



Summit for Recycling & Rocky Mountain Composting Symposium

Compost Operations & Seal of Testing Assurance
BOB YOST & SHAWN BRUCKMAN



August 23 - 24, 2022 Aurora, Colorado





- Municipal
- Private
- PPP – Public Private Partnership



Green Waste Recycling



Longmont Green Waste Site

- CDPHE Solid Waste Regs, Section 8, Recycling, Municipal own and operated with private contractor services
 - Private grinding and removal services
- Receives Limbs, logs, clean wood, and seasonal leaves
 - Residential and Commercial Organics Recycling
- Mass balance requirements
- Operational costs provide by municipal & commercial recycling fees
- Opportunities & Challenges



Loveland Green Waste Site

- CDPHE Solid Waste Regs, Section 8, Recycling, Municipal own and operated with private contractor services
 - Private Grinding and Removal Services
- Receives Limbs, logs, clean wood, grass, sod, and leaves
 - Residential and Commercial Organics Recycling
- Citizens access for processed organics (mulch)
- Mass balance requirements
- Operational costs provide by municipal & commercial recycling fees
- Opportunities & Challenges

A1 Organics Mountain States

- CDPHE Solid Waste Regs, Section 8, Recycling, Private
- Receives Limbs, logs, clean wood, grass leaves
- Mass balance required
- Revenues from Organic Recycling Fees & Retail & Wholesale Sales
- Opportunities & Challenges





Rooney Road Green Waste Site

PPP – Public Private Partnership between Rooney Road Recycling Authority & A1 Organics

- Rooney Road Recycling Authority inter-governmental agreement between (Lakewood, Arvada, Golden, Jefferson County)
- CDPHE Solid Waste Regs, Section 8, Recycling
- A1 Organics provided all operational & accounting requirements
- Receives Limbs, logs, clean wood, grass, sod, and leaves
 - Residential and Commercial Organics Recycling
- Included Revenue Sharing Agreement between A1 & RRRA

COMPOST METHODS

Windrows

Aerated Static Pile (ASP)

Covered Aerated Static Pile
(CASP)

Modified Aerated Static Pile
(MASP)

Mass Bed

In Vessel

Vermicompost



CONSIDERATION S

- Cost
- Space
- Feedstocks
- Volume
- Process Control
- Retention Time
- Climate

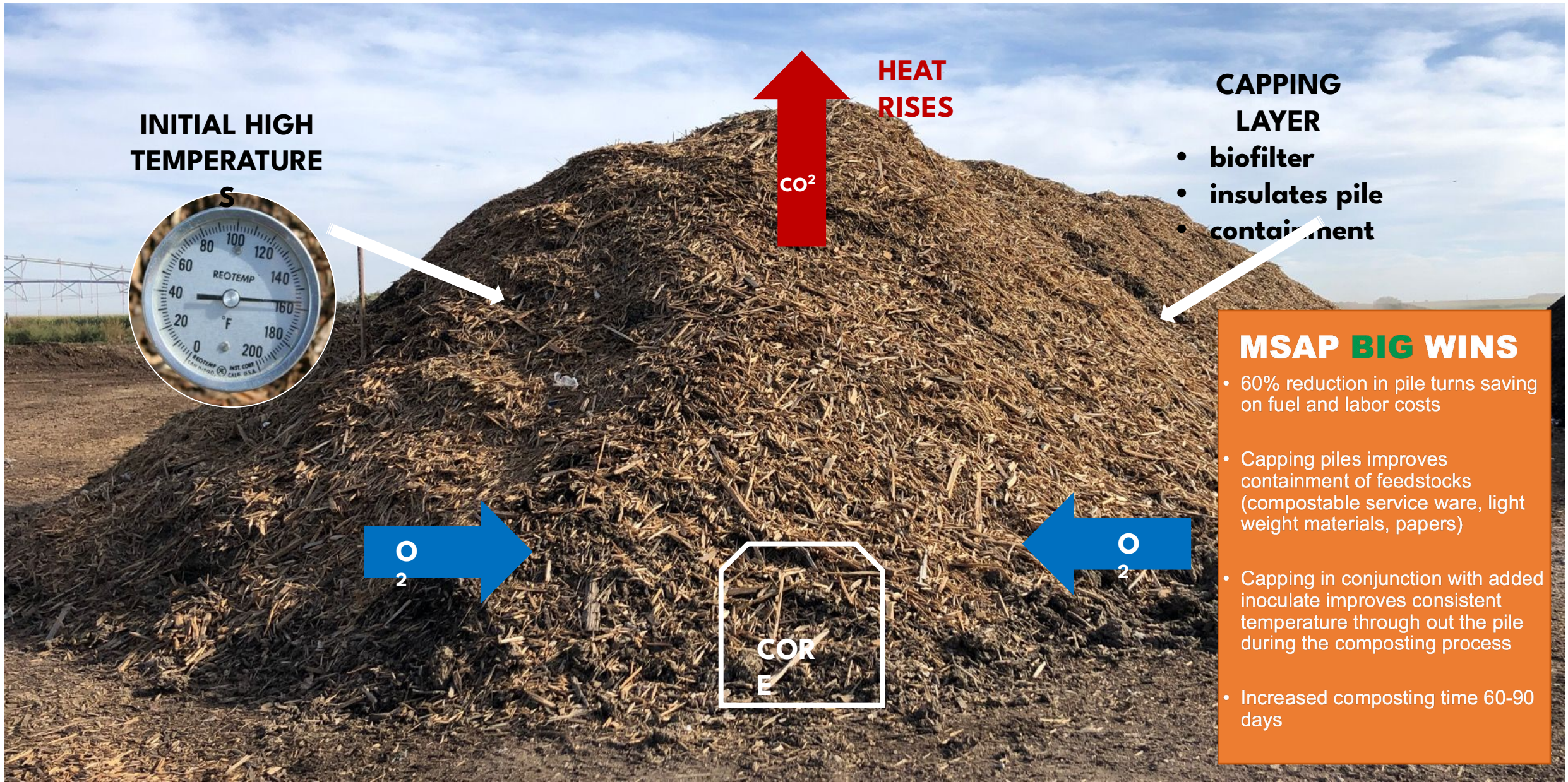




WINDROWS



AERATED STATIC PILES



INITIAL HIGH TEMPERATURE



HEAT RISES

CO²

CAPPING LAYER

- **biofilter**
- **insulates pile**
- **containment**

MSAP BIG WINS

- 60% reduction in pile turns saving on fuel and labor costs
- Capping piles improves containment of feedstocks (compostable service ware, light weight materials, papers)
- Capping in conjunction with added inoculate improves consistent temperature through out the pile during the composting process
- Increased composting time 60-90 days

O₂

O₂

CORE

MSAP – MODIFIED STATIC AEROBIC PILE



COVERED AERATED STATIC PILES

Covered Aerated Static Pile (CASP)

SG Heap™ System using GORE® Cover



- 50ft to 164ft Lengths
- 100 to 500 tons per Heap
- Asphalt or Concrete Surface
- Separate Leachate Collection
- \$80-\$100/ton Capital costs
- \$4-\$10/ton OPEX



Sustainable Generation Copyright 2018

SG Bunker™ System using GORE® Cover



- 50ft to 164ft Lengths
- 100 to 600 tons per Heap
- Asphalt or Concrete Surface w/Side Walls
- Complete Separate Leachate Collection
- \$80-\$100/ton Capital costs
- \$4-\$10/ton OPEX



Sustainable Generation Copyright 2018



IN VESSEL

Mass Bed





VERMICOMPOST

EQUIPMENT

- Loaders
- Grinders
- Turners
- Water
- Screens
- Vacuums
- Baggers





Loaders



Grinders



Turners



Water



Screens



Vacuums



Baggers

Composting Regulations Structure

14.1 - Scope and Applicability (contains our exemptions)

14.2 - Class I

14.3 - Class II

14.4 - Class III

14.5 - Pilot Projects

14.6 Compost Testing



PRODUCT QUALITY

Compost quality is judged in relation to its use and purchaser

DETERMINED BY:

- Market research
- Product research
- Surveys
- Similar/substitute products



PFRP – Process for further reduction of pathogens.

Class A - Alternative 5

Either the density of fecal coliform in the biosolids shall be less than 1000 Most Probable Number per gram of total solids (dry weight basis) or the density of Salmonella, sp. bacteria in the biosolids shall be less than three Most Probable Number per four grams of total solids (dry weight basis) at the time the biosolids are used or distributed; or at the time the final product material derived from biosolids is prepared to meet the requirements in section 64.14 of these regulations, and

(b) Biosolids that are used or distributed shall be treated in one of the Processes to Further Reduce Pathogens described as follows:

(i) Composting - Using either the within-vessel composting method or the static aerated pile composting method, the temperature of the biosolids compost is maintained at 55 degrees Celsius or higher for three days. Using the windrow composting method, the temperature of the biosolids compost is maintained at 55 degrees or higher for 15 days or longer. During the period when the compost is maintained at 55 degrees or higher, there shall be a minimum of five turnings of the windrow.

Class A - Alternative 4

The density of enteric viruses in the biosolids shall be less than one Plaque-forming Unit per four grams of total solids (dry weight basis) at the time the biosolids are used or distributed; or at the time the final product material derived from biosolids is prepared to meet the requirements in section 64.14 of these regulations, and

(ii) the density of viable helminth ova in the biosolids shall be less than one per four grams of total solids (dry weight basis) at the time the biosolids are used or distributed; or at the time the final product material derived from biosolids is prepared to meet the requirements in section 64.14 of these regulations.

TABLE 1
Maximum Constituent Concentration For Compost
Sold Or Distributed For Off-site Use
(mg/kg dry weight basis)

CONSTITUENTS	MAXIMUM LEVEL
INORGANICS¹ (mg/kg)	
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2800
BIOLOGICAL	
Fecal coliform	see 14.6 (D)
Salmonella	see 14.6 (D)

STA CERTIFIED COMPOST



COMPOST

Quality is in the eye of the consumer: Compost use and selection decisions consider many factors, and therefore are not one-size-fits-all. The Seal of Testing Assurance (STA) Program helps you make the best decision for your application by providing the 3 C's:

Clarity

Similar to a nutrition label, the STA Program's Compost Technical Data Sheet (CTDS) includes test results, a list of ingredients, and recommended directions for use.

Consistency

The STA Program provides checks and balances within the STA Lab and Participant network to ensure proficiency and consistency with testing procedures and compliance, providing apples to apples comparisons of compost properties.

Confidence

Similar to trusting a vehicle history report when purchasing a vehicle, the STA's CTDS report provides consumers with confidence and knowledge of what is in the compost and how it was produced.



US COMPOSTING COUNCIL

Seal of Testing Assurance

A-1 Organics - Colorado
Tanner Phelps
16350 WCR 76
Eaton, CO 80615

Product Identification
RR007 121319FW ECOGR0

Date Sampled/Received: 08 Apr. 20/08 Apr. 20

COMPOST TECHNICAL DATA SHEET

Compost Parameters	Reported as (unit of measure)	Test Results	Test Results
Plant Nutrients	% wet weight basis	Not reported	Not reported
Moisture Content	% wet weight basis	31.8	
Organic Matter Content	% dry weight basis	26.6	
pH	none	7.29	
Soluble Salts	dl/m (meq/liter)	5.1	
Particle Size or Sieve Size	percent aggregate size, inches	0.08	
Stability Indicator (respiration)			Stability Rating
CO ₂ Evolution	mg CO ₂ -C/g OM/day	0.0	stable
	mg CO ₂ -C/g TS/day	0.08	
Moisture Indicator (Passport)	average % of water	55.3	
Relative Seedling Vigor	average % of control	104.0	
Selected Pathogens	FASS-FAL, per US EPA Method 40 CFR 140.130	Pass	Final outcome
Trace Metals	FASS-FAL, per US EPA Method 40 CFR 140.11, Table 1 and 2	Pass	Substance

Participants in the US Composting Council's Seal of Testing Assurance Program declare the veracity of the information on their compost products on a prescribed basis and provide a means to better serve the needs of their compost customers.

Laboratory Group: AgCIB
Analyst: Assaf Sadeh



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COMPOST TECHNICAL DATA SHEET

Compost Parameters	Reported as (unit of measure)	Test Results	Test Results
Plant Nutrients	% wet weight basis	Not reported	Not reported
Moisture	31.8	31.8	
Organic Matter	26.6	26.6	
Phosphorus	0.00	0.00	
Potassium	0.00	0.00	
Calcium	0.00	0.00	
Magnesium	0.00	0.00	
Organic Carbon	26.6	26.6	
pH	7.29	7.29	
Soluble Salts	5.1	5.1	
Particle Size or Sieve Size	0.08	0.08	
Stability Indicator (respiration)			Stability Rating
CO ₂ Evolution	mg CO ₂ -C/g OM/day	0.0	stable
	mg CO ₂ -C/g TS/day	0.08	
Moisture Indicator (Passport)	average % of water	55.3	
Relative Seedling Vigor	average % of control	104.0	
Selected Pathogens	FASS-FAL, per US EPA Method 40 CFR 140.130	Pass	Final outcome
Trace Metals	FASS-FAL, per US EPA Method 40 CFR 140.11, Table 1 and 2	Pass	Substance

Participants in the US Composting Council's Seal of Testing Assurance Program declare the veracity of the information on their compost products on a prescribed basis and provide the ability, along with compost and test information, to better serve the needs of their compost customers.

Laboratory Group: AgCIB
Analyst: Assaf Sadeh

ANALYTICAL CHEMISTS
FOR
MICROBIOLOGISTS
Approved by State of Colorado

SOIL CONTROL LAB

TEL: 831-724-5422
FAX: 831-724-3188
www.controllabs.com

Account #: 40190-1/1-2305
Group: Apr2008 #12
Reporting Date: April 22, 2020

A-1 Organics - Colorado
16350 WCR 76
Eaton, CO 80615
Attn: Tanner Phelps

Date Received: 08 Apr. 20
Sample Identification: RR007 121319FW ECOGR0
Sample ID #: 40190 - 1/1

Nutrients	Dry wt.	As Rec'd.	units	Stability Indicator:	Respirometry
Total Nitrogen	1.8	1.1	%	CO ₂ Evolution	3.8
Ammonia (NH ₃ -N)	110	78	mg/kg	mg CO ₂ -C/g OM/day	0.96
Nitrate (NO ₃ -N)	1100	740	mg/kg	mg CO ₂ -C/g TS/day	0.08
Org. Nitrogen (Org.-N)	1.5	1.0	%	Stability Rating	stable
Phosphorus (as P ₂ O ₅)	1.2	0.85	%		
Phosphorus (P)	6600	3700	mg/kg	Maturity Indicator: Cucumber Bioassay	
Potassium (as K ₂ O)	1.0	0.69	%	Compost/Vermiculite (v/v)	1.2
Potassium (K)	6400	5700	mg/kg	Emergence (%)	63
Calcium (Ca)	2.0	1.4	%	Seedling Vigor (%)	104
Magnesium (Mg)	0.27	0.18	%	Description of Plants	Healthy
Sulfate (SO ₄ -S)	200	140	mg/kg		
Boron (Total B)	18	12	mg/kg	Pathogens	Results
Moisture	0	31.8	%	Fecal Coliform	6.3 MPN/g
Sodium (Na)	0.26	0.18	%	Salmonella	< 3 MPN/g
Chloride (Cl)	0.28	0.19	%		pass
pH Value	NA	7.29	unit	Date Tested: 08 Apr. 20	
Bulk Density	33	48	lb/cu ft	Physical Contaminants**	% by dry wt
Carbonates (CaCO ₃)	18	12	lb/ton	Total Plastic	< 0.1
Conductivity (ECs)	5.1	NA	meq/cm ²	Film Plastic	< 0.1
Organic Matter	26.6	18.1	%	Glass	< 0.1
Organic Carbon	14.0	9.7	%	Metal	< 0.1
Ash	73.4	50.0	%	Sharps	ND
C/N Ratio	9.1	6.1	ratio	Total	< 0.5
AgIndex	7	7	ratio		
Metals	Dry wt.	EPA Limit	units	Size Distribution	
Aluminum (Al)	4600	-	mg/kg	MM	% by weight
Arsenic (As)	1.4	41	mg/kg	> 50	0.0
Cadmium (Cd)	< 1.0	39	mg/kg	25 to 50	0.0
Chromium (Cr)	19	-	mg/kg	16 to 25	0.0
Cobalt (Co)	1.4	-	mg/kg	9.5 to 16	0.0
Copper (Cu)	25	1500	mg/kg	6.3 to 9.5	1.3
Iron (Fe)	6500	-	mg/kg	4.0 to 6.3	4.1
Lead (Pb)	10	300	mg/kg	2.0 to 4.0	11.1
Manganese (Mn)	110	-	mg/kg	< 2.0	83.6
Mercury (Hg)	< 1.0	17	mg/kg		
Molybdenum (Mo)	1.3	75	mg/kg		
Nickel (Ni)	8.3	420	mg/kg		
Selenium (Se)	< 1.0	100	mg/kg		
Zinc (Zn)	71	2800	mg/kg		

*Sample was received and handled in accordance with TMECC procedures.

Analyst: Assaf Sadeh

WWW.A1ORGANICS.COM/ANALYTICS



US Composting Council

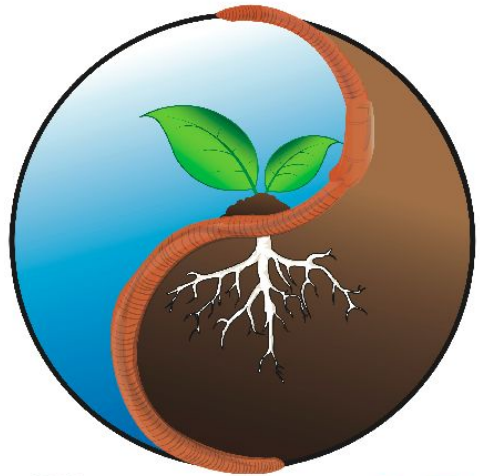
www.compostingcouncil.org



RESOURCES

- United States Composting Council (USCC)
 - Compost University
- Colorado Composting Council (COCC)
- Compost Research and Education Foundation (CREF)
- BioCycle Magazine
- Compost Manufacturers Alliance (CMA)





The GroundUp

Bob Yost – A1 Organics

Shawn Bruckman – The Ground Up

THANK YOU, QUESTIONS?