Fact Sheet
Calendar Year 2012
Biosolids Land Application Program
Moccasin Bend WWTP
NPDES Permit No. TN 0024210
City of Chattanooga, Tennessee

General

The information contained in this fact sheet is based on information submitted to the EPA and state regulatory agencies as part of the 40 CFR Part 503 Annual Sludge Report for 2012. (40 CFR Part 503.18)

Quantities Produced and Land Applied

Annual Quantities

- 69,684 Wet Tons/year
- 26,477 Dry Tons/year
- 24,019 Dry Metric Tons/year

Monthly Quantities

Month	Wet Tons	Dry Tons	Dry Metric Tons
January	1,446	500	454
February	3,868	1,354	1,229
March	5,133	1,820	1,651
April	10,126	3,661	3,321
May	10,728	3,906	3,543
June	7,780	2,856	2,591
July	6,719	2,555	2,318
August	4,718	1,927	1,748
September	4,268	1,737	1,576
October	4,984	2,020	1,833
November	8,110	3,374	3,061
December	1,804	766	695

Quantities Land Applied by State

State	Wet Tons	Dry Tons	Dry Metric Tons
TN	69,684	26,477	24,019

Quantities Land Applied by County

State	County	Wet Tons	Dry Tons	Dry Metric Tons
TN	Bledsoe	19,979	7,322	6,643
TN	Grundy	3,879	1,439	1,306
TN	Hamilton	14,863	5,814	5,274
TN	Marion	6,440	2,346	2,128
TN	Meigs	4,375	1,658	1,504
TN	Rhea	14,240	5,815	5,275
TN	Sequatchie	5,907	2,082	1,889

Land Application Area

Total Acres Land Applied - By State

State	Acres	Hectares
TN	5,463	2,211

Number of Farms and Total Acres Land Applied - By County

State	County	Acres	Hectares	Farms
TN	Bledsoe	1,691	684	58
TN	Grundy	284	115	16
TN	Hamilton	1,281	518	53
TN	Marion	435	176	6
TN	Meigs	388	157	19
TN	Rhea	850	344	48
TN	Sequatchie	534	216	15

Total Acres Available for Land Application - By State

State	Acres	Hectares
AL	7,641	3,092
TN	23,640	9,567

Total Acres Available for Land Application - By County

State	County	Acres	Hectares
AL	Blount	1,079	436
AL	Cherokee	40	16
AL	DeKalb	1,888	764
AL	Etowah	170	69
AL	Jackson	2,210	894
AL	Madison	100	40
AL	Marshall	2,155	872
TN	Bledsoe	7,550	3,055
TN	Grundy	1,390	563
TN	Hamilton	3,071	1,243
TN	Marion	5,338	2,160
TN	Meigs	1,024	414
TN	Rhea	1,408	570
TN	Sequatchie	3,860	1,562

Nutrient or Fertilizer Content

Data are averaged over 160 sampling events in 2012.

N-P-K and Lime (Ca) Content (% Dry-Wt Basis)

- Total Nitrogen (N) 3.6%
  - Organic Nitrogen (N) 3.5%
  - Ammonia Nitrogen (N) 0.1%
- Phosphorous (P) 7.8%
- Potassium (K) 0.2%
- Calcium (Ca) 10.7%
- Calcium (CaO equiv.) 3.7%

Other Nutrient Content (% Dry-Wt Basis)

- Iron (Fe) 1.6%
- Boron (B) 0.0%
- Sulfur (S) 0.8%

Total Solids & pH

- Total Solids 46.22%
- pH (std. units) 11.26

Potential Value of Nutrients in Biosolids

Value of Commercial Nutrients

- Nitrogen (N) (priced from ammonium nitrate) $1,280 /Ton
- Phosphorous as phosphate (P2O5) $500 /Ton
- Potassium as potassium oxide (K2O) $850 /Ton
- Ag Lime as calcium carbonate (CaCO3) $30 /Ton

Prices are scaled up as needed to represent the cost of "pure" nutrients: 100-0-0, 0-100-0, 0-0-100, and CCE=100, respectively.
Values are based on prices from a nutrient wholesaler in Auburn, AL, and include hauling and spreading costs.

Value of Nutrients in Biosolids

- Ammonia Nitrogen (NH4 as N) $1.65 /Dry Ton
- Organic Nitrogen (as N) $20.19 /Dry Ton
- Phosphorous as phosphate (P2O5) $89.23 /Dry Ton
- Potassium as potassium oxide (K2O) $3.52 /Dry Ton
- Ag Lime as calcium carbonate (CaCO3) $1.99 /Dry Ton
- Total: $116.59 /Dry Ton

The current year's and the next two years' mineralization of Organic Nitrogen is used in determining its immediate value. In the first three years, only 45.3% of the Organic Nitrogen is plant available, and only that portion is being assigned monetary value in this calculation. The remaining portion, as well as the other tangible benefits of adding organics to soils, is not included.

Total Annual Value of Nutrients in Biosolids Provided to Farmers

- Nitrogen (NH4 and available OrgN as N) $578,000
- Phosphorous as phosphate (P2O5) $2,363,000
- Potassium as potassium oxide (K2O) $93,000
- Ag Lime as calcium carbonate (CaCO3) $53,000

Only nutrients for which there is a net-crop need should be included in monetary valuation, on a field-by-field basis. Applications are Nitrogen-based, so the Nitrogen value should be included in its entirety. Liming of fields is typically necessary under normal farming operations, so the Ag Lime value should also be included in its entirety.

Quality Assurance/Quality Control

- Class B Biosolids (Pathogen Reduction 40 CFR 503.32) -- Biosolids may be land applied with stipulated restrictions and setbacks as defined in the regulations (40 CFR Part 503.14).
- Vector Attraction Reduction - Addition of Alkali (40 CFR 503.33(b)(6)) -- Biosolids are stabilized by the addition of lime kiln dust and raising the pH to greater than 12.0 for two (2) hours and retaining pH at or above 11.5 for an additional 22 hours as required by regulation.

1. Pollutant Concentrations (40 CFR Part 503.13 Table 3

Pollutant	*Monthly Avg. Allowable conc. (mg/kg)*	*Measured Conc. (mg/kg)*	*% of Allowable Conc.*
Arsenic	41	4.39	10.7%
Cadmium	39	4.81	12.3%
Chromium	N/A	29.89	N/A
Copper	1,500	140.68	9.4%
Lead	300	20.31	6.8%
Mercury	17	0.25	1.4%
Molybdenum	N/A	16.07	N/A
Nickel	420	53.00	12.6%
Selenium	100	5.98	6.0%
Zinc	2,800	506.00	18.1%

Data are averaged over 160 sampling events in 2012.

2. Pathogens [40 CFR Part 503.32(a) and (b)]

Class A Biosolids

	Annual Sampling Events	*Avg Measured Conc.*	*Allowable Conc. (dry-wt basis)*
• *Salmonella*	23	<2.9	<3 MPN / 4 grams
• Viable Helminth Ova	24	<1	<1 Ova / 4 grams
• Fecal Coliform	105	<1000	<1,000 CFU / gram
• Enteric Virus	24	<1	<1 PFU / 4 grams

Class B Biosolids

	Annual Sampling Events	*Avg Measured Conc.*	*Allowable Conc. (dry-wt basis)*
• Fecal Coliform	105	<1000	<2,000,000 CFU / gram

CFU = Colony Forming Unit
MPN = Most Probable Number
PFU = Plaque Forming Unit

Monitoring Requirements

- Minimum Monitoring Requirements (40 CFR Part 503.16, Table 1) -- For a plant generating greater than or equal to 15,000 metric tons per year, the required minimum monitoring frequency is once per month.
- City Monitoring Practices:

Total Solids, pH (grab samples)	Daily
Nutrients (N, P and K); Other Nutrients (Ca, Fe, B, and S) Regulated Metals; Fecal Coliform; and Total Solids (composite sample)	Once/Week
Pathogens for Class A and Class B biosolids	Once/Month
Pathogens (Dewatering Feed Solids)	Once/Quarter
PCB and TCLP	Once/Year

Production Methods

- Wastewater Treatment Process:
  The Moccasin Bend WWTP has a treatment capacity of 140 million gallons per day (MGD). The plant operates the following liquid treatment unit processes:
  1. Screening sand grit removal;
  2. Primary settling and scum removal;
  3. High purity oxygen activated sludge biological treatment;
  4. Final clarification;
  5. Chlorine disinfection;
  6. Sodium bisulfite dechlorination; and
  7. CSO/wet-weather treatment with a capacity of 80 MGD includes screenings and grit removal, polymer-aided primary treatment and chlorine disinfection.

- Biosolids Treatment Process:
  The Moccasin Bend WWTP has dewatering capacity of 120 dry tons per day. The plant currently operated the following liquid treatment unit processes:
  1. Gravity thickening of primary and waste-activated solids;
  2. Thermophillic/mesophillic anaerobic digestion of primary solids;
  3. Waste-activated solids are blended with digested primary solids;
  4. Chemical conditioning of blended solids with polymer;
  5. Conditioned solids are dewatered via two (2) 60 dry ton per day high-"G" centrifuges or two (2) 50 dry ton/day low-"G" centrifuges;
  6. Dewatered solids are lime stabilized with lime kiln dust to produce Class B bioaolids that are land applied on agricultural sites.

Other Considerations

Environmental and Conserved Natural Resources Value

- 452 tons of Nitrogen were recycled, rather than going to landfill.
- 18,400 mmBTU (million BTU) of natural gas was conserved, since farmers didn't need to purchase manufactured chemical fertilzer.
- That's 18,400,000 cubic feet of natural gas.
- If used to generate power, that natural gas could make 5,390,000 kW-hrs of electricity.
- That could run a typical 1000W hair dryer for 615 years.
- 1,110 tons of CO2 didn't end up in the atmosphere.