779052E-13

              ***          CO2      EQUIVALENT
SUMMARY ***
  FEED  STREAMS  CO2E                0.00000
KG/HR
  PRODUCT  STREAMS  CO2E          0.00000
KG/HR
  NET    STREAMS    CO2E    PRODUCTION
0.00000     KG/HR
```

```
  UTILITIES CO2E PRODUCTION      0.00000
KG/HR
  TOTAL CO2E PRODUCTION          0.00000
KG/HR

                *** INPUT DATA ***

 PRESSURE DROP  BAR                    0.0

 FRACTION OF FLOW               STRM=MX
FRAC=       0.090000

                *** RESULTS ***

 STREAM= MX            SPLIT=          0.090000
KEY= 0   STREAM-ORDER=  1
       EXTR1                  0.91000          0
2

 BLOCK:  SP2     MODEL: FSPLIT
 ------------------------------
  INLET STREAM:         EX-TOT2
  OUTLET STREAMS:       EXTR2     MY
  PROPERTY OPTION SET:  IDEAL     IDEAL
LIQUID / IDEAL GAS

              ***      MASS     AND     ENERGY
BALANCE  ***
                       IN                    OUT
RELATIVE DIFF.
    CONV.  COMP.(KMOL/HR  )        6638.28
6638.28       0.00000
           (KG/HR    )     119591.          119591.
0.00000
    NONCONV.  COMP(KG/HR    )      0.00000
0.00000       0.00000
  TOTAL BALANCE
    MASS(KG/HR    )          119591.          119591.
0.00000
    ENTHALPY(MMKCAL/H)     -370.097     -
370.097       0.602783E-08

              ***          CO2          EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                0.00000
KG/HR
  PRODUCT STREAMS CO2E             0.00000
KG/HR
  NET     STREAMS     CO2E     PRODUCTION
0.00000    KG/HR
  UTILITIES CO2E PRODUCTION      0.00000
KG/HR
  TOTAL CO2E PRODUCTION          0.00000
KG/HR

                *** INPUT DATA ***

 FRACTION OF FLOW               STRM=MY
FRAC=       0.052340

                *** RESULTS ***

 STREAM= EXTR2         SPLIT=          0.94766
KEY= 0   STREAM-ORDER=  2
       MY                     0.052340          0
1

 BLOCK:  SP3     MODEL: FSPLIT
 ------------------------------
  INLET STREAM:         EXTOT2
  OUTLET STREAMS:       PROCESS     STE
EX        DKOND     ST-AIRPH
  PROPERTY OPTION SET:  IDEAL     IDEAL
LIQUID / IDEAL GAS

              ***      MASS     AND     ENERGY
BALANCE  ***
                       IN                    OUT
RELATIVE DIFF.
    CONV.  COMP.(KMOL/HR  )        6290.84
6290.84       0.144575E-15
           (KG/HR    )     113331.          113331.
0.128402E-15
    NONCONV.  COMP(KG/HR    )      0.00000
0.00000       0.00000
  TOTAL BALANCE
    MASS(KG/HR    )          113331.          113331.
0.128402E-15
    ENTHALPY(MMKCAL/H)     -353.731     -
353.731       0.308428E-10

              ***          CO2          EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                0.00000
KG/HR
  PRODUCT STREAMS CO2E             0.00000
KG/HR
  NET     STREAMS     CO2E     PRODUCTION
0.00000    KG/HR
  UTILITIES CO2E PRODUCTION      0.00000
KG/HR
  TOTAL CO2E PRODUCTION          0.00000
KG/HR

                *** INPUT DATA ***

 FRACTION              OF              FLOW
STRM=PROCESS  FRAC=       0.27000
                       STRM=STE          FRAC=
0.090000
                       STRM=EX           FRAC=
0.55000
                       STRM=DKOND        FRAC=
0.072000

                *** RESULTS ***

 STREAM= PROCESS       SPLIT=          0.27000
KEY= 0   STREAM-ORDER=  1
```

```
      STE                    0.090000        0
2
      EX              0.55000       0         3
      DKOND                  0.072000        0
4
      ST-AIRPH               0.018000        0
5

 BLOCK: SP4     MODEL: FSPLIT
 ------------------------------
  INLET STREAM:        EX-ST5
  OUTLET STREAMS:      EXTR4     MA
  PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS

                ***      MASS     AND     ENERGY
BALANCE  ***
                         IN                  OUT
RELATIVE DIFF.
    CONV. COMP.(KMOL/HR )       3459.96
3459.96       0.00000
           (KG/HR    )     62332.1         62332.1
0.00000
    NONCONV. COMP(KG/HR    )   0.00000
0.00000       0.00000
  TOTAL BALANCE
    MASS(KG/HR    )        62332.1         62332.1
0.00000
    ENTHALPY(MMKCAL/H)    -195.543    -
195.543       0.127024E-10

                ***          CO2      EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                0.00000
KG/HR
  PRODUCT STREAMS CO2E             0.00000
KG/HR
  NET    STREAMS    CO2E    PRODUCTION
0.00000    KG/HR
  UTILITIES CO2E PRODUCTION        0.00000
KG/HR
  TOTAL CO2E PRODUCTION            0.00000
KG/HR

                    ***  INPUT DATA  ***

 FRACTION OF FLOW                STRM=MA
FRAC=       0.093310

                    ***  RESULTS  ***

 STREAM= EXTR4          SPLIT=          0.90669
KEY= 0   STREAM-ORDER=  2
      MA                     0.093310        0
1

 BLOCK: SP5     MODEL: FSPLIT
 ------------------------------
  INLET STREAM:        EX-ST6
  OUTLET STREAMS:      MB        EXTR5
  PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS

                ***      MASS     AND     ENERGY
BALANCE  ***
                         IN                  OUT
RELATIVE DIFF.
    CONV. COMP.(KMOL/HR )       3137.11
3137.11       0.00000
           (KG/HR    )     56515.9         56515.9
0.00000
    NONCONV. COMP(KG/HR    )   0.00000
0.00000       0.00000
  TOTAL BALANCE
    MASS(KG/HR    )        56515.9         56515.9
0.00000
    ENTHALPY(MMKCAL/H)    -178.921    -
178.921       0.287341E-10

                ***          CO2      EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                0.00000
KG/HR
  PRODUCT STREAMS CO2E             0.00000
KG/HR
  NET    STREAMS    CO2E    PRODUCTION
0.00000    KG/HR
  UTILITIES CO2E PRODUCTION        0.00000
KG/HR
  TOTAL CO2E PRODUCTION            0.00000
KG/HR

                    ***  INPUT DATA  ***

 FRACTION OF FLOW                STRM=MB
FRAC=       0.56000

                    ***  RESULTS  ***

 STREAM= MB             SPLIT=          0.56000
KEY= 0   STREAM-ORDER=  1
      EXTR5                  0.44000         0
2

 BLOCK: SSPL2   MODEL: SSPLIT
 ------------------------------
  INLET STREAM:        CHRPROD
  OUTLET STREAMS:      ASH       CRGAS
CARBON
  PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS

                ***      MASS     AND     ENERGY
BALANCE  ***
                         IN                  OUT
RELATIVE DIFF.
    CONV. COMP.(KMOL/HR )        148.267
148.267       0.00000
           (KG/HR    )      1617.22         1617.22
0.00000
```

```
    NONCONV. COMP(KG/HR    )    28.3030
28.3030       0.00000
  TOTAL BALANCE
    MASS(KG/HR    )        1645.52       1645.52
0.00000
    ENTHALPY(MMKCAL/H)          0.318848
0.318848       0.00000

                ***          CO2      EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                  0.00000
KG/HR
  PRODUCT STREAMS CO2E               0.00000
KG/HR
  NET   STREAMS   CO2E   PRODUCTION
0.00000    KG/HR
  UTILITIES CO2E PRODUCTION          0.00000
KG/HR
  TOTAL CO2E PRODUCTION              0.00000
KG/HR

                *** INPUT DATA ***

 FRACTION OF FLOW
  SUBSTRM=       STRM=         FRAC=
       MIXED       ASH              0.0
       MIXED       CARBON           0.0
       CIPSD       ASH              0.0
       CIPSD       CARBON           1.00000
       NCPSD       ASH              1.00000
       NCPSD       CARBON           0.0

                *** RESULTS ***

 STRM= ASH      SUBSTRM= MIXED   SPLIT
FRACT=       0.0
                 CIPSD              0.0
                 NCPSD              1.00000

 STRM= CRGAS    SUBSTRM= MIXED   SPLIT
FRACT=       1.00000
                 CIPSD              0.0
                 NCPSD              0.0

 STRM=  CARBON        SUBSTRM=  MIXED
SPLIT FRACT=       0.0
                 CIPSD              1.00000
                 NCPSD              0.0

 BLOCK:  SSPLIT   MODEL: SSPLIT
 ------------------------------
  INLET STREAM:       COMBPROD
  OUTLET STREAMS:     FLUEGAS   SOLIDS
  PROPERTY OPTION SET:  IDEAL   IDEAL
LIQUID / IDEAL GAS

               ***      MASS    AND    ENERGY
BALANCE ***
                          IN                 OUT
RELATIVE DIFF.
    CONV. COMP.(KMOL/HR )       17388.1
17388.1       0.00000
          (KG/HR    )    499538.        499538.
0.00000
    NONCONV. COMP(KG/HR    )    648.000
648.000       0.00000
  TOTAL BALANCE
    MASS(KG/HR    )        500186.       500186.
0.00000
    ENTHALPY(MMKCAL/H)    -121.826    -
121.826       0.215846E-08

                ***          CO2      EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                  62302.3
KG/HR
  PRODUCT STREAMS CO2E               62302.3
KG/HR
  NET   STREAMS   CO2E   PRODUCTION
0.00000    KG/HR
  UTILITIES CO2E PRODUCTION          0.00000
KG/HR
  TOTAL CO2E PRODUCTION              0.00000
KG/HR

                *** INPUT DATA ***

 OUTLET       PRESSURE                BAR
1.10000

 FRACTION OF FLOW
  SUBSTRM=       STRM=         FRAC=
       MIXED       FLUEGAS          1.00000
       CIPSD       FLUEGAS          0.0
       NCPSD       FLUEGAS          0.0

                *** RESULTS ***

 STRM=  FLUEGAS       SUBSTRM=  MIXED
SPLIT FRACT=       1.00000
                 CIPSD              0.0
                 NCPSD              0.0

 STRM= SOLIDS   SUBSTRM= MIXED   SPLIT
FRACT=       0.0
                 CIPSD              1.00000
                 NCPSD              1.00000

 BLOCK:  ST-AIR1  MODEL: HEATER
 ------------------------------
  INLET STREAM:       AIR1
  INLET HEAT STREAM:    QAIR-1
  OUTLET STREAM:      A1
  OUTLET HEAT STREAM:   QRES1
  PROPERTY OPTION SET:  IDEAL   IDEAL
LIQUID / IDEAL GAS

               ***      MASS    AND    ENERGY
BALANCE ***
```

IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 3044.67 3044.67 0.00000
(KG/HR) 87840.0 87840.0 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 87840.0 87840.0 0.00000
ENTHALPY(MMKCAL/H) 0.446364 0.446364 0.373089E-15

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 90.0000
SPECIFIED PRESSURE BAR 1.00000
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***
OUTLET TEMPERATURE C 90.000
OUTLET PRESSURE BAR 1.0000
HEAT DUTY MMKCAL/HR 1.3826
NET DUTY MMKCAL/HR 0.93538
OUTLET VAPOR FRACTION 1.0000

V-L PHASE EQUILIBRIUM :

COMP F(I) X(I) Y(I) K(I)
N2 0.79000 0.76647 0.79000 1536.4
O2 0.21000 0.23353 0.21000 1340.5

BLOCK: ST-AIR2 MODEL: HEATER

INLET STREAM: AIR2
INLET HEAT STREAM: QAIR-2
OUTLET STREAM: A2
OUTLET HEAT STREAM: QRES2
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 4567.01 4567.01 0.00000
(KG/HR) 131760. 131760. 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 131760. 131760. 0.00000
ENTHALPY(MMKCAL/H) 0.566302 0.566302 -0.392096E-15

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 80.0000
SPECIFIED PRESSURE BAR 1.10000
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***
OUTLET TEMPERATURE C 80.000
OUTLET PRESSURE BAR 1.1000

HEAT DUTY MMKCAL/HR 1.7543
NET DUTY MMKCAL/HR 1.1868
OUTLET VAPOR FRACTION 1.0000
PRESSURE-DROP CORRELATION PARAMETER 0.0000

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
N2	0.79000	0.76442	0.79000	1318.7
O2	0.21000	0.23558	0.21000	1137.4

BLOCK: ST-SIDE MODEL: HEATER

INLET STREAM: FW2
INLET HEAT STREAM: QB2
OUTLET STREAM: SH-ST1
OUTLET HEAT STREAM: QBRES
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	7294.85	7294.82	0.419471E-05
(KG/HR)	131419.	131418.	0.419471E-05
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	131419.	131418.	0.419471E-05
ENTHALPY(MMKCAL/H)	-388.172	-388.170	-0.516375E-05

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 540.000
SPECIFIED PRESSURE BAR 140.000
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***
OUTLET TEMPERATURE C 540.00
OUTLET PRESSURE BAR 140.00
HEAT DUTY MMKCAL/HR 78.017
NET DUTY MMKCAL/HR -0.89701
OUTLET VAPOR FRACTION 1.0000

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
H2O	1.0000	1.0000	1.0000	7.1011

BLOCK: STAIR MODEL: HEATER

INLET STREAM: STA-OUT
OUTLET STREAM: STAIR-KO
OUTLET HEAT STREAM: QSTA-RE
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	113.235	113.235	0.00000
(KG/HR)	2039.96	2039.96	0.00000
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	2039.96	2039.96	0.00000
ENTHALPY(MMKCAL/H)	-6.37830	-6.37830	0.329959E-08

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR

PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE PV FLASH
SPECIFIED PRESSURE BAR 9.00000
VAPOR FRACTION 0.0
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***
OUTLET TEMPERATURE C 175.45
OUTLET PRESSURE BAR 9.0000
HEAT DUTY MMKCAL/HR -1.0147
OUTLET VAPOR FRACTION 0.0000

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
H2O	1.0000	1.0000	1.0000	1.0000

BLOCK: STEH MODEL: HEATER

INLET STREAM: STE
OUTLET STREAM: STEOUT
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	566.175	566.175	0.00000
(KG/HR)	10199.8	10199.8	0.00000
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	10199.8	10199.8	0.00000
ENTHALPY(MMKCAL/H)	-31.8358	-31.9057	0.218877E-02

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 197.000
SPECIFIED PRESSURE BAR 8.10000
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***
OUTLET TEMPERATURE C 197.00
OUTLET PRESSURE BAR 8.1000
HEAT DUTY MMKCAL/HR -0.69834E-01
OUTLET VAPOR FRACTION 1.0000

V-L PHASE EQUILIBRIUM :

COMP	F(I)	X(I)	Y(I)	K(I)
H2O	1.0000	1.0000	1.0000	1.7983

BLOCK: STORAGE MODEL: MIXER

INLET STREAM: BOIL30
OUTLET STREAM: ENDUSERS
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.

CONV. COMP.(KMOL/HR) 82.0761 82.0761 0.00000
(KG/HR) 3178.19 3178.19 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 3178.19 3178.19 0.00000
ENTHALPY(MMKCAL/H) -4.12998 -4.12998 -0.169232E-09

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000
OUTLET PRESSURE: MINIMUM OF INLET STREAM PRESSURES

BLOCK: TGOUTMIX MODEL: MIXER

INLET STREAMS: FG1 FG2
OUTLET STREAM: END-FG
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 11997.8 11997.8 0.00000
(KG/HR) 344681. 344681. 0.506622E-15
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 344681. 344681. 0.506622E-15
ENTHALPY(MMKCAL/H) -148.230 -148.230 0.190647E-11

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 42988.6 KG/HR
PRODUCT STREAMS CO2E 42988.6 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE FLASH
MAXIMUM NO. ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000
OUTLET PRESSURE: MINIMUM OF INLET STREAM PRESSURES

BLOCK: TOTAVSPH MODEL: HEATER

INLET STREAM: KRVEXTRA
OUTLET STREAM: PHKRV
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 254.384 254.384 0.00000
(KG/HR) 4582.80 4582.80 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 4582.80 4582.80 0.00000
ENTHALPY(MMKCAL/H) -17.4436 -17.2499 -0.111017E-01

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***
TWO PHASE TP FLASH
SPECIFIED TEMPERATURE C 50.0000

```
  SPECIFIED PRESSURE                 BAR
6.00000
  MAXIMUM        NO.        ITERATIONS
30
  CONVERGENCE                TOLERANCE
0.000100000



                *** RESULTS ***
  OUTLET    TEMPERATURE              C
50.000
  OUTLET    PRESSURE                 BAR
6.0000
  HEAT  DUTY                 MMKCAL/HR
0.19365
  OUTLET        VAPOR        FRACTION
0.0000



  V-L PHASE EQUILIBRIUM :

    COMP          F(I)         X(I)         Y(I)
K(I)
    H2O         1.0000       1.0000       1.0000
0.20586E-01

 BLOCK:  TREDUC   MODEL: HEATER
 ------------------------------
  INLET STREAM:        ST-AIRPH
  OUTLET STREAM:       STA-OUT
  PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS

            ***      MASS     AND     ENERGY
BALANCE  ***
                     IN                  OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )       113.235
113.235       0.00000
           (KG/HR    )    2039.96       2039.96
0.00000
     NONCONV. COMP(KG/HR    )   0.00000
0.00000       0.00000
   TOTAL BALANCE
     MASS(KG/HR    )      2039.96       2039.96
0.00000
     ENTHALPY(MMKCAL/H)  -6.36716   -
6.37830      0.174541E-02

            ***        CO2       EQUIVALENT
SUMMARY ***
  FEED STREAMS CO2E                  0.00000
KG/HR
  PRODUCT STREAMS CO2E               0.00000
KG/HR
  NET    STREAMS    CO2E    PRODUCTION
0.00000    KG/HR
  UTILITIES CO2E PRODUCTION      0.00000
KG/HR
  TOTAL CO2E PRODUCTION          0.00000
KG/HR

               *** INPUT DATA ***
  TWO   PHASE TP FLASH
  SPECIFIED TEMPERATURE              C
200.000
  SPECIFIED PRESSURE                 BAR
9.00000
  MAXIMUM        NO.        ITERATIONS
30
  CONVERGENCE                TOLERANCE
0.000100000



               *** RESULTS ***
  OUTLET    TEMPERATURE              C
200.00
  OUTLET    PRESSURE                 BAR
9.0000
  HEAT DUTY        MMKCAL/HR          -
0.11133E-01
  OUTLET        VAPOR        FRACTION
1.0000



  V-L PHASE EQUILIBRIUM :

    COMP          F(I)         X(I)         Y(I)
K(I)
    H2O         1.0000       1.0000       1.0000
1.7240

 BLOCK:  V-DHDRYE MODEL: VALVE
 ------------------------------
  INLET STREAM:        PYDHW85
  OUTLET STREAM:       PREDUC
  PROPERTY OPTION SET:  IDEAL    IDEAL
LIQUID / IDEAL GAS
  FREE WATER OPTION SET: SYSOP12
ASME STEAM TABLE
  SOLUBLE WATER OPTION:  THE MAIN
PROPERTY OPTION SET (IDEAL    ).

            ***      MASS     AND     ENERGY
BALANCE  ***
                     IN                  OUT
RELATIVE DIFF.
     CONV.  COMP.(KMOL/HR  )       2715.69
2715.69       0.00000
           (KG/HR    )   48924.0       48924.0
0.00000
     NONCONV. COMP(KG/HR    )   0.00000
0.00000       0.00000
   TOTAL BALANCE
```

MASS(KG/HR) 48924.0 48924.0 0.00000
ENTHALPY(MMKCAL/H) -182.720 -182.720 0.00000

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

VALVE OUTLET PRESSURE BAR 3.00000
VALVE FLOW COEF CALC. NO

FLASH SPECIFICATIONS:
PHASE LIQUID
MAX NUMBER OF ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***

VALVE PRESSURE DROP BAR 0.0

BLOCK: V-FW MODEL: VALVE

INLET STREAM: PFWIN
OUTLET STREAM: FW1BAR
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 294.950 294.950 0.00000
(KG/HR) 5313.60 5313.60 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 5313.60 5313.60 0.00000
ENTHALPY(MMKCAL/H) -19.2888 -19.2888 -0.286414E-08

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

VALVE OUTLET PRESSURE BAR 1.10000
VALVE FLOW COEF CALC. NO

FLASH SPECIFICATIONS:
NPHASE 2
MAX NUMBER OF ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***

VALVE PRESSURE DROP BAR 7.00000

BLOCK: V2 MODEL: VALVE

INLET STREAM: DKOND
OUTLET STREAM: DKONIN
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***
IN OUT RELATIVE DIFF.
CONV. COMP.(KMOL/HR) 452.940 452.940 0.00000
(KG/HR) 8159.84 8159.84 0.00000
NONCONV. COMP(KG/HR) 0.00000 0.00000 0.00000
TOTAL BALANCE
MASS(KG/HR) 8159.84 8159.84 0.00000
ENTHALPY(MMKCAL/H) -25.4687 -25.4687 0.408716E-13

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR

PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

VALVE OUTLET PRESSURE BAR 3.17000
VALVE FLOW COEF CALC. NO

FLASH SPECIFICATIONS:
NPHASE 2
MAX NUMBER OF ITERATIONS 30
CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***

VALVE PRESSURE DROP BAR 6.31000

BLOCK: VALVE1 MODEL: VALVE

INLET STREAM: EX
OUTLET STREAM: EX-ST3
PROPERTY OPTION SET: IDEAL IDEAL LIQUID / IDEAL GAS

*** MASS AND ENERGY BALANCE ***

	IN	OUT	RELATIVE DIFF.
CONV. COMP.(KMOL/HR)	3459.96	3459.96	0.00000
(KG/HR)	62332.1	62332.1	0.00000
NONCONV. COMP(KG/HR)	0.00000	0.00000	0.00000
TOTAL BALANCE			
MASS(KG/HR)	62332.1	62332.1	0.00000
ENTHALPY(MMKCAL/H)	-194.552	-194.552	0.112947E-08

*** CO2 EQUIVALENT SUMMARY ***
FEED STREAMS CO2E 0.00000 KG/HR
PRODUCT STREAMS CO2E 0.00000 KG/HR
NET STREAMS CO2E PRODUCTION 0.00000 KG/HR
UTILITIES CO2E PRODUCTION 0.00000 KG/HR
TOTAL CO2E PRODUCTION 0.00000 KG/HR

*** INPUT DATA ***

VALVE OUTLET PRESSURE BAR 6.90000
VALVE FLOW COEF CALC. YES
FLOW COEF VS VALVE POSN DATA

VALVE POSN(%)	FLOW COEF
0.0000	0.0
10.0000	442.000
20.0000	966.000
30.0000	1,630.00
40.0000	2,480.00
50.0000	3,570.00
60.0000	5,020.00
70.0000	6,970.00
80.0000	9,590.00
90.0000	12,600.0
100.0000	13,800.0

PRES DROP RATIO FACTOR VS VALVE POSN DATA

VALVE POSN(%)	PDROP RATIO FACTOR
0.0000	0.42000
10.0000	0.42000
20.0000	0.42000
30.0000	0.43000
40.0000	0.44000
50.0000	0.45000
60.0000	0.42000
70.0000	0.34000
80.0000	0.25000
90.0000	0.18000
100.0000	0.15000

PRES RECOVERY FACTOR VS VALVE POSN DATA

VALVE POSN(%)	PRES RECOVERY FACTOR
0.0000	0.76000
10.0000	0.76000
20.0000	0.79000
30.0000	0.82000
40.0000	0.83000
50.0000	0.83000
60.0000	0.82000
70.0000	0.80000
80.0000	0.75000
90.0000	0.70000
100.0000	0.65000

CHOKED FLOW CHECKING YES

CAVITATION INDEX CALC. NO

FLASH SPECIFICATIONS:

NPHASE 2

MAX NUMBER OF ITERATIONS 30

CONVERGENCE TOLERANCE 0.000100000

*** RESULTS ***

VALVE PRESSURE DROP BAR 2.58000

OPERATING VALVE POSITION 18.8153

VALVE FLOW COEF 897.687

PRES DROP RATIO FACTOR 0.42000

PRES RECOVERY FACTOR 0.78607

CHOKED FLOW STATUS FLOW IS NOT CHOKED

CHOKED FLOW - OUTLET PRES BAR 5.75099