H2S Emissions Calculations: EMWD- Moreno Valley Appl. No. 473542

DATA	Digester Gas Desulfurization System		
Flow Rate	300	CFM	
Flow Rate	18000	CuFt/hr	
Temperature	60	deg.F	
	519.5	deg.R	
Mol.Wt. H2S	34	lb/lbmole	
Ideal Gas Const	0.73	atm*ft^3/lbmol*R	
Control eff	0.95	lb/lb	
Actual H2S conc	160	ppmv	
H2S Exit Conc.	6.2	ppmv	(Per Fuel Specification for Fuel Cell)
(Maximum)			

By the ideal Gas Law:

Molar Volume = [0.73atm*ft^3/lbmol*R]x[520 deg.R]
= 379 dscf/lbmole
@ 60 F

H2S Emission Rate Calculation Digester Gas Desulfurization System
Flow Rate = [18000 CuFt/hr]

H2S Emiss.Rate (Volumetric) = Flow Rate x H2S Exit Conc.
@6.2ppmv = [18000 cu.ft./hr]x[6 ppmv]/[1,000,000]
Volumetric Rate = 0.11 cf/hr

Molar Rate = [0.112 cf/hr]/[379 dscf/lbmole]
(@60 deg. F) = 0.00029 lbmole/hr

Mass rate (outlet) = Molar Rate x Mol.Wt. H2S
(as H2S) = [0.000294 lbmole/hr] x[34.00 lb/lbmole]
= 0.0100 lb/hr
0.2401 lb/day @24 hr/day
H2S (Inlet) = [Mass rate (outlet)] / (1 - Control eff)]
= [0.0100 lb/hr] / [(1 - 0.95)]
= 0.2001 lb/hr
= 4.8026 lb/day @24 hr/day

Volumetric Rate(Inlet) = [Volumetric Rate] / (1 - Control eff)]
(based on 95.0% Eff. = [0.1116 cf/hr] / [(1 - 0.95)]
of the iron sponge.) = 2.2320 cf/hr

H2S Conc. (Inlet) 124.0000 PPM

Actual H2S Inlet = [300 CFM]x[160.0 ppmv]x[34 x 60/10^6]
Concentration = 0.26 lb/hr
@ 160.0 ppmv = 6.20 lb/day

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Carbon Replacement Frequency H2S

	A/N	lbCarbo	H2S Absorption Capacity @0.05 lbH2S/lbCarbon	Days to H2S Saturation
DGDS	473542	25000	1250	260