RegenOx Summary Page

Regenesis Technical Support: USA (949) 366-8000

Site Name: Former Fiesta Beverage (Oakland, CA)
Location: Source
Consultant: Mark Detterman, Blymer Engineers, Inc.

Application Design Input Parameters

Width of plume (intersecting gw flow direction)	40	ft
Length of plume (parallel to gw flow direction)	20	ft
Thickness of contaminated zone	12	ft
Soil type	clay	

Design Summary - INITIAL APPLICATION ONLY

Number of RegenOx injection points (initial app.)	11	pts
RegenOx dose rate (oxidant + activator) (initial app.	16.8	lbs/ft
otal amount of water required for initial application	3,268	gallons
Total volume of RegenOx solution applied per foot of injection (initial app.	26.6	gallons/ft

Estimated number of RegenOx applications required (enter 1 through 6)	2

Summary of Estimated RegenOx Totals

Application number	Part A RegenOx Oxidant (lbs)	Part B RegenOx Activator (lbs)	Total RegenOx Material Requirement (lbs)	Cumulative Amount of Oxidant (Part A) Applied (lbs)	Cumulative Amount of Activator (Part B) Applied (lbs)	Cumulative RegenOx Cost	Total RegenOx Material Cost Per Application
First	1,260	1,260	2,520	1,260	1,260		
Second	1,260	1,260	2,520	2,520	2,520		
Third	0	0	15	0	0	$0	$0.00
Fourth	0	0	0	0	0	$0	$0.00
Fifth	0	0	0	0	0	$0	$0.00
Sixth	0	0	0	0	0	$0	$0.00
TOTALS	2,520	2,520	5,055		Volume discount if purchased all together		

(not including shipping or applicable taxes)

R0314

ORC *Advanced* Design Software for Grid Applications Using Slurry Injection

Aug 2006

Regenesis Technical Support: USA (949) 366-8000 — www.regenesis.com

Site Name: Former Fiesta Beverage (Oakland, CA)
Location: Source & Plume
Consultant: Mark Detterman, Blymer Engineers, Inc.

Estimated Plume Requiring Treatment

Width of plume (intersecting gw flow direction)	100	ft			
Length of plume (parallel to gw flow direction)	40	ft		4,000	ft²
Depth to contaminated zone	4	ft			
Thickness of contaminated saturated zone	12	ft			
Nominal aquifer soil (gravel, sand, silty sand, silt, clay)	clay				
Total porosity	0.45		Effective porosity	0.1	
Hydraulic conductivity	0.185	ft/day		6.5E-05	cm/sec
Hydraulic gradient	0.005	ft/ft			
Seepage velocity	4.5	ft/yr		0.012	ft/day
Treatment Zone Pore Volume	21,600	ft³		161,590	gallons

Dissolved Phase Oxygen Demand:

Individual species that represent oxygen demand:	Contaminant Conc. (mg/L)	Contaminant Mass (lb)	Stoichiometry (wt/wt) O_2/contaminant	ORC-Adv Dose (lb)
Benzene	0.00	0.0	3.1	0
Toluene	0.00	0.0	3.1	0
Ethylbenzene	0.00	0.0	3.2	0
Xylenes	0.00	0.0	3.2	0
MTBE	0.00	0.0	2.7	0
cis-1,2-DCE	0.00	0.0	0.7	0
Vinyl Chloride	0.00	0.0	1.3	0
User added, add stoich. demand and Koc (see pull-down)	0.00	0.0	0.0	0
User added, add stoich. demand and Koc (see pull-down)	0.00	0.0	0.0	0
Reduced metals: Fe^{+2} and Mn^{+2}	10.00	13.5	0.1	8

TPH-g <- pull-down menu

Measures of total oxygen demand	Contaminant Conc. (mg/L)	Contaminant Mass (lb)	Stoichiometry (wt/wt) O_2/contaminant	ORC-Adv Dose (lb)
Total Petroleum Hydrocarbons (see pull-down for Koc)	1.08	1.9	3.1	34
Biological Oxygen Demand (BOD)	0.00	0.0	1.0	0
Chemical Oxygen Demand (COD)	0.00	0.0	1.0	0

Parameters for Sorbed Phase Oxygen Demand:

Soil bulk density	1.5	g/cm³	=	94	lb/cf
Fraction of organic carbon (foc)	0.02	range: 0.0001 to 0.01			

(Estimated using sorbed phase = foc*Koc*Cgw) (Adjust Koc as necessary to provide realistic estimates)	Koc (L/kg)	Contaminant Conc. (mg/kg)	Contaminant Mass (lb)	Stoichiometry (wt/wt) O_2/contaminant	ORC-Adv Dose (lb)
Benzene	123	0.00	0.0	3.1	0
Toluene	287	0.00	0.0	3.1	0
Ethylbenzene	327	0.00	0.0	3.2	0
Xylenes	298	0.00	0.0	3.2	0
MTBE	12	0.00	0.0	2.7	0
cis-1,2-DCE	86	0.00	0.0	0.7	0
Vinyl Chloride	2.5	0.00	0.0	1.3	0
User added, add stoich. demand and Koc (see pull-down)	0.0	0.00	0.0	0.0	0
User added, add stoich. demand and Koc (see pull-down)	0.0	0.00	0.0	0.0	0
Measures of total oxygen demand					
Total Petroleum Hydrocarbons	373	10.29	46.3	3.1	846

Summary of Estimated ORC-Adv Requirements

	Dissolved Phase ORC-Adv Demand (lbs)	Sorbed Phase ORC-Adv Demand (lbs)	Additional Demand Factor (1 to 10x)	Total ORC-Adv Demand (lbs)	ORC-Adv Cost
Total BTEX, MTBE, etc.	8	0	5.0	40	[illegible]
Total Petroleum Hydrocarbons	34	846	4.5	3,917	[illegible]
Biological Oxygen Demand (BOD)	0	0	2.0	0	$0
Chemical Oxygen Demand (COD)	0	0	1.5	0	$0

Required ORC-Adv quantity (in 25 lb increments) ——> 3,925 pounds ORC-Adv

Delivery Design for ORC-Adv Slurry

Spacing within rows (ft)	8.5	feet
# points per row	13	points/row
Spacing between rows (ft)	8.0	ft
# of rows	5	rows
Advective travel time bet. rows (days)	645	days
Number of points in grid	66	points
ORC-Adv application rate	5.0	lbs/foot
Total ORC-Adv required	3,925	lbs of ORC-Adv

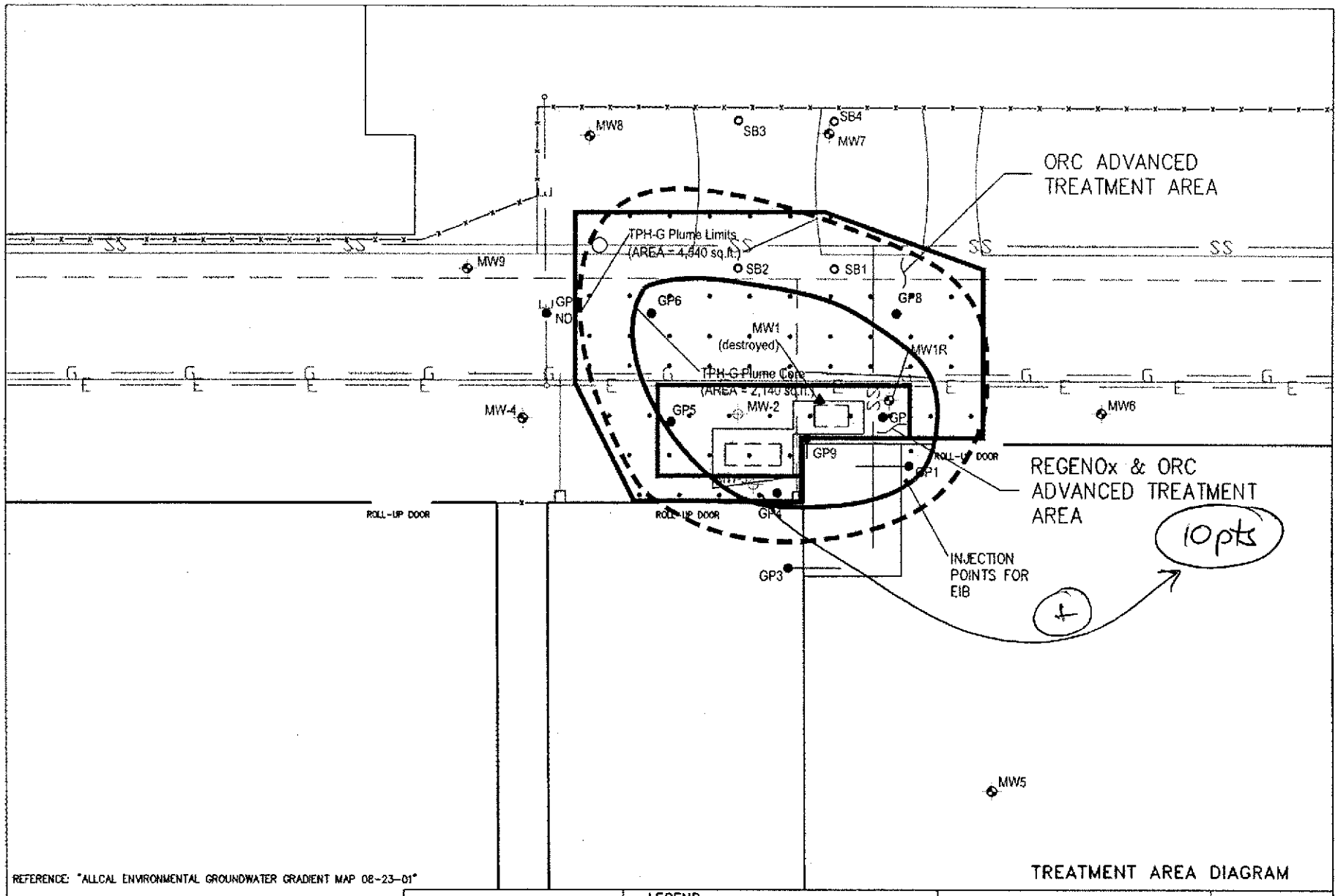
Slurry Mixing Volume for Injections

Pounds per location	60	pounds
Buckets per location	2.4	buckets
Design solids content (30-40% by wt. for injections)	60%	
Volume of water required per hole (gal)	17	gallons
Total water for mixing all holes (gal)	986	gallons
Simple ORC-Adv Backfilling: min hole dia. for 67% slurry	3.7	inches
Feasibility for slurry injection in sand: ok up to 15 lb/ft	(ok)	
Feasibility for slurry injection in silt: ok up to 10 lb/ft	(ok)	
Feasibility for slurry injection in clay: ok up to 10 lb/ft	(ok)	

Project Summary		
Number of ORC-Adv delivery points (adjust as necessary for site)		[illegible]
ORC-Adv application rate in lb/ft (adjust as necessary for site)		[illegible]
ORC-Adv bulk material for slurry injection (lbs)		[illegible]
Number of 25 lb ORC-Adv buckets		[illegible]
ORC-Adv bulk material cost ($/lb)	$	[illegible]
Cost for bulk ORC-Adv material	$	[illegible]
Shipping and Tax Estimates in US Dollars		
Sales Tax rate: [illegible]%	$	[illegible]
Total Material Cost	$	[illegible]
Shipping (call for amount)	$	[illegible]
Total Regenesis Material Cost	$	[illegible]

ORC-Adv Slurry Injection Cost Estimate (responsibility of customer to contract work)		
Footage for each point = uncontaminated interval + ORC-Adv injection interval (ft)		[illegible]
Total length for direct push for project (ft)		[illegible]
Estimated daily installation rate (ft per day, 300 for push, 150 for drilling)		[illegible]
Estimated points per day (10 to 30 is typical for direct push)		[illegible]
Required number of days		[illegible]
Mob/demob cost for injection subcontractor	$	[illegible]
Daily rate for injection subcontractor ($1,700 for push, $ [illegible] for drilling)	$	[illegible]
Total injection subcontractor cost for application	$	[illegible]
Total Install Cost (not including consultant, lab, etc.)	$	[illegible]

Other Project Cost Estimates		
Design	$	[illegible]
Permitting and reporting	$	[illegible]
Construction management	$	[illegible]
Groundwater monitoring and lab	$	[illegible]
Other	$	[illegible]
Other	$	[illegible]
Other	$	[illegible]
Other	$	[illegible]
Total Project Cost	$	[illegible]



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