

CALCS

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

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WASTE #2 CALCULATIONS

<u>ITEM</u>	<u>VALUE, 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, 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/min	calc'd
Peak Traverse Rate	0.30 ft/min	calc'd
API Transverse Rate	1 to 3 ft/min	recommended

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API SEPARATOR #2

<u>ITEM</u>	<u>VALUE, UNITS</u>	<u>COMMENTS</u>
Width	8 ft	input variable
Length	30 ft	input variable
Height	6 ft	input variable
Volume Total	1440 ft3	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 ft2	calc'd
surge factor	200% peak rate/avg flow	
Avg Rise Rate	0.19 gpm/ft2	calc'd
Peak Rise Rate	0.38	calc'd
API Rise Rate	0.4 to 1.6 gpm/ft2	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, 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	