E. 10.9.13 TMECC Report: Individual Feedstocks Commercial Organics

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-1/5-8079
Group: Oct.13 B #41
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification: 287 Comm
Sample ID #: 3100313 - 1/5
Metals Results Units MDL % Recovery Date Tested
Arsenic (As): Less than 1.0 mg/kg dw 1.0 93.9 17 Oct. 13
Cadmium (Cd): Less than 1.0 mg/kg dw 1.0 100.3 17 Oct. 13
Chromium (Cr): 1.2 mg/kg dw 1.0 86.9 17 Oct. 13
Copper (Cu): 6.7 mg/kg dw 1.0 93.7 17 Oct. 13
Lead (Pb): Less than 1.0 mg/kg dw 1.0 94.3 17 Oct. 13
Mercury (Hg): Less than 1.0 mg/kg dw 1.0 90.9 17 Oct. 13
Molybdenum (Mo): Less than 1.0 mg/kg dw 1.0 103.4 17 Oct. 13
Nickel (Ni): 2.2 mg/kg dw 1.0 95.1 17 Oct. 13
Selenium (Se): Less than 1.0 mg/kg dw 1.0 96.1 17 Oct. 13
Zinc (Zn): 22 mg/kg dw 1.0 102.3 17 Oct. 13
Cobalt (Co) Less than 1.0 mg/kg dw 0.50 93.2 17 Oct. 13
Total Solids (TMECC 03.09) 20 % 0.05 NA 11 Oct. 13
Bacteria Results Units MDL Date Tested
Fecal Coliform Greater than 2100 MPN/g dw 09 Oct. 13
Pollutant Loading Rate:
Multiply mg/kg dry weight values times 0.0177 to give you kilograms pollutant per 100 metric ton compost as-received based on a moisture content of 80.5 percent.
Method (metals): EPA 3050B / EPA 6010
Method (metals): TMECC 04.12-B / 04.14-A
Method (Mercury Hg) TMECC 04.06 / EPA 7471
Method (Fecal Coliform): Standard Methods 9221E
Method (Salmonella): TMECC 07.02-A
Analyst: Assaf Sadeh
Chaska, MN 55318
October 29, 2013

Metals & Bacteria

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-1/5-8079
Group: Oct.13 B #41
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 1/5
Sample Sampling Total
Identification Date E. Coli
287 Comm 08 Oct. 13 1200 MPN/g
Analyst: Assaf Sadeh
October 29, 2013

Method of Analysis: SM 9221 B & F
287 Comm
Chaska, MN 55318
Bateriological Examination of Material for Escherichia Coliform
TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
CODE: FS-compost
Account #: 3100313-1/5-8079
Group: Oct.13 B #41
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Chaska, MN 55318
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 1/5
Nutrients-Primary + Secondary Units as Received Dry Weight
Total Nitrogen (N): % 0.50 2.6
Organic Nitrogen (Org.-N): % 0.48 2.5
Ammonia (NH4-N): % 0.014 0.073
Nitrate (NO3-N): % 0.0039 0.02
Phosphorus (as P2O5): % 0.14 0.73
Potassium (as K2O): % 0.20 1.1
Calcium (Ca): % 0.44 2.2
Magnesium (Mg): % 0.015 0.078
Sulfate (SO4): % 0.025 0.13
C/N Ratio Ratio 18 18
AgIndex Ratio 3.5 3.5
Carbonates (as CaCO3) lbs/ton 19 98
Moisture % 80.5 0
Organic Matter: % 17.8 91.4
Ash: % 1.7 8.6
pH value units 4.44 NA
Salts
Sodium (Na): % 0.093 0.48
Chloride (Cl): % 0.15 0.77
Electrical Conductivity (EC5): mmhos/cm NA 15
Void Space % v/v NA 0.0
Bulk Density g/cc 0.99 0.19
Void Space (> 4mm fraction): % v/v NA 0.0
Volume (> 4mm fraction): % v/v NA 0.0
Volume (< 4mm fraction): % v/v NA 100.0
Excess fines % v/v NA 100.0
Size
Greater than 4 mm fraction: % w/w NA 0.0
Less than 4 mm fraction: % w/w NA 100.0
*Material Cost ($ per unit) $ NA
*Availability (1=least to 5=most) Rating NA
*=Information provided by client for formulation purpose. Analyst: Assaf Sadeh
287 Comm
October 29, 2013
Feedstock Analysis
TEL: 831-724-5422

FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-1/5-8079
Group: Oct.13 B #41
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 1/5
Sample Sampling Total
Identification Date Coliform
287 Comm 08 Oct. 13 Greater than 2100 MPN/g
Analyst: Assaf Sadeh
October 29, 2013
Chaska, MN 55318
287 Comm

Bateriological Examination of Material for Total Coliform

Method of Analysis: SM 9221 B

F. 10.9.13 TMECC Report: Individual Feedstocks Woodchips

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-4/5-8079
Group: Oct.13 B #44
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification: 290 WC
Sample ID #: 3100313 - 4/5
Metals Results Units MDL % Recovery Date Tested
Arsenic (As): 3.6 mg/kg dw 1.0 93.9 17 Oct. 13
Cadmium (Cd): Less than 1.0 mg/kg dw 1.0 100.3 17 Oct. 13
Chromium (Cr): 20 mg/kg dw 1.0 86.9 17 Oct. 13
Copper (Cu): 47 mg/kg dw 1.0 93.7 17 Oct. 13
Lead (Pb): 8.9 mg/kg dw 1.0 94.3 17 Oct. 13
Mercury (Hg): Less than 1.0 mg/kg dw 1.0 90.9 17 Oct. 13
Molybdenum (Mo): Less than 1.0 mg/kg dw 1.0 103.4 17 Oct. 13
Nickel (Ni): 7.0 mg/kg dw 1.0 95.1 17 Oct. 13
Selenium (Se): Less than 1.0 mg/kg dw 1.0 96.1 17 Oct. 13
Zinc (Zn): 40 mg/kg dw 1.0 102.3 17 Oct. 13
Cobalt (Co) 1.2 mg/kg dw 0.50 93.2 17 Oct. 13
Total Solids (TMECC 03.09) 55 % 0.05 NA 11 Oct. 13
Bacteria Results Units MDL Date Tested
Fecal Coliform Greater than 1400 MPN/g dw 09 Oct. 13
Pollutant Loading Rate:
Multiply mg/kg dry weight values times 0.0498 to give you kilograms pollutant per 100 metric ton compost as-received based on a moisture content of 45.1 percent.
Method (metals): EPA 3050B / EPA 6010
Method (metals): TMECC 04.12-B / 04.14-A
Method (Mercury Hg) TMECC 04.06 / EPA 7471
Method (Fecal Coliform): Standard Methods 9221E
Method (Salmonella): TMECC 07.02-A
Analyst: Assaf Sadeh
Chaska, MN 55318
October 29, 2013

Metals & Bacteria

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-4/5-8079
Group: Oct.13 B #44
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 4/5

Sample Sampling Total
Identification Date E. Coli
290 WC 08 Oct. 13 20 MPN/g
Analyst: Assaf Sadeh
October 29, 2013
Method of Analysis: SM 9221 B & F
290 WC
Chaska, MN 55318

Bateriological Examination of Material for Escherichia Coliform

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
CODE: FS-compost
Account #: 3100313-4/5-8079
Group: Oct.13 B #44
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Chaska, MN 55318
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 4/5

Nutrients-Primary + Secondary Units as Received Dry Weight
Total Nitrogen (N): % 0.24 0.44
Organic Nitrogen (Org.-N): % 0.24 0.43
Ammonia (NH4-N): % 0.0032 0.0058
Nitrate (NO3-N): % < 0.0001 < 0.0001
Phosphorus (as P2O5): % 0.052 0.093
Potassium (as K2O): % 0.14 0.26
Calcium (Ca): % 0.49 0.90
Magnesium (Mg): % 0.065 0.12
Sulfate (SO4): % 0.0066 0.012
C/N Ratio Ratio 99 99
AgIndex Ratio 29 29
Carbonates (as CaCO3) lbs/ton 7.4 13
Moisture % 45.1 0
Organic Matter: % 45.6 83.0
Ash: % 9.3 17.0
pH value units 7.37 NA

Salts
Sodium (Na): % 0.0081 0.015
Chloride (Cl): % 0.0067 0.012
Electrical Conductivity (EC5): mmhos/cm NA 0.77

Void Space % v/v NA 12.7
Bulk Density g/cc 0.37 0.21
Void Space (> 4mm fraction): % v/v NA 49.5
Volume (> 4mm fraction): % v/v NA 84.8
Volume (< 4mm fraction): % v/v NA 36.7
Voids left % v/v NA 12.7

Size
Greater than 4 mm fraction: % w/w NA 60.7
Less than 4 mm fraction: % w/w NA 39.3
*Material Cost ($ per unit) $ NA
*Availability (1=least to 5=most) Rating NA
*=Information provided by client for formulation purpose. Analyst: Assaf Sadeh

290 WC
October 29, 2013

Feedstock Analysis

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-4/5-8079
Group: Oct.13 B #44
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 4/5
Sample Sampling Total
Identification Date Coliform
290 WC 08 Oct. 13 Greater than 1400 MPN/g
Analyst: Assaf Sadeh
October 29, 2013
Chaska, MN 55318
290 WC

Bateriological Examination of Material for Total Coliform

Method of Analysis: SM 9221 B

G. 10.9.13 TMECC Report: Individual Feedstocks Grass

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-2/5-8079
Group: Oct.13 B #42
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification: 288 Grass
Sample ID #: 3100313 - 2/5
Metals Results Units MDL % Recovery Date Tested
Arsenic (As): 2.0 mg/kg dw 1.0 93.9 17 Oct. 13
Cadmium (Cd): Less than 1.0 mg/kg dw 1.0 100.3 17 Oct. 13
Chromium (Cr): 1.4 mg/kg dw 1.0 86.9 17 Oct. 13
Copper (Cu): 15 mg/kg dw 1.0 93.7 17 Oct. 13
Lead (Pb): 1.1 mg/kg dw 1.0 94.3 17 Oct. 13
Mercury (Hg): Less than 1.0 mg/kg dw 1.0 90.9 17 Oct. 13
Molybdenum (Mo): 1.3 mg/kg dw 1.0 103.4 17 Oct. 13
Nickel (Ni): 1.9 mg/kg dw 1.0 95.1 17 Oct. 13
Selenium (Se): Less than 1.0 mg/kg dw 1.0 96.1 17 Oct. 13
Zinc (Zn): 37 mg/kg dw 1.0 102.3 17 Oct. 13
Cobalt (Co) Less than 1.0 mg/kg dw 0.50 93.2 17 Oct. 13
Total Solids (TMECC 03.09) 30 % 0.05 NA 11 Oct. 13
Bacteria Results Units MDL Date Tested
Fecal Coliform Greater than 2600 MPN/g dw 09 Oct. 13
Pollutant Loading Rate:
Multiply mg/kg dry weight values times 0.0274 to give you kilograms pollutant per 100 metric ton compost as-received based on a moisture content of 69.8 percent.
Method (metals): EPA 3050B / EPA 6010
Method (metals): TMECC 04.12-B / 04.14-A
Method (Mercury Hg) TMECC 04.06 / EPA 7471
Method (Fecal Coliform): Standard Methods 9221E
Method (Salmonella): TMECC 07.02-A
Analyst: Assaf Sadeh
Chaska, MN 55318
October 29, 2013

Metals & Bacteria

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-2/5-8079
Group: Oct.13 B #42
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 2/5
Sample Sampling Total
Identification Date E. Coli
288 Grass 08 Oct. 13 Greater than 2600 MPN/g
Analyst: Assaf Sadeh
October 29, 2013

Method of Analysis: SM 9221 B & F
288 Grass
Chaska, MN 55318
Bateriological Examination of Material for Escherichia Coliform
TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
CODE: FS-compost
Account #: 3100313-2/5-8079
Group: Oct.13 B #42
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Chaska, MN 55318
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 2/5
Nutrients-Primary + Secondary Units as Received Dry Weight
Total Nitrogen (N): % 1.2 3.9
Organic Nitrogen (Org.-N): % 1.0 3.4
Ammonia (NH4-N): % 0.16 0.53
Nitrate (NO3-N): % 0.00031 0.001
Phosphorus (as P2O5): % 0.25 0.84
Potassium (as K2O): % 0.78 2.5
Calcium (Ca): % 0.33 1.1
Magnesium (Mg): % 0.078 0.26
Sulfate (SO4): % 0.073 0.24
C/N Ratio Ratio 11 11
AgIndex Ratio 11 11
Carbonates (as CaCO3) lbs/ton 1.7 5.6
Moisture % 69.8 0
Organic Matter: % 24.9 82.5
Ash: % 5.3 17.5
pH value units 6.62 NA
Salts
Sodium (Na): % 0.0051 0.017
Chloride (Cl): % 0.2 0.65
Electrical Conductivity (EC5): mmhos/cm NA 18
Void Space % v/v NA 0.0
Bulk Density g/cc 0.27 0.08
Void Space (> 4mm fraction): % v/v NA 0.0
Volume (> 4mm fraction): % v/v NA 20.0
Volume (< 4mm fraction): % v/v NA 80.0
Excess fines % v/v NA 80.0
Size
Greater than 4 mm fraction: % w/w NA 21.9
Less than 4 mm fraction: % w/w NA 78.1
*Material Cost ($ per unit) $ NA
*Availability (1=least to 5=most) Rating NA
*=Information provided by client for formulation purpose. Analyst: Assaf Sadeh
288 Grass
October 29, 2013
Feedstock Analysis
TEL: 831-724-5422

FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-2/5-8079
Group: Oct.13 B #42
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 2/5
Sample Sampling Total
Identification Date Coliform
288 Grass 08 Oct. 13 Greater than 2600 MPN/g
Analyst: Assaf Sadeh
October 29, 2013
Chaska, MN 55318
288 Grass

Bateriological Examination of Material for Total Coliform

Method of Analysis: SM 9221 B

H. 10.9.13 TMECC Report: Individual Feedstocks Leaves

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-3/5-8079
Group: Oct.13 B #43
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification: 289 LVS
Sample ID #: 3100313 - 3/5
Metals Results Units MDL % Recovery Date Tested
Arsenic (As): 2.1 mg/kg dw 1.0 93.9 17 Oct. 13
Cadmium (Cd): Less than 1.0 mg/kg dw 1.0 100.3 17 Oct. 13
Chromium (Cr): Less than 1.0 mg/kg dw 1.0 86.9 17 Oct. 13
Copper (Cu): 9.0 mg/kg dw 1.0 93.7 17 Oct. 13
Lead (Pb): Less than 1.0 mg/kg dw 1.0 94.3 17 Oct. 13
Mercury (Hg): Less than 1.0 mg/kg dw 1.0 90.9 17 Oct. 13
Molybdenum (Mo): Less than 1.0 mg/kg dw 1.0 103.4 17 Oct. 13
Nickel (Ni): 1.4 mg/kg dw 1.0 95.1 17 Oct. 13
Selenium (Se): Less than 1.0 mg/kg dw 1.0 96.1 17 Oct. 13
Zinc (Zn): 28 mg/kg dw 1.0 102.3 17 Oct. 13
Cobalt (Co) Less than 1.0 mg/kg dw 0.50 93.2 17 Oct. 13
Total Solids (TMECC 03.09) 47 % 0.05 NA 11 Oct. 13
Bacteria Results Units MDL Date Tested
Fecal Coliform Greater than 1800 MPN/g dw 09 Oct. 13
Pollutant Loading Rate:
Multiply mg/kg dry weight values times 0.0424 to give you kilograms pollutant per 100 metric ton compost as-received based on a moisture content of 53.2 percent.
Method (metals): EPA 3050B / EPA 6010
Method (metals): TMECC 04.12-B / 04.14-A
Method (Mercury Hg) TMECC 04.06 / EPA 7471
Method (Fecal Coliform): Standard Methods 9221E
Method (Salmonella): TMECC 07.02-A
Analyst: Assaf Sadeh
Chaska, MN 55318
October 29, 2013

Metals & Bacteria

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-3/5-8079
Group: Oct.13 B #43
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 3/5
Sample Sampling Total
Identification Date E. Coli
289 LVS 08 Oct. 13 Greater than 1800 MPN/g
Analyst: Assaf Sadeh
October 29, 2013

Method of Analysis: SM 9221 B & F
289 LVS
Chaska, MN 55318
Bateriological Examination of Material for Escherichia Coliform
TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
CODE: FS-compost
Account #: 3100313-3/5-8079
Group: Oct.13 B #43
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Chaska, MN 55318
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 3/5
Nutrients-Primary + Secondary Units as Received Dry Weight
Total Nitrogen (N): % 0.60 1.3
Organic Nitrogen (Org.-N): % 0.59 1.3
Ammonia (NH4-N): % 0.0096 0.021
Nitrate (NO3-N): % 0.0016 0.0035
Phosphorus (as P2O5): % 0.14 0.30
Potassium (as K2O): % 0.34 0.71
Calcium (Ca): % 0.98 2.1
Magnesium (Mg): % 0.13 0.28
Sulfate (SO4): % 0.05 0.11
C/N Ratio Ratio 34 34
AgIndex Ratio 11 11
Carbonates (as CaCO3) lbs/ton <0.01 <0.01
Moisture % 53.2 0
Organic Matter: % 41.1 87.7
Ash: % 5.8 12.3
pH value units 5.63 NA
Salts
Sodium (Na): % 0.012 0.025
Chloride (Cl): % 0.082 0.18
Electrical Conductivity (EC5): mmhos/cm NA 5.3
Void Space % v/v NA 0.0
Bulk Density g/cc 0.10 0.05
Void Space (> 4mm fraction): % v/v NA 0.0
Volume (> 4mm fraction): % v/v NA 87.4
Volume (< 4mm fraction): % v/v NA 12.6
Excess fines % v/v NA 12.6
Size
Greater than 4 mm fraction: % w/w NA 78.3
Less than 4 mm fraction: % w/w NA 21.7
*Material Cost ($ per unit) $ NA
*Availability (1=least to 5=most) Rating NA
*=Information provided by client for formulation purpose. Analyst: Assaf Sadeh
289 LVS
October 29, 2013

Feedstock Analysis

TEL: 831-724-5422

FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-3/5-8079
Group: Oct.13 B #43
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 3/5
Sample Sampling Total
Identification Date Coliform
289 LVS 08 Oct. 13 Greater than 1800 MPN/g
Analyst: Assaf Sadeh
October 29, 2013
Chaska, MN 55318
289 LVS

Bateriological Examination of Material for Total Coliform

Method of Analysis: SM 9221 B

I. 10.9.13 TMECC Report: Individual Feedstocks Co-Collected Organics

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-5/5-8079
Group: Oct.13 B #45
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification: 291 CO
Sample ID #: 3100313 - 5/5
Metals Results Units MDL % Recovery Date Tested
Arsenic (As): 3.8 mg/kg dw 1.0 93.9 17 Oct. 13
Cadmium (Cd): Less than 1.0 mg/kg dw 1.0 100.3 17 Oct. 13
Chromium (Cr): 3.9 mg/kg dw 1.0 86.9 17 Oct. 13
Copper (Cu): 24 mg/kg dw 1.0 93.7 17 Oct. 13
Lead (Pb): 5.5 mg/kg dw 1.0 94.3 17 Oct. 13
Mercury (Hg): Less than 1.0 mg/kg dw 1.0 90.9 17 Oct. 13
Molybdenum (Mo): Less than 1.0 mg/kg dw 1.0 103.4 17 Oct. 13
Nickel (Ni): 3.7 mg/kg dw 1.0 95.1 17 Oct. 13
Selenium (Se): Less than 1.0 mg/kg dw 1.0 96.1 17 Oct. 13
Zinc (Zn): 67 mg/kg dw 1.0 102.3 17 Oct. 13
Cobalt (Co) 2.1 mg/kg dw 0.50 93.2 17 Oct. 13
Total Solids (TMECC 03.09) 41 % 0.05 NA 11 Oct. 13
Bacteria Results Units MDL Date Tested
Fecal Coliform Greater than 1900 MPN/g dw 09 Oct. 13
Pollutant Loading Rate:
Multiply mg/kg dry weight values times 0.0374 to give you kilograms pollutant per 100 metric ton compost as-received based on a moisture content of 58.8 percent.
Method (metals): EPA 3050B / EPA 6010
Method (metals): TMECC 04.12-B / 04.14-A
Method (Mercury Hg) TMECC 04.06 / EPA 7471
Method (Fecal Coliform): Standard Methods 9221E
Method (Salmonella): TMECC 07.02-A
Analyst: Assaf Sadeh
Chaska, MN 55318
October 29, 2013

Metals & Bacteria

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-5/5-8079
Group: Oct.13 B #45
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 5/5
Sample Sampling Total
Identification Date E. Coli
291 CO 08 Oct. 13 Greater than 1900 MPN/g
Analyst: Assaf Sadeh
October 29, 2013

Method of Analysis: SM 9221 B & F
291 CO
Chaska, MN 55318
Bateriological Examination of Material for Escherichia Coliform
TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
CODE: FS-compost
Account #: 3100313-5/5-8079
Group: Oct.13 B #45
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Chaska, MN 55318
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 5/5
Nutrients-Primary + Secondary Units as Received Dry Weight
Total Nitrogen (N): % 0.76 1.8
Organic Nitrogen (Org.-N): % 0.74 1.8
Ammonia (NH4-N): % 0.019 0.046
Nitrate (NO3-N): % 0.00016 0.0004
Phosphorus (as P2O5): % 0.22 0.52
Potassium (as K2O): % 0.55 1.3
Calcium (Ca): % 0.88 2.1
Magnesium (Mg): % 0.15 0.37
Sulfate (SO4): % 0.025 0.061
C/N Ratio Ratio 22 22
AgIndex Ratio 16 16
Carbonates (as CaCO3) lbs/ton 4.0 9.8
Moisture % 58.8 0
Organic Matter: % 32.8 79.7
Ash: % 8.4 20.3
pH value units 5.46 NA
Salts
Sodium (Na): % 0.019 0.046
Chloride (Cl): % 0.074 0.18
Electrical Conductivity (EC5): mmhos/cm NA 6.6
Void Space % v/v NA 0.0
Bulk Density g/cc 0.35 0.14
Void Space (> 4mm fraction): % v/v NA 0.0
Volume (> 4mm fraction): % v/v NA 53.6
Volume (< 4mm fraction): % v/v NA 46.4
Excess fines % v/v NA 46.4
Size
Greater than 4 mm fraction: % w/w NA 49.5
Less than 4 mm fraction: % w/w NA 50.5
*Material Cost ($ per unit) $ NA
*Availability (1=least to 5=most) Rating NA
*=Information provided by client for formulation purpose. Analyst: Assaf Sadeh
291 CO
October 29, 2013

Feedstock Analysis

TEL: 831-724-5422

FAX: 831-724-3188
www.compostlab.com
Account #: 3100313-5/5-8079
Group: Oct.13 B #45
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Attn: Sarah Braman
Date Received: 09 Oct. 13
Sample Identification:
Sample ID #: 3100313 - 5/5
Sample Sampling Total
Identification Date Coliform
291 CO 08 Oct. 13 Greater than 1900 MPN/g
Analyst: Assaf Sadeh
October 29, 2013
Chaska, MN 55318
291 CO

Bateriological Examination of Material for Total Coliform

Method of Analysis: SM 9221 B

J. 10.10.13 TMECC Report: Finished Compost Cell 1

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100340-1/3-8079
Group: Oct.13 B #20
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Chaska, MN 55318
Attn: Sarah Braman
Date Received: 10 Oct. 13
Sample Identification: P1CM
Sample ID #: 3100340 - 1/3
Nutrients Dry wt. As Rcvd. units **Stability Indicator:** Biologically
Total Nitrogen: 1.9 0.94 % **CO2 Evolution** Respirometery Available C
Ammonia (NH_4-N): 47 23 mg/kg mg CO_2-C/g OM/day 2.9 2.9
Nitrate (NO_3-N): 78 39 mg/kg mg CO_2-C/g TS/day 1.5 1.6
Org. Nitrogen (Org.-N): 1.9 0.94 % *Stability Rating stable stable*
Phosphorus (as P_2O_5): 0.46 0.23 %
Phosphorus (P): 2000 1000 mg/kg
Potassium (as K_2O): 0.77 0.38 % **Maturity Indicator: Cucumber Bioassay**
Potassium (K): 6400 3100 mg/kg Compost:Vermiculite(v:v) 1:1 1:3
Calcium (Ca): 3.5 1.8 % Emergence (%) 100 100
Magnesium (Mg): 0.95 0.47 % Seedling Vigor (%) 90 90
Sulfate (SO_4-S): 56 28 mg/kg *Description of Plants healthy healthy*
Boron (Total B): 33 16 mg/kg
Moisture: 0 50.6 %
Sodium (Na): 0.050 0.025 % **Pathogens** Results Units Rating
Chloride (Cl): 0.11 0.056 % Fecal Coliform 1600 MPN/g *fail*
pH Value: NA 8.02 unit Salmonella < 3 MPN/4g *pass*
Bulk Density : 17 35 lb/cu ft Date Tested: 10 Oct. 13
Carbonates ($CaCO_3$): 120 61 lb/ton
Conductivity (EC5): 2.4 NA mmhos/cm
Organic Matter: 53.3 26.3 % **Inerts** % by weight
Organic Carbon: 30.0 15.0 % Plastic < 0.5
Ash: 46.7 23.1 % Glass < 0.5
C/N Ratio 16 16 ratio Metal < 0.5
AgIndex > 10 > 10 ratio Sharps ND
Metals Dry wt. EPA Limit units **Size & Volume Distribution**
Aluminum (Al) 3300 - mg/kg MM % by weight % by volume BD g/cc
Arsenic (As): 3.4 41 mg/kg > 50 0.0 0.0 0.00
Cadmium (Cd): < 1.0 39 mg/kg 25 to 50 0.0 0.0 0.00
Chromium (Cr): 12 1200 mg/kg 16 to 25 1.5 1.5 0.42
Cobalt (Co) 2.4 - mg/kg 9.5 to 16 8.6 6.6 0.54
Copper (Cu): 20 1500 mg/kg 6.3 to 9.5 8.7 10.8 0.34
Iron (Fe): 7200 - mg/kg 4.0 to 6.3 11.4 14.2 0.33
Lead (Pb): 21 300 mg/kg 2.0 to 4.0 20.2 21.3 0.39
Manganese (Mn): 280 - mg/kg < 2.0 49.6 45.5 0.45
Mercury (Hg): < 1.0 17 mg/kg Bulk Density Description:<.35 Light Materials,
Molybdenum (Mo): 1.9 75 mg/kg .35-.60 medium weight materials, >.60 Heavy Materials
Nickel (Ni): 8.0 420 mg/kg Analyst: Assaf Sadeh
Selenium (Se): < 1.0 36 mg/kg
Zinc (Zn): 83 2800 mg/kg
*Sample was received and handled in accordance with TMECC procedures.
October 29, 2013
Account No.: Date Received 10 Oct. 13

3100340 - 1/3 - 8079 Sample i.d.
Group: Sample I.d. No. 1/3 3100340
INTERPRETATION: Page one of three
Is Your Compost Stable?
Respiration Rate Biodegradation Rate of Your Pile
2.9 mg CO2-C/
g OM/day
Biologically Available Carbon (BAC) Optimum Degradation Rate
2.9 mg CO2-C/
g OM/day
Is Your Compost Mature?
0.60 Ratio
Ammonia N ppm
47 mg/kg
dry wt.
Nitrate N ppm
78 mg/kg
dry wt.
pH value
8.02 units
Cucumber Emergence
100.0 percent
Is Your Compost Safe Regarding Health?
Fecal Coliform
> 1000 MPN/g dry wt.
Salmonella
Less than 3 /4g dry wt.
Metals US EPA 503
Pass dry wt.
Does Your Compost Provide Nutrients or Organic Matter?
Nutrients (N+P2O5+K2O)
3.1 Percent
dry wt.
AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
15 Ratio
Plant Available Nitrogen (PAN) Estimated release for first season
4 lbs/ton
wet wt.
C/N Ratio
16 Ratio
Soluble Available Nutrients & Salts (EC5 w/w dw)
2.4 mmhos/cm
dry wt.
Lime Content (CaCO3)
120 Lbs/ton
dry wt.
What are the physical properties of your compost?
Percent Ash
46.7 Percent ++++++++++++++++++++++++++++++++++
dry wt.
Sieve Size % > 6.3 MM (0.25")
18.8 Percent
dry wt.
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch
AmmoniaN/NitrateN ratio
++++++++++++
P1CM
++++++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch
++++++++++++
VeryMature>|< Mature >|< Immature
+++++
VeryMature>|< Mature >|< Immature
++
< Immature >|< Mature
++
< Immature >|< Mature >|< Immature
++

< Immature >|< Mature
++
< Safe >|< High Fecal Coliform
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)
+++++++++
<All Metals Pass >|< One or more Metals Fail
++++++++++++++++++++++++++++++
++++++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content
++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider
< Low >|< Average >|< High Lime Content (as CaCO3)
< High Organic Matter >|< Average >|< High Ash Content
++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider
Oct.13 B No. 20
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand
++++++++++++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients
++
+++++++++++++++
Account No.: Date Received
3100340 - 1/3 - 8079 Sample i.d.
Group: Sample I.d. No. 1/3 3100340

INTERPRETATION:

Is Your Compost Stable? Page two of three

Respiration Rate

2.9 Low: Good for all uses mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

2.9 Low: Good for all uses mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

0.60 mature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This

Ammonia N ppm step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting

47 very mature in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic

Nitrate N ppm ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low

78 mature ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions.

pH value For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content

8.02 mature can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

> 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.1 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

P1CM

10 Oct. 13

Oct.13 B No. 20

Account No.: Date Received

3100340 - 1/3 - 8079 Sample i.d.

Group: Sample I.d. No. 1/3 3100340

INTERPRETATION: Page three of three

AgIndex (Nutrients/Na+Cl)

15 High nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

4 Low N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to offset the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

16 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

2.4 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

120 High lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

46.7 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

18.8 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter

mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Estimated available nutrients for use when calculating application rates

Plant Available Nitrogen (PAN) calculations: lbs/ton (As Rcvd.)

PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))

X value = If BAC < 2 then X = 0.1 Plant Available Nitrogen (PAN) 3.9

If BAC =2.1 to 5 then X = 0.2 Ammonia (NH4-N) 0.05

If BAC =5.1 to 10 then X = 0.3 Nitrate (NO3-N) 0.08

If BAC > 10 then X = 0.4 Available Phosphorus (P2O5*0.64) 2.9

Note: If C/N ratio > 15 additional N should be applied. Available Potassium (K2O) 7.5

10 Oct. 13

P1CM

Oct.13 B No. 20

TEL: 831-724-5422

FAX: 831-724-3188

www.compostlab.com

Account #: 3100340-1/3-8079

Group: Oct.13 B #20

Reporting Date:

Carver County Environmental Services

600 East 4th Street

Attn: Sarah Braman

Date Received: 10 Oct. 13

Sample Identification:

Sample ID #: 3100340 - 1/3

Sample Sampling Total

Identification Date E. Coli

P1CM 09 Oct. 13 2.0 MPN/g

Analyst: Assaf Sadeh

October 29, 2013

Method of Analysis: SM 9221 B & F

P1CM

Chaska, MN 55318

Bateriological Examination of Material for Escherichia Coliform

TEL: 831-724-5422

FAX: 831-724-3188

www.compostlab.com

Account #: 3100340-1/3-8079

Group: Oct.13 B #20

Reporting Date:

Carver County Environmental Services

600 East 4th Street

Attn: Sarah Braman

Date Received: 10 Oct. 13

Sample Identification:

Sample ID #: 3100340 - 1/3

Sample Sampling Total

Identification Date Coliform

P1CM 09 Oct. 13 Greater than 1600 MPN/g

Analyst: Assaf Sadeh

October 29, 2013

Chaska, MN 55318

P1CM

Bateriological Examination of Material for Total Coliform
Method of Analysis: SM 9221 B

K. 10.10.13 TMECC Report: Finished Compost Cell 2

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100340-2/3-8079
Group: Oct.13 B #21
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Chaska, MN 55318
Attn: Sarah Braman
Date Received: 10 Oct. 13
Sample Identification: P2CM
Sample ID #: 3100340 - 2/3
Nutrients Dry wt. As Rcvd. units **Stability Indicator:** Biologically
Total Nitrogen: 1.8 0.90 % **CO2 Evolution** Respirometery Available C
Ammonia (NH_4-N): 29 14 mg/kg mg CO_2-C/g OM/day 2.5 3.3
Nitrate (NO_3-N): 44 22 mg/kg mg CO_2-C/g TS/day 1.4 1.8
Org. Nitrogen (Org.-N): 1.8 0.89 % *Stability Rating stable stable*
Phosphorus (as P_2O_5): 0.47 0.23 %
Phosphorus (P): 2100 1000 mg/kg
Potassium (as K_2O): 0.74 0.36 % **Maturity Indicator: Cucumber Bioassay**
Potassium (K): 6100 3000 mg/kg Compost:Vermiculite(v:v) 1:1 1:3
Calcium (Ca): 3.9 1.9 % Emergence (%) 100 100
Magnesium (Mg): 0.98 0.48 % Seedling Vigor (%) 90 93
Sulfate (SO_4-S): 44 22 mg/kg *Description of Plants healthy healthy*
Boron (Total B): 32 16 mg/kg
Moisture: 0 50.6 %
Sodium (Na): 0.045 0.022 % **Pathogens** Results Units Rating
Chloride (Cl): 0.088 0.043 % Fecal Coliform > 1700 MPN/g *fail*
pH Value: NA 8.02 unit Salmonella < 3 MPN/4g *pass*
Bulk Density : 18 37 lb/cu ft Date Tested: 10 Oct. 13
Carbonates ($CaCO_3$): 140 72 lb/ton
Conductivity (EC5): 2.0 NA mmhos/cm
Organic Matter: 55.5 27.4 % **Inerts** % by weight
Organic Carbon: 29.0 14.0 % Plastic 0.17
Ash: 44.5 22.0 % Glass < 0.5
C/N Ratio 16 16 ratio Metal < 0.5
AgIndex > 10 > 10 ratio Sharps ND
Metals Dry wt. EPA Limit units **Size & Volume Distribution**
Aluminum (Al) 2400 - mg/kg MM % by weight % by volume BD g/cc
Arsenic (As): 3.0 41 mg/kg > 50 0.0 0.0 0.00
Cadmium (Cd): < 1.0 39 mg/kg 25 to 50 4.7 1.9 1.14
Chromium (Cr): 12 1200 mg/kg 16 to 25 2.4 1.4 0.80
Cobalt (Co) 1.9 - mg/kg 9.5 to 16 7.0 7.8 0.42
Copper (Cu): 47 1500 mg/kg 6.3 to 9.5 7.4 7.6 0.45
Iron (Fe): 5500 - mg/kg 4.0 to 6.3 8.7 10.4 0.39
Lead (Pb): 25 300 mg/kg 2.0 to 4.0 16.3 19.8 0.39
Manganese (Mn): 300 - mg/kg < 2.0 53.5 51.0 0.49
Mercury (Hg): < 1.0 17 mg/kg Bulk Density Description:<.35 Light Materials,
Molybdenum (Mo): 1.4 75 mg/kg .35-.60 medium weight materials, >.60 Heavy Materials
Nickel (Ni): 6.7 420 mg/kg Analyst: Assaf Sadeh
Selenium (Se): < 1.0 36 mg/kg
Zinc (Zn): 97 2800 mg/kg
*Sample was received and handled in accordance with TMECC procedures.
October 29, 2013
Account No.: Date Received 10 Oct. 13

3100340 - 2/3 - 8079 Sample i.d.
Group: Sample I.d. No. 2/3 3100340
INTERPRETATION: Page one of three
Is Your Compost Stable?
Respiration Rate Biodegradation Rate of Your Pile
2.5 mg CO2-C/
g OM/day
Biologically Available Carbon (BAC) Optimum Degradation Rate
3.3 mg CO2-C/
g OM/day
Is Your Compost Mature?
0.66 Ratio
Ammonia N ppm
29 mg/kg
dry wt.
Nitrate N ppm
44 mg/kg
dry wt.
pH value
8.02 units
Cucumber Emergence
100.0 percent
Is Your Compost Safe Regarding Health?
Fecal Coliform
> 1000 MPN/g dry wt.
Salmonella
Less than 3 /4g dry wt.
Metals US EPA 503
Pass dry wt.
Does Your Compost Provide Nutrients or Organic Matter?
Nutrients (N+P2O5+K2O)
3.0 Percent
dry wt.
AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
15 Ratio
Plant Available Nitrogen (PAN) Estimated release for first season
4 lbs/ton
wet wt.
C/N Ratio
16 Ratio
Soluble Available Nutrients & Salts (EC5 w/w dw)
2.0 mmhos/cm
dry wt.
Lime Content (CaCO3)
140 Lbs/ton
dry wt.
What are the physical properties of your compost?
Percent Ash
44.5 Percent ++++++++++++++++++++++++++++++++++
dry wt.
Sieve Size % > 6.3 MM (0.25")
21.5 Percent
dry wt.
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch
AmmoniaN/NitrateN ratio
++++++++++++++
P2CM
+++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch
++++++++++++++
VeryMature>|< Mature >|< Immature
+++
VeryMature>|< Mature >|< Immature
++++++++++++++++++++++++++++++++++
< Immature >|< Mature
++
< Immature >|< Mature >|< Immature
++

< Immature >|< Mature
++
< Safe >|< High Fecal Coliform
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)
+++++++++
<All Metals Pass >|< One or more Metals Fail
++++++++++++++++++++++++++++++
++++++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content
++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider
< Low >|< Average >|< High Lime Content (as CaCO3)
< High Organic Matter >|< Average >|< High Ash Content
++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider
Oct.13 B No. 21
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand
++++++++++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients
++
++++++++++++++
Account No.: Date Received
3100340 - 2/3 - 8079 Sample i.d.
Group: Sample I.d. No. 2/3 3100340

INTERPRETATION:

Is Your Compost Stable? Page two of three

Respiration Rate

2.5 Low: Good for all uses mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

3.3 Low: Good for all uses mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

0.66 mature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This

Ammonia N ppm step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting

29 very mature in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic

Nitrate N ppm ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low

44 immature ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions.

pH value For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content

8.02 mature can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

> 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.0 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

P2CM

10 Oct. 13

Oct.13 B No. 21

Account No.: Date Received

3100340 - 2/3 - 8079 Sample i.d.

Group: Sample I.d. No. 2/3 3100340

INTERPRETATION: Page three of three

AgIndex (Nutrients/Na+Cl)

15 High nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

4 Low N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to offset the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

16 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

2.0 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

140 High lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

44.5 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

21.5 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter

mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Estimated available nutrients for use when calculating application rates

Plant Available Nitrogen (PAN) calculations: lbs/ton (As Rcvd.)

PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))

X value = If BAC < 2 then X = 0.1 Plant Available Nitrogen (PAN) 3.7

If BAC =2.1 to 5 then X = 0.2 Ammonia (NH4-N) 0.03

If BAC =5.1 to 10 then X = 0.3 Nitrate (NO3-N) 0.04

If BAC > 10 then X = 0.4 Available Phosphorus (P2O5*0.64) 2.9

Note: If C/N ratio > 15 additional N should be applied. Available Potassium (K2O) 7.2

10 Oct. 13

P2CM

Oct.13 B No. 21

TEL: 831-724-5422

FAX: 831-724-3188

www.compostlab.com

Account #: 3100340-2/3-8079

Group: Oct.13 B #21

Reporting Date:

Carver County Environmental Services

600 East 4th Street

Attn: Sarah Braman

Date Received: 10 Oct. 13

Sample Identification:

Sample ID #: 3100340 - 2/3

Sample Sampling Total

Identification Date E. Coli

P2CM 09 Oct. 13 2.0 MPN/g

Analyst: Assaf Sadeh

October 29, 2013

Method of Analysis: SM 9221 B & F

P2CM

Chaska, MN 55318

Bateriological Examination of Material for Escherichia Coliform

TEL: 831-724-5422

FAX: 831-724-3188

www.compostlab.com

Account #: 3100340-2/3-8079

Group: Oct.13 B #21

Reporting Date:

Carver County Environmental Services

600 East 4th Street

Attn: Sarah Braman

Date Received: 10 Oct. 13

Sample Identification:

Sample ID #: 3100340 - 2/3

Sample Sampling Total

Identification Date Coliform

P2CM 09 Oct. 13 Greater than 1700 MPN/g

Analyst: Assaf Sadeh

October 29, 2013

Chaska, MN 55318

P2CM

Bateriological Examination of Material for Total Coliform
Method of Analysis: SM 9221 B

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100340-2/3-8079
Group: Oct.13 B #21
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Chaska, MN 55318
Attn: Sarah Braman
Date Received: 10 Oct. 13
Sample Identification: P2CM
Sample ID #: 3100340 - 2/3
Nutrients Dry wt. As Rcvd. units **Stability Indicator:** Biologically
Total Nitrogen: 1.8 0.90 % **CO2 Evolution** Respirometery Available C
Ammonia (NH_4-N): 29 14 mg/kg mg CO_2-C/g OM/day 2.5 3.3
Nitrate (NO_3-N): 44 22 mg/kg mg CO_2-C/g TS/day 1.4 1.8
Org. Nitrogen (Org.-N): 1.8 0.89 % *Stability Rating stable stable*
Phosphorus (as P_2O_5): 0.47 0.23 %
Phosphorus (P): 2100 1000 mg/kg
Potassium (as K_2O): 0.74 0.36 % **Maturity Indicator: Cucumber Bioassay**
Potassium (K): 6100 3000 mg/kg Compost:Vermiculite(v:v) 1:1 1:3
Calcium (Ca): 3.9 1.9 % Emergence (%) 100 100
Magnesium (Mg): 0.98 0.48 % Seedling Vigor (%) 90 93
Sulfate (SO_4-S): 44 22 mg/kg *Description of Plants healthy healthy*
Boron (Total B): 32 16 mg/kg
Moisture: 0 50.6 %
Sodium (Na): 0.045 0.022 % **Pathogens** Results Units Rating
Chloride (Cl): 0.088 0.043 % Fecal Coliform > 1700 MPN/g *fail*
pH Value: NA 8.02 unit Salmonella < 3 MPN/4g *pass*
Bulk Density : 18 37 lb/cu ft Date Tested: 10 Oct. 13
Carbonates ($CaCO_3$): 140 72 lb/ton
Conductivity (EC5): 2.0 NA mmhos/cm
Organic Matter: 55.5 27.4 % **Inerts** % by weight
Organic Carbon: 29.0 14.0 % Plastic 0.17
Ash: 44.5 22.0 % Glass < 0.5
C/N Ratio 16 16 ratio Metal < 0.5
AgIndex > 10 > 10 ratio Sharps ND
Metals Dry wt. EPA Limit units **Size & Volume Distribution**
Aluminum (Al) 2400 - mg/kg MM % by weight % by volume BD g/cc
Arsenic (As): 3.0 41 mg/kg > 50 0.0 0.0 0.00
Cadmium (Cd): < 1.0 39 mg/kg 25 to 50 4.7 1.9 1.14
Chromium (Cr): 12 1200 mg/kg 16 to 25 2.4 1.4 0.80
Cobalt (Co) 1.9 - mg/kg 9.5 to 16 7.0 7.8 0.42
Copper (Cu): 47 1500 mg/kg 6.3 to 9.5 7.4 7.6 0.45
Iron (Fe): 5500 - mg/kg 4.0 to 6.3 8.7 10.4 0.39
Lead (Pb): 25 300 mg/kg 2.0 to 4.0 16.3 19.8 0.39
Manganese (Mn): 300 - mg/kg < 2.0 53.5 51.0 0.49
Mercury (Hg): < 1.0 17 mg/kg Bulk Density Description:<.35 Light Materials,
Molybdenum (Mo): 1.4 75 mg/kg .35-.60 medium weight materials, >.60 Heavy Materials
Nickel (Ni): 6.7 420 mg/kg Analyst: Assaf Sadeh
Selenium (Se): < 1.0 36 mg/kg
Zinc (Zn): 97 2800 mg/kg
*Sample was received and handled in accordance with TMECC procedures.
October 29, 2013
Account No.: Date Received 10 Oct. 13

3100340 - 2/3 - 8079 Sample i.d.
Group: Sample I.d. No. 2/3 3100340
INTERPRETATION: Page one of three
Is Your Compost Stable?
Respiration Rate Biodegradation Rate of Your Pile
2.5 mg CO2-C/
g OM/day
Biologically Available Carbon (BAC) Optimum Degradation Rate
3.3 mg CO2-C/
g OM/day
Is Your Compost Mature?
0.66 Ratio
Ammonia N ppm
29 mg/kg
dry wt.
Nitrate N ppm
44 mg/kg
dry wt.
pH value
8.02 units
Cucumber Emergence
100.0 percent
Is Your Compost Safe Regarding Health?
Fecal Coliform
> 1000 MPN/g dry wt.
Salmonella
Less than 3 /4g dry wt.
Metals US EPA 503
Pass dry wt.
Does Your Compost Provide Nutrients or Organic Matter?
Nutrients (N+P2O5+K2O)
3.0 Percent
dry wt.
AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
15 Ratio
Plant Available Nitrogen (PAN) Estimated release for first season
4 lbs/ton
wet wt.
C/N Ratio
16 Ratio
Soluble Available Nutrients & Salts (EC5 w/w dw)
2.0 mmhos/cm
dry wt.
Lime Content (CaCO3)
140 Lbs/ton
dry wt.
What are the physical properties of your compost?
Percent Ash
44.5 Percent ++++++++++++++++++++++++++++++++++
dry wt.
Sieve Size % > 6.3 MM (0.25")
21.5 Percent
dry wt.
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch
AmmoniaN/NitrateN ratio
++++++++++++++
P2CM
+++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch
++++++++++++++
VeryMature>|< Mature >|< Immature
+++
VeryMature>|< Mature >|< Immature
++++++++++++++++++++++++++++++++++
< Immature >|< Mature
++
< Immature >|< Mature >|< Immature
++

< Immature >|< Mature
++
< Safe >|< High Fecal Coliform
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)
+++++++++
<All Metals Pass >|< One or more Metals Fail
++++++++++++++++++++++++++++++
++++++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content
++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider
< Low >|< Average >|< High Lime Content (as CaCO3)
< High Organic Matter >|< Average >|< High Ash Content
++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider
Oct.13 B No. 21
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand
++++++++++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients
++
++++++++++++++
Account No.: Date Received
3100340 - 2/3 - 8079 Sample i.d.
Group: Sample I.d. No. 2/3 3100340

INTERPRETATION:

Is Your Compost Stable? Page two of three

Respiration Rate

2.5 Low: Good for all uses mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

3.3 Low: Good for all uses mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

0.66 mature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This

Ammonia N ppm step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting

29 very mature in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic

Nitrate N ppm ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low

44 immature ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions.

pH value For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content

8.02 mature can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

> 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.0 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

P2CM

10 Oct. 13

Oct.13 B No. 21

Account No.: Date Received

3100340 - 2/3 - 8079 Sample i.d.

Group: Sample I.d. No. 2/3 3100340

INTERPRETATION: Page three of three

AgIndex (Nutrients/Na+Cl)

15 High nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

4 Low N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to offset

the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation

because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

16 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

2.0 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades,

volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

140 High lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

44.5 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

21.5 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter

mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Estimated available nutrients for use when calculating application rates

Plant Available Nitrogen (PAN) calculations: lbs/ton (As Rcvd.)

PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))

X value = If BAC < 2 then X = 0.1 Plant Available Nitrogen (PAN) 3.7

If BAC =2.1 to 5 then X = 0.2 Ammonia (NH4-N) 0.03

If BAC =5.1 to 10 then X = 0.3 Nitrate (NO3-N) 0.04

If BAC > 10 then X = 0.4 Available Phosphorus (P2O5*0.64) 2.9

Note: If C/N ratio > 15 additional N should be applied. Available Potassium (K2O) 7.2

10 Oct. 13

P2CM

Oct.13 B No. 21

TEL: 831-724-5422

FAX: 831-724-3188

www.compostlab.com

Account #: 3100340-2/3-8079

Group: Oct.13 B #21

Reporting Date:

Carver County Environmental Services

600 East 4th Street

Attn: Sarah Braman

Date Received: 10 Oct. 13

Sample Identification:

Sample ID #: 3100340 - 2/3

Sample Sampling Total

Identification Date E. Coli

P2CM 09 Oct. 13 2.0 MPN/g

Analyst: Assaf Sadeh

October 29, 2013

Method of Analysis: SM 9221 B & F

P2CM

Chaska, MN 55318

Bateriological Examination of Material for Escherichia Coliform

TEL: 831-724-5422

FAX: 831-724-3188

www.compostlab.com

Account #: 3100340-2/3-8079

Group: Oct.13 B #21

Reporting Date:

Carver County Environmental Services

600 East 4th Street

Attn: Sarah Braman

Date Received: 10 Oct. 13

Sample Identification:

Sample ID #: 3100340 - 2/3

Sample Sampling Total

Identification Date Coliform

P2CM 09 Oct. 13 Greater than 1700 MPN/g

Analyst: Assaf Sadeh

October 29, 2013

Chaska, MN 55318

P2CM

Bateriological Examination of Material for Total Coliform
Method of Analysis: SM 9221 B

L. 10.10.13 TMECC Report: Finished Compost Cell 3

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 3100340-3/3-8079
Group: Oct.13 B #22
Reporting Date:
Carver County Environmental Services
600 East 4th Street
Chaska, MN 55318
Attn: Sarah Braman
Date Received: 10 Oct. 13
Sample Identification: P3CM
Sample ID #: 3100340 - 3/3
Nutrients Dry wt. As Rcvd. units **Stability Indicator:** Biologically
Total Nitrogen: 1.9 0.82 % **CO2 Evolution** Respirometery Available C
Ammonia (NH_4-N): 22 10 mg/kg mg CO_2-C/g OM/day 3.2 4.4
Nitrate (NO_3-N): 14 6.4 mg/kg mg CO_2-C/g TS/day 1.8 2.5
Org. Nitrogen (Org.-N): 1.9 0.84 % *Stability Rating stable* *moderately unstable*
Phosphorus (as P_2O_5): 0.44 0.20 %
Phosphorus (P): 1900 860 mg/kg
Potassium (as K_2O): 0.63 0.28 % **Maturity Indicator: Cucumber Bioassay**
Potassium (K): 5200 2300 mg/kg Compost:Vermiculite(v:v) 1:1 1:3
Calcium (Ca): 3.8 1.7 % Emergence (%) 100 100
Magnesium (Mg): 1.1 0.49 % Seedling Vigor (%) 88 90
Sulfate (SO_4-S): 26 11 mg/kg *Description of Plants healthy healthy*
Boron (Total B): 32 14 mg/kg
Moisture: 0 55.8 %
Sodium (Na): 0.033 0.015 % **Pathogens** Results Units Rating
Chloride (Cl): 0.059 0.026 % Fecal Coliform 550 MPN/g *pass*
pH Value: NA 7.89 unit Salmonella < 3 MPN/4g *pass*
Bulk Density : 18 41 lb/cu ft Date Tested: 10 Oct. 13
Carbonates ($CaCO_3$): 160 72 lb/ton
Conductivity (EC5): 1.9 NA mmhos/cm
Organic Matter: 56.4 24.9 % **Inerts** % by weight
Organic Carbon: 32.0 14.0 % Plastic < 0.5
Ash: 43.6 19.3 % Glass < 0.5
C/N Ratio 18 18 ratio Metal < 0.5
AgIndex > 10 > 10 ratio Sharps ND
Metals Dry wt. EPA Limit units **Size & Volume Distribution**
Aluminum (Al) 2300 - mg/kg MM % by weight % by volume BD g/cc
Arsenic (As): 3.1 41 mg/kg > 50 0.0 0.0 0.00
Cadmium (Cd): < 1.0 39 mg/kg 25 to 50 0.0 0.0 0.00
Chromium (Cr): 20 1200 mg/kg 16 to 25 0.7 1.0 0.28
Cobalt (Co) 1.8 - mg/kg 9.5 to 16 3.2 3.6 0.37
Copper (Cu): 36 1500 mg/kg 6.3 to 9.5 9.3 11.7 0.34
Iron (Fe): 5400 - mg/kg 4.0 to 6.3 13.6 15.0 0.39
Lead (Pb): 21 300 mg/kg 2.0 to 4.0 17.9 19.3 0.40
Manganese (Mn): 300 - mg/kg < 2.0 55.2 49.3 0.48
Mercury (Hg): < 1.0 17 mg/kg Bulk Density Description:<.35 Light Materials,
Molybdenum (Mo): 1.2 75 mg/kg .35-.60 medium weight materials, >.60 Heavy Materials
Nickel (Ni): 7.2 420 mg/kg Analyst: Assaf Sadeh
Selenium (Se): < 1.0 36 mg/kg
Zinc (Zn): 83 2800 mg/kg
*Sample was received and handled in accordance with TMECC procedures.
October 29, 2013
Account No.: Date Received 10 Oct. 13

3100340 - 3/3 - 8079 Sample i.d.
Group: Sample I.d. No. 3/3 3100340
INTERPRETATION: Page one of three

Is Your Compost Stable?

Respiration Rate Biodegradation Rate of Your Pile
3.2 mg CO2-C/
g OM/day
Biologically Available Carbon (BAC) Optimum Degradation Rate
4.4 mg CO2-C/
g OM/day

Is Your Compost Mature?

NA Ratio
Ammonia N ppm
22 mg/kg
dry wt.
Nitrate N ppm
14 mg/kg
dry wt.
pH value
7.89 units
Cucumber Emergence
100.0 percent

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt.
Salmonella
Less than 3 /4g dry wt.
Metals US EPA 503
Pass dry wt.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
3.0 Percent
dry wt.
AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
15 Ratio
Plant Available Nitrogen (PAN) Estimated release for first season
3 lbs/ton
wet wt.
C/N Ratio
18 Ratio
Soluble Available Nutrients & Salts (EC5 w/w dw)
1.9 mmhos/cm
dry wt.
Lime Content (CaCO3)
160 Lbs/ton
dry wt.

What are the physical properties of your compost?

Percent Ash
43.6 Percent ++++++++++++++++++++++++++++++++++
dry wt.
Sieve Size % > 6.3 MM (0.25")
13.2 Percent
dry wt.
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch
AmmoniaN/NitrateN ratio
Ratio does not apply due to low concentrations of both Ammonia N and Nitrate N.
P3CM
++++++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch
++++++++++++++++
VeryMature>|< Mature >|< Immature
++
VeryMature>|< Mature >|< Immature
++++++++++
< Immature >|< Mature
++
< Immature >|< Mature >|< Immature
++

< Immature >|< Mature
+++++++
< Safe >|< High Fecal Coliform
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)
+++++++++
<All Metals Pass >|< One or more Metals Fail
++++++++++++++++++++++++++++++++
++++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content
++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider
< Low >|< Average >|< High Lime Content (as CaCO3)
< High Organic Matter >|< Average >|< High Ash Content
++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider
Oct.13 B No. 22
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand
++++++++++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients
++
++++++++++++
Account No.: Date Received
3100340 - 3/3 - 8079 Sample i.d.
Group: Sample I.d. No. 3/3 3100340

INTERPRETATION:

Is Your Compost Stable? Page two of three

Respiration Rate

3.2 Low: Good for all uses mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

4.4 Moderate-selected use mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

NA NA (Ratio does not apply due to low concentrations of both Ammonia N and Nitrate N.)

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This

Ammonia N ppm step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting

22 very mature in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic

Nitrate N ppm ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low

14 immature ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions.

pH value For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content

7.89 mature can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.0 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

P3CM

10 Oct. 13

Oct.13 B No. 22

Account No.: Date Received

3100340 - 3/3 - 8079 Sample i.d.

Group: Sample I.d. No. 3/3 3100340

INTERPRETATION: Page three of three

AgIndex (Nutrients/Na+Cl)

15 High nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

3 Low N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to offset the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

18 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

1.9 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

160 High lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

43.6 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

13.2 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter

mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Estimated available nutrients for use when calculating application rates

Plant Available Nitrogen (PAN) calculations: lbs/ton (As Rcvd.)

PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))

X value = If BAC < 2 then X = 0.1 Plant Available Nitrogen (PAN) 3.3

If BAC =2.1 to 5 then X = 0.2 Ammonia (NH4-N) 0.02

If BAC =5.1 to 10 then X = 0.3 Nitrate (NO3-N) 0.01

If BAC > 10 then X = 0.4 Available Phosphorus (P2O5*0.64) 2.5

Note: If C/N ratio > 15 additional N should be applied. Available Potassium (K2O) 5.5

10 Oct. 13

P3CM

Oct.13 B No. 22

TEL: 831-724-5422

FAX: 831-724-3188

www.compostlab.com

Account #: 3100340-3/3-8079

Group: Oct.13 B #22

Reporting Date:

Carver County Environmental Services

600 East 4th Street

Attn: Sarah Braman

Date Received: 10 Oct. 13

Sample Identification:

Sample ID #: 3100340 - 3/3

Sample Sampling Total

Identification Date E. Coli

P3CM 09 Oct. 13 Less than 2.0 MPN/g

Analyst: Assaf Sadeh

October 29, 2013

Method of Analysis: SM 9221 B & F

P3CM

Chaska, MN 55318

Bateriological Examination of Material for Escherichia Coliform

TEL: 831-724-5422

FAX: 831-724-3188

www.compostlab.com

Account #: 3100340-3/3-8079

Group: Oct.13 B #22

Reporting Date:

Carver County Environmental Services

600 East 4th Street

Attn: Sarah Braman

Date Received: 10 Oct. 13

Sample Identification:

Sample ID #: 3100340 - 3/3

Sample Sampling Total

Identification Date Coliform

P3CM 09 Oct. 13 Greater than 1700 MPN/g

Analyst: Assaf Sadeh

October 29, 2013

Chaska, MN 55318

P3CM

Bateriological Examination of Material for Total Coliform

Method of Analysis: SM 9221 B

M. 4.17.2014 TMECC Report: Finished Total Compost

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com
Account #: 4040519-1/2-4850
Group: Apr.14 C #22
Reporting Date:
Specialized Environmental Technologies, Inc.
6321 Bury Drive, Suite 13
Eden Prairie, MN 55346
Attn: Rob Friend
Date Received: 17 Apr. 14
Sample Identification: #397 Arboretum
Sample ID #: 4040519 - 1/2
Nutrients Dry wt. As Rcvd. units **Stability Indicator:** Biologically
Total Nitrogen: 1.3 0.66 % **CO2 Evolution** Respirometery Available C
Ammonia (NH_4-N): 300 150 mg/kg mg CO_2-C/g OM/day 1.8 1.8
Nitrate (NO_3-N): 86 43 mg/kg mg CO_2-C/g TS/day 0.73 0.74
Org. Nitrogen (Org.-N): 1.3 0.65 % *Stability Rating very stable very stable*
Phosphorus (as P_2O_5): 0.52 0.26 %
Phosphorus (P): 2300 1100 mg/kg
Potassium (as K_2O): 0.85 0.42 % **Maturity Indicator: Cucumber Bioassay**
Potassium (K): 7000 3500 mg/kg Compost:Vermiculite(v:v) 1:1 1:3
Calcium (Ca): 7.2 3.6 % Emergence (%) 100 100
Magnesium (Mg): 2.9 1.5 % Seedling Vigor (%) 100 100
Sulfate (SO_4-S): 84 42 mg/kg *Description of Plants healthy healthy*
Boron (Total B): 35 17 mg/kg
Moisture: 0 49.9 %
Sodium (Na): 0.096 0.048 % **Pathogens** Results Units Rating
Chloride (Cl): 0.16 0.078 % Fecal Coliform 1.9 MPN/g *pass*
pH Value: NA 8.10 unit Salmonella < 3 MPN/4g *pass*
Bulk Density : 27 54 lb/cu ft Date Tested: 17 Apr. 14
Carbonates ($CaCO_3$): 530 260 lb/ton
Conductivity (EC5): 2.6 NA mmhos/cm
Organic Matter: 41.4 20.7 % **Inerts** % by weight
Organic Carbon: 20.0 10.0 % Plastic < 0.5
Ash: 58.6 29.3 % Glass < 0.5
C/N Ratio 15 15 ratio Metal < 0.5
AgIndex > 10 > 10 ratio Sharps ND
Metals Dry wt. EPA Limit units **Size & Volume Distribution**
Aluminum (Al) 2500 - mg/kg MM % by weight % by volume BD g/cc
Arsenic (As): 5.2 41 mg/kg > 50 0.0 0.0 0.00
Cadmium (Cd): < 1.0 39 mg/kg 25 to 50 0.0 0.0 0.00
Chromium (Cr): 26 1200 mg/kg 16 to 25 0.0 0.0 0.00
Cobalt (Co) 3.5 - mg/kg 9.5 to 16 2.3 1.7 0.89
Copper (Cu): 66 1500 mg/kg 6.3 to 9.5 7.6 6.8 0.73
Iron (Fe): 7100 - mg/kg 4.0 to 6.3 18.0 17.1 0.69
Lead (Pb): 20 300 mg/kg 2.0 to 4.0 17.2 17.9 0.63
Manganese (Mn): 830 - mg/kg < 2.0 54.9 56.4 0.64
Mercury (Hg): < 1.0 17 mg/kg Bulk Density Description:<.35 Light Materials,
Molybdenum (Mo): 1.2 75 mg/kg .35-.60 medium weight materials, >.60 Heavy Materials
Nickel (Ni): 15 420 mg/kg Analyst: Assaf Sadeh
Selenium (Se): < 1.0 36 mg/kg
Zinc (Zn): 110 2800 mg/kg
*Sample was received and handled in accordance with TMECC procedures.
May 1, 2014
Account No.: Date Received 17 Apr. 14

4040519 - 1/2 - 4850 Sample i.d.
Group: Sample I.d. No. 1/2 4040519
INTERPRETATION: Page one of three
Is Your Compost Stable?
Respiration Rate Biodegradation Rate of Your Pile
1.8 mg CO2-C/
g OM/day
Biologically Available Carbon (BAC) Optimum Degradation Rate
1.8 mg CO2-C/
g OM/day
Is Your Compost Mature?
3.5 Ratio
Ammonia N ppm
300 mg/kg
dry wt.
Nitrate N ppm
86 mg/kg
dry wt.
pH value
8.10 units
Cucumber Emergence
100.0 percent
Is Your Compost Safe Regarding Health?
Fecal Coliform
< 1000 MPN/g dry wt.
Salmonella
Less than 3 /4g dry wt.
Metals US EPA 503
Pass dry wt.
Does Your Compost Provide Nutrients or Organic Matter?
Nutrients (N+P2O5+K2O)
2.7 Percent
dry wt.
AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
10 Ratio
Plant Available Nitrogen (PAN) Estimated release for first season
6 lbs/ton
wet wt.
C/N Ratio
15 Ratio
Soluble Available Nutrients & Salts (EC5 w/w dw)
2.6 mmhos/cm
dry wt.
Lime Content (CaCO3)
530 Lbs/ton
dry wt.
What are the physical properties of your compost?
Percent Ash
58.6 Percent ++
dry wt.
Sieve Size % > 6.3 MM (0.25")
9.9 Percent
dry wt.
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch
AmmoniaN/NitrateN ratio
++
#397 Arboretum
+++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch
+++++++
VeryMature>|< Mature >|< Immature
++++++++++++++++++++++++++++++++
VeryMature>|< Mature >|< Immature
++
< Immature >|< Mature
++
< Immature >|< Mature >|< Immature
++

< Immature >|< Mature
+++++++
< Safe >|< High Fecal Coliform
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)
+++++++++
<All Metals Pass >|< One or more Metals Fail
++++++++++++++++++++++++++++
++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content
++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider
< Low >|< Average >|< High Lime Content (as CaCO3)
< High Organic Matter >|< Average >|< High Ash Content
++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider
Apr.14 C No. 22
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand
++++++++++++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients
++
++++++++++++++++++++
Account No.: Date Received
4040519 - 1/2 - 4850 Sample i.d.
Group: Sample I.d. No. 1/2 4040519

INTERPRETATION:

Is Your Compost Stable? Page two of three

Respiration Rate

1.8 Low: Good for all uses mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

1.8 Low: Good for all uses mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

3.5 immature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This

Ammonia N ppm step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting

300 mature in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic

Nitrate N ppm ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low

86 mature ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions.

pH value For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content

8.10 mature can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

2.7 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

#397 Arboretum

17 Apr. 14

Apr.14 C No. 22

Account No.: Date Received

4040519 - 1/2 - 4850 Sample i.d.

Group: Sample I.d. No. 1/2 4040519

INTERPRETATION: Page three of three

AgIndex (Nutrients/Na+Cl)

10 High nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

6 Average N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to offset

the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation

because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

15 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

2.6 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades,

volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

530 High lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

58.6 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

9.9 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter

mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Estimated available nutrients for use when calculating application rates

Plant Available Nitrogen (PAN) calculations: lbs/ton (As Rec'd)

PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))

X value = If BAC < 2 then X = 0.1 Plant Available Nitrogen (PAN) 5.5

If BAC =2.1 to 5 then X = 0.2 Ammonia (NH4-N) 0.30

If BAC =5.1 to 10 then X = 0.3 Nitrate (NO3-N) 0.09

If BAC > 10 then X = 0.4 Available Phosphorus (P_2O_5*0.64) 3.2

Note: If C/N ratio > 15 additional N should be applied. Available Potassium (K_2O) 8.4

17 Apr. 14

#397 Arboretum

Apr.14 C No. 22