

21-E-42  
SOUR WATER STRIPPER  
BOTTOMS COOLER

21-E-26  
SOUR WATER STRIPPER  
BOTTOMS/FEED EXCHANGER

21-C-10  
SOUR WATER STRIPPER

21-D-15  
SOUR WATER STRIPPER OFF GAS  
K.O. POT

21-D-5  
HEAD TANK  
4'-0" x 8'-0" x 4'-0" H

21-E-39  
RECIRCULATING  
TEMPERED WATER COOLER  
20,219 MMBTU/HR  
(17,085 MMBTU/HR)

22-E-38A/B  
CLARIFIED OIL  
RUNDOWN COOLER  
EXCHANGER  
2,804 MMBTU/HR  
(0 MMBTU/HR)

22-E-41  
TOP PUMPAROUND  
TEMPERED WATER  
EXCHANGER  
6,245 MMBTU/HR  
(0 MMBTU/HR)

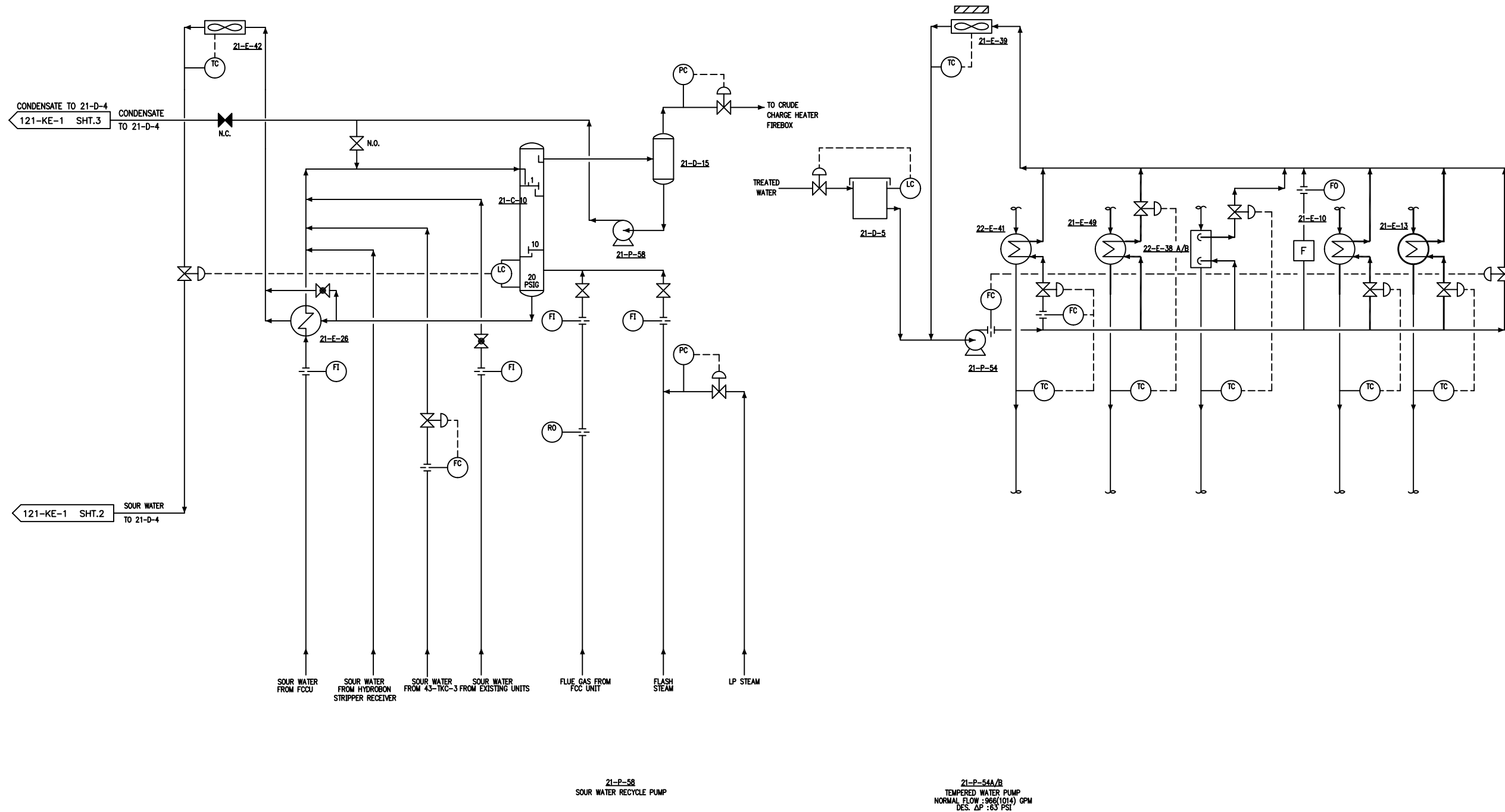
21-E-10  
(MODIFIED/RELOCATED)  
HEAVY FUEL OIL  
TEMPERED WATER COOLER  
5.4 MMBTU/HR

21-E-49  
ATMOSPHERIC  
GAS OIL COOLER  
0 MMBTU/HR  
(1,519 MMBTU/HR)

21-E-13  
HEAVY VACUUM GAS  
OIL/TEMPERED  
WATER COOLER  
4,963 MMBTU/HR  
(5,809 MMBTU/HR)

GENERAL NOTES:

- 1.1 THE MAJOR PROCESS EQUIPMENT CAPACITIES/DUTIES SHOWN ON THIS PFD ARE FOR 45,000 BPSD OF TYPICAL BRFT CRUDE IN WINTER OPERATION. NUMBERS SHOWN IN THE BRACKET ARE FOR SUMMER OPERATION & #2 FCCU IS DOWN.
- 1.2 THIS DRAWING INCLUDES DATA DEVELOPED BY SWCL - JOB NO. 07405.0001 APRIL 1998.



REVISION	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	APP'D BY
7	JUNE 03	REVISED AS BUILT		SG	
6	FEB 00	LINE 9 REVERSAL PROJECT ADDED ENG# 15001320		A.V.	M.H. B.B.
5	APR 96	P-58 WAS P-43		WM	
4	16 DEC. 1996	W. W. T. SOURCE CONTROL PROJECT MODS INCORPORATED. (S. & W. PROJ. #CJ-10632.) SEE 10-28456 FOR PROJ. DWS. ENG. P.M.#15000286. AFE #4518.		M.J.	M.J. M.V. J.R.F.
3	APR 96	UPDATED TO REFLECT 9RVP PROJECT AS BUILTS ENG.# 006361		WM	
2	MAY 95	UPDATED TO REFLECT #2CDU PROJECT MODIFICATIONS, 1995 T/A ; ENG.# 006361		RS	RHL. ISR
1		FINAL ISSUE			
B	02/22/93	ISSUE FOR DESIGN		ST	RHL. ISR
A1	01/22/93	ISSUE FOR APPROVAL - 40,000 BPSD SWCL PROJECT C4-10436.0002		SRC	RHL. ISR
A	09/29/92	ISSUE FOR APPROVAL - 43,000 BPSD		LC/DAB	RHL. ISR



TITLE	DEPARTMENT
PROCESS FLOW DIAGRAM	AREA NO.
CRUDE ATMOSPHERIC AND VACUUM DISTILLATION UNIT	CLASS NO.
	PROJ. NO. 07405.0001
	DATE '93
	SCALE NONE

DRAWN BY	CHECKED CH. DRAFT	SECTION NO.	DWG. NO.	REV.
JPP	CHECKED ENGINEER	APPROVED BY	121-KE-1 SHT. 1 OF 7	7

21-E-15  
SPLITTER FEED/  
BOTTOMS EXCHANGER  
6.344 MMBTU/HR

21-C-5  
SPLITTER COLUMN  
5'-0" / 6'-6" I.D.  
x 54'-6" T

21-E-16  
SPLITTER REBOILER  
17.800 MMBTU/HR

21-E-36  
SPLITTER OVERHEAD  
CONDENSER  
13.328 MMBTU/HR

21-D-2  
SPLITTER OVERHEAD  
PRODUCT DRUM  
5'-6" I.D. x 12'-0" T

21-E-63  
LSR GASOLINE  
COOLER  
0.838 MMBTU/HR

21-E-37  
LSR GASOLINE  
COOLER  
0.838 MMBTU/HR

21-E-17  
STABILIZER FEED  
BOTTOMS EXCHANGER  
2.288 MMBTU/HR

21-C-6  
STABILIZER COLUMN  
3'-0" / 4'-6" I.D.  
x 74'-6" T

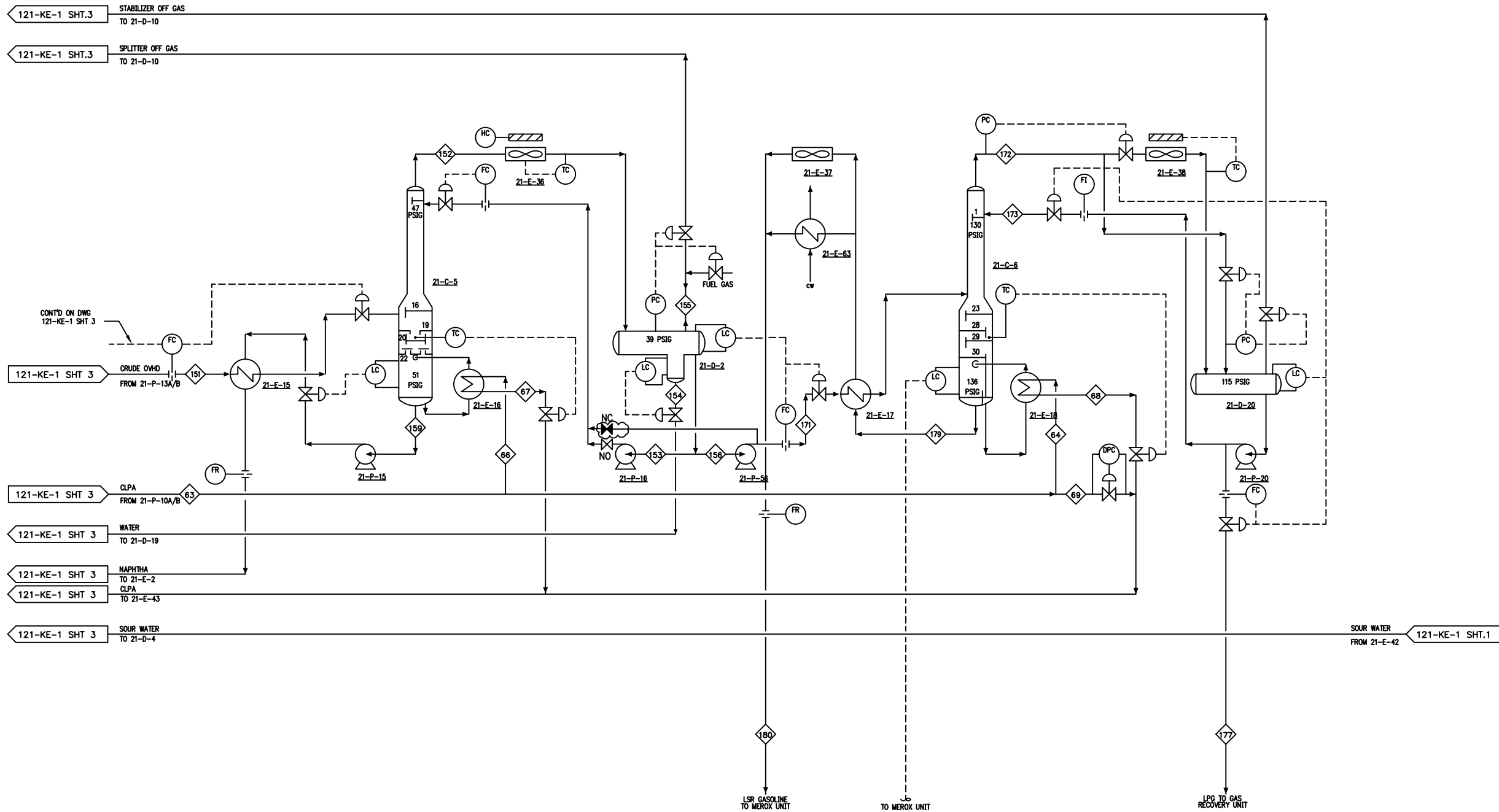
21-E-18  
STABILIZER REBOILER  
6.500 MMBTU/HR

21-E-38  
STABILIZER OVERHEAD  
CONDENSER  
4.877 MMBTU/HR

21-D-20  
STABILIZER OVERHEAD  
PRODUCT DRUM

NOTES:

- 2.1 FOR GENERAL NOTES SEE DWG. No. 121-KE-1, SHT.1
- 2.2 THIS DRAWING INCLUDES DATA DEVELOPED BY SWCL - JOB NO. 07405.0001 APRIL 1998.



- 121-KE-1 SHT 3 CRUDE OVD FROM 21-P-13A/B
- 121-KE-1 SHT 3 CLPA FROM 21-P-10A/B
- 121-KE-1 SHT 3 WATER TO 21-D-19
- 121-KE-1 SHT 3 NAPHTHA TO 21-E-2
- 121-KE-1 SHT 3 CLPA TO 21-E-43
- 121-KE-1 SHT 3 SOUR WATER TO 21-D-4

SOUR WATER FROM 21-E-42 121-KE-1 SHT.1

21-P-15 A/R  
SPLITTER BOTTOMS PUMP  
NORMAL FLOW : 292 GPM  
DES. ΔP : 62 PSI

21-P-16  
SPLITTER REFLUX PUMP  
NORMAL FLOW : 57 GPM  
DES. ΔP : 62 PSI

21-P-56A/B  
STABILIZER FEED PUMP  
NORMAL FLOW : 160 GPM  
DES. ΔP : 202 PSI

21-P-20 A/R  
STABILIZER REFLUX PUMP  
NORMAL FLOW : 94 GPM  
DES. ΔP : 197 PSI

STREAM NUMBER	63	151	152	153	154	155	156	159	171	172	173	177	179	180
DESCRIPTION	CLPA	SPLY FEED	SPLY OVD	REFLUX	SPLY WTR	SPLY OFF GAS	C-5 OVD LIQ	SPLY BTMS	STB FEED	STB OVD	STB REFLUX	LPG	STB BTMS	LSR
CASE	L	L	V	L	W	V	W	W	W	W	W	W	W	W
FLOW, BBL/S (DAY) (LBS/HR)	53,001	13,092	(67,962)	1,885	(22)	0	5,304	7,786	5,304	(26,519)	1,240	1,839	3,464	3,464
TEMPERATURE, °F	420	111	214	100	100	100	100	102	102	201	100	102	295	100
PRESSURE, PSIG (mmHg)	160	117	47	39	39	39	39	51	249	130	130	280	136	115

REVISION	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APP'D BY
6	JUNE 03	REVISED AS BUILT		S.G.	
5	FEB 00	LINE 9 REVERSAL PROJECT ADDED ENG.# 15001320		A.V.	M.H. B.B.
4	APR 96	UPDATED TO REFLECT SRVP PROJECT AS BUILTS ENG.# 006361		WM	
3	MAY 95	UPDATED TO REFLECT #200U PROJECT MODIFICATIONS, 1995 T/A ; ENG.# 006361		RS	RHL ISR
2	DEC.94	21-D-20 WAS 21-D-3. 95 T/A ENG.# 006493		VA	AW
1		FINAL ISSUE			
B	02/22/93	ISSUE FOR DESIGN		PW	RHL ISR
A1	01/22/93	ISSUE FOR APPROVAL - 40,000 BPSD SWCL PROJECT CJ-10436.0002		PW	RHL ISR
A	09/29/92	ISSUE FOR APPROVAL - 43,000 BPSD		LC/DAB	RHL ISR



TITLE PROCESS FLOW DIAGRAM CRUDE ATMOSPHERIC AND VACUUM DISTILLATION UNIT		DEPARTMENT
AREA NO.		CLASS NO.
PREL. NO.		DATE '93
SCALE NONE		REV. 6
DRAWN BY JPP	CHECKED BY CHECKED ENGINEER	SECTION NO. APPROVED BY
DWG. NO. 121-KE-1 SHT. 2 OF 7		

21-C-1  
CRUDE COLUMN (MODIFIED)  
12'-6" I.D. x 124'-0" T/T

21-C-2  
(MODIFIED)  
LIGHT No.1 DISTILLATE STRIPPER  
(WAS NAPHTHA STRIPPER)

21-E-35  
CRUDE OVERHEAD  
CONDENSER  
33,000 MMBTU/HR

21-F-50  
CRUDE OVERHEAD  
TRIM COOLER  
22,172 MMBTU/HR

21-D-19  
DESALTER WATER  
SURGE DRUM  
6'-0" I.D. x 6'-6" T/T

21-D-10  
C.D.I. OFF GAS K.O. POT  
16'-0" I.D. x 5'-0" T/F

21-D-1  
CRUDE OVERHEAD  
PRODUCT DRUM  
7'-0" I.D. x 12'-0" T/T  
(BOOT 3'-0" I.D. x 3'-0" T/B)

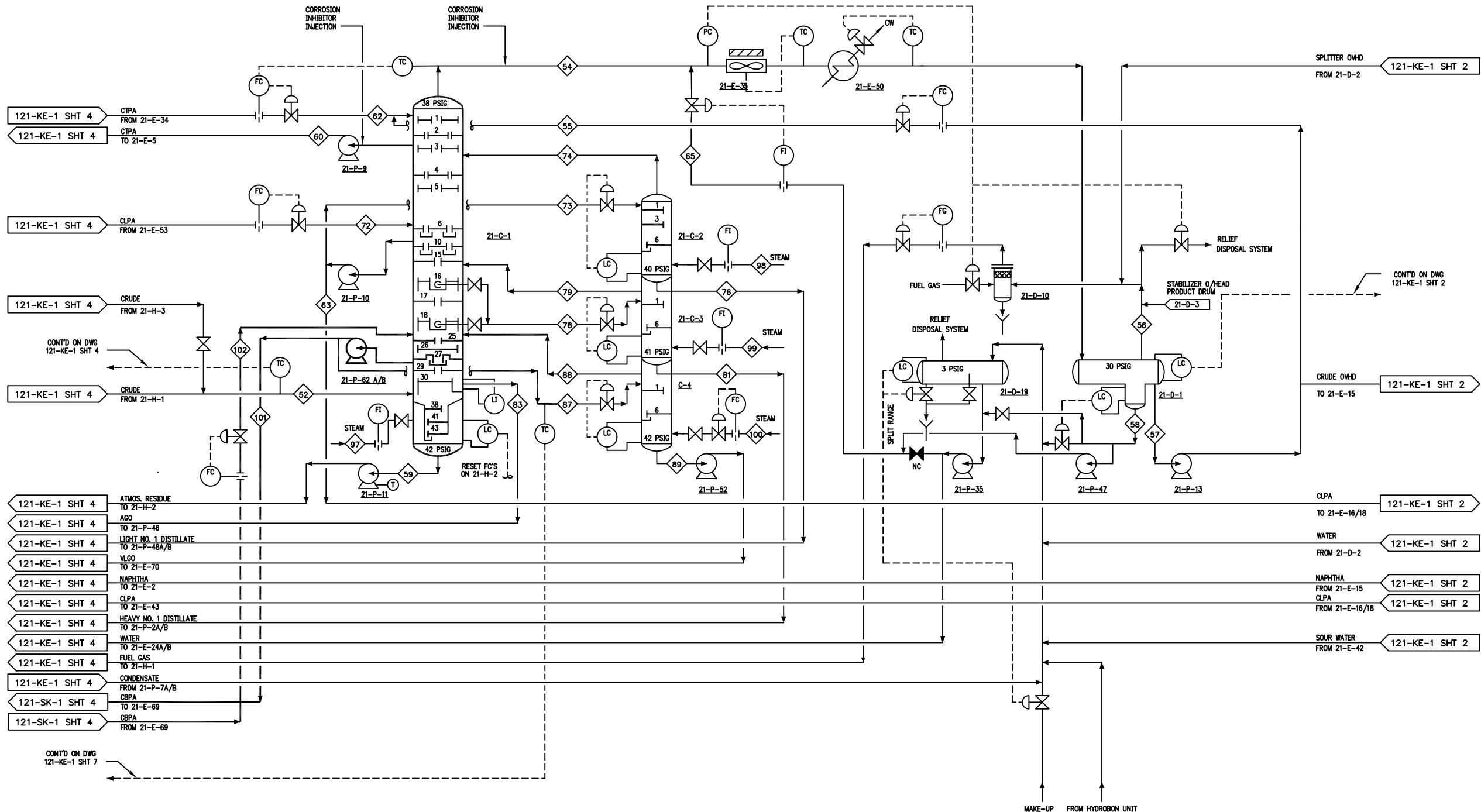
21-C-3  
HEAVY No.1 DISTILLATE  
STRIPPER  
(WAS No.1 DISTILLATE  
STRIPPER)

21-C-4  
VIRGIN LGO STRIPPER  
4'-0" I.D. x 79'-2" T/T

NOTES:

3.1 FOR GENERAL NOTES SEE DWG. No. 121-KE-1, SHT.1

3.2 THIS DRAWING INCLUDES DATA DEVELOPED BY SWCL -  
JOB NO. 07405.0001 APRIL 1998.



- 121-KE-1 SHT 4 CTPA FROM 21-E-34 TO 21-E-5
- 121-KE-1 SHT 4 CLPA FROM 21-E-53
- 121-KE-1 SHT 4 CRUDE FROM 21-H-3
- 121-KE-1 SHT 4 CRUDE FROM 21-H-1
- 121-KE-1 SHT 4 ATMOS. RESIDUE TO 21-H-2
- 121-KE-1 SHT 4 AGO TO 21-P-46
- 121-KE-1 SHT 4 LIGHT NO. 1 DISTILLATE TO 21-P-48A/B
- 121-KE-1 SHT 4 V.LGO TO 21-E-70
- 121-KE-1 SHT 4 NAPHTHA TO 21-E-2
- 121-KE-1 SHT 4 CLPA TO 21-E-43
- 121-KE-1 SHT 4 HEAVY NO. 1 DISTILLATE TO 21-P-2A/B
- 121-KE-1 SHT 4 WATER TO 21-E-24A/B
- 121-KE-1 SHT 4 FUEL GAS TO 21-H-1
- 121-KE-1 SHT 4 CONDENSATE FROM 21-P-7A/B
- 121-SK-1 SHT 4 CBPA TO 21-E-69
- 121-SK-1 SHT 4 CBPA FROM 21-E-69

- 121-KE-1 SHT 2 SPLITTER OVHD FROM 21-D-2
- 121-KE-1 SHT 2 CRUDE OVHD TO 21-E-15
- 121-KE-1 SHT 2 CLPA TO 21-E-16/18
- 121-KE-1 SHT 2 WATER FROM 21-D-2
- 121-KE-1 SHT 2 NAPHTHA FROM 21-E-15
- 121-KE-1 SHT 2 CLPA FROM 21-E-16/18
- 121-KE-1 SHT 2 SOUR WATER FROM 21-E-42

STREAM NUMBER	52	54	55	56	57	58	59	60	62	63	65	72	76	81	83	89	97	98	99	100	101	102		
DESCRIPTION	HEATER OUT	CT OVHD	CT REFLUX	CT OFF GAS	D-1 LIQUID	SOUR WTR	ATM RESID	CTPA	CTPA	CLPA	WASH WTR	CLPA	C-2 BTMS	C-3 BTMS	AGO	C-4 BTMS	STM	STM	STM	CBPA	CBPA			
PHASE	M	M	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L			
FLOW, BBL/DAY (LBS/HR)	45,133	45,118	(171,370)	1500	0	14,582	(32,725)	17,180	55,003	55,003	55,003	53,001	(12,900)	53,001	6,049	2,600	1,100	5,020	(9,960)	(5,045)	(1,410)	(2,300)	24,999	24,999
TEMPERATURE, °F	660	660	275	111	110	110	110	633	303	247	246	420	110	314	349	470	604	544	650	650	110	650	568	523
PRESSURE, PSIG (mmHg)	57	57	38	38	30	30	30	42	170	38	38	160	200	39	40	41	41	42	100	100	100	100	102	41

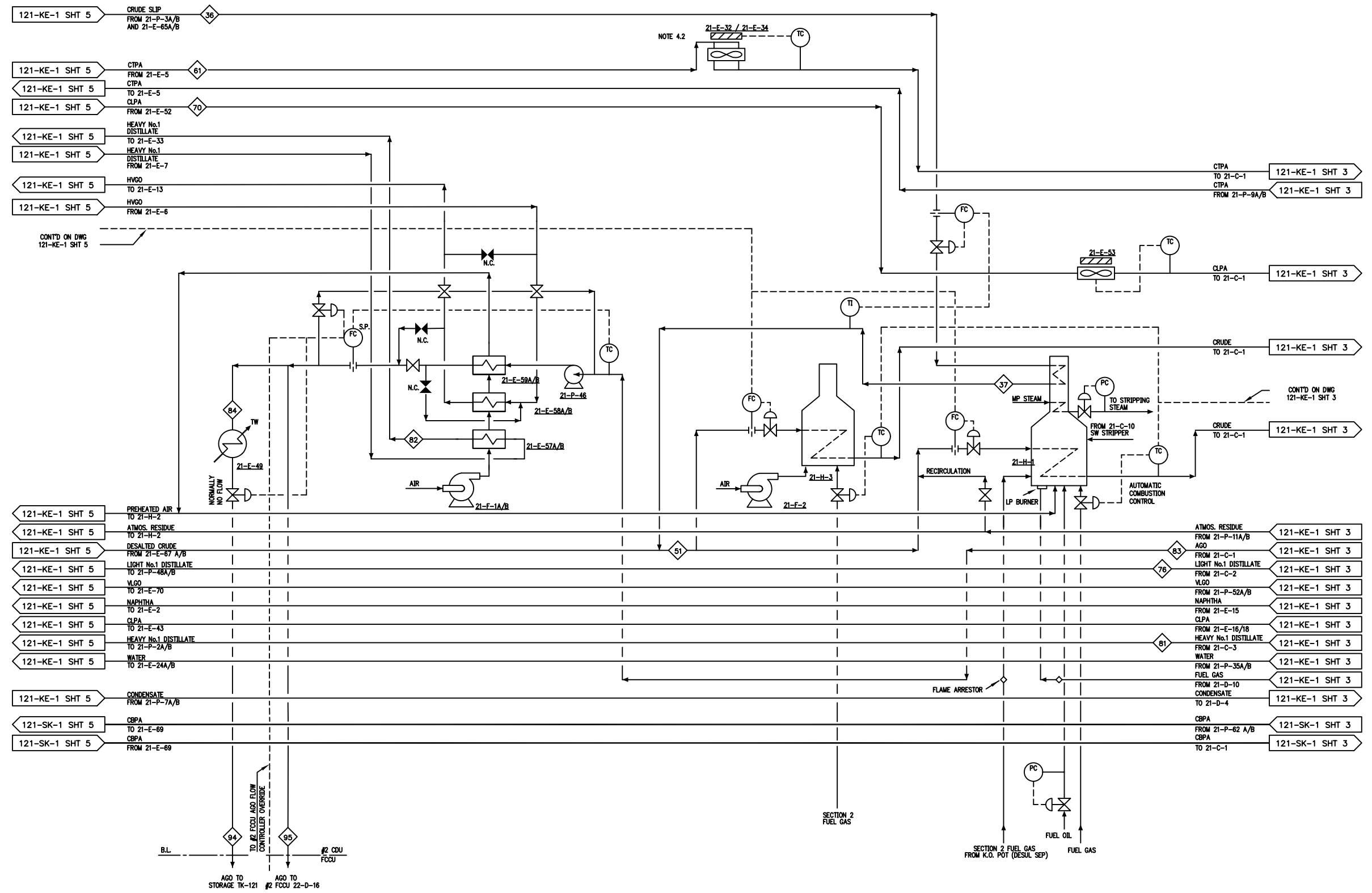
REVISION	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	APP'D BY
4	JUNE 03	UPDATED AS BUILT			SG
3	FEB 00	LINE 9 REVERSAL PROJECT ADDED ENG# 15001320		A.V.	M.H. B.B.
2	MAY 95	UPDATED TO REFLECT #2CDU PROJECT MODIFICATIONS, 1995 T/A ; ENG.# 006361		RS	RHL ISR
1		FINAL ISSUE			
B	02/22/93	ISSUE FOR DESIGN		PW	RHL ISR
A1	01/22/93	ISSUE FOR APPROVAL - 40,000 BPSD SWCL PROJECT CJ-10436.0002		PW	RHL ISR
A	09/29/92	ISSUE FOR APPROVAL - 43,000 BPSD		LC/DAB	RHL ISR



TITLE: PROCESS FLOW DIAGRAM  
DEPARTMENT: AREA NO.  
CLASS NO.:  
PROJ. NO.: 07405.0001  
DATE: '93  
SCALE: NONE

DRAWN BY: JPP  
CHECKED CH. DRAFT: [ ]  
SECTION NO.:  
APPROVED BY: [ ]  
DWG. NO.: 121-KE-1  
SHT. 3 OF 7  
REV. 4

21-E-49 ATMOSPHERIC GAS OIL COOLER 0 MMBTU/HR (1,519 MMBTU/HR)  
 21-E-57 A/B COMBUSTION AIR/HEAVY No.1 DISTILLATE PREHEATER 1,470 MMBTU/HR (1,191 MMBTU/HR)  
 21-E-58A/B COMBUSTION AIR/HVGO PREHEATER 2,088 MMBTU/HR (1,747 MMBTU/HR)  
 21-E-59 A/B COMBUSTION AIR/AGO PREHEATER 2,637 MMBTU/HR (2,415 MMBTU/HR)  
 21-E-32 CRUDE TOP PUMPAROUND COOLER 0 MMBTU/HR (0 MMBTU/HR)  
 21-E-34 CRUDE TOP PUMPAROUND COOLER 2,850 MMBTU/HR (5,751 MMBTU/HR)  
 21-H-3 No.2 CRUDE CHARGE HEATER ABSORBED DUTY : 25,000 MMBTU/HR (25,000 MMBTU/HR)  
 21-H-1 CRUDE CHARGE HEATER ABSORBED DUTY : 60,755 MMBTU/HR (58,085 MMBTU/HR)  
 21-E-53 CRUDE LOWER PUMPAROUND COOLER 1,009 MMBTU/HR (3,659 MMBTU/HR)



- 121-KE-1 SHT 5 PREHEATED AIR TO 21-H-2
- 121-KE-1 SHT 5 ATMOS. RESIDUE TO 21-H-2
- 121-KE-1 SHT 5 DESALTED CRUDE FROM 21-E-67 A/B
- 121-KE-1 SHT 5 LIGHT No.1 DISTILLATE TO 21-P-48A/B
- 121-KE-1 SHT 5 V.LGO TO 21-E-70
- 121-KE-1 SHT 5 NAPHTHA TO 21-E-2
- 121-KE-1 SHT 5 CLPA TO 21-E-43
- 121-KE-1 SHT 5 HEAVY No.1 DISTILLATE TO 21-P-2A/B
- 121-KE-1 SHT 5 WATER TO 21-E-24A/B
- 121-KE-1 SHT 5 CONDENSATE FROM 21-P-7A/B
- 121-SK-1 SHT 5 CBPA TO 21-E-69
- 121-SK-1 SHT 5 CBPA FROM 21-E-69

- 121-KE-1 SHT 3 ATMOS. RESIDUE FROM 21-P-11A/B
- 121-KE-1 SHT 3 AGO FROM 21-C-1
- 121-KE-1 SHT 3 LIGHT No.1 DISTILLATE FROM 21-C-2
- 121-KE-1 SHT 3 V.LGO FROM 21-P-52A/B
- 121-KE-1 SHT 3 NAPHTHA FROM 21-E-15
- 121-KE-1 SHT 3 CLPA FROM 21-E-16/18
- 121-KE-1 SHT 3 HEAVY No.1 DISTILLATE FROM 21-C-3
- 121-KE-1 SHT 3 WATER FROM 21-P-35A/B
- 121-KE-1 SHT 3 FUEL GAS FROM 21-D-10
- 121-KE-1 SHT 3 CONDENSATE TO 21-D-4
- 121-SK-1 SHT 3 CBPA FROM 21-P-62 A/B
- 121-SK-1 SHT 3 CBPA TO 21-C-1

STREAM NUMBER	36	51	70	78	81	83	84	95
DESCRIPTION	CRUDE SLIP	CRUDE TO HEATER	CLPA	C-2 BTMS	C-3 BTMS	AGO TO STORAGE	AGO TO #2 FCCU	AGO TO #2 FCCU
CASE	W	S	W	S	S	W	S	S
PHASE	L	W	W	L	L	L	L	L
FLOW, BBL/DAY (LBS/HR)	7,397	7,398	45,133	45,118	53,001	53,001	6,049	2,600
TEMPERATURE, °F	342	341	503	510	317	324	349	470
PRESSURE, PSIG (mmHg)	395	380	350	335	95	95	40	41

21-F-1A/B FORCED AIR BLOWER  
 NORMAL FLOW : 18320 CFM  
 DES. ΔP : ~11.0in.

21-P-46 A/B ATMOSPHERIC GAS OIL PUMP  
 NORMAL FLOW : 43 GPM  
 DES. ΔP : 74 PSI

21-F-2 FORCED DRAFT FAN  
 NORMAL FLOW : 8150 CFM  
 DES. ΔP : ~3.7in.

- NOTES:
- 4.1 FOR GENERAL NOTES SEE DWG. No. 121-KE-1, SHT.1
  - 4.2 21-E-32 HAS BEEN SEALED FROM 21-E-34 AND IS NOT IN OPERATION.
  - 4.3 THIS DRAWING INCLUDES DATA DEVELOPED BY SWCL - JOB NO. 07405.0001 APRIL 1998.

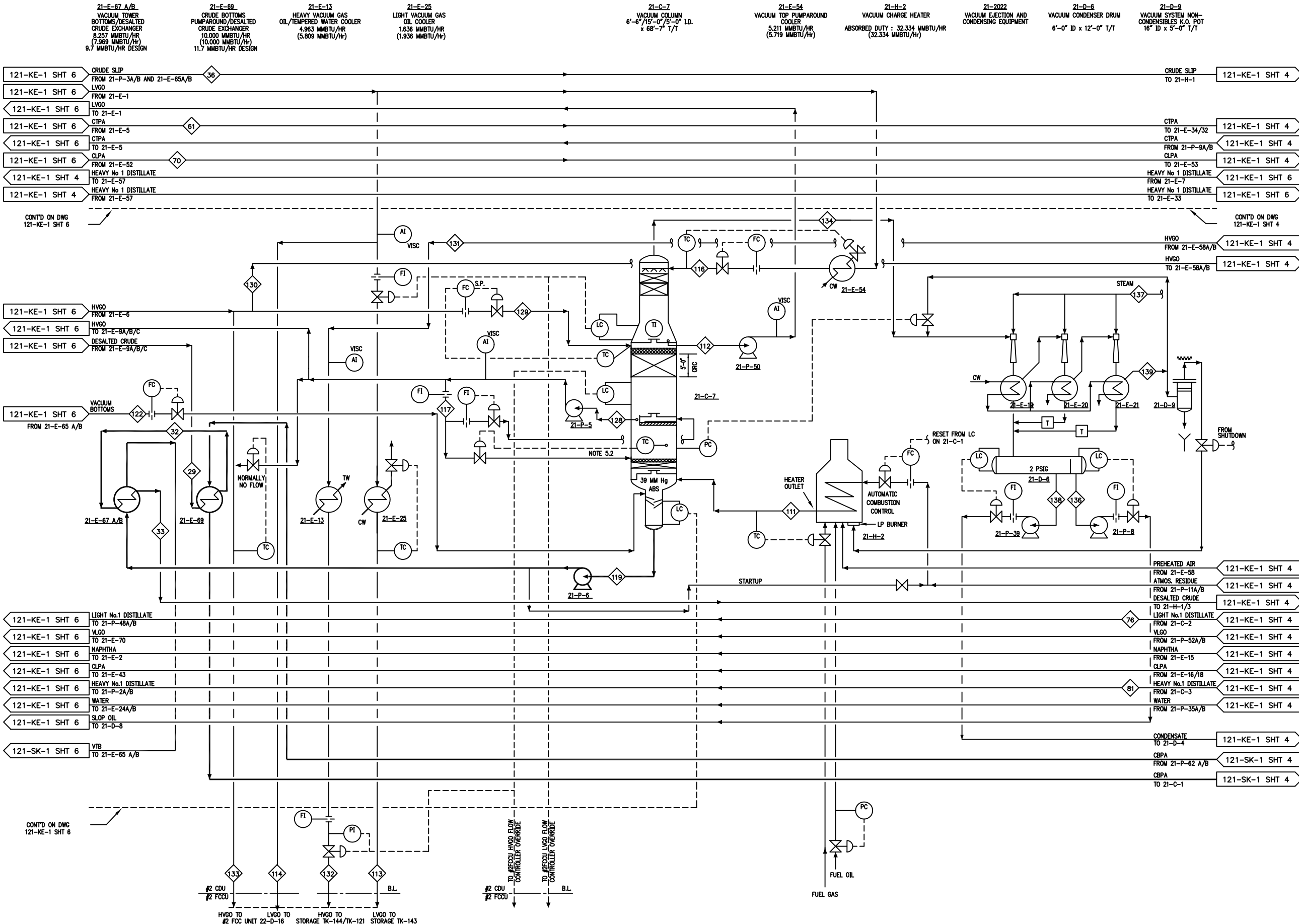
REVISION	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	APP'D BY
4	JUNE 03	UPDATED AS BUILT		SG	
3	FEB 00	LINE 9 REVERSAL PROJECT ADDED ENG# 15001320		A.V.	M.H. B.B.
2	MAY 95	UPDATED TO REFLECT #2CDU PROJECT MODIFICATIONS, 1995 T/A ; ENG.# 006361	RS	RHL	ISR
1		FINAL ISSUE			
B	01/22/93	ISSUE FOR DESIGN		LC	RHL ISR
A1	01/22/93	ISSUE FOR APPROVAL - 40,000 BPSD SWCL PROJECT CJ-10436.0002		LC	RHL ISR
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TITLE: PROCESS FLOW DIAGRAM  
 CRUDE ATMOSPHERIC AND VACUUM DISTILLATION UNIT

DEPARTMENT: AREA NO. CLASS NO. PROJ. NO. DATE: '93 SCALE: NONE

DRAWN BY: JPP CHECKED CH. DRAFT: CHECKED ENGINEER SECTION NO. APPROVED BY: DWG. NO. 121-KE-1 SHT. 4 OF 7 REV. 4



**NOTES:**

5.1 FOR GENERAL NOTES SEE DWG. NO. 121-KE-1, SHT.1

5.2 IT IS NECESSARY THAT 0.25 GPM/FT<sup>2</sup> OF SLOP WAX RATE IS MAINTAINED TO MINIMIZE COKING TENDENCIES IN THE WASH ZONE.

5.3 THIS DRAWING INCLUDES DATA DEVELOPED BY SWCL - JOB NO. 07405.0001 APRIL 1998.

121-KE-1 SHT 6	CRUDE SLIP FROM 21-P-3A/B AND 21-E-65A/B LVGO	121-KE-1 SHT 4	CRUDE SLIP TO 21-H-1
121-KE-1 SHT 6	FROM 21-E-1 LVGO	121-KE-1 SHT 4	CTPA TO 21-E-34/32
121-KE-1 SHT 6	TO 21-E-1 CTPA	121-KE-1 SHT 4	CTPA FROM 21-P-9A/B
121-KE-1 SHT 6	FROM 21-E-5	121-KE-1 SHT 4	CLPA TO 21-E-53
121-KE-1 SHT 6	TO 21-E-5 CLPA	121-KE-1 SHT 6	HEAVY No.1 DISTILLATE FROM 21-E-7
121-KE-1 SHT 4	FROM 21-E-52	121-KE-1 SHT 6	HEAVY No.1 DISTILLATE TO 21-E-33
121-KE-1 SHT 4	HEAVY No.1 DISTILLATE TO 21-E-57		
121-KE-1 SHT 4	HEAVY No.1 DISTILLATE FROM 21-E-57		
121-KE-1 SHT 6	HVGO FROM 21-E-6	121-KE-1 SHT 4	HVGO FROM 21-E-58A/B
121-KE-1 SHT 6	TO 21-E-9A/B/C	121-KE-1 SHT 4	HVGO TO 21-E-58A/B
121-KE-1 SHT 6	DESALTED CRUDE FROM 21-E-9A/B/C		
121-KE-1 SHT 6	VACUUM BOTTOMS FROM 21-E-65 A/B		
121-KE-1 SHT 6	LIGHT No.1 DISTILLATE TO 21-P-48A/B	121-KE-1 SHT 4	PREHEATED AIR FROM 21-E-58
121-KE-1 SHT 6	VLGO TO 21-E-70	121-KE-1 SHT 4	ATMOS. RESIDUE FROM 21-P-11A/B
121-KE-1 SHT 6	NAPHTHA TO 21-E-2	121-KE-1 SHT 4	DESALTED CRUDE TO 21-H-1/3
121-KE-1 SHT 6	CLPA TO 21-E-43	121-KE-1 SHT 4	LIGHT No.1 DISTILLATE FROM 21-C-2
121-KE-1 SHT 6	HEAVY No.1 DISTILLATE TO 21-P-2A/B	121-KE-1 SHT 4	VLGO FROM 21-P-52A/B
121-KE-1 SHT 6	WATER TO 21-E-24A/B	121-KE-1 SHT 4	NAPHTHA FROM 21-E-15
121-KE-1 SHT 6	SLOP OIL TO 21-D-8	121-KE-1 SHT 4	CLPA FROM 21-E-16/18
121-SK-1 SHT 6	VTB TO 21-E-65 A/B	121-KE-1 SHT 4	HEAVY No.1 DISTILLATE FROM 21-C-3
		121-KE-1 SHT 4	WATER FROM 21-P-35A/B
		121-KE-1 SHT 4	CONDENSATE TO 21-D-4
		121-SK-1 SHT 4	CBPA FROM 21-P-62 A/B
		121-SK-1 SHT 4	CBPA TO 21-C-1

STREAM NUMBER	36	70	76	81	111	112	113	114	116	117	119	122	128	129	132	133	134	136	137	138	139										
DESCRIPTION	CRUDE SLIP	CLPA	C2- BTMS	C-3 BTMS	HR OUTLET	LVGO	LVGO	LVGO TO #2 FCCU	WASH OIL	WASH OIL	VTB	QUENCH OIL	HVGO	HVGO PA	HVGO	#2 FCCU	VT OWH	SLOP OIL	EJECT STM	VAC COND	VAC OFF GAS										
PHASE	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L										
FLOW, BRLS/DAY (LBS/HR)	7,397	7,398	53,001	53,001	6,049	2,600	17,112	14,350	14,345	5,350	5,345	0	9,000	4,027	4,022	7,949	7,949	2,300	2,300	23,513	24,214	13,400	14,100	6,087	6,092	0	(1271)	7	(10,300)	719	(1,002)
TEMPERATURE, °F	342	341	317	324	349	470	757	347	347	150	150	0	106	570	569	659	660	439	447	570	570	315	330	152	157	110	100	367	100	100	100
PRESSURE, PSIG (mmHg)	395	380	95	95	40	41	(119)	(21)	(21)	30	30	-	(527)	150	150	(57)	(57)	130	130	(34)	(34)	(543)	(543)	40	40	-	(10)	2	150	2	2

REVISION	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	APP'D BY
4	JUNE 03	UPDATED AS BUILT		SG	
3	FEB 00	LINE 9 REVERSAL PROJECT ADDED ENG# 15001320		A.V.	M.H. B.B.
2	MAY 95	UPDATED TO REFLECT #2CDU PROJECT MODIFICATIONS, 1995 T/A ; ENG.# 006361		RS	RHL ISR
1		FINAL ISSUE			
B	01/22/93	ISSUE FOR DESIGN		ST	RHL ISR
A1	01/22/93	ISSUE FOR APPROVAL - 40,000 BPSD SWCL PROJECT CJ-10436.0002		SRC	RHL ISR
A	09/29/92	ISSUE FOR APPROVAL - 43,000 BPSD		LC/DAE	RHL ISR

**PETRO-CANADA**  
LAKE ONTARIO REFINERY - OAKVILLE

TITLE: PROCESS FLOW DIAGRAM  
DEPARTMENT: AREA NO.  
CLASS NO.  
PROJ. NO.  
DATE: '93  
SCALE: NONE

DRAWN BY: JPP  
CHECKED CH. DRAFT: [ ]  
SECTION NO.: [ ]  
DVG. NO.: 121-KE-1  
SHT. 5 OF 7  
REV. 4

21-D-8  
DESALTER VESSEL  
12'-0" I.D. x 42'-0" T  
21-2201  
DESALTER PACKAGE  
UNIT

21-E-52  
CRUDE / CLPA  
EXCHANGER  
9,263 MMBTU/HR  
(8,302 MMBTU/HR)

21-E-43  
CLPA / CRUDE  
EXCHANGER  
7,396 MMBTU/HR  
(5,706 MMBTU/HR)

21-E-8  
DESALTED CRUDE/  
VACUUM LOWER  
PUMP/AROUND EXCHANGER  
12,457 MMBTU/HR  
(12,090 MMBTU/HR)

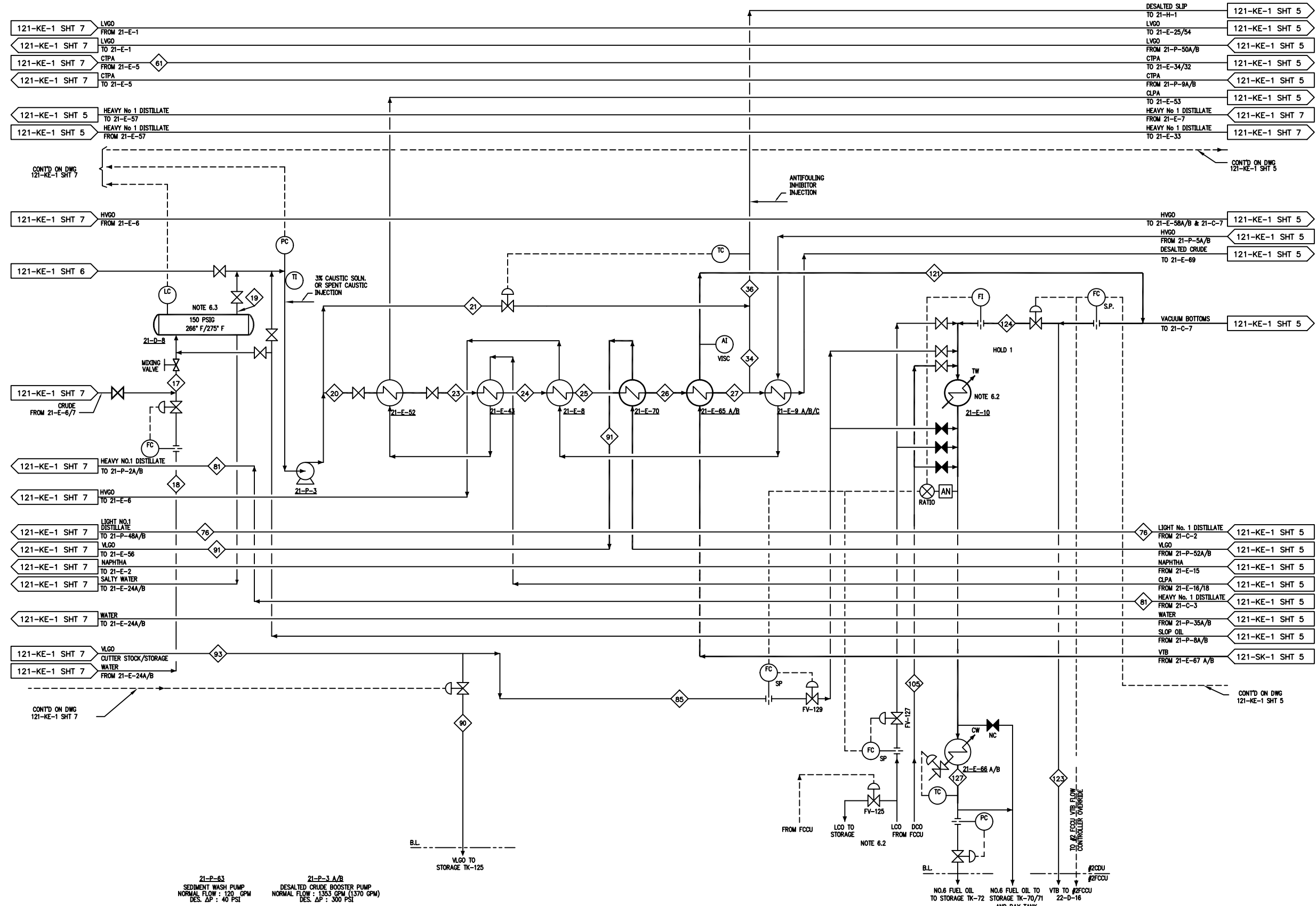
21-E-70  
VLGO PRODUCT/  
DESALTED CRUDE  
EXCHANGER  
5,694 MMBTU/HR  
(5,372 MMBTU/HR)

21-E-65A/B  
DESALTED CRUDE/  
VACUUM TOWER BOTTOM  
EXCHANGER  
8,415 MMBTU/HR  
(8,275 MMBTU/HR)

21-E-9 A/B/C  
DESALTED CRUDE/  
VACUUM LOWER  
PUMP/AROUND EXCHANGER  
18,057 MMBTU/HR  
(17,728 MMBTU/HR)

21-E-66A/B  
HEAVY FUEL OIL/  
COOLING WATER EXCHANGER  
2.7 MMBTU/HR

21-E-10  
HEAVY FUEL OIL  
TEMPERED  
WATER COOLER  
5.4 MMBTU/HR



21-P-63  
SEDIMENT WASH PUMP  
NORMAL FLOW : 120 GPM  
DES. ΔP : 40 PSI

21-P-3 A/B  
DESALTED CRUDE BOOSTER PUMP  
NORMAL FLOW : 1353 GPM (1370 GPM)  
DES. ΔP : 300 PSI

STREAM NUMBER	18		19		36		76		81		85		90		123		127		
	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	
DESCRIPTION	WASH WATER	CRUDE FROM D-8	CRUDE SLIP	C-2 BTMS	C-3 BTMS	VLGO CUTTERSTOCK	VLGO TO STORAGE	VIB TO FCCU	FUEL OIL TO STORAGE										
PHASE	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
FLOW, BBL/DAY (LBS/HR)	2,250	45,133	45,118	7,397	7,398	6,049	2,600	18	1,883	2,504	3,137	2,000	1,500	4,885	5,032				
TEMPERATURE, °F	145	275	266	342	341	349	470	100	100	100	100	100	100	100	100	100	100	100	100
PRESSURE, PSIG (mmHg)	175	150	150	395	380	40	41	120	120	30	30	130	130	55	55				

- NOTES:
- FOR GENERAL NOTES SEE DWG. NO. 121-KE-1, SHT.1
  - ALL DCO IS COMBINED VTB FOR RUNDOWN. EITHER VLGO OR LCO CAN BE USED AS CUTTER STOCK. PROVIDE CONNECTION TO INJECT VLGO, LCO, OR DCO EITHER UP STREAM OR DOWN STREAM OF 21-E-66.
  - PROVIDE SEDIMENT WASH FACILITIES TO DESALTER.
  - THIS DRAWING INCLUDES DATA DEVELOPED BY SWCL - JOB NO. 07405.0001 APRIL 1998.
  - EXCHANGERS HAVE BEEN DESIGNED FOR 1200 BPD DCO PER DESIGN BASIS. A REVISED VALUE OF A TYPICAL FLOW OF 800 BPD WAS NOT INCLUDED.

REVISION	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	APP'D BY
5	JUNE 03	UPDATED AS BUILT			
4	FEB 00	LINE 9 REVERSAL PROJECT ADDED ENG# 15001320			
3	MAY 95	UPDATED TO REFLECT #200U PROJECT MODIFICATIONS, 1995 T/A ; ENG.# 006361	RS	RHL	ISR
2	OCT.94	REMOVED PUMP 21-P-40A/B & PIPING. 95 T/A ENG.# 006266	DL	AW	
1		FINAL ISSUE			
B	02/22/93	ISSUE FOR DESIGN	LC	RHL	ISR
A1	01/22/93	ISSUE FOR APPROVAL - 40,000 BPSD SWCL PROJECT CJ-10436.0002	LC	RHL	ISR
A	09/29/92	ISSUE FOR APPROVAL - 43,000 BPSD	LC/DAB	RHL	ISR



TITLE: PROCESS FLOW DIAGRAM  
CRUDE ATMOSPHERIC AND VACUUM DISTILLATION UNIT

DEPARTMENT: AREA NO.  
CLASS NO.  
PREL. NO.  
DATE: 93  
SCALE: NONE

DRAWN BY: W.J.C.  
CHECKED ENGINEER: [Signature]  
SECTION NO.: [Blank]  
DIV. NO.: 121-KE-1  
SHT. 6 OF 7

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