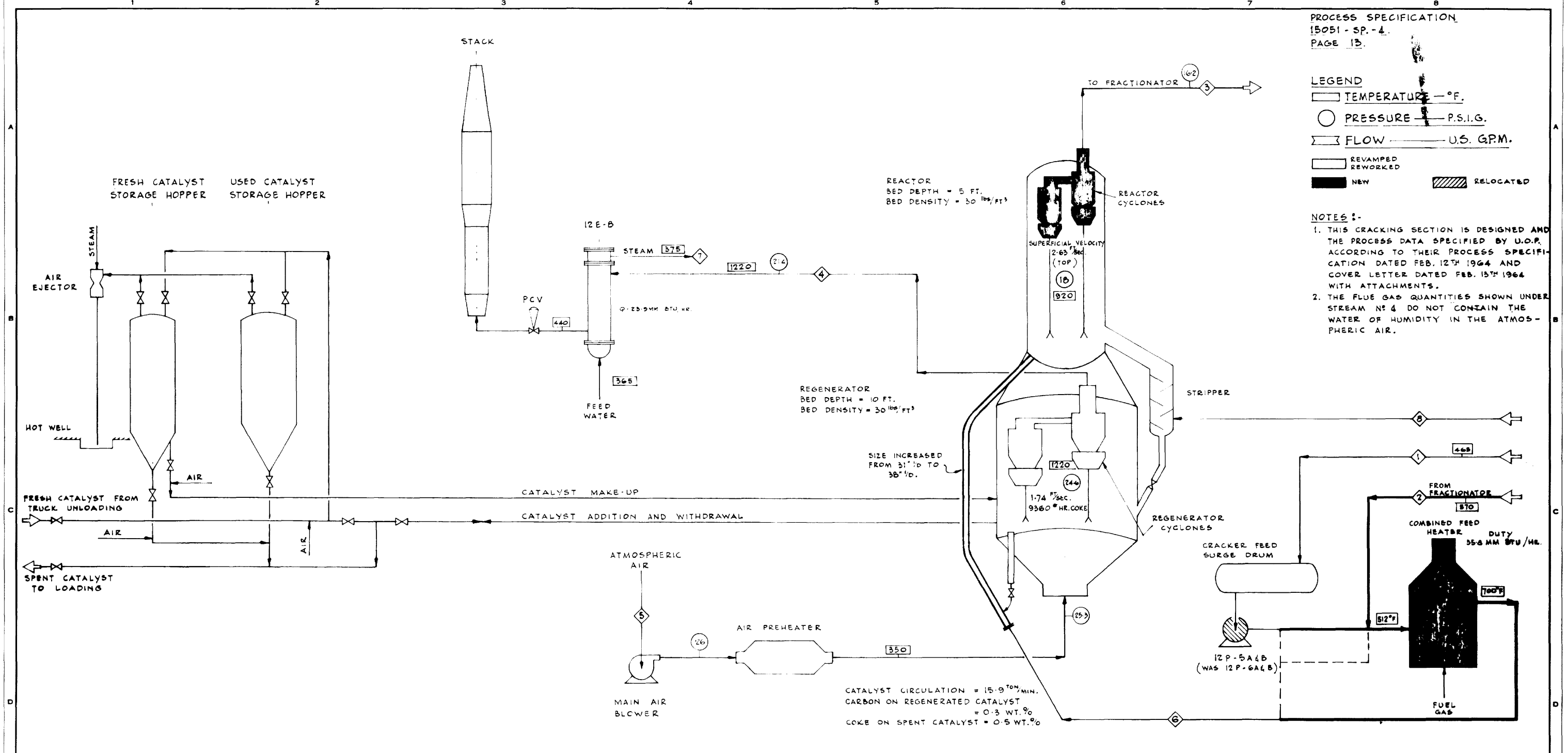


LEGEND
 [] TEMPERATURE — °F.
 () PRESSURE — P.S.I.G.
 [] FLOW — U.S. G.P.M.
 [] REVAMPED
 [] REWORKED
 [] NEW
 [] RELOCATED

NOTES :-
 1. THIS CRACKING SECTION IS DESIGNED AND THE PROCESS DATA SPECIFIED BY U.O.P. ACCORDING TO THEIR PROCESS SPECIFICATION DATED FEB. 12TH 1964 AND COVER LETTER DATED FEB. 15TH 1964 WITH ATTACHMENTS.
 2. THE FLUE GAS QUANTITIES SHOWN UNDER STREAM NO 4 DO NOT CONTAIN THE WATER OF HUMIDITY IN THE ATMOSPHERIC AIR.



CATALYST CIRCULATION = 15.9^{TON}/MIN.
 CARBON ON REGENERATED CATALYST = 0.3 WT. %
 COKE ON SPENT CATALYST = 0.5 WT. %

STREAM STREAM NO	FRESH FEED 1	H.C.S. RECYCLE 2	REACTOR VAPORS 3	FLUE GAS 4	COMBUSTION AIR 5	COMBINED FEED 6	STEAM 7	STRIPPING STEAM 8
B.P.S.D.	12,000	9,000	275,510	116,550	107,500	21,000	25,000	2,760
POUNDS / HOUR	158,630	122,800	275,510	116,550	107,500	21,000	25,000	2,760
U.S.G.P.M. @ FLOW CONDITIONS	425	336	21,000	116,550	107,500	21,000	25,000	2,760
A.P.I. @ 60°F	24.5	19.8	22.4	28.3	29.5	29.5	29.5	29.5
MOLECULAR WEIGHT	334	257	117.5	28.3	29.5	29.5	29.5	29.5
VISCOSITY @ F.C. - CP								
HYDROCARBONS	475	478	2171		953			
INERTS			65					
STEAM			88					154
TOTAL MOLES/HOUR.			2,324	4,106	3,720			

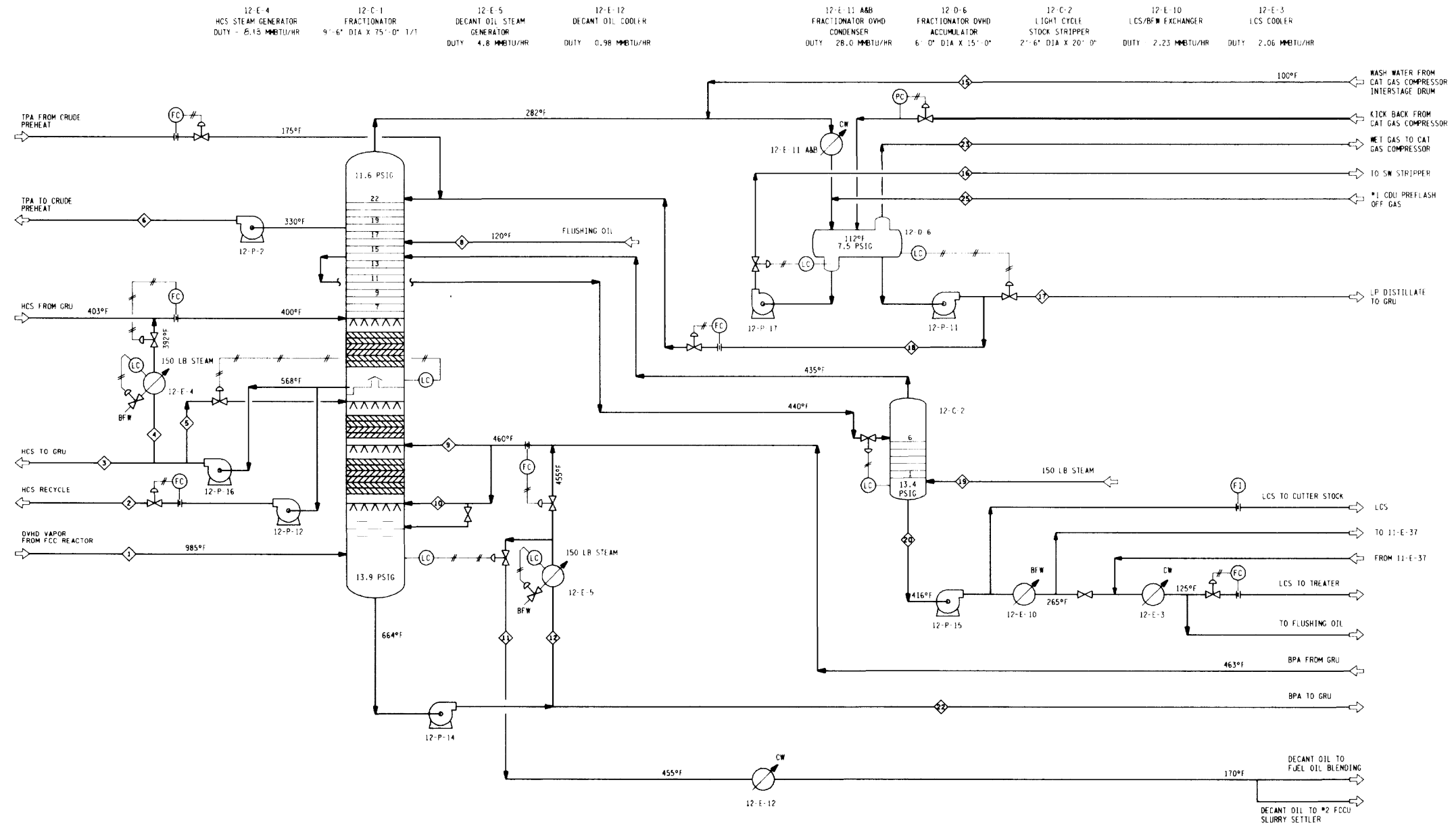
BT	3/13/65	REVISED TO DATE	
7T	11-9-64	REVISED TO DATE AS PER COMMENT PRINT	
GT	8-18-64	REVISED & REDRAWN TO DATE.	
REV.	DATE	DESCRIPTION	APPROVED



DESIGNED BY	DATE	APPROVED BY	DATE
DRAWN R. YOUNG	8-18-64		
CHECKED	10/20/64	SCALE	NONE

TITLE: CATALYTIC CRACKER
 CRACKING SECTION
 PROCESS FLOWDIAGRAM

DRAWING NO. 112-KD-1
 REVISION 8T



DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	25
COMPONENT	REACTOR EFFLUENT	HCS RECYCLE	HCS TO GRU	HCS TO 12-E-4	HCS REFLUX	TOP PUMP-AROUND	FLUSHING OIL RETURN	BPA TO TOP RETURN	BPA TO BTM RETURN	DECANT OIL	BPA TO 12-E-5	WASH WATER	SOUR WATER	LP DISTILLATE	TOP REFLUX	STRIPPING STEAM	LCS	BPA TO GRU	WET GAS +PFOG	PREFLASH OFF GAS			
BPSD (MMSCFD)	(19.80)	0	15,661	5,593	11,641	16,785	600	5,790	3,851	552	2,471	824	1,098	5,639	1,937	(0.51)	2,342	7,721	(11.90)	(0.29)			
*API (MM)	(71.8)		8.2	8.2	8.2	35.8	16.2	1.4	1.4	1.4	1.4	10.0	10.0	56.7	56.7	(18.0)	16.2	1.4	(45.8)	(47.5)			
LB/HR TOTAL	156,167	0	231,570	82,700	172,131	207,294	8,377	89,851	59,758	8,566	38,352	12,000	15,993	61,825	21,009	1,000	32,757	119,832	59,903	1,500			
COMPONENT (MPH)																							
H ₂ O	251.6											666.1	887.5		55.5	1.6							0.7
INERTS	90.5																						1.1
H ₂ S	17.2												0.03										0.8
C ₁	140.0																						1.7
C ₂	63.8																						4.6
C ₂ =	66.9																						-
C ₃	57.5																						10.5
C ₃ =	176.5																						-
IC ₄	106.7																						2.1
NC ₄	36.9																						5.4
C ₄ =	172.7																						-
C ₅ +	993.5						40.9			30.3										149.7			4.7
TOTAL MPH	2173.8	0	931.6	332.7	692.5	1,330.0	40.9	317.8	211.4	30.3	135.7	666.1	887.5	592.0	206.3	55.5	151.3	423.8	1,306.8				31.6

NOTES:
 1. ALL PRESSURES SHOWN ARE GAUGE PRESSURES.
 2. NEW EQUIPMENT SHOWN DARK.
 3. REVISED FOR REDUCED SCOPE CASE.

REF. RUN # 4224, 5162 & 1081
 2. DATA 12-E-4 DUTY CORRECTED

FOR CLIENT APPROVAL	JC	SH
FOR DESIGN APPROVAL	JC	SH
PER APPROVED SCOPE	JC	SH
GENERAL REVISION NOTE 3	JC	PW
GENERAL REVISIONS	JC	AEB
ISSUED FOR APPROVAL	JC	AEB

PETRO-CANADA
 OAKVILLE REFINERY

No. 1 FCCU FRACTIONATOR
 PROCESS FLOW DIAGRAM
 MSW CASE
 FCCU FEED = 12,000 BPSD

Job No.	Drawing No.	Rev
195	112-KD-3	

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15-C-7
#1 FCCU C3/C4 AMINE ABSORBER

46-D-19
DDS SOUR GAS COMP. K.O. DRUM

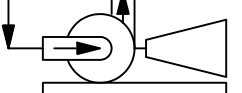
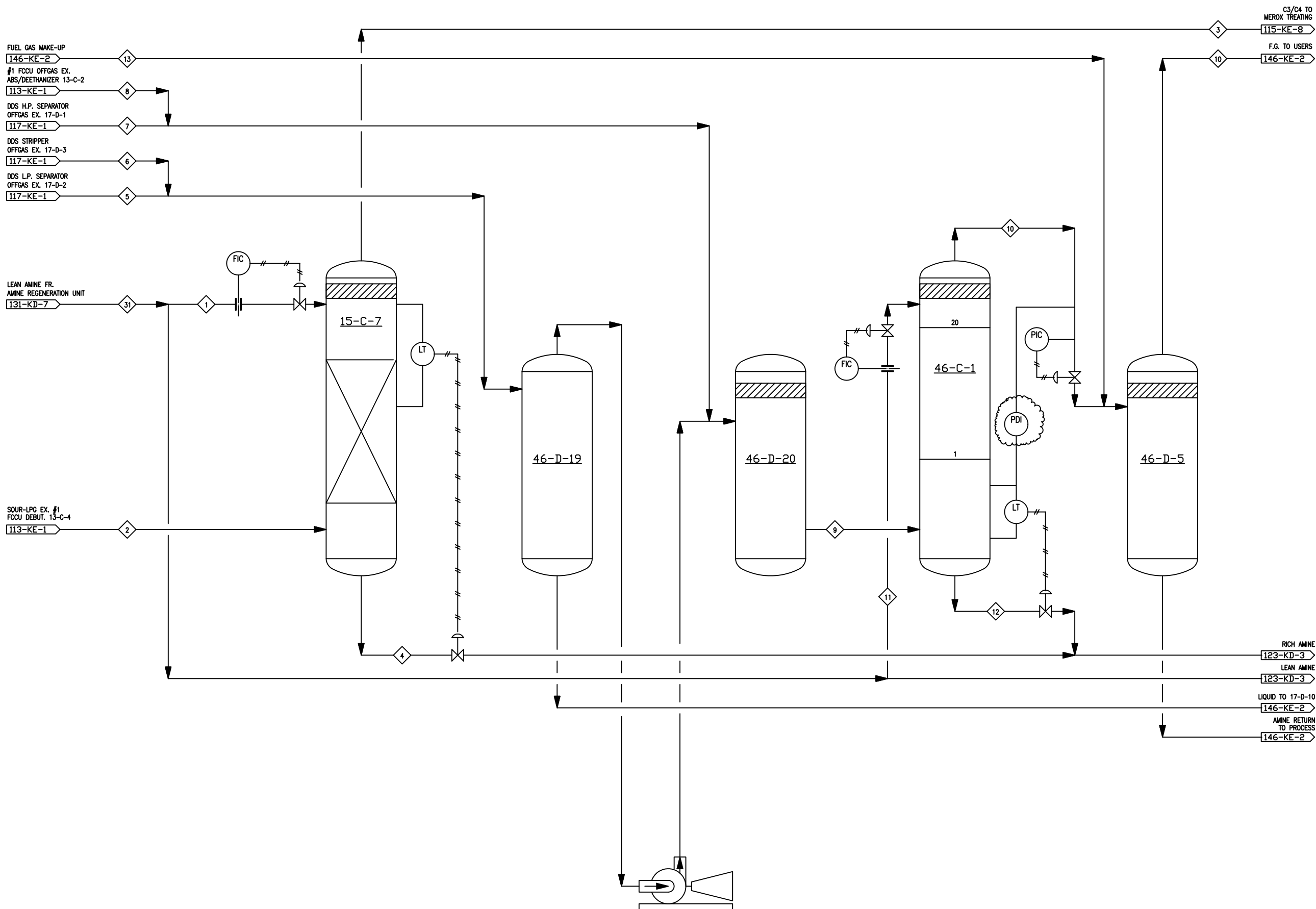
46-D-20
AMINE ABSORBER DRY DRUM

46-C-1
FUEL GAS AMINE ABSORBER

46-D-5
FUEL GAS K.O. DRUM

GENERAL NOTES

1. AMINE STRENGTH IS 27% WT. DEA.
2. INSTALL PDI ACROSS 46-C-1 TRAYS.
3. FOR GENERAL NOTES & LEGEND SEE DWG 112-KE-1 SHT.1.



46-K-5
DDS SOUR GAS
COMPRESSOR

C3/C4 TO
MEROX TREATING
115-KE-8

F.G. TO USERS
146-KE-2

RICH AMINE
123-KD-3

LEAN AMINE
123-KD-3

LIQUID TO 17-D-10
146-KE-2

AMINE RETURN
TO PROCESS
146-KE-2

0	AUG92	REVISED PER TPA CONTRACT 2065-00	DN		
REVISION	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	APP'D BY

TPA, Inc. Consultants/Engineers/Managers
Dallas, Texas



TITLE PROCESS FLOW DIAGRAM PLANT 1 AMINE ABSORBERS		DEPARTMENT	
AREA NO.		CLASS NO.	
PROJ. NO. 2065-00		DATE 8/18/92	
SCALE NONE		REV. 0	
DRAWN BY NELSON	CHECKED CH. DRAFT	SECTION NO.	DWG. NO. 112-KD-5
	CHECKED ENGINEER	APPROVED BY	

- GENERAL NOTES**
1. DELETED
 2. NEW EQUIPMENT IS SHOWN CIRCLED.
 3. DELETED
 4. PUMP REMOVED FROM T-20 TO T-21 PUMP/ROUND PUMP.
 5. EXISTING FRACTIONATOR, 12-E-1 TO BE DECOMMISSIONED AND REPLACED WITH NEW TOWER.
 6. PUMPS 12-P-22A/B AND 12-P-23A/B ARE NEW.
 7. DELETED
 8. KNOCK-OUT PATE 12-D-20 AND 12-D-21 TO PREVENT WATER CARRY-OVER ARE NEW.
 9. HEAT EXCHANGER 12-E-19 WILL BE REMOVED FOR DESIGN TEMP. OF 300°F. EXCHANGER MUST BE 100% EFFICIENT.
 10. HEAT EXCHANGER 12-E-19 HAS DESIGN MAX. ALLOW. OF 1000 BPSD. DESIGN OIL FLOW ANTICIPATED TO BE 1000 BPSD. DESIGN OIL FLOW ANTICIPATED TO BE 1000 BPSD. DESIGN OIL FLOW ANTICIPATED TO BE 1000 BPSD. DESIGN OIL FLOW ANTICIPATED TO BE 1000 BPSD.
 11. NEW 100HP MOTOR TO REPLACE EXISTING 75HP MOTOR FOR 12-E-19A/B.
 12. CW OUTLET TEMPERATURE IS 150°F FOR A DECAANT OIL MAXIMUM OF 1000 BPSD.

THIS PFD SKETCH IS
 BASED ON PCD DRAWING No.
 112-KD-3
 AND HAS BEEN CONVERTED TO CAD AS SHEET 1

- LEGEND**
- TEMPERATURE, °F
 - PRESSURE, PSIG
 - DWT, MMHG/A

ISSUE NO.	DATE	DESCRIPTION	BY	CHK'D	APP'D
C		ISSUE FOR PDP	AM	BPA	AS/PA
B	09/23/01	ISSUE FOR REVIEW	AM	BPA	AS/PA
A	04/19/01	ISSUE FOR INFORMATION	AM	BPA	AS/PA

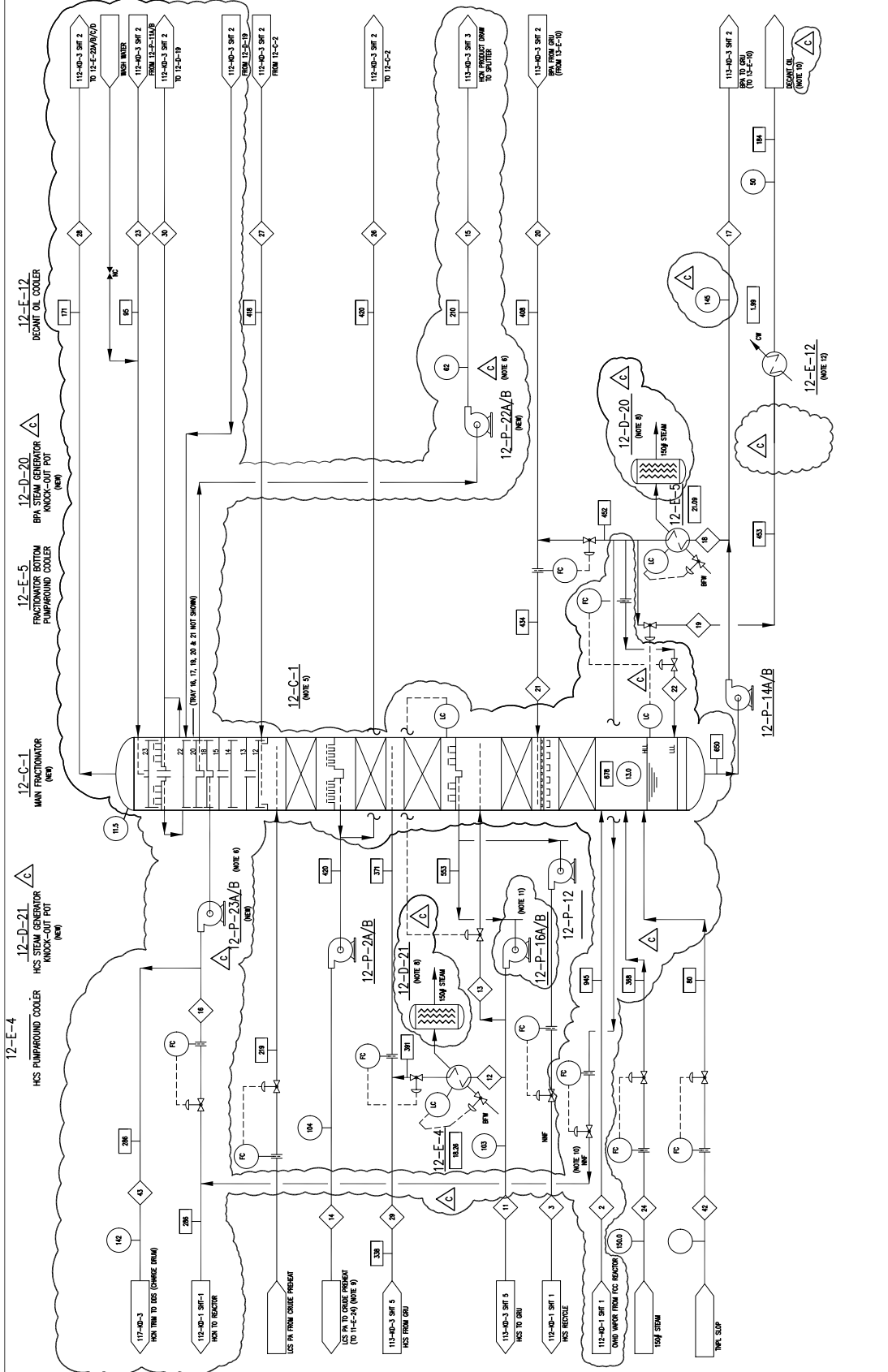
colt engineering corporation

PETRO-CANADA OAKVILLE REFINERY

UNIT: 1201
 FLOW: 1201
 PIPING: 1201

No 1 FCCU FRACTIONATOR
 PROCESS FLOW DIAGRAM
 NORMAL OPERATING CASE-150 ppmw

DRAWN BY: [Name]
 CHECKED BY: [Name]
 DATE: [Date]



STREAM No.	STREAM NAME	12-P-16A/B HEAVY CYCLE STACK PUMP/ROUND PUMPS (NOTE 4)	12-P-2A/B FRACTIONATOR L/S PUMP/ROUND PUMPS (NOTE 4)	12-P-23A/B HCS RECYCLE PUMPS (NOTE 4)	12-P-12 HEAVY CYCLE STACK RECYCLE PUMP (NOTE 4)	12-P-14A/B FRACTIONATOR BOTTOMS PUMPS (NOTE 4)	12-P-22A/B SPRINTERS FEED PUMPS (NOTE 4)	12-E-12 DECAANT OIL (NOTE 10)	12-E-12 DECAANT OIL (NOTE 10)	12-E-12 DECAANT OIL (NOTE 10)	12-E-12 DECAANT OIL (NOTE 10)
2	FRACTIONATOR FEED	241781	0	241781	0	241781	0	241781	0	241781	0
3	HCS RECYCLE	8883	14370	10570	2600	5000	6771	12840	1080	17549	110000
4	HCS TO GRU	133718	216283	159083	60492	260378	40884	184243	500	36188	1977
5	HCS TO GRU	133718	216283	159083	60492	260378	40884	184243	500	36188	1977
6	HCS TO GRU	133718	216283	159083	60492	260378	40884	184243	500	36188	1977
7	HCS TO GRU	133718	216283	159083	60492	260378	40884	184243	500	36188	1977
8	HCS TO GRU	133718	216283	159083	60492	260378	40884	184243	500	36188	1977
9	HCS TO GRU	133718	216283	159083	60492	260378	40884	184243	500	36188	1977
10	HCS TO GRU	133718	216283	159083	60492	260378	40884	184243	500	36188	1977
11	HCS TO GRU	133718	216283	159083	60492	260378	40884	184243	500	36188	1977
12	HCS TO GRU	133718	216283	159083	60492	260378	40884	184243	500	36188	1977
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GENERAL NOTES

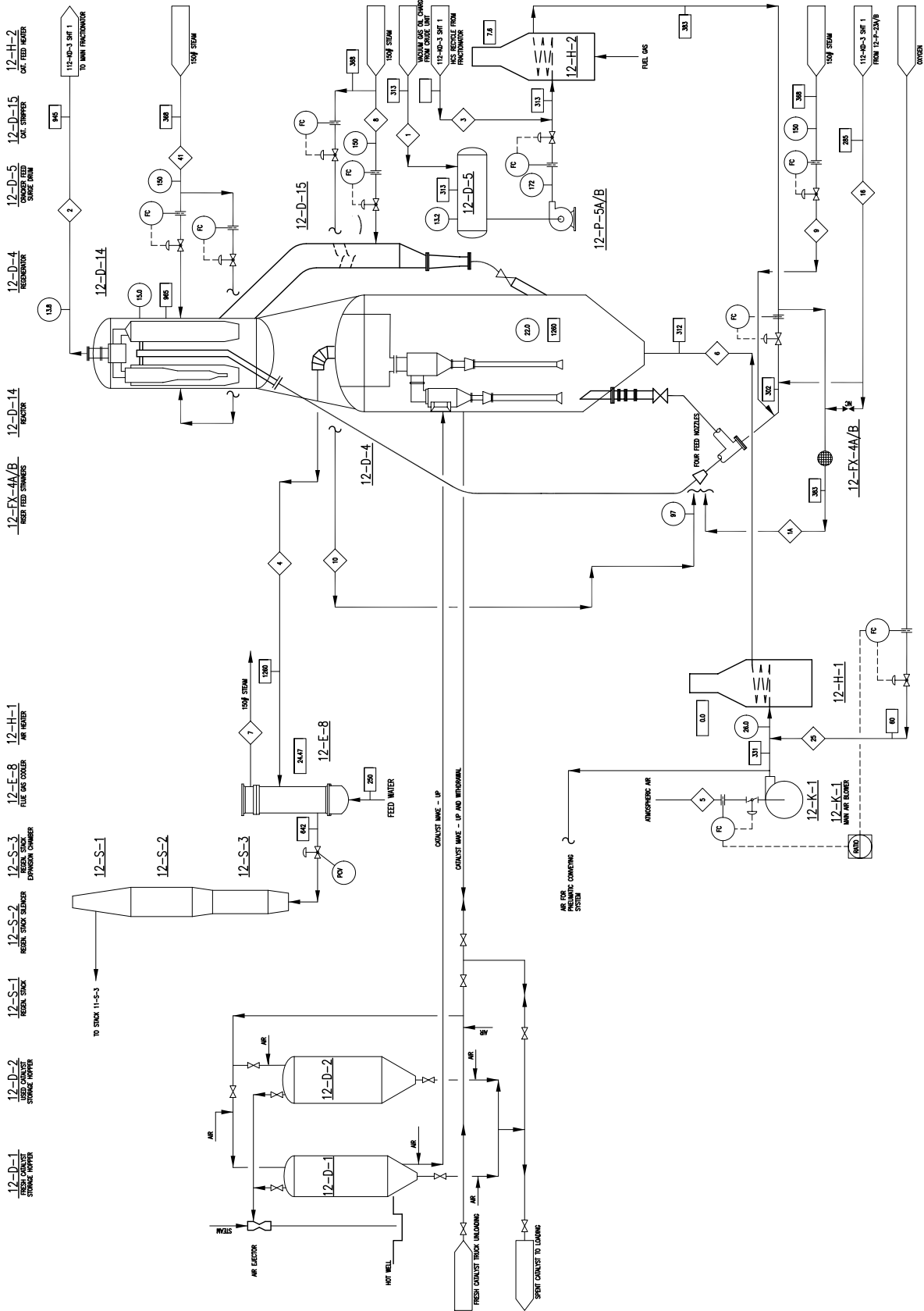
THIS PFD SKETCH IS
BASED ON PFD DRAWING NO.
1505-112-KD-1
AND HAS BEEN CONVERTED TO CAD

- LEGEND
- TEMPERATURE, °F
 - PRESSURE, PSIG
 - DOT, MM/HR

REV	DATE	BY	CHKD	DESCRIPTION
E	04/12/05	AS	AS	AS-BUILT FOR USE IN FEED FRACTIONATOR PROJECT
D	12/20/01	AM	AS	REVISION FOR PIP ISSUE
C	12/20/01	AM	AS	ISSUE FOR PIP
B	08/23/01	AM	AS	ISSUE FOR REVISION
A	04/18/01	AM	AS	ISSUE FOR INFORMATION

colt engineering corporation

TITLE	DEPARTMENT	PIPING
No. 1 FCCU	AREA NO.	12
CRACKING SECTION	CLASS NO.	
PROCESS FLOW DIAGRAM	FEED NO.	DT6003
NORMAL OPERATING CASE-150 ppmw	DATE	
DESIGNED BY	CHECKED BY	NTS
D. HOUGH	APPROVED BY	112-SK-1
		SHT. 1 OF 1

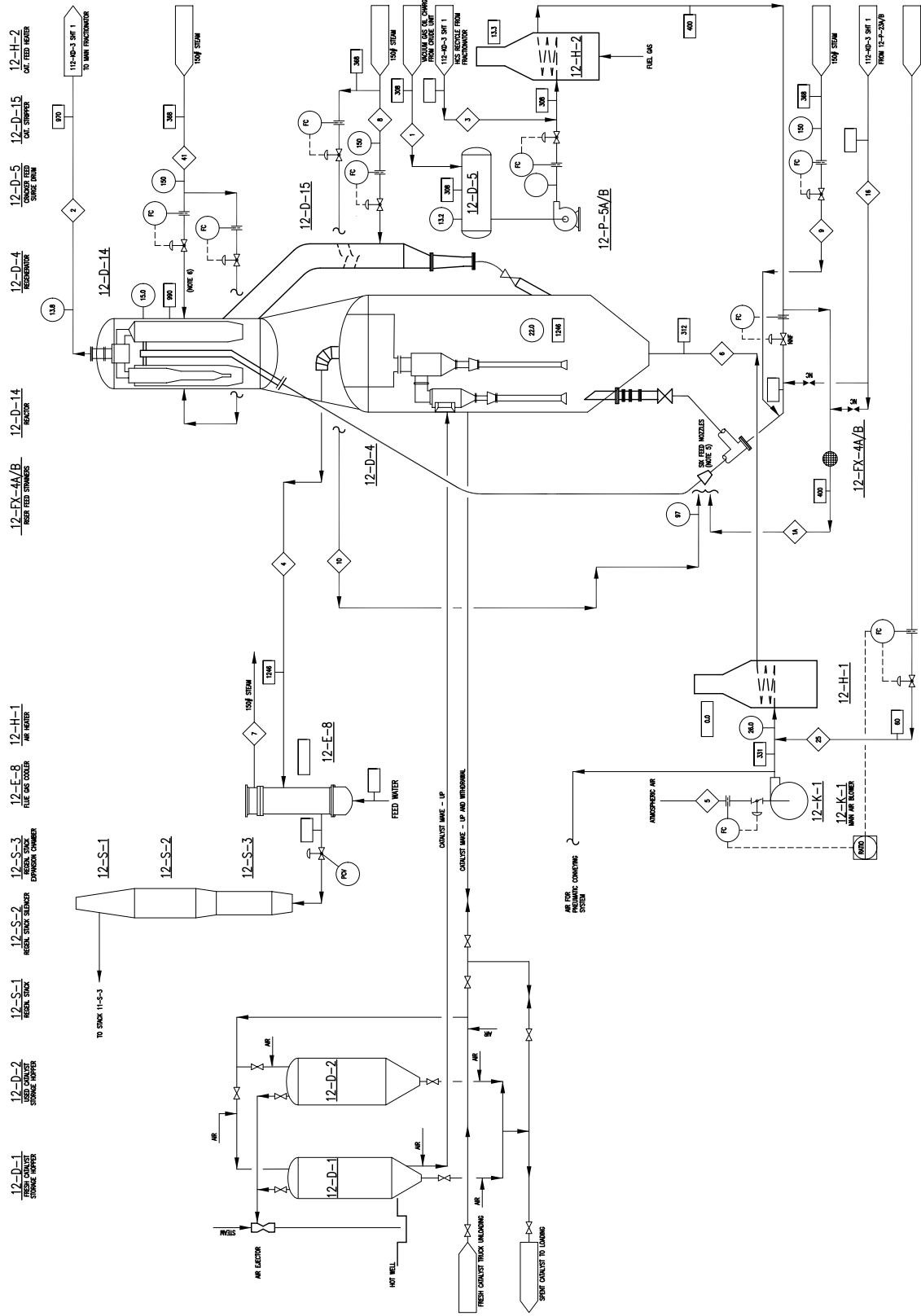
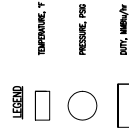


STREAM No.	1	2	3	4	5	6	7	8	9	10	16	25	41
GAS OIL FEED	18543	18543	0	15500	13305	14414	2420	2501	3009	3210	8559	11529	2000
GAS OIL FEED	12000	24784	0	0	0	0	0	0	0	0	0	0	0
TOTAL FLOW (B/H)	30543	43327	0	15500	13305	14414	2420	2501	3009	3210	8559	11529	2000
VOLUME FLOW (BPS @ 60°F)	1350	1800	0	15500	13305	14414	2420	2501	3009	3210	8559	11529	2000
VOLUME FLOW (MSSD)	1350	1800	0	15500	13305	14414	2420	2501	3009	3210	8559	11529	2000

12-P-5A/B
CRACKER CHARGE PUMPS

GENERAL NOTES

1. THE PFD IS BASED ON PFD 112-SK-1, SHEET 1, REV. C
2. THE PFD IS BASED FOR INFORMATION ONLY. IT REPRESENTS PRELIMINARY INFORMATION FOR FUTURE SHEET DEVELOPMENT. IT IS NOT TO BE USED FOR CONSTRUCTION OR FOR ANY OTHER PURPOSES WITHOUT THE NECESSARY APPROVALS AND REVISIONS TO BE MADE.
3. EQUIPMENT RATED FOR 150 PSIA SULPHUR IN CONTACT HAS BEEN USED FOR THESE LINES UNLESS NOTED TO THE CONTRARY. THESE LINES DO NOT NECESSARILY MEET 30 PPM REQUIREMENTS.
4. BLOCKS FOR TEMPERATURE, PRESSURE & DENSITY ARE LEFT BLANK IF THAT PART OF THE PROCESS HAS NOT BEEN SIMULATED.
5. SKV MODELS REQUIRED ON HESH FOR 30 PPM CASE.
6. STEAM TO BURNING



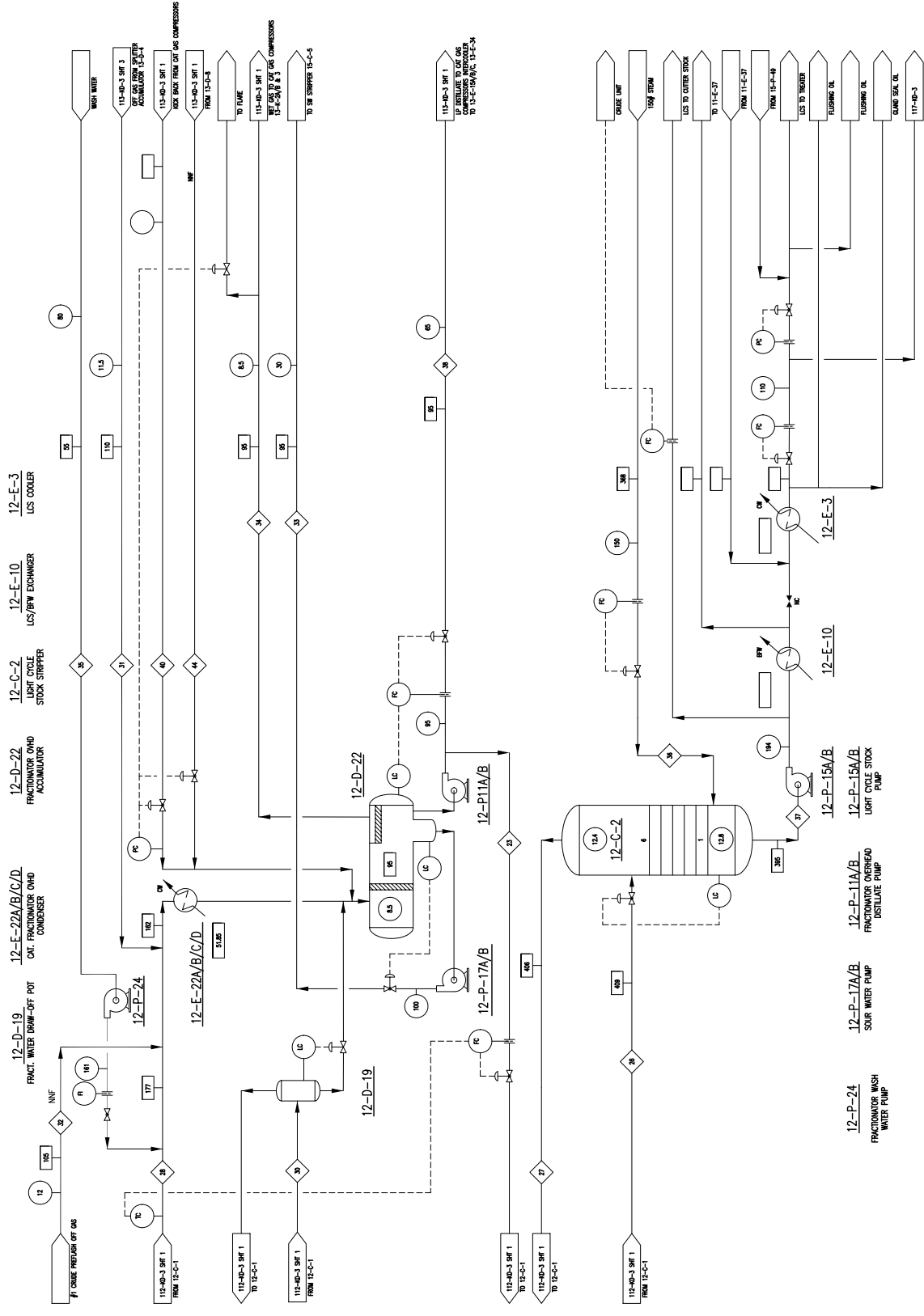
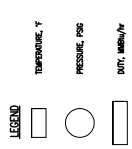
STREAM NO.	1	2	3	4	5	6	7	8	9	10	18	25	41
GAS OIL FEED FROM CRACKER	240888	240888	0	15219	13285	14414	2501	1432	4793	0	11529	2000	
TOTAL FLOW (b/hr)	18000	20255	0	4668	4383	4654							
VOLUME FLOW (BPSD @ 60°F)	18000	20255	0	4668	4383	4654							
VOLUME FLOW (MMSCFD)	18000	20255	0	4668	4383	4654							

12-P-5A/B
CRACKER CHARGE PUMPS

TITLE: No 1 FCCU
 CRACKING SECTION
 PROCESS FLOW DIAGRAM
 ALTERNATIVE CASE-30 ppmw
 DRAWN BY: D. HOUGH
 CHECKED BY: KS/PA
 SECTION NO.: 112-SK-18
 SHEET: 1 of 1
 DEPARTMENT: PETRO-CANADA OAKVILLE REFINERY
 PROJECT NO.: 017503
 DATE: 2001 APRIL
 SCALE: NTS
 SHEET NO.: 112-SK-18
 SHEET: 1 of 1

GENERAL NOTES

1. THIS PFD IS BASED ON PFD 112-SK-3, SHEET 2 OF 2 REV. C
2. IF REVISIONS ARE MADE TO THIS PFD, THE REVISIONS MUST BE ACCOMPANIED BY A REVISIONS PRELIMINARY RECOMMENDATION FOR FUTURE NORMAL OPERATION. THIS REVISIONS PRELIMINARY RECOMMENDATION IS BASED ON THE ASSUMPTION THAT THE PROCESS IS BEING SIMULATED, BASED ON THE CURRENT DESIGN.
3. EQUIPMENT SIZES FOR 150 PPM SULFUR IN GASOLINE HAS BEEN SIZED FOR WIPER LINES AND APPROVED FOR 30 PPM SULFUR IN GASOLINE. THIS IS BASED ON THE ASSUMPTION THAT THE PROCESS IS BEING SIMULATED, BASED ON THE CURRENT DESIGN. THIS IS NOT NECESSARILY MEET TO PPM REQUIREMENTS. BLOCKS FOR TEMPERATURE, PRESSURE & DUTY ARE LEFT BLANK IF THEY HAVE NOT BEEN SIMULATED.
4. THIS PART OF THE PROCESS HAS NOT BEEN SIMULATED.



STREAM No.	TOP RETUX	LUS STRIPPER FEED	LUS STRIPPER	FRACTIONATOR WASH WATER	WATER DRAW-OFF	SPRITER OFF-GAS	OVHD OFF-GAS	SOUR WATER	WET GAS 4710G	WASH WATER	STRIPPING STREAM	LUS	LP DISTILLATE	LP CAT GAS COMPRESSOR KICK BACK	OVHD COMPRESSOR KICK BACK
23	16680	27421	1714	28310	0	284	0	23637	67196	13000	250	29658	40064	0	0
24	10784	1952	10784	1596	878	1596	1071	4043	1259	0.13					
25															
26															
27															
28															
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42															
43															
44															

REVISION	DATE	DESCRIPTION	REV	DATE	BY
A					

colt engineering corporation

PETRO-CANADA OAKVILLE REFINERY

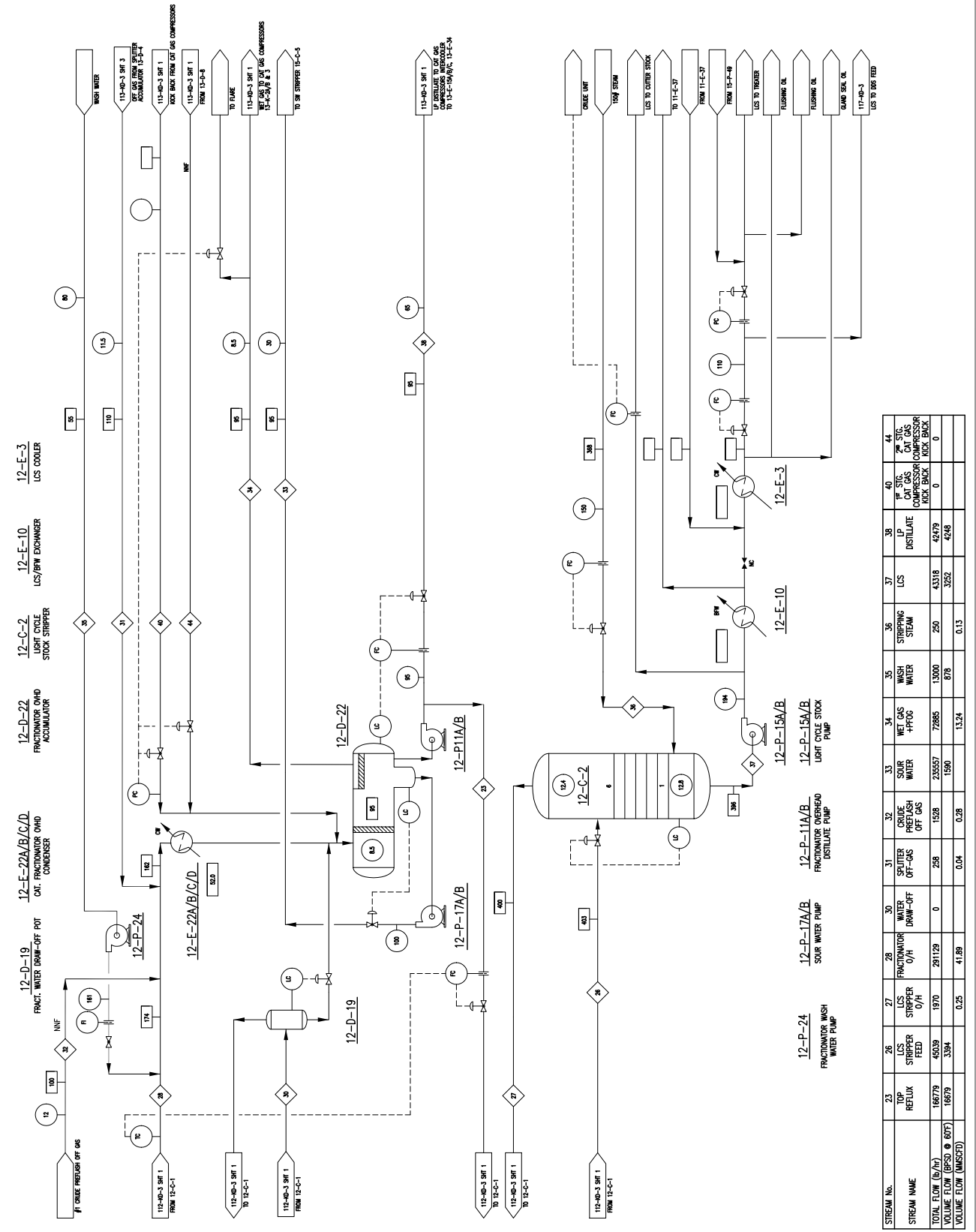
FILE: 112-SK-3-3A
 SHEET: 2 OF 2

NO. 1 FCCU FRACTIONATOR
 PROCESS FLOW DIAGRAM
 NORMAL OPERATING CASE-30 ppmw

DESIGNED BY: CS/PA
 CHECKED BY: NTS
 DATE: 2007 APRIL
 SCALE: 1:1
 SHEET: 2 OF 2

GENERAL NOTES

1. THIS PFD IS BASED ON PFD 112-SK-3, SHEET 2 OF 2, REV. C
2. THIS PFD IS BASED ON INFORMATION ONLY. IT REPRESENTS PRELIMINARY INFORMATION FOR FUTURE SHEET CHANGES. IT IS NOT TO BE USED FOR CONSTRUCTION. ANY CHANGES TO THIS PFD MUST BE APPROVED BY THE DESIGNER.
3. EQUIPMENT RELATED TO 100 PPM SULPHUR IN GASOLINE HAS BEEN SIZED FOR WOULD LOADS ASSUMED TO BE 30 PPM. THESE SIZES ARE NOT NECESSARILY MEET 30 PPM REQUIREMENTS. SIZES NOT NECESSARILY MEET 30 PPM REQUIREMENTS.
4. TAGS FOR TEMPERATURE, PRESSURE & DENSITY ARE LEFT BLANK IF THIS PART OF THE PROCESS HAS NOT BEEN SIMULATED.



LEGEND

TEMPERATURE, T

PRESSURE, PSIG

DENSITY, LB/IN³

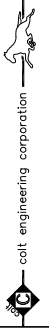
REV.	DATE	DESCRIPTION
A		ISSUE FOR PDP

DESIGNED BY	D. HOUGH
CHECKED BY	KSP/A
APPROVED BY	

PROJECT NO.	112-SK-3B
SHEET NO.	2 of 2

AREA NO.	PP/NG
UNIT NO.	12
UNIT NAME	NO. 1 FCCU FRACTIONATOR
UNIT CODE	01T503
DATE	2001 APRIL
SCALE	N/T/S

PROJECT NO.	112-SK-3B
SHEET NO.	2 of 2



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PETRO-CANADA
 OAKVILLE REFINERY

STREAM No.	STREAM NAME	TOP REFLUX	LCS STRIPPER FLD	LCS STRIPPER O/H	FRACTIONATOR WASH WATER O/H	WATER DRAW-OFF	SPLITTER OFF-GAS	CRUDE PREHEAT OFF-GAS	SOUR WATER	WET GAS +FUG	WASH WATER	STRIPPING STEAM	LCS	LP DISTILLATE	STG. BLAS COMPRESSOR KICK BACK	STG. FUG COMPRESSOR KICK BACK
23	TOP REFLUX	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
26	LCS STRIPPER FLD	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
27	LCS STRIPPER O/H	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
28	FRACTIONATOR WASH WATER O/H	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
30	WATER DRAW-OFF	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
31	SPLITTER OFF-GAS	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
32	CRUDE PREHEAT OFF-GAS	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
33	SOUR WATER	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
34	WET GAS +FUG	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
35	WASH WATER	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
36	STRIPPING STEAM	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
37	LCS	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
38	LP DISTILLATE	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
40	STG. BLAS COMPRESSOR KICK BACK	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
44	STG. FUG COMPRESSOR KICK BACK	166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
TOTAL FLOW (lb/hr)		166779	45039	1970	291129	0	258	1528	235557	72885	13000	250	43318	42479	0	0
VOLUME FLOW (BPSD @ 60°F)		16679	4507	1970	291129	0	258	1528	235557	72885	1324	0.13	3252	4248	0	0
VOLUME FLOW (MMSFDD)		0.25	0.04	0.28	0.04	0.28	0.13	3252	4248	0	0	0	0	0	0	0