

Tools of the Trade

USCC January 29th, 2013

Jeff Gage,

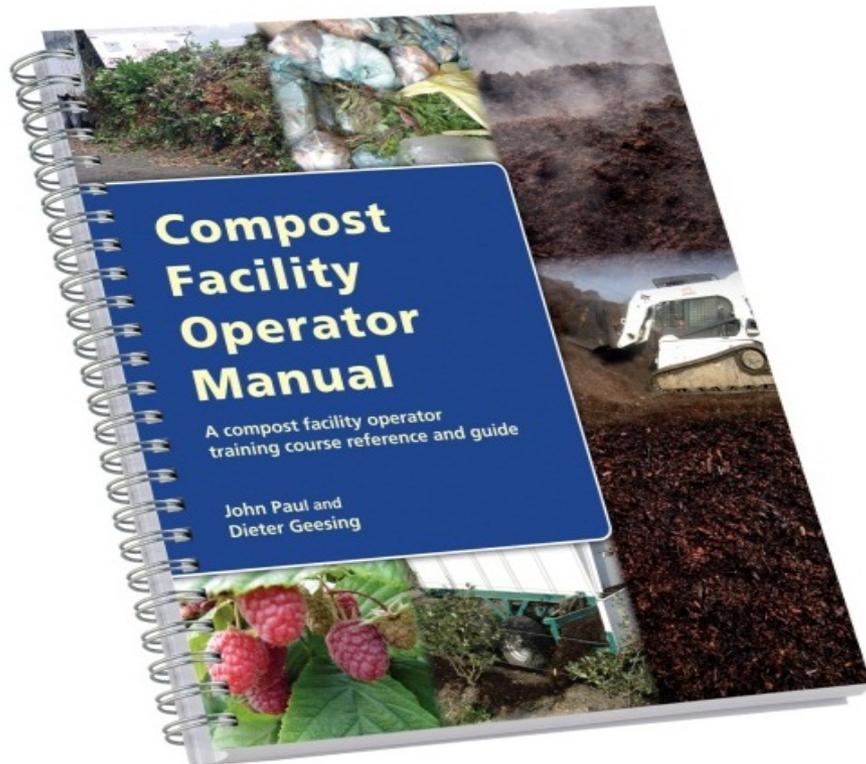
Green Mountain Technologies

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Compost Manuals



 Cooperative Extension

NRAES-54

On-Farm Composting Handbook

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Compost Mixture Calculators

Mix Identifier

Date

Material

Mix	Moisture	Solids	Total	Total	C:N	Bulk
parts	Content	Content	N	C		Density
yards	%	%	%	%		lb/cu yd

chkyrd

1.0 66 34 1.37 35 25 1800

chkbed

1.0 56 45 2.19 27 12 836

food

1.0 79 22 1.41 31 22 973

weeds

2.0 71 29 1.38 17 12 400

bulk

6.0 50 50 0.08 44 50 600

extra water to add, gallons

0

extra water to add, lbs

0

Mix Carbon %

38

Target

Mix Nitrogen %

0.75

Range

Mix C:N

50

20-40:1

Mix moisture

60

40-65%

[http://composting
technology.com/
resources/compost-
calculator-tool/](http://compostingtechnology.com/resources/compost-calculator-tool/)

Moisture Tester



Oxygen/gas analyzers



Amp clamps, Hot wire Anemometer



Pressure gauges and pitot tubes



Temperature probes and loggers



Web Controller Windows Internet Explorer

ECS **COMPTROLLER™**
Composting Data Acquisition and Control System

City of Compton

Current Status Manual

Zone	Status	Damper	Avg Top	Avg Bottom	Regime	Age (days)
Zone 1	RUNNING	POSITIVE	119°F	117°F	3	33.9
Zone 2	Stopped	CLOSED	75°F	76°F		
Zone 3	RUNNING	POSITIVE	146°F	133°F	3	26.1
Zone 4	Stopped	CLOSED	75°F	77°F		
Zone 5	RUNNING	NEGATIVE	141°F	146°F	2	12.0
Zone 6	RUNNING	NEGATIVE	104°F	93°F	1	-0.0
Zone 7	RUNNING	NEGATIVE	161°F	161°F	2	5.8

Zone Zone 1 is RUNNING

Batch Name: 2010-E20-Z4
Batch Start Date: 10-06-2010 17:12
Logged Days: 33.8 Cur
Regime Days: 18.3 Dar
PFRP Days: 3.8
VAR Days: 17.7 Aerato

Front Temp - Top: 123°F Back
Front Temp - Bottom: 125°F Back Te

mp: 81°F
per: 20%
p 1: 62°F
p 2: 68°F

Supply Fan

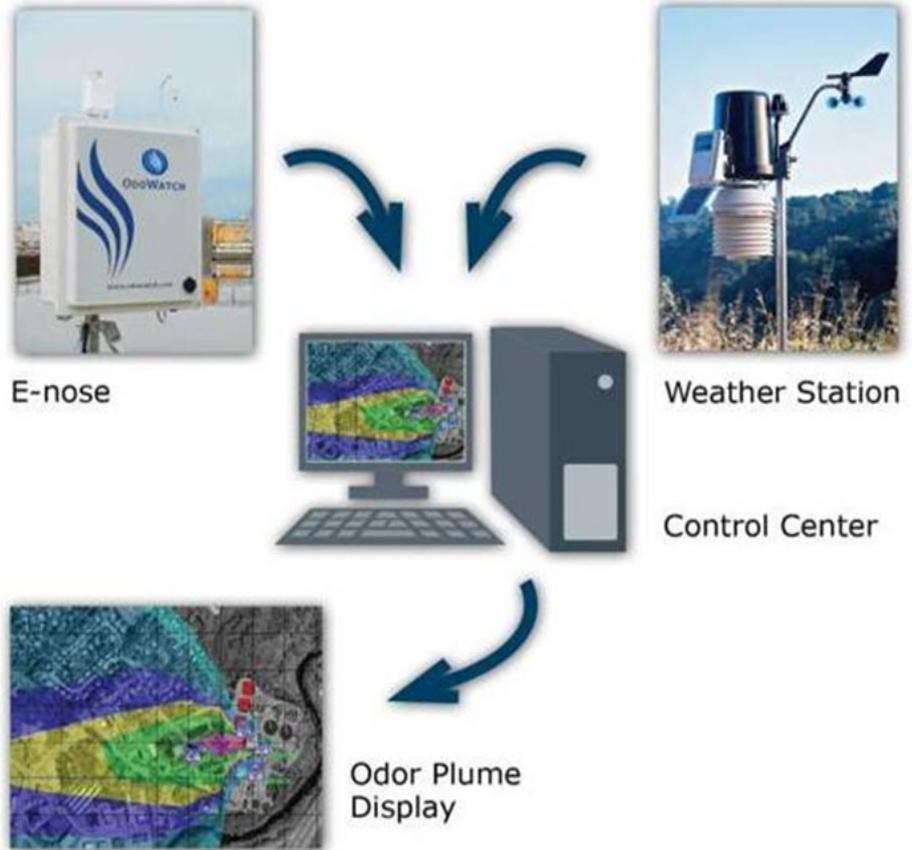
WATCH
Designed to work with ECS2000 Composting Equipment

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Temperature graph showing a line fluctuating between approximately 60°F and 80°F over time.



Odor Sensors and Monitoring



NASAL RANGER[®]
field olfactometer

pH monitoring, Sulfide testing



Stability test kits



Solvita® Compost

Stable compost...
low CO₂ rate and no
free ammonia

Click for more info >

CO₂ % / 4hr

1
2
3
4
5
6
7
8

mg NH₃-N/test

5
4
3
2
1

The image shows a Solvita Compost Respiration Test kit. It consists of a clear plastic jar with a white lid, containing a white plastic insert and dark brown compost. To the left of the jar is a vertical color scale for CO₂ % / 4hr, ranging from 1 (yellow) to 8 (purple). To the right is another vertical color scale for mg NH₃-N/test, ranging from 5 (yellow) to 1 (blue). The text indicates that the kit is used to test for stable compost, characterized by a low CO₂ rate and no free ammonia. A link to more information is provided.



Temperature depth

- Hotter outer layer and cooler core temps indicate low oxygen



Oxygen Site Testing CIWMB



- Confined space meters can be found at www.raesystems.com
- ReoTemp ProbeGuard and compost dial thermometer
- Compressor moisture desiccant pack
- Vinyl tubing and connectors

QRAE Plus Confined Space Air Monitors

Hand Squeeze Test for Moisture Estimation



Procedures for Hand-squeeze Quick Test

- Reach into the pile (bucket) and grab a handful of composting material.
- Squeeze the material firmly, observing your fist.
- Release your grip and allow the material to stay in your hand.
- Inspect the material and your hand.
- Use the “Rules of thumb” to estimate % moisture.
- Record your observations and your own % moisture estimate.

Interpretation of moisture Observations

% Moisture (estimation)

- Dusty; draws moisture from hand 42% or less
- Crumbly; doesn't stick together; hand dry 42% - 47%
- Tacky; smears a little on hand 47% - 52%
- Moist; smears a lot on hand; no wet sheen 52% - 58%
- Sticks together; hand is moist, "glistens" 58% - 63%
- Water drops (1-2) when squeezed 63% - 68%
- Multiple drops (3 or more) 68% - 73%
- Stream of water or pudding texture >73%

Note: These ranges work for fine texture materials, when compost texture is coarse increase moisture estimates by 10%

Bucket test for Bulk Density

- **Bulk density**
- The procedures for measuring pile bulk density simulate the compaction of materials one would expect under normal composting operations. Dropping the bucket 10 times helps keep the measuring process uniform.
- Weigh empty bucket. Record weight.
- Fill bucket 1/3 full with material (compost or feedstock)
- Raise bucket 6" above firm surface and let it drop 10 times.
- Fill bucket with an additional 1/3 of material.
- Raise bucket 6" above surface and let it drop 10 times.
- Fill bucket level to the brim and repeat dropping sequence.
- Top off the bucket w/ material level to the brim. Do not drop.
- Weigh the bucket with material.
- Record weight & complete calculations on the data collection sheet.

Bucket test for Free Air Space

- **Free Air Space**
- Use the same bucket and materials from the bulk density test to complete the free air space test.
- This test uses water to approximate the amount of voids (free air space) in a bucket full of compost materials.
- Place the bucket with material on level ground.
- Fill the bucket with water completely without overflowing.
- Weigh the filled bucket. Use caution – the bucket will be heavy!
- Record weight and complete calculations on the data collection sheet.

Customized Compost Field Monitoring Test Kits

GREEN MOUNTAIN TECHNOLOGIES

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