

Total Separation and Application Costs

Total costs, including equipment, labor, polymer, fuel and application are between 1.3¢ and 1.4¢ per gallon depending on the type of separation equipment used.

Separation / Application Cost (¢:g)

Item	Cost for MS	Cost for GBT
Equipment	0.70	0.87
Electricity	0.004	0.005
Polymer	0.144	0.144
Labor	0.313	0.313
Total	1.16	1.33
Application (irrigator)	0.1093	0.1093
Total	1.2693 (1.3)	1.4393 (1.4)

Total costs of separation and application are comparable to current land application costs for raw slurry, making this an economically viable alternative while providing additional environmental and operational benefits.

Land Application Costs for Raw Slurry

Less than 1 million gallons	= 2.01¢/gallon
1-4 million gallons	= 1.67¢/gallon
Greater than 4 million gallons	= 0.89¢/gallon

Characteristics of Raw Slurry and Separated Effluent

Sample ID	% DM	SS ml/L	TSS mg/L	pH	COD mg/L	% N	P ppm	NH3 ppm	N:P ratio
Raw	0.82	112.27	5610	7.28	7658	0.115	167.6	713	6.9:1
SE GBT	0.44	16.38	380	7.61	2794	0.088	75.7	809	11.6:1
SE MS	0.39	2.43	352	7.66	2352	0.078	67.6	743	11.8:1
Solids GBT	7.45	----	----	----	----	0.539	1678	----	3.2:1
Solids MS	7.73	----	----	----	----	0.494	1725	----	2.9:1
% change raw to SE	49.6	91.4	93.5	----	66.6	27.6	56.4	56.4	----

Slurry separation provides an efficient and cost effective system for managing the odor and nutrient overload associated with swine manure while improving animal welfare, reducing non-point source pollution concerns, and providing a source of beneficial soil amendments for crop production. For more information check out the website at:

www.sweeta.illinois.edu



Separated solids used for composting

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Slurry Separation Cost Considerations

The Livestock and Urban Waste Research (LUW) Team has adapted polymer-assisted wastewater separation technology to economically separate liquid swine manure into its biosolid and liquid fractions. This systems approach allows the biosolids fraction to be composted for ultimate use as either an on-farm or off-farm soil amendment while producing a liquid fraction with low odor, low solids and low phosphorus concentrations that can be irrigated as a nitrogen fertilizer for row crops. The cost considerations for implementing a separation system and an economic comparison to current disposal methods are critically important factors for producers in determining the best waste management system for their operation. The information contained in this brochure is based on processing slurry for one 10 hour work day once a week (48,000 gallons over an 8 hour period) producing approximately 2 million gallons of separated effluent per year. More total gallons could be processed by operating the system more frequently or by sizing up the equipment used.



These minimum requirements and cost calculations are based on production scale operations at the ISU Farm which is processing up to 2 million gallons a year. Total costs include the “worst case scenario” of diesel fuel costing \$4: gallon.

Minimum Equipment Requirements

Items for both systems	Cost
Building	\$50,000
Reception pit(25'x8' w/sump)	\$15,000
Open prop agitator to stir pit	\$6,000
Pump to supply primary screen	\$6,000
Separator Model 250	\$11,000
Effluent tank (15'x8' w/sump)	\$12,000
Effluent pump w/ on-off level switch	\$8,000
Feed pump for raw material	\$5,000
Chemical injection pump for polymer	\$4,000
Mixing tanks - 500 gal (x2) & controls	\$6,000
Total = \$123,000	

Plus either: Microscreen \$17,000 = \$140,000
or Gravity Belt \$50,000 = \$173,000

10 yr straight line depreciation (cost/10yrs)

Microscreen \$14,000/2 million gallons = 0.70¢:g
Gravity Belt \$17,300/2 million gallons = 0.87¢:g



Suspended solids are removed using a microscreen separator and polymer



Suspended solids are separated using a gravity belt thickener and polymer

Operating Costs

Electricity Costs

Ameren quoted 0.0795¢/kwh
GBT = 0.005¢/gallon
MS = 0.004¢/gallon

Polymer Costs

15 measurements were taken of both GBT and MS
Average gallons / # of polymer = 1707g
Cost of polymer = \$2.45/#
\$2.45/1707 gallons = 0.144¢/gallon

Labor Costs

Approximately 2 hours per day are needed for startup and shutdown
Daily operation of 8 hours is recommended
Total hours = 10
Rate of pay = \$15.00/hr x 10 hours = \$150.00
System is run at 100gpm (x60min x8hrs) = 48000g
\$150.00/48000 gallons = 0.3125¢/gallon



Separable solids are removed using a gravity screen-rollpress separator



Separated effluent is dramatically cleaner than the raw slurry

Application Costs

Diesel fuel for irrigator

10 gallons of diesel fuel used to irrigate 500,000 gallons of SE
At \$2:gallon of fuel, cost = 0.004¢:gallon of SE
At \$4:gallon of fuel, cost = 0.008¢:gallon of SE

Electricity Costs for irrigator pump

Ameren quoted 0.0795¢/kwh
3,666 kwh to pump 217,982 gallons of SE over 12hrs
0.0168 kwh:gallon of SE x 0.0795¢/kwh
= .0013¢:gallon of SE

Irrigator - sized for 40 acres

20 year straight line depreciation
(\$40,000/20yrs = \$2000)
\$2,000/2 million gallons = 0.10¢:gallon

Total Application Costs

At \$2:gallon of fuel, cost = 0.1053¢:gallon of SE
At \$4:gallon of fuel, cost = 0.1093¢:gallon of SE



Separated effluent is applied using center pivot irrigation