

EXAMPLE WASTEWATER CALCULATIONS

5/5/98

H. CORBIN, P.E. - WCA

PERMIT REQUIREMENTS (Deep Well Injection)

<u>ITEM</u>	<u>VALUE.</u>	<u>UNITS</u>	<u>COMMENTS</u>
Quantity	210000	GPD	permit requirement
(Flow average)	146	gpm	info only
Pb	5	mg/l	permit requirement
Hg	0.2	mg/l	permit requirement
NH3-N	200	mg/l	permit requirement
Benzene	0.5	mg/l	permit requirement
o-Cresol	200	mg/l	permit requirement
m-Cresol	200	mg/l	permit requirement
p-Cresol	200	mg/l	permit requirement
MEK	200	mg/l	permit requirement
tot. Phenols	2500	mg/l	permit requirement

OVERVIEW CALCULATIONS @design load

<u>ITEM</u>	<u>VALUE.</u>	<u>UNITS</u>	<u>COMMENTS</u>
PRODUCT	1000	tons/day	design rating
INPUT	1429	tons/day	calc'd
INPUT, H2O	30%		site estimate
Input H2O massrate	857143	lbs/day	calc'd
Input H2O volumerate	102775	gals/day equivalent	calc'd
Input H2O flowrate	71	avg. gpm equivalent	calc'd
H2O Vapor Loss	2%	of Input H2O	estimated
H2O as wastewater	70	avg. gpm	calc'd

WASTE #1 CALCULATIONS

<u>ITEM</u>	<u>VALUE.</u>	<u>UNITS</u>	<u>COMMENTS</u>
Flow, avg. @design	45	gpm	
Transfer Valve Rate	90	gpm instant max.	
Volume	2300	total gallons	
Volume, high	1870	gallons	
Volume, low	986	gallons	
Working Volume	1650	gallons	
TSS conc.	610	mg/l	
O&G Conc.	950	mg/l	
TSS, massrate	14	lb/hr	calc'd
O&G, massrate	21	lb/hr	calc'd
Slop Solids, conc.	10%		HRC estimate
Slop Solids, massrate	35	lb/hr	calc'd
Slop, massrate	351	lb/hr	calc'd
Slop, sp. gr.	0.90		HRC estimate
Slop, volumerate	47	gph	calc'd
Slop, daily mass	8424	lb/day	calc'd
Slop, daily volume	1122	gals/day	calc'd

WASTE #2 CALCULATIONS

<u>ITEM</u>	<u>VALUE,</u>	<u>UNITS</u>	<u>COMMENTS</u>
Flow, avg. @design	80.3	gpm	
Transfer Valve Rate	107	gpm instantaneous	
Volume	7500	total gallons	
Volume, high	6700	gallons	
Volume, low	3500	gallons	
Working Volume	4000	gallons	
TSS conc.	26000	mg/l	
O&G Conc.	192	mg/l	
TSS, massrate	1044	lb/hr	calc'd
O&G, massrate	8	lb/hr	calc'd
Slop Solids, conc.	10%		HRC estimate
Slop Solids, massrate	1052	lb/hr	calc'd
Slop, massrate	10516	lb/hr	calc'd
Slop, sp. gr.	0.90		HRC estimate
Slop, volumerate	1401	gph	calc'd
Slop, daily mass	252386	lb/day	calc'd
Slop, daily volume	33625	gals/day	calc'd

API SEPARATOR #1

<u>ITEM</u>	<u>VALUE,</u>	<u>UNITS</u>	<u>COMMENTS</u>
Width	8	ft	input variable
Length	30	ft	input variable
Height	6	ft	input variable
Volume Total	1440	ft ³	calc'd
Gallons Total	10771	gallons	calc'd
Freeboard	0.75	ft	input variable
Working Volume	9425	gallons	calc'd
Gallons per foot	1795	gallons	calc'd
Retention Time	117	minutes	calc'd
Surface Area	240	ft ²	calc'd
surge factor	133%	peak rate/avg flow	
Avg Rise Rate	0.33	gpm/ft ²	calc'd
Peak Rise Rate	0.45		calc'd
API Rise Rate	0.4 to 1.6	gpm/ft ²	recommended
Avg Transverse Rate	0.22	ft/miin	calc'd
Peak Traverse Rate	0.30	ft/min	calc'd
API Transverse Rate	1 to 3	ft/min	recommended

API SEPARATOR #2

<u>ITEM</u>	<u>VALUE.</u>	<u>UNITS</u>	<u>COMMENTS</u>
Width	8	ft	input variable
Length	30	ft	input variable
Height	6	ft	input variable
Volume Total	1440	ft ³	calc'd
Gallons Total	10771	gallons	calc'd
Freeboard	0.75	ft	input variable
Working Volume	9425	gallons	calc'd
Gallons per foot	1795	gallons	calc'd
Retention Time	209	minutes	calc'd
Surface Area	240	ft ²	calc'd
surge factor	200%	peak rate/avg flow	
Avg Rise Rate	0.19	gpm/ft ²	calc'd
Peak Rise Rate	0.38		calc'd
API Rise Rate	0.4 to 1.6	gpm/ft ²	recommended
Avg Transverse Rate	0.13	ft/miin	calc'd
Peak Traverse Rate	0.25	ft/min	calc'd
API Transverse Rate	1 to 3	ft/min	recommended

CHEMICAL FEED SYSTEMS (#1 AND #2 Waste)

<u>ITEM</u>	<u>VALUE.</u>	<u>UNITS</u>	<u>COMMENTS</u>
Alum Feed, #1	300	mg/l	Field Estimate
Process Flow	22500	lbs/hr.	
Chemical Flow	6.75	lbs/hr. - 100% basis	
Chemical Strength	40%	solution	
Chem Sol'n	16.875	lbs/hr	
Chem Sol'n	1.875	gph	
Alum Feed, #2	300	mg/l	Field Estimate
Process Flow	40150	lbs/hr.	
Chemical Flow	12.0	lbs/hr. - 100% basis	
Chemical Strength	40%	solution	
Chem Sol'n	30	lbs/hr	
Chem Sol'n	3.3	gph	
Poly Feed, #1	10	mg/l	Field Estimate
Process Flow	22500	lbs/hr.	
Chemical Flow	0.23	lbs/hr. - 100% basis	
Chemical Strength	1%	solution	
Chem Sol'n	22.5	lbs/hr	
Chem Sol'n	2.5	gph	
Poly Feed, #2	10	mg/l	Field Estimate
Process Flow	40150	lbs/hr.	
Chemical Flow	0.40	lbs/hr. - 100% basis	
Chemical Strength	1%	solution	
Chem Sol'n	40	lbs/hr	
Chem Sol'n	4.5	gph	