Natural Resources Canada's CanmetENERGY disclaimer

SPECIFICATION TIPS

TO GET:	SPECIFY:
GL TTA	Control Weak Wash to Dissolving Tank
GL NaOH etc.	WL Clarif. Mud Wash Underflow conc.
WL NaOH	Control NaOH M/U to give WL NaOH conc
WL Na2S	Control Gen Effluent to give WL Sulfidity
WL Na2CO3	Control Limestone to give Na2CO3 conc
WL Na2SO4	Set Recovery Reduction
WL Na2SO3	Control Recovery smelt Na2SO3 flow
WL Na2S2O3	Control Recovery smelt Na2S2O3 flow
WL NaCl	- Recovery FlyAshClEnrichemntRatio - Fly Ash Purge - Bound Cl during digestion and O2 Delig. - Numerous inputs and loss ratios
Potassium	- Recovery FlyAshKEnrichemntRatio - Bound K during digestion and O2 Delig. - Numerous inputs and loss ratios
Digester WL	WL Clarifier WL flow to give EA/Wood
Production	Chips to Dig, yield, rejects, shrinkage
Bleach Chemicals	Applicaton %s at top of Bleach table
Convergence:	- Use <> to ensure all specifications met - K and Cl will continue to drift for days

CNCG	t/d	Vol%
H2O[V]	4.00	37.65
O2	2.14	11.34
N2	6.26	37.86
H2S	0.71	3.5220
CH3SH	0.95	3.3653
C2H6S	1.00	2.7403
C2H6S2	0.63	1.1260
CH3OH	0.31	1.6550
CO2	0.07	0.2537
Turps	0.40	0.4917
Vol Flow	11.2	Am3/min
Total S	2.25	t/d
Temperature	77.0	°C
Pressure	7.0	kPa_g

RAW GREEN LIQUOR

Chemicals expressed as equivalent Na2O:

AA	45.24 g/l		206.1 t/d
EA	28.43 g/l		129.5 t/d
TTA	116.13 g/l		529.0 t/d
TA	116.37 g/l		530.1 t/d
Activity	38.88		
Sulfidity	74.3 %AA	29.0 %TTA	
Reduction	93.0 %	Causticity	14.1 %
NaOH	11.62 g/l		52.9 t/d
Na2S	33.62 g/l		153.2 t/d
Na2CO3	70.89 g/l		322.9 t/d
Na2SO4	1.69 g/l		7.7 t/d
Na2SO3	0.24 g/l		1.1 t/d
Na2S2O3	0.30 g/l		1.4 t/d
NaCl	1.19 g/l		5.4 t/d
Tofal Chem.	119.55 g/l		

Elemental mass flows:		Flow:
Na	384.5 t/d	835.7 USGPM
S	85.2 t/d	3163.6 l/m
K	33.2 t/d	
Cl	6.2 t/d	

WHITE LIQUOR

Chemicals expressed as equivalent Na2O:

AA	104.58 g/l		396.2 t/d
EA	87.97 g/l		333.3 t/d
TTA	120.78 g/l		457.5 t/d
TA	121.02 g/l		458.4 t/d
Activity	86.42		
Sulfidity	31.8 %AA	27.5 %TTA	
Reduction	91.9 %	Causticity	81.5 %
NaOH	71.36 g/l		270.3 t/d
Na2S	33.22 g/l		125.8 t/d
Na2CO3	16.20 g/l		61.4 t/d
Na2SO4	2.11 g/l		8.0 t/d
Na2SO3	0.24 g/l		0.9 t/d
Na2S2O3	0.30 g/l		1.1 t/d
NaCl	1.15 g/l		4.4 t/d
Tofal Chem.	124.58 g/l		

Elemental mass flows:		Flow:
Na	334.4 t/d	694.9 USGPM
S	70.8 t/d	2630.6 l/m
K	26.6 t/d	
Cl	5.0 t/d	

SIMULATION DATE: 15:53 March 13, 2024

DRAWING FILE: 10-01 Recaust.DRA

CADSIMPLUS

CanmetENERGY - KraftSIM

AREA
KRAFT MILL
RECAUSTICIZING

SUBJECT
ENERGY SIMULATION
(L/s % dissolved solids)

PROJECT NUMBER		DA.	MO.	YR.
	DES. LSW	07	05	21
	CH.			
	APP.			

DRAWING NUMBER A1- 100-10-01

REV. 04

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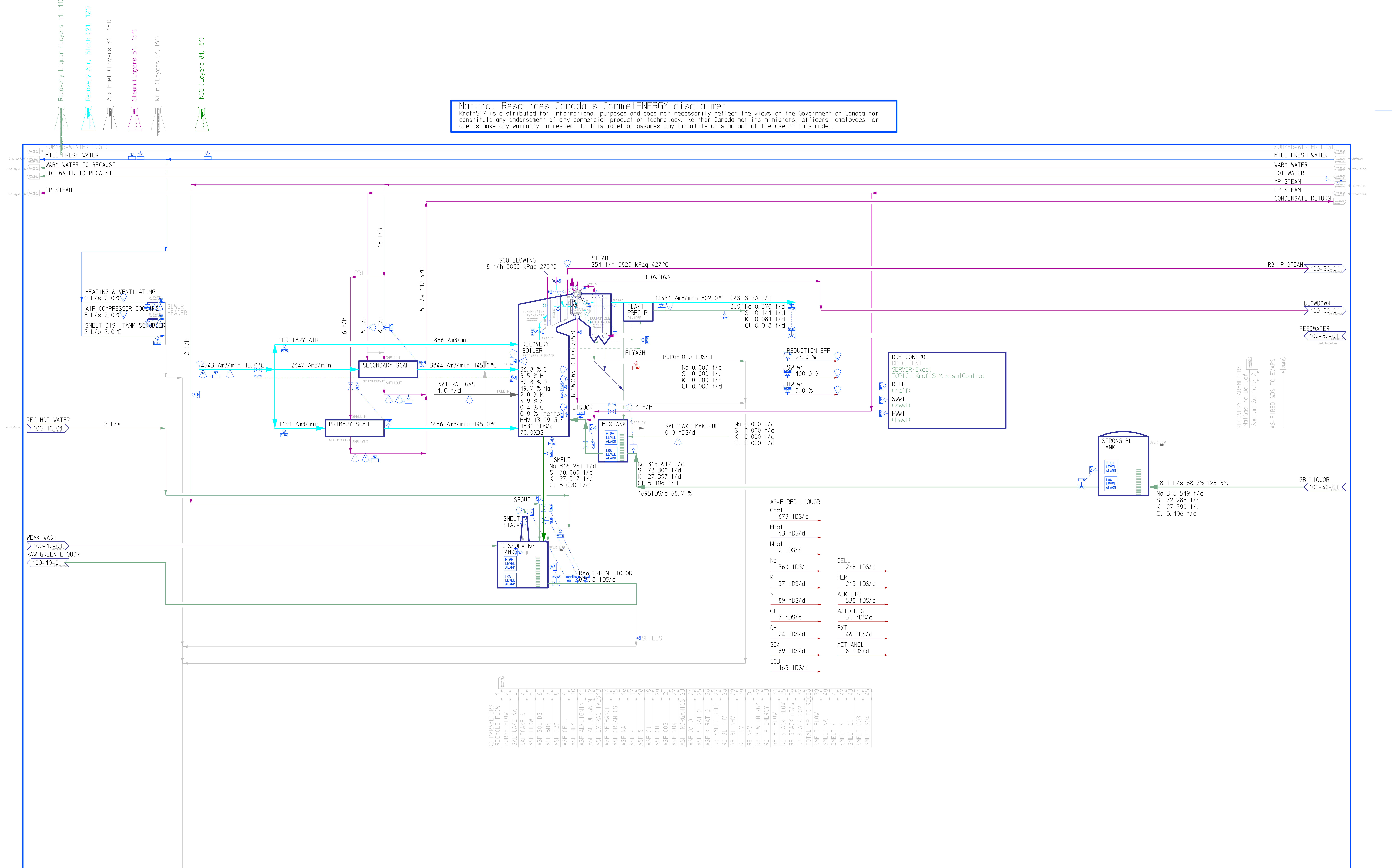

RAW GREEN LIQUOR

Chemicals expressed as equivalent Na2O:

AA	45.24 g/l	206.1 t/d
EA	28.43 g/l	129.5 t/d
TTA	?A g/l	
TA	?A g/l	
Activity	38.88	
Sulfidity	74.3 %AA	29.0 %TTA
Reduction	93.0 %	Causticity 14.1 %
NaOH	11.62 g/l	52.9 t/d
Na2S	33.62 g/l	153.2 t/d
Na2CO3	70.89 g/l	322.9 t/d
Na2SO4	1.69 g/l	7.7 t/d
Na2SO3	0.24 g/l	1.1 t/d
Na2S2O3	0.30 g/l	1.4 t/d
NaCl	1.19 g/l	5.4 t/d
Total Chem	?A g/l	

Elemental mass flows:

Na	384.5 t/d	Flow:
S	85.2 t/d	835.7 USGPM
K	33.2 t/d	3163.6 l/m
Cl	?A t/d	

SIMULATION DATE: 15:54 March 13, 2024

DRAWING FILE: 20-01 Recovery.DRA

CADSIMPLUS

CanmetENERGY - KraftSIM

AREA
KRAFT MILL
RECOVERY BOILER

SUBJECT
ENERGY SIMULATION
(L/s % dissolved solids)

PROJECT NUMBER

		DA	MO	YR
DES.	LSW	07	05	21
CH				
APP				

DRAWING NUMBER A1-100-20-01

REV. 04

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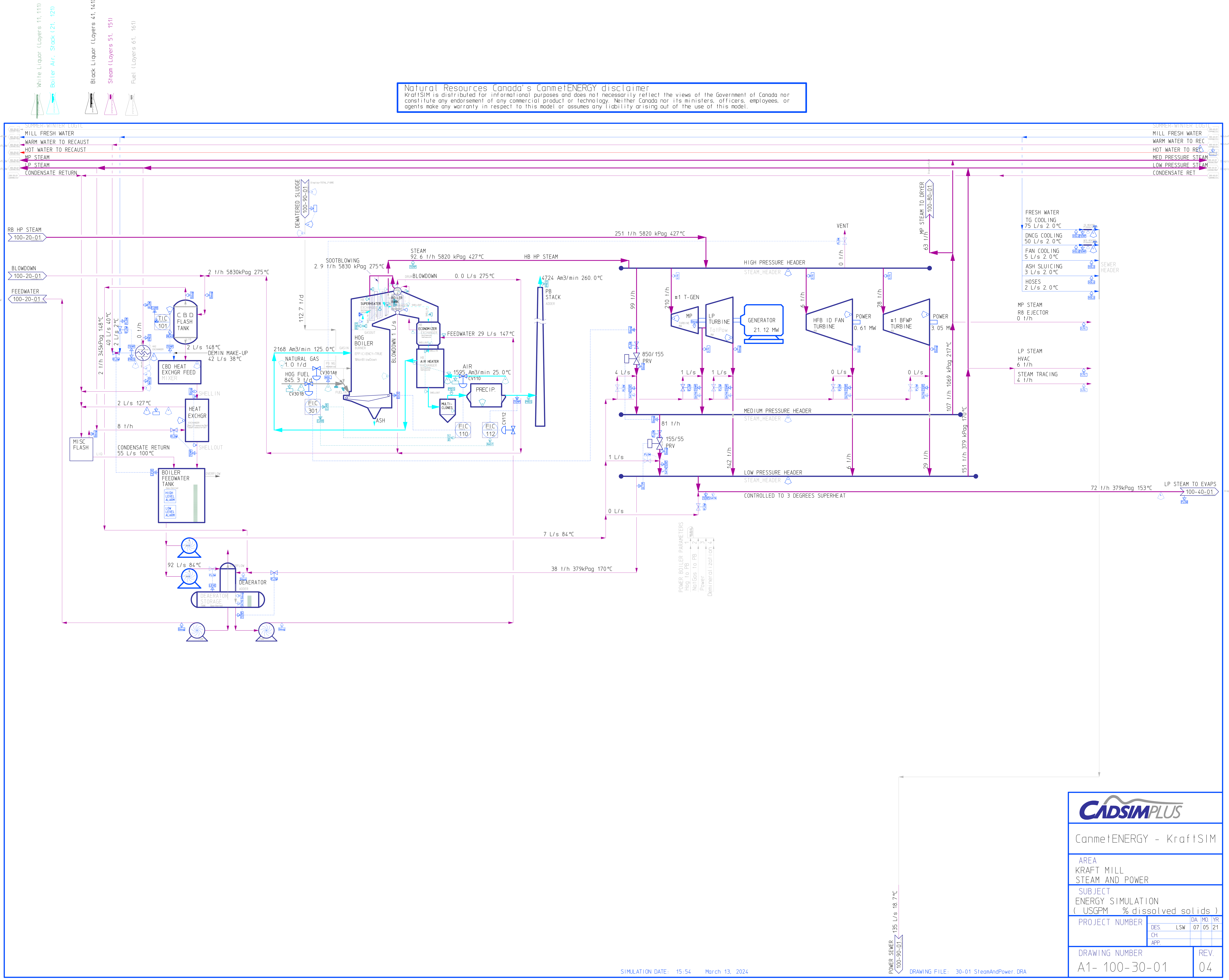

CADSIMPLUS

CanmetENERGY - KraftSIM

AREA
KRAFT MILL
STEAM AND POWER

SUBJECT
ENERGY SIMULATION
(USGPM % dissolved solids)

PROJECT NUMBER

		DA	MO.	YR.
DES.	LSW	07	05	21
CH				
APP				

DRAWING NUMBER
A1- 100-30-01

REV.
04

SIMULATION DATE: 15:54 March 13, 2024

DRAWING FILE: 30-01 SteamAndPower.DRA

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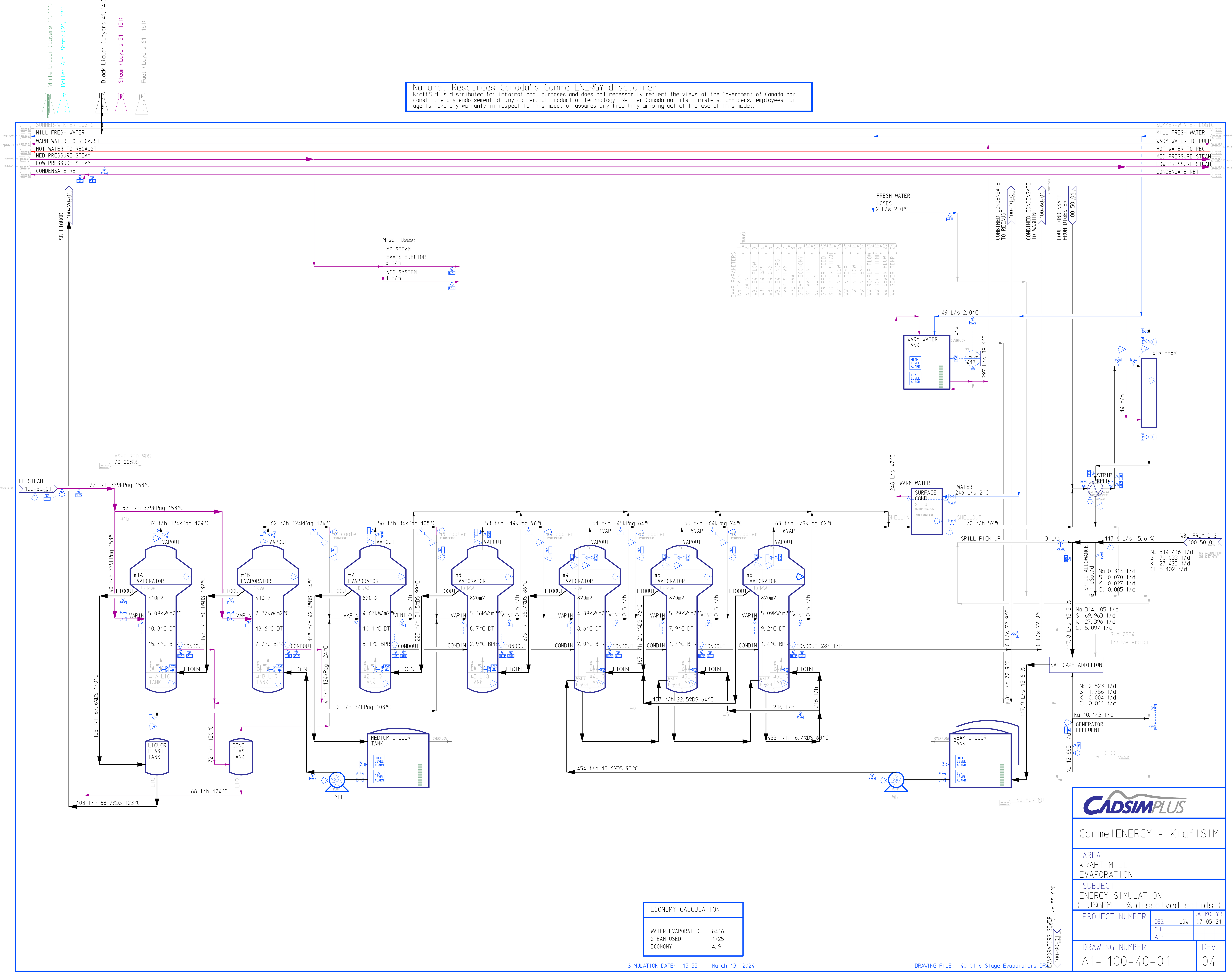

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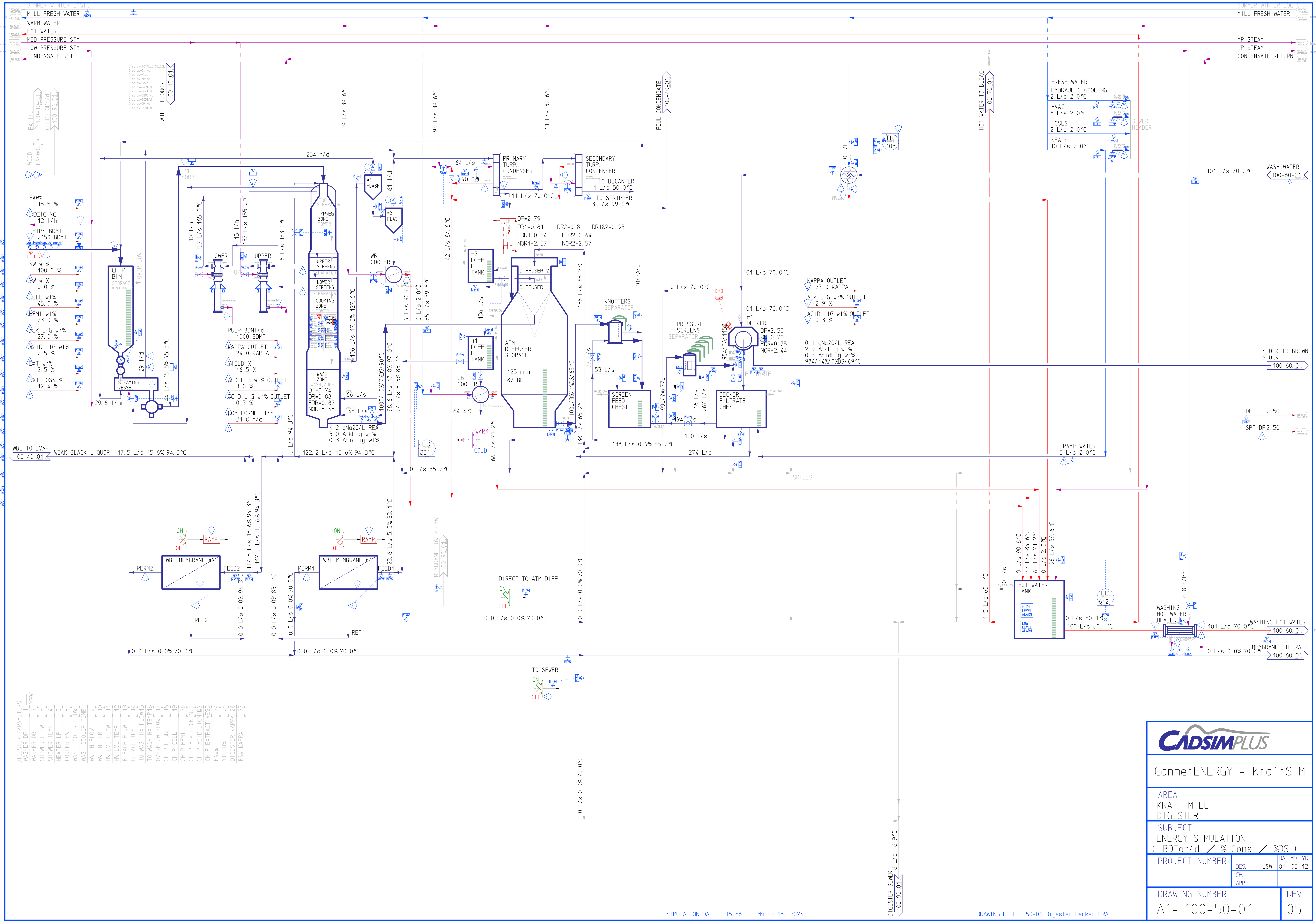

DDE CONTROL
DDECLIENT
SERVER Excel
TOPIC [KraftSIM.xlsm]Control
EAW (eaw)
CHIPS (chips)
SWwt (swwt)
HWwt (hwwt)
CELLwt (cellwt)
HEMIwt (hemiwt)
ALKLIGwt (alkligwt)
ACIDLIGwt (acidligwt)
EXTRACTwt (extractwt)
EXTRACTLOSS (extractloss)
PULP (pulp)
DIGESTERKAPPA (digesterkappa)
YIELD (yield)
ALKLIGwtDIGESTER (alkligwtdigester)
ACIDLIGwtDIGESTER (acidligwtdigester)
CO3FORM (co3form)
BSWKAPPA (bswkappa)
ALKLIGwtBSW (alkligwtbsw)
ACIDLIGwtBSW (acidligwtbsw)

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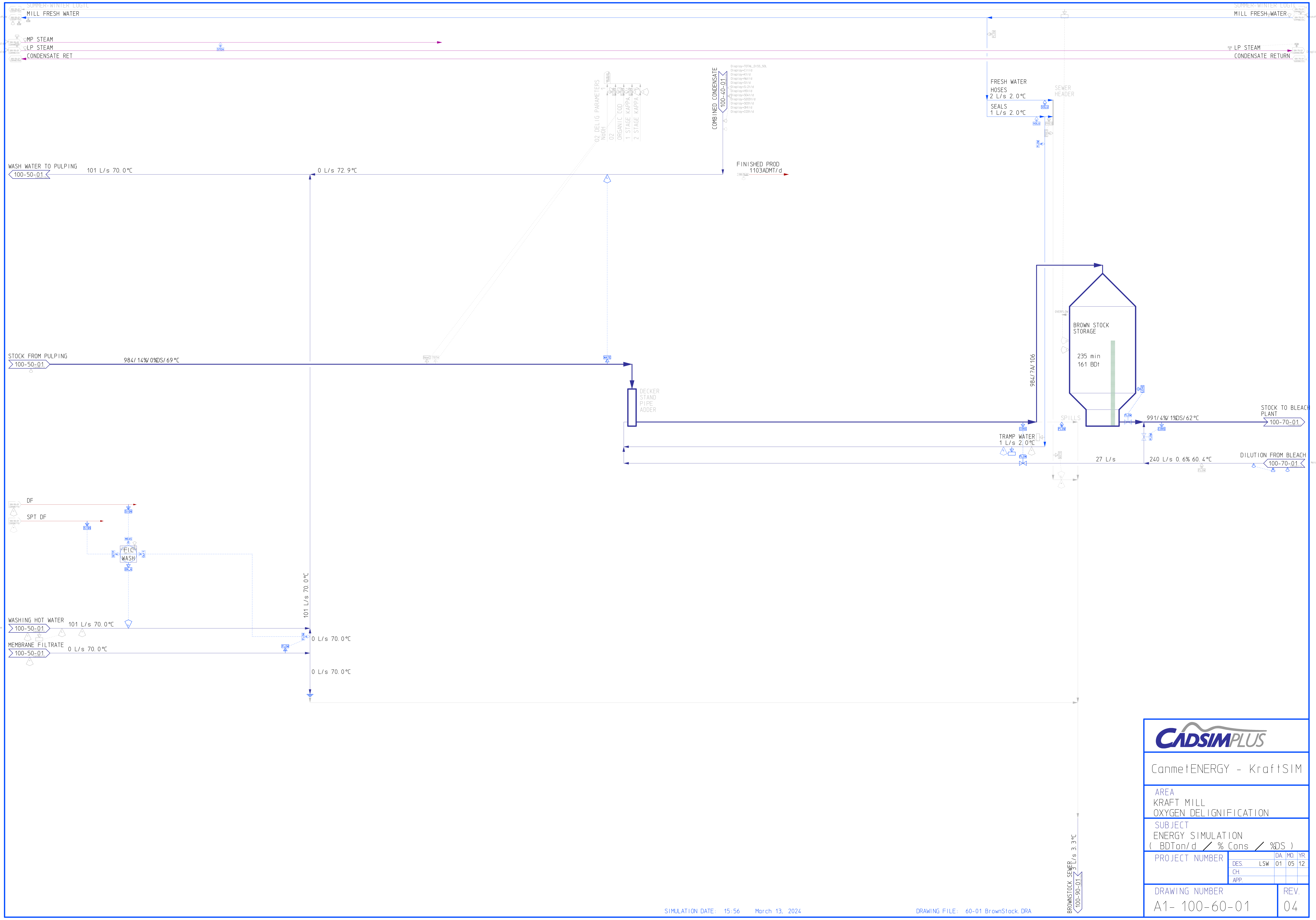

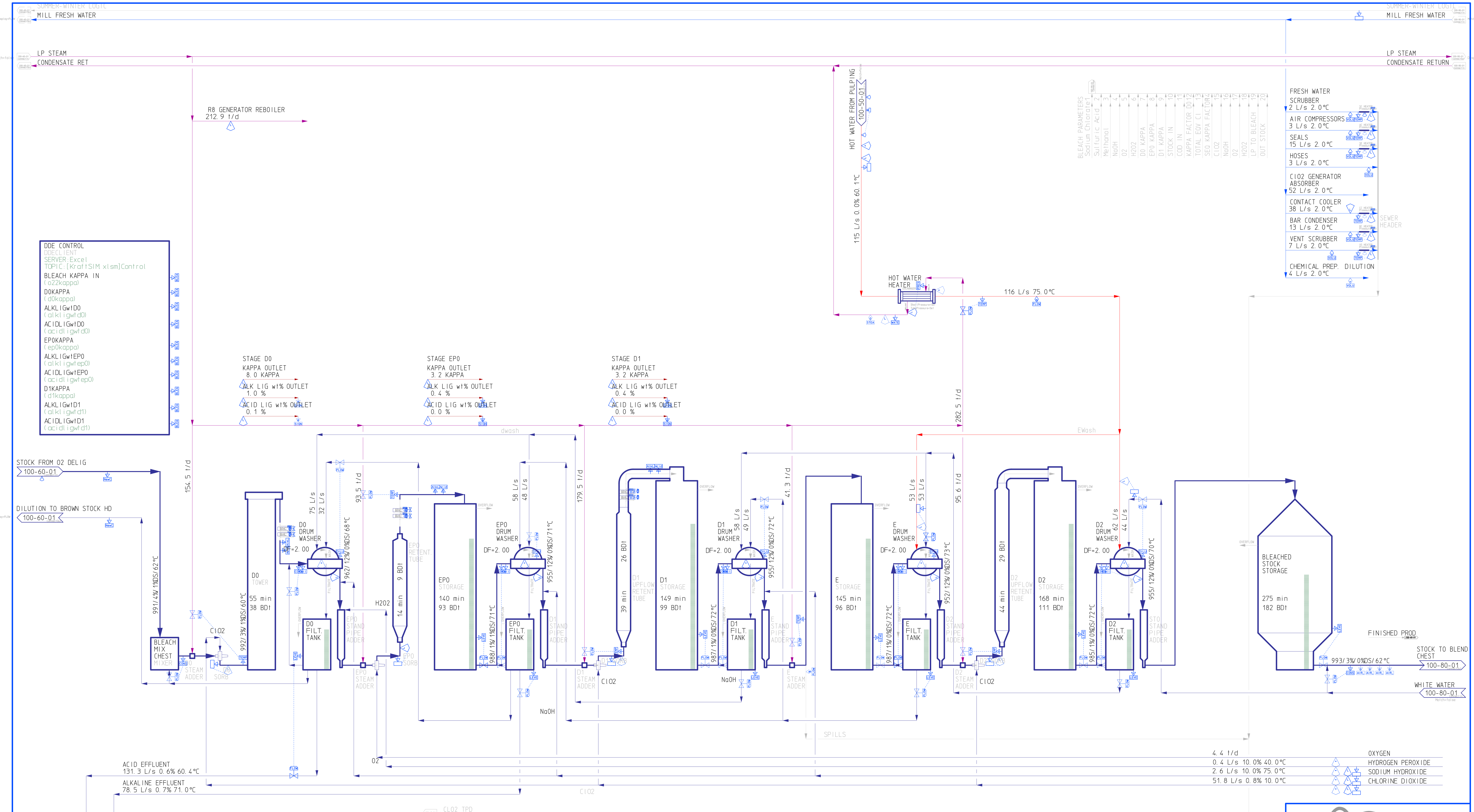

BLEACHING CONDITIONS

COD IN (t/d)	19.0
COD (kg/BDt)	19.1
BLEACH KAPPA IN	23.0
D0 KAPPA FACTOR	0.26
TOTAL EQV. Cl- (t/d)	101.9
TOTAL EQV. Cl- CHARGE (%)	9.2
SEQUENCE KAPPA FACTOR ON ADMT	0.40

BLEACH PLANT CHEMICAL USAGE

PRODUCTION 955.4 BDt/d

CHEMICAL	% APPLICATION ON BD PULP LEAVING BLEACH PLANT 1 -- Do	2 -- EPO	3 -- D1	4 -- E	5 -- D2	TOTAL %	TOTAL CHEMICAL t/d	TOTAL CHEMICAL kg/ADMT
ClO2	1%CLO2 2.52		3%CLO2 1.03		5%CLO2 0.23	T%CLO2 3.78	36.08	kgClO2/ADMT 32.7
NaOH		2%NAOH 2.02	3%NAOH 0.10	4%NAOH 0.400		T%NAOH 2.52	24.08	kgNaOH/ADMT 21.8
O2		2%O2 0.46				0.46	4.39	kgO2/ADMT 4.0
H2O2		2%H2O2 0.35				0.35	3.34	kgH2O2/ADMT 3.0

SIMULATION DATE: 15:57 March 13, 2024

NOTES

The following modelling estimates* are used:

COD = 0.107 InorganicDS + 1.332 OrganicDS
DoClO2(%onBD) = 0.0684 KappaIn + 0.019 COD + 0.58
EPONaOH(%onBD) = 0.65 DoClO2 + 1.1 EPOH2O2

*Estimates should be checked and validated relative to your own experience and conditions.

DRAWING FILE: 70-01 5-Stage Bleach.DRA

CADSIMPLUS

CanmetENERGY - KraftSIM

AREA
KRAFT MILL
BLEACHING

SUBJECT
ENERGY SIMULATION
(BDTon/d / % Cons / %DS)

PROJECT NUMBER

		DA.	MO.	YR.
DES.	LSW	01	05	12
CH.				
APP.				

DRAWING NUMBER
A1- 100-70-01

REV.
04

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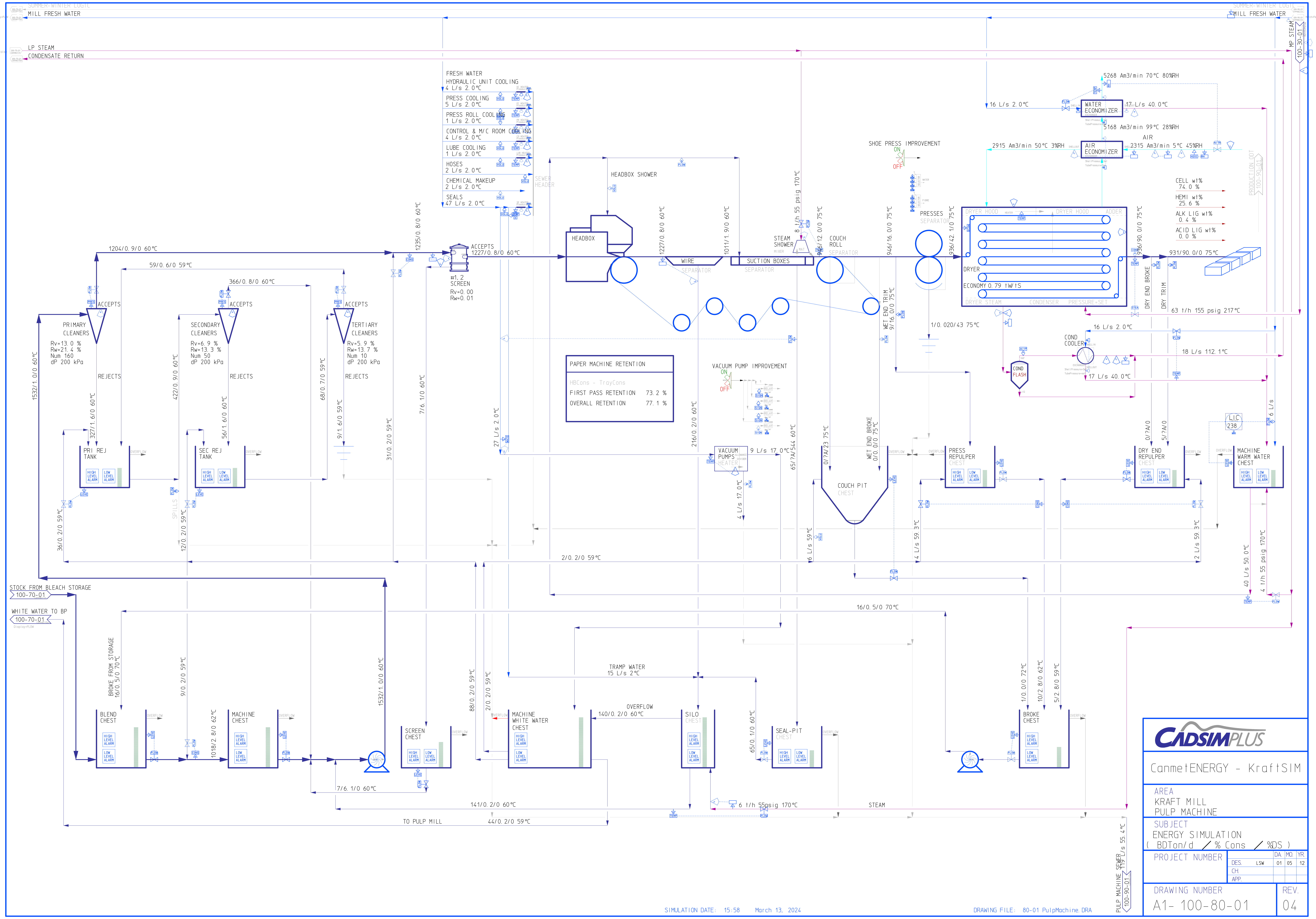

CADSIMPLUS

CanmetENERGY - KraftSIM

AREA
KRAFT MILL
PULP MACHINE

SUBJECT
ENERGY SIMULATION
(BDTon/d / % Cons / %DS)

PROJECT NUMBER

	DA	MO	YR
DES. LSW	01	05	12
CH			
APP.			

DRAWING NUMBER
A1- 100-80-01

REV.
04

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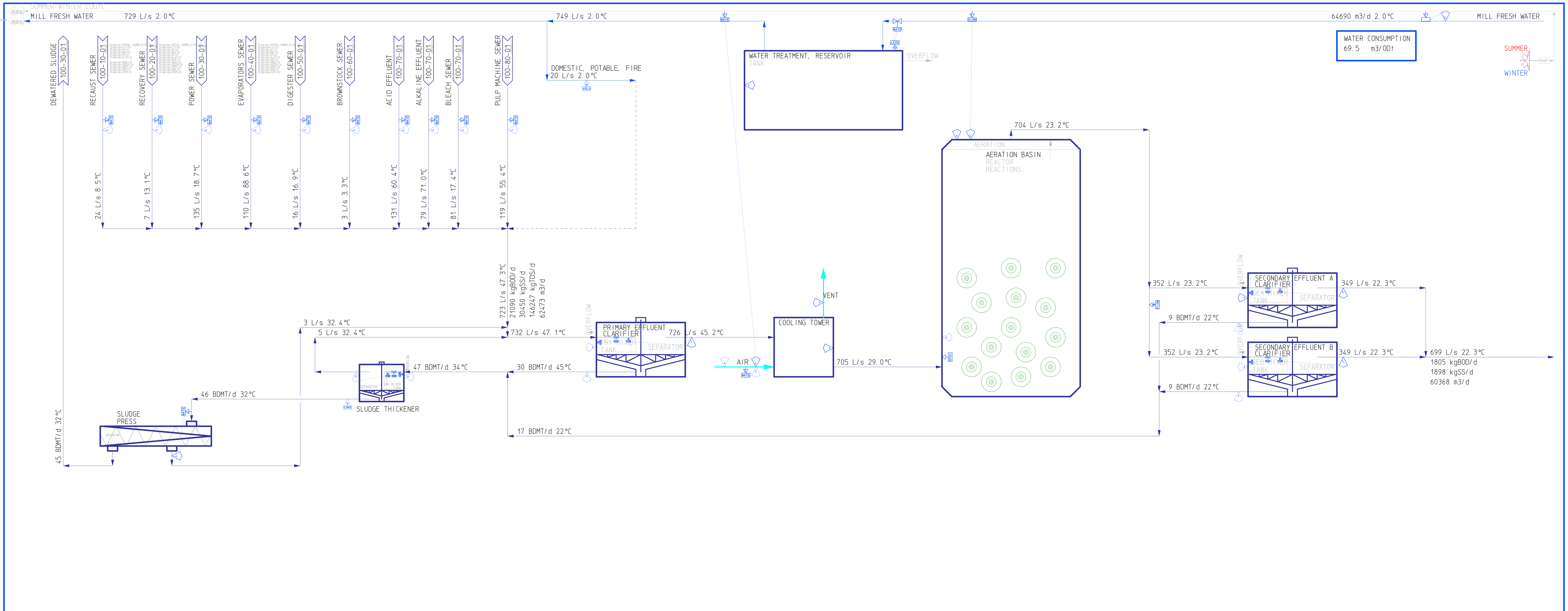


POWER DEMAND

DIGESTER, WOODROOM	5.4 MW
SCREENING, WASHING	3.6 MW
O2 DELIG	0.0 MW
BLEACHING	5.4 MW
PULP MACHINE	7.3 MW
RECAUSTICIZING	3.4 MW
RECOVERY	3.6 MW
POWER PLANT	2.4 MW
EVAPORATORS	1.8 MW
COOLING TOWERS	1.2 MW
WASTE WATER	3.0 MW
MISC.	1.8 MW
TOTAL DEMAND	39.0 MW
GENERATED	21.1 MW
PURCHASED	17.8 MW

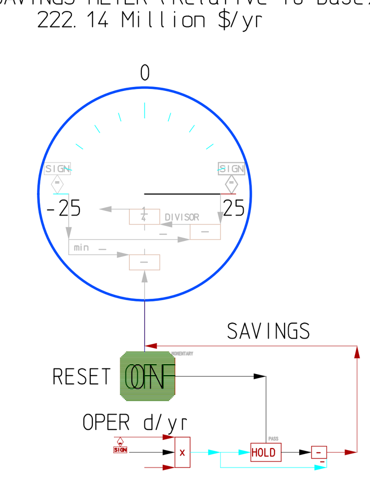
OPERATING COSTS

	DAILY USAGE	COST/UNIT USED	DAILY COST
CHIPS	2150.8 BDt/d	200.0 $/BDt	430161 $/d
BIOMASS	422.6 BDt/d	100.0 $/BDt	42264 $/d
NATURAL GAS	1813.1 GJ/d	3.5 $/GJ	6346 $/d
FUEL OIL	0.0 GJ/d	17.0 $/GJ	0 $/d
PURCHASED POWER	428.3 MWh/d	0.07 $/MWh	30 $/d
SODIUM HYDROXIDE	54.3 t/d	600.0 $/t	32600 $/d
SODIUM SULFATE	0.0 t/d	100.0 $/t	0 $/d
SODIUM CHLORATE	58.6 t/d	700.0 $/t	41019 $/d
SULFURIC ACID	36.7 t/d	150.0 $/t	5505 $/d
METHANOL	6.0 t/d	480.0 $/t	2892 $/d
OXYGEN	4.4 t/d	35.0 $/t	154 $/d
HYDROGEN PEROXIDE	3.3 t/d	90.0 $/t	301 $/d
LIMESTONE	29.2 t/d	35.0 $/t	1023 $/d
CALCIUM QUICK LIME	0.0 t/d	55.0 $/t	0 $/d
RAW WATER	64681.2 t/d	0.037 $/t	2426 $/d
DEMINERALIZATION	3597.9 t/d	1.0 $/t	3598 $/d
EFFLUENT TREATMENT	61762.1 t/d	0.043 $/t	2656 $/d
CO2 GHG TAX	91.4 t CO2/d	30.0 $/t	2741 $/d
MISCELANEOUS	1034.9 ADt/d	1.0 $/ADt	1035 $/d
TOTAL VARIABLE COSTS			574751 $/d

GROSS REVENUE

PULP SALES	1034.9 ADt/d
PULP PRICE	1160.0 $/ADt
GROSS REVENUE	1200497 $/d
REVENUE - VARIABLE	625747 $/d

SAVINGS METER (Relative to Base)
222.14 Million $/yr



NOTES

The following modelling estimates* are used:

Electrical power = factor * production + constant
Cost rates are estimates
Pulp sales price is an estimate
BOD = 0.4 OrganicDS
Conductivity = 1.43 TotalDisSol(mg/L)

*Estimates should be checked and validated relative to your own experience and conditions.

SIMULATION DATE: 15:58 March 13, 2024

DRAWING FILE: 90-01 Influent, Effluent, Cost Summary.DRA

CADSIMPLUS

CanmetENERGY - KraftSIM

AREA
INFLUENT, EFFLUENT
MILL SUMMARY

SUBJECT
SIMULATION
(BDTon/d / % Cons / USGPM)

PROJECT NUMBER

		DA.	MO.	YR.
DES.	LSW	01	05	12
CH.				
APP.				

DRAWING NUMBER
A1- 100-90-01

REV.
04