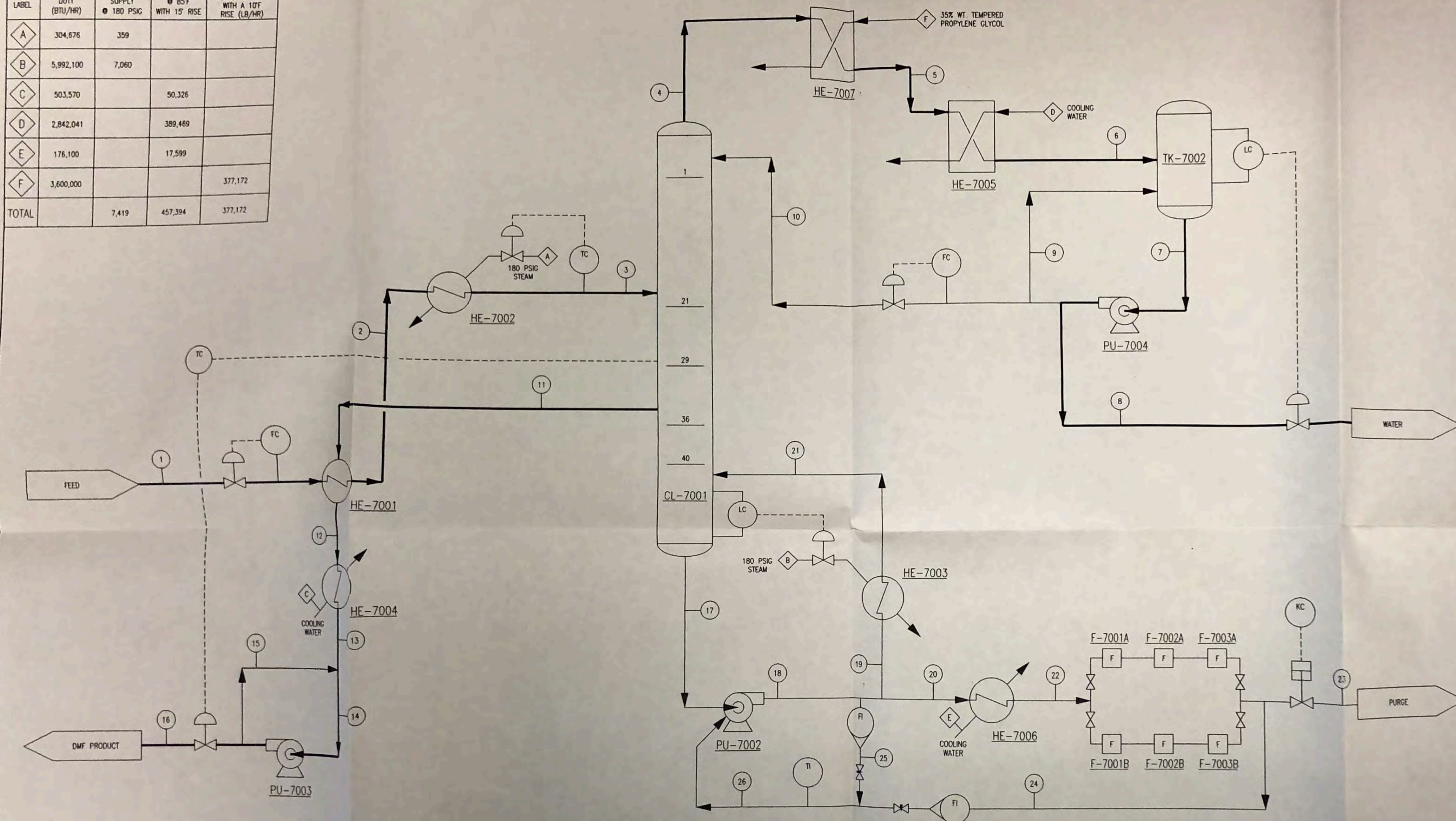


UTILITIES				
STREAM LABEL	HEAT DUTY (BTU/HR)	STEAM SUPPLY (180 PSIG)	COOLING WATER (85F WITH 15° RISE)	35% WT PROPYLENE GLYCOL @ 194F WITH A 10F RISE (LB/HR)
A	304,676	359		
B	5,992,100	7,060		
C	503,570		50,326	
D	2,842,041		389,469	
E	176,100		17,599	
F	3,600,000			377,172
TOTAL		7,419	457,394	377,172



EQUIPMENT LIST		
ITEM	DESCRIPTION	MATERIAL
CL-7001	DISTILLATION COLUMN	316LSS/HASTELLOY C-276
F-700X	BOTTOMS FILTERS	316SS
HE-7001	FEED PREHEATER	SHELL: CARBON STEEL TUBES: 316LSS
HE-7002	STEAM HEATER	SHELL: CARBON STEEL TUBES: 316LSS
HE-7003	REBOILER	SHELL: CARBON STEEL TUBES: HASTELLOY C-276
HE-7004	PRODUCT COOLER	SHELL: CARBON STEEL TUBES: 316LSS
HE-7005	COLUMN CONDENSER	304SS/GASKETS EPDM
HE-7006	BOTTOM PURGE COOLER	SHELL: CARBON STEEL TUBES: HASTELLOY C-276
HE-7007	HEAT RECOVERY CONDENSER	304SS/GASKETS EPDM
PU-7002	BOTTOMS PUMP	HASTELLOY C
PU-7003	PRODUCT PUMP	316SS
PU-7004	REFLUX PUMP	316SS
TK-7002	REFLUX DRUM	316LSS

- NOTES:
1. MATERIAL BALANCE SHOWN IS FOR 15% WT DMF AVERAGE FEED COMPOSITION.
 2. UTILITIES DATA REFLECT MAXIMUM DUTY ACROSS THE 14-35% WT RANGE FOR THE DMF FEED.
 3. WHEN HE-7007 IS NOT IN SERVICE STREAM 5 WILL BE AS STREAM 4.
 4. FOR MATERIAL BALANCE PURPOSE SOLIDS ARE CONSIDERED TO BE COMPLETELY REMOVED BY FILTERS.
 5. NO ALLOWANCE IS MADE FOR SOLVENT LOSSES DUE TO CHANGING OF FILTERS.

MATERIAL BALANCE STREAM NUMBER & IDENTITY		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
COMPONENT	MOL. WT.	COLD FEED TO FEED PREHEATER HE-7001	WARM FEED TO STREAM HEATER HE-7002	HOT FEED COLUMN CL-7001	CL-7001 OVERHEAD VAPORS	FEED TO HE-7005 (NOTE 3)	CONDENSED OVERHEAD VAPORS TO TK-7002	CONDENSED OVERHEAD VAPORS TO PU-7004	DISTILLATE PRODUCT TO SEWER	MIN. FLOW RECYCLE FOR PUMP PU-7004	REFLUX TO COLUMN CL-7001	DMF VAPOR DRAW TO HE-7001	CONDENSED DMF TO PRODUCT COOLER HE-7004	COOLED DMF FROM PRODUCT COOLER HE-7004	DMF PRODUCT TO PRODUCT PUMP PU-7003	MIN. FLOW RECYCLE FOR PUMP PU-7003	DMF PRODUCT TO STORAGE	COLUMN BOTTOMS TO PUMP PU-7002	COLUMN BOTTOMS FROM PUMP PU-7002	COLUMN BOTTOMS TO REBOILER HE-7003	PURGE STREAM TO HE-7006	REBOILER RETURN TO COLUMN CL-7001	COOLED PURGE STREAM TO FILTERS	COOLED BOTTOMS PURGE TO TREATMENT (BY OTHERS)	COLD/FILTERED BOTTOMS LIQUID RECYCLE	HOT BOTTOMS LIQUID RECYCLE	MIN. FLOW WAGNET FLUSH TO PUMP PU-7002
1 WATER	18.015	3369.7	3369.7	3369.7	5487.2	5487.2	5487.2	5487.2	3369.6	3369.6	2117.5	0.1	0.1	0.1	0.1	0.1	0.1	0.9	1.0	0.9	0.0	0.9	0.0	0.0	0.0	0.0	0.0
2 DIMETHYLFORMAMIDE	73.095	594.7	594.7	594.7	5.5	5.5	5.5	5.5	3.4	3.4	2.1	588.1	588.1	588.1	588.1	469.1	588.1	110616.5	114027.2	110613.4	1517.6	110613.4	1517.6	3.16	1514.4	1896.3	3410.7
3 FORMIC ACID	46.026	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.1	0.2	1487.7	1533.6	1487.7	20.4	1487.7	20.4	0.04	20.4	25.5	45.9
4 SOLIDS	-	4.0	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1147.9	1167.3	1132.3	15.5	1132.3	15.5	0.00	0.0	19.4	19.4
TOTAL	LB/HR	3969	3969	3969	5493	5493	5493	7950	3373.0	2457.6	2119.7	588.4	588.4	588.4	2907.8	2319.4	588.4	113253.1	116729.1	113234.3	1553.5	113234.3	1553.5	3.2	1534.8	1941.2	3476.0
TEMPERATURE	°F	70	121	200	218	218	140	140	140	140	140	328	200	115	115	115	115	330	328	328	328	330	115	115	115	328	234
PRESSURE	PSIG	40	15.7	3.5	2.0	1.0	0.3	22.5	20.0	43.8	2.0	4.8	4.5	10.0	10.0	35.0	15.0	8.6	26.5	6.0	26.5	4.9	25.0	5.0	20.0	26.5	9.0
DENSITY	LB/FT ³	61.755	60.967	59.319	0.04011	59.685	61.522	61.281	61.281	61.281	61.281	0.176	54.843	57.703	57.703	57.703	57.703	51.534	51.546	51.546	51.546	0.174	57.9	57.703	57.703	51.546	54.171
VISCOSITY	cP	0.970	0.553	0.304	0.012	0.275	0.474	0.474	0.463	0.463	0.463	0.010	0.394	0.634	0.634	0.634	0.634	0.249	0.249	0.249	0.249	0.011	0.634	0.634	0.634	0.249	0.396
FLOW	GPM(ACTM)	8.0	8.1	8.3	(2282)	11.5	11.1	16.1	6.9	5.0	4.3	(55.8)	1.3	1.3	6.3	5.0	1.3	274.0	282.3	273.9	3.8	(10846)	3.3	0.01	3.3	4.7	8.0
HEAT CAPACITY	BTU/LBF	0.922	0.924	0.934	0.500	1.002	1.000	0.998	0.998	0.998	0.998	0.412	0.526	0.503	0.503	0.503	0.503	0.575	0.575	0.575	0.575	0.413	0.503	0.503	0.503	0.575	0.546
THERMAL COND.	BTU/HR/FT	0.261	0.252	0.347	0.014	0.393	0.371	0.371	0.373	0.373	0.373	0.011	0.091	0.101	0.101	0.101	0.101	0.081	0.081	0.081	0.081	0.011	0.100	0.100	0.100	0.081	0.089
MOLECULAR WEIGHT	LB/LEMOLE	20.311	20.311	20.311	18.029	18.029	18.029	18.029	18.029	18.029	18.029	73.048	73.048	73.048	73.048	73.048	73.048	72.857	72.857	72.857	72.857	72.857	72.857	72.857	72.857	72.857	72.857

0	AS BUILT	8-19-96	CJB
P	FOR CUSTOMER APPROVAL	3-2-98	CJB
REV.	DESCRIPTION	DATE	APPD
REVISIONS			
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CLIENT INFORMATION		PROCESS FLOW DIAGRAM	
PROJ. NO.	PO. NO.	JOB NO.	137-1222
SCALE	NONE	DRAWING NO.	REV.
DRAWN	BENDEROTH	DATE	2-27-98
DESIGNED	DATE		
ENGR.	SANFORD	DATE	3-2-98
D-1222-00-01		0	