Composting of Residuals from a Strawboard Manufacturing Facility

by

Scott Douglas Chapman

A Thesis Submitted to the Faculty of Graduate Studies of
The University of Manitoba
in Partial Fulfillment of the Requirements of the Degree of

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THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

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ABSTRACT

Dow BioProducts Ltd. operates a strawboard manufacturing facility located near Elie, Manitoba that has an annual waste stream composed of approximately 6,000 wet tonnes (wt) of straw too wet to use in the process and 5,000 wt of fine process residuals (unders). Composting is a viable alternative for managing this waste stream although limited research has been completed on effectively composting a high carbon to nitrogen ratio material such as straw.

To determine optimal compost recipe formulation, Phase 1 of this study utilized bench-scale reactors to compost various recipes using straw, process unders, and a lagoon mixture (nitrogen amendment) as feedstock materials at different moisture levels for a nine-week period. It was concluded that water addition and the addition of unders to the compost mixture increased degradability, while the added nitrogen source of a lagoon mixture did little to enhance degradability.

Due to changes in the strawboard manufacturing facility's waste stream and the results obtained in Phase 1 of the study, Phase 2 focused solely on the straw feedstock and investigated the effects of straw particle size using four unshredded/shredded straw combinations (by volume): (1) all unshredded straw, (2) 2/3 unshredded straw, 1/3 shredded straw, (3) 1/3 unshredded straw, 2/3 shredded straw, and (4) all shredded straw. The recipes were composted in 140L rigid plastic containers for a period of 180 days at a moisture content of 70% (wet basis). The rate and degree of straw degradation was assessed by measurements of volume, volatile solids (VS), and lignocellulose fibre (lignin, cellulose, and hemicellulose). It was found that VS degradation was greatest for recipes containing both shredded and unshredded straw, with the recipe containing 2/3 shredded straw performing the best (35% VS removal). Pure unshredded and shredded

straw had VS reductions of 29% and 26%, respectively. Total volume reductions ranged from 80 to 90%. Hemicellulose was completely degraded for all recipes by day 95. By day 180 cellulose content had decreased from 3.75 g/g ash to 0.75 g/g ash for all four recipes. By day 180, lignin degradation was greatest for recipes containing both shredded and unshredded straw (reduction from 1.0 g/g ash to 0.4 g/g ash) while lignin content decreased from 1.0 g/g ash to 0.6 g/g ash for the other recipes. Based on the experimental results it was concluded that recipes containing a mixture of shredded and unshredded straw provided better composting conditions. These two recipes had both greater overall removals and greater removal rates of volatile solids, cellulose, and lignin.

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NOMENCLATURE AND ABBREVIATIONS

ADF	acid detergent fibre
APHA	American Public Health Association
ASTM	American Society for Testing and Materials
C:N	carbon to nitrogen ratio
C_U	coefficient of uniformity
d	depth
D_{10}	particle size such that 10% of particles are smaller than that size
D_{30}	particle size such that 30% of particles are smaller than that size
D_{60}	particle size such that 60% of particles are smaller than that size
FAS	free air space
FS	fixed solids
g	gravitational constant
MC	moisture content
N	nitrogen
NDF	neutral detergent fibre
OC	organic carbon
P_d	stress at depth, d
ρ_{wbd}	wet bulk density
TKN	total Kjeldahl nitrogen
TS	total solids
USCC	United States Composting Council
VS	volatile solids

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1.0 INTRODUCTION

Dow BioProducts Ltd. operates a manufacturing facility located near Elie, Manitoba that utilizes straw from the surrounding area to produce strawboard. Each year approximately 6,000 wet tonnes (wt) of straw become too wet for use as feedstock (i.e. >25% moisture content). To date there is approximately 60,000 wt of unusable straw stored at the facility in 1m x 1m x 2m rectangular bales. The manufacturing process also produces, on average, 5,000 wt/year of fine process residuals (unders). Together, the wet straw and unders represent a significant annual waste stream from the strawboard manufacturing facility.

Composting technology has the potential of addressing this waste stream and diverting organic material from a landfill to produce a valuable soil conditioner. However, the lignified fibre composition and high carbon content that makes straw an appropriate structural material for producing strawboard also attributes to the long composting times needed to degrade it. Limited research has been completed in composting a high carbon content material such as straw.

Therefore, to optimize the composting process, the selection of the correct feedstocks and feedstock proportions is critical. Potential compost recipes would include the two components of the plant's waste stream (straw and unders) and require the addition of water to enable an efficient composting process. As a nitrogen amendment, a lagoon mixture obtained from the James Valley Colony, a Hutterite village, was used in select compost recipes to potentially decrease the duration of the active composting period. James Valley Colony lies approximately six kilometres southwest of the strawboard manufacturing facility and uses a lagoon which stores manure from its livestock operations. This lagoon mixture is used as fertilizer for the Colony's crops but also has the possibility of becoming a nitrogen source for the composting of straw at the strawboard facility.

The rates and degree of degradation as well as volume reduction are of great importance for the design of a full-scale straw composting facility. However, the effects of particle size on the composting of a high carbon material such as straw have not been well documented and an assessment of how particle size impacts straw composting could result in potential cost savings with regards to straw shredding.

2.0 LITERATURE REVIEW

Straws vary greatly in their chemical composition according to variety and age. The approximate chemical composition of straw is 36% cellulose, 25% hemicellulose, and 18% lignin (Rykens, 1977). The remaining portions are composed of salts, insoluble ash (silica) and various other organic compounds. The rates and degree of straw degradation is therefore largely dependent upon the characteristics of the lignocellulosic structure of straw.

Cellulose is a long chain of glucose molecules. The simplicity of the cellulosic structure, using repeated identical bonds, means that only a small number of enzymes are required to degrade this material. Hemicelluloses are branched polymers of xylose, arabinose, galactose, mannose, and glucose. Hemicelluloses bind bundles of cellulose fibrils to form microfibrils, which enhance the stability of the cell wall. They also cross-link with lignin, creating a complex web of bonds which provide structural strength, but also challenge microbial degradation (Ladisch et al., 1983; Lynch, 1992). Lignin is a complex polymer of phenylpropane units, which are cross-linked to each other with a variety of chemical bonds. This complexity has impeded the understanding of its effects on microbial degradation. However, some organisms, particularly fungi, have developed the necessary enzymes to degrade lignin. Actinomycetes can also decompose lignin, but typically degrade less than 20 percent of the total lignin present (Crawford, 1986; Basaglia et al., 1992).

Because lignin is the most recalcitrant component of the plant cell wall, the higher the proportion of lignin the lower the bioavailability of the substrate. The effect of lignin on the bioavailability of outer cell wall components is thought to be largely a physical restriction with lignin molecules reducing the surface area available to enzymatic penetration and activity (Haug, 1993). Thus, the creation of composting conditions which favour the growth of fungi, including adequate moisture and temperature as well as an appropriate particle size to maintain a balance between available surface area for enzymatic activity and available oxygen to maintain suitable aerobic conditions, all appear to be important in encouraging decomposition and are essential for efficient straw composting. In addition, as straw is a high carbon material and slow to degrade, a nitrogen amendment is usually added to the composting process to reduce the carbon to nitrogen ratio and enhance the composting process.

Many researchers have observed the degradation of hemicellulose and cellulose in straw composting (Epstein, 1997; Eklind, 1998). However, the effects of particle size on the composting of a high carbon material such as straw have not been well documented.

3.0 OBJECTIVES

Although the rates and degree of degradation as well as volume reduction are of great importance for the design of a full-scale straw composting facility, an assessment of how particle size impacts straw composting could result in potential cost savings with regards to straw shredding during feedstock preparation. The specific research objectives of this two-phase experiment were to:

- Determine the optimal feedstock proportions for straw composting by adding water, process unders, and nitrogen to the compost recipe .
- Evaluate the effects of particle size on compost degradation and volume reduction.
- Monitor the rate of degradation (measured by VS reduction) and degree of degradation (measured by lignin, cellulose, and hemicellulose) over a typical Canadian Prairie summer composting period.

Phase 1 of the experiment attempted to ascertain optimal moisture levels in a purely straw-based composting recipe. Also, the addition of unders to the straw feedstock would not only utilize a by-product of the strawboard manufacturing process but investigate the potential benefits to reducing the average particle size of the compost matrix and increasing the surface area available for straw degradation. The addition of the lagoon mixture explored the potential benefits of adding a nitrogen source to a high-carbon material such as straw.

Upon completion of Phase 1 of the experiment, it was learned that the historic waste stream at the strawboard manufacturing facility (process unders and straw too wet for use in the manufacturing process) had been eliminated. Process unders were now being incorporated into the strawboard without any effects on the physical properties of the strawboard. Additionally, better management practices were initiated in the stack yard such as covering the straw stacks with tarpaulins and constructing raised gravel bases for the straw stacks which eliminated wet straw from the annual waste stream. Therefore, Phase 2 of the experiment focused solely on the wet straw stockpiled at the facility. Using the moisture content results for the straw-based composting recipes from Phase 1, Phase 2 of the experiment further investigated the effects of particle size on the degree and rate of degradation during straw composting.

4.0 MATERIALS AND METHODS

Phase 1 of the research was a preliminary investigation that employed small bench-scale compost reactors containing various recipes using three feedstock materials (straw, process unders, and lagoon mixture) at different moisture levels in an attempt to gain an understanding of composting effectiveness and to aid in the selection of several recipes that could be used for Phase 2 research. The recipe variations used formed the basis for comparing the impact of: (1) water addition; (2) unders addition; and (3) nitrogen addition in the form of a lagoon mixture.

Phase 2 was a more in-depth study focused solely on the straw feedstock utilizing four unshredded/shredded straw combinations (by volume): (1) all unshredded straw, (2) 2/3 unshredded straw, 1/3 shredded straw, (3) 1/3 unshredded straw, 2/3 shredded straw, and (4) all shredded straw. Process unders were not included in this phase of the experiment since process improvements at the strawboard manufacturing plant led to the elimination of the unders from the waste stream. Specific objectives for Phase 2 were to: (1) investigate the effects of particle size on compost degradation and volume reduction; and (2) monitor the rate of degradation (measured by VS reduction) and degree of degradation (measured by lignin, cellulose, and hemicellulose) over a typical Canadian Prairie summer composting period to estimate the ultimate degradability of straw compost.

4.1 Materials

The straw used in Phases 1 and 2 was obtained from the Dow BioProducts stack yard and is mainly AC Barrie wheat straw, a predominant variety of wheat farmed in the 50-80 km feedstock collection radius of the strawboard manufacturing facility. The stack yard was estimated as 75% AC Barrie wheat straw with the remainder composed of up to 15 other wheat straw varieties. The straw bales in the stack yard all had common dimensions of 1 m x 1 m x 2 m. Straw used for Phase 1 was sampled from 1998 stock on June 18, 2001. Five separate straw bales from the 1998 stock were sampled and three straw sub-samples (4-8 L each) were collected from each straw bale based upon a randomly selected position within each bale. The three straw sub-samples collected from each bale were then combined to form a composite sample. The straw was shredded using a 3 horse power Chipper/Shredder, (Crary Bearcat Model 530, West Fargo, North Dakota, USA) with a screen size of approximately 10 cm. Straw used for Phase 2 was sampled from 1997, 1998, 1999, and 2000 stock on April 10, 2002 from several locations in the stack yard. A total of eight straw bales (two from each year) were used to obtain representative straw samples following the method outlined for Phase 1 of the experiment with the exception that the sub-samples were approximately 30-50 L each. Portions of the Phase 2 straw samples collected from the stack yard were shredded using a 460 horsepower tub grinder (Haybuster Model H1100E, Jamestown, ND, 58401, USA) that is owned and operated by Dow BioProducts.

The process unders used for Phase 1 were obtained from the Dow BioProducts strawboard manufacturing facility. The unders are removed from the strawboard manufacturing process at the wet screens (0.3 x 0.2 mm slots) just before the dryers.

The lagoon mixture was obtained from James Valley Colony, a Hutterite farming colony. Colony farming operations include livestock such as diary cows (approximately 55 head), laying hens (approximately 14,000 head), and farrow-to-finish hogs (approximately 600 head). Manure from the chicken and hog barns flows by gravity to a collection pit and is then pumped to a two-cell lagoon from which 19,000 m^3 of the material is used annually as fertilizer on the Colony's fields.

4.2 Composting Set-Up

The bench-scale composting period for Phase 1 was nine weeks in duration. Seven different recipes were investigated in duplicate resulting in a total of 14 reactors. The recipe descriptions are shown in Table 4.1. Recipes 2A to 2E were based on the projected long-term waste generation at the strawboard manufacturing facility in 2001 (6,000 wet tonnes straw/year, 5,000 wet tonnes process unders/year). The various recipes were selected to answer three specific research questions for Phase 1. The questions and recipes are summarized in Table 4.2.

Table 4.1: Phase 1 Small Bench-scale Reactor Recipe Descriptions.

	Feedstock (% of wet weight)				
Reactor Recipe	**Straw**	**Unders**	**Lagoon Mixture**	**Water**	**Initial MC (%)**
1A	100	NA	NA	NA	57
1B	70	NA	NA	30	70
2A	55	45	NA	NA	40
2B	41	34	NA	25	55
2C	34	28	NA	38	62.5
2D	27	22	NA	51	70
2E	32	25	43	NA	62.5

Note: NA = not added

Table 4.2: Phase 1 Recipes Used for Comparisons

Research Questions	Recipes Used for Comparison
Impact of water addition	1A and 1B; 2A to 2D
Impact of under addition	1A and 2B; 1B and 2D
Impact of additional N source	2C and 2E

Plastic 3.8 litre pails were used as bench-scale compost reactors and placed in an environmental chamber (1.2 m x 1.0 m x 1.2 m) maintained at 55°C (Larsen and McCartney, 2000) as shown in Figure 4.1. The compost reactors were laid on the floor of the environmental chamber with the reactor lids fitted loosely on top to minimize moisture loss while still maintaining aerobic conditions. Open containers of water were also placed on the floor of the chamber to increase chamber humidity and minimize reactor moisture losses as shown in Figure 4.2. Reactors were mixed and readjusted to target moisture contents on 3-4 day intervals. Initial amounts of dry material in each reactor ranged from 80 – 150 grams.

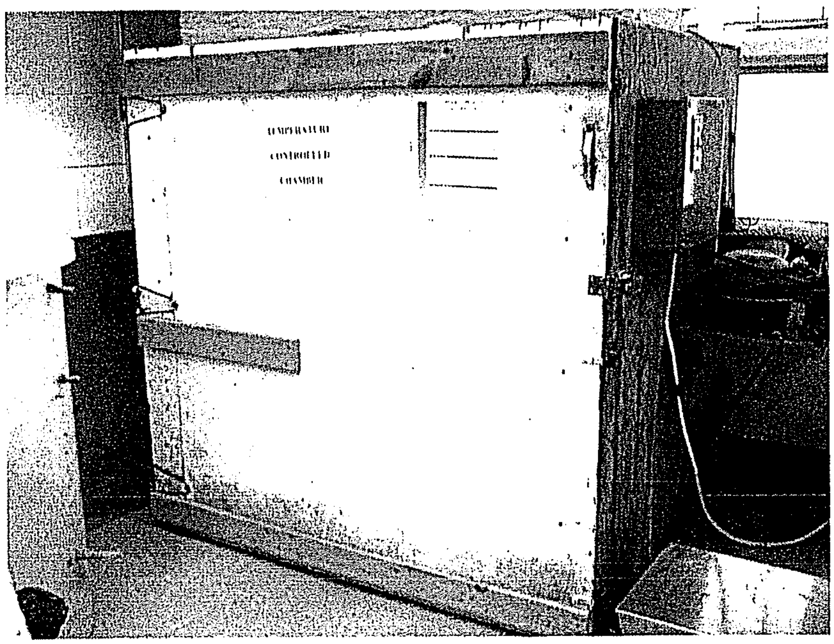

Figure 4.1: Phase 1 environmental chamber.

Figure 4.2: Phase 1 reactors inside environmental chamber.

Phase 2 of the experiment was a more in-depth study lasting a typical six-month composting season in the Canadian Prairies. Four recipes of varying straw particle sizes were composted in duplicate 140 L plastic containers as shown in Figure 4.3 (Schaefer System International Limited Compostainer Model, Brampton, Ontario, Canada).

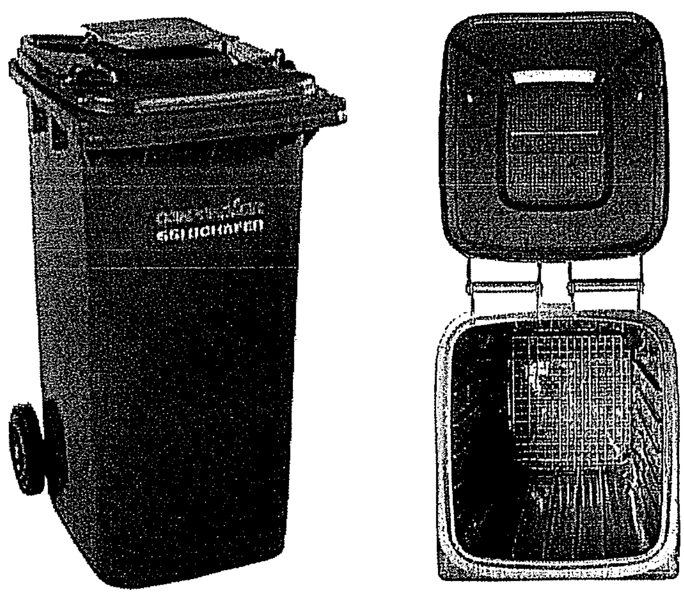

Figure 4.3: Phase 2 compost reactors.

Three oxygen/temperature sampling ports (1 cm diameter) located 10, 35, and 50 cm above the container bottoms were drilled into two sides of each container. The containers were placed in an environmental chamber where the average temperature and relative humidity for the duration of the experiment was 42.6 °C and 41.7% respectively. Passive aeration was used as opposed to forced aeration. The contents of each reactor were mixed weekly to allow for water addition as needed to maintain a moisture content of 70% (wet basis) and to reestablish the structure and pore space of the compost matrix to allow for adequate distribution of air. Loads were placed on top of the reactor contents to simulate a 2.5 m depth within a windrow compost pile. The target moisture content of 70 % was chosen based on the results of Phase 1 of the experiment and to ensure that with the simulated depth of 2.5 m, a free air space (FAS) greater than 30% for all recipes at could be maintained. FAS refers to the inter-particle voids in the compost matrix and is discussed in Eftoda and McCartney (2002). The FAS level of 30% is recommended by Rynk (1992). The loads needed were calculated by first running a series of tests on each recipe to determine the wet bulk density in a large cylindrical container, or biocell (Wizbicky, 2002), with added loads of 3, 6, and 10 kPa. An equation from McCartney and Chen (2001):

$$P_d = \rho_{wbd} dg \quad \text{(McCartney and Chen, 2001)} \qquad [4\text{-}1]$$

where P_d is the stress at any depth (kPa); ρ_{wbd} is the material wet bulk density (kg m^{-3}); d is the material depth (m); and g is gravity (9.81 m/s^2), was used to calculate depth so a plot of compost pile depth versus FAS could be constructed (included in Appendix A). The loads used for Phase 2 of the experiment (Day 0 – Day 119 only) were 2.70, 3.54, 5.41, and 6.88 kPa for Recipes 1 through 4, respectively which, using the average crosssectional area of the compost reactors, translated into weights of 38.70, 50.75, 77.55, and 98.62 kg, respectively. A decision was made to remove the loads on Day 119 since they were no longer compressing the compost material (volume and particle size reduction were considerable at this point). The initial masses of unshredded and shredded straw used in each recipe were calculated on a volume basis and are shown in Table 4.3. The total masses of straw in Recipes 1 through 4 were 12.3, 19.8, 27.3, and 34.8 kg, respectively.

Table 4.3: Masses of unshredded and shredded straw used in Phase 2 recipes.

Recipe	Mass of Straw (kg)	
	Shredded	Unshredded
1 (unshredded straw)	12.3	0
2 (2/3 unshredded straw, 1/3 shredded straw)	8.2	11.6
3 (1/3 unshredded straw, 2/3 shredded straw)	4.1	23.2
4 (shredded straw)	0	34.8

4.3 Sampling

Initial samples were taken for both phases of the experiment. Phase 1 sampling continued every 3-4 days thereafter – the weight of the reactor contents being recorded following each moisture readjustment to track weight loss. Phase 2 employed a weekly sampling protocol in which the contents of each reactor were spread out on a tarp and ten approximately equal random samples of 50 g each were taken to form a composite sample. Quartering techniques were then used to obtain a 50 g sample for analysis. The cumulative amounts of sample removed from each reactor throughout the entire composting period range from 4.5 to 9.1% of the initial dry weight. Temperature and oxygen measurements were taken at a horizontally centered position in the composting reactor using the three oxygen/temperature sampling ports. Reported values are an average of measurements taken from the three sampling ports for each reactor. Temperature measurements were taken daily from day 2 to day 56 only, at which time the temperature profile for each compost reactor had reached a plateau. Pore space oxygen measurements were made during a one-week period from day 13 to day 20.

4.4 Physical and Chemical Analyses

In Phase 1 of the experiment, moisture content was monitored every 3 to 4 days using an Infra-red Moisture Balance (CSC Scientific Company, Inc., Fairfax, Virginia) with a 125-watt infrared lamp (McCartney and Tingley, 1998). The 5-gram samples used for moisture determination were returned to the reactor.

The initial compost feedstock materials (straw and manure) and the initial and finished compost recipes were analysed for total solids (TS), volatile solids (VS), fixed solids (FS), organic carbon (OC), total Kjeldahl nitrogen (TKN), and fibre composition (lignin, cellulose, and hemicellulose). Phase 2 included analyses of bulk density, particle density, FAS, and particle size in addition to weekly analysis of TS, VS, FS, OC, and fibre composition. TS, VS, and FS were determined using standard methods 2540 B and E (APHA, 1995). The OC was calculated using Equation 2 where OC and FS are based on the dry weight fraction. TKN analysis was conducted by following the "Micro-Kjeldahl Digestion Followed by Steam Distillation: Without Pretreatment to Include NO_2^- and NO_3^- Quantitatively" method (Carter, 1993). The C:N ratio was calculated using the OC and TKN results. For Phase 1, mass balances were conducted to determine VS reduction and N loss. Phase 2 fibre analysis was based on separate determinations of neutral detergent fibres (NDF), acid detergent fibres (ADF) and lignin. ADF (Komarek et al. 1993) and NDF (Komarek et al. 1994) were analysed using the ANKOM Fibre Analyser #F200 (Fairport, NY). The NDF fraction, that material which is not solubilised by neutral detergent, is an estimate of total fibre content (lignin, cellulose, and hemicellulose), while the ADF fraction, that material which is not solubilised by acid detergent, contains cellulose and lignin. Lignin was determined on the remaining material after ADF analysis and further treatment with 72% sulphuric acid (van Soest, 1963). Results from NDF, ADF and lignin determinations were used to estimate contents of hemicellulose (NDF - ADF) and cellulose (ADF – lignin). Bulk density was determined using the procedures in method 07.01-A proposed by USCC (1997), with the exception that the vessel used had a diameter of 25cm and a height of 57cm. Particle density was determined using the water pycnometer method (Klute et al. 1986) with the exception that a 1 litre volumetric flask was substituted for the pyconometer in order to accommodate larger sample volumes. Details on FAS calculations can be found in Eftoda and McCartney (2002). Particle size analysis was completed using the ASTM standard method D 422-63 (1990). Hand sieving was used with sieve screen sizes of 37.5, 19.0, 9.5, 4.75, 2.36, 1.18, 0.6, 0.3, and 0.15 mm (1.5, 0.75, 0.375, 0.187, 0.091, 0.0465, 0.0236, 0.0118, 0.00591 inches). Temperature and oxygen measurements were made using an oxygen-temperature probe (Demista Instruments Model No. OT-21, Mt. Prospect, Illinois, 60056, USA).

$$OC = \frac{(1-FS)}{1.8} \qquad \text{(Haug 1993, Liao et al. 1995)} \qquad [4\text{-}2]$$

5.0 RESULTS AND DISCUSSION

A summary of the physical and chemical characteristics for the raw feedstock materials and initial compost recipes for Phases 1 and 2 is presented in Table 5.1.

5.1 Phase 1 Composting

The final material characteristics of the compost recipes were analyzed to determine the composting properties of each recipe over the entire nine-week composting period. Table 5.2 compares the final C:N ratios as well as the mass balance results for VS reduction and N loss in each compost recipe.

Table 5.1: Phase 1 & 2 Feedstock and Initial Bench-scale Recipe Material Characteristics

	Materials	%MC (db)	%TKN (db)	%OC (db)	C:N (wt:wt)	% Lignin (db)	% Cellulose (db)	% Hemicellulose (db)
Phase 1	Straw	57 (16.6)	1.43 (0.22)	45.3 (2.2)	28.5	n.d.	n.d.	n.d.
Phase 1	Unders	18	1.48	45.6	31.0	n.d.	n.d.	n.d.
Phase 1	Lagoon Mixture	93 (0.2)	23.5 (13.8)	13.9 (1.5)	0.6	n.d.	n.d.	n.d.
Phase 1	Recipe 1A	57	1.43 (0.22)	45.7 (0.1)	32.0	n.d.	n.d.	n.d.
Phase 1	Recipe 1B	70	1.43 (0.22)	44.3 (0.6)	31.0	n.d.	n.d.	n.d.
Phase 1	Recipe 2A	40	1.29 (0.13)	44.8 (0.2)	34.7	n.d.	n.d.	n.d.
Phase 1	Recipe 2B	55	1.29 (0.13)	44.5 (0.1)	34.5	n.d.	n.d.	n.d.
Phase 1	Recipe 2C	62.5	1.29 (0.13)	44.8 (0.3)	34.7	n.d.	n.d.	n.d.
Phase 1	Recipe 2D	70	1.29 (0.13)	45.1 (0.4)	35.0	n.d.	n.d.	n.d.
Phase 1	Recipe 2E	62.5	1.55 (0.18)	44.6 (0.0)	28.8	n.d.	n.d.	n.d.
Phase 2	Recipe 1,2,3,4	70	0.76 (0.06)	48.9 (0.8)	64.2	11.4	42.5	19.6

Notes:
1) Values shown are mean values (standard deviations shown in parentheses).
2) n.d. = not determined

Table 5.2: Final Compost Characteristics of Phase 1 Recipes

Recipe	% VS Reduction	% N Loss	% Weight Reduction (dry basis)	*Final C:N Ratio*
1A	45.8 (0.0)	17.0 (5.5)	39.3 (0.1)	20.9
1B	58.2 (2.0)	8.5 (3.2)	48.9 (2.0)	14.2
2A	46.9 (2.1)	17.1 (3.1)	38.9 (2.8)	22.2
2B	58.7 (0.2)	18.8 (0.4)	48.7 (0.1)	17.6
2C	65.9 (2.7)	23.4 (1.2)	55.4 (2.0)	15.5
2D	71.3 (1.5)	18.6 (4.7)	58.8 (1.6)	12.3
2E	69.9 (1.5)	32.4 (0.1)	57.9 (1.0)	12.8

Note: Characteristics shown here are averages of duplicate reactors for each recipe (standard deviations shown in parentheses).

For the recipes consisting of only straw (1A & 1B), it was found that an increase in moisture content resulted in greater VS reduction. A similar trend was seen for the recipes including straw and unders – increased VS reduction with increased MC where VS reduction reached a maximum of 71.3% for Recipe 2D. Figure 5.1 more clearly indicates the strong positive linear trend (R^2=0.9983) associated with MC for Recipes 2A, 2B, 2C, and 2D. Using Figure 5.1, comparisons between Recipes 1A & 2B and Recipes 1B & 2D showed an increased VS reduction with the addition of unders to the compost mixture. The increased VS reduction, an indication of increased degradability, was likely due to better degradability of the unders material. Since decomposition occurs on particle surfaces, the smaller particle size of the unders increases the surface area available and therefore improves degradability.

It was also possible to assess the potential advantages of adding a nitrogen source in the form of a lagoon mixture by analyzing VS reduction. Recipes 2C and 2E were compared to make this assessment and their initial N contents and C:N ratios are shown in Table

5.1. Figure 5.1 indicates that the added N source in Recipe 2E did not result in a statistically significant advantage over Recipe 2C with respect to VS reduction. The starting recipe characteristics shown in Table 5.1 indicate only a marginal difference in initial C:N ratio, which may have reduced the expected advantages of the nitrogen addition.

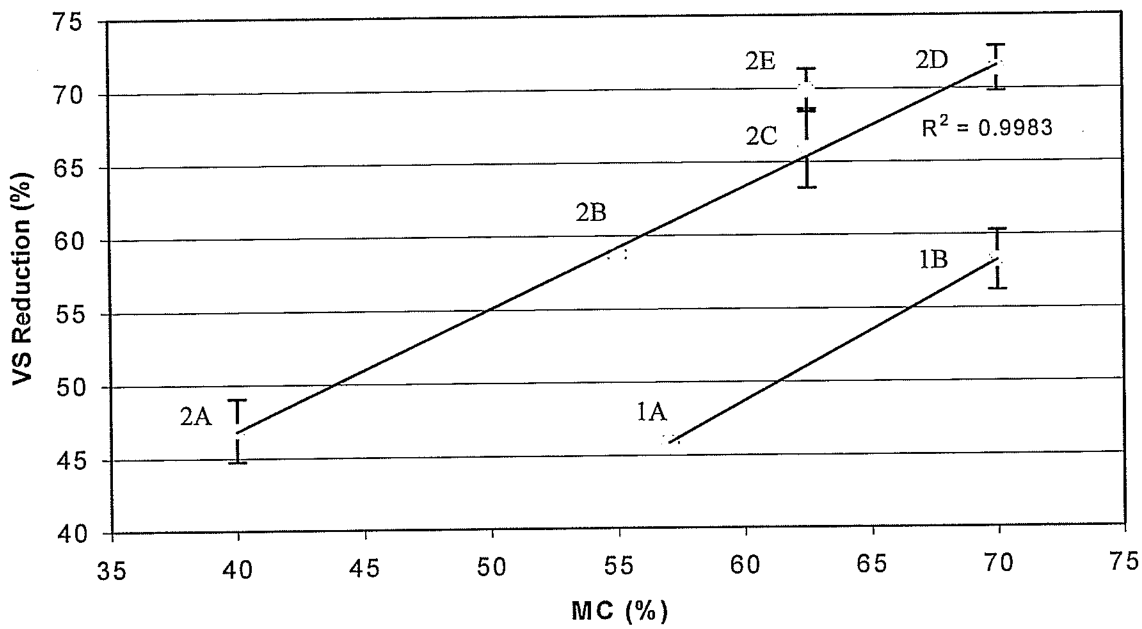

Figure 5.1: VS reduction as a function of moisture content for Phase 1 recipes.
Note: Results indicate averages of duplicate reactors. Error bars represent ± one standard deviation of recipe duplicates.

Assuming the dry weight loss in the reactors was due to VS losses, the VS removal profiles for the entire small bench-scale test period were calculated. For Recipes 1A and 1B, similar drops in % original VS occurred in the first 20 days but Recipe 1B, with an increased MC, showed a greater overall reduction for the remainder of the experiment. This trend was similar for Recipes 2A to 2D. Similar reductions of VS were exhibited for the first 10 to 12 days of the trial but after this point, differentiation was noticed for the remainder of the experiment with greater reductions of VS occurring for reactors with higher moisture contents. Comparisons of the VS removal profiles for Recipes 1A & 2B and Recipes 1B & 2D showed that the addition of unders to the compost recipe resulted in increased reduction of original VS by day 10, once again indicating the greater degradability of the unders when they are added to the compost mixture. By comparing Recipes 2C & 2E it was noticed that Recipe 2E displayed a quicker initial reduction of VS but after 15 days the decrease in VS for the two treatment recipes was similar. As with the results shown in Figure 5.1, only a small advantage was noticed with the addition of nitrogen to the compost mixture.

The N loss for each of the compost recipes is shown in Table 5.2. Comparison of Recipes 1A & 1B (varying only in MC) indicated a smaller N loss for the recipe with a higher MC (Recipe 1B). This comparison seems to agree well with conventional theory – the higher moisture content in Recipe 1B would be expected to aid in preventing the volatilization of nitrogen in the form of ammonia. No statistical significance was noted between the straw-only recipes and the straw/unders recipes. Additionally, there appears to be no trend with respect to N loss as MC increases in straw/unders recipes (Recipes 2A through 2D). The N loss exhibited for Recipe 2E (containing an additional nitrogen source) was greater than that for Recipe 2C. The greater N loss was expected since the initial %TKN was greater for Recipe 2E (see Table 5.1).

5.2 Phase 2 Composting

5.2.1 Particle Size, Mass, Volume and C:N Ratio

The final material characteristics of the compost recipes used in Phase 2 of the experiment are shown in Table 5.3. Results of the initial particle size analysis are shown in Table 5.4. The particle size such that 10% of the particles are smaller than that size is denoted by D_{10}. D_{30} and D_{60} are defined similarly. The coefficient of uniformity (C_U) indicates the range of particle sizes in the material (i.e. the higher the value of C_U the larger the range of particle sizes).

Table 5.3: Compost Characteristics of Phase 2 Recipes

Recipe	Dry Bulk Density (kg/m^3)		Initial FAS (%)	% Weight Reduction (dry basis)	C:N Ratio	
	Initial	Final			Initial	Final
1 (unshredded straw)	20.1	219.5 (3.2)	87	77.5 (1.9)	64.2	13.5
2 (2/3 unshredded straw, 1/3 shredded straw)	31.4	327.0 (37.2)	79	73.6 (0.9)	64.2	11.1
3 (1/3 unshredded straw, 2/3 shredded straw)	49.1	399.5 (43.4)	68	74.3 (0.2)	64.2	9.4
4 (shredded straw)	58.0	225.7 (22.6)	62	67.3 (0.3)	64.2	10.7

Note: Characteristics shown here are averages of duplicate reactors for each recipe (standard deviations shown in parentheses).

Table 5.4: Initial Particle Size Analysis of Phase 2 Recipes

Recipe	D_{10} (mm)	D_{30} (mm)	D_{60} (mm)	C_U (D_{60} / D_{30})
1 (unshredded)	1.5	3.6	8.0	5.3
2 (2/3 unshredded, 1/3 shredded)	1.1	2.0	4.7	4.3
3 (1/3 unshredded, 2/3 shredded)	1.1	2.3	4.1	3.7
4 (shredded)	0.9	1.8	3.2	3.6

The initial dry bulk density increased for Recipes 1 through 4. This was expected due to the decrease in particle size for each recipe. Initial FAS determinations are in agreement with the dry bulk density and particle size analysis. Recipe 1 had the highest initial FAS (87%) while Recipe 4 had the lowest initial FAS (62%). An analysis of the initial and final dry bulk densities for each recipe indicated that the recipe with the largest initial particle size (Recipe 1) attained the largest increase in dry bulk density (10.9 times the initial) followed by Recipes 2 through 4 at 10.4, 8.1, and 3.9 times their initial dry bulk density. Weight reduction also followed this trend with the exception that Recipe 3 showed a greater weight reduction than Recipe 2. High initial C:N ratios of 64.2 were reduced the most by Recipe 3 (final C:N of 9.4). The final C:N ratio was highest for Recipe 1 (13.5) after the 180-day composting period.

The volume reductions for each recipe are shown in Figure 5.2. It should be noted that the results shown are an average of duplicate reactors for each recipe and do not take into account the amounts of material withdrawn for weekly sampling purposes. Also, the loads used to simulate a 2.5 m depth in a windrow compost pile were removed on day 119 of the experiment resulting in a slight "refluffing" of the compost material represented by a mild peak in Figure 5.2. Volume reductions of 50% were observed by day 50 of the experiment for all recipes. Recipes 2 and 3 showed similar rates of volume reduction before stabilizing at approximately 10% of their initial volumes indicating that the particles sizes (mixture of unshredded and shredded straw) were more conducive to rapid volume reduction. Recipe 1 did not exhibit the same rates of volume reduction as Recipes 2 and 3 but finished at approximately 10% of its initial volume as well. Recipe 4 showed the least amount of volume reduction (81%) perhaps owing to the smaller initial particle size. The additional 10% of volume reduction attained by Recipes 1, 2, and 3 would have important implications in the design of a full-scale straw composting operation.

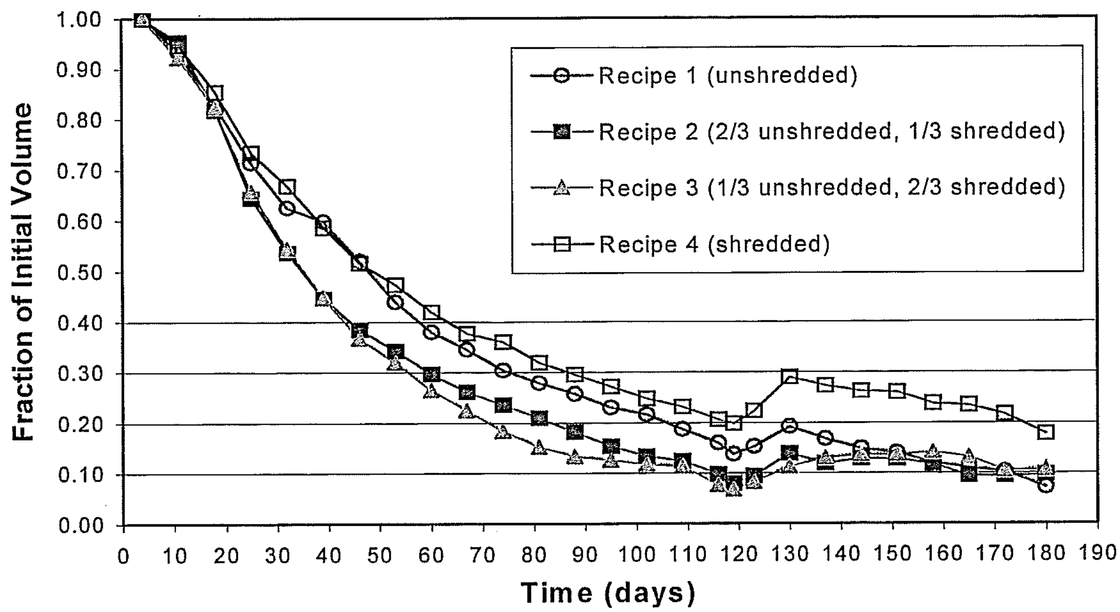

Figure 5.2: Volume reductions for Phase 2 recipes.
Note: Results indicate averages of duplicate reactors.

5.2.2 Temperature and Oxygen

Temperature monitoring for each compost reactor continued until day 56, at which point a plateau in the temperature profile was evident as shown in Figure 5.3. It was noticed that the diminished mass of compost remaining in each reactor at this time might not have been capable of heating itself to a temperature greater than that within the environmental chamber. The average temperature within the environmental chamber was 42.6°C. Epstein (1997) reported on the work of others who studied the succession of fungi in straw and grass compost. They found that both mesophilic and thermophilic fungi decreased in population as temperature of compost reached 70°C. However, as soon as the temperature decreased below 65°C, the thermophilic fungi resumed growth and their population peaked at approximately 45°C.

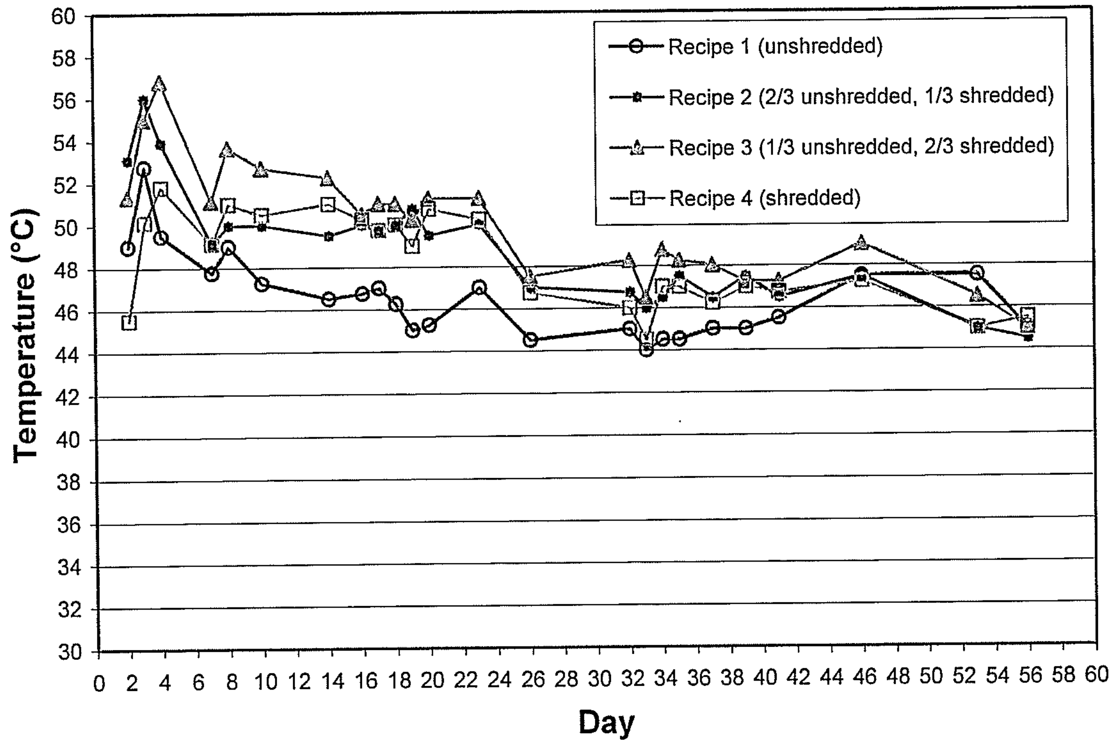

Figure 5.3: Temperature measurements for Phase 2 recipes.
Note: Results indicate averages of duplicate reactors.

The temperature rise in actively composting wastes is a function of both the heat gain from microbial exothermic reactions associated with respiratory metabolism (Tchobanoglous et al. 1993; Epstein, 1997), and heat loss due to ventilation. Recipe 3 exhibited the highest temperatures throughout the monitoring period perhaps indicating the highest level of microbial activity and/or least heat loss. Temperature maxima were reached on day 4 for all recipes and gradually decreased throughout the monitoring period. Average temperatures for Recipes 1, 2, 3, and 4 were 46.5°C, 48.9°C, 50.0°C, and 48.3°C for the monitoring period, respectively.

Oxygen levels within the compost reactors were only monitored from day 13 to day 20 due to measuring probe malfunctions. The contents of each reactor were mixed on day 18 restoring the pore space within the compost matrix. Average oxygen levels (%)

throughout the monitoring period for Recipes 1, 2, 3, and 4 were 17.5, 12.9, 10.0, and 8.9, respectively. These results were expected since the supply of oxygen to compost microorganisms depends on the porosity and particle size within the compost, its moisture content and rates of diffusion and convection, the latter two being affected by temperature (Joshua et al. 1998). As moisture content and temperature were constants for all compost recipes, the particle size variations for Recipe 1 through 4 directly impacted oxygen diffusion and convection throughout the compost matrix. All recipes exhibited pore space oxygen levels above the minimum oxygen concentration of 5% suggested by Rynk (1992) to assure efficient aerobic metabolism.

5.2.3 Volatile Solids Reduction

A plot of volatile solids reduction for each recipe throughout the duration of the experiment is shown in Figure 5.4. Volatile solids reduction was most significant and rapid for Recipe 3 decreasing from 88% to a final value of 58% while Recipes 1, 2 and 4 showed volatile solids reduction to final values of 63%, 61%, and 65%, respectively. Volatile solids began to stabilize after approximately 140 days. Comparatively, Eiland et al. (2001) evaluated the composting of *Miscanthus* straw and liquid pig manure in both open box and closed reactor systems. VS in the box system decreased from 75% to 68%. In the reactor system, VS decreased from 78% to 65%. VS stabilization was observed at approximately day 120 in both systems. The VS reductions in the experiment reported herein ranged from 25 to 30 % whereas the VS reductions in the Eiland et al. (2001) experiment ranged from 7 to 13%. However, moisture content in the box and reactor systems in the Eiland et al. (2001) experiment fluctuated as low as 53% in the box system with final moisture contents of 80% for both systems. Also, temperatures in that experiment varied from 16°C to maxima of 65-70°C. The conditions in the present experiment may have been better suited for straw composting. Temperature was stable within the 40-50°C range (ideal for thermophilic fungi) and moisture content was controlled at 70% (±5%).

Volatile solids degradation in Recipe 1 may have been slowed by a larger initial particle size that inhibited microbial activity. Conversely, the smaller particle sizes (and pore spaces) in Recipe 4 coupled with a high moisture content of 70% may have produced oxygen constraints which limited oxygen transport (McCauley and Shell, 1956; Miller, 1991; Hamelers, 1992; Tseng et al. 1995; Richard, 1996) and reduced the rate of decomposition (Richard et al. 1999). Pore space oxygen measurements from day 13 to day 20 seem to indicate that oxygen levels were adequate (>5%), however, the one week of measurements only represented a small fraction of the nearly 26-week composting period.

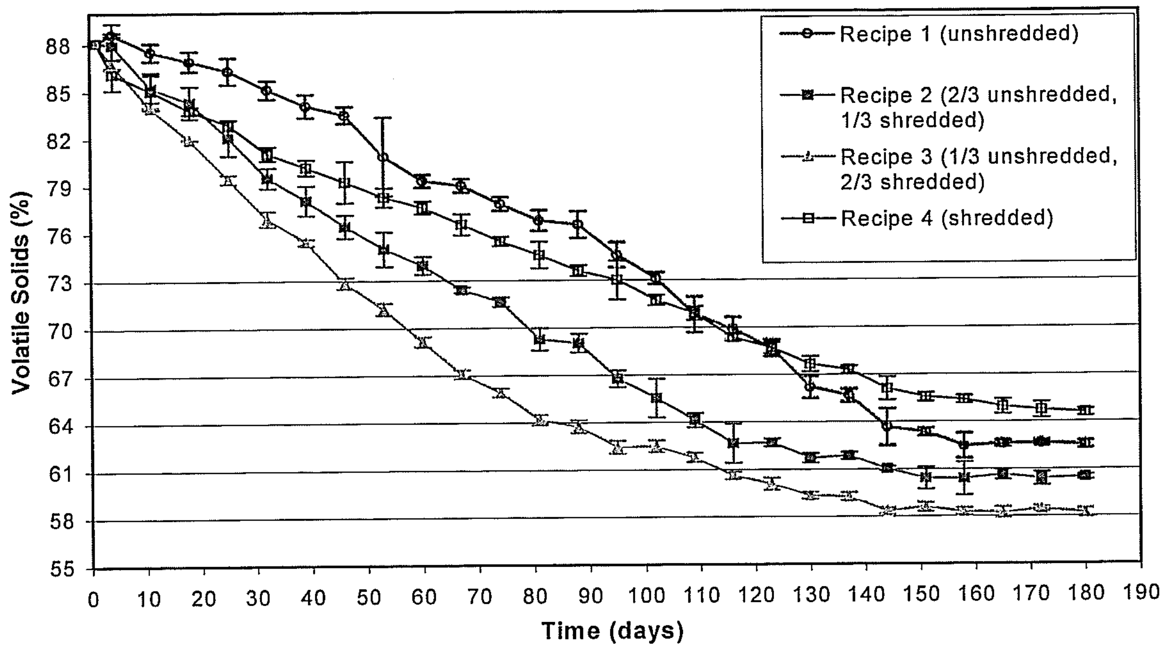

Figure 5.4: Volatile solids reduction for Phase 2 recipes.
Note: Results indicate averages of duplicate reactors. Error bars represent ± one standard deviation of recipe duplicates.

5.2.4 Fibre Degradation

The degradation of straw fibres (hemicellulose, cellulose, and lignin) during composting is shown in Figures 5.5, 5.6, and 5.7. Since the homogeneity of the composting material increased (due to decreasing particle size) over the composting period, the within recipe variability decreased with time, as indicated by the error bars presented in Figures 5.5 to 5.7. Additionally, Figure 5.5, showing the degradation of hemicellulose, appears to dip below zero on the y-axis. The reason for this may be due to the analytical method used in this experiment. Many complex polysaccharides that can be classed as hemicelluloses are water-soluble and will thus not be estimated by this method. Secondly, some hemicelluloses require a pH of less than zero to be solubilised and thus the ADF assay will not remove all of them. Generally, fibre degradation was most rapid and complete for the compost recipes containing mixtures of unshredded and shredded straw. Recipe 3 performed the best, followed closely by Recipe 2. Recipes 1 and 4 showed the slowest rates of degradation.

Hemicellulose decreased from 1.72 g g^{-1} ash to zero by day 90 for Recipes 2, 3, and 4 and by day 110 for Recipe 1. While hemicellulose was eliminated in this experiment, Eiland et al. (2001) observed that hemicellulose content only decreased to 6% of the initial hemicellulose content at the end of the composting period (190 days in the box system, 150 days in the closed reactor).

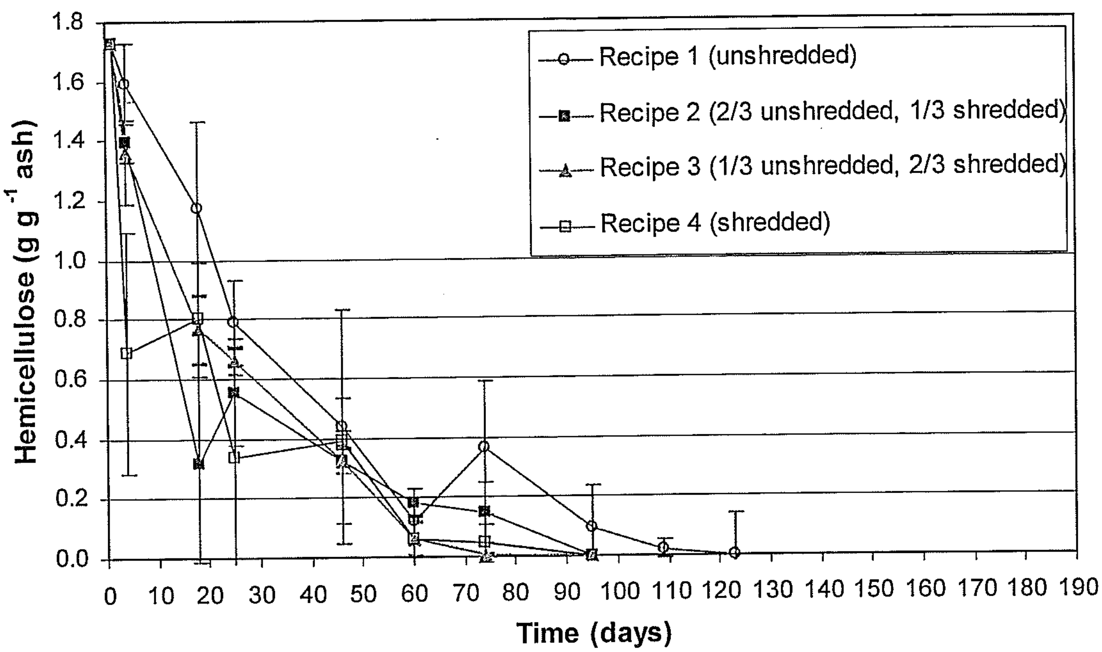

Figure 5.5: Hemicellulose degradation during Phase 2 composting.
Note: Results indicate averages of duplicate reactors. Error bars represent ± one standard deviation of recipe duplicates.

In the experiment by Eiland et al. (2001), cellulose reached stable levels at day 50. Cellulose final levels of 36% and 30% of initial cellulose levels were determined for the box and reactor systems respectively. As stated previously in the discussion of VS reduction, the conditions in the present experiment may have been better suited for straw composting. The stabilization of cellulose was most rapidly achieved by Recipe 3 (day

60), followed by Recipe 2 (day 95), and Recipes 1 and 4 (day 137). By day 137, cellulose content had decreased from 3.75 g g^{-1} ash to 0.75 g g^{-1} ash for all recipes representing a loss of 80%.

Additionally, work reported by Epstein (1997) determined that after 153 days of composting, straw had lost approximately 33% of the hemicellulose and 50% of the cellulose initially present. No change in cellulose levels was observed before day 24 and the most rapid degradation occurred from day 24 to day 90. Results from the present experiment show that rapid degradation of hemicellulose and cellulose began early in the composting period (by day 4) and continued until approximately day 60.

Eklind (1998) evaluated the degradation of the fibre fraction as half-life times (50% degradation). In that evaluation, straw composting exhibited half-life times for hemicellulose and cellulose of 29 and 26 days respectively. Eiland et al. (2001) observed half-life times for hemicellulose and cellulose of 21 and 100 days respectively. Results for this study were similar to the straw-only composting in Eklind's (1998) experiment with half-life times for hemicellulose of approximately 20 days for all recipes, and cellulose half-life times of 20 days for Recipes 2, 3, and 4 and 50 days for Recipe 1.

Epstein (1997) reported on the biochemical changes that occur during the composting of wheat straw. Cellulose and hemicellulose, constituting 45.3% and 35.7% of the initial dry weight, decreased to 13.3% and 17.0% of the original dry weight in 60 days. Also, the straw had lost 50% of its initial dry weight after 60 days of composting, essentially representing the loss of hemicellulose and cellulose. In the present study, cellulose and hemicellulose decreased from 42.5% and 19.7% of the initial dry weight to 22 - 30% and 0.5 - 5%, respectively after 60 days. All recipes had lost 50% of the initial dry weight by the 90th day of composting. After 180 days, cellulose had decreased to 30% of the initial dry weight while hemicellulose had been completely degraded.

The microbial enzymes catalyzing degradation of hemicellulose and cellulose are repressed by the presence of low-molecular weight carbon sources that are more easily metabolized than hemicellulose and cellulose (Madigan et al. 2000). This explanation supports results obtained by Eiland et al. (2001) where, while composting straw with liquid pig manure, the metabolism of readily available carbon creating high metabolic rates resulted in a period of high temperature where hemicellulose and cellulose degradation was delayed until the eighth day. However, hemicellulose and cellulose degradation is noticed earlier for this experiment (day 4), indicating a lack of more easily degraded carbon.

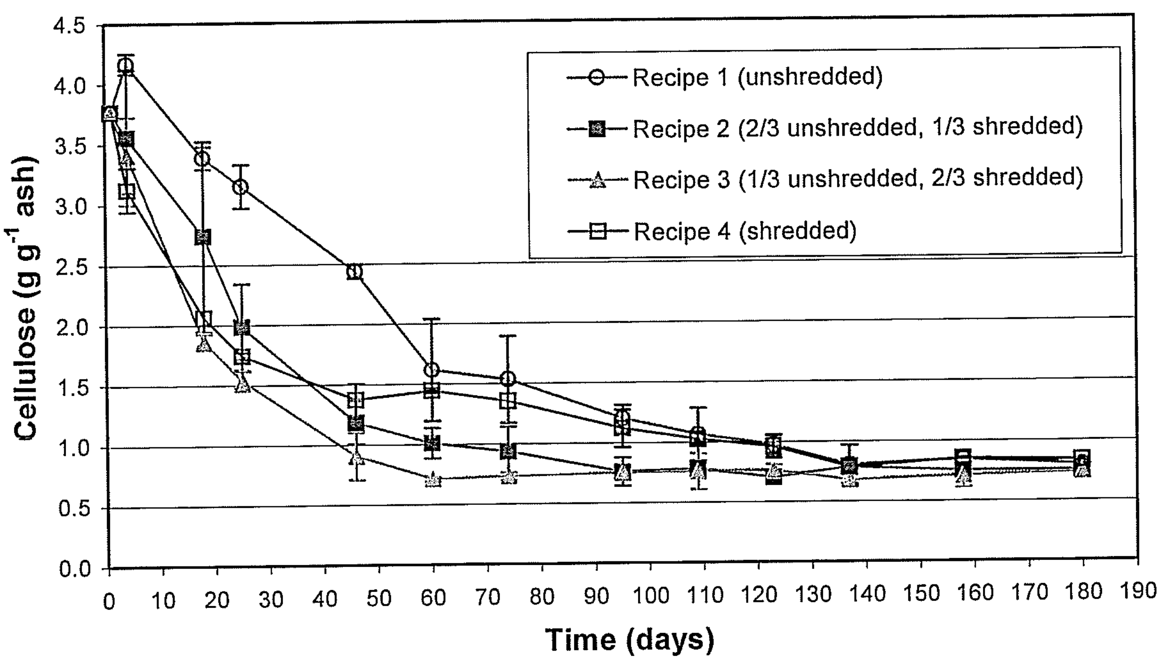

Figure 5.6: Cellulose degradation during Phase 2 composting.
Note: Results indicate averages of duplicate reactors. Error bars represent ± one standard deviation of recipe duplicates.

The degradation of lignin was slower and less complete than hemicellulose and cellulose degradation in this experiment. Lignin content decreased from 1.0 g g^{-1} ash to 0.4 g g^{-1} ash for Recipes 2 and 3, 0.5 g g^{-1} ash for Recipe 1, and 0.6 g g^{-1} ash for Recipe 4. Lignin levels were approximately stable by day 140. In the work done by Eiland et al. (2001), no degradation of lignin was observed. It was hypothesized that this was caused by the presence of nitrogen in the final stage of the composting period, because lignin-degrading enzymes are induced by nitrogen limitation. The initial C:N ratios were 25 and 16 for box and reactor systems respectively. The initial C:N ratio for Phase 2 of this study was 64.2, perhaps creating more ideal nitrogen-limiting conditions for lignin degradation.

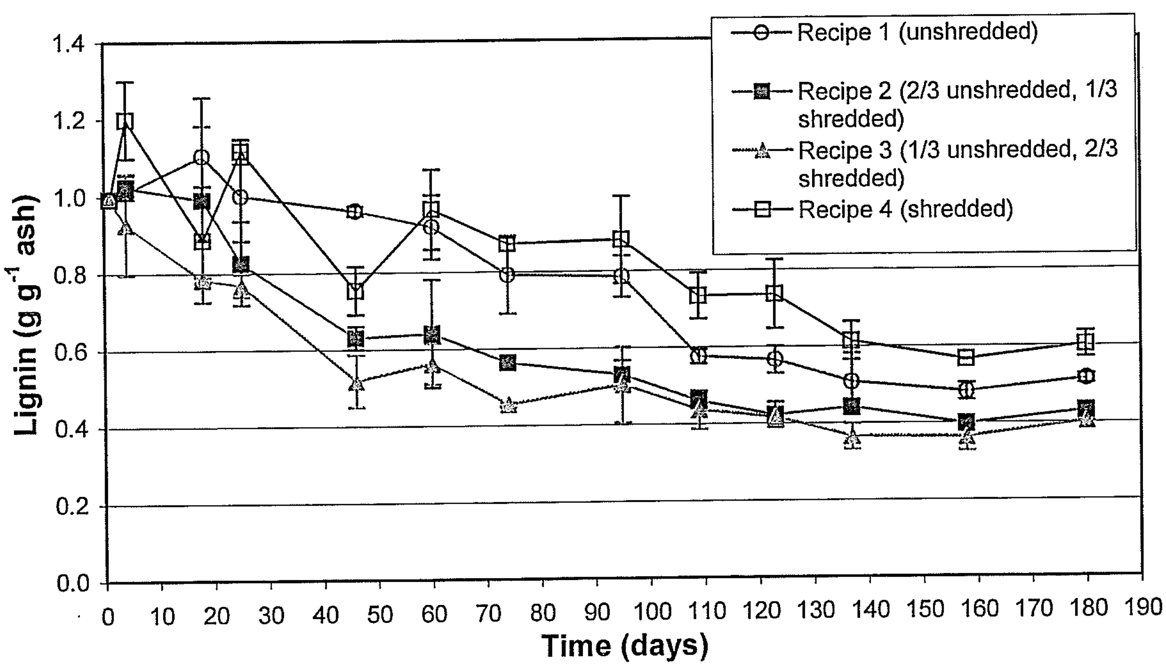

Figure 5.7: Lignin degradation during Phase 2 composting.

Note: Results indicate averages of duplicate reactors. Error bars represent ± one standard deviation of recipe duplicates.

6.0 SUMMARY AND CONCLUSIONS

Phase 1 of the research was a preliminary investigation that employed small bench-scale compost reactors containing various recipes using the three feedstock materials (straw, process unders, and lagoon mixture) at different moisture levels in an attempt to gain an understanding of composting effectiveness and to aid in the selection of several recipes that could be used for larger-scale laboratory testing. The recipe variations used formed the basis for comparing the impacts of: (1) water addition; (2) unders addition; and (3) nitrogen addition in the form of a lagoon mixture. The Phase 1 small bench-scale results for this project indicated:

1) The VS reduction (indicating degradability) was greater for the compost recipes containing unders suggesting the possibility that unders, having a smaller particle size and thus a larger surface area, are more easily biodegraded.
2) A clear trend emerged indicating that VS reduction was aided by an increase in moisture content for the straw and straw/unders recipes.
3) The advantages of adding a nitrogen source (in the form of a lagoon mixture) were limited when considering VS reduction. The N addition also resulted in a greater loss of N throughout the experiment. No trend emerged with respect to N loss with increasing moisture content for the straw/unders recipes.

Phase 2 was a larger-scale investigation focused on the composting of four recipes of varying straw particle sizes. The objectives for this phase were to investigate the effects of particle size on compost degradation and volume reduction and to monitor the rate and degree of degradation over a typical Canadian Prairie summer composting period to estimate the ultimate degradability of straw compost. Based on the analysis of the observed data the following conclusions were made:

1) Degradation of volatile solids and lignocelluloses was most rapid and complete for recipes containing both shredded and unshredded straw, with the recipe containing 2/3 shredded straw performing the best.

2) Volume reduction reached approximately 90% for recipes containing either unshredded straw only or a mixture of unshredded and shredded straw.

7.0 RECOMMENDATIONS AND ENGINEERING SIGNIFICANCE

The conclusions reached as a result of Phase 1 and Phase 2 of this experiment offer insight for a potential full-scale operation attempting to compost a high carbon material such as straw. The rates and degree of degradation as well as volume reduction during straw composting are of great importance for the sizing and operation of a full-scale facility. In addition, understanding the impacts of straw particle size could result in potential cost savings with respect to feedstock preparation via straw shredding.

However, this research consisted of laboratory-controlled experiments to simulate windrow composting of straw over a typical Canadian Prairie summer. Parameters such as moisture level, humidity, temperature, and compost mixing can be controlled and optimized in the laboratory, but challenges exist in replicating laboratory conditions at a larger field scale. As a logical next step towards full-scale design, a pilot-scale field trial would be useful in determining larger-scale composting conditions and, if possible, provide correlations with the results of the completed laboratory-scale work.

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APPENDIX A – PHASE 1 COMPOSTING PHOTOGRAPHS

Figure A-1: Phase 1 composting, initial Recipe 1.

Figure A-2: Phase 1 composting, initial Recipe 2.

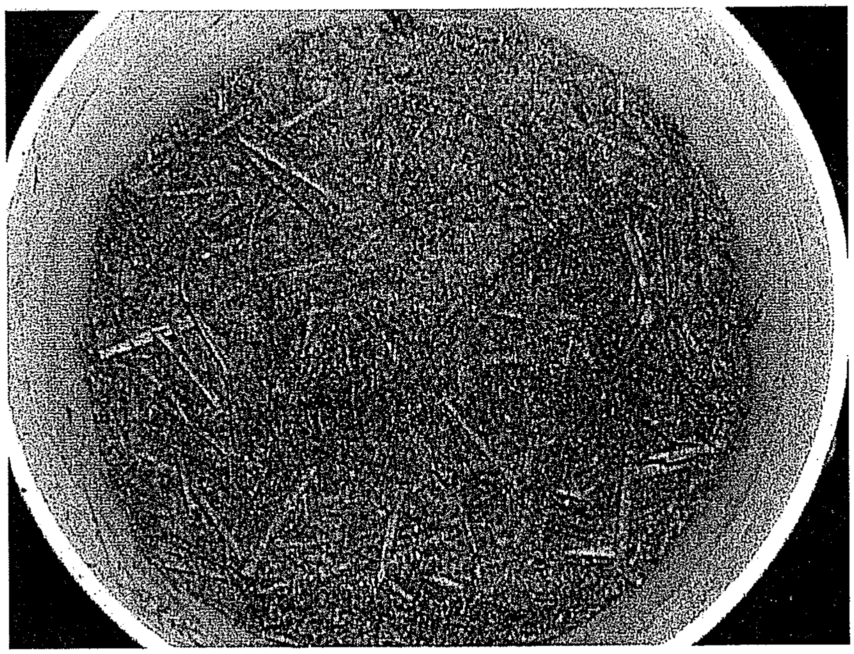


Figure A-3: Phase 1 composting, initial Recipe 3.

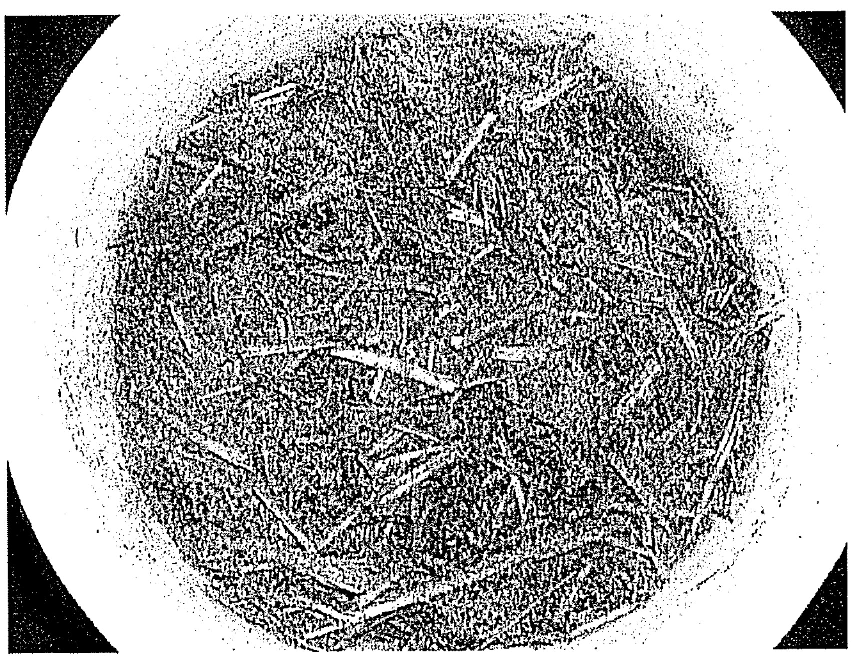


Figure A-4: Phase 1 composting, initial Recipe 4.

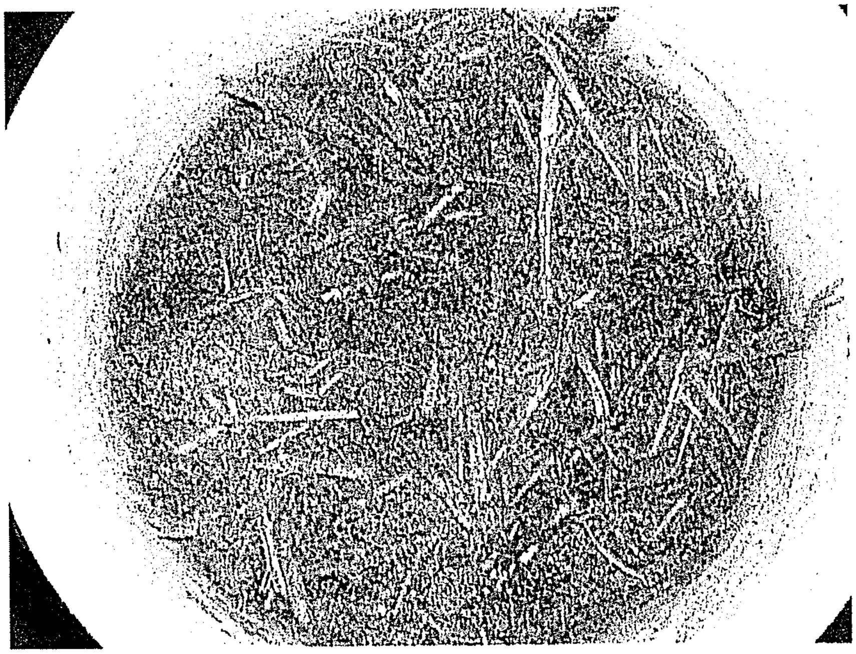


Figure A-5: Phase 1 composting, initial Recipe 5.

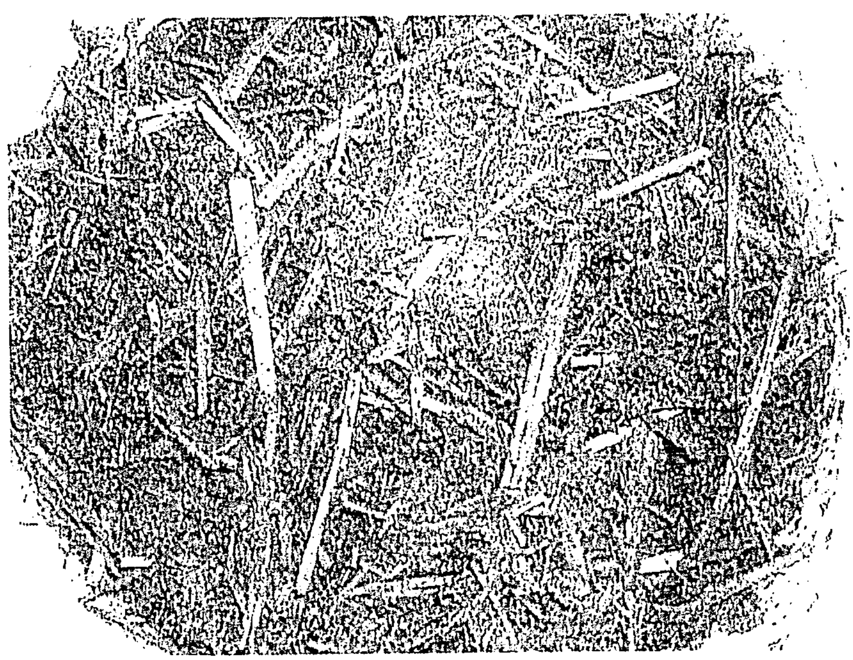


Figure A-6: Phase 1 composting, initial Recipe 6.

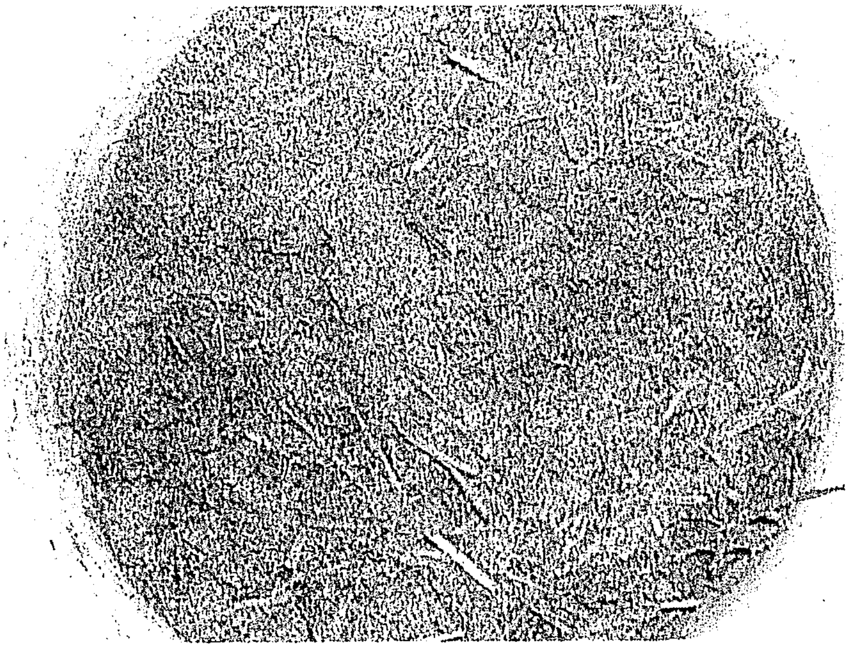


Figure A-7: Phase 1 composting, initial Recipe 7.

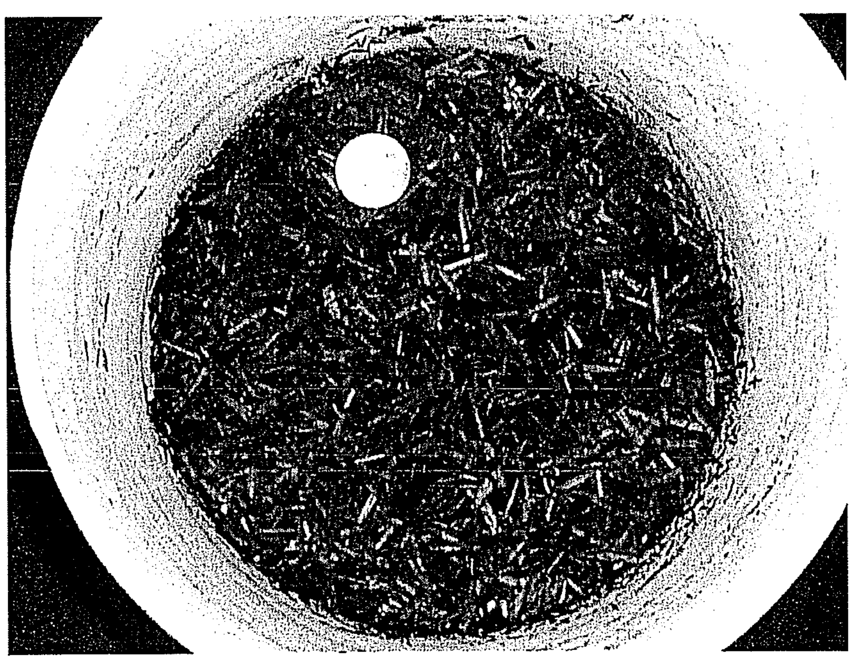


Figure A-8: Phase 1 composting, finished Recipe 1.

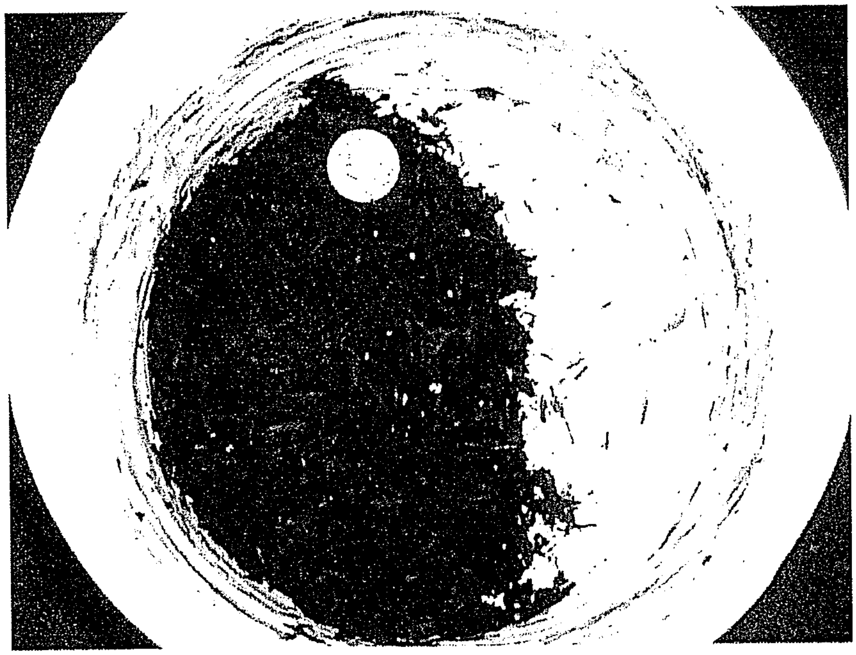


Figure A-9: Phase 1 composting, finished Recipe 2.

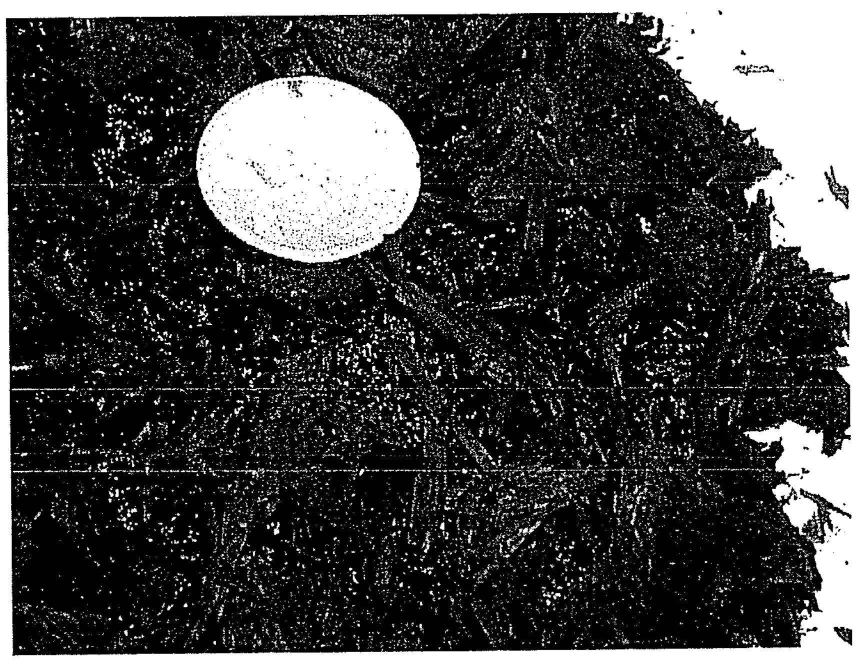


Figure A-10: Phase 1 composting, finished Recipe 2 (close-up).

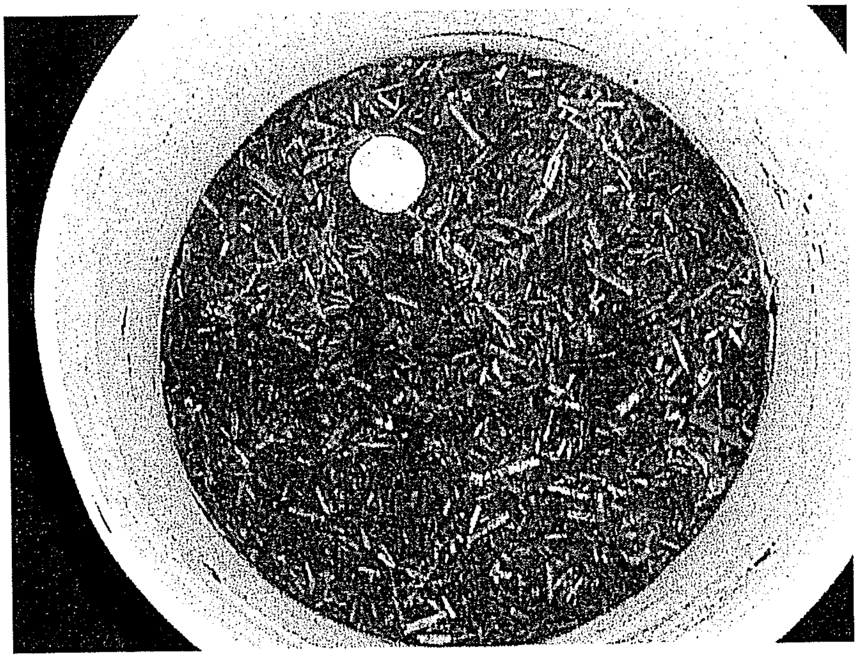


Figure A-11: Phase 1 composting, finished Recipe 3.

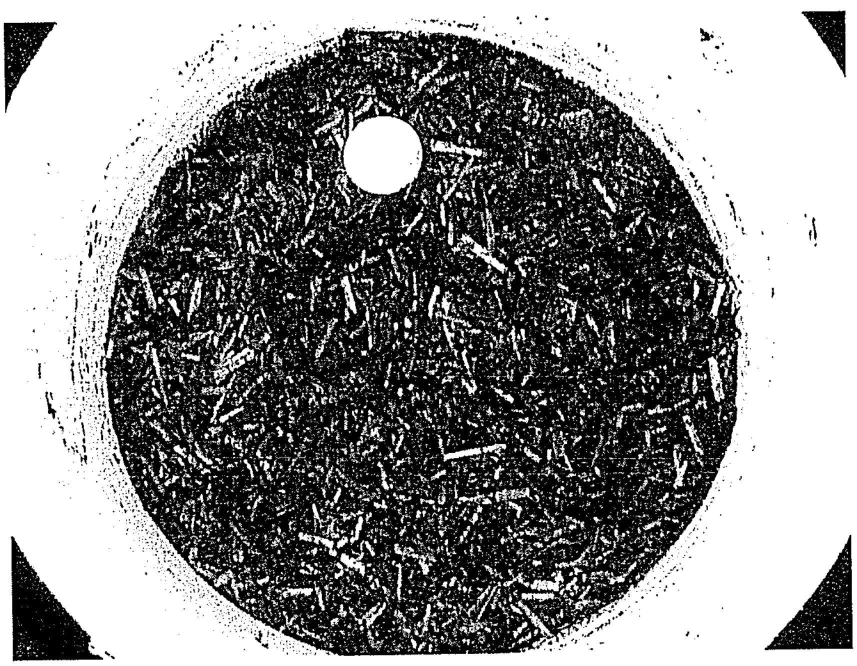


Figure A-12: Phase 1 composting, finished Recipe 4.

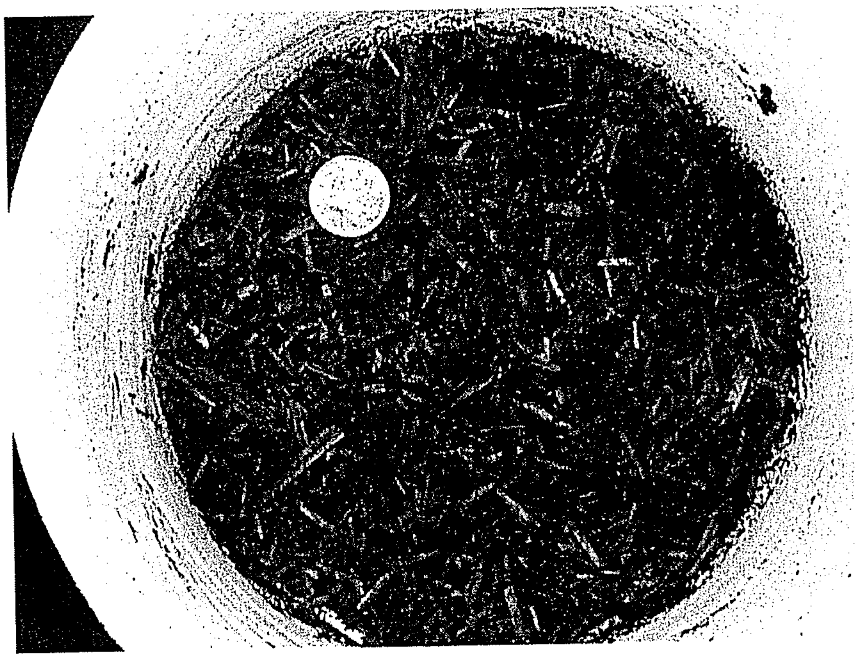


Figure A-13: Phase 1 composting, finished Recipe 5.

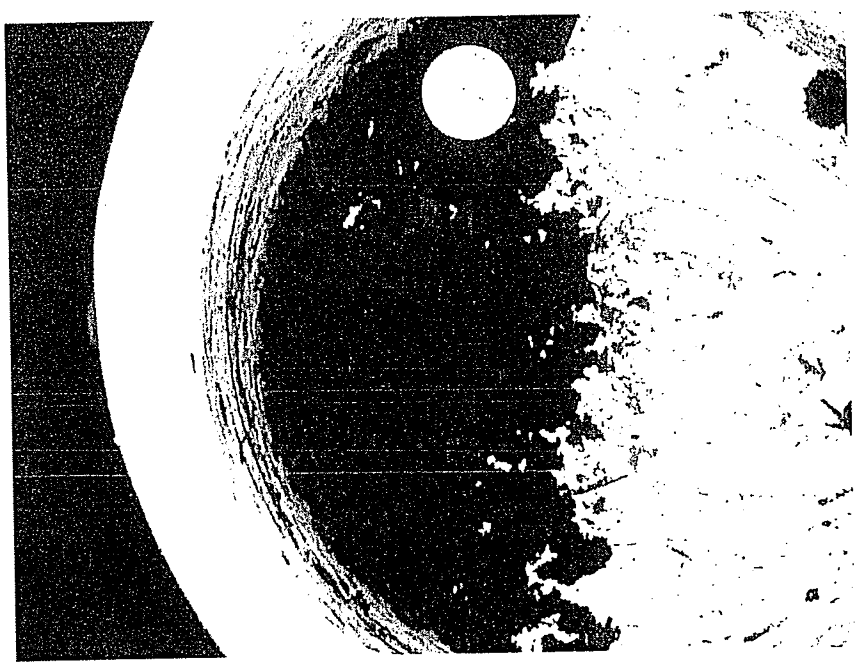


Figure A-14: Phase 1 composting, finished Recipe 6.

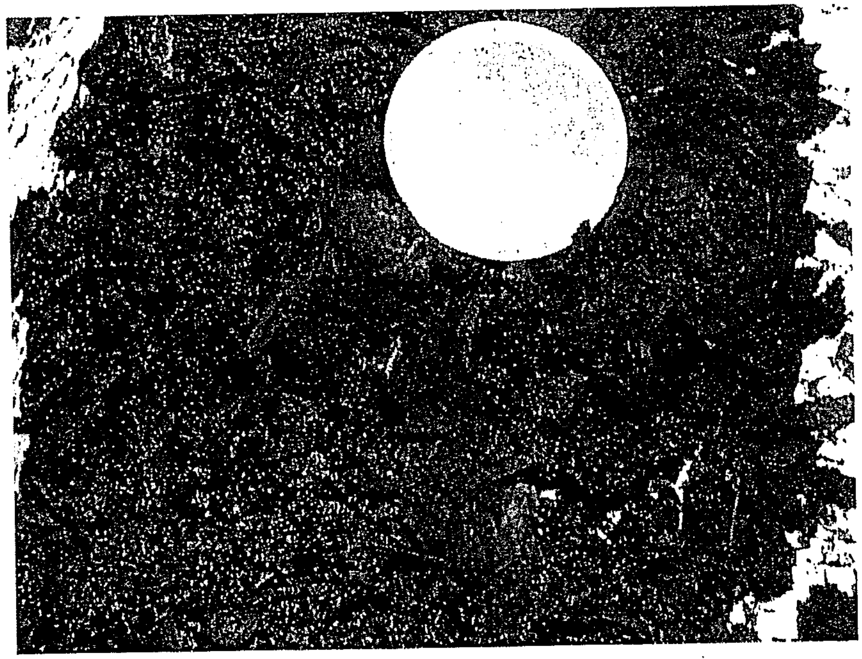


Figure A-15: Phase 1 composting, finished Recipe 6 (close-up).

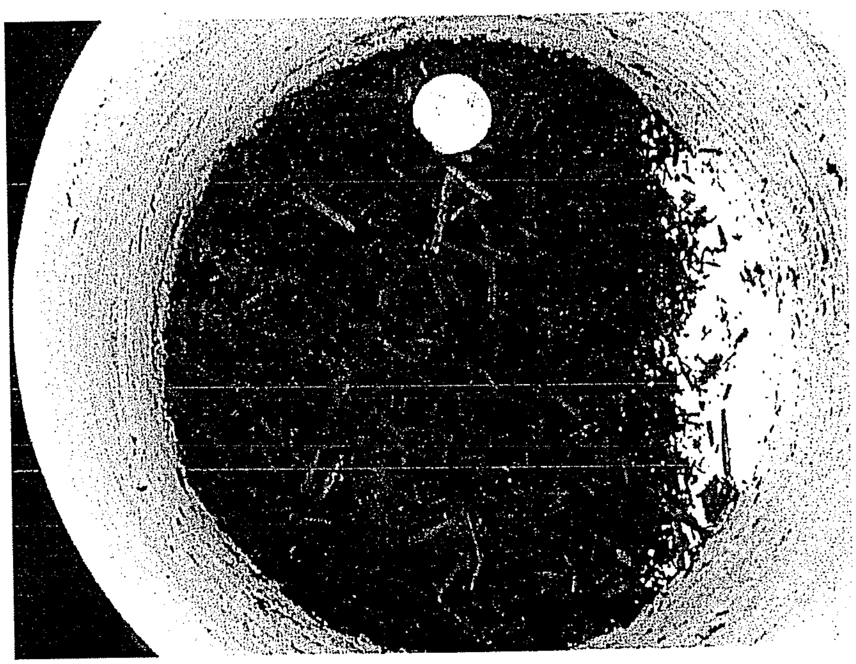


Figure A-16: Phase 1 composting, finished Recipe 7.

APPENDIX B – PHASE 2 COMPOSTING PHOTOGRAPHS

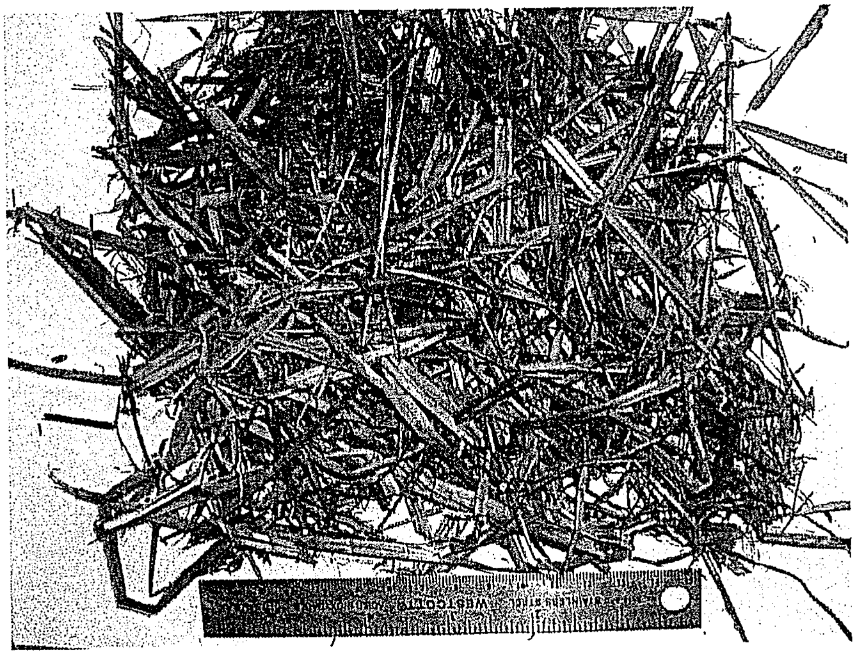


Figure B-1: Phase 2 composting, initial Recipe 1.

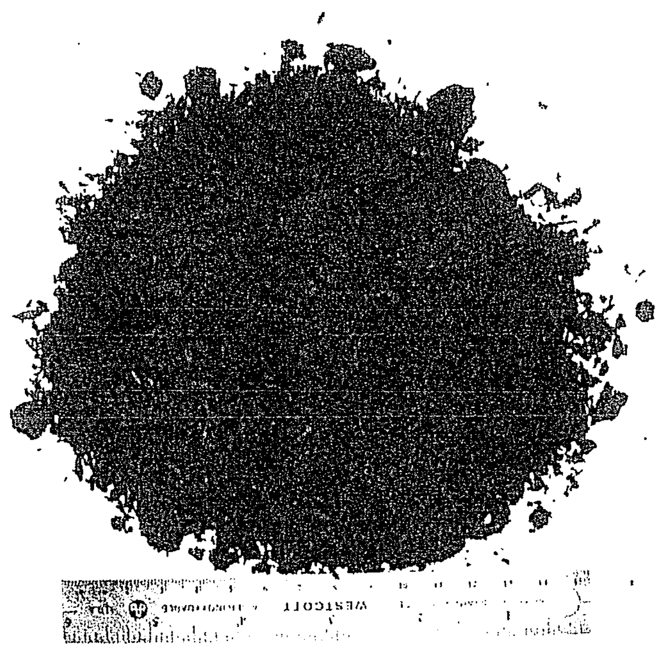


Figure B-2: Phase 2 composting, finished Recipe 1.

Figure B-3: Phase 2 composting, initial Recipe 2.

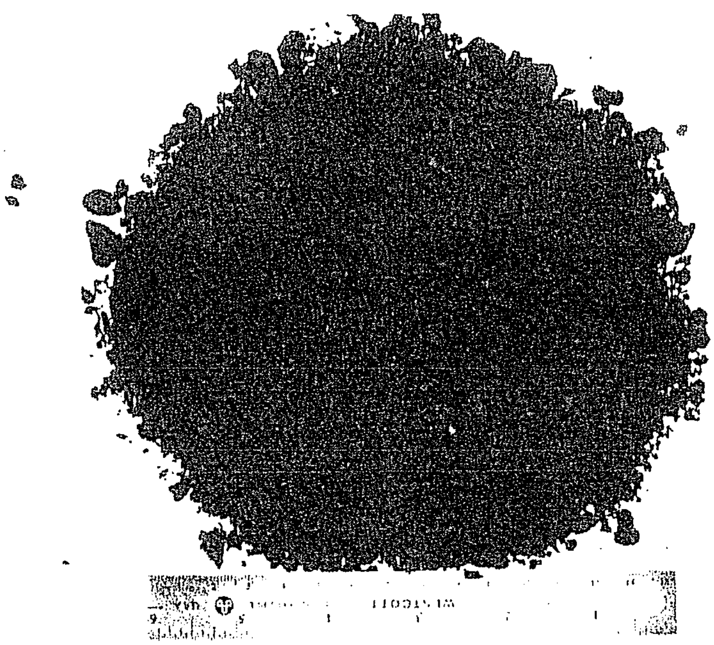


Figure B-4: Phase 2 composting, finished Recipe 2.

Figure B-5: Phase 2 composting, initial Recipe 3.

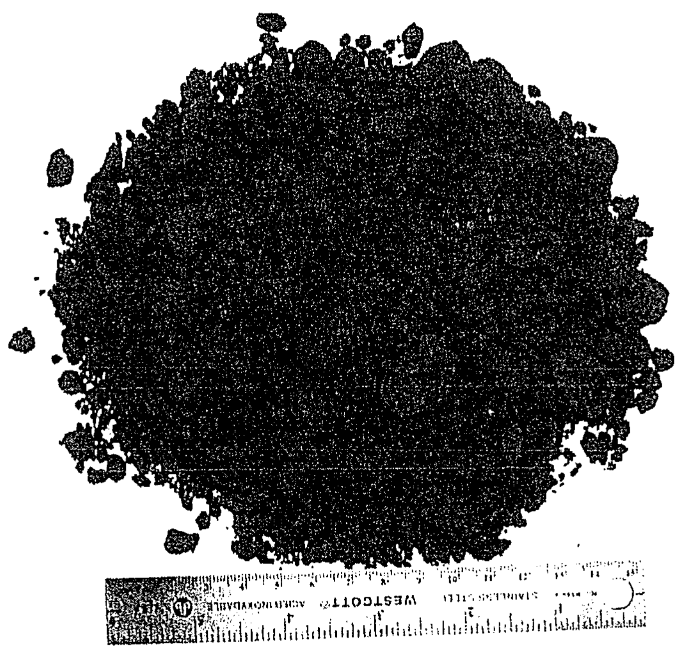


Figure B-6: Phase 2 composting, finished Recipe 3.

Figure B-7: Phase 2 composting, initial Recipe 4.

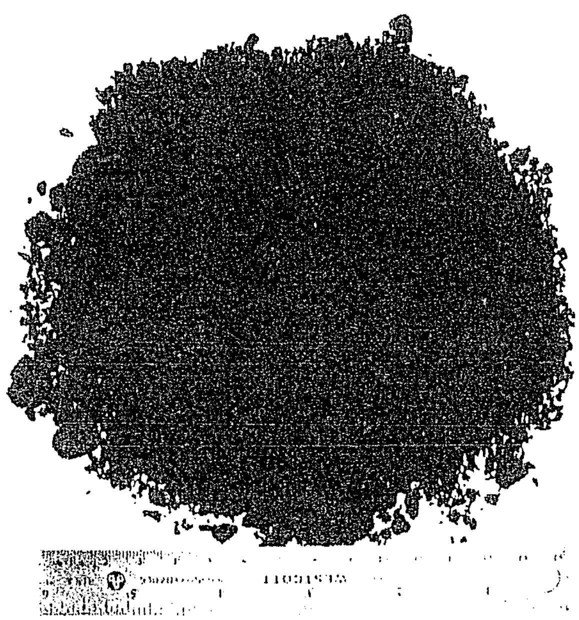


Figure B-8: Phase 2 composting, finished Recipe 4.

APPENDIX C – PHASE 1 EXPERIMENTAL LABORATORY DATA

Phase 1 - Feedstock Characterization
Solids Analysis

Straw
Analysis Date: June 21, 2001

Sample	Crucible #	Tare (g)	Tare+Straw (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
Bale 1	40	91.6286	101.8070	94.0923	92.0175	75.7948	24.2052	84.2148	15.7852	46.7860
	3	90.9418	100.1400	93.4191	91.2753	73.0676	26.9324	86.5378	13.4622	48.0765
Bale 2	J-13	90.4578	94.5629	92.9515	90.8681	39.2536	60.7464	83.5465	16.4535	46.4147
	18	90.1443	93.6830	92.2939	90.4814	39.2545	60.7455	84.3180	15.6820	46.8433
Bale 3	J-4	90.8540	94.1502	92.8944	91.1698	38.0984	61.9016	84.5226	15.4774	46.9570
	J-3	90.3738	95.8413	93.3909	90.9578	44.8176	55.1824	80.6437	19.3563	44.8020
Bale 4	34	89.9993	99.7484	94.2672	90.8294	56.2226	43.7774	80.5502	19.4498	44.7501
	27	96.8249	104.6880	100.3312	97.5280	55.4082	44.5918	79.9475	20.0525	44.4153
Bale 5	J-7	92.9658	112.5193	97.5310	94.1200	76.6528	23.3472	74.7174	25.2826	41.5097
	57	91.5928	110.1417	96.0535	92.6699	75.9517	24.0483	75.8536	24.1464	42.1409
					Mean =	57.4522	42.5478	81.4852	18.5148	45.2696
					Std Dev. =	16.6447	16.6447	3.8865	3.8865	2.1592

Lagoon Mixture
Tested June 21, 2001

Crucible #	Tare only (g)	Tare + manure (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
J-6	94.1486	100.6715	95.2250	94.7344	83.4981	16.5019	45.5779	54.4221	25.3210
30	81.6106	113.0737	82.4891	82.1925	97.2078	2.7922	33.7621	66.2379	18.7567
				Mean =	90.3530	9.6470	39.6700	60.3300	22.0389
				Std. Dev. =	9.6942	9.6942	8.3550	8.3550	4.6417

Chicken Manure
Tested June 21, 2001

Crucible #	Tare only (g)	Tare + manure (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
7	89.2966	113.0207	90.6578	89.7198	94.2624	5.7376	68.9098	31.0902	38.2832
R1	93.4841	118.0354	94.9601	93.9296	93.9881	6.0119	69.8171	30.1829	38.7873
				Mean =	94.1252	5.8748	69.3634	30.6366	38.5352
				Std. Dev. =	0.1939	0.1939	0.6415	0.6415	0.3564

Cow Manure
Tested June 21, 2001

Crucible #	Tare only (g)	Tare + manure (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
45	89.1839	133.8114	94.6692	91.1336	87.7087	12.2913	64.4559	35.5441	35.8088
70	70.9715	114.6407	76.4593	71.9364	87.4332	12.5668	82.4174	17.5826	45.7874
				Mean =	87.5710	12.4290	73.4366	26.5634	40.7981
				Std. Dev. =	0.1948	0.1948	12.7007	12.7007	7.0559

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fraction.
2) All samples collected on June 18, 2001.

Phase 1 - Feedstock Characterization
Solids Analysis

Straw
Analysis Date: August 14, 2001

Crucible #	Tare only (g)	Tare+Straw (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
40	91.6264	101.6775	94.8141	92.3927	68.2851	31.7149	75.9607	24.0393	42.200402
J-12	87.1130	95.8620	90.1189	87.7272	65.6429	34.3571	79.5669	20.4331	44.203807
50	87.9911	97.6190	91.2247	88.6760	66.4143	33.5857	78.8193	21.1807	43.788485
J-4	90.8580	105.9020	95.4640	91.9295	69.3831	30.6169	76.7369	23.2631	42.631592
				Mean =	67.4314	32.5686	77.7709	22.2291	43.2061
				Std Dev. =	1.7099	1.7099	1.7000	1.7000	43.4575

Lagoon
Tested August 14, 2001

Crucible #	Tare only (g)	Tare+Lagoon (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
40	91.6238	133.6750	94.4764	93.8272	93.2164	6.7836	22.7582	77.2418	12.643436
J-12	87.1106	122.0751	89.5924	88.8949	92.9019	7.0981	28.1046	71.8954	15.613667
50	87.9814	130.3497	91.0271	90.2233	92.8114	7.1886	26.3913	73.6087	14.661837
J-4	90.8540	126.6366	93.2469	92.7030	93.3127	6.6873	22.7297	77.2703	12.627635
				Mean =	93.0606	6.9394	24.9960	75.0040	13.8866
				Std Dev. =	0.2	0.2416	2.6928	2.6928	1.4960

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight
2) All samples collected on June 18, 2001.
3) Straw samples shredded in the laboratory prior to testing.

Phase 1 - Initial Solids Analysis

Test Date: August 23, 2001
%OC=(100-%FS)/1.8

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
1a	33	91.0635	100.4222	94.7081	91.7496	61.06	38.94	81.17	18.83	
	T9	89.7546	97.4908	93.0133	90.3179	57.88	42.12	82.71	17.29	
	T3	87.3404	96.2040	91.1645	87.9964	56.86	43.14	82.85	17.15	
1a Mean						58.60	41.40	82.24	17.76	45.7
1a St. Dev.						2.19	2.19	0.93	0.93	0.93
1b	74	85.5421	94.3134	89.2228	86.2203	58.04	41.96	81.57	18.43	
	nn 35R	89.8343	98.0622	93.1754	90.4455	59.39	40.61	81.71	18.29	
	nn red	86.0176	94.9306	89.8346	86.6636	57.17	42.83	83.08	16.92	
1b Mean						58.20	41.80	82.12	17.88	45.6
1b St. Dev.						1.12	1.12	0.83	0.83	0.83
Recipe 1 Mean								**82.18**		**45.7**
Recipe 1 St. Dev. (between 1a and 1b)								0.09		0.05
									%RSD =	0.11

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
2a	G	104.0151	113.3129	106.7091	104.5036	71.03	28.97	81.87	18.13	
	J-8	91.9104	101.4841	94.1991	92.3376	76.09	23.91	81.33	18.67	
	56	89.9814	99.6713	92.8725	90.6066	70.16	29.84	78.38	21.62	
2a Mean						72.43	27.57	80.53	19.47	44.7
2a St. Dev.						3.20	3.20	1.88	1.88	1.88
2b	H1	90.8014	100.0070	93.2644	91.3221	73.24	26.76	78.86	21.14	
	T5	88.6136	98.5895	91.0144	89.1095	75.93	24.07	79.34	20.66	
	no handle	90.3086	99.8356	broke	-					
2b Mean						74.59	25.41	79.10	20.90	43.9
2b St. Dev.						1.90	1.90	0.34	0.34	0.34
Recipe 2 Mean								**79.81**		**44.3**
Recipe 2 St. Dev. (between 2a and 2b)								1.01		0.56
									%RSD =	1.26

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
3a	J-6	81.6155	91.3352	87.2955	82.7220	41.56	58.44	80.52	19.48	
	7	89.3041	99.1300	94.9324	disturbed	42.72	57.28			
	3	90.9437	100.7719	96.6654	92.0090	41.78	58.22	81.38	18.62	
3a Mean						42.02	57.98	80.95	19.05	45.0
3a St. Dev.						0.61	0.61	0.61	0.61	0.61
3b	R1	93.4913	103.2218	99.0485	94.6246	42.89	57.11	79.61	20.39	
	2	91.8600	100.3108	96.7478	92.7934	42.16	57.84	80.90	19.10	
	25	92.1652	99.9084	96.7553	93.0503	40.72	59.28	80.72	19.28	
3b Mean						41.92	58.08	80.41	19.59	44.7
3b St. Dev.						1.10	1.10	0.70	0.70	0.70
Recipe 3 Mean								**80.68**		**44.8**
Recipe 3 St. Dev. (between 3a and 3b)								0.38		0.21
									%RSD =	0.47

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
4a	A-7	91.3107	100.9540	95.0450	92.0798	61.28	38.72	79.40	20.60	
	49	90.9486	99.2875	94.3628	91.6143	59.06	40.94	80.50	19.50	
	A-11	89.1607	98.8374	93.6262	90.0488	53.85	46.15	80.11	19.89	
4a Mean						58.06	41.94	80.01	19.99	44.4
4a St. Dev.						3.81	3.81	0.56	0.56	0.56
4b	A-8	89.8055	98.5957	92.0875	90.2541	74.04	25.96	80.34	19.66	
	T8	88.0321	97.7744	91.8040	88.7635	61.28	38.72	80.61	19.39	
	45	89.1923	98.5330	93.3620	90.0294	55.36	44.64	79.92	20.08	
4b Mean						63.56	36.44	80.29	19.71	44.6
4b St. Dev.						9.55	9.55	0.35	0.35	0.35
Recipe 4 Mean								**80.15**		**44.5**
Recipe 4 St. Dev. (between 4a and 4b)								0.20		0.11
									%RSD =	0.25

Phase 1 - Initial Solids Analysis

Test Date: August 23, 2001
%OC=(100-%FS)/1.8

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
5a	57	91.5992	100.0736	94.6111	92.1693	64.46	35.54	81.07	18.93	
	30	94.1616	102.5252	96.9760	94.7464	66.35	33.65	79.22	20.78	
	18	90.1442	98.5408	93.0829	90.7070	65.00	35.00	80.85	19.15	
5a Mean						65.27	34.73	80.38	19.62	44.7
5a St. Dev.						0.97	0.97	1.01	1.01	1.01
5b	J-3	90.3802	98.5560	93.1368	90.8988	66.28	33.72	81.19	18.81	
	11B	103.9079	113.5660	107.1498	104.5362	66.43	33.57	80.62	19.38	
	J-12	87.1116	97.3770	90.7709	87.7983	64.35	35.65	81.23	18.77	
5b Mean						65.69	34.31	81.01	18.99	45.0
5b St. Dev.						1.16	1.16	0.34	0.34	0.34
Recipe 5 Mean								**80.70**		**44.8**
Recipe 5 St. Dev. (between 5a and 5b)								0.45		0.25
									%RSD =	0.55

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
6a	70	71.0105	80.1151	73.4060	71.4079	73.69	26.31	83.41	16.59	
	T2	88.1434	97.1422	90.6664	88.6111	71.96	28.04	81.46	18.54	
	nn 37-P	71.6303	80.3980	74.0238	72.1103	72.70	27.30	79.95	20.05	
6a Mean						72.78	27.22	81.61	18.39	45.3
6a St. Dev.						0.87	0.87	1.74	1.74	1.74
6b	T7	88.6406	97.8214	91.2320	89.1261	71.77	28.23	81.26	18.74	
	32	94.0833	104.0430	96.8098	94.6156	72.62	27.38	80.48	19.52	
	50	90.7168	99.6220	93.0990	91.1848	73.25	26.75	80.35	19.65	
6b Mean						72.55	27.45	80.70	19.30	44.8
6b St. Dev.						0.74	0.74	0.49	0.49	0.49
Recipe 6 Mean								**81.15**		**45.1**
Recipe 6 St. Dev. (between 6a and 6b)								0.64		0.36
									%RSD =	0.79

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
7a	J-4	90.8567	98.7456	93.7624	91.4017	63.17	36.83	81.24	18.76	
	50	87.9836	96.2455	90.9268	88.5664	64.38	35.62	80.20	19.80	
	40	91.6251	99.8118	94.4188	92.1948	65.88	34.12	79.61	20.39	
7a Mean						64.47	35.53	80.35	19.65	44.6
7a St. Dev.						1.36	1.36	0.83	0.83	0.83
7b	34	90.0013	99.2850	93.4540	90.6333	62.81	37.19	81.70	18.30	
	J-7	92.9659	102.8898	96.1604	93.6449	67.81	32.19	78.74	21.26	
	T1	87.7708	95.9265	90.4678	88.2976	66.93	33.07	80.47	19.53	
7b Mean						65.85	34.15	80.30	19.70	44.6
7b St. Dev.						2.67	2.67	1.48	1.48	1.48
Recipe 7 Mean								**80.33**		**44.6**
Recipe 7 St. Dev. (between 7a and 7b)								0.03		0.02
									%RSD =	0.04

Phase 1 - Final Solids Analysis

Tested October 31, 2001
%OC=(100-%FS)/1.8

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
1a	56	89.9819	98.0829	93.8353	90.9853	52.43	47.57	73.96	26.04	
	J-8	91.9117	102.5341	96.9910	93.2748	52.18	47.82	73.16	26.84	
	57	91.5969	101.7965	96.5091	92.9050	51.84	48.16	73.37	26.63	
1a Mean						52.15	47.85	73.50	26.50	40.8
1a St. Dev.						0.30	0.30	0.41	0.41	0.41
1b	74	85.5431	94.9780	90.0149	86.7520	52.60	47.40	72.97	27.03	
	J-4	90.8591	101.5570	95.8571	92.1659	53.28	46.72	73.85	26.15	
	3	90.9443	100.3640	95.4240	92.1560	52.44	47.56	72.95	27.05	
1b Mean						52.78	47.22	73.26	26.74	40.7
1b St. Dev.						0.44	0.44	0.52	0.52	0.52
Recipe 1 Mean								73.38		40.8
Recipe 1 St. Dev. (between 1a and 1b)								0.17		0.09

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
2a	T8	88.0349	105.2603	93.3057	89.8116	69.40	30.60	66.29	33.71	
	A-11	89.1616	107.1790	94.7530	91.0706	68.97	31.03	65.86	34.14	
	45	89.1936	105.6909	94.1988	90.8532	69.66	30.34	66.84	33.16	
2a Mean						69.34	30.66	66.33	33.67	36.9
2a St. Dev.						0.35	0.35	0.49	0.49	0.49
2b	7	89.3068	105.2142	93.9465	90.9579	70.83	29.17	64.41	35.59	
	30	94.1564	112.3161	99.3728	96.0314	71.27	28.73	64.06	35.94	
	J-6	81.6164	98.0611	86.4302	83.3730	70.73	29.27	63.51	36.49	
2b Mean						71.05	28.95	64.23	35.77	35.7
2b St. Dev.						0.31	0.31	0.25	0.25	0.25
Recipe 2 Mean								65.28		36.3
Recipe 2 St. Dev. (between 2a and 2b)								1.48		0.82

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
3a	T7	88.6357	98.7401	94.7339	90.4561	39.65	60.35	70.15	29.85	
	33	91.0620	101.8165	97.5654	cracked	39.53	60.47			
	40	91.6273	102.0515	98.0312	93.5516	38.57	61.43	69.95	30.05	
3a Mean						39.25	60.75	70.05	29.95	38.9
3a St. Dev.						0.59	0.59	0.14	0.14	0.14
3b	R1	93.4911	102.4266	99.2175	95.2219	35.91	64.09	69.78	30.22	
	G	104.0152	111.8290	108.9163	105.4827	37.28	62.72	70.06	29.94	
	J-12	87.1134	94.4370	91.5849	88.4296	38.94	61.06	70.56	29.44	
3b Mean						37.38	62.62	70.13	29.87	39.0
3b St. Dev.						1.52	1.52	0.40	0.40	0.40
Recipe 3 Mean								70.09		38.9
Recipe 3 St. Dev. (between 3a and 3b)								0.06		0.03

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
4a	T1	87.7720	97.6890	92.6022	89.5120	51.29	48.71	63.98	36.02	
	32	94.0810	105.3106	99.5265	96.0453	51.51	48.49	63.93	36.07	
	T5	88.6123	99.6614	93.9659	90.5314	51.55	48.45	64.15	35.85	
4a Mean						51.45	48.55	64.02	35.98	35.6
4a St. Dev.						0.14	0.14	0.12	0.12	0.12
4b	70	70.9766	80.8403	75.6130	72.6112	53.00	47.00	64.74	35.26	
	T3	87.3244	99.3778	92.9329	89.3046	53.47	46.53	64.69	35.31	
	T9	89.7526	97.7125	93.4758	91.0425	53.23	46.77	65.36	34.64	
4b Mean						53.23	46.77	64.93	35.07	36.1
4b St. Dev.						0.24	0.24	0.37	0.37	0.37
Recipe 4 Mean								64.47		35.8
Recipe 4 St. Dev. (between 4a and 4b)								0.64		0.36

Phase 1 - Final Solids Analysis

Tested October 31, 2001
%OC=(100-%FS)/1.8

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
5a	T12	88.1906	101.7646	93.5985	90.2244	60.16	39.84	62.39	37.61	
	T4	87.4935	100.1876	92.6012	89.3975	59.76	40.24	62.72	37.28	
	T6	88.2116	102.0984	93.6976	90.2240	60.49	39.51	63.32	36.68	
5a Mean						60.14	39.86	62.81	37.19	34.9
5a St. Dev.						0.37	0.37	0.47	0.47	0.47
5b	T11	87.8896	99.8980	92.4934	89.7191	61.66	38.34	60.26	39.74	
	A-12	94.9554	109.1740	100.4936	97.1640	61.05	38.95	60.12	39.88	
	38	83.9456	97.4978	89.1888	86.0114	61.31	38.69	60.60	39.40	
5b Mean						61.34	38.66	60.33	39.67	33.5
5b St. Dev.						0.31	0.31	0.25	0.25	0.25
Recipe 5 Mean								61.57		34.2
Recipe 5 St. Dev. (between 5a and 5b)								1.76		0.98

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
6a	30	94.1455	107.6910	98.0477	95.8625	71.19	28.81	56.00	44.00	
	J-6	81.6067	93.8590	85.2008	83.1730	70.67	29.33	56.42	43.58	
	7	89.2954	102.4120	93.0221	90.9362	71.59	28.41	55.97	44.03	
6a Mean						71.15	28.85	56.13	43.87	31.2
6a St. Dev.						0.46	0.46	0.25	0.25	0.25
6b	J-4	90.8554	101.1469	93.7790	92.1192	71.59	28.41	56.77	43.23	
	3	90.9391	105.1501	94.9020	92.6646	72.11	27.89	56.46	43.54	
	74	85.5387	101.2220	89.8895	87.4177	72.26	27.74	56.81	43.19	
6b Mean						71.99	28.01	56.68	43.32	31.5
6b St. Dev.						0.35	0.35	0.19	0.19	0.19
Recipe 6 Mean								56.41		31.3
Recipe 6 St. Dev. (between 6a and 6b)								0.39		0.22

Reactor	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC (db)
7a	T2	88.1442	97.8504	91.9413	89.7946	60.88	39.12	56.54	43.46	
	50	90.7192	99.2448	94.0512	92.1680	60.92	39.08	56.52	43.48	
	H1	90.8016	100.0721	94.3661	92.3527	61.55	38.45	56.48	43.52	
7a Mean						61.12	38.88	56.51	43.49	31.4
7a St. Dev.						0.38	0.38	0.03	0.03	0.03
7b	49	90.9470	101.5844	95.2017	92.7013	60.00	40.00	58.77	41.23	
	A-7	91.3097	104.3008	96.5408	93.5024	59.73	40.27	58.08	41.92	
	A-8	89.8043	101.3888	94.4218	91.7258	60.14	39.86	58.39	41.61	
7b Mean						59.96	40.04	58.41	41.59	32.5
7b St. Dev.						0.21	0.21	0.34	0.34	0.34
Recipe 7 Mean								57.46		31.9
Recipe 7 St. Dev. (between 7a and 7b)								1.34		0.75

Phase 1 - Volatile Solids Summary
Reactor Basis (standard deviations are for triplicate samples)

Reactor	Initial %VS	Initial Dry Weight (g)	Initial VS (g)	Final %VS	Final Dry Weight (g)	Final VS (g)	% Reduction of VS Mass
1a	82.24	90.12	74.12	73.50	54.63	40.15	45.8
st.dev.	0.93		0.93	0.41		0.41	
1b	82.12	90.03	73.93	73.26	54.68	40.06	45.8
st.dev.	0.83		0.83	0.52		0.52	
2a	80.53	80.27	64.64	66.33	42.12	27.94	56.8
st.dev.	1.88		1.88	0.49		0.49	
2b	79.10	80.51	63.68	64.23	39.98	25.68	59.7
st.dev.	0.34		0.34	0.25		0.25	
3a	80.95	152.62	123.55	70.05	96.34	67.49	45.4
st.dev.	0.61		0.61	0.14		0.14	
3b	80.41	155.06	124.68	70.13	91.74	64.34	48.4
st.dev.	0.70		0.70	0.40		0.40	
4a	80.01	114.30	91.45	64.02	58.73	37.60	58.9
st.dev.	0.56		0.56	0.12		0.12	
4b	80.29	113.70	91.29	64.93	58.28	37.84	58.5
st.dev.	0.35		0.35	0.37		0.37	
5a	80.38	96.49	77.56	62.81	44.46	27.93	64.0
st.dev.	1.01		1.01	0.47		0.47	
5b	81.01	96.18	77.92	60.33	41.56	25.07	67.8
st.dev.	0.34		0.34	0.25		0.25	
6a	81.61	80.50	65.69	56.13	32.28	18.12	72.4
st.dev.	1.74		1.74	0.25		0.25	
6b	80.70	76.54	61.77	56.68	32.42	18.38	70.2
st.dev.	0.49		0.49	0.19		0.19	
7a	80.35	96.30	77.38	56.51	39.85	22.52	70.9
st.dev.	0.83		0.83	0.03		0.03	
7b	80.30	94.05	75.52	58.41	40.30	23.54	68.8
st.dev.	1.48		1.48	0.34		0.34	

Phase 1 - Volatile Solids Summary
Recipe Basis (standard deviations are for duplicate reactors)

Recipe	%MC	Initial %VS	Initial VS (g)	Final %VS	Final VS (g)	% Reduction
1A	57	82.18	74.03	73.38	40.10	45.8
st.dev.		0.09	0.13	0.17	0.07	0.0
1B	70	79.81	64.16	65.28	26.81	58.2
st.dev.		1.01	0.67	1.48	1.60	2.0
2A	40	80.68	124.11	70.09	65.91	46.9
st.dev.		0.38	0.80	0.06	2.22	2.1
2B	55	80.15	91.37	64.47	37.72	58.7
st.dev.		0.20	0.11	0.64	0.17	0.2
2C	62.5	80.70	77.74	61.57	26.50	65.9
st.dev.		0.45	0.25	1.76	2.02	2.7
2D	70	81.15	63.73	56.41	18.25	71.3
st.dev.		0.64	2.78	0.39	0.18	1.5
2E	62.5	80.33	76.45	57.46	23.03	69.9
st.dev.		0.03	1.31	1.34	0.72	1.5

Phase 1 - C:N Summary
Reactor Basis

Reactor	Initial C:N	Final C:N
1a	31.7	21.8
1b	31.7	20.0
2a	31.7	15.2
2b	31.7	13.2
3a	34.7	22.3
3b	34.7	22.2
4a	34.7	17.6
4b	34.7	17.6
5a	34.7	16.5
5b	34.7	14.5
6a	34.7	12.4
6b	34.7	12.2
7a	28.8	12.3
7b	28.8	13.2

Recipe Basis
(standard deviations are for duplicate reactors)

Recipe	Initial C:N	Final C:N
1A	31.7	20.9
st.dev.	0	1.3
1B	31.7	14.2
st.dev.	0	1.4
2A	34.7	22.3
st.dev.	0	0.1
2B	34.7	17.6
st.dev.	0	0.0
2C	34.7	15.5
st.dev.	0	1.4
2D	34.7	12.3
st.dev.	0	0.1
2E	28.8	12.8
st.dev.	0	0.6

Phase 1 - Organic Carbon Summary
Reactor Basis (standard deviations are for triplicate samples)

Reactor	Initial %OC	Initial Dry Weight (g)	Initial mass OC (g)	Final %OC	Final Dry Weight (g)	Final mass OC (g)	% Reduction in Mass of OC
1a	45.69	90.12	41.18	40.83	54.63	22.31	45.8
st.dev.	0.93			0.41			
1b	45.62	90.03	41.07	40.70	54.68	22.25	45.8
st.dev.	0.83			0.52			
2a	44.74	80.27	35.91	36.85	42.12	15.52	56.8
st.dev.	1.88			0.49			
2b	43.95	80.51	35.38	35.69	39.98	14.27	59.7
st.dev.	0.34			0.25			
3a	44.97	152.62	68.64	38.92	96.34	37.49	45.4
st.dev.	0.61			0.14			
3b	44.67	155.06	69.27	38.96	91.74	35.74	48.4
st.dev.	0.70			0.40			
4a	44.45	114.30	50.80	35.57	58.73	20.89	58.9
st.dev.	0.56			0.12			
4b	44.61	113.70	50.72	36.07	58.28	21.02	58.5
st.dev.	0.35			0.37			
5a	44.66	96.49	43.09	34.89	44.46	15.51	64.0
st.dev.	1.01			0.47			
5b	45.01	96.18	43.29	33.52	41.56	13.93	67.8
st.dev.	0.34			0.25			
6a	45.34	80.50	36.50	31.18	32.28	10.07	72.4
st.dev.	1.74			0.25			
6b	44.83	76.54	34.31	31.49	32.42	10.21	70.2
st.dev.	0.49			0.19			
7a	44.64	96.30	42.99	31.40	39.85	12.51	70.9
st.dev.	0.83			0.03			
7b	44.61	94.05	41.96	32.45	40.30	13.08	68.8
st.dev.	1.48			0.34			

Phase 1 - Organic Carbon Summary
Recipe Basis (standard deviations are for duplicate reactors)

Recipe	Initial %OC	Initial mass OC (g)	Final %OC	Final mass OC (g)	% Reduction
1A	45.66	41.13	40.77	22.28	45.8
st.dev.	0.05	0.07	0.09	0.04	0.0
1B	44.34	35.65	36.27	14.89	58.2
st.dev.	0.56	0.37	0.82	0.89	2.0
2A	44.82	68.95	38.94	36.62	46.9
st.dev.	0.21	0.45	0.03	1.24	2.1
2B	44.53	50.76	35.82	20.96	58.7
st.dev.	0.11	0.06	0.36	0.10	0.2
2C	44.83	43.19	34.21	14.72	65.9
st.dev.	0.25	0.14	0.98	1.12	2.7
2D	45.08	35.41	31.34	10.14	71.3
st.dev.	0.36	1.54	0.22	0.10	1.5
2E	44.63	42.47	31.92	12.79	69.9
st.dev.	0.02	0.73	0.75	0.40	1.5

Phase 1 - % Nitrogen Summary
Reactor Basis

Reactor	Start %N	Start Dry Weight (g)	Start, mass N (g)	Finish %N	Finish Dry Weight (g)	Finish, mass N (g)	% Loss in mass of N
1a	1.43	90.12	1.29	1.87	54.63	1.02	20.7
st.dev.	0.23			0.13			
1b	1.43	90.03	1.29	2.04	54.68	1.12	13.4
st.dev.	0.23			0.11			
2a	1.43	80.27	1.15	2.43	42.12	1.02	10.8
st.dev.	0.23			0.13			
2b	1.43	80.51	1.15	2.70	39.98	1.08	6.2
st.dev.	0.23			0.36			
3a	1.29	152.62	1.97	1.74	96.34	1.68	14.9
st.dev.	0.13			0.08			
3b	1.29	155.06	2.00	1.76	91.74	1.61	19.3
st.dev.	0.13			0.03			
4a	1.29	114.30	1.47	2.03	58.73	1.19	19.1
st.dev.	0.13			0.06			
4b	1.29	113.70	1.47	2.05	58.28	1.19	18.5
st.dev.	0.13			0.04			
5a	1.29	96.49	1.24	2.12	44.46	0.94	24.3
st.dev.	0.13			0.05			
5b	1.29	96.18	1.24	2.31	41.56	0.96	22.6
st.dev.	0.13			0.04			
6a	1.29	80.50	1.04	2.51	32.28	0.81	22.0
st.dev.	0.13			0.05			
6b	1.29	76.54	0.99	2.58	32.42	0.84	15.3
st.dev.	0.13			0.07			
7a	1.55	96.30	1.49	2.53	39.85	1.01	32.5
st.dev.	0.18			0.03			
7b	1.55	94.05	1.46	2.45	40.30	0.99	32.3
st.dev.	0.18			0.11			

Phase 1 - % Nitrogen Summary
Recipe Basis (standard deviations are for duplicate reactors)

Recipe	Set %MC	Start C:N	Start %N	Start, mass N (g)	Finish %N	Finish, mass N (g)	% Loss in mass of N
1A	57	32.0	1.43	1.29	1.96	1.07	17.0
st.dev.			0.23	0.00	0.14	0.07	5.2
1B	70	31.0	1.43	1.15	2.57	1.05	8.5
st.dev.			0.23	0.00	0.28	0.04	3.2
2A	40	34.7	1.29	1.98	1.75	1.65	17.1
st.dev.			0.13	0.02	0.05	0.04	3.1
2B	55	34.5	1.29	1.47	2.04	1.19	18.8
st.dev.			0.13	0.01	0.05	0.00	0.4
2C	62.5	34.7	1.29	1.24	2.21	0.95	23.4
st.dev.			0.13	0.00	0.11	0.01	1.2
2D	70	35.0	1.29	1.01	2.54	0.82	18.6
st.dev.			0.13	0.04	0.07	0.02	4.7
2E	62.5	28.8	1.55	1.48	2.49	1.00	32.4
st.dev.			0.18	0.02	0.08	0.01	0.1

Reactor Weights

Reactor Basis

Reactor	% Reduction
1a	39.4
1b	39.3
2a	47.5
2b	50.3
3a	36.9
3b	40.8
4a	48.6
4b	48.7
5a	53.9
5b	56.8
6a	59.9
6b	57.6
7a	58.6
7b	57.2

Recipe Basis (standard deviations are for duplicate reactors)

Recipe	% Reduction	st.dev.
1A	39.3	0.1
1B	48.9	2.0
2A	38.9	2.8
2B	48.7	0.1
2C	55.4	2.0
2D	58.8	1.6
2E	57.9	1.0

Phase 1 - Reactor Dry Weights (material only)

August 23, 2001 (Day 0) to October 24, 2001 (Day 62).
Calculated from readjusted wet weights (measured after MC adjustments) with the exception of October 24, 2001 (Day 62) which was calculated from a non-readjusted wet weight.
All weights are in grams.

		Aug 23	Aug 30	Sept 4	Sept 8	Sept 12	Sept 15	Sept 19	Sept 21	Sept 24	Sept 27	Sept 30	Oct 3	Oct 5	Oct 8	Oct 10	Oct 12	Oct 14	Oct 16	Oct 18	Oct 20	Oct 22	Oct 24
Recipe	Reactor	Day 0	Day 7	Day 12	Day 16	Day 20	Day 23	Day 27	Day 29	Day 32	Day 35	Day 38	Day 41	Day 43	Day 46	Day 48	Day 50	Day 52	Day 54	Day 56	Day 58	Day 60	Day 62
straw	1a	90.12	76.80	72.34	74.09	66.92	61.35	60.59	59.02	61.02	59.82	59.22	58.78	58.99	58.40	59.41	55.54	58.73	56.65	57.71	57.86	54.85	54.63
57% MC	1b	90.03	86.28	77.92	49.76	65.69	64.92	62.90	63.61	64.97	66.94	64.04	58.73	59.86	60.51	61.62	56.51	60.26	59.68	59.79	57.07	56.31	54.68
straw	2a	80.27	66.48	62.80	59.65	56.68	48.76	48.48	51.56	50.94	51.67	48.72	46.78	46.10	47.65	45.83	44.54	44.56	41.49	43.82	40.82	38.80	42.12
70% MC	2b	80.51	84.05	68.93	58.98	55.53	46.42	47.36	36.65	43.78	50.33	48.33	42.08	46.43	43.55	42.40	43.22	38.97	39.07	38.21	40.41	36.32	39.98
str+und	3a	152.62	145.22	116.22	113.96	110.44	107.95	106.39	107.56	109.10	106.19	103.33	102.92	102.46	101.82	103.26	101.23	100.01	98.83	98.15	96.23	97.19	96.34
40% MC	3b	155.06	134.93	118.34	112.29	112.52	107.69	107.24	107.54	106.34	102.35	102.22	102.97	101.01	99.05	100.46	97.36	99.13	100.06	98.29	97.43	95.07	91.74
str+und	4a	114.30	103.97	95.31	80.66	76.27	73.40	70.21	71.19	69.44	68.26	67.90	68.63	66.80	65.22	64.75	64.42	65.60	63.17	63.68	63.09	61.50	58.73
55% MC	4b	113.70	105.38	66.74	76.91	70.51	73.14	70.47	70.80	70.81	68.68	68.78	68.54	66.11	64.99	65.77	64.08	66.24	62.64	61.76	59.42	59.64	58.28
str+und	5a	96.49	88.16	71.29	65.21	58.82	60.48	55.67	56.17	54.16	54.95	53.12	51.67	50.89	51.38	51.38	49.06	49.81	48.88	51.66	47.85	46.58	44.46
62.5% MC	5b	96.18	87.97	75.27	60.56	55.46	55.62	52.88	56.92	51.83	53.83	53.61	48.73	46.46	46.62	46.88	45.89	47.48	45.44	43.74	43.13	41.75	41.56
str+und	6a	80.50	64.95	55.69	45.21	51.53	41.21	40.01	39.57	42.23	40.49	39.94	40.76	37.52	35.65	33.99	32.81	34.70	31.96	33.45	31.99	32.62	32.28
70% MC	6b	76.54	66.23	58.37	44.38	44.39	44.88	39.62	40.85	41.32	39.61	39.95	40.22	39.77	34.88	34.69	32.72	32.20	32.31	31.97	30.96	31.22	32.42
str+und+lag	7a	96.30	77.74	67.79	51.75	52.79	51.87	50.42	51.11	50.47	50.64	49.34	47.72	49.13	46.31	48.23	43.27	44.58	41.27	41.59	42.45	41.07	39.85
62.5% MC	7b	94.05	62.85	72.89	54.92	53.31	53.26	54.31	55.29	51.23	49.87	49.76	46.65	45.39	44.82	45.15	46.02	43.75	44.62	43.96	42.73	42.26	40.30

Phase 1 - Recipe Dry Weights (averages of reactors, material only)

August 23, 2001 (Day 0) to October 24, 2001 (Day 62).
All weights are in grams.

	Date	Aug 23	Aug 30	Sept 4	Sept 8	Sept 12	Sept 15	Sept 19	Sept 21	Sept 24	Sept 27	Sept 30	Oct 3	Oct 5	Oct 8	Oct 10	Oct 12	Oct 14	Oct 16	Oct 18	Oct 20	Oct 22	Oct 24
Recipe	Day	0	7	12	16	20	23	27	29	32	35	38	41	43	46	48	50	52	54	56	58	60	62
1A		90.07	81.54	75.13	61.93	66.30	63.14	61.75	61.31	63.00	63.38	61.63	58.75	59.42	59.46	60.51	56.02	59.50	58.17	58.75	57.46	55.58	54.66
1B		80.39	75.26	65.87	59.32	56.10	47.59	47.92	44.10	47.36	51.00	48.52	44.43	46.26	45.60	44.11	43.88	41.76	40.28	41.01	40.61	37.56	41.05
2A		153.84	140.08	117.28	113.12	111.48	107.82	106.82	107.55	107.72	104.27	102.78	102.94	101.73	100.43	101.86	99.30	99.57	99.44	98.22	96.83	96.13	94.04
2B		114.00	104.67	81.03	78.79	73.39	73.27	70.34	70.99	70.13	68.47	68.34	68.59	66.46	65.11	65.26	64.25	65.92	62.91	62.72	61.26	60.57	58.50
2C		96.34	88.07	73.28	62.89	57.14	58.05	54.27	56.54	53.00	54.39	53.36	50.20	48.68	49.00	49.13	47.48	48.64	47.16	47.70	45.49	44.16	43.01
2D		78.52	65.59	57.03	44.79	47.96	43.05	39.82	40.21	41.77	40.05	39.94	40.49	38.65	35.27	34.34	32.76	33.45	32.13	32.71	31.48	31.92	32.35
2E		95.17	70.30	70.34	53.33	53.05	52.57	52.37	53.20	50.85	50.26	49.55	47.18	47.26	45.56	46.69	44.65	44.16	42.94	42.77	42.59	41.66	40.07

Phase 1 - Accumulated Losses of Dry Weights on a Recipe Basis (averages of reactors, material only)

August 23, 2001 (Day 0) to October 24, 2001 (Day 62).
Weights shown are cumulative dry weight lost throughout the experiment.
All weights are in grams.

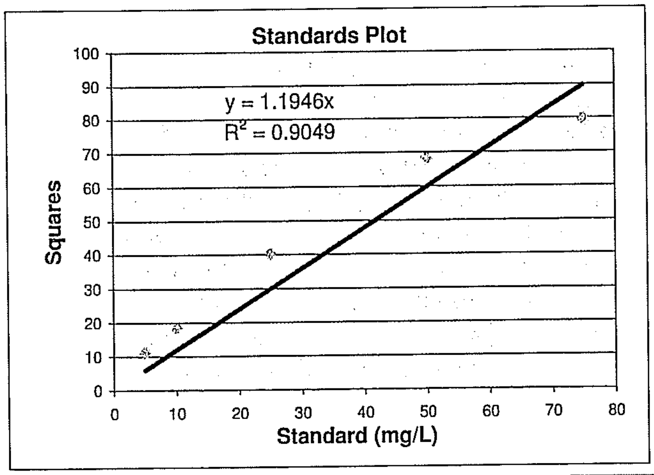
	Date	Aug 23	Aug 30	Sept 4	Sept 8	Sept 12	Sept 15	Sept 19	Sept 21	Sept 24	Sept 27	Sept 30	Oct 3	Oct 5	Oct 8	Oct 10	Oct 12	Oct 14	Oct 16	Oct 18	Oct 20	Oct 22	Oct 24
Recipe	Day	0	7	12	16	20	23	27	29	32	35	38	41	43	46	48	50	52	54	56	58	60	62
1A		0.00	8.53	14.94	28.15	23.77	26.94	28.33	28.76	27.08	26.69	28.44	31.32	30.65	30.61	29.56	34.05	30.58	31.90	31.32	32.61	34.49	35.41
1B		0.00	5.13	14.52	21.07	24.29	32.80	32.47	36.29	33.03	29.39	31.87	35.96	34.13	34.79	36.28	36.51	38.63	40.11	39.38	39.78	42.83	39.34
2A		0.00	13.76	36.56	40.72	42.36	46.02	47.03	46.29	46.12	49.57	51.06	50.90	52.11	53.41	51.98	54.54	54.27	54.40	55.62	57.01	57.71	59.80
2B		0.00	9.33	32.97	35.21	40.61	40.73	43.66	43.00	43.87	45.53	45.66	45.41	47.54	48.89	48.74	49.75	48.08	51.09	51.28	52.74	53.43	55.49
2C		0.00	8.27	23.06	33.45	39.20	38.29	42.06	39.79	43.34	41.95	42.97	46.13	47.66	47.34	47.20	48.86	47.69	49.18	48.64	50.84	52.17	53.33
2D		0.00	12.93	21.49	33.73	30.56	35.47	38.70	38.31	36.75	38.47	38.58	38.03	39.87	43.25	44.18	45.75	45.07	46.39	45.81	47.04	46.60	46.17
2E		0.00	24.88	24.83	41.84	42.13	42.61	42.81	41.97	44.32	44.92	45.62	47.99	47.91	49.61	48.49	50.53	51.01	52.23	52.40	52.58	53.51	55.10

Phase 1 - TKN Analysis for Feedstock Materials (July 4)

Standards:

mg N/L	# of squares
75	79.5
50	68
25	40
10	18.5
5	11

Conversion Equation:
squares/1.1946 = mg N/L



Straw

Sample size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%TS	%N (db)	%OC (db)	C:N
100	28	23.44	1.172	1.17	59	1.99		
100	27	22.60	1.130	1.13	59	1.92		
100	28	23.44	1.172	1.17	59	1.99		
200	41	34.32	1.716	0.86	59	1.45		
200	43	36.00	1.800	0.90	59	1.53		
400	84	70.32	3.516	0.88	59	1.49		
400	86	71.99	3.600	0.90	59	1.53		
500	93.5	78.27	3.913	0.78	59	1.33		
500	103	86.22	4.311	0.86	59	1.46		
					Average =	1.63	45.27	27.77
					Std. Dev. =	0.26	2.16	
					Literature Ranges (Rynk, 1992):	0.3 - 1.1	14 - 165	48 - 150

Notes:
1) Samples collected on June 18, 2001.
2) Analysis completed on July 4, 2001.
3) Used wet straw samples from Bale 3 (MC = 41%) and calculated %N (db) using TS of material.

Lagoon

Sample Size (mL)	# of squares	1:5 dilution	mg N/L	%TS	%N (wb)	%N (db)	%OC (db)	C:N
10	49	245	1025.45	6.9	1.49	21.54		
10	53	265	1109.16	6.9	1.61	23.30		
10	47	235	983.59	6.9	1.43	20.66		
10	48	240	1004.52	6.9	1.46	21.10		
				Average =	1.49	21.65	13.89	0.64
				Std. Dev. =	0.08	1.16	1.5	
				Enviro-Test Laboratories Analysis Report (October 31, 2000):	0.35	10.6		

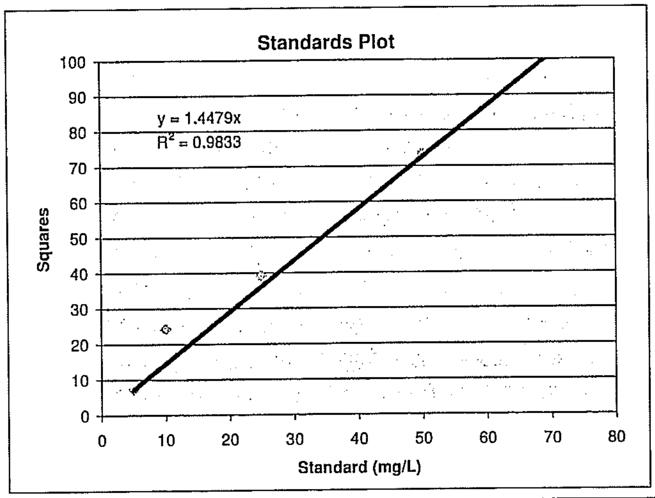
Notes:
1) Samples collected on June 18, 2001.
2) Analysis completed on July 4, 2001.
3) %N (wb) calculation: 1% TS = 10,000 mg/L.
4) Used liquid lagoon sample with MC = 93.1%.

Phase 1 - TKN Analysis for Feedstock Materials

Standards:

mg N/L	# of squares
75	106
50	73
25	39
10	24
5	7

Conversion Equation:
squares/1.4479 = mg N/L



Straw

Sample size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%TS	%N (db)	%OC (db)	C:N
100	21	14.50	0.725	0.73	33	2.20		
300	42	29.01	1.450	0.48	33	1.47		
400	48	33.15	1.658	0.41	33	1.26		
500	51	35.22	1.761	0.35	33	1.07		
					Average =	1.26	45.27	35.85
					Std Dev. =	0.20	2.16	
					Literature Ranges (Rynk, 1992):	0.3 - 1.1	14 - 165	48 - 150

Notes:
1) Samples collected on June 18, 2001.
2) Analysis completed on August 20, 2001.
3) Used wet straw samples from Bale 3 (MC = 41%) and calculated %N (db) using TS of material.
4) %N calculated using TS of material.

Lagoon Mixture

Sample size (mL)	# of squares	:10 dilution	mg N/L	%TS	%N (wb)	%N (db)	%OC (db)	C:N
10	45	450	1553.97	6.9	2.25	32.64		
10	70	700	2417.29	6.9	3.50	50.77		
10	43	430	1484.91	6.9	2.15	31.19		
				Average =	2.64	38.20	13.89	0.36
				Std Dev. =	0.75	10.91	2.69	
				Enviro-Test Laboratories Analysis Report (October 31, 2000):	0.35	10.6		

Notes:
1) Samples collected on June 18, 2001.
2) Analysis completed on August 20, 2001.
3) %N (wb) calculation: 1% TS = 10,000 mg/L.
4) Used liquid lagoon sample with MC = 93.1%.

Phase 1 - TKN Analysis for Feedstock Materials - Summary

Straw

Date Tested	%MC	%TS		%N (db)	%OC (db)	C:N
July 4	41	59	Average	1.59	45.27	28.50
			St. Dev.	0.25	2.16	
August 20	67	33	Average	1.26	45.27	35.85
			St. Dev.	0.20	1.70	
Literature Ranges (Rynk, 1992):				0.3 - 1.1	14 - 165	

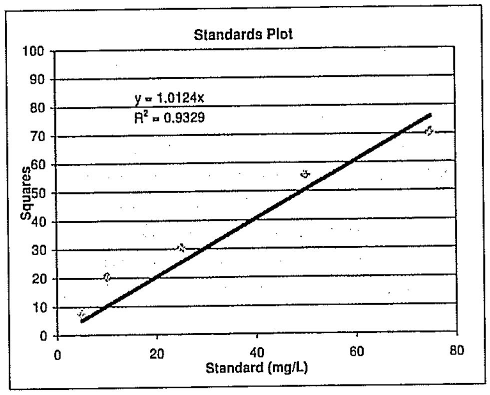
Lagoon Mixture

Date Tested	%MC	%TS		%N (wb)	%N (db)	%OC (db)	C:N
July 4	93.1	6.9	Average	1.49	21.65	13.89	0.64
			St. Dev.	0.08	1.16	2.69	
August 20	93.1	6.9	Average	2.64	38.20	13.89	0.36
			St. Dev.	0.75	10.91	1.50	
Enviro-Test Laboratories Analysis Report (October 31, 2000):				0.35	10.6		

Values Used for Phase 1:

Material		%MC	%N (db)	%OC (db)	C:N
Straw	Value:	57	1.43	45.27	31.74
	Std. Dev.:	16	0.22	2.16	
Lagoon Mix.	Value:	93.1	23.48	13.89	0.59
	Std. Dev.:	0.2	13.75		

Phase 1 - Initial TKN Analysis



Standards

std cal = 3.0

mg N/L	# of squares
75	70
50	55
25	30
10	20
5	7

Conversion Equation:
squares/1.0124 = mg N/L

S+U %MC = 57 (avg. of composite sample)
%TS = 43

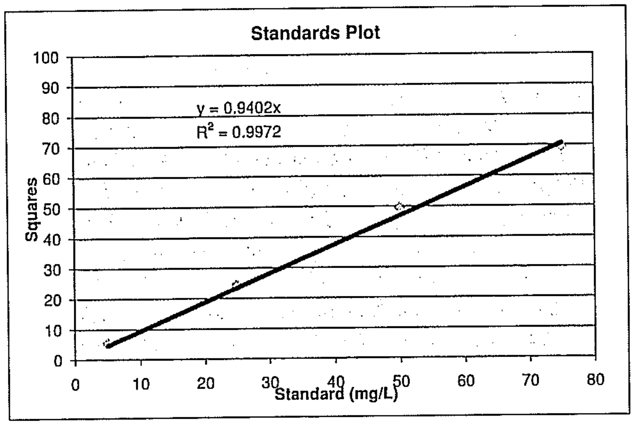
S+U+L %MC = 62.5 (avg. of composite sample)
%TS = 38

Sample	Sample Size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%N (db)	%OC (db)	C:N
S+U 100A	100	13	12.84	0.642	0.64	1.49		
S+U 100B	100	13	12.84	0.642	0.64	1.49		
S+U 100C	100	10	9.88	0.494	0.49	1.15		
S+U 300A	300	29	28.64	1.432	0.48	1.11		
S+U 300B	300	35	34.57	1.729	0.58	1.34		
S+U 300C	300	33	32.60	1.630	0.54	1.26		
S+U 400A	400	42	41.49	2.074	0.52	1.20		
S+U 400B	400	46	45.44	2.272	0.57	1.32		
S+U 400C	400	45	44.45	2.222	0.56	1.29		
				Average =	0.56	1.29	44.80	34.7
				Std. Dev. =	0.06	0.13	1.7	
				%RSD =		10.4		

Sample	Sample Size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%N (db)	%OC (db)	C:N
S+U+L 100A	100	12	11.85	0.593	0.59	1.58		
S+U+L 100B	100	13	12.84	0.642	0.64	1.71		
S+U+L 100C	100	14	13.83	0.691	0.69	1.84		
S+U+L 200A	200	22	21.73	1.087	0.54	1.45		
S+U+L 200C	200	24	23.71	1.185	0.59	1.58		
S+U+L 300A	300	34	33.58	1.679	0.56	1.49		
S+U+L 300B	300	33	32.60	1.630	0.54	1.45		
S+U+L 300C	300	29	28.64	1.432	0.48	1.27		
				Average =	0.58	1.55	44.6	28.8
				Std. Dev. =	0.07	0.18	1.7	
				%RSD =		11.3		

Notes:
1) Analysis completed on September 13, 2001.
2) S+U = straw and under recipe.
3) S+U+L = straw and under and lagoon mixture recipe.

Phase 1 - Final TKN Analysis



Standards
std cal = 3.0

mg N/L	# of squares
75	69
50	49
25	24
10	
5	5

Conversion Equation:
squares/0.9402 = mg N/L

Reactor	Sample	Sample Size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%MC	%TS	%N (db)
1a	i	400	65	69.13	3.457	0.86	52	48	1.80
1a	ii	400	73	77.64	3.882	0.97	52	48	2.02
1a	iii	400	65	69.13	3.457	0.86	52	48	1.80
1a Mean						0.90			1.87
1a St. Dev.						0.06			0.13
1b	i	400	76	80.83	4.042	1.01	53	47	2.15
1b	ii	400	72	76.58	3.829	0.96	53	47	2.04
1b	iii	400	68	72.33	3.616	0.90	53	47	1.92
1b Mean						0.96			2.04
1b St. Dev.						0.05			0.11
Recipe 1 Mean									1.96
Recipe 1 St. Dev. (between 1a and 1b)									0.11

Reactor	Sample	Sample Size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%MC	%TS	%N (db)
2a	i	400	56	59.56	2.978	0.74	69	31	2.40
2a	ii	400	54	57.43	2.872	0.72	69	31	2.32
2a	iii	400	60	63.82	3.191	0.80	69	31	2.57
2a Mean						0.75			2.43
2a St. Dev.						0.04			0.13
2b	i	400	50	53.18	2.659	0.66	71	29	2.29
2b	ii	400	64	68.07	3.404	0.85	71	29	2.93
2b	iii	400	63	67.01	3.350	0.84	71	29	2.89
2b Mean						0.78			2.70
2b St. Dev.						0.10			0.36
Recipe 2 Mean									2.57
Recipe 2 St. Dev. (between 2a and 2b)									0.19

Reactor	Sample	Sample Size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%MC	%TS	%N (db)
3a	i	400	78	82.96	4.148	1.04	39	61	1.70
3a	ii	400	84	89.34	4.467	1.12	39	61	1.83
3a	iii	400	78	82.96	4.148	1.04	39	61	1.70
3a Mean						1.06			1.74
3a St. Dev.						0.05			0.08
3b	i	400	83	88.28	4.414	1.10	37	63	1.75
3b	ii	400	82	87.22	4.361	1.09	37	63	1.73
3b	iii	400	85	90.41	4.520	1.13	37	63	1.79
3b Mean						1.11			1.76
3b St. Dev.						0.02			0.03
Recipe 3 Mean									1.75
Recipe 3 St. Dev. (between 3a and 3b)									0.01

Phase 1 - Final TKN Analysis

Reactor	Sample	Sample Size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%MC	%TS	%N (db)
4a	i	400	73	77.64	3.882	0.97	51	49	1.98
4a	ii	400	77	81.90	4.095	1.02	51	49	2.09
4a	iii	400	74	78.71	3.935	0.98	51	49	2.01
4a Mean						0.99			2.03
4a St. Dev.						0.03			0.06
4b	i	400	72	76.58	3.829	0.96	53	47	2.04
4b	ii	400	71	75.52	3.776	0.94	53	47	2.01
4b	iii	400	74	78.71	3.935	0.98	53	47	2.09
4b Mean						0.96			2.05
4b St. Dev.						0.02			0.04
Recipe 4 Mean									2.04
Recipe 4 St. Dev. (between 4a and 4b)									0.01

Reactor	Sample	Sample Size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%MC	%TS	%N (db)
5a	i	400	62	65.94	3.297	0.82	60	40	2.06
5a	ii	400	65	69.13	3.457	0.86	60	40	2.16
5a	iii	400	64	68.07	3.404	0.85	60	40	2.13
5a Mean						0.85			2.12
5a St. Dev.						0.02			0.05
5b	i	400	69	73.39	3.669	0.92	61	39	2.35
5b	ii	400	67	71.26	3.563	0.89	61	39	2.28
5b	iii	400	67	71.26	3.563	0.89	61	39	2.28
5b Mean						0.90			2.31
5b St. Dev.						0.02			0.04
Recipe 5 Mean									2.21
Recipe 5 St. Dev. (between 5a and 5b)									0.13

Reactor	Sample	Sample Size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%MC	%TS	%N (db)
6a	i	400	56	59.56	2.978	0.74	71	29	2.57
6a	ii	400	54	57.43	2.872	0.72	71	29	2.48
6a	iii	400	54	57.43	2.872	0.72	71	29	2.48
6a Mean						0.73			2.51
6a St. Dev.						0.02			0.05
6b	i	400	53	56.37	2.819	0.70	72	28	2.52
6b	ii	400	54	57.43	2.872	0.72	72	28	2.56
6b	iii	400	56	59.56	2.978	0.74	72	28	2.66
6b Mean						0.72			2.58
6b St. Dev.						0.02			0.07
Recipe 6 Mean									2.54
Recipe 6 St. Dev. (between 6a and 6b)									0.05

Reactor	Sample	Sample Size (mg)	# of squares	mg N/L	mg of N in sample	%N (wb)	%MC	%TS	%N (db)
7a	i	300	55	58.50	2.925	0.97	61	39	2.50
7a	ii	300	56	59.56	2.978	0.99	61	39	2.55
7a	iii	300	56	59.56	2.978	0.99	61	39	2.55
7a Mean						0.99			2.53
7a St. Dev.						0.01			0.03
7b	i	300	53	56.37	2.819	0.94	60	40	2.35
7b	ii	300	58	61.69	3.084	1.03	60	40	2.57
7b	iii	300	55	58.50	2.925	0.97	60	40	2.44
7b Mean						0.98			2.45
7b St. Dev.						0.04			0.11
Recipe 7 Mean									2.49
Recipe 7 St. Dev. (between 7a and 7b)									0.06

Notes:
1) Analysis completed on November 16, 2001.
2) %MC and %TS values from final Phase I solids analysis.

Phase 1 - Feedstock Characterization
Wet Bulk Density - Straw

Tested June 21, 2001

Used a 2 US gallon container to measure the wet bulk density
2 US gal = 0.007571 m^3
2 US gal = 7.571 L

Sample	Tare (kg)	Tare + material (kg)	Bulk Density (kg/m^3)
Bale 1	0.4	1.22	108.31
Bale 2	0.4	0.75	46.23
Bale 3	0.4	0.79	51.51
Bale 4	0.4	0.91	67.36
Bale 5	0.4	1.69	170.39
		Mean =	88.8
		Std. Dev. =	51.7
		Literature value (Rynk, 1992) =	134.7

Notes:
1) All samples collected on June 18, 2001.

Phase 1 - Example of Moisture Content Adjustment Calculation Sheet

Reactor 1a

Initial MC =	49	%
Target MC =	57	%
MC =	(wet - dry)/wet	
original mass of sample (wet) =	106.58	g
calculated dry mass =	54.36	g
target wet mass (calculated) =	126.41	g
Water addition needed =	19.83	g or mL

This number varies with each moisture test

This number varies with each moisture test

163.65 g = tare weight
400.08 g = mass at start up (tare+material)
236.43 g = mass at start up (material only)
209.57 g = mass at start up (after sampling, material only)
373.22 g = mass at start up (after sampling, tare + material)

290.06 g = proper mass after MC adjustment (tare + material)

Dry Mass Calculation:
dry mass = wet mass - (%MC/100)*wet mass
Target Wet Mass Calculation:
target wet mass = calculated dry mass/(1 - target %MC/100)
Water Addition Needed Calculation:
Water needed = target wet mass - original wet mass

Reactor 1b

Initial MC =	55	%
Desired MC =	57	%
MC =	(wet - dry)/wet	
original mass of sample (wet) =	120.91	g
calculated dry mass =	54.41	g
desired wet mass (calculated) =	126.53	g
Water addition needed =	5.62	g or mL

This number varies with each moisture test

This number varies with each moisture test

163.50 g = tare weight
400.15 g = mass at start up (tare+material)
236.65 g = mass at start up (material only)
209.37 g = mass at start up (after sampling, material only)
372.87 g = mass at start up (after sampling, tare + material)

290.03 g = proper mass after MC adjustment (tare + material)

Phase 1 - Moisture Content Measurements

Recipe Description	#	Day 8	Day 13	Day 17	Day 21	Day 24	Day 28	Day 30	Day 33	Day 36	Day 39	Day 42	Day 44	Day 47	Day 49	Day 51	Day 53	Day 55	Day 57	Day 59	Day 61	Day 63	Mean	St. Dev.	Excluding Day 28		After Day 47	
																									Mean	St.Dev.	Mean	St.Dev.
Straw (MC = 57%)	1a	49	49	51	54	28	14	40	52	52	50	49	22	11	46	49	42	47	51	46	55	49	43	13	44	12	48	4
	1b	38	54	50	9	47	50	39	51	45	57	54	24	24	49	44	44	45	50	52	54	55	45	12	44	12	48	4
Straw (MC = 70%)	2a	61	60	60	68	63	28	48	65	67	70	44	38	34	60	63	51	66	67	67	70	64	58	12	59	11	63	6
	2b	57	70	63	65	70	10	70	56	62	70	52	44	45	67	41	62	67	69	65	70	66	59	14	61	10	63	10
Straw + Unders (MC = 40%)	3a	20	29	29	10	6	5	24	35	34	37	11	11	15	31	29	34	35	37	33	33	38	26	11	26	10	33	3
	3b	27	37	6	13	6	4	32	34	24	38	26	18	6	29	22	18	33	39	37	38	40	25	12	25	11	31	8
Straw + Unders (MC = 55%)	4a	38	55	48	50	48	5	34	51	53	49	40	41	6	42	37	48	54	52	52	53	46	43	14	45	11	48	6
	4b	45	55	9	53	10	36	22	48	53	50	52	48	46	48	54	51	54	51	45	51	55	45	14	44	14	51	3
Straw + Unders (MC = 62.5%)	5a	56	62.5	61	60	27	6	41	54	55	61	37	31	22	47	16	40	60	57	61	61	62	47	17	48	15	49	17
	5b	57	62.5	16	56	56	5	54	45	59	61	44	25	28	48	47	55	60	62	62	56	59	48	16	50	14	56	6
Straw + Unders (MC = 70%)	6a	60	70	69	63	60	5	53	65	63	69	66	68	65	39	48	46	67	66	69	67	68	59	15	62	9	57	13
	6b	68	69	69	46	57	5	42	67	63	68	66	64	64	27	21	57	67	68	62	67	67	56	18	59	14	53	20
Straw+Unders+Lagoon (MC = 62.5%)	7a	56	60	62.5	42	32	9	29	58	61	60	54	56	32	57	54	33	59	53	58	62	60	50	15	52	12	54	10
	7b	58	47	27	57	42	32	42	58	62	60	58	24	9	55	45	30	55	58	58	59	61	47	15	48	15	51	11

Notes:
1) All moisture contents are indicated in %.
2) All moisture contents measured before moisture content adjustment (H_2O addition).
3) Moisture content on Day 1 as per recipe description.

Phase 1 - Moisture Content Losses

Bucket Description	#	Day 8	Day 13	Day 17	Day 21	Day 24	Day 28	Day 30	Day 33	Day 36	Day 39	Day 42	Day 44	Day 47	Day 49	Day 51	Day 53	Day 55	Day 57	Day 59	Day 61	Day 63	Mean	St. Dev.	Excluding Day 28		After Day 47	
																									Mean	St.Dev.	Mean	St.Dev.
Straw	1a	8	8	6	3	29	43	17	5	5	7	8	35	46	11	8	15	10	6	11	2	8	14	13	13	12	9	4
(MC = 57%)	1b	19	3	.7	48	10	7	18	6	12	0	3	33	33	8	13	13	12	7	5	3	2	12	12	13	12	9	4
Straw	2a	9	10	10	2	7	42	22	5	3	0	26	32	36	10	7	19	4	3	3	0	6	12	13	11	11	7	6
(MC = 70%)	2b	13	0	7	5	0	60	0	14	8	0	18	26	25	3	29	8	3	1	5	0	4	11	15	9	10	7	10
Straw + Unders (MC	3a	20	11	11	30	34	35	16	5	6	3	29	29	25	9	11	6	5	3	7	7	2	14	11	14	10	7	3
= 40%)	3b	13	3	34	27	34	36	8	6	16	2	14	22	34	11	18	22	7	1	3	2	0	15	12	15	11	9	8
Straw + Unders (MC	4a	17	0	7	5	7	50	21	4	2	6	15	14	49	13	18	7	1	3	3	2	9	12	14	10	11	7	6
= 55%)	4b	10	0	46	2	45	19	33	7	2	5	3	7	9	7	1	4	1	4	10	4	0	10	14	11	14	4	3
Straw + Unders (MC	5a	6.5	0	1.5	2.5	35.5	56.5	21.5	8.5	7.5	1.5	25.5	31.5	40.5	15.5	46.5	22.5	2.5	5.5	1.5	1.5	0.5	16	17	15	15	14	17
= 62.5%)	5b	5.5	0	46.5	6.5	6.5	57.5	8.5	17.5	3.5	1.5	18.5	37.5	34.5	14.5	15.5	7.5	2.5	0.5	0.5	6.5	3.5	14	17	12	14	7	6
Straw + Unders (MC	6a	10	0	1	7	10	65	17	5	7	1	4	2	5	31	22	24	3	4	1	3	2	11	15	8	9	13	13
= 70%)	6b	2	1	1	24	13	65	28	3	7	2	4	6	6	43	49	13	3	2	8	3	3	14	18	11	14	17	20
Straw+Unders+Lagoon	7a	6.5	2.5	0	20.5	30.5	53.5	33.5	4.5	1.5	2.5	8.5	6.5	30.5	5.5	8.5	29.5	3.5	9.5	4.5	0.5	2.5	13	15	11	12	9	10
(MC = 62.5%)	7b	4.5	15.5	35.5	5.5	20.5	30.5	20.5	4.5	0.5	2.5	4.5	38.5	53.5	7.5	17.5	32.5	7.5	4.5	4.5	3.5	1.5	15	15	15	15	11	11
Average losses =		10	4	15	13	20	44	19	7	6	2	13	23	31	14	19	16	5	4	5	3	3	13		12		9	
Standard Deviation =		5	5	17	14	14	17	9	4	4	2	9	13	15	11	14	9	3	3	3	2	3	2		2		3	

Notes:

1) All moisture losses are indicated in %.

2) All moisture contents measured before moisture content adjustment (H_2O addition).

3) Moisture content on Day 1 as per recipe description.

Phase 1 - Odour Observation Summary

Reactor	Day 1	Day 17	Day 21	Day 24	Day 28	Day 36	Day 49	Day 55	Day 63	Average
1a	1	1	1.5	1	1	2	1	0.5	0.5	1.1
1b	1	1	0.5	2	1	1	1	0.5	0.5	0.9
2a	1	1	1	1.5	1	1	1	1	0.5	1.0
2b	1	1	1	1.5	0.5	1.5	1	1	0.5	1.0
3a	1	2	1.5	0.5	0.5	1.5	1	1	0.5	1.1
3b	1	2	1.5	0.5	0.5	1	1	1	0.5	1.0
4a	1	1.5	1	1	1	1	0.5	1	0.5	0.9
4b	1	1	1	1	1	1	0.5	1	0.5	0.9
5a	1	1	1	1	1	0.5	1	1	0.5	0.9
5b	1	1	1	1.5	1	0.5	1	1	0.5	0.9
6a	1	1	1	1	1	0.5	1	1	0.5	0.9
6b	1	1	1	1	1	0.5	1	1	0.5	0.9
7a	3	1.5	1	1	1	1	0.5	0.5	0.5	1.1
7b	3	1.5	1.5	1	2	1	0.5	0.5	0.5	1.3

Scale:

Agreeable Odour 1 — Disagreeable Odour 5

Phase 1 - Texture Comments Summary

Reactor 1a - Straw Only (57% MC)

Day	Comments
1	partially coarse straw
17	dry, individual straw particles become smaller with mixing action
21	wetter than 1b; soft, fluffy particles
24	dry; smaller straw particles
28	dry
36	light, soft, not much degradation of straw particles
49	damp; softer than straw at startup
55	particle like
63	evident straw particles; not crunchy

Reactor 1b - Straw Only (57% MC)

Day	Comments
1	partially coarse straw
17	dry, individual straw particles become smaller with mixing action
21	dried out and dusty; brittle straw particles
24	dry; smaller straw particles
28	less dry than 1a, softer than 1a
36	light, soft, not much degradation of straw particles
49	damp; softer than straw at startup
55	particle like
63	evident straw particles; not crunchy

Notes:
1) Observations made before moisture content adjustments (H_2O addition).
2) Smaller particles size may be due to brittleness of dry reactor contents.

Phase 1 - Texture Comments Summary

Reactor 2a - Straw Only (70% MC)

Day	Comments
1	wetter straw, less coarse
17	less fagile particles than 1a, 1b; a lottle larger in size than 1a, 1b; wet feeling; crusty on outsides expecially on top; wet on inside (core)
21	crunchy on top before mixing; wet/soft feel
24	wet; still longer straw particles
28	very dry particles
36	wet, somewhat mushy
49	soft; drier particles get very hard; some clumps formed
55	very wet, sticky, clumpy
63	wet; more visible particles than in 6a,b; top layer of straw is a little crunchy/hard

Reactor 2b - Straw Only (70% MC)

Day	Comments
1	wetter straw, less coarse
17	less fagile particles than 1a, 1b; a lottle larger in size than 1a, 1b; wet feeling; crusty on outsides expecially on top; wet on inside (core)
21	crunchy on top before mixing; wet/soft feel
24	very wet; initially crunchy on top; still long particles of straw
28	very dry particles; agglomerated chunks
36	wet, somewhat mushy
49	soft; drier particles get very hard; some clumps formed
55	very wet, sticky, clumpy
63	wet; more visible particles than in 6a,b; top layer of straw is a little crunchy/hard

Notes:

1) Observations made before moisture content adjustments (H_2O addition).

2) Smaller particles size may be due to brittleness of dry reactor contents.

Phase 1 - Texture Comments Summary

Reactor 3a - Straw and Unders (40% MC)

Day	Comments
1	dry, dusty mixture, fuller body (unders fill spaces between straw particles)
17	unders are separate; dusty unders on bottom; some under in clumps on bottom (baked into corners)
21	little combining of two materials; brittle straw particles
24	some of unders stuck to straw particles (cover straw in coating) but a lot of straw particles uncoated and crunchy; some unders clumped together; still dry
28	light; fluffy; still separated unders/straw
36	soft, fluffy, some instances of under clumping; very little degradation
49	still separation of materials; dusty at times; some clumpls of unders; center contains most of moisture
55	still a mixture; light, dusty
63	separate straw/unders; damp unders

Reactor 3b - Straw and Unders (40% MC)

Day	Comments
1	dry, dusty mixture, fuller body (unders fill spaces between straw particles)
17	unders are separate; dusty unders on bottom; some under in clumps on bottom (baked into corners)
21	little combining of two materials; brittle straw particles
24	some of unders stuck to straw particles (cover straw in coating) but a lot of straw particles uncoated and crunchy; some unders clumped together; still dry
28	light; fluffy; still separated unders/straw
36	soft, fluffy, some instances of under clumping; very little degradation
49	still separation of materials; dusty at times; some clumpls of unders; center contains most of moisture
55	still a mixture; light, dusty
63	separate straw/unders; damp unders

Notes:

1) Observations made before moisture content adjustments (H_2O addition).

2) Smaller particles size may be due to brittleness of dry reactor contents.

Phase 1 - Texture Comments Summary

Reactor 4a - Straw and Unders (55% MC)

Day	Comments
1	less dry than 3a, 3b
17	less unders clumping than 3a, 3b; wetter feel; longer straw fibres than 3a, 3b
21	more of a mixture than 3z, 3b; soft
24	a lot less "straw-like" mixture - actually forming a composted material
28	fairly dry; noteiceable straw particles
36	light, soft; some noticeable straw particles
49	quite soft; less clumping than 3a,b; top surface drier - middle moist; still recognizable material separation
55	more dense than 3a,b
63	soft; light; some harder straw particles

Reactor 4b - Straw and Unders (55% MC)

Day	Comments
1	less dry than 3a, 3b
17	similar to 3a, 3b but wetter
21	more of a mixture than 3z, 3b; soft
24	same as 4a but drier
28	a little wetter and softer than 4a; more of a mixture than 4a
36	light, soft; some noticeable straw particles
49	quite soft; less clumping than 3a,b; top surface drier - middle moist; still recognizable material separation
55	more dense than 3a,b
63	soft; light; some harder straw particles

Notes:

1) Observations made before moisture content adjustments (H_2O addition).

2) Smaller particles size may be due to brittleness of dry reactor contents.

Phase 1 - Texture Comments Summary

Reactor 5a - Straw and Unders (62.5% MC)

Day	Comments
1	less dry than 4a, 4b
17	feels more like "soil"; softer than 1,2,3,4; not just crunchy straw
21	soft, fluffy; wetter than 4a, 4b; some larger straw particles
24	drier than 5b
28	very dry
36	some larger straw particles but darker in color; soft, light, fluffy
49	very light; more dense mixture
55	denser than 4a,b
63	same as 4a,b; less hard straw particles

Reactor 5b - Straw and Unders (62.5% MC)

Day	Comments
1	less dry than 4a, 4b
17	crunchy like 3a, 3b; rather dry
21	soft, fluffy; wetter than 4a, 4b; some larger straw particles
24	softer than 4a,b; more of a solid (thicker) material than 4a,b
28	very dry
36	some larger straw particles but darker in color; soft, light, fluffy
49	very light; more dense mixture
55	more dense than 3a,b
63	same as 4a,b; less hard straw particles

Notes:
1) Observations made before moisture content adjustments (H_2O addition).
2) Smaller particles size may be due to brittleness of dry reactor contents.

Phase 1 - Texture Comments Summary

Reactor 6a - Straw and Unders (70% MC)

Day	Comments
1	less dry than 5a, 5b
17	softer mix on straw/unders; straw/unders combined; wet feeling especially in core
21	soft, wet with some larger particles
24	straw particles haven't decreased much in size; more soil-like; wetter
28	very dry
36	damp; about the same as 5a,b
49	very dry; hard; crunchy; some clumping
55	crunchy on top; fairly wet; chunky unders
63	wet; globules; little distinction between straw/unders in globules

Reactor 6b - Straw and Unders (70% MC)

Day	Comments
1	less dry than 5a, 5b
17	softer mix on straw/unders; straw/unders combined; wet feeling especially in core
21	drier than 6a; crunchy particles
24	straw particles haven't decreased much in size; more soil-like; wetter
28	very dry
36	damp; about the same as 5a,b
49	very dry; hard; crunchy; some clumping
55	crunchy on top; fairly wet; chunky unders
63	wet; globules; little distinction between straw/unders in globules

Notes:

1) Observations made before moisture content adjustments (H_2O addition).

2) Smaller particles size may be due to brittleness of dry reactor contents.

Phase 1 - Texture Comments Summary

Reactor 7a - Straw, Unders, & Lagoon (62.5% MC)

Day	Comments
1	similar to 5a, 5b
17	soft, as 5a
21	a little drier than 7b
24	drier than 7b; about the same as 5a,b
28	very dry
36	a better mix of materials than 5a,b; soft,damp
49	soft; fluffy
55	some clumps; a bit crunchy on top; good mix
63	very slightly more particle-like than 5a,b; less soft than 5a,b; basically the same as 5a,b but darker in colour

Reactor 7b - Straw, Unders, & Lagoon (62.5% MC)

Day	Comments
1	similar to 5a, 5b
17	dry, crunchy like 2 or 3 but with a uniform mixture
21	similar to 5a, 5b
24	same as 5a,b
28	not quite as dry as 7a
36	a better mix of materials than 5a,b; soft,damp
49	soft; fluffy
55	some clumps; a bit crunchy on top; good mix
63	very slightly more particle-like than 5a,b; less soft than 5a,b; basically the same as 5a,b but darker in colour

Notes:

1) Observations made before moisture content adjustments (H_2O addition).

2) Smaller particles size may be due to brittleness of dry reactor contents.

Phase 1 - Colour Comments Summary

Reactor 1a - Straw Only (57% MC)

Day	Comments
1	straw color
17	light straw color
21	brown & darker beige particles
24	light brown
28	medium brown
36	some light straw particles but mostly darker
49	some darker and some lighter brown
55	med brown
63	med brown, about same as 4a,b

Reactor 1b - Straw Only (57% MC)

Day	Comments
1	straw color
17	light straw color
21	dry looking straw; very light brown/beige
24	light brown (a little darker than 1a)
28	medium brown but a little darker
36	some light straw particles but mostly darker
49	some darker and some lighter brown
55	med brown
63	med brown, about same as 4a,b

Notes:
1) Observations made before moisture content adjustments (H_2O addition).

Phase 1 - Colour Comments Summary

Reactor 2a - Straw Only (70% MC)

Day	Comments
1	darker straw color
17	darker straw colour (more moist)
21	darker brown
24	dark brown (a little darker than 2b)
28	darker brown
36	dark brown
49	very dark brown
55	dark brown
63	very dark brown

Reactor 2b - Straw Only (70% MC)

Day	Comments
1	darker straw color
17	darker straw colour (more moist)
21	darker brown
24	dark brown
28	darker brown
36	dark brown
49	very dark brown
55	dark brown
63	very dark brown

Notes:
1) Observations made before moisture content adjustments (H_2O addition).

Phase 1 - Colour Comments Summary

Reactor 3a - Straw and Unders (40% MC)

Day	Comments
1	light beige mix
17	dry, pale under/straw mix
21	dry straw/under mixture
24	light brown; pale
28	light brown
36	medium beige/light brown
49	light brown/beige
55	light brown
63	light brown

Reactor 3b - Straw and Unders (40% MC)

Day	Comments
1	light beige mix
17	dry, pale under/straw mix
21	dry straw/under mixture
24	light brown; pale
28	light brown
36	a little lighter than 3a
49	light brown/beige
55	light brown
63	light brown

Notes:
1) Observations made before moisture content adjustments (H_2O addition).

Phase 1 - Colour Comments Summary

Reactor 4a - Straw and Unders (55% MC)

Day	Comments
1	darker beige mix
17	a little darker than 3a, 3b
21	more uniform colour of medium brown than 3a, 3b
24	darker brown than 3a,b
28	a little darker than 3a,b
36	medium brown
49	medium brown
55	med to dark brown, some lighter straw particles
63	med brown

Reactor 4b - Straw and Unders (55% MC)

Day	Comments
1	darker beige mix
17	very dry like 3a
21	more uniform colour of medium brown than 3a, 3b
24	darker than 3a,b but lighter than 4a
28	a little darker than 3a,b
36	medium brown
49	medium brown
55	med to dark brown, some lighter straw particles
63	med brown

Notes:
1) Observations made before moisture content adjustments (H_2O addition).

Phase 1 - Colour Comments Summary

Reactor 5a - Straw and Unders (62.5% MC)

Day	Comments
1	brown mix
17	darker than 4
21	a little darker brown than 4a, 4b
24	about the same as 4a,b
28	a little darker than 4a,b
36	darker than 4a,b
49	med-dark brown
55	darker brown than 4a,b; lesser amounts of light straw particles
63	dark brown

Reactor 5b - Straw and Unders (62.5% MC)

Day	Comments
1	brown mix
17	between 3 and 4
21	a little darker brown than 4a, 4b
24	darker brown than 4a,b
28	a little darker than 4a,b
36	darker than 4a,b
49	med-dark brown
55	darker brown than 4a,b; lesser amounts of light straw particles
63	dark brown

Notes:
1) Observations made before moisture content adjustments (H_2O addition).

Phase 1 - Colour Comments Summary

Reactor 6a - Straw and Unders (70% MC)

Day	Comments
1	darker brown mix
17	darker than 1-5
21	darker brown than 5a, 5b
24	dark brown
28	medium brown/beige and a little darker than 5a,b
36	darker than 5a,b
49	pale brown
55	darker brown than 5a,b
63	very dark brown

Reactor 6b - Straw and Unders (70% MC)

Day	Comments
1	darker brown mix
17	darker than 1-5
21	brown as 5a, 5b
24	dark brown
28	medium brown/beige and a little darker than 5a,b
36	darker than 5a,b
49	pale brown
55	darker brown than 5a,b
63	very dark brown

Notes:
1) Observations made before moisture content adjustments (H_2O addition).

Phase 1 - Colour Comments Summary

Reactor 7a - Straw, Unders, & Lagoon (62.5% MC)

Day	Comments
1	darker brown mix
17	darker, like 5a
21	a little lighter than 7b
24	same as 5a,b
28	darker than 3-6
36	darker than 3-6
49	darker brown
55	med brown
63	darker than 5a,b

Reactor 7b - Straw, Unders, & Lagoon (62.5% MC)

Day	Comments
1	darker brown mix
17	dry, pale combination
21	same as 5a, 5b
24	same as 5a,b
28	darker than 3-6
36	darker than 3-6
49	darker brown
55	med brown
63	darker than 5a,b

Notes:
1) Observations made before moisture content adjustments (H_2O addition).

APPENDIX D – PHASE 2 EXPERIMENTAL LABORATORY DATA

Phase 2 - Straw Feedstock Moisture Content Analysis

Test Date: April 11, 2002

Sample Year	Tare only (g)	Tare+Material (g)	After 103°C (g)	%MC
1997	11.7	47.4	31.8	43.7
1998	11.7	38.9	30.3	31.6
1999	11.7	34.8	28.1	29.0
2000	11.7	44.9	30.0	44.9
			Mean =	**37.3**
			St.Dev. =	8.2
			%RSD =	21.9

Notes:
1) Four straw bales from Dow BioProducts stackyard were sampled (years 1997, 1998, 1999, and 2000).
2) Shredded straw samples taken April 10, 2002.
3) %RSD = St.Dev./Mean x 100

Test Date: May 13, 2002

Sample #	Tare only (g)	Tare+Material (g)	After 103°C (g)	%MC
Straw 2	11.36	23.52	20.96	21.1
Straw 2	11.33	24.77	22.32	18.2
Straw 2	11.36	26.29	23.17	20.9
			Mean =	**20.1**
			St.Dev. =	1.6
			%RSD =	7.9

Notes:
1) Unshredded straw samples taken May 2, 2002.
2) %RSD = St.Dev./Mean x 100

Test Date: May 14, 2002

Sample Year	Tare only (g)	Tare+Material (g)	After 103°C (g)	%MC
1997	11.41	33.58	23.83	**44.0**

Notes:
1) Shredded straw samples taken April 10, 2002.

From Phase 1:

	%MC
Straw Mean =	57.5
St.Dev. =	16.6
%RSD =	29.0

Phase 2 - Straw Feestock Solids Analysis

Test Date: April 22, 2002

Sample Year	Crucible #	Tare (g)	Tare + Dry Straw (g)	After 550°C (g)	VS (%)	FS (%)	OC (%)
1997	T2	88.1443	91.8020	88.5801	88.09	11.91	
	T3	87.3280	91.3949	87.8134	88.06	11.94	
	T4	87.4976	90.8428	87.9305	87.06	12.94	
Mean					**87.74**	**12.26**	**48.7**
St.Dev.					0.59	0.59	0.59
1998	T5	88.6142	92.0152	89.0504	87.17	12.83	
	T1	87.7727	91.3728	88.2660	86.30	13.70	
	T10	88.3252	91.6232	88.7506	87.10	12.90	
Mean					**86.86**	**13.14**	**48.3**
St.Dev.					0.49	0.49	0.49
1999	J5	85.1650	88.7665	85.6291	87.11	12.89	
	56	89.9660	93.1802	90.3630	87.65	12.35	
	43	83.7480	86.1434	84.0264	88.38	11.62	
Mean					**87.71**	**12.29**	**48.7**
St.Dev.					0.63	0.63	0.63
2000	39	90.3469	93.7285	disturbed	-	-	
	T8	88.0326	91.0184	88.3256	90.19	9.81	
	T11	87.8929	90.9765	88.1998	90.05	9.95	
Mean					**90.12**	**9.88**	**50.1**
St.Dev.					0.10	0.10	0.10

Notes:
1) Straw samples collected on April 10, 2002.
2) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fraction.

Values Used for Phase 2:

	%VS	%FS	%OC (db)
Straw Mean =	**88.1**	**11.9**	**48.9**
St.Dev. =	1.4	1.4	0.8
%RSD =	1.6	11.8	1.6

Values Used for Phase 1:

	%VS:	%OC (db)
Straw Mean =	**81.0**	**45.0**
St.Dev. =	1.7	0.9
%RSD =	2.1	2.1

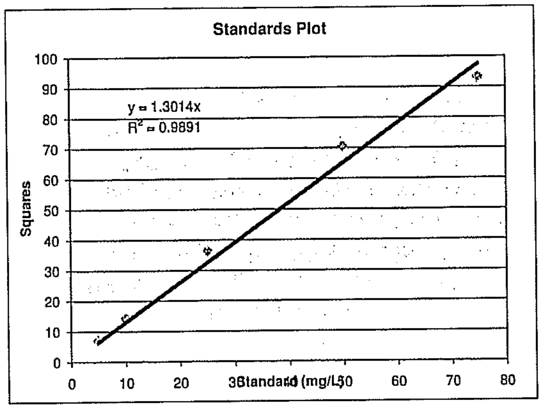
Phase 2 - Straw Feedstock TKN Analysis

Test Date: April 23-25, 2002

Standards:

mg N/L	# of Squares	Adjusted
75	94	93
50	71	70
25	37	36
10	15	14
5	8	7
blank	1	0

Conversion Equation:
squares/1.3014 = mg N/L



Straw Sample Year	Sample Size (mg) (mg)	# of Squares	mg N/L	N in sample (mg)	%N (db) (dry basis)	g N/g ash (dry basis)	%OC (db) (dry basis)	C:N
1997	100	21	16.14	0.807	0.81	0.07		
	100	20	15.37	0.768	0.77	0.06		
	100	21	16.14	0.807	0.81	0.07		
1998	100	23	17.67	0.884	0.88	0.07		
	100	18	13.83	0.692	0.69	0.06		
	100	20	15.37	0.768	0.77	0.06		
1999	100	18	13.83	0.692	0.69	0.06		
	100	19	14.60	0.730	0.73	0.06		
	100	21	16.14	0.807	0.81	0.07		
2000	100	18	13.83	0.692	0.69	0.06		
	100	18	13.83	0.692	0.69	0.06		
	100	21	16.14	0.807	0.81	0.07		
				Average =	**0.76**	**0.06**	**48.9**	**64.2**
				Std. Dev. =	0.06	0.01	0.8	
				%RSD =	8.28	8.28	1.6	

Notes:
1) Shredded Straw Samples taken April 10, 2002
2) Samples were dried and grinded prior to TKN analysis.
3) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fraction.
4) %RSD = St.Dev./Mean x 100

Literature Ranges (Rynk, 1992):

%N (db)	%OC (db)	C:N
0.3 - 1.1	14 - 165	48 - 150

From Phase 1:

	%N (db)	%OC (db)	C:N
Straw Mean =	1.43	45.0	31.5
Std Dev. =	0.23	0.9	
%RSD =	16.2	2.1	

Phase 2 - Initial Feedstock Particle Density Analysis

ρ_p = particle density (g/cm³) $= \rho_w (W_s - W_a) / [(W_s - W_a) - (W_{sw} - W_w)]$

ρ_w = density of water (1 g/cm³)

W_s = weight of pyconometer plus sample (g)

W_a = weight of pyconometer filled with air (g)

W_{sw} = weight of pyconometer filled with sample and water (g)

W_w = weight of the pyconometer filled with water at temperature observed

1997 Subsamples
Test Date: April 14+15, 2002

Subsample	W_a	W_w	W_s	W_{sw}	ρ_w	ρ_p
1997 - 1	246.3	1232.9	266.3	1233.4	1.0	1.03
1997 - 2	226.3	1218.3	246.3	1220.0	1.0	1.09
1997 - 3	242.7	1230.9	262.7	1232.7	1.0	1.10
1997 Mean						1.07
1997 St. Dev.						0.04
1997 %RSD						3.79

Maximum Water Content:

Subsample	Tare (g)	Tare+Straw (g)	After 103°C (g)	Max %MC
1997 - 1	11.8	71.1	20.2	85.8
1997 - 2	11.8	75.9	20.8	86.0
1997 - 3	11.8	75.8	20.8	85.9
1997 Mean				85.9
1997 St. Dev.				0.1
1997 %RSD				0.1

1998 Subsamples
Test Date: April 16, 2002

Subsample	W_a	W_w	W_s	W_{sw}	ρ_w	ρ_p
1998 - 1	246.3	1232.9	266.3	1237.0	1.0	1.26
1998 - 2	226.3	1218.3	246.3	1224.2	1.0	1.42
1998 - 3	242.7	1230.9	262.7	1232.8	1.0	1.10
1998 Mean						1.26
1998 St. Dev.						0.16
1998 %RSD						12.44

Maximum Water Content:

Subsample	Tare (g)	Tare+Straw (g)	After 103°C (g)	Max %MC
1998 - 1	11.8	85.4	22.1	86.0
1998 - 2	11.8	79.8	21.2	86.2
1998 - 3	11.8	86.2	22.3	85.9
1998 Mean				86.0
1998 St. Dev.				0.1
1998 %RSD				0.2

1999 Subsamples
Test Date: April 17, 2002

Subsample	W_a	W_w	W_s	W_{sw}	ρ_w	ρ_p
1999 - 1	246.3	1232.9	266.3	1234.8	1.0	1.10
1999 - 2	226.3	1218.3	246.3	1218.6	1.0	1.02
1999 - 3	242.7	1230.9	262.7	1233.2	1.0	1.13
1999 Mean						1.08
1999 St. Dev.						0.06
1999 %RSD						5.57

Maximum Water Content:

Subsample	Tare (g)	Tare+Straw (g)	After 103°C (g)	Max %MC
1999 - 1	11.8	88.5	23.2	85.1
1999 - 2	11.8	83.2	23.1	84.2
1999 - 3	11.8	87.1	23.7	84.2
1999 Mean				84.5
1999 St. Dev.				0.5
1999 %RSD				0.7

2000 Subsamples
Test Date: April 18, 2002

Subsample	W_a	W_w	W_s	W_{sw}	ρ_w	ρ_p
2000 - 1	246.3	1232.9	266.3	1232.8	1.0	1.00
2000 - 2	226.3	1218.3	246.3	1222.7	1.0	1.28
2000 - 3	242.7	1230.9	262.7	1233.1	1.0	1.12
2000 Mean						1.13
2000 St. Dev.						0.14
2000 %RSD						12.68

Maximum Water Content:

Subsample	Tare (g)	Tare+Straw (g)	After 103°C (g)	Max %MC
2000 - 1	11.8	67.4	20.4	84.5
2000 - 2	11.8	73.8	21.8	83.9
2000 - 3	11.8	67.1	20.6	84.1
2000 Mean				84.2
2000 St. Dev.				0.3
2000 %RSD				0.4

Average Particle Density for 1997 - 2000 Straw =	1.14	g/cm³
Range =	1.07 - 1.26	g/cm³
St. Dev. =	0.09	
%RSD =	7.58	
Average Maximum %MC for 1997 - 2000 Straw =	85.1	g/cm³
Range =	84.2 - 86.0	g/cm³
St. Dev. =	1.0	
%RSD =	1.1	

Notes:
1) Shredded Straw Samples collected April 10, 2002
2) Used 20 g samples for all particle density tests.
3) Drying of straw samples for maximum water content test was completed in a 103°C oven for 24 hours.
4) Room temperature for particle desity test was 21°C.
5) %RSD = St.Dev./Mean x 100

Phase 2 - Straw Feedstock Bulk Density Analysis

1997 Shredded Straw

Biocell ID	Tare (kg)	Volume (L)	Tare+Straw (kg)	Straw (kg)	Wet Bulk Density (kg/m^3)	%MC	Dry Bulk Density (kg/m^3)
1	1.65	4.33	1.96	0.31	71.59	43.70	40.31
2	1.64	4.33	1.96	0.32	73.90	43.70	41.61
3	1.64	4.33	1.94	0.30	69.28	43.70	39.01
1997 Mean				0.31	71.59		40.31
1997 St. Dev.					2.31		1.30
1997 %RSD					3.23		3.23

1998 Shredded Straw

Biocell ID	Tare (kg)	Volume (L)	Tare+Straw (kg)	Straw (kg)	Wet Bulk Density (kg/m^3)	%MC	Dry Bulk Density (kg/m^3)
1	1.65	4.33	1.92	0.27	62.36	31.62	42.64
2	1.64	4.33	1.89	0.25	57.74	31.62	39.48
3	1.64	4.33	1.89	0.25	57.74	31.62	39.48
1998 Mean				0.26	59.28		40.53
1998 St. Dev.					2.67		1.82
1998 %RSD					4.50		4.50

1999 Shredded Straw

Biocell ID	Tare (kg)	Volume (L)	Tare+Straw (kg)	Straw (kg)	Wet Bulk Density (kg/m^3)	%MC	Dry Bulk Density (kg/m^3)
1	1.65	4.33	1.91	0.26	60.05	29.00	42.63
2	1.64	4.33	1.89	0.25	57.74	29.00	40.99
3	1.64	4.33	1.90	0.26	60.05	29.00	42.63
1999 Mean				0.26	59.28		42.08
1999 St. Dev.					1.33		0.95
1999 %RSD					2.25		2.25

2000 Shredded Straw

Biocell ID	Tare (kg)	Volume (L)	Tare+Straw (kg)	Straw (kg)	Wet Bulk Density (kg/m^3)	%MC	Dry Bulk Density (kg/m^3)
1	1.65	4.33	1.97	0.32	73.90	44.88	40.74
2	1.64	4.33	1.95	0.31	71.59	44.88	39.46
3	1.64	4.33	1.98	0.34	78.52	44.88	43.28
2000 Mean				0.32	74.67		41.16
2000 St. Dev.					3.53		1.94
2000 %RSD					4.72		4.72

Notes:
1) Small biocell used for analyses.
2) %RSD = St.Dev./Mean x 100

Summary:

	Wet Bulk Density (kg/m^3)	Dry Bulk Density (kg/m^3)
Phase 2:		
1997, 1998, 1999, & 2000 Shredded Straw Mean =	66.20	41.02
St. Dev =	8.10	0.79
% RSD =	12.23	1.94
Phase 1:		
Unshredded Straw Mean =	88.76	38.17
St. Dev =	51.72	-
% RSD =	58.27	-
Literature Value:		
(Rynk, 1992) =	134.70	

Phase 2 - Straw Feedstock Bulk Density Analysis

1997 Unshredded Straw
Test Date: May 13, 2002

Large Biocell	Volume of Biocell (m^3)	Volume of Biocell (L)	Straw in Biocell (kg)	Wet Bulk Density (kg/m^3)	%MC	Dry Bulk Density (kg/m^3)
L1	0.3109	310.9	7.00	**22.52**	20.06	**18.00**

Notes:
1) Large biocell used for analyses.
2) Unshredded straw samples collected on May 2, 2002 were used for the analyses.

1997 Shredded Straw
Test Date: May 14, 2002

Large Biocell	Volume of Biocell (m^3)	Volume of Biocell (L)	Straw in Biocell (kg)	Wet Bulk Density (kg/m^3)	%MC	Dry Bulk Density (kg/m^3)
L1	0.3109	310.9	34.15	**109.84**	43.98	**61.54**

Notes:
1) Large biocell used for analyses.
2) Unshredded straw samples collected on May 2, 2002 were used for the analyses.

Phase 2 - Compost Recipe Bulk Density Analysis

Recipe 1 - Unshredded Straw
Test Date: May 23, 2002

Large Biocell	Volume of Biocell (m^3)	Volume of Biocell (L)	Straw in Biocell (kg)	Wet Bulk Density (kg/m^3)	%MC	Dry Bulk Density (kg/m^3)
L1	0.3109	310.9	7.82	**25.15**	20.06	**20.11**

Notes:
1) Large biocell used for analyses.
2) Unshredded 1997 straw samples were used for the analyses.

Recipe 2 - 2/3 Unshredded Straw, 1/3 shredded straw (by volume)
Tested on: May 31, 2002

Large Biocell	Volume (m^3)	Volume (L)	Straw Added (kg)	Wet Bulk Density (kg/m^3)	%MC	Dry Bulk Density (kg/m^3)
L1	0.3109	310.9	15.38	**49.47**	36.5	**31.41**

Notes:
1) Large biocell used for analyses.
2) Unshredded and shredded 1997 straw samples were used for the analyses.

Recipe 3 - 1/3 Unshredded Straw, 2/3 shredded straw (by volume)
Tested on: May 31, 2002

Large Biocell	Volume (m^3)	Volume (L)	Straw Added (kg)	Wet Bulk Density (kg/m^3)	%MC	Dry Bulk Density (kg/m^3)
L1	0.2798	279.8	23.5	**83.99**	41.5	**49.13**

Notes:
1) Large biocell used for analyses.
2) Unshredded and shredded 1997 straw samples were used for the analyses.

Recipe 4 - Shredded Straw
Test Date: May 23, 2002

Large Biocell	Volume of Biocell (m^3)	Volume of Biocell (L)	Straw in Biocell (kg)	Wet Bulk Density (kg/m^3)	%MC	Dry Bulk Density (kg/m^3)
L1	0.3109	310.9	32.20	**103.57**	43.98	**58.02**

Notes:
1) Large biocell used for analyses.
2) Shredded 1997 straw samples were used for the analyses.

Phase 2 - Weekly Solids Analysis
June 1, 2002 Day 1

Phase 2 Feedstock:

All Recipes	%VS	%FS	%OC (db)
Mean	88.11	11.89	48.95
St. Dev.	1.40	1.40	0.78

Notes:
1) Feedstock volatile solids based upon samples analyzed from 1997,1998, 1999, and 2000 straw stock.
2) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis
June 4, 2002 Day 4

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	T2	88.1290	97.0500	91.0599	88.4534	67.15	32.85	88.93	11.07	
1A	T8	88.0190	95.2300	90.4795	88.3092	65.88	34.12	88.21	11.79	
Recipe 1A Mean						66.51		88.57	11.43	49.2
Recipe 1A St. Dev.						0.90		0.51	0.51	0.51
1B	T1	87.7609	96.2160	90.7166	88.0832	65.04	34.96	89.10	10.90	
1B	T6	88.2058	94.4640	90.6736	88.4932	60.57	39.43	88.35	11.65	
Recipe 1B Mean						62.80		88.72	11.28	49.3
Recipe 1B St. Dev.						3.16		0.52	0.52	0.52
2A	T3	87.3203	94.1163	89.6433	87.5859	65.82	34.18	88.57	11.43	
2A	38	83.9541	91.5830	86.2007	84.1932	70.55	29.45	89.36	10.64	
Recipe 2A Mean						68.18		88.96	11.04	49.4
Recipe 2A St. Dev.						3.35		0.56	0.56	0.56
2B	faded 35-R	89.8319	97.3028	92.3485	90.1635	66.31	33.69	86.82	13.18	
2B	51	80.9666	88.6900	83.5737	81.3032	66.24	33.76	87.09	12.91	
Recipe 2B Mean						66.28		86.96	13.04	48.3
Recipe 2B St. Dev.						0.05		0.19	0.19	0.19
3A	W-01	85.1340	93.1520	87.9042	85.4811	65.45	34.55	87.47	12.53	
3A	35-R	87.3307	96.1270	90.2799	87.7007	66.47	33.53	87.45	12.55	
Recipe 3A Mean						65.96		87.46	12.54	48.6
Recipe 3A St. Dev.						0.72		0.01	0.01	0.01
3B	36-P	70.9765	82.2400	74.1452	71.4216	71.87	28.13	85.95	14.05	
3B	37-P	72.3980	78.1520	74.1118	72.6361	70.22	29.78	86.11	13.89	
Recipe 3B Mean						71.04		86.03	13.97	47.8
Recipe 3B St. Dev.						1.17		0.11	0.11	0.11
4A	39	90.3446	101.6600	93.6064	90.7902	71.17	28.83	86.34	13.66	
4A	32									
Recipe 4A Mean						71.17		86.34	13.66	48.0
Recipe 4A St. Dev.						0.00		0.00	0.00	0.00
4B	43	83.7509	97.9880	87.8747	84.3308	71.03	28.97	85.94	14.06	
4B	J-5	85.1700	94.3860	88.4845	85.6371	64.04	35.96	85.91	14.09	
Recipe 4B Mean						67.54		85.92	14.08	47.7
Recipe 4B St. Dev.						4.95		0.02	0.02	0.02

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

June 11, 2002 Day 11

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	3	90.9415	98.6890	93.6142	91.2510	65.50	34.50	88.42	11.58	
1A	J-4	90.8591	100.2334	93.8642	91.2338	67.94	32.06	87.53	12.47	
1A	30	94.1543	102.4472	96.7857	94.4755	68.27	31.73	87.79	12.21	
Recipe 1A Mean						67.24		87.91	12.09	48.8
Recipe 1A St. Dev.						1.51		0.46	0.46	0.46
1B	74	85.5408	93.9280	87.7622	85.8309	73.51	26.49	86.94	13.06	
1B	7	89.3005	98.3882	91.8251	89.6510	72.22	27.78	86.12	13.88	
1B	56	89.9828	97.9692	92.2227	90.2447	71.95	28.05	88.31	11.69	
Recipe 1B Mean						72.56		87.12	12.88	48.4
Recipe 1B St. Dev.						0.84		1.11	1.11	1.11
2A	A-12	94.9569	101.3711	97.1316	broke	66.10	33.90			
2A	45	89.1910	98.6151	92.2269	disturbed	67.79	32.21			
2A	50	90.7159	99.7815	93.6237	91.1277	67.92	32.08	85.84	14.16	
Recipe 2A Mean						67.27		85.84	14.16	47.7
Recipe 2A St. Dev.						1.02		0.00	0.00	0.00
2B	43	83.7559	92.1985	86.2867	84.1685	70.02	29.98	83.70	16.30	
2B	J-6	81.6096	89.7370	83.8211	81.9363	72.79	27.21	85.23	14.77	
2B	J-8	91.9182	99.9444	94.2257	92.2642	71.25	28.75	85.01	14.99	
Recipe 2B Mean						71.35		84.64	15.36	47.0
Recipe 2B St. Dev.						1.39		0.83	0.83	0.83
3A	R6	88.2142	95.5444	90.0153	88.4961	75.43	24.57	84.35	15.65	
3A	38	83.9469	93.7690	86.4189	84.3774	74.83	25.17	82.58	17.42	
3A	T8	88.0317	98.0270	90.3271	88.4353	77.04	22.96	82.42	17.58	
Recipe 3A Mean						75.77		83.12	16.88	46.2
Recipe 3A St. Dev.						1.14		1.07	1.07	1.07
3B	T1	87.7716	95.4431	90.0673	88.1200	70.07	29.93	84.82	15.18	
3B	T11	87.8973	95.8158	90.3028	88.2661	69.62	30.38	84.67	15.33	
3B	T12	88.2240	97.9230	91.0304	88.6502	71.07	28.93	84.81	15.19	
Recipe 3B Mean						70.25		84.77	15.23	47.1
Recipe 3B St. Dev.						0.74		0.09	0.09	0.09
4A	T5	88.6180	99.5319	91.7008	89.0781	71.75	28.25	85.08	14.92	
4A	T10	88.3290	98.2967	91.1555	88.7433	71.64	28.36	85.34	14.66	
4A	T3	87.3281	96.4674	89.8960	87.7148	71.90	28.10	84.94	15.06	
Recipe 4A Mean						71.77		85.12	14.88	47.3
Recipe 4A St. Dev.						0.13		0.20	0.20	0.20
4B	1A	71.9873	82.4377	74.7915	72.4054	73.17	26.83	85.09	14.91	
4B	faded 35-R	89.8316	99.9695	92.5606	90.2487	73.08	26.92	84.72	15.28	
4B	35-R	87.3304	97.5628	90.0526	87.7326	73.40	26.60	85.23	14.77	
Recipe 4B Mean						73.21		85.01	14.99	47.2
Recipe 4B St. Dev.						0.16		0.26	0.26	0.26

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis
June 18, 2002 **Day 18**

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	T5	88.6192	97.0381	91.3522	88.9939	67.54	32.46	86.29	13.71	
1A	38	83.9511	93.3481	86.8314	84.3307	69.35	30.65	86.82	13.18	
1A	7	89.3021	99.0602	92.3598	89.7215	68.67	31.33	86.28	13.72	
Recipe 1A Mean						68.52		86.46	13.54	48.0
Recipe 1A St. Dev.						0.91		0.31	0.31	0.31
1B	T11	87.8987	95.6391	90.1939	88.1879	70.35	29.65	87.40	12.60	
1B	T12	88.2000	96.1465	90.5637	88.4817	70.25	29.75	88.08	11.92	
1B	T1	87.7760	98.4076	90.9732	88.2033	69.93	30.07	86.64	13.36	
Recipe 1B Mean						70.18		87.37	12.63	48.5
Recipe 1B St. Dev.						0.22		0.72	0.72	0.72
2A	T6	88.2190	97.4046	90.9284	88.6051	70.50	29.50	85.75	14.25	
2A	T3	87.3294	98.2638	90.5831	87.8275	70.24	29.76	84.69	15.31	
2A	50	90.7166	99.1176	93.2466	91.1034	69.88	30.12	84.71	15.29	
Recipe 2A Mean						70.21		85.05	14.95	47.3
Recipe 2A St. Dev.						0.31		0.61	0.61	0.61
2B	T8	88.0366	98.7555	91.1219	88.7190	71.22	28.78			
2B	45	89.1915	98.6268	91.8580	89.6320	71.74	28.26	83.48	16.52	
2B	T10	88.3299	98.1034	90.9389	88.7543	73.31	26.69	83.73	16.27	
Recipe 2B Mean						72.09		83.61	16.39	46.4
Recipe 2B St. Dev.						1.09		0.18	0.18	0.18
3A	40	91.6276	101.6112	93.8754	92.0431	77.49	22.51	81.52	18.48	
3A	J-6	81.6152	93.5960	84.3550	82.1414	77.13	22.87	80.79	19.21	
3A	74	85.5420	93.4750	87.4581	85.8682	75.85	24.15	82.98	17.02	
Recipe 3A Mean						76.82		81.76	18.24	45.4
Recipe 3A St. Dev.						0.86		1.11	1.11	1.11
3B	J-8	91.9160	100.9626	94.4270	92.3755	72.24	27.76	81.70	18.30	
3B	25	92.1643	103.6571	95.3657	92.7565	72.14	27.86	81.50	18.50	
3B	J-4	90.8607	98.8375	93.0592	91.2321	72.44	27.56	83.11	16.89	
Recipe 3B Mean						72.28		82.10	17.90	45.6
Recipe 3B St. Dev.						0.15		0.87	0.87	0.87
4A	T50	95.1103	102.2568	97.1191	95.4436	71.89	28.11	83.41	16.59	
4A	T2	88.1448	97.1592	90.5983	88.5372	72.78	27.22	84.01	15.99	
4A	39	90.3478	100.0769	93.0852	90.7849	71.86	28.14	84.03	15.97	
Recipe 4A Mean						72.18		83.82	16.18	46.6
Recipe 4A St. Dev.						0.52		0.35	0.35	0.35
4B	1A	71.9878	81.0780	74.3642	72.3654	73.86	26.14	84.11	15.89	
4B	73	73.2222	80.4643	75.1322	73.5362	73.63	26.37	83.56	16.44	
4B	70	70.9771	80.1363	73.3480	71.3627	74.11	25.89	83.74	16.26	
Recipe 4B Mean						73.87		83.80	16.20	46.6
Recipe 4B St. Dev.						0.24		0.28	0.28	0.28

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

June 25, 2002 Day 25

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	74	85.5422	95.2629	88.7427	86.0061	67.08	32.92	85.51	14.49	
1A	7	89.3024	97.4138	91.9359	89.6829	67.53	32.47	85.55	14.45	
1A	25	92.1651	100.6830	95.0019	92.5614	66.70	33.30	86.03	13.97	
Recipe 1A Mean						67.10		85.70	14.30	47.6
Recipe 1A St. Dev.						0.42		0.29	0.29	0.29
1B	T8	88.0370	96.8214	90.7495	88.3923	69.12	30.88	86.90	13.10	
1B	T5	88.6187	97.6068	91.4992	88.9822	67.95	32.05	87.38	12.62	
1B	T3	87.3293	98.6372	90.8322	87.8057	69.02	30.98	86.40	13.60	
Recipe 1B Mean						68.70		86.89	13.11	48.3
Recipe 1B St. Dev.						0.65		0.49	0.49	0.49
2A	T1	87.7754	98.6078	91.0664	88.3548	69.62	30.38	82.39	17.61	
2A	T2	88.1459	98.4988	91.2694	88.6677	69.83	30.17	83.29	16.71	
2A	T6	88.2188	99.7320	91.6861	88.8117	69.88	30.12	82.90	17.10	
Recipe 2A Mean						69.78		82.86	17.14	46.0
Recipe 2A St. Dev.						0.14		0.45	0.45	0.45
2B	T11	87.8966	97.5964	90.5543	88.3839	72.60	27.40	81.66	18.34	
2B	T10	88.3305	99.9822	91.2985	88.8908	74.53	25.47	81.12	18.88	
2B	T12	88.2009	96.9235	90.4801	88.6320	73.87	26.13	81.09	18.91	
Recipe 2B Mean						73.67		81.29	18.71	45.2
Recipe 2B St. Dev.						0.98		0.32	0.32	0.32
3A	50	90.7162	99.7700	92.8034	91.1612	76.95	23.05	78.68	21.32	
3A	45	89.1917	97.3085	91.0677	89.5793	76.89	23.11	79.34	20.66	
3A	39	90.3489	100.0426	92.6495	90.8173	76.27	23.73	79.64	20.36	
Recipe 3A Mean						76.70		79.22	20.78	44.0
Recipe 3A St. Dev.						0.38		0.49	0.49	0.49
3B	J-6	81.6147	89.3717	83.7426	82.0456	72.57	27.43	79.75	20.25	
3B	J-4	90.8609	98.2859	92.8391	91.2580	73.36	26.64	79.93	20.07	
3B	J-8	91.9169	101.0518	94.4399	92.4376	72.38	27.62	79.36	20.64	
Recipe 3B Mean						72.77		79.68	20.32	44.3
Recipe 3B St. Dev.						0.52		0.29	0.29	0.29
4A	43	83.7605	90.3512	85.6010	84.0789	72.07	27.93	82.70	17.30	
4A	3	90.9419	98.3208	93.0152	91.3050	71.90	28.10	82.49	17.51	
4A	40	91.6263	98.6367	93.5829	91.9617	72.09	27.91	82.86	17.14	
Recipe 4A Mean						72.02		82.68	17.32	45.9
Recipe 4A St. Dev.						0.10		0.19	0.19	0.19
4B	J-3	90.3731	98.7597	92.6277	90.7614	73.12	26.88	82.78	17.22	
4B	30	94.1544	104.1459	96.7950	94.6032	73.57	26.43	83.00	17.00	
4B	J-5	85.1824	92.8641	87.2577	85.5248	72.98	27.02	83.50	16.50	
Recipe 4B Mean						73.22		83.09	16.91	46.2
Recipe 4B St. Dev.						0.31		0.37	0.37	0.37

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

July 2, 2002 Day 32

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	43	83.7617	91.2824	86.0018	84.1114	70.21	29.79	84.39	15.61	
1A	7	89.3030	97.1030	91.7040	89.6807	69.22	30.78	84.27	15.73	
1A	25	92.1659	101.4659	94.9937	92.5967	69.59	30.41	84.77	15.23	
Recipe 1A Mean						69.68		84.47	15.53	46.9
Recipe 1A St. Dev.						0.50		0.26	0.26	0.26
1B	30	94.1550	101.0635	96.2510	94.4652	69.66	30.34	85.20	14.80	
1B	40	91.6275	99.4584	94.0087	91.9797	69.59	30.41	85.21	14.79	
1B	3	90.9438	98.1290	93.1422	91.2348	69.40	30.60	86.76	13.24	
Recipe 1B Mean						69.55		85.72	14.28	47.6
Recipe 1B St. Dev.						0.13		0.90	0.90	0.90
2A	74	85.5437	93.9579	88.0223	86.0117	70.54	29.46	81.12	18.88	
2A	J-6	81.6156	90.3893	84.2420	82.1412	70.07	29.93	79.99	20.01	
2A	J-5	85.1835	92.4631	87.3791	85.6255	69.84	30.16	79.87	20.13	
Recipe 2A Mean						70.15		80.33	19.67	44.6
Recipe 2A St. Dev.						0.36		0.69	0.69	0.69
2B	J-3	90.3738	95.7706	91.8495	90.6977	72.66	27.34	78.05	21.95	
2B	J-4	90.8616	96.9536	92.5075	91.2053	72.98	27.02	79.12	20.88	
2B	J-8	91.9189	99.5681	93.8805	92.3294	74.36	25.64	79.07	20.93	
Recipe 2B Mean						73.33		78.75	21.25	43.7
Recipe 2B St. Dev.						0.90		0.60	0.60	0.60
3A	T11	87.8979	97.1045	89.8676	88.3453	78.61	21.39	77.29	22.71	
3A	T10	88.3319	96.5453	90.3278	88.8089	75.70	24.30	76.10	23.90	
3A	T12	88.2021	95.9865	89.8792	88.5835	78.46	21.54	77.26	22.74	
Recipe 3A Mean						77.59		76.88	23.12	42.7
Recipe 3A St. Dev.						1.64		0.68	0.68	0.68
3B	T1	87.7770	95.0635	89.7088	88.2244	73.49	26.51	76.84	23.16	
3B	T2	88.1474	95.1085	89.9837	88.5658	73.62	26.38	77.22	22.78	
3B	T6	88.2200	94.7535	89.9561	88.6185	73.43	26.57	77.05	22.95	
Recipe 3B Mean						73.51		77.03	22.97	42.8
Recipe 3B St. Dev.						0.10		0.19	0.19	0.19
4A	T8	88.0387	94.1879	89.6960	88.3515	73.05	26.95	81.13	18.87	
4A	T5	88.6197	94.9829	90.3235	88.9488	73.22	26.78	80.68	19.32	
4A	T3	87.3303	94.4804	89.2524	87.7021	73.12	26.88	80.66	19.34	
Recipe 4A Mean						73.13		80.82	19.18	44.9
Recipe 4A St. Dev.						0.09		0.26	0.26	0.26
4B	39	90.3502	98.2132	92.4101	90.7519	73.80	26.20	80.50	19.50	
4B	50	90.7168	98.1233	92.6106	91.0611	74.43	25.57	81.82	18.18	
4B	45	89.1925	96.8080	91.1650	89.5553	74.10	25.90	81.61	18.39	
Recipe 4B Mean						74.11		81.31	18.69	45.2
Recipe 4B St. Dev.						0.31		0.71	0.71	0.71

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

July 9, 2002 Day 39

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	50	87.9841	98.2440	91.2668	88.5699	68.00	32.00	82.15	17.85	
1A	18	90.1429	98.2744	92.5937	90.5537	69.86	30.14	83.24	16.76	
1A	56	89.9812	98.7249	92.6573	90.4144	69.39	30.61	83.81	16.19	
Recipe 1A Mean						69.09		83.07	16.93	46.1
Recipe 1A St. Dev.						0.97		0.84	0.84	0.84
1B	J-3	90.3724	97.7464	92.6639	90.7063	68.92	31.08	85.43	14.57	
1B	J-8	91.9154	100.7638	94.6680	92.3175	68.89	31.11	85.39	14.61	
1B	74	85.5424	94.4070	88.3256	85.9776	68.60	31.40	84.36	15.64	
Recipe 1B Mean						68.81		85.06	14.94	47.3
Recipe 1B St. Dev.						0.18		0.60	0.60	0.60
2A	43	83.7615	91.7330	86.1441	84.2868	70.11	29.89	77.95	22.05	
2A	7	89.3016	97.7180	91.8765	89.8327	69.41	30.59	79.37	20.63	
2A	25	92.1652	99.0045	94.2230	92.5779	69.91	30.09	79.94	20.06	
Recipe 2A Mean						69.81		79.09	20.91	43.9
Recipe 2A St. Dev.						0.36		1.03	1.03	1.03
2B	J-4	90.8542	100.4755	93.4537	91.4733	72.98	27.02	76.18	23.82	
2B	J-5	85.1779	91.3104	86.8457	85.5578	72.80	27.20	77.22	22.78	
2B	J-6	81.6085	89.3649	83.6761	82.0663	73.34	26.66	77.86	22.14	
Recipe 2B Mean						73.04		77.09	22.91	42.8
Recipe 2B St. Dev.						0.27		0.85	0.85	0.85
3A	23	90.5548	98.7376	92.3370	90.9793	78.22	21.78	76.18	23.82	
3A	11B	103.9106	108.8295	104.9753	104.1567	78.35	21.65	76.89	23.11	
3A	38	83.9501	91.4631	85.6115	84.3462	77.89	22.11	76.16	23.84	
Recipe 3A Mean						78.15		76.41	23.59	42.4
Recipe 3A St. Dev.						0.24		0.41	0.41	0.41
3B	T1	87.7743	96.1057	89.8852	88.3065	74.66	25.34	74.79	25.21	
3B	T2	88.1448	94.9236	89.8997	88.5860	74.11	25.89	74.86	25.14	
3B	T3	87.3281	97.0297	89.7975	87.9731	74.55	25.45	73.88	26.12	
Recipe 3B Mean						74.44		74.51	25.49	41.4
Recipe 3B St. Dev.						0.29		0.55	0.55	0.55
4A	T5	88.6172	95.8813	90.5662	89.0152	73.17	26.83	79.58	20.42	
4A	T6	88.2172	94.4282	89.8920	88.5552	73.03	26.97	79.82	20.18	
4A	T8	88.0359	96.7713	90.3811	88.5153	73.15	26.85	79.56	20.44	
Recipe 4A Mean						73.12		79.65	20.35	44.3
Recipe 4A St. Dev.						0.07		0.14	0.14	0.14
4B	T10	88.3282	94.6645	89.9425	88.6382	74.52	25.48	80.80	19.20	
4B	T11	87.8951	96.6458	90.1409	88.3356	74.34	25.66	80.39	19.61	
4B	T12	88.2006	97.0093	90.4702	88.6329	74.23	25.77	80.95	19.05	
Recipe 4B Mean						74.36		80.71	19.29	44.8
Recipe 4B St. Dev.						0.15		0.29	0.29	0.29

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

July 16, 2002 **Day 46**

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	56	89.9832	97.9484	92.5939	90.4427	67.22	32.78	82.40	17.60	
1A	23	90.5566	96.7774	92.5804	90.8988	67.47	32.53	83.09	16.91	
1A	18	90.1440	97.8179	92.5875	90.5742	68.16	31.84	82.39	17.61	
Recipe 1A Mean						67.62		82.63	17.37	45.9
Recipe 1A St. Dev.						0.48		0.40	0.40	0.40
1B	J-5	85.1834	93.7112	87.7383	85.5902	70.04	29.96	84.08	15.92	
1B	J-3	90.3745	99.0692	93.0601	90.8096	69.11	30.89	83.80	16.20	
1B	J-8	91.9176	98.7182	94.0605	92.2380	68.49	31.51	85.05	14.95	
Recipe 1B Mean						69.21		84.31	15.69	46.8
Recipe 1B St. Dev.						0.78		0.66	0.66	0.66
2A	74	85.5452	92.7752	87.7769	86.0206	69.13	30.87	78.70	21.30	
2A	J-4	90.8613	97.1989	92.8166	91.2772	69.15	30.85	78.73	21.27	
2A	J-6	81.6156	88.6713	83.8169	82.1091	68.80	31.20	77.58	22.42	
Recipe 2A Mean						69.03		78.34	21.66	43.5
Recipe 2A St. Dev.						0.20		0.65	0.65	0.65
2B	25	92.1658	99.0834	94.1618	92.6852	71.15	28.85	73.98	26.02	
2B	43	83.7614	93.6254	86.4149	broke	73.10	26.90	-	-	
2B	50	87.9846	94.9928	89.8716	88.4540	73.07	26.93	75.12	24.88	
Recipe 2B Mean						72.44		74.55	25.45	41.4
Recipe 2B St. Dev.						1.12		0.81	0.81	0.81
3A	T7	88.6382	96.0381	90.3199	89.1250	77.27	22.73	71.05	28.95	
3A	T9	89.7521	96.0197	91.1144	90.0908	78.26	21.74	75.14	24.86	
3A	38	83.9519	90.0516	85.3201	84.3057	77.57	22.43	74.14	25.86	
Recipe 3A Mean						77.70		73.44	26.56	40.8
Recipe 3A St. Dev.						0.51		2.13	2.13	2.13
3B	T10	88.3311	93.8732	89.7214	88.7173	74.91	25.09	72.22	27.78	
3B	T11	87.8981	94.1105	89.4547	88.3216	74.94	25.06	72.79	27.21	
3B	T12	88.2013	94.8810	89.8887	88.6770	74.74	25.26	71.81	28.19	
Recipe 3B Mean						74.87		72.27	27.73	40.2
Recipe 3B St. Dev.						0.11		0.49	0.49	0.49
4A	T1	87.7770	97.1317	90.2060	88.3100	74.03	25.97	78.06	21.94	
4A	T2	88.1471	93.4115	89.5366	88.4424	73.61	26.39	78.75	21.25	
4A	T3	87.3307	93.6704	89.0320	87.6971	73.16	26.84	78.46	21.54	
Recipe 4A Mean						73.60		78.42	21.58	43.6
Recipe 4A St. Dev.						0.44		0.35	0.35	0.35
4B	T5	88.6208	94.3447	90.0759	88.9164	74.58	25.42	79.69	20.31	
4B	T6	88.2214	94.9086	89.9418	88.5630	74.27	25.73	80.14	19.86	
4B	T8	88.0391	94.4247	89.7005	88.3643	73.98	26.02	80.43	19.57	
Recipe 4B Mean						74.28		80.09	19.91	44.5
Recipe 4B St. Dev.						0.30		0.37	0.37	0.37

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis
July 23, 2002 **Day 53**

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-3	90.3749	99.4220	93.1519	90.9658	69.31	30.69	78.72	21.28	
1A	J-5	85.1835	94.4413	87.8324	85.7337	71.39	28.61	79.23	20.77	
1A	J-8	91.9173	100.5668	94.5516	92.4610	69.54	30.46	79.36	20.64	
Recipe 1A Mean						70.08		79.10	20.90	43.9
Recipe 1A St. Dev.						1.14		0.34	0.34	0.34
1B	18	89.9825	97.6707	92.4472	90.5328	67.94	32.06	77.67	22.33	
1B	74	85.5445	95.2874	88.5320	86.0419	69.34	30.66	83.35	16.65	
1B	56	90.1441	99.7223	92.9387	90.5121	70.82	29.18	86.83	13.17	
Recipe 1B Mean						69.37		82.62	17.38	45.9
Recipe 1B St. Dev.						1.44		4.62	4.62	4.62
2A	50	87.9849	94.6030	90.2130	88.5277	66.33	33.67	75.64	24.36	
2A	25	92.1657	97.8868	94.0978	92.6170	66.23	33.77	76.64	23.36	
2A	23	90.5570	96.0672	92.3994	90.9628	66.56	33.44	77.97	22.03	
Recipe 2A Mean						66.38		76.75	23.25	42.6
Recipe 2A St. Dev.						0.17		1.17	1.17	1.17
2B	J-4	90.8615	95.9501	92.2327	91.2191	73.05	26.95	73.92	26.08	
2B	J-6	81.6157	91.0476	84.2174	82.3409	72.42	27.58	72.13	27.87	
2B	50	90.7126	96.0062	92.1179	91.0813	73.45	26.55	73.76	26.24	
Recipe 2B Mean						72.97		73.27	26.73	40.7
Recipe 2B St. Dev.						0.52		0.99	0.99	0.99
3A	39	90.3469	97.2868	91.9979	90.7961	76.21	23.79	72.79	27.21	
3A	T6	88.2196	94.5450	89.7104	88.6541	76.43	23.57	70.85	29.15	
3A	38	83.9511	90.0394	85.3789	84.3500	76.55	23.45	72.06	27.94	
Recipe 3A Mean						76.40		71.90	28.10	39.9
Recipe 3A St. Dev.						0.17		0.98	0.98	0.98
3B	T7	88.6394	96.7649	90.7217	89.2486	74.37	25.63	70.74	29.26	
3B	T8	88.0386	95.8737	90.0433	88.6334	74.41	25.59	70.33	29.67	
3B	T9	89.7540	97.1125	91.6460	90.3141	74.29	25.71	70.40	29.60	
Recipe 3B Mean						74.36		70.49	29.51	39.2
Recipe 3B St. Dev.						0.06		0.22	0.22	0.22
4A	T10	88.3314	95.0380	90.1745	88.7441	72.52	27.48	77.61	22.39	
4A	T11	87.8976	94.4646	89.7431	88.3219	71.90	28.10	77.01	22.99	
4A	T12	88.2011	94.6357	89.9666	88.5966	72.56	27.44	77.60	22.40	
Recipe 4A Mean						72.33		77.41	22.59	43.0
Recipe 4A St. Dev.						0.37		0.34	0.34	0.34
4B	T1	87.7769	95.7629	89.8661	88.2206	73.84	26.16	78.76	21.24	
4B	T2	88.1467	94.0336	89.7531	88.4739	72.71	27.29	79.63	20.37	
4B	T3	87.3306	92.8833	88.8360	87.6447	72.89	27.11	79.14	20.86	
Recipe 4B Mean						73.15		79.18	20.82	44.0
Recipe 4B St. Dev.						0.61		0.44	0.44	0.44

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

July 30, 2002 Day 60

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-3	90.3748	98.5516	92.8316	90.9103	69.95	30.05	78.20	21.80	
1A	J-4	90.8614	97.8083	93.1415	91.3485	67.18	32.82	78.64	21.36	
1A	J-5	85.1840	92.2902	87.5266	85.7117	67.03	32.97	77.47	22.53	
Recipe 1A Mean						68.06		78.10	21.90	43.4
Recipe 1A St. Dev.						1.65		0.59	0.59	0.59
1B	18	90.1451	95.7867	91.9434	90.4923	68.12	31.88	80.69	19.31	
1B	25	92.1663	98.7001	94.2360	92.5745	68.32	31.68	80.28	19.72	
1B	56	89.9834	95.6330	91.6904	90.3158	69.79	30.21	80.53	19.47	
Recipe 1B Mean						68.74		80.50	19.50	44.7
Recipe 1B St. Dev.						0.91		0.21	0.21	0.21
2A	J-6	81.6163	87.1457	83.5546	82.0861	64.95	35.05	75.76	24.24	
2A	J-8	91.9178	98.9959	94.3820	92.4982	65.19	34.81	76.45	23.55	
2A	74	85.5449	93.3337	88.2637	86.2041	65.09	34.91	75.75	24.25	
Recipe 2A Mean						65.07		75.99	24.01	42.2
Recipe 2A St. Dev.						0.12		0.40	0.40	0.40
2B	T6	88.2209	94.3590	89.9509	88.7020	71.82	28.18	72.19	27.81	
2B	23	90.5579	99.2960	92.9972	91.2619	72.08	27.92	71.14	28.86	
2B	50	87.9855	96.3340	90.3017	88.6223	72.26	27.74	72.51	27.49	
Recipe 2B Mean						72.05		71.95	28.05	40.0
Recipe 2B St. Dev.						0.22		0.72	0.72	0.72
3A	39	90.3499	98.0566	92.1681	90.8806	76.41	23.59	70.81	29.19	
3A	50	90.7163	98.8155	92.6242	91.2870	76.44	23.56	70.09	29.91	
3A	38	83.9522	90.9089	85.6019	84.4454	76.29	23.71	70.10	29.90	
Recipe 3A Mean						76.38		70.33	29.67	39.1
Recipe 3A St. Dev.						0.08		0.41	0.41	0.41
3B	T1	87.7770	95.4663	89.7712	88.4131	74.07	25.93	68.10	31.90	
3B	T2	88.1470	96.9692	90.4228	88.8868	74.20	25.80	67.49	32.51	
3B	T3	87.3309	93.6654	88.9635	87.8503	74.23	25.77	68.19	31.81	
Recipe 3B Mean						74.17		67.93	32.07	37.7
Recipe 3B St. Dev.						0.09		0.38	0.38	0.38
4A	T7	88.6406	93.6437	90.0193	88.9611	72.44	27.56	76.75	23.25	
4A	T8	88.0390	93.2314	89.4835	88.3721	72.18	27.82	76.94	23.06	
4A	T9	89.7548	96.4126	91.5905	90.1841	72.43	27.57	76.61	23.39	
Recipe 4A Mean						72.35		76.77	23.23	42.6
Recipe 4A St. Dev.						0.15		0.16	0.16	0.16
4B	T10	88.3316	94.9449	90.1879	88.7376	71.93	28.07	78.13	21.87	
4B	T11	87.8981	95.3028	89.9267	88.3390	72.60	27.40	78.27	21.73	
4B	T12	88.2017	93.4032	89.6435	88.5039	72.28	27.72	79.04	20.96	
Recipe 4B Mean						72.27		78.48	21.52	43.6
Recipe 4B St. Dev.						0.34		0.49	0.49	0.49

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

August 6, 2002 Day 67

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	25	92.1658	99.9656	94.5499	92.6828	69.43	30.57	78.31	21.69	
1A	56	89.9831	98.2328	92.5080	90.5609	69.39	30.61	77.12	22.88	
1A	J-6	81.6157	89.5509	84.1334	82.1697	68.27	31.73	78.00	22.00	
Recipe 1A Mean						69.03		77.81	22.19	43.2
Recipe 1A St. Dev.						0.66		0.62	0.62	0.62
1B	74	85.5433	93.6177	87.8401	86.0036	71.55	28.45	79.96	20.04	
1B	50	87.9864	95.4055	90.1461	88.4099	70.89	29.11	80.39	19.61	
1B	18	90.1443	99.3993	92.8422	90.6769	70.85	29.15	80.26	19.74	
Recipe 1B Mean						71.10		80.20	19.80	44.6
Recipe 1B St. Dev.						0.40		0.22	0.22	0.22
2A	J-3	90.3745	98.9259	92.9976	91.0494	69.33	30.67	74.27	25.73	
2A	J-4	90.8610	96.5510	92.6237	91.3124	69.02	30.98	74.39	25.61	
2A	J-5	85.1832	90.7713	86.9549	broke	68.30	31.70	-	-	
Recipe 2A Mean						68.88		74.33	25.67	41.3
Recipe 2A St. Dev.						0.53		0.09	0.09	0.09
2B	45	89.1909	95.3499	90.9460	broke	71.50	28.50	-	-	
2B	T6	88.2202	94.9901	90.1446	88.7915	71.57	28.43	70.31	29.69	
2B	J-8	91.9172	99.1940	94.0339	92.5374	70.91	29.09	70.70	29.30	
Recipe 2B Mean						71.33		70.51	29.49	39.2
Recipe 2B St. Dev.						0.36		0.27	0.27	0.27
3A	50	90.7156	99.9752	93.0932	91.4753	74.32	25.68	68.05	31.95	
3A	38	83.9518	91.4290	85.8246	84.5379	74.95	25.05	68.70	31.30	
3A	39	90.3496	99.9806	92.8108	91.1532	74.45	25.55	67.35	32.65	
Recipe 3A Mean						74.57		68.03	31.97	37.8
Recipe 3A St. Dev.						0.33		0.68	0.68	0.68
3B	T7	88.6396	96.2309	90.6392	89.3128	73.66	26.34	66.33	33.67	
3B	T8	88.0385	96.4091	90.2662	88.7830	73.39	26.61	66.58	33.42	
3B	T9	89.7547	98.5890	92.1104	90.5702	73.33	26.67	65.38	34.62	
Recipe 3B Mean						73.46		66.10	33.90	36.7
Recipe 3B St. Dev.						0.17		0.63	0.63	0.63
4A	T1	87.7764	96.4778	90.2602	88.3973	71.46	28.54	75.00	25.00	
4A	T2	88.1465	96.1335	90.4136	88.6988	71.62	28.38	75.64	24.36	
4A	T3	87.3301	93.3857	89.0558	87.7559	71.50	28.50	75.33	24.67	
Recipe 4A Mean						71.52		75.32	24.68	41.8
Recipe 4A St. Dev.						0.08		0.32	0.32	0.32
4B	T10	88.3309	96.6593	90.6409	88.8495	72.26	27.74	77.55	22.45	
4B	T11	87.8978	94.4343	89.7209	88.3019	72.11	27.89	77.83	22.17	
4B	T12	88.2012	94.0967	89.8258	88.5585	72.44	27.56	78.01	21.99	
Recipe 4B Mean						72.27		77.80	22.20	43.2
Recipe 4B St. Dev.						0.17		0.23	0.23	0.23

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

August 13, 2002 **Day 74**

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	40	91.6278	98.7333	93.6750	92.1146	71.19	28.81	76.22	23.78	
1A	0	89.8346	99.8515	92.7308	90.5311	71.09	28.91	75.95	24.05	
1A	C	85.6970	96.2685	88.7065	86.4161	71.53	28.47	76.11	23.89	
Recipe 1A Mean						71.27		76.09	23.91	42.3
Recipe 1A St. Dev.						0.23		0.14	0.14	0.14
1B	50	87.9867	95.0999	90.1741	88.4154	69.25	30.75	80.40	19.60	
1B	18	90.1456	97.2740	92.3126	90.5947	69.60	30.40	79.28	20.72	
1B	74	85.5449	93.7273	88.0571	86.0700	69.30	30.70	79.10	20.90	
Recipe 1B Mean						69.38		79.59	20.41	44.2
Recipe 1B St. Dev.						0.19		0.71	0.71	0.71
2A	J-6	81.6169	88.1428	83.5962	82.1217	69.67	30.33	74.50	25.50	
2A	J-3	90.3755	98.1089	92.6697	90.9706	70.33	29.67	74.06	25.94	
2A	7	89.3030	97.1763	91.6631	89.9159	70.02	29.98	74.03	25.97	
Recipe 2A Mean						70.01		74.20	25.80	41.2
Recipe 2A St. Dev.						0.33		0.26	0.26	0.26
2B	56	89.9842	97.9204	92.3511	90.7224	70.18	29.82	68.81	31.19	
2B	50	90.7166	98.5377	93.0505	91.4376	70.16	29.84	69.11	30.89	
2B	T6	88.2219	94.3605	90.0374	88.7761	70.42	29.58	69.47	30.53	
Recipe 2B Mean						70.25		69.13	30.87	38.4
Recipe 2B St. Dev.						0.15		0.33	0.33	0.33
3A	38	83.9523	90.9689	85.8471	84.5761	73.00	27.00	67.08	32.92	
3A	T-8	95.1104	100.5033	96.5597	95.5892	73.13	26.87	66.96	33.04	
3A	39	90.3502	97.4711	92.2978	90.9958	72.65	27.35	66.85	33.15	
Recipe 3A Mean						72.92		66.96	33.04	37.2
Recipe 3A St. Dev.						0.25		0.11	0.11	0.11
3B	T7	88.6413	96.7034	90.8754	89.4315	72.29	27.71	64.63	35.37	
3B	T8	88.0403	96.3622	90.3283	88.8529	72.51	27.49	64.48	35.52	
3B	T9	89.7564	97.4052	91.8413	90.4792	72.74	27.26	65.33	34.67	
Recipe 3B Mean						72.51		64.82	35.18	36.0
Recipe 3B St. Dev.						0.23		0.45	0.45	0.45
4A	T10	88.3325	94.8773	90.2411	88.8261	70.84	29.16	74.14	25.86	
4A	T11	87.8992	95.4551	90.0773	88.4532	71.17	28.83	74.56	25.44	
4A	T12	88.2028	94.2395	89.9443	88.6460	71.15	28.85	74.55	25.45	
Recipe 4A Mean						71.05		74.42	25.58	41.3
Recipe 4A St. Dev.						0.19		0.24	0.24	0.24
4B	T1	87.7785	93.6281	89.4675	88.1753	71.13	28.87	76.51	23.49	
4B	T2	88.1479	95.8982	90.3717	88.6612	71.31	28.69	76.92	23.08	
4B	T3	87.3328	94.5504	89.3926	87.8220	71.46	28.54	76.25	23.75	
Recipe 4B Mean						71.30		76.56	23.44	42.5
Recipe 4B St. Dev.						0.17		0.34	0.34	0.34

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

August 20, 2002 Day 81

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-3	90.3750	98.0321	92.6517	90.9215	70.27	29.73	76.00	24.00	
1A	J-4	90.8622	97.9529	92.9916	91.4151	69.97	30.03	74.03	25.97	
1A	J-5	91.9182	98.7392	93.9635	92.4204	70.01	29.99	75.45	24.55	
Recipe 1A Mean						70.08		75.16	24.84	41.8
Recipe 1A St. Dev.						0.16		1.01	1.01	1.01
1B	56	89.9839	98.0350	92.5541	90.5435	68.08	31.92	78.23	21.77	
1B	40	91.6256	98.8694	93.9232	92.1164	68.28	31.72	78.64	21.36	
1B	18	90.1455	95.8824	91.9814	broke	68.00	32.00	-	-	
Recipe 1B Mean						68.12		78.43	21.57	43.6
Recipe 1B St. Dev.						0.15		0.29	0.29	0.29
2A	J-6	81.6168	91.2066	84.5102	82.4931	69.83	30.17	69.71	30.29	
2A	74	85.5454	92.3228	87.5911	86.1201	69.82	30.18	71.91	28.09	
2A	50	87.9862	95.1291	90.1417	88.5879	69.82	30.18	72.09	27.91	
Recipe 2A Mean						69.82		71.24	28.76	39.6
Recipe 2A St. Dev.						0.01		1.32	1.32	1.32
2B	38	83.9523	91.8296	86.3744	broke	69.25	30.75	-	-	
2B	39	90.3500	97.5527	92.5521	91.0703	69.43	30.57	67.29	32.71	
2B	7	89.3016	96.1167	91.3896	89.9816	69.36	30.64	67.43	32.57	
Recipe 2B Mean						69.35		67.36	32.64	37.4
Recipe 2B St. Dev.						0.09		0.10	0.10	0.10
3A	T6	88.2215	95.2365	90.1012	88.8653	73.20	26.80	65.75	34.25	
3A	T-8	95.1098	103.6491	97.4132	95.9300	73.03	26.97	64.39	35.61	
3A	50	90.7160	100.5982	93.3768	91.6849	73.07	26.93	63.59	36.41	
Recipe 3A Mean						73.10		64.58	35.42	35.9
Recipe 3A St. Dev.						0.09		1.09	1.09	1.09
3B	T1	87.7778	95.6561	89.9743	88.5808	72.12	27.88	63.44	36.56	
3B	T2	88.1479	99.5214	91.2935	89.2998	72.34	27.66	63.38	36.62	
3B	T3	87.3314	95.0738	89.5305	88.1135	71.60	28.40	64.44	35.56	
Recipe 3B Mean						72.02		63.75	36.25	35.4
Recipe 3B St. Dev.						0.38		0.59	0.59	0.59
4A	T7	88.6406	95.8444	90.7713	89.2101	70.42	29.58	73.27	26.73	
4A	T8	88.0389	94.8873	90.0838	88.5781	70.14	29.86	73.63	26.37	
4A	T9	89.7557	94.5537	91.1797	90.1280	70.32	29.68	73.86	26.14	
Recipe 4A Mean						70.29		73.59	26.41	40.9
Recipe 4A St. Dev.						0.14		0.29	0.29	0.29
4B	T10	88.3315	94.5608	90.1519	broke	70.78	29.22	-	-	
4B	T11	87.8989	93.8585	89.6339	88.3259	70.89	29.11	75.39	24.61	
4B	T12	88.2012	94.5749	90.0897	88.6560	70.37	29.63	75.92	24.08	
Recipe 4B Mean						70.68		75.65	24.35	42.0
Recipe 4B St. Dev.						0.27		0.37	0.37	0.37

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis
August 27, 2002 Day 88

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	01	89.9342	99.1026	92.6063	90.5641	70.86	29.14	76.43	23.57	
1A	30	94.1538	101.4480	96.2516	94.7084	71.24	28.76	73.56	26.44	
1A	25	92.1663	97.6551	93.8011	92.5747	70.22	29.78	75.02	24.98	
Recipe 1A Mean						70.77		75.00	25.00	41.7
Recipe 1A St. Dev.						0.52		1.43	1.43	1.43
1B	J-3	90.3755	97.7704	92.6819	90.8779	68.81	31.19	78.22	21.78	
1B	J-4	90.8621	97.8811	93.0699	91.3538	68.55	31.45	77.73	22.27	
1B	J-6	81.6166	88.0183	83.6254	82.0555	68.62	31.38	78.15	21.85	
Recipe 1B Mean						68.66		78.03	21.97	43.4
Recipe 1B St. Dev.						0.14		0.26	0.26	0.26
2A	74	85.5453	92.7939	87.8081	86.2083	68.78	31.22	70.70	29.30	
2A	56	89.9841	97.0878	92.2476	90.6443	68.14	31.86	70.83	29.17	
2A	J-8	91.9178	99.4995	94.2910	92.5884	68.70	31.30	71.74	28.26	
Recipe 2A Mean						68.54		71.09	28.91	39.5
Recipe 2A St. Dev.						0.35		0.57	0.57	0.57
2B	50	87.9868	95.3068	90.3327	88.7754	67.95	32.05	66.38	33.62	
2B	40	91.6259	97.8605	93.6107	92.2686	68.16	31.84	67.62	32.38	
2B	7	89.3013	96.2371	91.4800	90.0206	68.59	31.41	66.98	33.02	
Recipe 2B Mean						68.23		67.00	33.00	37.2
Recipe 2B St. Dev.						0.32		0.62	0.62	0.62
3A	50	90.7158	98.8970	93.0479	91.5457	71.49	28.51	64.41	35.59	
3A	39	90.3500	96.9801	92.2190	91.0214	71.81	28.19	64.08	35.92	
3A	T-8	95.1105	99.8167	96.4478	95.5888	71.58	28.42	64.23	35.77	
Recipe 3A Mean						71.63		64.24	35.76	35.7
Recipe 3A St. Dev.						0.16		0.17	0.17	0.17
3B	T1	87.7771	94.1590	89.6225	88.4532	71.08	28.92	63.36	36.64	
3B	T2	88.1474	94.0847	89.8991	88.7852	70.50	29.50	63.59	36.41	
3B	T3	87.3306	95.1966	89.6434	88.1948	70.60	29.40	62.63	37.37	
Recipe 3B Mean						70.73		63.20	36.80	35.1
Recipe 3B St. Dev.						0.31		0.50	0.50	0.50
4A	T6	88.2220	96.5169	90.7855	88.9046	69.10	30.90	73.37	26.63	
4A	T7	88.6406	95.8553	90.8340	89.2516	69.60	30.40	72.14	27.86	
4A	T8	88.0391	95.0656	90.1748	88.6254	69.61	30.39	72.55	27.45	
Recipe 4A Mean						69.43		72.69	27.31	40.4
Recipe 4A St. Dev.						0.29		0.63	0.63	0.63
4B	T9	89.7553	96.5913	91.7838	90.2690	70.33	29.67	74.68	25.32	
4B	T11	87.8986	95.5811	90.2003	88.4819	70.04	29.96	74.66	25.34	
4B	T12	88.2015	95.5296	90.4154	88.7697	69.79	30.21	74.33	25.67	
Recipe 4B Mean						70.05		74.56	25.44	41.4
Recipe 4B St. Dev.						0.27		0.19	0.19	0.19

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis
September 3, 2002 Day 95

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	3	90.9406	99.8785	93.6358	91.6616	69.85	30.15	73.25	26.75	
1A	74	85.5473	94.6878	88.3602	86.2909	69.23	30.77	73.56	26.44	
1A	7	89.3027	98.0082	91.9895	90.0770	69.14	30.86	71.18	28.82	
Recipe 1A Mean						69.40		72.66	27.34	40.4
Recipe 1A St. Dev.						0.39		1.29	1.29	1.29
1B	25	92.1675	98.8721	94.1023	92.6212	71.14	28.86	76.55	23.45	
1B	50	87.9883	95.2830	90.0685	88.4826	71.48	28.52	76.24	23.76	
1B	56	89.9854	99.2774	92.6134	90.5949	71.72	28.28	76.81	23.19	
Recipe 1B Mean						71.45		76.53	23.47	42.5
Recipe 1B St. Dev.						0.29		0.29	0.29	0.29
2A	30	94.1544	100.0825	95.8695	94.6854	71.07	28.93	69.04	30.96	
2A	40	91.6270	99.1937	93.7915	92.2908	71.39	28.61	69.33	30.67	
2A	J-3	90.3767	97.6200	92.5135	91.0545	70.50	29.50	68.28	31.72	
Recipe 2A Mean						70.99		68.88	31.12	38.3
Recipe 2A St. Dev.						0.45		0.54	0.54	0.54
2B	J-4	90.8628	97.2933	92.7841	91.5354	70.12	29.88	64.99	35.01	
2B	J-6	81.6178	87.8633	83.4785	82.2713	70.21	29.79	64.88	35.12	
2B	J-8	91.9189	98.2470	93.8164	92.6012	70.01	29.99	64.04	35.96	
Recipe 2B Mean						70.11		64.64	35.36	35.9
Recipe 2B St. Dev.						0.10		0.52	0.52	0.52
3A	39	90.3504	96.9190	92.2966	91.0512	70.37	29.63	63.99	36.01	
3A	50	90.7167	99.5885	93.3816	broke	69.96	30.04	-	-	
3A	T-8	95.1113	101.2192	96.9527	95.7955	69.85	30.15	62.84	37.16	
Recipe 3A Mean						70.06		63.42	36.58	35.2
Recipe 3A St. Dev.						0.27		0.81	0.81	0.81
3B	T1	87.7778	98.6741	90.9888	88.9943	70.53	29.47	62.11	37.89	
3B	T2	88.1484	95.5687	90.3636	88.9772	70.15	29.85	62.59	37.41	
3B	T3	87.3310	94.4539	89.5256	88.2195	69.19	30.81	59.51	40.49	
Recipe 3B Mean						69.96		61.40	38.60	34.1
Recipe 3B St. Dev.						0.69		1.65	1.65	1.65
4A	T6	88.2222	96.7691	90.7565	88.9685	70.35	29.65	70.55	29.45	
4A	T7	88.6413	94.4069	90.3489	89.1296	70.38	29.62	71.40	28.60	
4A	T8	88.0392	95.1376	90.1123	88.6275	70.79	29.21	71.62	28.38	
Recipe 4A Mean						70.51		71.19	28.81	39.6
Recipe 4A St. Dev.						0.25		0.57	0.57	0.57
4B	T9	89.7554	97.9516	92.2300	90.3826	69.81	30.19	74.65	25.35	
4B	T11	87.8995	94.3275	89.8577	88.3939	69.54	30.46	74.75	25.25	
4B	T12	88.2017	94.9634	90.2510	88.7107	69.69	30.31	75.16	24.84	
Recipe 4B Mean						69.68		74.86	25.14	41.6
Recipe 4B St. Dev.						0.14		0.27	0.27	0.27

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis
September 10, 2002 Day 102

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	74	85.5395	93.0854	87.6487	86.1519	72.05	27.95	70.97	29.03	
1A	25	92.1588	99.6651	94.2735	92.7674	71.83	28.17	71.22	28.78	
1A	56	89.9781	98.2950	92.3363	90.6452	71.65	28.35	71.71	28.29	
Recipe 1A Mean						71.84		71.30	28.70	39.6
Recipe 1A St. Dev.						0.20		0.38	0.38	0.38
1B	J-3	90.3698	96.8516	92.3266	90.8626	69.81	30.19	74.82	25.18	
1B	50	87.9818	94.1842	89.8761	88.4628	69.46	30.54	74.61	25.39	
1B	3	90.9349	96.5357	92.6063	91.3479	70.16	29.84	75.29	24.71	
Recipe 1B Mean						69.81		74.90	25.10	41.6
Recipe 1B St. Dev.						0.35		0.35	0.35	0.35
2A	0	85.6914	91.7280	87.5098	86.2811	69.88	30.12	67.57	32.43	
2A	7	89.2977	95.3848	91.1278	89.8948	69.93	30.07	67.37	32.63	
2A	11B	103.9044	109.5925	105.6103	104.4297	70.01	29.99	69.21	30.79	
Recipe 2A Mean						69.94		68.05	31.95	37.8
Recipe 2A St. Dev.						0.07		1.01	1.01	1.01
2B	J-4	90.8618	96.5629	92.6575	91.5166	68.50	31.50	63.54	36.46	
2B	J-6	81.6173	87.5187	83.4913	82.2906	68.24	31.76	64.07	35.93	
2B	J-8	91.9173	99.5885	94.4121	92.8811	67.48	32.52	61.37	38.63	
Recipe 2B Mean						68.08		62.99	37.01	35.0
Recipe 2B St. Dev.						0.53		1.43	1.43	1.43
3A	39	90.3493	98.3586	92.8319	91.2555	69.00	31.00	63.50	36.50	
3A	A-11	89.1610	96.7897	91.5008	broke	69.33	30.67	-	-	
3A	T-8	95.1106	100.9331	96.9370	broke	68.63	31.37	-	-	
Recipe 3A Mean						68.99		63.50	36.50	35.3
Recipe 3A St. Dev.						0.35		0.00	0.00	0.00
3B	T1	87.7780	94.8501	89.8423	88.5650	70.81	29.19	61.88	38.12	
3B	T2	88.1485	99.0291	91.3232	89.3656	70.82	29.18	61.66	38.34	
3B	T3	87.3310	92.5798	88.8727	87.9376	70.63	29.37	60.65	39.35	
Recipe 3B Mean						70.75		61.40	38.60	34.1
Recipe 3B St. Dev.						0.11		0.65	0.65	0.65
4A	T6	88.2228	95.5236	90.4285	88.8761	69.79	30.21	70.38	29.62	
4A	T7	88.6404	97.3332	91.2455	89.4167	70.03	29.97	70.20	29.80	
4A	T8	88.0399	95.9883	90.4461	88.7493	69.73	30.27	70.52	29.48	
Recipe 4A Mean						69.85		70.37	29.63	39.1
Recipe 4A St. Dev.						0.16		0.16	0.16	0.16
4B	T9	89.7568	95.9806	91.5855	90.2357	70.62	29.38	73.81	26.19	
4B	T11	87.8996	94.4048	89.8350	88.4281	70.25	29.75	72.69	27.31	
4B	T12	88.2033	93.5693	89.7994	88.6353	70.26	29.74	72.93	27.07	
Recipe 4B Mean						70.37		73.15	26.85	40.6
Recipe 4B St. Dev.						0.21		0.59	0.59	0.59

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

September 17, 2002 **Day 109**

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103℃ (g)	After 550℃ (g)	%MC	%TS	%VS	%FS	%OC
1A	74	85.5479	91.3774	87.2249	86.0648	71.23	28.77	69.18	30.82	
1A	J-6	81.6186	90.3118	84.1196	82.3822	71.23	28.77	69.47	30.53	
1A	J-8	91.9196	98.6891	93.9088	92.5192	70.62	29.38	69.86	30.14	
Recipe 1A Mean						71.03		69.50	30.50	38.6
Recipe 1A St. Dev.						0.36		0.34	0.34	0.34
1B	3	90.9438	96.7020	92.7291	91.4657	69.00	31.00	70.77	29.23	
1B	25	92.1683	100.0736	94.5956	92.8126	69.30	30.70	73.46	26.54	
1B	50	87.9887	94.4832	89.9488	cracked	69.82	30.18	-	-	
Recipe 1B Mean						69.37		72.11	27.89	40.1
Recipe 1B St. Dev.						0.42		1.90	1.90	1.90
2A	39	90.3521	97.5888	92.4763	91.0811	70.65	29.35	65.68	34.32	
2A	0	85.6986	91.8964	87.5510	86.3411	70.11	29.89	65.32	34.68	
2A	7	89.3036	97.2267	91.5981	90.0939	71.04	28.96	65.56	34.44	
Recipe 2A Mean						70.60		65.52	34.48	36.4
Recipe 2A St. Dev.						0.47		0.19	0.19	0.19
2B	56	89.9866	95.2329	91.6198	90.5878	68.87	31.13	63.19	36.81	
2B	J-3	90.3778	97.9849	92.7506	91.2814	68.81	31.19	61.92	38.08	
2B	J-4	90.8642	96.8969	92.7833	91.5729	68.19	31.81	63.07	36.93	
Recipe 2B Mean						68.62		62.73	37.27	34.8
Recipe 2B St. Dev.						0.38		0.70	0.70	0.70
3A	A	110.7077	116.7595	112.5886	111.4054	68.92	31.08	62.91	37.09	
3A	B	109.2554	114.8298	110.9487	109.8976	69.62	30.38	62.07	37.93	
3A	C	114.5859	124.0366	117.4311	115.6535	69.89	30.11	62.48	37.52	
Recipe 3A Mean						69.48		62.49	37.51	34.7
Recipe 3A St. Dev.						0.50		0.42	0.42	0.42
3B	T1	87.7793	93.5000	89.5567	88.4819	68.93	31.07	60.47	39.53	
3B	T2	88.1497	93.0608	89.6454	88.7305	69.54	30.46	61.17	38.83	
3B	T3	87.3321	92.6109	88.9582	87.9616	69.20	30.80	61.29	38.71	
Recipe 3B Mean						69.22		60.98	39.02	33.9
Recipe 3B St. Dev.						0.31		0.44	0.44	0.44
4A	T6	88.2236	94.0913	90.0192	88.7690	69.40	30.60	69.63	30.37	
4A	T7	88.6416	96.0503	90.9849	89.3740	68.37	31.63	68.74	31.26	
4A	T8	88.0411	94.9917	90.1486	88.6896	69.68	30.32	69.23	30.77	
Recipe 4A Mean						69.15		69.20	30.80	38.4
Recipe 4A St. Dev.						0.69		0.44	0.44	0.44
4B	T9	89.7580	97.8350	92.1781	90.4244	70.04	29.96	72.46	27.54	
4B	T11	87.9010	95.6818	90.2386	88.5383	69.96	30.04	72.74	27.26	
4B	T12	88.2045	95.4062	90.3524	88.7912	70.18	29.82	72.68	27.32	
Recipe 4B Mean						70.06		72.63	27.37	40.3
Recipe 4B St. Dev.						0.11		0.14	0.14	0.14

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

September 24, 2002 Day 116

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-4	90.8629	98.3716	93.1440	91.5855	69.62	30.38	68.32	31.68	
1A	J-6	81.6177	88.8015	83.8337	82.3388	69.15	30.85	67.46	32.54	
1A	J-8	91.9191	98.4106	93.9301	92.5797	69.02	30.98	67.15	32.85	
Recipe 1A Mean						69.26		67.64	32.36	37.6
Recipe 1A St. Dev.						0.32		0.61	0.61	0.61
1B	56	89.9859	98.0278	92.3236	90.6299	70.93	29.07	72.45	27.55	
1B	74	85.5471	92.8983	87.7716	86.1523	69.74	30.26	72.79	27.21	
1B	3	90.9428	98.5827	93.1688	91.5845	70.86	29.14	71.17	28.83	
Recipe 1B Mean						70.51		72.14	27.86	40.1
Recipe 1B St. Dev.						0.67		0.85	0.85	0.85
2A	25	92.1671	100.3531	94.8430	93.2139	67.31	32.69	60.88	39.12	
2A	J-3	90.3768	97.6981	92.7131	91.2358	68.09	31.91	63.23	36.77	
2A	0	85.6972	93.7825	88.2470	86.5990	68.46	31.54	64.63	35.37	
Recipe 2A Mean						67.95		62.92	37.08	35.0
Recipe 2A St. Dev.						0.59		1.90	1.90	1.90
2B	A	114.5826	120.3051	116.3284	115.2286	69.49	30.51	63.00	37.00	
2B	B	109.2520	115.8316	111.2832	110.0270	69.13	30.87	61.85	38.15	
2B	C	110.7048	117.8296	112.9801	111.5611	68.07	31.93	62.37	37.63	
Recipe 2B Mean						68.90		62.40	37.60	34.7
Recipe 2B St. Dev.						0.74		0.58	0.58	0.58
3A	D	110.4153	115.9318	112.0956	111.0683	69.54	30.46	61.14	38.86	
3A	39	90.3513	97.3348	92.5518	91.1989	68.49	31.51	61.48	38.52	
3A	7	89.3023	95.7415	91.2932	90.0612	69.08	30.92	61.88	38.12	
Recipe 3A Mean						69.04		61.50	38.50	34.2
Recipe 3A St. Dev.						0.53		0.37	0.37	0.37
3B	T1	87.7781	96.6844	90.4275	88.8481	70.25	29.75	59.61	40.39	
3B	T2	88.1483	95.1027	90.2062	88.9791	70.41	29.59	59.63	40.37	
3B	T3	87.3313	94.0860	89.3337	88.1371	70.36	29.64	59.76	40.24	
Recipe 3B Mean						70.34		59.67	40.33	33.1
Recipe 3B St. Dev.						0.08		0.08	0.08	0.08
4A	T6	88.2233	93.1351	89.6783	88.6873	70.38	29.62	68.11	31.89	
4A	T7	88.6411	96.1672	90.8653	89.3598	70.45	29.55	67.69	32.31	
4A	T8	88.0406	94.7559	90.1467	88.7206	68.64	31.36	67.71	32.29	
Recipe 4A Mean						69.82		67.84	32.16	37.7
Recipe 4A St. Dev.						1.03		0.24	0.24	0.24
4B	T9	89.7577	97.3103	92.0039	90.4111	70.26	29.74	70.91	29.09	
4B	T11	87.9001	93.8833	89.7276	88.4275	69.46	30.54	71.14	28.86	
4B	T12	88.2038	97.9093	91.0955	89.0521	70.21	29.79	70.66	29.34	
Recipe 4B Mean						69.97		70.91	29.09	39.4
Recipe 4B St. Dev.						0.45		0.24	0.24	0.24

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

October 1, 2002 Day 123

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-4	90.8614	97.0780	92.5547	91.4403	72.76	27.24	65.81	34.19	
1A	J-6	81.6167	86.7440	82.9525	82.0727	73.95	26.05	65.86	34.14	
1A	J-8	91.9175	99.1717	93.8629	92.5927	73.18	26.82	65.29	34.71	
Recipe 1A Mean						73.30		65.66	34.34	36.5
Recipe 1A St. Dev.						0.60		0.32	0.32	0.32
1B	0	85.6966	91.3814	87.2596	86.1271	72.51	27.49	72.46	27.54	
1B	25	92.1661	98.5164	93.9178	92.6634	72.42	27.58	71.61	28.39	
1B	T	119.5162	125.2274	121.1411	119.9879	71.55	28.45	70.97	29.03	
Recipe 1B Mean						72.16		71.68	28.32	39.8
Recipe 1B St. Dev.						0.53		0.75	0.75	0.75
2A	A	114.5794	122.6481	116.9629	115.4515	70.46	29.54	63.41	36.59	
2A	B	109.2484	118.0388	111.8986	110.2169	69.85	30.15	63.46	36.54	
2A	C	110.7000	119.4794	113.3237	111.6477	70.12	29.88	63.88	36.12	
Recipe 2A Mean						70.14		63.58	36.42	35.3
Recipe 2A St. Dev.						0.31		0.26	0.26	0.26
2B	D	110.4135	117.6024	112.5150	111.2220	70.77	29.23	61.53	38.47	
2B	40	91.6228	98.3503	93.5682	92.3645	71.08	28.92	61.87	38.13	
2B	56	89.9832	98.1230	92.3802	90.8940	70.55	29.45	62.00	38.00	
Recipe 2B Mean						70.80		61.80	38.20	34.3
Recipe 2B St. Dev.						0.27		0.25	0.25	0.25
3A	74	85.5430	93.8332	88.1205	86.5599	68.91	31.09	60.55	39.45	
3A	7	89.2988	96.1902	91.4681	90.1503	68.52	31.48	60.75	39.25	
3A	3	90.9406	97.8586	93.1000	91.7954	68.79	31.21	60.41	39.59	
Recipe 3A Mean						68.74		60.57	39.43	33.6
Recipe 3A St. Dev.						0.20		0.17	0.17	0.17
3B	T1	87.7741	95.9198	90.2434	88.7590	69.69	30.31	60.11	39.89	
3B	T2	88.1445	94.5364	90.0903	88.9403	69.56	30.44	59.10	40.90	
3B	T3	87.3274	96.1218	89.9855	88.4090	69.78	30.22	59.31	40.69	
Recipe 3B Mean						69.67		59.51	40.49	33.1
Recipe 3B St. Dev.						0.11		0.53	0.53	0.53
4A	T6	88.2198	96.1213	90.8089	89.0611	67.23	32.77	67.51	32.49	
4A	T7	88.6372	95.5122	90.7341	89.3195	69.50	30.50	67.46	32.54	
4A	T8	88.0374	96.9578	90.7765	88.9385	69.29	30.71	67.10	32.90	
Recipe 4A Mean						68.68		67.36	32.64	37.4
Recipe 4A St. Dev.						1.25		0.22	0.22	0.22
4B	T9	89.7535	97.1394	91.8988	90.4089	70.95	29.05	69.45	30.55	
4B	T11	87.8948	94.9962	90.0351	88.5276	69.86	30.14	70.43	29.57	
4B	T12	88.1988	94.0008	89.9260	88.7113	70.23	29.77	70.33	29.67	
Recipe 4B Mean						70.35		70.07	29.93	38.9
Recipe 4B St. Dev.						0.56		0.54	0.54	0.54

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis
October 8, 2002 **Day 130**

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-4	90.8639	99.5728	94.0262	92.0244	63.69	36.31	63.30	36.70	
1A	J-6	81.6189	87.7898	83.6599	82.3550	66.93	33.07	63.93	36.07	
1A	J-8	91.9198	99.9437	94.5464	92.8920	67.27	32.73	62.99	37.01	
Recipe 1A Mean						67.10		63.41	36.59	35.2
Recipe 1A St. Dev.						0.24		0.48	0.48	0.48
1B	7	89.3035	96.0917	91.4689	89.9945	68.10	31.90	68.09	31.91	
1B	3	90.9441	97.3444	92.9330	91.5653	68.92	31.08	68.77	31.23	
1B	40	91.6271	97.8026	93.6396	92.2321	67.41	32.59	69.94	30.06	
Recipe 1B Mean						68.15		68.93	31.07	38.3
Recipe 1B St. Dev.						0.76		0.94	0.94	0.94
2A	A	114.5814	120.0638	116.2542	115.2161	69.49	30.51	62.06	37.94	
2A	B	109.2512	117.2396	111.6876	110.1712	69.50	30.50	62.24	37.76	
2A	C	110.7038	117.8151	112.8418	111.5150	69.94	30.06	62.06	37.94	
Recipe 2A Mean						69.64		62.12	37.88	34.5
Recipe 2A St. Dev.						0.25		0.10	0.10	0.10
2B	D	110.4171	116.8490	112.5490	111.2296	66.85	33.15	61.89	38.11	
2B	T	119.5203	127.9496	122.2350	120.5789	67.79	32.21	61.00	39.00	
2B	0	85.6989	93.5116	88.1938	86.6700	68.07	31.93	61.08	38.92	
Recipe 2B Mean						67.57		61.32	38.68	34.1
Recipe 2B St. Dev.						0.64		0.49	0.49	0.49
3A	56	89.9868	96.7619	92.0416	90.8009	69.67	30.33	60.38	39.62	
3A	25	92.1683	99.8066	94.5614	93.1515	68.67	31.33	58.92	41.08	
3A	74	85.5479	92.2751	87.6458	86.3852	68.81	31.19	60.09	39.91	
Recipe 3A Mean						69.05		59.79	40.21	33.2
Recipe 3A St. Dev.						0.54		0.78	0.78	0.78
3B	T1	87.7794	94.3401	89.7450	88.5859	70.04	29.96	58.97	41.03	
3B	T2	88.1493	95.3340	90.3173	89.0464	69.82	30.18	58.62	41.38	
3B	T3	87.3324	97.0156	90.2477	88.5325	69.89	30.11	58.83	41.17	
Recipe 3B Mean						69.92		58.81	41.19	32.7
Recipe 3B St. Dev.						0.11		0.18	0.18	0.18
4A	T6	88.2238	94.6027	90.0943	88.8541	70.68	29.32	66.30	33.70	
4A	T7	88.6408	94.9793	90.5241	89.2735	70.29	29.71	66.40	33.60	
4A	T8	88.0411	94.4133	89.8887	88.6561	71.01	28.99	66.71	33.29	
Recipe 4A Mean						70.66		66.47	33.53	36.9
Recipe 4A St. Dev.						0.36		0.21	0.21	0.21
4B	T9	89.7588	94.8787	91.2977	90.2338	69.94	30.06	69.13	30.87	
4B	T11	87.9013	97.6580	90.7258	88.7860	71.05	28.95	68.68	31.32	
4B	T12	88.2047	94.9315	90.2290	88.8364	69.91	30.09	68.79	31.21	
Recipe 4B Mean						70.30		68.87	31.13	38.3
Recipe 4B St. Dev.						0.65		0.24	0.24	0.24

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

October 15, 2002 Day 137

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-4	90.8646	97.9589	93.1989	91.7164	67.10	32.90	63.51	36.49	
1A	J-6	81.6195	89.3079	83.9692	82.4831	69.44	30.56	63.25	36.75	
1A	J-8	91.9209	98.2040	93.9200	92.6496	68.18	31.82	63.55	36.45	
Recipe 1A Mean						68.24		63.43	36.57	35.2
Recipe 1A St. Dev.						1.17		0.16	0.16	0.16
1B	40	91.6272	100.6925	94.3374	92.5190	70.10	29.90	67.09	32.91	
1B	25	92.1687	99.3524	94.3109	92.8505	70.18	29.82	68.17	31.83	
1B	0	85.6991	92.5930	87.7817	86.3599	69.79	30.21	68.27	31.73	
Recipe 1B Mean						70.02		67.85	32.15	37.7
Recipe 1B St. Dev.						0.21		0.65	0.65	0.65
2A	3	90.9445	99.7643	93.1952	91.7872	74.48	25.52	62.56	37.44	
2A	74	85.5484	94.2869	88.0639	86.5059	71.21	28.79	61.94	38.06	
2A	56	89.9872	97.6420	92.1770	90.8208	71.39	28.61	61.93	38.07	
Recipe 2A Mean						72.36		62.14	37.86	34.5
Recipe 2A St. Dev.						1.84		0.36	0.36	0.36
2B	7	89.3041	96.6924	91.6508	90.2082	68.24	31.76	61.47	38.53	
2B	A	114.5846	123.2607	117.3190	115.6332	68.48	31.52	61.65	38.35	
2B	B	109.2535	118.0288	112.0472	110.3285	68.16	31.84	61.52	38.48	
Recipe 2B Mean						68.30		61.55	38.45	34.2
Recipe 2B St. Dev.						0.17		0.09	0.09	0.09
3A	C	110.7072	117.8044	112.8419	111.5619	69.92	30.08	59.96	40.04	
3A	D	110.4195	118.8550	113.0354	111.4679	68.99	31.01	59.92	40.08	
3A	T	119.5229	126.8560	121.6936	120.3903	70.40	29.60	60.04	39.96	
Recipe 3A Mean						69.77		59.97	40.03	33.3
Recipe 3A St. Dev.						0.72		0.06	0.06	0.06
3B	T1	87.7796	94.6403	89.8138	88.6182	70.35	29.65	58.77	41.23	
3B	T2	88.1498	97.5930	90.9499	89.3255	70.35	29.65	58.01	41.99	
3B	T3	87.3333	96.5694	90.0492	88.4556	70.59	29.41	58.68	41.32	
Recipe 3B Mean						70.43		58.49	41.51	32.5
Recipe 3B St. Dev.						0.14		0.41	0.41	0.41
4A	T6	88.2242	96.5673	90.6144	89.0281	71.35	28.65	66.37	33.63	
4A	T7	88.6419	95.3329	90.5871	89.2982	70.93	29.07	66.26	33.74	
4A	T8	88.0422	95.1461	90.0958	88.7318	71.09	28.91	66.42	33.58	
Recipe 4A Mean						71.12		66.35	33.65	36.9
Recipe 4A St. Dev.						0.21		0.08	0.08	0.08
4B	T9	89.7592	98.2055	92.2579	90.5586	70.42	29.58	68.01	31.99	
4B	T11	87.9021	96.2056	90.3784	88.6939	70.18	29.82	68.02	31.98	
4B	T12	88.2051	95.2223	90.3181	88.8651	69.89	30.11	68.76	31.24	
Recipe 4B Mean						70.16		68.27	31.73	37.9
Recipe 4B St. Dev.						0.26		0.43	0.43	0.43

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis
October 22, 2002 Day 144

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-4	90.8646	98.7277	92.8942	91.6213	74.19	25.81	62.72	37.28	
1A	J-6	81.6194	89.4976	83.8640	82.5271	71.51	28.49	59.56	40.44	
1A	J-8	91.9202	100.7963	94.2895	92.8126	73.31	26.69	62.33	37.67	
Recipe 1A Mean						73.00		61.54	38.46	34.2
Recipe 1A St. Dev.						1.37		1.72	1.72	1.72
1B	56	89.9871	97.6724	92.1695	90.7471	71.60	28.40	65.18	34.82	
1B	25	92.1689	98.8822	94.0874	92.8138	71.42	28.58	66.39	33.61	
1B	0	85.6993	91.6026	87.4117	86.2879	70.99	29.01	65.63	34.37	
Recipe 1B Mean						71.34		65.73	34.27	36.5
Recipe 1B St. Dev.						0.31		0.61	0.61	0.61
2A	40	91.6273	97.6813	93.4647	92.3277	69.65	30.35	61.88	38.12	
2A	3	90.9442	99.7856	93.6087	91.9700	69.86	30.14	61.50	38.50	
2A	74	85.5482	93.0263	87.8294	86.4166	69.49	30.51	61.93	38.07	
Recipe 2A Mean						69.67		61.77	38.23	34.3
Recipe 2A St. Dev.						0.18		0.24	0.24	0.24
2B	A	114.5843	122.3309	116.8107	115.4680	71.26	28.74	60.31	39.69	
2B	B	109.2534	116.3460	111.2883	110.0603	71.31	28.69	60.35	39.65	
2B	C	110.7057	119.8955	113.3522	111.7563	71.20	28.80	60.30	39.70	
Recipe 2B Mean						71.26		60.32	39.68	33.5
Recipe 2B St. Dev.						0.05		0.02	0.02	0.02
3A	D	110.4185	117.3305	112.4626	111.2490	70.43	29.57	59.37	40.63	
3A	E	119.5226	129.0992	122.3618	120.6945	70.35	29.65	58.72	41.28	
3A	7	89.3041	97.8563	91.8728	90.3876	69.96	30.04	57.82	42.18	
Recipe 3A Mean						70.25		58.64	41.36	32.6
Recipe 3A St. Dev.						0.25		0.78	0.78	0.78
3B	T1	87.7793	94.6855	89.8715	88.6521	69.71	30.29	58.28	41.72	
3B	T2	88.1496	95.9777	90.5316	89.1388	69.57	30.43	58.47	41.53	
3B	T3	87.3327	94.6231	89.5837	88.2960	69.12	30.88	57.21	42.79	
Recipe 3B Mean						69.47		57.99	42.01	32.2
Recipe 3B St. Dev.						0.30		0.68	0.68	0.68
4A	T6	88.2245	96.1098	90.5638	89.0295	70.33	29.67	65.59	34.41	
4A	T7	88.6421	97.2160	91.2218	89.5363	69.91	30.09	65.34	34.66	
4A	T8	88.0421	97.2594	90.7513	88.9810	70.61	29.39	65.34	34.66	
Recipe 4A Mean						70.28		65.42	34.58	36.3
Recipe 4A St. Dev.						0.35		0.14	0.14	0.14
4B	T9	89.7589	97.3903	91.9538	90.4819	71.24	28.76	67.06	32.94	
4B	T11	87.9015	95.3151	90.0552	88.6227	70.95	29.05	66.51	33.49	
4B	T12	88.2048	94.2541	89.9482	88.7834	71.18	28.82	66.81	33.19	
Recipe 4B Mean						71.12		66.80	33.20	37.1
Recipe 4B St. Dev.						0.15		0.27	0.27	0.27

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis
October 29, 2002 Day 151

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-4	90.8662	98.8736	93.2702	91.7768	69.98	30.02	62.12	37.88	
1A	J-6	81.6205	88.7664	83.8163	82.4554	69.27	30.73	61.98	38.02	
1A	J-8	91.9214	100.0909	94.4666	92.8813	68.85	31.15	62.29	37.71	
Recipe 1A Mean						69.36		62.13	37.87	34.5
Recipe 1A St. Dev.						0.57		0.15	0.15	0.15
1B	56	89.9885	97.7214	92.3223	90.8261	69.82	30.18	64.11	35.89	
1B	74	85.5493	91.7073	87.3140	86.1727	71.34	28.66	64.67	35.33	
1B	40	91.6288	99.2375	93.8618	92.4160	70.65	29.35	64.75	35.25	
Recipe 1B Mean						70.60		64.51	35.49	35.8
Recipe 1B St. Dev.						0.76		0.35	0.35	0.35
2A	3	90.9456	99.4855	93.3528	91.8739	71.81	28.19	61.44	38.56	
2A	25	92.1701	99.9440	94.3985	93.0370	71.33	28.67	61.10	38.90	
2A	7	89.3049	97.1441	91.5422	90.1763	71.46	28.54	61.05	38.95	
Recipe 2A Mean						71.54		61.20	38.80	34.0
Recipe 2A St. Dev.						0.25		0.21	0.21	0.21
2B	A	114.5881	122.6855	116.8747	115.5019	71.76	28.24	60.04	39.96	
2B	B	109.2575	117.7518	111.6373	110.1955	71.98	28.02	60.58	39.42	
2B	C	110.7104	120.4175	113.4571	111.8549	71.70	28.30	58.33	41.67	
Recipe 2B Mean						71.82		59.65	40.35	33.1
Recipe 2B St. Dev.						0.15		1.17	1.17	1.17
3A	D	110.4226	118.4799	112.7237	111.3775	71.44	28.56	58.50	41.50	
3A	E	119.5263	129.2505	122.3633	120.6859	70.83	29.17	59.13	40.87	
3A	0	85.7006	94.9635	88.4049	86.8036	70.81	29.19	59.21	40.79	
Recipe 3A Mean						71.02		58.95	41.05	32.7
Recipe 3A St. Dev.						0.36		0.39	0.39	0.39
3B	T1	87.7807	94.1208	89.6697	88.5737	70.21	29.79	58.02	41.98	
3B	T2	88.1509	98.0143	91.0697	89.3675	70.41	29.59	58.32	41.68	
3B	T3	87.3338	95.7724	89.8223	88.3764	70.51	29.49	58.10	41.90	
Recipe 3B Mean						70.37		58.15	41.85	32.3
Recipe 3B St. Dev.						0.16		0.15	0.15	0.15
4A	T6	88.2251	98.6120	91.2561	89.2854	70.82	29.18	65.02	34.98	
4A	T7	88.6427	97.8568	91.3623	89.5928	70.48	29.52	65.06	34.94	
4A	T8	88.0430	95.9965	90.3457	88.8508	71.05	28.95	64.92	35.08	
Recipe 4A Mean						70.78		65.00	35.00	36.1
Recipe 4A St. Dev.						0.28		0.07	0.07	0.07
4B	T9	89.7604	96.6280	91.8360	90.4543	69.78	30.22	66.57	33.43	
4B	T11	87.9027	95.8407	90.3084	88.7305	69.69	30.31	65.59	34.41	
4B	T12	88.2061	95.0893	90.2636	88.9016	70.11	29.89	66.20	33.80	
Recipe 4B Mean						69.86		66.12	33.88	36.7
Recipe 4B St. Dev.						0.22		0.49	0.49	0.49

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

November 5, 2002 Day 158

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-4	90.8644	100.2564	95.6904	92.8237	48.62	51.38	59.40	40.60	
1A	J-6	81.6182	90.3606	86.2732	83.3813	46.75	53.25	62.12	37.88	
1A	J-8	91.9200	101.0336	96.5191	93.6859	49.54	50.46	61.60	38.40	
Recipe 1A Mean						48.30		61.04	38.96	33.9
Recipe 1A St. Dev.						1.42		1.45	1.45	1.45
1B	56	89.9869	97.2293	92.8212	91.0137	60.87	39.13	63.77	36.23	
1B	40	91.6268	98.8786	94.8774	92.8057	55.18	44.82	63.73	36.27	
1B	25	92.1686	98.2060	94.6501	93.0621	58.90	41.10	63.99	36.01	
Recipe 1B Mean						58.31		63.83	36.17	35.5
Recipe 1B St. Dev.						2.89		0.14	0.14	0.14
2A	3	90.9443	99.4207	94.4418	92.3212	58.74	41.26	60.63	39.37	
2A	0	85.6991	95.3960	89.7367	87.2583	58.36	41.64	61.38	38.62	
2A	74	85.5476	92.9194	88.9706	86.8625	53.57	46.43	61.59	38.41	
Recipe 2A Mean						56.89		61.20	38.80	34.0
Recipe 2A St. Dev.						2.88		0.50	0.50	0.50
2B	A	114.5860	122.5454	118.1753	116.1010	54.90	45.10	57.79	42.21	
2B	B	109.2557	116.3442	112.3173	110.4583	56.81	43.19	60.72	39.28	
2B	C	110.7091	118.7452	114.0914	112.0530	57.91	42.09	60.27	39.73	
Recipe 2B Mean						56.54		59.59	40.41	33.1
Recipe 2B St. Dev.						1.52		1.58	1.58	1.58
3A	D	110.4216	117.2615	112.7440	111.3863	66.05	33.95	58.46	41.54	
3A	E	119.5251	126.8380	122.1857	120.6175	63.62	36.38	58.94	41.06	
3A	7	89.3040	96.9074	91.8976	90.3732	65.89	34.11	58.78	41.22	
Recipe 3A Mean						65.18		58.73	41.27	32.6
Recipe 3A St. Dev.						1.36		0.24	0.24	0.24
3B	T1	87.7788	95.8605	90.6428	88.9929	64.56	35.44	57.61	42.39	
3B	T2	88.1495	93.6897	90.0785	88.9649	65.18	34.82	57.73	42.27	
3B	T3	87.3325	97.0263	90.4763	88.6515	67.57	32.43	58.04	41.96	
Recipe 3B Mean						65.77		57.79	42.21	32.1
Recipe 3B St. Dev.						1.59		0.23	0.23	0.23
4A	T6	88.2232	97.9160	91.2952	89.2985	68.31	31.69	65.00	35.00	
4A	T7	88.6426	97.4114	91.5694	89.6708	66.62	33.38	64.87	35.13	
4A	T8	88.0412	95.7123	90.4215	88.8829	68.97	31.03	64.64	35.36	
Recipe 4A Mean						67.97		64.84	35.16	36.0
Recipe 4A St. Dev.						1.21		0.18	0.18	0.18
4B	T9	89.7583	98.0511	92.2695	90.6112	69.72	30.28	66.04	33.96	
4B	T11	87.9013	94.0061	89.7492	88.5253	69.73	30.27	66.23	33.77	
4B	T12	88.2047	96.5596	90.7176	89.0675	69.92	30.08	65.67	34.33	
Recipe 4B Mean						69.79		65.98	34.02	36.7
Recipe 4B St. Dev.						0.11		0.29	0.29	0.29

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

November 12, 2002 **Day 165**

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-4	90.8620	97.0858	94.4021	92.2282	43.12	56.88	61.41	38.59	
1A	J-6	81.6172	89.7472	86.1910	83.3942	43.74	56.26	61.15	38.85	
1A	J-8	91.9183	97.2047	94.8737	93.0564	44.09	55.91	61.49	38.51	
Recipe 1A Mean						43.65		61.35	38.65	34.1
Recipe 1A St. Dev.						0.49		0.18	0.18	0.18
1B	7	89.3009	96.0415	92.2269	90.3640	56.59	43.41	63.67	36.33	
1B	3	91.9423				0.00	100.00	0.00	100.00	
1B	0	85.6975	92.7288	88.8220	86.8231	55.56	44.44	63.98	36.02	
Recipe 1B Mean						56.08		63.82	36.18	35.5
Recipe 1B St. Dev.						0.73		0.22	0.22	0.22
2A	56	89.9861	97.5462	94.3394	91.6825	42.42	57.58	61.03	38.97	
2A	40	91.6258	99.1942	95.9213	93.3088	43.24	56.76	60.82	39.18	
2A	74	85.5469	94.3255	90.3265	87.4337	45.55	54.45	60.52	39.48	
Recipe 2A Mean						43.74		60.79	39.21	33.8
Recipe 2A St. Dev.						1.63		0.26	0.26	0.26
2B	A	114.5831	124.0971	119.8619	116.6428	44.52	55.48	60.98	39.02	
2B	B	109.2535	117.5573	114.1989	111.2162	40.44	59.56	60.31	39.69	
2B	C	110.7056	119.8458	116.0957	112.8464	41.03	58.97	60.28	39.72	
Recipe 2B Mean						42.00		60.53	39.47	33.6
Recipe 2B St. Dev.						2.20		0.40	0.40	0.40
3A	D	110.4190	119.5619	114.2550	112.0404	58.04	41.96	57.73	42.27	
3A	E	119.5237	129.7550	123.6843	121.2326	59.33	40.67	58.93	41.07	
3A	25	92.1673	99.7645	95.6808	93.6193	53.75	46.25	58.67	41.33	
Recipe 3A Mean						57.04		58.44	41.56	32.5
Recipe 3A St. Dev.						2.92		0.63	0.63	0.63
3B	T1	87.7778	96.8910	91.9189	89.5060	54.56	45.44	58.27	41.73	
3B	T2	88.1485	98.4641	92.9478	90.1677	53.48	46.52	57.93	42.07	
3B	T3	87.3320	97.6049	91.5971	89.1372	58.48	41.52	57.68	42.32	
Recipe 3B Mean						55.51		57.96	42.04	32.2
Recipe 3B St. Dev.						2.63		0.30	0.30	0.30
4A	T6	88.2233	94.9519	90.4446	89.0260	66.99	33.01	63.86	36.14	
4A	T7	88.6410	95.3685	90.7385	89.3849	68.82	31.18	64.53	35.47	
4A	T8	88.0413	96.2701	90.6950	88.9783	67.75	32.25	64.69	35.31	
Recipe 4A Mean						67.85		64.36	35.64	35.8
Recipe 4A St. Dev.						0.92		0.44	0.44	0.44
4B	T9	89.7580	98.9980	92.5107	90.7052	70.21	29.79	65.59	34.41	
4B	T11	87.9008	95.9778	90.4326	88.7677	68.65	31.35	65.76	34.24	
4B	T12	88.2044	96.0013	90.6145	89.0404	69.09	30.91	65.31	34.69	
Recipe 4B Mean						69.32		65.55	34.45	36.4
Recipe 4B St. Dev.						0.80		0.23	0.23	0.23

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis
November 19, 2002 Day 172

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	S-1	119.6916	127.0050	122.7439	120.8606	58.26	41.74	61.70	38.30	
1A	S-5	117.5632	127.1824	121.7697	119.1783	56.27	43.73	61.60	38.40	
1A	S-7	107.6781	115.7619	111.2215	109.0513	56.17	43.83	61.25	38.75	
Recipe 1A Mean						56.90		61.52	38.48	34.2
Recipe 1A St. Dev.						1.18		0.24	0.24	0.24
1B	S-6	116.5009	124.6865	119.8981	117.7361	58.50	41.50	63.64	36.36	
1B	S-8	112.3737	120.8663	115.7323	113.5879	60.45	39.55	63.85	36.15	
1B	S-2	118.5798	125.5521	121.3260	119.5780	60.61	39.39	63.65	36.35	
Recipe 1B Mean						59.85		63.71	36.29	35.4
Recipe 1B St. Dev.						1.18		0.12	0.12	0.12
2A	J-4	90.8671	98.1023	94.8052	92.4407	45.57	54.43	60.04	39.96	
2A	74	85.5504	92.2373	89.0158	86.8972	48.18	51.82	61.14	38.86	
2A	J-8	91.9223	98.3481	95.3109	93.2618	47.27	52.73	60.47	39.53	
Recipe 2A Mean						47.00		60.55	39.45	33.6
Recipe 2A St. Dev.						1.32		0.55	0.55	0.55
2B	3	90.9461	98.8660	95.0144	92.5515	48.63	51.37	60.54	39.46	
2B	0	85.7019	93.2873	89.5872	87.2483	48.78	51.22	60.20	39.80	
2B	40	91.6296	100.0683	96.0377	93.3928	47.76	52.24	60.00	40.00	
Recipe 2B Mean						48.39		60.25	39.75	33.5
Recipe 2B St. Dev.						0.55		0.27	0.27	0.27
3A	25	92.1712	100.8434	96.6654	94.0123	48.18	51.82	59.03	40.97	
3A	56	89.9894	97.9200	93.8018	91.5397	51.93	48.07	59.34	40.66	
3A	7	89.3058	97.0870	92.8200	90.7822	54.84	45.16	57.99	42.01	
Recipe 3A Mean						51.65		58.79	41.21	32.7
Recipe 3A St. Dev.						3.34		0.71	0.71	0.71
3B	A	114.5911	124.4392	120.2835	116.9869	42.20	57.80	57.91	42.09	
3B	B	109.2600	117.2521	113.7548	111.1507	43.76	56.24	57.94	42.06	
3B	C	110.7124	118.5865	115.2818	112.6117	41.97	58.03	58.43	41.57	
Recipe 3B Mean						42.64		58.09	41.91	32.3
Recipe 3B St. Dev.						0.97		0.29	0.29	0.29
4A	S-4	108.8961	116.2605	111.4796	109.8161	64.92	35.08	64.39	35.61	
4A	E	119.5296	128.9155	123.0256	120.7789	62.75	37.25	64.26	35.74	
4A	S-3	92.6904	100.8587	95.9704	93.8619	59.84	40.16	64.28	35.72	
Recipe 4A Mean						62.51		64.31	35.69	35.7
Recipe 4A St. Dev.						2.55		0.07	0.07	0.07
4B	T11	87.9041	95.4691	90.6454	88.8535	63.76	36.24	65.37	34.63	
4B	39	90.3636	97.7695	93.1575	broke	62.27	37.73	-	-	
4B	JT-1	122.0813	129.4461	124.9127	123.0721	61.55	38.45	65.01	34.99	
Recipe 4B Mean						62.53		65.19	34.81	36.2
Recipe 4B St. Dev.						1.13		0.25	0.25	0.25

Notes:
1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Weekly Solids Analysis

November 27, 2002 **Day 180**

Recipe	Crucible #	Tare only (g)	Tare+Material (g)	After 103°C (g)	After 550°C (g)	%MC	%TS	%VS	%FS	%OC
1A	J-4	90.8670	97.9148	93.6784	91.9532	60.11	39.89	61.36	38.64	
1A	J-6	81.6210	89.6788	84.7190	82.8100	61.55	38.45	61.62	38.38	
1A	J-8	91.9229	99.9787	95.0475	93.1055	61.21	38.79	62.15	37.85	
Recipe 1A Mean						60.96		61.71	38.29	34.3
Recipe 1A St. Dev.						0.75		0.40	0.40	0.40
1B	74	85.5507	92.6768	88.4389	86.6113	59.47	40.53	63.28	36.72	
1B	40	91.6295	98.5452	94.4915	92.6786	58.62	41.38	63.34	36.66	
1B	0	85.7021	92.7552	88.5405	86.7408	59.76	40.24	63.41	36.59	
Recipe 1B Mean						59.28		63.34	36.66	35.2
Recipe 1B St. Dev.						0.59		0.06	0.06	0.06
2A	7	89.3060	96.1216	92.7440	90.6521	49.56	50.44	60.85	39.15	
2A	30	94.1561	102.7891	98.3128	95.7951	51.85	48.15	60.57	39.43	
2A	3	90.9471	100.2673	95.6033	92.7701	50.04	49.96	60.85	39.15	
Recipe 2A Mean						50.48		60.75	39.25	33.8
Recipe 2A St. Dev.						1.21		0.16	0.16	0.16
2B	A	114.5896	122.4066	118.8083	116.2591	46.03	53.97	60.43	39.57	
2B	B	109.2593	119.6804	115.1568	111.6081	43.41	56.59	60.17	39.83	
2B	C	110.7123	118.7341	115.1349	112.4754	44.87	55.13	60.13	39.87	
Recipe 2B Mean						44.77		60.24	39.76	33.5
Recipe 2B St. Dev.						1.31		0.16	0.16	0.16
3A	S-4	108.8949	118.5373	114.2089	111.1014	44.89	55.11	58.48	41.52	
3A	S-5	117.5632	124.9683	121.6982	119.2921	44.16	55.84	58.19	41.81	
3A	S-6	116.5019	125.5707	121.3716	118.5207	46.30	53.70	58.54	.41.46	
Recipe 3A Mean						45.12		58.40	41.60	32.4
Recipe 3A St. Dev.						1.09		0.19	0.19	0.19
3B	T1	87.7818	96.8408	93.6182	90.2242	35.57	64.43	58.15	41.85	
3B	T2	88.1520	96.3621	93.0679	90.2313	40.12	59.88	57.70	42.30	
3B	T3	87.3352	96.9773	93.3741	89.8695	37.37	62.63	58.03	41.97	
Recipe 3B Mean						37.69		57.96	42.04	32.2
Recipe 3B St. Dev.						2.29		0.23	0.23	0.23
4A	T6	88.2263	97.1561	91.8987	89.5684	58.87	41.13	63.45	36.55	
4A	T7	88.6440	95.8871	91.8031	89.7812	56.38	43.62	64.00	36.00	
4A	T8	88.0440	97.5688	91.9346	89.4307	59.15	40.85	64.36	35.64	
Recipe 4A Mean						58.14		63.94	36.06	35.5
Recipe 4A St. Dev.						1.52		0.46	0.46	0.46
4B	T9	89.7619	97.7526	92.8604	90.8371	61.22	38.78	65.30	34.70	
4B	T11	87.9045	96.9910	91.2730	broke	62.93	37.07	-	-	
4B	T12	88.2068	96.4094	91.1085	89.2178	64.62	35.38	65.16	34.84	
Recipe 4B Mean						62.93		65.23	34.77	36.2
Recipe 4B St. Dev.						1.70		0.10	0.10	0.10

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fr

Phase 2 - Summary of Weekly Volatile Solids Analysis

%VS

Recipe	Day	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	mean	88.11	88.57	87.91	86.46	85.70	84.47	83.07	82.63	79.10	78.10	77.81	76.09	75.16	75.00	72.66	71.30	69.50	67.64	65.66	63.41	63.43	61.54	62.13	61.04	61.35	61.52	61.71
	stdev	1.40	0.51	0.46	0.31	0.29	0.26	0.84	0.40	0.34	0.59	0.62	0.14	1.01	1.43	1.29	0.38	0.34	0.61	0.32	0.48	0.16	1.72	0.15	1.45	0.18	0.24	0.40
1B	mean	88.11	88.72	87.12	87.37	86.89	85.72	85.06	84.31	82.62	80.50	80.20	79.59	78.43	78.03	76.53	74.90	72.11	72.14	71.68	68.93	67.85	65.73	64.51	63.83	63.82	63.71	63.34
	stdev	1.40	0.52	1.11	0.72	0.49	0.90	0.60	0.66	4.62	0.21	0.22	0.71	0.29	0.26	0.29	0.35	1.90	0.85	0.75	0.94	0.65	0.61	0.35	0.14	0.22	0.12	0.06
2A	mean	88.11	88.96	85.84	85.05	82.86	80.33	79.09	78.34	76.75	75.99	74.33	74.20	71.24	71.09	68.88	68.05	65.52	62.92	63.58	62.12	62.14	61.77	61.20	61.20	60.79	60.55	60.75
	stdev	1.40	0.56	0.00	0.61	0.45	0.69	1.03	0.65	1.17	0.40	0.09	0.26	1.32	0.57	0.54	1.01	0.19	1.90	0.26	0.10	0.36	0.24	0.21	0.50	0.26	0.55	0.16
2B	mean	88.11	86.96	84.64	83.61	81.29	78.75	77.09	74.55	73.27	71.95	70.51	69.13	67.36	67.00	64.64	62.99	62.73	62.40	61.80	61.32	61.55	60.32	59.65	59.59	60.53	60.25	60.24
	stdev	1.40	0.19	0.83	0.18	0.32	0.60	0.85	0.81	0.99	0.72	0.27	0.33	0.10	0.62	0.52	1.43	0.70	0.58	0.25	0.49	0.09	0.02	1.17	1.58	0.40	0.27	0.16
3A	mean	88.11	87.46	83.12	81.76	79.22	76.88	76.41	73.44	71.90	70.33	68.03	66.96	64.58	64.24	63.42	63.50	62.49	61.50	60.57	59.79	59.97	58.64	58.95	58.73	58.44	58.79	58.40
	stdev	1.40	0.01	1.07	1.11	0.49	0.68	0.41	2.13	0.98	0.41	0.68	0.11	1.09	0.17	0.81	0.00	0.42	0.37	0.17	0.78	0.06	0.78	0.39	0.24	0.63	0.71	0.19
3B	mean	88.11	86.03	84.77	82.10	79.68	77.03	74.51	72.27	70.49	67.93	66.10	64.82	63.75	63.20	61.40	61.40	60.98	59.67	59.51	58.81	58.49	57.99	58.15	57.79	57.96	58.09	57.96
	stdev	1.40	0.11	0.09	0.87	0.29	0.19	0.55	0.49	0.22	0.38	0.63	0.45	0.59	0.50	1.65	0.65	0.44	0.08	0.53	0.18	0.41	0.68	0.15	0.23	0.30	0.29	0.23
4A	mean	88.11	86.34	85.12	83.82	82.68	80.82	79.65	78.42	77.41	76.77	75.32	74.42	73.59	72.69	71.19	70.37	69.20	67.84	67.36	66.47	66.35	65.42	65.00	64.84	64.36	64.31	63.94
	stdev	1.40	0.00	0.20	0.35	0.19	0.26	0.14	0.35	0.34	0.16	0.32	0.24	0.29	0.63	0.57	0.16	0.44	0.24	0.22	0.21	0.08	0.14	0.07	0.18	0.44	0.07	0.46
4B	mean	88.11	85.92	85.01	83.80	83.09	81.31	80.71	80.09	79.18	78.48	77.80	76.56	75.65	74.56	74.86	73.15	72.63	70.91	70.07	68.87	68.27	66.80	66.12	65.98	65.55	65.19	65.23
	stdev	1.40	0.02	0.26	0.28	0.37	0.71	0.29	0.37	0.44	0.49	0.23	0.34	0.37	0.19	0.27	0.59	0.14	0.24	0.54	0.24	0.43	0.27	0.49	0.29	0.23	0.25	0.10

Phase 2 - Summary of Weekly Fixed Solids Analysis

%FS (dry basis)

Recipe	Day	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	mean	11.89	11.43	12.09	13.54	14.30	15.53	16.93	17.37	20.90	21.90	22.19	23.91	24.84	25.00	27.34	28.70	30.50	32.36	34.34	36.59	36.57	38.46	37.87	38.96	38.65	38.48	38.29
	stdev	1.40	0.51	0.46	0.31	0.29	0.26	0.84	0.40	0.34	0.59	0.62	0.14	1.01	1.43	1.29	0.38	0.34	0.61	0.32	0.48	0.16	1.72	0.15	1.45	0.18	0.24	0.40
1B	mean	11.89	11.28	12.88	12.63	13.11	14.28	14.94	15.69	17.38	19.50	19.80	20.41	21.57	21.97	23.47	25.10	27.89	27.86	28.32	31.07	32.15	34.27	35.49	36.17	36.18	36.29	36.66
	stdev	1.40	0.52	1.11	0.72	0.49	0.90	0.60	0.66	4.62	0.21	0.22	0.71	0.29	0.26	0.29	0.35	1.90	0.85	0.75	0.94	0.65	0.61	0.35	0.14	0.22	0.12	0.06
2A	mean	11.89	11.04	14.16	14.95	17.14	19.67	20.91	21.66	23.25	24.01	25.67	25.80	28.76	28.91	31.12	31.95	34.48	37.08	36.42	37.88	37.86	38.23	38.80	38.80	39.21	39.45	39.25
	stdev	1.40	0.56	0.00	0.61	0.45	0.69	1.03	0.65	1.17	0.40	0.09	0.26	1.32	0.57	0.54	1.01	0.19	1.90	0.26	0.10	0.36	0.24	0.21	0.50	0.26	0.55	0.16
2B	mean	11.89	13.04	15.36	16.39	18.71	21.25	22.91	25.45	26.73	28.05	29.49	30.87	32.64	33.00	35.36	37.01	37.27	37.60	38.20	38.68	38.45	39.68	40.35	40.41	39.47	39.75	39.76
	stdev	1.40	0.19	0.83	0.18	0.32	0.60	0.85	0.81	0.99	0.72	0.27	0.33	0.10	0.62	0.52	1.43	0.70	0.58	0.25	0.49	0.09	0.02	1.17	1.58	0.40	0.27	0.16
3A	mean	11.89	12.54	16.88	18.24	20.78	23.12	23.59	26.56	28.10	29.67	31.97	33.04	35.42	35.76	36.58	36.50	37.51	38.50	39.43	40.21	40.03	41.36	41.05	41.27	41.56	41.21	41.60
	stdev	1.40	0.01	1.07	1.11	0.49	0.68	0.41	2.13	0.98	0.41	0.68	0.11	1.09	0.17	0.81	0.00	0.42	0.37	0.17	0.78	0.06	0.78	0.39	0.24	0.63	0.71	0.19
3B	mean	11.89	13.97	15.23	17.90	20.32	22.97	25.49	27.73	29.51	32.07	33.90	35.18	36.25	36.80	38.60	38.60	39.02	40.33	40.49	41.19	41.51	42.01	41.85	42.21	42.04	41.91	42.04
	stdev	1.40	0.11	0.09	0.87	0.29	0.19	0.55	0.49	0.22	0.38	0.63	0.45	0.59	0.50	1.65	0.65	0.44	0.08	0.53	0.18	0.41	0.68	0.15	0.23	0.30	0.29	0.23
4A	mean	11.89	13.66	14.88	16.18	17.32	19.18	20.35	21.58	22.59	23.23	24.68	25.58	26.41	27.31	28.81	29.63	30.80	32.16	32.64	33.53	33.65	34.58	35.00	35.16	35.64	35.69	36.06
	stdev	1.40	0.00	0.20	0.35	0.19	0.26	0.14	0.35	0.34	0.16	0.32	0.24	0.29	0.63	0.57	0.16	0.44	0.24	0.22	0.21	0.08	0.14	0.07	0.18	0.44	0.07	0.46
4B	mean	11.89	14.08	14.99	16.20	16.91	18.69	19.29	19.91	20.82	21.52	22.20	23.44	24.35	25.44	25.14	26.85	27.37	29.09	29.93	31.13	31.73	33.20	33.88	34.02	34.45	34.81	34.77
	stdev	1.40	0.02	0.26	0.28	0.37	0.71	0.29	0.37	0.44	0.49	0.23	0.34	0.37	0.19	0.27	0.59	0.14	0.24	0.54	0.24	0.43	0.27	0.49	0.29	0.23	0.25	0.10

Phase 2 - Summary of Weekly Organic Carbon Analysis

%OC (dry basis)

Recipe	Day	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	mean	48.95	49.20	48.84	48.04	47.61	46.93	46.15	45.90	43.95	43.39	43.23	42.27	41.76	41.67	40.37	39.61	38.61	37.58	36.48	35.23	35.24	34.19	34.52	33.91	34.08	34.18	34.28
	stdev	0.78	0.51	0.46	0.31	0.29	0.26	0.84	0.40	0.34	0.59	0.62	0.14	1.01	1.43	1.29	0.38	0.34	0.61	0.32	0.48	0.16	1.72	0.15	1.45	0.18	0.24	0.40
1B	mean	48.95	49.29	48.40	48.54	48.27	47.62	47.26	46.84	45.90	44.72	44.56	44.22	43.57	43.35	42.52	41.61	40.06	40.08	39.82	38.30	37.69	36.52	35.84	35.46	35.46	35.40	35.19
	stdev	0.78	0.52	1.11	0.72	0.49	0.90	0.60	0.66	4.62	0.21	0.22	0.71	0.29	0.26	0.29	0.35	1.90	0.85	0.75	0.94	0.65	0.61	0.35	0.14	0.22	0.12	0.06
2A	mean	48.95	49.42	47.69	47.25	46.04	44.63	43.94	43.52	42.64	42.22	41.30	41.22	39.58	39.50	38.27	37.81	36.40	34.95	35.32	34.51	34.52	34.32	34.00	34.00	33.77	33.64	33.75
	stdev	0.78	0.56	0.00	0.61	0.45	0.69	1.03	0.65	1.17	0.40	0.09	0.26	1.32	0.57	0.54	1.01	0.19	1.90	0.26	0.10	0.36	0.24	0.21	0.50	0.26	0.55	0.16
2B	mean	48.95	48.31	47.02	46.45	45.16	43.75	42.83	41.42	40.71	39.97	39.17	38.41	37.42	37.22	35.91	35.00	34.85	34.67	34.33	34.07	34.19	33.51	33.14	33.11	33.63	33.47	33.47
	stdev	0.78	0.19	0.83	0.18	0.32	0.60	0.85	0.81	0.99	0.72	0.27	0.33	0.10	0.62	0.52	1.43	0.70	0.58	0.25	0.49	0.09	0.02	1.17	1.58	0.40	0.27	0.16
3A	mean	48.95	48.59	46.18	45.42	44.01	42.71	42.45	40.80	39.95	39.07	37.80	37.20	35.88	35.69	35.23	35.28	34.71	34.17	33.65	33.22	33.32	32.58	32.75	32.63	32.47	32.66	32.45
	stdev	0.78	0.01	1.07	1.11	0.49	0.68	0.41	2.13	0.98	0.41	0.68	0.11	1.09	0.17	0.81	0.00	0.42	0.37	0.17	0.78	0.06	0.78	0.39	0.24	0.63	0.71	0.19
3B	mean	48.95	47.79	47.09	45.61	44.27	42.80	41.39	40.15	39.16	37.74	36.72	36.01	35.42	35.11	34.11	34.11	33.88	33.15	33.06	32.67	32.49	32.21	32.30	32.11	32.20	32.27	32.20
	stdev	0.78	0.11	0.09	0.87	0.29	0.19	0.55	0.49	0.22	0.38	0.63	0.45	0.59	0.50	1.65	0.65	0.44	0.08	0.53	0.18	0.41	0.68	0.15	0.23	0.30	0.29	0.23
4A	mean	48.95	47.97	47.29	46.56	45.93	44.90	44.25	43.57	43.00	42.65	41.85	41.34	40.88	40.38	39.55	39.09	38.44	37.69	37.42	36.93	36.86	36.35	36.11	36.02	35.76	35.73	35.52
	stdev	0.78	0.00	0.20	0.35	0.19	0.26	0.14	0.35	0.34	0.16	0.32	0.24	0.29	0.63	0.57	0.16	0.44	0.24	0.22	0.21	0.08	0.14	0.07	0.18	0.44	0.07	0.46
4B	mean	48.95	47.73	47.23	46.56	46.16	45.17	44.84	44.49	43.99	43.60	43.22	42.53	42.03	41.42	41.59	40.64	40.35	39.39	38.93	38.26	37.93	37.11	36.73	36.65	36.42	36.21	36.24
	stdev	0.78	0.02	0.26	0.28	0.37	0.71	0.29	0.37	0.44	0.49	0.23	0.34	0.37	0.19	0.27	0.59	0.14	0.24	0.54	0.24	0.43	0.27	0.49	0.29	0.23	0.25	0.10

Notes:

1) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fraction.

Phase 2 - Summary of Weekly Volatile Solids Analysis

Normalized %VS

Recipe	Day	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	mean	100.0	100.5	99.8	98.1	97.3	95.9	94.3	93.8	89.8	88.6	88.3	86.4	85.3	85.1	82.5	80.9	78.9	76.8	74.5	72.0	72.0	69.8	70.5	69.3	69.6	69.8	70.0
	stdev	1.59	0.58	0.52	0.35	0.33	0.29	0.96	0.46	0.38	0.67	0.70	0.15	1.15	1.63	1.47	0.43	0.39	0.69	0.36	0.55	0.19	1.96	0.18	1.64	0.20	0.27	0.46
1B	mean	100.0	100.7	98.9	99.2	98.6	97.3	96.5	95.7	93.8	91.4	91.0	90.3	89.0	88.6	86.9	85.0	81.8	81.9	81.4	78.2	77.0	74.6	73.2	72.5	72.4	72.3	71.9
	stdev	1.59	0.60	1.26	0.82	0.56	1.02	0.69	0.74	5.25	0.24	0.25	0.80	0.33	0.30	0.32	0.40	2.16	0.97	0.85	1.06	0.74	0.69	0.40	0.16	0.25	0.13	0.07
2A	mean	100.0	101.0	97.4	96.5	94.0	91.2	89.8	88.9	87.1	86.2	84.4	84.2	80.9	80.7	78.2	77.2	74.4	71.4	72.2	70.5	70.5	70.1	69.5	69.5	69.0	68.7	69.0
	stdev	1.59	0.63	0.00	0.69	0.51	0.78	1.16	0.74	1.33	0.45	0.10	0.30	1.50	0.64	0.62	1.14	0.21	2.15	0.29	0.12	0.41	0.27	0.24	0.57	0.29	0.63	0.18
2B	mean	100.0	98.7	96.1	94.9	92.3	89.4	87.5	84.6	83.2	81.7	80.0	78.5	76.5	76.0	73.4	71.5	71.2	70.8	70.1	69.6	69.9	68.5	67.7	67.6	68.7	68.4	68.4
	stdev	1.59	0.21	0.94	0.20	0.37	0.68	0.96	0.92	1.13	0.81	0.31	0.38	0.11	0.70	0.59	1.62	0.80	0.65	0.28	0.56	0.10	0.03	1.33	1.79	0.45	0.31	0.18
3A	mean	100.0	99.3	94.3	92.8	89.9	87.3	86.7	83.4	81.6	79.8	77.2	76.0	73.3	72.9	72.0	72.1	70.9	69.8	68.7	67.9	68.1	66.6	66.9	66.7	66.3	66.7	66.3
	stdev	1.59	0.01	1.21	1.26	0.56	0.77	0.47	2.42	1.11	0.47	0.77	0.13	1.24	0.19	0.92	0.00	0.47	0.42	0.19	0.88	0.07	0.88	0.44	0.28	0.71	0.80	0.21
3B	mean	100.0	97.6	96.2	93.2	90.4	87.4	84.6	82.0	80.0	77.1	75.0	73.6	72.4	71.7	69.7	69.7	69.2	67.7	67.5	66.7	66.4	65.8	66.0	65.6	65.8	65.9	65.8
	stdev	1.59	0.12	0.10	0.99	0.33	0.21	0.62	0.56	0.25	0.43	0.72	0.51	0.67	0.57	1.88	0.74	0.50	0.09	0.61	0.20	0.47	0.78	0.17	0.26	0.34	0.33	0.26
4A	mean	100.0	98.0	96.6	95.1	93.8	91.7	90.4	89.0	87.9	87.1	85.5	84.5	83.5	82.5	80.8	79.9	78.5	77.0	76.4	75.4	75.3	74.3	73.8	73.6	73.1	73.0	72.6
	stdev	1.59	0.00	0.23	0.40	0.21	0.30	0.16	0.39	0.39	0.19	0.36	0.28	0.33	0.71	0.64	0.18	0.50	0.27	0.25	0.24	0.09	0.16	0.08	0.21	0.50	0.08	0.52
4B	mean	100.0	97.5	96.5	95.1	94.3	92.3	91.6	90.9	89.9	89.1	88.3	86.9	85.9	84.6	85.0	83.0	82.4	80.5	79.5	78.2	77.5	75.8	75.0	74.9	74.4	74.0	74.0
	stdev	1.59	0.02	0.30	0.32	0.42	0.80	0.33	0.42	0.49	0.56	0.26	0.38	0.42	0.22	0.31	0.67	0.16	0.27	0.61	0.27	0.49	0.31	0.56	0.33	0.26	0.29	0.11

Phase 2 - Summary of Weekly Volatile Solids Analysis
%VS

Recipe	Day	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1	mean	88.11	88.65	87.52	86.92	86.29	85.10	84.06	83.47	80.86	79.30	79.01	77.84	76.80	76.52	74.60	73.10	70.81	69.89	68.67	66.17	65.64	63.63	63.32	62.44	62.59	62.62	62.53
	stdev	0.00	0.11	0.56	0.64	0.85	0.58	0.72	0.53	2.48	0.40	0.42	0.42	0.65	0.85	0.79	0.36	1.12	0.73	0.53	0.71	0.41	1.17	0.25	0.79	0.20	0.18	0.23
2	mean	88.11	87.96	85.24	84.33	82.08	79.54	78.09	76.44	75.01	73.97	72.42	71.66	69.30	69.04	66.76	65.52	64.12	62.66	62.69	61.72	61.85	61.05	60.42	60.40	60.66	60.40	60.50
	stdev	0.00	1.42	0.84	1.02	1.11	0.65	0.94	0.73	1.08	0.56	0.18	0.30	0.71	0.59	0.53	1.22	0.44	1.24	0.25	0.30	0.23	0.13	0.69	1.04	0.33	0.41	0.16
3	mean	88.11	86.75	83.94	81.93	79.45	76.96	75.46	72.86	71.20	69.13	67.07	65.89	64.16	63.72	62.41	62.45	61.73	60.58	60.04	59.30	59.23	58.31	58.55	58.26	58.20	58.44	58.18
	stdev	0.00	1.01	1.17	0.24	0.33	0.43	0.48	1.31	0.60	0.40	0.66	0.28	0.84	0.33	1.23	0.33	0.43	0.23	0.35	0.48	0.24	0.73	0.27	0.23	0.46	0.50	0.21
4	mean	88.11	86.13	85.06	83.81	82.89	81.07	80.18	79.25	78.29	77.62	76.56	75.49	74.62	73.62	73.02	71.76	70.91	69.37	68.71	67.67	67.31	66.11	65.56	65.41	64.96	64.75	64.58
	stdev	0.00	0.29	0.08	0.01	0.29	0.49	0.22	0.36	0.39	0.33	0.27	0.29	0.33	0.41	0.42	0.37	0.29	0.24	0.38	0.23	0.26	0.21	0.28	0.23	0.33	0.16	0.28

Notes:
1) Shown as averages of duplicate recipes

Phase 2 - Summary of Weekly Volatile Solids Analysis
Normalized %VS

Recipe	Day	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1	mean	100.00	100.61	99.33	98.65	97.94	96.59	95.41	94.74	91.78	90.01	89.67	88.35	87.16	86.85	84.67	82.97	80.36	79.33	77.94	75.10	74.50	72.22	71.87	70.87	71.03	71.07	70.97
	stdev	0.00	0.13	0.64	0.73	0.96	0.66	0.82	0.60	2.82	0.45	0.48	0.48	0.74	0.96	0.90	0.41	1.27	0.83	0.60	0.80	0.46	1.32	0.29	0.90	0.22	0.20	0.26
2	mean	100.00	99.83	96.75	95.71	93.16	90.27	88.63	86.76	85.14	83.95	82.19	81.34	78.65	78.36	75.77	74.37	72.78	71.12	71.15	70.05	70.19	69.29	68.58	68.55	68.85	68.55	68.67
	stdev	0.00	1.61	0.96	1.16	1.26	0.73	1.06	0.83	1.23	0.63	0.20	0.34	0.81	0.67	0.60	1.38	0.50	1.40	0.29	0.34	0.26	0.15	0.79	1.18	0.37	0.47	0.18
3	mean	100.00	98.46	95.27	92.99	90.17	87.35	85.65	82.69	80.81	78.46	76.12	74.78	72.83	72.32	70.84	70.88	70.06	68.76	68.14	67.31	67.23	66.18	66.45	66.12	66.06	66.33	66.04
	stdev	0.00	1.15	1.33	0.27	0.37	0.49	0.54	1.49	0.68	0.45	0.74	0.32	0.96	0.38	1.40	0.37	0.49	0.26	0.40	0.54	0.27	0.83	0.31	0.27	0.53	0.57	0.24
4	mean	100.00	97.76	96.55	95.12	94.08	92.01	91.01	89.95	88.86	88.10	86.89	85.68	84.69	83.56	82.88	81.44	80.49	78.74	77.99	76.81	76.39	75.03	74.41	74.24	73.73	73.49	73.30
	stdev	0.00	0.33	0.09	0.01	0.33	0.55	0.25	0.41	0.44	0.37	0.31	0.33	0.38	0.46	0.47	0.42	0.33	0.27	0.43	0.26	0.29	0.24	0.32	0.27	0.38	0.18	0.31

Notes:
1) Shown as averages of duplicate recipes

Phase 2 - Wet Weight of Tare & Compost Material (kg)

Recipe	Tare Wt.	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	12.64	27.78	25.85	24.72	24.04	22.68	22.68	22.00	21.09	20.41	19.73	19.50	19.50	18.82	18.82	18.26	18.37	17.69	17.12	17.35	16.10	16.33	16.78	16.10	14.63	14.55	14.89	
1B	12.66	28.04	26.08	26.99	25.40	23.81	23.36	22.57	21.89	21.32	20.64	20.53	19.73	19.05	19.16	19.28	18.82	18.37	18.37	18.03	16.90	16.78	16.78	16.56	15.31	14.60	15.28	
2A	12.96	32.39	30.39	29.03	28.80	27.22	25.12	24.27	23.13	22.00	21.32	21.77	21.55	20.98	20.41	20.64	19.84	19.28	18.82	18.82	18.60	18.71	18.37	18.56	16.67	15.75	15.75	
2B	13.28	33.48	31.75	31.52	29.94	28.35	26.76	25.63	24.61	23.59	23.13	22.00	21.32	20.64	20.18	20.18	19.50	19.50	19.28	19.50	18.60	18.71	19.05	19.05	17.01	16.01	16.24	
3A	13.31	42.20	40.14	40.82	38.78	36.74	34.47	33.34	31.86	29.48	28.58	26.76	25.40	24.49	23.81	22.91	22.45	22.13	21.77	21.55	21.55	21.32	21.32	21.43	20.18	18.60	17.92	
3B	13.27	44.23	41.73	38.78	36.74	34.47	32.89	31.52	30.16	28.46	27.67	26.31	25.17	24.49	23.81	23.13	23.13	22.45	22.45	22.00	21.77	21.77	21.32	21.55	20.18	17.98	17.30	
4A	13.10	45.38	43.09	41.28	39.46	37.65	36.06	34.70	33.79	31.98	31.07	29.94	28.80	27.67	26.99	26.76	26.08	25.17	24.83	24.27	24.72	24.49	23.93	23.81	22.68	22.19	21.28	
4B	13.01	44.18	42.41	42.41	41.05	39.01	37.42	36.06	34.93	33.00	32.21	30.84	29.94	28.80	28.12	27.22	27.22	26.31	25.63	25.63	24.72	24.27	24.27	23.59	23.25	22.83	21.14	

Notes:
1) All weights were recorded after moisture adjustment and sampling.
2) Tare + material weight was not recorded for Day 180.

Phase 2 - Wet Weight of Compost Material (kg)

Recipe	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	15.14	13.21	12.08	11.40	10.04	10.04	9.36	8.45	7.77	7.09	6.86	6.86	6.18	6.18	5.62	5.73	5.05	4.48	4.71	3.46	3.69	4.14	3.46	1.99	1.91	2.25	2.467
1B	15.38	13.42	14.33	12.74	11.15	10.70	9.91	9.23	8.66	7.98	7.87	7.07	6.39	6.50	6.62	6.16	5.71	5.71	5.37	4.24	4.12	4.12	3.90	2.65	1.94	2.62	2.701
2A	19.43	17.43	16.07	15.84	14.26	12.16	11.31	10.17	9.04	8.36	8.81	8.59	8.02	7.45	7.68	6.88	6.32	5.86	5.86	5.64	5.75	5.41	5.60	3.71	2.79	2.79	3.031
2B	20.20	18.47	18.24	16.66	15.07	13.48	12.35	11.33	10.31	9.85	8.72	8.04	7.36	6.90	6.90	6.22	6.22	6.00	6.22	5.32	5.43	5.77	5.77	3.73	2.73	2.96	2.967
3A	28.89	26.83	27.51	25.47	23.43	21.16	20.03	18.55	16.17	15.27	13.45	12.09	11.18	10.50	9.60	9.14	8.82	8.46	8.24	8.24	8.01	8.01	8.12	6.87	5.29	4.61	4.081
3B	30.96	28.46	25.51	23.47	21.20	19.62	18.25	16.89	15.19	14.40	13.04	11.90	11.22	10.54	9.86	9.86	9.18	9.18	8.73	8.50	8.50	8.05	8.28	6.91	4.71	4.03	3.811
4A	32.28	29.99	28.18	26.36	24.55	22.96	21.60	20.69	18.88	17.97	16.84	15.70	14.57	13.89	13.66	12.98	12.07	11.73	11.17	11.62	11.39	10.83	10.71	9.58	9.09	8.18	7.527
4B	31.17	29.40	29.40	28.04	26.00	24.41	23.05	21.92	19.99	19.20	17.83	16.93	15.79	15.11	14.21	14.21	13.30	12.62	12.62	11.71	11.26	11.26	10.58	10.24	9.82	8.13	8.298

Notes:
1) All weights were recorded after moisture adjustment and sampling.

Phase 2 - Wet Weight of Compost Material, Normalized (%)

Recipe	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	100.00	87.25	79.79	75.30	66.31	66.31	61.82	55.81	51.32	46.83	45.31	45.31	40.82	40.82	37.12	37.85	33.36	29.59	31.11	22.85	24.37	27.34	22.85	13.13	12.62	14.84	16.29
1B	100.00	87.26	93.17	82.83	72.50	69.57	64.43	60.01	56.31	51.89	51.17	45.97	41.55	42.26	43.04	40.05	37.13	37.13	34.92	27.57	26.79	26.79	25.36	17.22	12.61	17.05	17.56
2A	100.00	89.71	82.71	81.52	73.39	62.58	58.21	52.34	46.53	43.03	45.34	44.21	41.28	38.34	39.53	35.41	32.53	30.16	30.16	29.03	29.59	27.84	28.82	19.09	14.36	14.38	15.60
2B	100.00	91.44	90.30	82.48	74.60	66.73	61.14	56.09	51.04	48.76	43.17	39.80	36.44	34.16	34.16	30.79	30.79	29.70	30.79	26.34	26.88	28.56	28.56	18.46	13.51	14.65	14.69
3A	100.00	92.87	95.22	88.16	81.10	73.24	69.33	64.21	55.97	52.86	46.56	41.85	38.70	36.34	33.23	31.64	30.53	29.28	28.52	28.52	27.73	27.73	28.11	23.80	18.31	15.95	14.13
3B	100.00	91.93	82.40	75.81	68.48	63.37	58.95	54.55	49.06	46.51	42.12	38.44	36.24	34.04	31.85	31.85	29.65	29.65	28.20	27.45	27.45	26.00	26.74	22.33	15.21	13.03	12.31
4A	100.00	92.91	87.30	81.66	76.05	71.13	66.91	64.10	58.49	55.67	52.17	48.64	45.14	43.03	42.32	40.21	37.39	36.34	34.60	36.00	35.29	33.55	33.18	29.68	28.16	25.35	23.32
4B	100.00	94.32	94.32	89.96	83.41	78.31	73.95	70.32	64.13	61.60	57.20	54.32	50.66	48.48	45.59	45.59	42.67	40.49	40.49	37.57	36.12	36.12	33.94	32.84	31.50	26.07	26.62

Phase 2 - Wet Weight of Compost Material (kg)

Recipe	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	15.14	13.30	12.21	11.62	10.04	10.36	9.68	8.87	8.25	7.57	7.39	7.45	6.82	6.87	6.36	6.52	5.89	5.38	5.65	4.46	4.74	5.25	4.62	3.20	3.17	3.56	3.84
1B	15.38	13.51	14.46	12.90	11.15	10.96	10.22	9.59	9.07	8.44	8.38	7.64	7.01	7.17	7.34	6.93	6.53	6.58	6.29	5.21	5.14	5.19	5.02	3.81	3.15	3.88	4.02
2A	19.43	17.52	16.20	16.02	14.26	12.44	11.64	10.55	9.48	8.86	9.36	9.19	8.67	8.16	8.44	7.69	7.19	6.79	6.85	6.68	6.84	6.56	6.80	4.96	4.08	4.14	4.44
2B	20.20	18.56	18.37	16.83	15.07	13.75	12.67	11.70	10.73	10.33	9.26	8.63	8.00	7.60	7.66	7.03	7.09	6.93	7.20	6.37	6.53	6.93	6.98	4.99	4.04	4.33	4.40
3A	28.89	26.92	27.64	25.64	23.43	21.43	20.35	18.92	16.59	15.75	13.98	12.68	11.82	11.20	10.36	9.96	9.69	9.39	9.23	9.28	9.11	9.16	9.33	8.13	6.60	5.97	5.51
3B	30.96	28.55	25.64	23.64	21.20	19.90	18.58	17.27	15.62	14.89	13.59	12.51	11.88	11.26	10.64	10.70	10.07	10.14	9.75	9.58	9.64	9.24	9.52	8.21	6.06	5.43	5.27
4A	32.28	30.08	28.31	26.53	24.55	23.23	21.93	21.07	19.31	18.45	17.38	16.29	15.22	14.60	14.43	13.81	12.95	12.67	12.17	12.67	12.50	11.99	11.93	10.86	10.42	9.57	8.98
4B	31.17	29.49	29.53	28.21	26.00	24.68	23.38	22.30	20.42	19.69	18.37	17.53	16.45	15.82	14.98	15.03	14.18	13.56	13.61	12.76	12.37	12.42	11.79	11.49	11.13	9.49	9.72

Notes:
1) Includes correction for mass of compost sample removed from reactor weekly (i.e.removed sample weight is added to wet weight of compost material).

Phase 2 - Wet Weight, Material Only, Normalized (%)

Recipe	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	100.00	87.82	80.63	76.73	66.31	68.41	63.92	58.58	54.48	49.99	48.84	49.18	45.03	45.38	42.04	43.08	38.92	35.50	37.35	29.47	31.30	34.65	30.52	21.14	20.91	23.49	25.35
1B	100.00	87.82	94.00	83.89	72.50	71.24	66.43	62.32	58.96	54.88	54.51	49.64	45.56	46.61	47.72	45.05	42.46	42.78	40.88	33.85	33.40	33.74	32.64	24.80	20.47	25.25	26.15
2A	100.00	90.15	83.36	82.43	73.39	64.02	59.92	54.32	48.77	45.58	48.18	47.32	44.64	41.99	43.44	39.59	37.01	34.94	35.23	34.38	35.20	33.74	35.00	25.52	21.02	21.29	22.83
2B	100.00	91.86	90.93	83.32	74.60	68.05	62.72	57.91	53.13	51.14	45.82	42.72	39.62	37.62	37.92	34.82	35.10	34.30	35.67	31.51	32.35	34.30	34.57	24.70	20.00	21.41	21.78
3A	100.00	93.17	95.66	88.75	81.10	74.17	70.44	65.48	57.43	54.50	48.39	43.89	40.93	38.76	35.86	34.46	33.56	32.51	31.95	32.13	31.53	31.71	32.28	28.16	22.85	20.68	19.08
3B	100.00	92.20	82.81	76.37	68.48	64.26	60.00	55.77	50.45	48.09	43.88	40.39	38.38	36.36	34.35	34.55	32.54	32.74	31.48	30.93	31.12	29.83	30.75	26.52	19.57	17.55	17.04
4A	100.00	93.17	87.69	82.19	76.05	71.98	67.93	65.26	59.81	57.17	53.83	50.47	47.14	45.22	44.69	42.77	40.13	39.25	37.69	39.25	38.71	37.15	36.96	33.63	32.29	29.65	27.81
4B	100.00	94.60	94.73	90.51	83.41	79.19	74.99	71.53	65.51	63.16	58.94	56.24	52.76	50.75	48.05	48.22	45.50	43.50	43.68	40.94	39.68	39.85	37.83	36.88	35.71	30.44	31.20

Notes:
1) Includes correction for mass of compost sample removed from reactor weekly (i.e.removed sample weight is added to wet weight of compost material).

Phase 2 - Dry Weight of Compost Material (kg)

Recipe	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	4.54	4.43	3.96	3.59	3.30	3.04	2.89	2.74	2.32	2.26	2.12	1.97	1.85	1.81	1.72	1.61	1.46	1.38	1.26	1.14	1.17	1.12	1.06	1.03	1.08	0.97	0.96
1B	4.61	4.99	3.93	3.80	3.49	3.26	3.09	2.84	2.65	2.49	2.27	2.16	2.04	2.04	1.89	1.86	1.75	1.68	1.50	1.35	1.24	1.18	1.15	1.10	0.85	1.05	1.10
2A	5.83	5.54	5.26	4.72	4.31	3.63	3.41	3.15	3.04	2.92	2.74	2.58	2.42	2.34	2.23	2.07	1.86	1.88	1.75	1.71	1.59	1.64	1.59	1.60	1.57	1.48	1.50
2B	6.06	6.22	5.23	4.65	3.97	3.60	3.33	3.12	2.79	2.75	2.50	2.39	2.26	2.19	2.06	1.99	1.95	1.87	1.82	1.73	1.72	1.66	1.63	1.62	1.58	1.53	1.64
3A	8.67	9.12	6.67	5.90	5.46	4.74	4.38	4.14	3.82	3.61	3.42	3.27	3.01	2.98	2.87	2.83	2.69	2.62	2.58	2.55	2.42	2.38	2.35	2.39	2.27	2.23	2.24
3B	9.29	8.25	7.59	6.51	5.77	5.20	4.66	4.25	3.89	3.72	3.46	3.27	3.14	3.09	2.96	2.88	2.83	2.72	2.65	2.56	2.51	2.46	2.45	2.37	2.10	2.31	2.37
4A	9.68	8.91	7.96	7.33	6.87	6.17	5.81	5.46	5.22	4.97	4.80	4.55	4.33	4.25	4.03	3.91	3.72	3.54	3.50	3.41	3.29	3.22	3.13	3.07	2.92	3.07	3.15
4B	9.35	9.56	7.88	7.33	6.96	6.32	5.91	5.64	5.37	5.32	4.94	4.86	4.63	4.53	4.27	4.21	3.98	3.79	3.74	3.48	3.36	3.25	3.19	3.09	3.01	3.05	3.08

Notes:
1) Dry weights calculated from wet weights using % Moisture Content = (wet weight - dry weight)/wet weight

Phase 2 - Dry Weight of Compost Material, Normalized (%)

Recipe	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	100.00	97.43	87.13	79.01	72.72	67.02	63.70	60.24	51.18	49.86	46.78	43.39	40.71	39.77	37.86	35.53	32.21	30.32	27.69	25.06	25.80	24.61	23.34	22.63	23.70	21.32	21.20
1B	100.00	108.20	85.22	82.34	75.64	70.61	66.99	61.59	57.49	54.06	49.29	46.92	44.15	44.15	40.96	40.31	37.91	36.49	32.40	29.27	26.77	25.59	24.85	23.93	18.47	22.81	23.84
2A	100.00	95.09	90.23	80.95	73.93	62.27	58.58	54.03	52.14	50.10	47.04	44.20	41.52	40.21	38.22	35.48	31.88	32.22	30.02	29.38	27.27	28.15	27.34	27.43	26.93	25.40	25.75
2B	100.00	102.71	86.23	76.73	65.48	59.33	54.94	51.53	45.99	45.43	41.25	39.47	37.23	36.17	34.03	32.76	32.21	30.79	29.97	28.47	28.40	27.36	26.83	26.75	26.13	25.20	27.04
3A	100.00	105.25	76.91	68.12	62.99	54.71	50.50	47.73	44.03	41.62	39.46	37.78	34.70	34.37	33.16	32.70	31.06	30.22	29.72	29.43	27.94	27.49	27.15	27.62	26.22	25.70	25.84
3B	100.00	88.86	81.71	70.05	62.15	55.96	50.22	45.75	41.93	40.05	37.26	35.22	33.80	33.22	31.89	31.05	30.42	29.32	28.51	27.53	27.06	26.46	26.41	25.48	22.56	24.91	25.57
4A	100.00	91.98	82.15	75.73	70.93	63.71	59.96	56.40	53.95	51.31	49.53	46.93	44.70	43.85	41.60	40.41	38.45	36.56	36.13	35.21	33.97	33.24	32.32	31.68	30.18	31.68	32.54
4B	100.00	102.18	84.23	78.35	74.46	67.58	63.20	60.29	57.40	56.94	52.87	51.96	49.51	48.40	45.62	45.03	42.58	40.53	40.02	37.19	35.93	34.78	34.10	33.07	32.22	32.57	32.90

Notes:
1) Dry weights calculated from wet weights using % Moisture Content = (wet weight - dry weight)/wet weight

Phase 2 - Dry Weight, Compost Material (kg)

Recipe	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	4.54	4.45	4.00	3.66	3.30	3.14	2.99	2.87	2.47	2.42	2.29	2.14	2.04	2.01	1.95	1.84	1.71	1.65	1.51	1.47	1.51	1.42	1.42	1.65	1.78	1.53	1.50
1B	4.61	5.02	3.97	3.85	3.49	3.34	3.19	2.95	2.78	2.64	2.42	2.34	2.23	2.25	2.10	2.09	2.00	1.94	1.75	1.66	1.54	1.49	1.48	1.59	1.38	1.56	1.64
2A	5.83	5.57	5.30	4.77	4.31	3.71	3.52	3.27	3.19	3.09	2.91	2.76	2.62	2.57	2.45	2.31	2.11	2.18	2.04	2.03	1.89	1.99	1.94	2.14	2.30	2.19	2.20
2B	6.06	6.25	5.26	4.70	3.97	3.67	3.42	3.22	2.90	2.89	2.65	2.57	2.45	2.41	2.29	2.25	2.22	2.15	2.10	2.06	2.07	1.99	1.97	2.17	2.34	2.23	2.43
3A	8.67	9.15	6.70	5.94	5.46	4.80	4.45	4.22	3.92	3.72	3.56	3.43	3.18	3.18	3.10	3.09	2.96	2.91	2.89	2.87	2.75	2.73	2.70	2.83	2.84	2.89	3.03
3B	9.29	8.28	7.63	6.55	5.77	5.27	4.75	4.34	4.00	3.85	3.61	3.44	3.32	3.30	3.19	3.13	3.10	3.01	2.96	2.88	2.85	2.82	2.82	2.81	2.70	3.12	3.29
4A	9.68	8.93	7.99	7.38	6.87	6.24	5.89	5.56	5.34	5.10	4.95	4.72	4.52	4.46	4.25	4.16	4.00	3.82	3.81	3.72	3.61	3.56	3.49	3.48	3.35	3.59	3.76
4B	9.35	9.58	7.91	7.37	6.96	6.39	5.99	5.73	5.48	5.46	5.09	5.03	4.82	4.74	4.50	4.45	4.25	4.07	4.04	3.79	3.69	3.59	3.55	3.47	3.41	3.55	3.60

Notes:
1) Includes correction for mass of compost sample (dry mass) removed from reactor weekly (i.e.removed dry sample weight is added to dry weight of compost material).
2) Dry weights calculated from wet weights using % Moisture Content = (wet weight - dry weight)/wet weight

Phase 2 - Dry Weight, Compost Material, Normalized (%)

Recipe	1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180
1A	100.00	98.07	88.05	80.51	72.72	69.14	65.86	63.22	54.33	53.22	50.42	47.10	44.91	44.22	42.88	40.44	37.59	36.38	33.24	32.32	33.14	31.19	31.18	36.42	39.28	33.74	32.99
1B	100.00	108.89	85.98	83.39	75.64	72.31	69.06	63.96	60.20	57.18	52.51	50.67	48.41	48.69	45.41	45.34	43.35	42.05	37.94	35.94	33.38	32.23	31.98	34.46	29.97	33.79	35.49
2A	100.00	95.56	90.95	81.85	73.93	63.70	60.30	56.08	54.65	53.07	49.98	47.30	44.91	44.04	42.01	39.67	36.27	37.33	35.07	34.80	32.43	34.11	33.21	36.68	39.43	37.61	37.68
2B	100.00	103.19	86.84	77.52	65.48	60.50	56.36	53.20	47.87	47.64	43.79	42.37	40.47	39.84	37.78	37.05	36.71	35.56	34.72	34.07	34.18	32.86	32.47	35.79	38.67	36.84	40.09
3A	100.00	105.59	77.26	68.57	62.99	55.41	51.30	48.67	45.18	42.91	41.02	39.62	36.70	36.65	35.78	35.62	34.14	33.55	33.29	33.15	31.77	31.45	31.18	32.68	32.72	33.33	34.91
3B	100.00	89.13	82.12	70.57	62.15	56.74	51.12	46.77	43.12	41.41	38.82	37.01	35.79	35.48	34.40	33.68	33.39	32.37	31.82	31.02	30.67	30.36	30.37	30.26	29.02	33.56	35.38
4A	100.00	92.24	82.52	76.22	70.93	64.47	60.86	57.43	55.16	52.69	51.10	48.70	46.69	46.08	43.93	42.98	41.26	39.48	39.35	38.39	37.27	36.80	36.00	35.90	34.60	37.05	38.80
4B	100.00	102.48	84.59	78.84	74.46	68.34	64.09	61.33	58.63	58.38	54.48	53.80	51.56	50.66	48.08	47.63	45.41	43.54	43.17	40.53	39.47	38.36	38.01	37.13	36.52	38.02	38.55

1) Includes correction for mass of compost sample (dry mass) removed from reactor weekly (i.e.removed dry sample weight is added to dry weight of compost material).
2) Dry weights calculated from wet weights using % Moisture Content = (wet weight - dry weight)/wet weight

Phase 2 - Moisture Content Measurements

Recipe	Day 1	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137	144	151	158	165	172	180	Average for Compost Period
1a	70.0	66.5	67.2	68.5	67.1	69.7	69.1	67.6	70.1	68.1	69.0	71.3	70.1	70.8	69.4	71.8	71.0	69.3	73.3	67.1	68.2	73.0	69.4	48.3	43.7	56.9	61.0	66.9
1b	70.0	62.8	72.6	70.2	68.7	69.6	68.8	69.2	69.4	68.7	71.1	69.4	68.1	68.7	71.5	69.8	69.4	70.5	72.2	68.2	70.0	71.3	70.6	58.3	56.1	59.9	59.3	67.9
2a	70.0	68.2	67.3	70.2	69.8	70.2	69.8	69.0	66.4	65.1	68.9	70.0	69.8	68.5	71.0	69.9	70.6	68.0	70.1	69.6	72.4	69.7	71.5	56.9	43.7	47.0	50.5	66.4
2b	70.0	66.3	71.4	72.1	73.7	73.3	73.0	72.4	73.0	72.1	71.3	70.3	69.4	68.2	70.1	68.1	68.6	68.9	70.8	67.6	68.3	71.3	71.8	56.5	42.0	48.4	44.8	67.2
3a	70.0	66.0	75.8	76.8	76.7	77.6	78.2	77.7	76.4	76.4	74.6	72.9	73.1	71.6	70.1	69.0	69.5	69.0	68.7	69.1	69.8	70.3	71.0	65.2	57.0	51.7	45.1	70.0
3b	70.0	71.0	70.3	72.3	72.8	73.5	74.4	74.8	74.4	74.2	73.5	72.5	72.0	70.7	70.0	70.8	69.2	70.3	69.7	69.9	70.4	69.5	70.4	65.8	55.5	42.6	37.7	68.4
4a	70.0	70.3	71.8	72.2	72.0	73.1	73.1	73.6	72.3	72.4	71.5	71.1	70.3	69.4	70.5	69.9	69.2	69.8	68.7	70.7	71.1	70.3	70.8	68.0	67.9	62.5	58.1	70.0
4b	70.0	67.5	73.2	73.9	73.2	74.1	74.4	74.3	73.2	72.3	72.3	71.3	70.7	70.1	70.0	70.4	70.1	70.0	70.4	70.3	70.2	71.1	69.9	69.8	69.3	62.5	62.9	70.6

Notes:

1) Values indicate moisture contents of compost after moisture addition and mixing.

Phase 2 - Depth to Compost Material in Reactors

Recipe	Day 4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	119	123	130	137	144	151	158	165	172	180
1A	38.0	40.5	46.3	52.0	55.6	56.0	60.4	64.6	67.4	68.9	71.1	72.4	73.6	75.0	75.5	77.1	78.6	79.6	79.3	78.0	79.1	80.0	79.5	80.3	80.3	81.5	82.0
1B	37.0	40.0	43.5	48.0	52.6	54.8	57.6	61.3	64.4	66.4	68.3	69.6	70.6	72.0	73.0	74.5	75.9	77.3	76.0	73.0	74.5	75.6	77.0	78.4	79.5	79.0	82.0
2A	35.0	36.5	43.1	51.0	55.5	60.1	63.3	65.3	67.6	69.4	71.0	72.4	74.0	75.4	77.1	78.0	79.3	80.8	80.1	77.5	77.9	78.0	77.9	79.1	80.1	81.0	80.0
2B	35.5	38.0	43.8	52.3	58.3	62.8	66.0	68.4	70.9	73.0	74.1	75.6	77.1	78.9	79.3	79.6	81.3	81.9	80.8	78.4	80.3	79.0	79.3	79.1	80.8	80.0	80.5
3A	32.5	36.0	40.5	48.5	55.0	58.8	62.6	65.8	69.0	70.9	73.6	75.9	77.1	77.7	78.3	78.6	81.0	82.0	80.9	79.0	77.5	77.3	77.3	76.8	77.5	78.8	79.3
3B	29.0	33.0	38.1	47.0	52.4	59.4	64.6	67.0	70.1	73.0	75.3	76.8	77.9	78.3	78.7	78.9	81.1	81.3	80.5	78.5	77.9	77.4	77.4	77.3	77.6	79.8	79.0
4A	30.0	33.0	37.1	44.0	48.5	52.6	56.3	58.5	61.9	64.0	65.0	67.6	69.0	70.8	71.5	72.9	74.9	74.9	73.5	70.5	70.8	71.0	70.9	72.0	72.0	72.9	76.1
4B	32.0	34.0	38.8	44.0	46.3	50.8	54.6	57.0	59.6	62.3	63.1	65.3	66.6	67.8	69.8	70.3	71.4	72.3	70.6	65.9	67.5	68.5	68.9	70.4	70.8	72.0	73.5

Notes:
1) All measurements are in cm measured from top of composting reactor.
2) Depths were measured with applied weights in place and prior to mixing/sampling.
3) Weights were removed from compost reactors on Day 119 following depth measurement.

Phase 2 - Volume (cm^3) of Compost Material in Reactors

Recipe	Day 4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	119	123	130	137	144	151	158	165	172	180
1A	68551	64481	55258	46488	41096	40504	34120	28077	24249	22189	19133	17455	15789	13972	13315	11227	9257	7976	8455	10062	8615	7497	8135	7179	7179	5595	4965
1B	70194	65291	59673	52612	45581	42359	38113	32863	28428	25634	23045	21165	19809	17957	16620	14631	12824	11033	12660	16620	14631	13151	11357	9579	8135	8776	4965
2A	73509	71019	60309	48005	41244	34480	30015	27201	23904	21506	19302	17455	15292	13479	11195	10062	8455	6544	7338	10709	10224	10062	10224	8615	7338	6227	7497
2B	72677	68551	59197	46034	37127	30724	26155	22873	19471	16620	15126	13151	11195	8936	8391	8040	5911	5123	6544	9579	7179	8776	8455	8615	6544	7497	6861
3A	77704	71847	64481	51839	41987	36472	30901	26503	22018	19471	15789	12824	11195	10450	9675	9257	6227	4965	6385	8776	10709	11033	11033	11682	10709	9096	8455
3B	83674	76860	68387	54166	45883	35564	28077	24767	20486	16620	13643	11682	10191	9675	9161	8936	6069	5911	6861	9418	10224	10871	10871	11033	10547	7816	8776
4A	81956	76860	70029	58880	51839	45543	40135	36836	31969	28956	27551	23904	22018	19640	18628	16787	14136	14136	15955	19978	19640	19302	19471	17957	17957	16787	12497
4B	78550	75180	67242	58880	55258	48386	42545	39030	35202	31435	30192	27201	25287	23732	20995	20317	18797	17622	19809	26329	24077	22702	22189	20147	19640	17957	15955

Notes:
1) All measurements are in cm^3.
2) Maximum volume of reactors = 137,600 cm^3.

Phase 2 - Normalized Volume (cm^3) of Compost Material in Reactors

Recipe	Day 4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	119	123	130	137	144	151	158	165	172	180
1A	1.000	0.941	0.806	0.678	0.600	0.591	0.498	0.410	0.354	0.324	0.279	0.255	0.230	0.204	0.194	0.164	0.135	0.116	0.123	0.147	0.126	0.109	0.119	0.105	0.105	0.082	0.072
1B	1.000	0.930	0.850	0.750	0.649	0.603	0.543	0.468	0.405	0.365	0.328	0.302	0.282	0.256	0.237	0.208	0.183	0.157	0.180	0.237	0.208	0.187	0.162	0.136	0.116	0.125	0.071
Recipe 1 Mean	1.000	0.935	0.828	0.714	0.624	0.597	0.520	0.439	0.379	0.344	0.304	0.278	0.256	0.230	0.216	0.186	0.159	0.137	0.152	0.192	0.167	0.148	0.140	0.121	0.110	0.103	0.072
Recipe 1 St.Dev.	0.000	0.007	0.031	0.050	0.035	0.009	0.032	0.041	0.036	0.029	0.035	0.033	0.037	0.037	0.030	0.032	0.034	0.029	0.040	0.064	0.059	0.055	0.030	0.022	0.008	0.031	0.001
2A	1.000	0.966	0.820	0.653	0.561	0.469	0.408	0.370	0.325	0.293	0.263	0.237	0.208	0.183	0.152	0.137	0.115	0.089	0.100	0.146	0.139	0.137	0.139	0.117	0.100	0.085	0.102
2B	1.000	0.943	0.815	0.633	0.511	0.423	0.360	0.315	0.268	0.229	0.208	0.181	0.154	0.123	0.115	0.111	0.081	0.070	0.090	0.132	0.099	0.121	0.116	0.119	0.090	0.103	0.094
Recipe 2 Mean	1.000	0.955	0.817	0.643	0.536	0.446	0.384	0.342	0.297	0.261	0.235	0.209	0.181	0.153	0.134	0.124	0.098	0.080	0.095	0.139	0.119	0.129	0.128	0.118	0.095	0.094	0.098
Recipe 2 St.Dev.	0.000	0.016	0.004	0.014	0.036	0.033	0.034	0.039	0.041	0.045	0.039	0.040	0.038	0.043	0.026	0.019	0.024	0.013	0.007	0.010	0.028	0.011	0.016	0.001	0.007	0.013	0.005
3A	1.000	0.925	0.830	0.667	0.540	0.469	0.398	0.341	0.283	0.251	0.203	0.165	0.144	0.134	0.125	0.119	0.080	0.064	0.082	0.113	0.138	0.142	0.142	0.150	0.138	0.117	0.109
3B	1.000	0.919	0.817	0.647	0.548	0.425	0.336	0.296	0.245	0.199	0.163	0.140	0.122	0.116	0.109	0.107	0.073	0.071	0.082	0.113	0.122	0.130	0.130	0.132	0.126	0.093	0.105
Recipe 3 Mean	1.000	0.922	0.824	0.657	0.544	0.447	0.367	0.319	0.264	0.225	0.183	0.152	0.133	0.125	0.117	0.113	0.076	0.067	0.082	0.113	0.130	0.136	0.136	0.141	0.132	0.105	0.107
Recipe 3 St.Dev.	0.000	0.004	0.009	0.014	0.006	0.031	0.044	0.032	0.027	0.037	0.028	0.018	0.016	0.013	0.011	0.009	0.005	0.005	0.000	0.000	0.011	0.009	0.009	0.013	0.008	0.017	0.003
4A	1.000	0.938	0.854	0.718	0.633	0.556	0.490	0.449	0.390	0.353	0.336	0.292	0.269	0.240	0.227	0.205	0.172	0.172	0.195	0.244	0.240	0.236	0.238	0.219	0.219	0.205	0.152
4B	1.000	0.957	0.856	0.750	0.703	0.616	0.542	0.497	0.448	0.400	0.384	0.346	0.322	0.302	0.267	0.259	0.239	0.224	0.252	0.335	0.307	0.289	0.282	0.256	0.250	0.229	0.203
Recipe 4 Mean	1.000	0.947	0.855	0.734	0.668	0.586	0.516	0.473	0.419	0.377	0.360	0.319	0.295	0.271	0.247	0.232	0.206	0.198	0.223	0.289	0.273	0.262	0.260	0.238	0.235	0.217	0.178
Recipe 4 St.Dev.	0.000	0.014	0.001	0.022	0.050	0.043	0.037	0.034	0.041	0.033	0.034	0.039	0.038	0.044	0.028	0.038	0.047	0.037	0.041	0.065	0.047	0.038	0.032	0.026	0.022	0.017	0.036

Phase 2 - Reactor and Sampling Masses (wet basis)

Day	Reactor	Tare Weight (kg)	Initial Mass (material+tare) (lb)	Initial Mass (material only) (kg)	Mass After Water Addition and Sampling (material+tare) (lb)	Mass After Water Addition and Sampling (material only) (kg)	Mass Sampled (g)	Cumulative Mass Sampled (g)
Day 4	1A	12.64	58.0	13.67	57.0	13.21	86.20	86.20
	1B	12.66	58.5	13.88	57.5	13.42	86.20	86.20
	2A	12.96	68.5	18.11	67.0	17.43	86.20	86.20
	2B	13.28	71.0	18.93	70.0	18.47	86.20	86.20
	3A	13.31	90.0	27.51	88.5	26.83	86.20	86.20
	3B	13.27	94.5	29.59	92.0	28.46	86.20	86.20
	4A	13.10	96.0	30.44	95.0	29.99	86.20	86.20
	4B	13.01	97.5	31.22	93.5	29.40	86.20	86.20
Day 11	1A	12.64	55.0	12.31	54.5	12.08	41.20	127.40
	1B	12.66	60.5	14.78	59.5	14.33	41.20	127.40
	2A	12.96	64.5	16.30	64.0	16.07	41.20	127.40
	2B	13.28	70.0	18.47	69.5	18.24	41.20	127.40
	3A	13.31	91.0	27.97	90.0	27.51	41.20	127.40
	3B	13.27	86.5	25.97	85.5	25.51	41.20	127.40
	4A	13.10	92.5	28.86	91.0	28.18	41.20	127.40
	4B	13.01	95.0	30.08	93.5	29.40	41.20	127.40
Day 18	1A	12.64	54.0	11.85	53.0	11.40	36.2	163.60
	1B	12.66	56.5	12.97	56.0	12.74	35.2	162.60
	2A	12.96	64.0	16.07	63.5	15.84	48.2	175.60
	2B	13.28	66.0	16.66	66.0	16.66	44.2	171.60
	3A	13.31	86.0	25.70	85.5	25.47	41.2	168.60
	3B	13.27	82.0	23.92	81.0	23.47	47.2	174.60
	4A	13.10	88.0	26.82	87.0	26.36	43.2	170.60
	4B	13.01	91.0	28.27	90.5	28.04	45.2	172.60
Day 25	1A	12.64	50.5	10.27	50.0	10.04	53.2	216.80
	1B	12.66	53.5	11.61	52.5	11.15	50.2	212.80
	2A	12.96	60.5	14.48	60.0	14.26	53.2	228.80
	2B	13.28	63.0	15.30	62.5	15.07	53.2	224.80
	3A	13.31	82.5	24.11	81.0	23.43	49.2	217.80
	3B	13.27	77.0	21.66	76.0	21.20	50.2	224.80
	4A	13.10	84.0	25.00	83.0	24.55	54.2	224.80
	4B	13.01	86.5	26.23	86.0	26.00	50.2	222.80
Day 32	1A	12.64	51.0	10.49	50.0	10.04	49.2	266.00
	1B	12.66	52.0	10.93	51.5	10.70	44.2	257.00
	2A	12.96	57.0	12.89	55.4	12.16	51.2	280.00
	2B	13.28	59.8	13.82	59.0	13.48	42.2	267.00
	3A	13.31	77.3	21.73	76.0	21.16	51.2	269.00
	3B	13.27	74.0	20.30	72.5	19.62	50.2	275.00
	4A	13.10	80.5	23.41	79.5	22.96	49.2	274.00
	4B	13.01	83.5	24.86	82.5	24.41	50.2	273.00
Day 39	1A	12.64	48.5	9.36	48.5	9.36	51.2	317.20
	1B	12.66	50.3	10.13	49.8	9.91	49.2	306.20
	2A	12.96	54.0	11.53	53.5	11.31	53.2	333.20
	2B	13.28	56.5	12.35	56.5	12.35	52.2	319.20
	3A	13.31	74.5	20.48	73.5	20.03	51.2	320.20
	3B	13.27	70.0	18.48	69.5	18.25	51.2	326.20
	4A	13.10	78.0	22.28	76.5	21.60	52.2	326.20
	4B	13.01	80.5	23.50	79.5	23.05	52.2	325.20

Phase 2 - Reactor and Sampling Masses (wet basis)

Day	Reactor	Tare Weight (kg)	Initial Mass (material+tare) (lb)	Initial Mass (material only) (kg)	Mass After Water Addition and Sampling (material+tare) (lb)	Mass After Water Addition and Sampling (material only) (kg)	Mass Sampled (g)	Cumulative Mass Sampled (g)
Day 46	1A	12.64	47.0	8.68	46.5	8.45	48.2	365.40
	1B	12.66	48.5	9.34	48.3	9.23	49.2	355.40
	2A	12.96	51.5	10.40	51.0	10.17	51.2	384.40
	2B	13.28	54.8	11.55	54.3	11.33	49.2	368.40
	3A	13.31	71.5	19.12	70.3	18.55	47.2	367.40
	3B	13.27	68.0	17.57	66.5	16.89	50.2	376.40
	4A	13.10	75.3	21.03	74.5	20.69	49.2	375.40
	4B	13.01	78.0	22.37	77.0	21.92	51.2	376.40
Day 53	1A	12.64	45.0	7.77	45.0	7.77	53.2	418.60
	1B	12.66	46.8	8.55	47.0	8.66	52.2	407.60
	2A	12.96	49.5	9.49	48.5	9.04	51.2	435.60
	2B	13.28	53.3	10.87	52.0	10.31	54.2	422.60
	3A	13.31	68.5	17.76	65.0	16.17	54.2	421.60
	3B	13.27	65.0	16.21	62.8	15.19	53.2	429.60
	4A	13.10	72.8	19.90	70.5	18.88	51.2	426.60
	4B	13.01	75.3	21.12	72.8	19.99	54.2	430.60
Day 60	1A	12.64	44.0	7.32	43.5	7.09	59.2	477.80
	1B	12.66	46.0	8.21	45.5	7.98	52.2	459.80
	2A	12.96	47.3	8.47	47.0	8.36	61.2	496.80
	2B	13.28	51.3	9.97	51.0	9.85	57.2	479.80
	3A	13.31	64.0	15.72	63.0	15.27	54.2	475.80
	3B	13.27	61.8	14.74	61.0	14.40	59.2	488.80
	4A	13.10	69.5	18.42	68.5	17.97	58.2	484.80
	4B	13.01	71.5	19.42	71.0	19.20	57.2	487.80
Day 67	1A	12.64	42.5	6.64	43.0	6.86	56.2	534.00
	1B	12.66	44.5	7.52	45.3	7.87	53.2	513.00
	2A	12.96	46.0	7.91	48.0	8.81	54.2	551.00
	2B	.13.28	49.0	8.95	48.5	8.72	55.2	535.00
	3A	13.31	61.3	14.47	59.0	13.45	55.2	531.00
	3B	13.27	59.3	13.61	58.0	13.04	57.2	546.00
	4A	13.10	67.0	17.29	66.0	16.84	52.2	537.00
	4B	13.01	69.5	18.51	68.0	17.83	53.2	541.00
Day 74	1A	12.64	42.0	6.41	43.0	6.86	52.2	586.20
	1B	12.66	44.0	7.30	43.5	7.07	52.2	565.20
	2A	12.96	47.0	8.36	47.5	8.59	53.2	604.20
	2B	13.28	47.5	8.27	47.0	8.04	55.2	590.20
	3A	13.31	57.8	12.88	56.0	12.09	59.2	590.20
	3B	13.27	57.0	12.58	55.5	11.90	59.2	605.20
	4A	13.10	65.0	16.38	63.5	15.70	55.2	592.20
	4B	13.01	67.0	17.38	66.0	16.93	59.2	600.20
Day 81	1A	12.64	42.0	6.41	41.5	6.18	51.2	637.40
	1B	12.66	42.5	6.62	42.0	6.39	51.2	616.40
	2A	12.96	46.8	8.25	46.3	8.02	49.2	653.40
	2B	13.28	46.0	7.59	45.5	7.36	52.2	642.40
	3A	13.31	55.0	11.64	54.0	11.18	54.2	644.40
	3B	13.27	54.5	11.45	54.0	11.22	56.2	661.40
	4A	13.10	62.0	15.02	61.0	14.57	56.2	648.40
	4B	13.01	64.8	16.36	63.5	15.79	55.2	655.40
Day 88	1A	12.64	40.5	5.73	41.5	6.18	53.2	690.60
	1B	12.66	41.5	6.16	42.3	6.50	52.2	668.60
	2A	12.96	45.0	7.45	45.0	7.45	56.2	709.60
	2B	13.28	44.5	6.90	44.5	6.90	56.2	698.60
	3A	13.31	52.5	10.50	52.5	10.50	53.2	697.60
	3B	13.27	53.0	10.77	52.5	10.54	57.2	718.60
	4A	13.10	60.0	14.12	59.5	13.89	58.2	706.60
	4B	13.01	62.5	15.34	62.0	15.11	53.2	708.60

Phase 2 - Reactor and Sampling Masses (wet basis)

Day	Reactor	Tare Weight (kg)	Initial Mass (material+tare) (lb)	Initial Mass (material only) (kg)	Mass After Water Addition and Sampling (material+tare) (lb)	Mass After Water Addition and Sampling (material only) (kg)	Mass Sampled (g)	Cumulative Mass Sampled (g)
Day 95	1A	12.64	40.5	5.73	40.3	5.62	54.2	744.80
	1B	12.66	41.0	5.94	42.5	6.62	50.2	718.80
	2A	12.96	44.0	7.00	45.5	7.68	51.2	760.80
	2B	13.28	43.5	6.45	44.5	6.90	61.2	759.80
	3A	13.31	51.0	9.82	50.5	9.60	61.2	758.80
	3B	13.27	51.5	10.09	51.0	9.86	57.2	775.80
	4A	13.10	58.0	13.21	59.0	13.66	60.2	766.80
	4B	13.01	60.5	14.43	60.0	14.21	59.2	767.80
Day 102	1A	12.64	39.0	5.05	40.5	5.73	48.2	793.00
	1B	12.66	42.0	6.39	41.5	6.16	50.2	769.00
	2A	12.96	44.0	7.00	43.8	6.88	52.2	813.00
	2B	13.28	43.5	6.45	43.0	6.22	54.2	814.00
	3A	13.31	49.5	9.14	49.5	9.14	57.2	816.00
	3B	13.27	50.5	9.64	51.0	9.86	60.2	836.00
	4A	13.10	57.5	12.98	57.5	12.98	58.2	825.00
	4B	13.01	59.0	13.75	60.0	14.21	53.2	821.00
Day 109	1A	12.64	39.5	5.28	39.0	5.05	50.2	843.20
	1B	12.66	39.8	5.37	40.5	5.71	51.2	820.20
	2A	12.96	42.5	6.32	42.5	6.32	57.2	870.20
	2B	13.28	42.0	5.77	43.0	6.22	56.2	870.20
	3A	13.31	48.5	8.69	48.8	8.82	58.2	874.20
	3B	13.27	49.0	8.96	49.5	9.18	58.2	894.20
	4A	13.10	56.0	12.30	55.5	12.07	58.2	883.20
	4B	13.01	58.8	13.64	58.0	13.30	61.2	882.20
Day 116	1A	12.64	38.0	4.60	37.8	4.48	52.2	895.40
	1B	12.66	39.3	5.14	40.5	5.71	49.2	869.40
	2A	12.96	42.0	6.09	41.5	5.86	58.2	928.40
	2B	13.28	41.0	5.32	42.5	6.00	58.2	928.40
	3A	13.31	47.0	8.01	48.0	8.46	57.2	931.40
	3B	13.27	48.5	8.73	49.5	9.18	62.2	956.40
	4A	13.10	54.0	11.39	54.8	11.73	55.2	938.40
	4B	13.01	56.5	12.62	56.5	12.62	55.2	937.40
Day 123	1A	12.64	36.5	3.92	38.3	4.71	49.2	944.60
	1B	12.66	39.0	5.03	39.8	5.37	48.2	917.60
	2A	12.96	39.5	4.96	41.5	5.86	57.2	985.60
	2B	13.28	41.3	5.43	43.0	6.22	56.2	984.60
	3A	13.31	46.0	7.56	47.5	8.24	59.2	990.60
	3B	13.27	48.0	8.50	48.5	8.73	59.2	1015.60
	4A	13.10	52.8	10.83	53.5	11.17	59.2	997.60
	4B	13.01	55.5	12.16	56.5	12.62	57.2	994.60
Day 130	1A	12.64	36.0	3.69	35.5	3.46	57.2	1001.80
	1B	12.66	37.5	4.35	37.3	4.24	49.2	966.80
	2A	12.96	40.0	5.18	41.0	5.64	55.2	1040.80
	2B	13.28	41.5	5.54	41.0	5.32	61.2	1045.80
	3A	13.31	46.0	7.56	47.5	8.24	53.2	1043.80
	3B	13.27	47.5	8.28	48.0	8.50	61.2	1076.80
	4A	13.10	52.8	10.83	54.5	11.62	53.2	1050.80
	4B	13.01	55.0	11.94	54.5	11.71	56.2	1050.80
Day 137	1A	12.64	34.0	2.78	36.0	3.69	47.2	1049.00
	1B	12.66	35.5	3.44	37.0	4.12	50.2	1017.00
	2A	12.96	40.0	5.18	41.3	5.75	48.2	1089.00
	2B	13.28	39.5	4.64	41.3	5.43	58.2	1104.00
	3A	13.31	46.0	7.56	47.0	8.01	54.2	1098.00
	3B	13.27	47.0	8.05	48.0	8.50	58.2	1135.00
	4A	13.10	53.0	10.94	54.0	11.39	56.2	1107.00
	4B	13.01	52.5	10.80	53.5	11.26	57.2	1108.00

Phase 2 - Reactor and Sampling Masses (wet basis)

Day	Reactor	Tare Weight (kg)	Initial Mass (material+tare) (lb)	Initial Mass (material only) (kg)	Mass After Water Addition and Sampling (material+tare) (lb)	Mass After Water Addition and Sampling (material only) (kg)	Mass Sampled (g)	Cumulative Mass Sampled (g)
Day 144	1A	12.64	34.8	3.12	37.0	4.14	57.2	1106.20
	1B	12.66	36.0	3.67	37.0	4.12	52.2	1069.20
	2A	12.96	41.0	5.64	40.5	5.41	56.2	1145.20
	2B	13.28	40.5	5.09	42.0	5.77	54.2	1158.20
	3A	13.31	46.3	7.67	47.0	8.01	54.2	1152.20
	3B	13.27	47.5	8.28	47.0	8.05	51.2	1186.20
	4A	13.10	53.0	10.94	52.8	10.83	54.2	1161.20
	4B	13.01	52.5	10.80	53.5	11.26	52.2	1160.20
Day 151	1A	12.64	36.0	3.69	35.5	3.46	55.2	1161.40
	1B	12.66	36.0	3.67	36.5	3.90	50.2	1119.40
	2A	12.96	39.5	4.96	40.8	5.52	56.2	1201.40
	2B	13.28	41.5	5.54	42.0	5.77	54.2	1212.40
	3A	13.31	46.3	7.67	47.3	8.12	53.2	1205.40
	3B	13.27	46.5	7.82	47.5	8.28	55.2	1241.40
	4A	13.10	52.0	10.49	52.5	10.71	58.2	1219.40
	4B	13.01	52.5	10.80	52.0	10.58	51.2	1211.40
Day 158	1A	12.64	31.0	1.42	32.3	1.99	50.2	1211.60
	1B	12.66	32.5	2.08	33.8	2.65	46.2	1165.60
	2A	12.96	35.0	2.92	36.8	3.71	48.2	1249.60
	2B	13.28	36.0	3.05	37.5	3.73	48.2	1260.60
	3A	13.31	43.0	6.19	44.5	6.87	54.2	1259.60
	3B	13.27	44.0	6.69	44.5	6.91	55.2	1296.60
	4A	13.10	48.5	8.90	50.0	9.58	56.2	1275.60
	4B	13.01	49.5	9.44	51.3	10.24	46.2	1257.60
Day 165	1A	12.64	29.8	0.85	32.1	1.91	44.2	1255.80
	1B	12.66	30.5	1.17	32.2	1.94	43.2	1208.80
	2A	12.96	31.8	1.44	34.7	2.79	45.2	1294.80
	2B	13.28	33.0	1.69	35.3	2.73	50.2	1310.80
	3A	13.31	39.3	4.49	41.0	5.29	51.2	1310.80
	3B	13.27	38.0	3.97	39.7	4.71	51.2	1347.80
	4A	13.10	47.0	8.22	48.9	9.09	56.2	1331.80
	4B	13.01	47.0	8.31	50.3	9.82	52.2	1309.80
Day 172	1A	12.64	30.0	0.97	32.8	2.25	53.2	1309.00
	1B	12.66	30.5	1.17	33.7	2.62	53.2	1262.00
	2A	12.96	32.0	1.55	34.7	2.79	48.2	1343.00
	2B	13.28	33.0	1.69	35.8	2.96	56.2	1367.00
	3A	13.31	36.5	3.25	39.5	4.61	57.2	1368.00
	3B	13.27	35.5	2.83	38.1	4.03	53.2	1401.00
	4A	13.10	43.5	6.63	46.9	8.18	55.2	1387.00
	4B	13.01	44.3	7.06	46.6	8.13	50.2	1360.00
Day 180	1A	12.64	29.8	0.89	-	2.47	61.8	1370.80
	1B	12.66	30.2	1.03	-	2.70	58.4	1320.40
	2A	12.96	31.7	1.43	-	3.03	61.8	1404.80
	2B	13.28	32.6	1.48	-	2.97	64.8	1431.80
	3A	13.31	34.5	2.34	-	4.08	64.4	1432.40
	3B	13.27	34.1	2.22	-	3.81	62.5	1463.50
	4A	13.10	40.4	5.23	-	7.53	62.9	1449.90
	4B	13.01	41.6	5.86	-	8.30	66.7	1426.70

Phase 2 - Cumulative Sampling Losses

Reactor	Initial Dry Mass (kg)	Cumulative Sample Mass Collected (g, wet basis)	Cumulative Mass of Compost Material Removed for Sampling (kg, wet basis)	Cumulative Mass of Compost Material Removed for Sampling (kg, dry basis [1])	Total Compost Material Removed for Sampling (%)
1A	4.542	1370.8	1.371	0.41	9.1%
1B	4.614	1320.4	1.320	0.40	8.6%
2A	5.829	1404.8	1.405	0.42	7.2%
2B	6.060	1431.8	1.432	0.43	7.1%
3A	8.667	1432.4	1.432	0.43	5.0%
3B	9.288	1463.5	1.464	0.44	4.7%
4A	9.684	1449.9	1.450	0.43	4.5%
4B	9.351	1426.7	1.427	0.43	4.6%

Notes:
[1] - Dry basis calculation assumes target moisture content of 70% maintained throughout Phase 2 experiment.

Phase 2 - % Lignin (dry matter basis)

Feedstock Straw Samples:

Sample Year	% Lignin
1997	12.9070
1999	10.7592
2000	10.4017
Average =	11.3560

	Day												
Reactor	1	4	18	25	46	60	74	95	109	123	137	158	180
1a	11.3560	11.4143	15.6958	13.1259	16.5053	18.7770	17.1932	20.4162	17.1290	18.5357	16.58139	18.1158	19.3266
1b	11.3560	11.5471	13.2472	14.1856	15.1916	19.0275	17.6036	19.3184	16.38613	16.6897	17.96692	17.9358	19.1240
Recipe 1 Mean	11.3560	11.4807	14.4715	13.6558	15.8485	18.9023	17.3984	19.8673	16.7576	17.6127	17.2742	18.0258	19.2253
Recipe 1 St.Dev.	0.0000	0.0939	1.7314	0.7493	0.9290	0.1771	0.2902	0.7763	0.5253	1.3053	0.9797	0.1273	0.1433
2a	11.3560	11.4614	17.6170	15.4702	14.1040	17.7486	14.7487	17.2671	16.05755	16.1799	17.19412	15.4811	16.7692
2b	11.3560	13.1688	13.1455	13.9982	15.4710	15.1497	17.0399	17.7541	16.87615	15.1819	16.38949	15.8878	17.2145
Recipe 2 Mean	11.3560	12.3151	15.3813	14.7342	14.7875	16.4492	15.8943	17.5106	16.4668	15.6809	16.7918	15.6845	16.9919
Recipe 2 St.Dev.	0.0000	1.2073	3.1618	1.0409	0.9666	1.8377	1.6201	0.3444	0.5788	0.7057	0.5690	0.2875	0.3149
3a	11.3560	12.7613	14.1692	15.5324	15.0185	17.7888	15.1296	20.8884	17.65214	16.2850	15.5137	15.9620	16.7574
3b	11.3560	11.6456	14.0835	16.0110	13.0099	16.7841	15.7847	16.7180	15.62298	16.9073	14.14768	14.2057	16.8257
Recipe 3 Mean	11.3560	12.2035	14.1264	15.7717	14.0142	17.2865	15.4572	18.8032	16.6376	16.5962	14.8307	15.0839	16.7916
Recipe 3 St.Dev.	0.0000	0.7889	0.0606	0.3384	1.4203	0.7104	0.4632	2.9489	1.4348	0.4400	0.9659	1.2419	0.0483
4a	11.3560	17.3534	14.3528	19.7206	15.2737	20.6696	22.0074	23.0535	21.26192	21.9263	19.45204	19.8067	20.8878
4b	11.3560	15.8867	14.3345	18.5047	15.8610	22.3080	20.6993	24.1403	21.20286	23.8815	20.5493	19.1910	21.7822
Recipe 4 Mean	11.3560	16.6201	14.3436	19.1127	15.5674	21.4888	21.3534	23.5969	21.2324	22.9039	20.0007	19.4988	21.3350
Recipe 4 St.Dev.	0.0000	1.0371	0.0129	0.8598	0.4152	1.1585	0.9250	0.7685	0.0418	1.3825	0.7759	0.4353	0.6324

Notes:

1) % Lignin on Day 1 is an average of 1997, 1999, and 2000 straw samples.

Phase 2 - % Cellulose (dry matter basis)

Feedstock Straw Samples:

Sample Year	% Cellulose
1997	37.9829
1999	42.6874
2000	46.7332
Average =	42.4678

	Day												
Reactor	1	4	18	25	46	60	74	95	109	123	137	158	180
1a	42.4678	46.9532	44.8771	43.1407	43.00945	28.7907	30.53626	30.5847	27.71977	31.38411	25.18726	32.88933	30.74052
1b	42.4678	47.6324	43.5674	42.8494	37.55437	37.2934	36.42124	30.0080	33.9268	29.20402	29.48354	30.51168	29.13004
Recipe 1 Mean	42.4678	47.2928	44.2222	42.9951	40.2819	33.0421	33.4787	30.2964	30.8233	30.2941	27.3354	31.7005	29.9353
Recipe 1 St.Dev.	0.0000	0.4803	0.9261	0.2060	3.8573	6.0123	4.1613	0.4078	4.3890	1.5416	3.0379	1.6813	1.1388
2a	42.4678	43.6582	49.1742	38.2447	28.33992	26.3036	27.78458	26.1357	26.52561	24.59233	29.07582	29.83968	29.98075
2b	42.4678	41.2150	35.6721	32.3361	26.86412	25.7737	24.33605	23.8026	29.09582	27.57791	30.75548	29.63392	29.31946
Recipe 2 Mean	42.4678	42.4366	42.4231	35.2904	27.6020	26.0387	26.0603	24.9692	27.8107	26.0851	29.9157	29.7368	29.6501
Recipe 2 St.Dev.	0.0000	1.7276	9.5474	4.1780	1.0435	0.3747	2.4385	1.6498	1.8174	2.1111	1.1877	0.1455	0.4676
3a	42.4678	45.5207	33.0984	30.6930	27.68992	21.4579	24.78055	26.9022	32.2431	28.58637	28.19131	32.10054	29.95205
3b	42.4678	44.5225	34.1293	32.3799	21.14122	22.3412	24.78858	29.2476	25.36863	32.13284	26.60072	26.90856	31.69963
Recipe 3 Mean	42.4678	45.0216	33.6139	31.5365	24.4156	21.8996	24.7846	28.0749	28.8059	30.3596	27.3960	29.5045	30.8258
Recipe 3 St.Dev.	0.0000	0.7058	0.7290	1.1928	4.6306	0.6246	0.0057	1.6584	4.8610	2.5077	1.1247	3.6713	1.2357
4a	42.4678	44.3841	32.6072	29.8230	27.59073	33.2311	33.49478	29.0015	30.52839	29.11668	26.36648	29.69443	29.65232
4b	42.4678	42.0952	34.0030	29.7198	29.13363	31.2927	32.6666	30.8032	28.96986	30.57773	24.98755	29.0969	29.24467
Recipe 4 Mean	42.4678	43.2397	33.3051	29.7714	28.3622	32.2619	33.0807	29.9024	29.7491	29.8472	25.6770	29.3957	29.4485
Recipe 4 St.Dev.	0.0000	1.6185	0.9870	0.0730	1.0910	1.3707	0.5856	1.2740	1.1020	1.0331	0.9751	0.4225	0.2883

Notes:

1) % Cellulose on Day 1 is an average of 1997, 1999, and 2000 straw samples.

Phase 2 - % Hemicellulose (dry matter basis)

Feedstock Straw Samples:

Sample Year	% Hemi-Cellulose
1997	20.6272
1999	19.6638
2000	18.6504
Average =	19.6471

	Day												
Reactor	1	4	18	25	46	60	74	95	109	123	137	158	180
1a	19.6471	19.2534	13.0953129	9.8269	2.795827	2.5897	12.47508	-1.6792	-2.417961	-3.465468	-2.103817	-13.19606	-6.435227
1b	19.6471	16.8534	17.3925574	11.6415	11.22109	2.3016	4.200056	4.5636	1.268458	5.770109	-6.45685	-6.445028	-6.419516
Recipe 1 Mean	19.6471	18.0534	15.2439	10.7342	7.0085	2.4457	8.3376	1.4422	-0.5748	1.1523	-4.2803	-9.8205	-6.4274
Recipe 1 St.Dev.	0.0000	1.6971	3.0386	1.2831	5.9576	0.2037	5.8513	4.4143	2.6067	6.5305	3.0781	4.7737	0.0111
2a	19.6471	15.9864	1.2283158	7.3593	10.23703	5.1820	5.605122	-1.6888	-4.21078	6.023566	1.369742	-8.52393	-2.782026
2b	19.6471	17.5572	9.02026098	12.7611	4.511377	4.1171	2.368538	-5.8774	-10.61344	2.966874	-1.56257	-5.152862	-2.464633
Recipe 2 Mean	19.6471	16.7718	5.1243	10.0602	7.3742	4.6496	3.9868	-3.7831	-7.4121	4.4952	-0.0964	-6.8384	-2.6233
Recipe 2 St.Dev.	0.0000	1.1107	5.5097	3.8196	4.0486	0.7530	2.2886	2.9618	4.5274	2.1614	2.0735	2.3837	0.2244
3a	19.6471	18.5879	15.4184608	14.4203	9.552694	2.9110	-1.011868	-3.8696	-8.036319	-0.904961	3.464985	-7.580948	-3.391222
3b	19.6471	17.2743	12.2915207	12.7606	8.142306	0.7494	0.43696	-13.0759	-1.604789	-10.27879	0.538108	-4.315688	-7.711912
Recipe 3 Mean	19.6471	17.9311	13.8550	13.5905	8.8475	1.8302	-0.2875	-8.4728	-4.8206	-5.5919	2.0015	-5.9483	-5.5516
Recipe 3 St.Dev.	0.0000	0.9289	2.2111	1.1736	0.9973	1.5285	1.0245	6.5098	4.5478	6.6283	2.0696	2.3089	3.0552
4a	19.6471	5.4762	15.1694742	1.3117	7.995301	-1.0582	-3.692248	-1.4494	-3.17615	-4.463249	3.385255	-3.572675	-4.752599
4b	19.6471	13.6789	10.7215661	10.0355	8.287499	2.5104	2.078843	-1.7204	4.318566	-1.415311	6.346244	-1.114502	-5.302889
Recipe 4 Mean	19.6471	9.5776	12.9455	5.6736	8.1414	0.7261	-0.8067	-1.5849	0.5712	-2.9393	4.8657	-2.3436	-5.0277
Recipe 4 St.Dev.	0.0000	5.8002	3.1451	6.1687	0.2066	2.5234	4.0808	0.1916	5.2996	2.1552	2.0937	1.7382	0.3891

Notes:
1) % Hemicellulose on Day 1 is an average of 1997, 1999, and 2000 straw samples.

Phase 2 - g Lignin / g Ash (dry matter basis)

Feedstock Straw Samples:

Sample Year	% lignin	%FS	g lignin / g ash
1997	12.907	12.26	1.0528
1999	10.7592	12.29	0.8754
2000	10.4017	9.88	1.0528
Average =	11.3560	11.48	0.9937

	Day												
Reactor	1	4	18	25	46	60	74	95	109	123	137	158	180
1a	0.9937	0.9985	1.1596	0.9176	0.9501	0.8576	0.7192	0.7469	0.5616	0.5397	0.4535	0.4650	0.5048
1b	0.9937	1.0241	1.0491	1.0824	0.9681	0.9757	0.8626	0.8232	0.5876	0.5893	0.5588	0.4959	0.5217
Recipe 1 Mean	0.9937	1.0113	1.1044	1.0000	0.9591	0.9167	0.7909	0.7850	0.5746	0.5645	0.5061	0.4805	0.5132
Recipe 1 St.Dev.	0.0000	0.0181	0.0782	0.1165	0.0127	0.0835	0.1014	0.0539	0.0183	0.0351	0.0745	0.0218	0.0120
2a	0.9937	1.0383	1.1785	0.9027	0.6510	0.7391	0.5716	0.5549	0.4657	0.4443	0.4542	0.3990	0.4273
2b	0.9937	1.0096	0.8019	0.7482	0.6079	0.5400	0.5520	0.5021	0.4528	0.3974	0.4262	0.3932	0.4330
Recipe 2 Mean	0.9937	1.0240	0.9902	0.8255	0.6295	0.6396	0.5618	0.5285	0.4592	0.4209	0.4402	0.3961	0.4302
Recipe 2 St.Dev.	0.0000	0.0203	0.2663	0.1093	0.0305	0.1408	0.0138	0.0374	0.0091	0.0331	0.0198	0.0041	0.0040
3a	0.9937	1.0178	0.7769	0.7475	0.5655	0.5996	0.4580	0.5710	0.4705	0.4130	0.3876	0.3867	0.4029
3b	0.9937	0.8336	0.7869	0.7879	0.4692	0.5233	0.4486	0.4332	0.4003	0.4176	0.3408	0.3366	0.4003
Recipe 3 Mean	0.9937	0.9257	0.7819	0.7677	0.5174	0.5615	0.4533	0.5021	0.4354	0.4153	0.3642	0.3617	0.4016
Recipe 3 St.Dev.	0.0000	0.1303	0.0071	0.0286	0.0681	0.0540	0.0066	0.0975	0.0496	0.0032	0.0331	0.0355	0.0018
4a	0.9937	1.2703	0.8868	1.1387	0.7079	0.8897	0.8603	0.8003	0.6903	0.6717	0.5781	0.5633	0.5792
4b	0.9937	1.1285	0.8850	1.0946	0.7964	1.0365	0.8830	0.9601	0.7746	0.7979	0.6475	0.5641	0.6264
Recipe 4 Mean	0.9937	1.1994	0.8859	1.1166	0.7522	0.9631	0.8716	0.8802	0.7325	0.7348	0.6128	0.5637	0.6028
Recipe 4 St.Dev.	0.0000	0.1002	0.0013	0.0312	0.0626	0.1038	0.0161	0.1130	0.0596	0.0893	0.0491	0.0006	0.0334

Notes:
1) % Lignin on Day 1 is an average of 1997, 1999, and 2000 straw samples.

Phase 2 - g Cellulose / g Ash (dry matter basis)

Feedstock Straw Samples:

Sample Year	% Cellulose	%FS	g Cellulose /g Ash
1997	37.9829	12.26	3.0981
1999	42.6874	12.29	3.4733
2000	46.7332	9.88	4.7301
Average =	42.4678	11.48	3.7672

	Day												
Reactor	1	4	18	25	46	60	74	95	109	123	137	158	180
1a	3.7672	4.1074	3.3156	3.0159	2.4758	1.3149	1.2773	1.1189	0.9089	0.9138	0.6888	0.8442	0.8029
1b	3.7672	4.2245	3.4502	3.2694	2.3933	1.9124	1.7846	1.2787	1.2165	1.0312	0.9169	0.8436	0.7947
Recipe 1 Mean	3.7672	4.1660	3.3829	3.1427	2.4345	1.6137	1.5310	1.1988	1.0627	0.9725	0.8029	0.8439	0.7988
Recipe 1 St.Dev.	0.0000	0.0828	0.0952	0.1793	0.0584	0.4225	0.3587	0.1130	0.2175	0.0830	0.1613	0.0004	0.0058
2a	3.7672	3.9552	3.2894	2.2317	1.3082	1.0954	1.0767	0.8399	0.7693	0.6753	0.7680	0.7691	0.7639
2b	3.7672	3.1598	2.1760	1.7283	1.0556	0.9187	0.7884	0.6731	0.7806	0.7220	0.7999	0.7334	0.7375
Recipe 2 Mean	3.7672	3.5575	2.7327	1.9800	1.1819	1.0071	0.9326	0.7565	0.7749	0.6986	0.7839	0.7512	0.7507
Recipe 2 St.Dev.	0.0000	0.5625	0.7873	0.3559	0.1786	0.1250	0.2039	0.1180	0.0080	0.0330	0.0225	0.0252	0.0187
3a	3.7672	3.6307	1.8148	1.4770	1.0427	0.7233	0.7501	0.7354	0.8595	0.7250	0.7043	0.7777	0.7201
3b	3.7672	3.1870	1.9070	1.5934	0.7625	0.6966	0.7045	0.7578	0.6501	0.7936	0.6408	0.6376	0.7541
Recipe 3 Mean	3.7672	3.4089	1.8609	1.5352	0.9026	0.7099	0.7273	0.7466	0.7548	0.7593	0.6726	0.7076	0.7371
Recipe 3 St.Dev.	0.0000	0.3137	0.0652	0.0823	0.1981	0.0189	0.0322	0.0159	0.1481	0.0485	0.0449	0.0991	0.0241
4a	3.7672	3.2489	2.0147	1.7221	1.2787	1.4305	1.3093	1.0067	0.9912	0.8920	0.7835	0.8444	0.8223
4b	3.7672	2.9903	2.0992	1.7580	1.4629	1.4540	1.3935	1.2251	1.0584	1.0217	0.7874	0.8552	0.8411
Recipe 4 Mean	3.7672	3.1196	2.0570	1.7400	1.3708	1.4422	1.3514	1.1159	1.0248	0.9568	0.7855	0.8498	0.8317
Recipe 4 St.Dev.	0.0000	0.1829	0.0598	0.0254	0.1303	0.0166	0.0595	0.1544	0.0475	0.0917	0.0027	0.0076	0.0133

Notes:

1) % Cellulose on Day 1 is an average of 1997, 1999, and 2000 straw samples.

Phase 2 - g Hemicellulose / g Ash (dry matter basis)

Feedstock Straw Samples:

Sample Year	% Hemicellulose	%FS	g Hemicellulose /g Ash
1997	20.6272	12.26	1.6825
1999	19.6638	12.29	1.6000
2000	18.6504	9.88	1.8877
Average =	19.6471	11.48	1.7234

	Day												
Reactor	1	4	18	25	46	60	74	95	109	123	137	158	180
1a	1.7234	1.6843	0.9675	0.6870	0.1609	0.1183	0.5218	-0.0614	-0.0793	-0.1009	-0.0575	-0.3387	-0.1681
1b	1.7234	1.4947	1.3773	0.8883	0.7151	0.1180	0.2058	0.1945	0.0455	0.2037	-0.2008	-0.1782	-0.1751
Recipe 1 Mean	1.7234	1.5895	1.1724	0.7876	0.4380	0.1182	0.3638	0.0665	-0.0169	0.0514	-0.1292	-0.2585	-0.1716
Recipe 1 St.Dev.	0.0000	0.1340	0.2898	0.1423	0.3918	0.0002	0.2235	0.1809	0.0882	0.2154	0.1013	0.1135	0.0050
2a	1.7234	1.4483	0.0822	0.4294	0.4725	0.2158	0.2172	-0.0543	-0.1221	0.1654	0.0362	-0.2197	-0.0709
2b	1.7234	1.3460	0.5502	0.6821	0.1773	0.1468	0.0767	-0.1662	-0.2847	0.0777	-0.0406	-0.1275	-0.0620
Recipe 2 Mean	1.7234	1.2858	0.3337	0.6137	0.3941	0.2188	0.1740	-0.1487	-0.2773	0.1602	-0.0033	-0.2215	-0.0804
Recipe 2 St.Dev.	0.0000	0.0723	0.3310	0.1786	0.2088	0.0488	0.0993	0.0791	0.1150	0.0620	0.0543	0.0652	0.0063
3a	1.7234	1.4826	0.8454	0.6939	0.3597	0.0981	-0.0306	-0.1058	-0.2142	-0.0230	0.0866	-0.1837	-0.0815
3b	1.7234	1.2365	0.6868	0.6280	0.2937	0.0234	0.0124	-0.3388	-0.0411	-0.2538	0.0130	-0.1023	-0.1835
Recipe 3 Mean	1.7234	1.3595	0.7661	0.6609	0.3267	0.0607	-0.0091	-0.2223	-0.1277	-0.1384	0.0498	-0.1430	-0.1325
Recipe 3 St.Dev.	0.0000	0.1740	0.1121	0.0467	0.0467	0.0529	0.0304	0.1648	0.1224	0.1633	0.0520	0.0576	0.0721
4a	1.7234	0.4009	0.9373	0.0757	0.3705	-0.0456	-0.1443	-0.0503	-0.1031	-0.1367	0.1006	-0.1016	-0.1318
4b	1.7234	0.9717	0.6619	0.5936	0.4161	0.1166	0.0887	-0.0684	0.1578	-0.0473	0.2000	-0.0328	-0.1525
Recipe 4 Mean	1.7234	0.6863	0.7996	0.3347	0.3933	0.0355	-0.0278	-0.0594	0.0273	-0.0920	0.1503	-0.0672	-0.1421
Recipe 4 St.Dev.	0.0000	0.4036	0.1947	0.3662	0.0322	0.1147	0.1648	0.0128	0.1845	0.0632	0.0703	0.0487	0.0146

Notes:

1) % Hemicellulose on Day 1 is an average of 1997, 1999, and 2000 straw samples.

With correction to eliminate negative hemicellulose results:

	Day												
Reactor	1	4	18	25	46	60	74	95	109	123	137	158	180
1a	1.7234	1.6843	0.9675	0.6870	0.1609	0.1183	0.5218	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1b	1.7234	1.4947	1.3773	0.8883	0.7151	0.1180	0.2058	0.1945	0.0455	0.2037	0.0000	0.0000	0.0000
Recipe 1 Mean	1.7234	1.5895	1.1724	0.7876	0.4380	0.1182	0.3638	0.0972	0.0227	0.0000			
Recipe 1 St.Dev.	0.0000	0.1340	0.2898	0.1423	0.3918	0.0002	0.2235	0.1375	0.0322	0.1441			
2a	1.7234	1.4483	0.0822	0.4294	0.4725	0.2158	0.2172	0.0000	0.0000	0.1654	0.0362	0.0000	0.0000
2b	1.7234	1.3460	0.5502	0.6821	0.1773	0.1468	0.0767	0.0000	0.0000	0.0777	0.0000	0.0000	0.0000
Recipe 2 Mean	1.7234	1.3972	0.3162	0.5558	0.3249	0.1813	0.1470	0.0000					
Recipe 2 St.Dev.	0.0000	0.0723	0.3310	0.1786	0.2088	0.0488	0.0993	0.0000					
3a	1.7234	1.4826	0.8454	0.6939	0.3597	0.0981	0.0000	0.0000	0.0000	0.0000	0.0866	0.0000	0.0000
3b	1.7234	1.2365	0.6868	0.6280	0.2937	0.0234	0.0124	0.0000	0.0000	0.0000	0.0130	0.0000	0.0000
Recipe 3 Mean	1.7234	1.3595	0.7661	0.6609	0.3267	0.0607	0.0062	0.0000					
Recipe 3 St.Dev.	0.0000	0.1740	0.1121	0.0467	0.0467	0.0529	0.0088	0.0000					
4a	1.7234	0.4009	0.9373	0.0757	0.3705	0.0000	0.0000	0.0000	0.0000	0.0000	0.1006	0.0000	0.0000
4b	1.7234	0.9717	0.6619	0.5936	0.4161	0.1166	0.0887	0.0000	0.1578	0.0000	0.2000	0.0000	0.0000
Recipe 4 Mean	1.7234	0.6863	0.7996	0.3347	0.3933	0.0583	0.0443	0.0000					
Recipe 4 St.Dev.	0.0000	0.4036	0.1947	0.3662	0.0322	0.0825	0.0627	0.0000					

Phase 2 - Temperature Measurements

Recipe \ Day	2	3	4	7	8	10	14	16	17	18	19	20	23	26	32	33	34	35	37	39	41	46	53	56
1A	49.0	52.5	50.5	47.5	48.5	48.0	47.0	47.5	47.0	47.0	47.0	45.5	48.0	45.0	45.0	44.0	44.0	44.0	45.0	44.0	45.0	47.0	47.0	45.0
1B	49.0	53.0	48.5	48.0	49.5	46.5	46.0	46.0	47.0	45.5	43.0	45.0	46.0	44.0	45.0	44.0	45.0	45.0	45.0	46.0	46.0	48.0	48.0	45.0
2A	51.7	54.0	53.3	49.0	50.0	48.0	49.0	50.0	50.0	48.5	51.5	50.5	50.0	47.0	46.5	45.5	46.0	47.0	46.0	47.0	47.0	47.0	45.0	44.0
2B	54.5	58.0	54.5	49.3	50.0	52.0	50.0	50.0	49.5	51.5	50.0	48.5	50.0	47.0	47.0	46.5	47.0	48.0	47.0	48.0	46.0	48.0	45.0	45.0
3A	52.7	54.7	56.3	52.3	55.3	52.7	51.5	50.0	50.5	51.0	50.5	51.0	51.0	46.0	48.0	45.5	47.5	48.0	47.0	47.0	46.5	50.0	47.0	46.0
3B	50.0	55.3	57.3	50.0	52.0	52.7	53.0	51.0	51.5	51.0	50.0	51.5	51.5	49.0	48.5	47.5	50.0	48.5	49.0	47.5	48.0	48.0	46.0	44.0
4A	45.3	50.0	52.3	49.0	51.7	51.7	51.5	51.0	50.0	50.5	49.0	51.5	51.5	47.5	46.0	45.0	47.0	47.0	47.0	47.5	47.0	47.0	44.0	46.0
4B	45.7	50.3	51.3	49.3	50.3	49.3	50.5	49.5	49.5	49.5	49.0	50.0	49.0	46.0	46.0	44.0	47.0	47.0	45.5	46.5	46.5	47.5	46.0	45.0

On Recipe Basis:

Recipe \ Day	2	3	4	7	8	10	14	16	17	18	19	20	23	26	32	33	34	35	37	39	41	46	53	56	Average
1	49.0	52.8	49.5	47.8	49.0	47.3	46.5	46.8	47.0	46.3	45.0	45.3	47.0	44.5	45.0	44.0	44.5	44.5	45.0	45.0	45.5	47.5	47.5	45.0	46.5
2	53.1	56.0	53.9	49.2	50.0	50.0	49.5	50.0	49.8	50.0	50.8	49.5	50.0	47.0	46.8	46.0	46.5	47.5	46.5	47.5	46.5	47.5	45.0	44.5	48.9
3	51.4	55.0	56.8	51.2	53.7	52.7	52.3	50.5	51.0	51.0	50.3	51.3	51.3	47.5	48.3	46.5	48.8	48.3	48.0	47.3	47.3	49.0	46.5	45.0	50.0
4	45.5	50.2	51.8	49.2	51.0	50.5	51.0	50.3	49.8	50.0	49.0	50.8	50.3	46.8	46.0	44.5	47.0	47.0	46.3	47.0	46.8	47.3	45.0	45.5	48.3

Note:
1) Temperatures recorded in °C.

Phase 2 - Oxygen Measurements

	Day							Reactor	Recipe	
Recipe	13	14	16	17	18	19	20	(Avg.)	(Avg.)	(St.Dev.)
1A	NM	17.5	18.5	18.5	17.0	17.5	19.0	18.0	17.5	0.7
1B	16.5	18.0	18.0	18.5	13.5	15.0	19.0	17.0		
2A	NM	15.0	14.5	14.0	14.0	13.5	14.5	14.3	12.9	1.9
2B	13.5	13.5	10.0	10.5	10.0	14.0	11.5	11.6		
3A	12.0	8.5	11.5	10.0	7.0	12.0	10.5	9.9	10.0	0.1
3B	10.6	8.5	10.0	7.5	8.0	13.5	13.0	10.1		
4A	9.3	7.5	9.5	9.0	8.5	7.5	8.0	8.3	8.9	0.8
4B	13.3	9.0	11.0	9.0	9.5	8.5	10.0	9.5		

NM - Oxygen not measured on this day due to moisture content adjustment
Notes:
1) Oxygen level recorded for each reactor represents average from all three sampling ports.

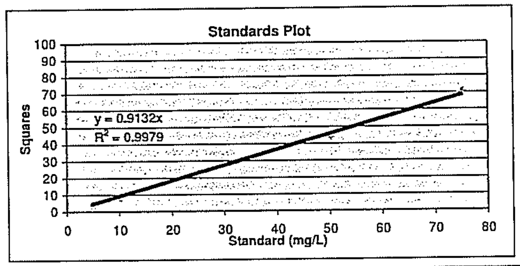
Phase 2 - Finished Compost TKN Analysis

Test Date: February 11-15, 2003

Standards:

mg N/L	# of Squares	Adjusted
75	71	70
50	45	44
25	23	22
10	9.5	8.5
5	5	4
blank	1	0

Conversion Equation: # squares/0.9132 = mg N/L



Recipe	Sample Size (mg)	# of Squares	mg N/L	N in Sample (mg)	%N (dry basis)	g N/g Ash (dry basis)	Initial N in Reactor (g, dry basis)	Final N in Reactor (g)	N Loss (%, dry basis)	OC (db) (%, dry basis)	Finished C:N
1a	100	43	47.09	2.354	2.35	0.061	3450	2260	34.50%	34.28	
	100	47	51.47	2.573	2.57	0.067	3450	2470	28.40%	34.28	
	100	50	54.75	2.738	2.74	0.071	3450	2628	23.83%	34.28	
1b	100	49	53.66	2.683	2.68	0.073	3504	2951	15.77%	35.19	
	100	49	53.66	2.683	2.68	0.073	3504	2951	15.77%	35.19	
	100	45	49.28	2.464	2.46	0.067	3504	2710	22.64%	35.19	
Recipe 1 Mean					**2.58**	**0.069**	**3477**	**2662**	**23.44%**	**34.74**	**13.5**
Recipe 1 St.Dev.					0.15	0.005	29	272	0.073		
2a	100	52	56.94	2.847	2.85	0.073	4431	4271	3.61%	33.75	
	100	53	58.04	2.902	2.90	0.074	4431	4353	1.76%	33.75	
	100	56	61.32	3.066	3.07	0.078	4431	4599	-3.80%	33.75	
2b	100	55	60.23	3.011	3.01	0.076	4606	4939	-7.23%	33.47	
	100	57	62.42	3.121	3.12	0.078	4606	5118	-11.13%	33.47	
	100	58	63.51	3.176	3.18	0.080	4606	5208	-13.08%	33.47	
Recipe 2 Mean					**3.02**	**0.076**	**4518**	**4748**	**-5.09%**	**33.61**	**11.1**
Recipe 2 St.Dev.					0.13	0.003	96	398			
3a	100	57	62.42	3.121	3.12	0.075	6589	6991	-6.09%	32.45	
	100	63	68.99	3.449	3.45	0.083	6589	7727	-17.26%	32.45	
	100	60	65.70	3.285	3.29	0.079	6589	7359	-11.68%	32.45	
3b	100	65	71.18	3.559	3.56	0.085	7060	8435	-19.46%	32.2	
	100	67	73.37	3.668	3.67	0.087	7060	8694	-23.14%	32.2	
	100	63	68.99	3.449	3.45	0.082	7060	8175	-15.79%	32.2	
Recipe 3 Mean					**3.42**	**0.082**	**6825**	**7897**	**-15.71%**	**32.33**	**9.4**
Recipe 3 St.Dev.					0.20	0.004	258	654			
4a	100	65	71.18	3.559	3.56	0.099	7357	11211	-52.38%	35.52	
	100	62	67.89	3.395	3.39	0.094	7357	10693	-45.35%	35.52	
	100	60	65.70	3.285	3.29	0.091	7357	10348	-40.66%	35.52	
4b	100	57	62.42	3.121	3.12	0.090	7106	9612	-35.27%	36.24	
	100	62	67.89	3.395	3.39	0.098	7106	10456	-47.14%	36.24	
	100	63	68.99	3.449	3.45	0.099	7106	10624	-49.51%	36.24	
Recipe 4 Mean					**3.37**	**0.095**	**7231**	**10491**	**-45.07%**	**35.88**	**10.7**
Recipe 4 St.Dev.					0.15	0.004	137	523			

Notes:
1) Samples collected after 6 month composting period (Phase 2) ending November 27, 2002.
2) Samples were dried and grinded prior to TKN analysis.
3) OC (Organic Carbon) calculated using the following equation: OC = (1-FS)/1.8 (Haug 1993, Liao 1995), where OC and FS are based on the dry weight fraction.

Phase 2 - Finished Compost Bulk Density Analysis

Test Date: November 28, 2002

Recipe	Biocell ID	Tare (kg)	Volume (L)	Mass Tare+Compost (kg)	Mass Compost (kg)	Wet Bulk Density (kg/m³)	Moisture Content (%)	Dry Bulk Density (kg/m³)	Wet Bulk Density [1] (kg/m³)
1a	1	1.64	4.33	4.10	2.46	568.1	61.0	221.8	739.3
1b	1	1.64	4.33	3.95	2.31	533.5	59.3	217.2	724.1
Recipe 1 Mean								**219.5**	**731.7**
Recipe 1 St.Dev.								3.2	10.8
2a	1	1.64	4.33	4.27	2.63	607.4	50.5	300.8	1002.6
2b	1	1.64	4.33	4.41	2.77	639.7	44.8	353.3	1177.7
Recipe 2 Mean								**327.0**	**1090.2**
Recipe 2 St.Dev.								37.2	123.8
3a	1	1.64	4.33	4.55	2.91	672.1	45.1	368.8	1229.4
3b	1	1.64	4.33	4.63	2.99	690.5	37.7	430.3	1434.2
Recipe 3 Mean								**399.5**	**1331.8**
Recipe 3 St.Dev.								43.4	144.8
4a	1	1.64	4.33	4.14	2.50	577.4	58.1	241.7	805.6
4b	1	1.64	4.33	4.09	2.45	565.8	62.9	209.7	699.2
Recipe 4 Mean								**225.7**	**752.4**
Recipe 4 St.Dev.								22.6	75.3

Notes:

[1] - Uses target moisture content of 70%.

1) Small biocell (Volume = 4.33 L) used for bulk density analysis.

Phase 2 - Particle Size Analysis

Test Date: March 12, 2003

Initial Compost Recipes - % MC Analysis

Recipe	Mass Tare	Mass Tare+Material	Mass After 103°C	Moisture Content
	(g)	(g)	(g)	(%)
1	11.2	62.9	35.1	53.8
2	11.2	65.9	33.5	59.2
3	16.7	81.1	34.4	72.5
4	11.8	46.4	23.5	66.2

Initial Compost Recipes - Particle Size Analysis

Recipe	Mass of Sample (g)	Mesh Size									
		37.5 mm	19.0 mm	9.5 mm	4.8 mm (Mesh No. 4)	2.4 mm (Mesh No. 8)	1.2 mm (Mesh No. 16)	0.6 mm (Mesh No. 30)	0.3 mm (Mesh No. 50)	0.15 mm (Mesh No. 100)	Bottom Pan
Recipe 1											
mass retained	20.2	1.8	1.5	3.7	5.3	4.1	2.2	0.8	0.3	0.3	0.2
mass passing		18.4	16.9	13.2	7.9	3.8	1.6	0.8	0.5	0.2	
% passing		91.1	83.7	65.3	39.1	18.8	7.9	4.0	2.5	1.0	
Recipe 2											
mass retained	18.5	0.8	0.9	2.0	3.4	4.7	4.5	1.5	0.3	0.3	0.1
mass passing		17.7	16.8	14.8	11.4	6.7	2.2	0.7	0.4	0.1	
% passing		95.7	90.8	80.0	61.6	36.2	11.9	3.8	2.2	0.5	
Recipe 3											
mass retained	17.1	0.0	0.1	0.6	4.8	6.3	3.6	1.3	0.1	0.2	0.1
mass passing		17.1	17.0	16.4	11.6	5.3	1.7	0.4	0.3	0.1	
% passing		100.0	99.4	95.9	67.8	31.0	9.9	2.3	1.8	0.6	
Recipe 4											
mass retained	11.8	0.0	0.0	0.1	1.9	4.9	3.1	1.0	0.5	0.2	0.1
mass passing		11.8	11.8	11.7	9.8	4.9	1.8	0.8	0.3	0.1	
% passing		100.0	100.0	99.2	83.1	41.5	15.3	6.8	2.5	0.8	

Notes:
1) Particle size tests completed according to ASTM Standard Method D422 - 93 (1990).

Initial Compost Recipes - Coefficients of Uniformity

Coefficient of Uniformity: $C_U = D_{60}/D_{10}$ - higher Cu indicates larger range of particle sizes.

Coefficient of Curvature: $C_Z = D^2_{30}/D_{60}D_{10}$ - a well graded material has a Cz bewteen 1 and 3.

Recipe	D_{10}	D_{30}	D_{60}	C_U	C_Z
1	1.5	3.6	8.0	5.3	1.1
2	1.1	2.0	4.7	4.3	0.8
3	1.1	2.3	4.1	3.7	1.2
4	0.9	1.8	3.2	3.6	1.1

Phase 2 - Particle Size Analysis

Test Date: March 12, 2003

Finished Compost Recipes - Particle Size Analysis

Recipe		Mass of	Mesh Size 37.5 mm	19.0 mm	9.5 mm	4.8 mm (Mesh No. 4)	2.4 mm (Mesh No. 8)	1.2 mm (Mesh No. 16)	0.6 mm (Mesh No. 30)	0.3 mm (Mesh No. 50)	0.15 mm (Mesh No. 100)	Bottom Pan
Recipe 1	Recipe 1a											
	mass retained	162.2	0.0	0.0	7.2	27.4	53.7	51.4	18.3	3.2	0.7	0.3
	mass passing		162.2	162.2	155.0	127.6	73.9	22.5	4.2	1.0	0.3	
	% passing		100.0	100.0	95.6	78.7	45.6	13.9	2.6	0.6	0.2	
	Recipe 1b											
	mass retained	115.7	0.0	0.0	3.6	16.9	31.8	42.3	16.4	3.5	0.9	0.3
	mass passing		115.7	115.7	112.1	95.2	63.4	21.1	4.7	1.2	0.3	
	% passing		100.0	100.0	96.9	82.3	54.8	18.2	4.1	1.0	0.3	
	Recipe 1 Mean		100.0	100.0	96.2	80.5	50.2	16.1	3.3	0.8	0.2	
Recipe 2	Recipe 2a											
	mass retained	198.3	0.0	0.0	5.4	37.5	48.2	61.1	30.7	10.4	3.4	1.6
	mass passing		198.3	198.3	192.9	155.4	107.2	46.1	15.4	5.0	1.6	
	% passing		100.0	100.0	97.3	78.4	54.1	23.2	7.8	2.5	0.8	
	Recipe 2b											
	mass retained	216.0	0.0	0.0	5.5	43.8	61.3	68.2	25.6	6.4	3.0	2.2
	mass passing		216.0	216.0	210.5	166.7	105.4	37.2	11.6	5.2	2.2	
	% passing		100.0	100.0	97.5	77.2	48.8	17.2	5.4	2.4	1.0	
	Recipe 2 Mean		100.0	100.0	97.4	77.8	51.4	20.2	6.6	2.5	0.9	
Recipe 3	Recipe 3a											
	mass retained	250.4	0.0	0.0	20.6	70.2	65.6	62.5	23.1	4.7	2.0	1.7
	mass passing		250.4	250.4	229.8	159.6	94.0	31.5	8.4	3.7	1.7	
	% passing		100.0	100.0	91.8	63.7	37.5	12.6	3.4	1.5	0.7	
	Recipe 3b											
	mass retained	292.0	0.0	0.0	16.4	80.7	90.9	77.3	21.2	2.2	1.7	1.6
	mass passing		292.0	292.0	275.6	194.9	104.0	26.7	5.5	3.3	1.6	
	% passing		100.0	100.0	94.4	66.7	35.6	9.1	1.9	1.1	0.5	
	Recipe 3 Mean		100.0	100.0	93.1	65.2	36.6	10.9	2.6	1.3	0.6	
Recipe 4	Recipe 4a											
	mass retained	168.0	0.0	0.0	17.7	39.4	33.5	50.0	22.9	2.9	1.2	0.4
	mass passing		168.0	168.0	150.3	110.9	77.4	27.4	4.5	1.6	0.4	
	% passing		100.0	100.0	89.5	66.0	46.1	16.3	2.7	1.0	0.2	
	Recipe 4b											
	mass retained	138.9	0.0	0.0	10.4	26.8	36.5	48.2	15.7	0.4	0.7	0.2
	mass passing		138.9	138.9	128.5	101.7	65.2	17.0	1.3	0.9	0.2	
	% passing		100.0	100.0	92.5	73.2	46.9	12.2	0.9	0.6	0.1	
	Recipe 4 Mean		100.0	100.0	91.0	69.6	46.5	14.3	1.8	0.8	0.2	

Notes:
1) Particle size tests completed according to ASTM Standard Method D422 - 93 (1990).

Phase 2 - Particle Size Analysis

Test Date: March 12, 2003

Finished Compost Recipes - Coefficients of Uniformity

Coefficient of Uniformity: $C_U = D_{60}/D_{10}$ - higher Cu indicates larger range of particle sizes.

Coefficient of Curvature: $C_Z = D^2_{30}/D_{60}D_{10}$ - a well graded material has a Cz bewteen 1 and 3.

Recipe	Reactor	D_{10}	D_{30}	D_{60}	C_U	C_Z
1	1a	1.0	1.7	3.3	3.3	0.9
	1b	0.9	1.5	2.7	3.0	0.9
Mean =		1.0	1.6	3.0	3.2	0.9
2	2a	0.7	1.4	2.8	4.0	1.0
	2b	0.8	1.5	3.2	4.0	0.9
Mean =		0.8	1.5	3.0	4.0	0.9
3	3a	1.0	2.0	4.4	4.4	0.9
	3b	1.2	2.1	4.1	3.4	0.9
Mean =		1.1	2.1	4.3	3.9	0.9
4	4a	1.0	1.7	3.9	3.9	0.7
	4b	1.0	1.7	3.3	3.3	0.9
Mean =		1.0	1.7	3.6	3.6	0.8

Phase 2 - Finished Compost Particle Density Analysis

Test Date: February 13-15, 2003

ρ_p =particle density (g/cm^3)

ρ_w =density of water (1 g/cm^3)

W_s = weight of pyconometer plus sample (g)

W_a = weight of pyconometer filled with air (g)

W_{sw} = weight of pyconometer filled with sample and water (g)

W_w = weight of the pyconometer filled with water at temperature observed (g)

$$\rho w = \rho_w (W_s - W_a) / [(W_s - W_a) - (W_{sw} - W_w)]$$

Recipe	Flask	W_a (g)	W_w (g)	W_s (g)	W_{sw} (g)	ρ_w (g/cm^3)	ρ_p (g/cm^3)
1a	2	242.1	1227.0	292.1	1234.6	1	1.18
1a	3	234.3	1217.1	284.36	1225.6	1	1.20
1b	E	272.8	1253.1	322.8	1261.6	1	1.20
1b	C	220.5	1214.0	270.5	1223.2	1	1.23
Recipe 1 Mean							**1.20**
Recipe 1 St. Dev.							0.02
2a	ED	226.2	1218.1	276.2	1226.4	1	1.20
2a	B	226.1	1218.7	276.1	1229.2	1	1.27
2b	E	272.8	1253.1	322.8	1266.4	1	1.36
2b	C	220.5	1214.0	270.5	1225.7	1	1.31
Recipe 2 Mean							**1.28**
Recipe 2 St. Dev.							0.07
3a	B	226.1	1218.7	276.1	1227.8	1	1.22
3a	E	272.8	1253.1	322.8	1262.7	1	1.24
3b	2	242.1	1227.0	292.1	1240.1	1	1.36
3b	3	234.3	1217.1	284.3	1229.4	1	1.33
Recipe 3 Mean							**1.29**
Recipe 3 St. Dev.							0.07
4a	ED	226.2	1218.1	276.2	1223.1	1	1.11
4a	E	272.8	1253.1	322.8	1256.9	1	1.08
4b	2	242.1	1227.0	292.1	1233.0	1	1.14
4b	B	226.1	1218.7	276.1	1223.7	1	1.11
Recipe 4 Mean							**1.11**
Recipe 4 St. Dev.							0.02

Notes:
1) Particle density tests performed with 50 g compost samples.
2) Sample drying was completed in a 103°C oven for 24 hours.
3) Room temperature for particle density test was 21.0 °C.

Phase 2 - Statistical Analysis of Volatile Solids Analysis (Day 180)

Data

Recipe	%VS
1A	61.36
1A	61.62
1A	62.15
Recipe 1A Mean	61.71
Recipe 1A St. Dev.	0.40
1B	63.28
1B	63.34
1B	63.41
Recipe 1B Mean	63.34
Recipe 1B St. Dev.	0.06
2A	60.85
2A	60.57
2A	60.85
Recipe 2A Mean	60.75
Recipe 2A St. Dev.	0.16
2B	60.43
2B	60.17
2B	60.13
Recipe 2B Mean	60.24
Recipe 2B St. Dev.	0.16
3A	58.48
3A	58.19
3A	58.54
Recipe 3A Mean	58.40
Recipe 3A St. Dev.	0.19
3B	58.15
3B	57.70
3B	58.03
Recipe 3B Mean	57.96
Recipe 3B St. Dev.	0.23
4A	63.45
4A	64.00
4A	64.36
Recipe 4A Mean	63.94
Recipe 4A St. Dev.	0.46
4B	65.30
4B	-
4B	65.16
Recipe 4B Mean	65.23
Recipe 4B St. Dev.	0.10

Summary

	%VS
1A Mean:	61.71
1B Mean:	63.34
2A Mean:	60.75
2B Mean:	60.24
3A Mean:	58.40
3B Mean:	57.96
4A Mean:	63.94
4B Mean:	65.23

T-Test Results

Shows the probability that Recipe 1 is statistically the same as Recipe 2, etc.

T-Test (between recipes)		
Compare Recipe 1 to Recipe 2 0.109984806		
Compare Recipe 1 to Recipe 3 0.04966786	Compare Recipe 2 to Recipe 3 0.010835272	
Compare Recipe 1 to Recipe 4 0.096612147	Compare Recipe 2 to Recipe 4 0.033804045	Compare Recipe 3 to Recipe 4 0.02142015

Phase 2 - Statistical Analysis of g Lignin / g Ash (Day 180)

Reactor	g Lignin / g Ash
1a	0.5048
1b	0.5217
Recipe 1 Mean	0.5132
Recipe 1 St.Dev.	0.0120
2a	0.4273
2b	0.4330
Recipe 2 Mean	0.4302
Recipe 2 St.Dev.	0.0040
3a	0.4029
3b	0.4003
Recipe 3 Mean	0.4016
Recipe 3 St.Dev.	0.0018
4a	0.5792
4b	0.6264
Recipe 4 Mean	0.6028
Recipe 4 St.Dev.	0.0334

T-test Results (shows the probability that Recipe 1 is statistically the same as Recipe 2, etc.)		
Compare Recipe 1 to Recipe 2 0.021831446		
Compare Recipe 1 to Recipe 3 0.021784056	Compare Recipe 2 to Recipe 3 0.016367846	
Compare Recipe 1 to Recipe 4 0.066422729	Compare Recipe 2 to Recipe 4 0.041335251	Compare Recipe 3 to Recipe 4 0.036787673

Phase 2 - Statistical Analysis of g Cellulose / g Ash (Day 180)

Reactor	g Cellulose / g Ash
1a	0.8029
1b	0.7947
Recipe 1 Mean	0.7988
Recipe 1 St.Dev.	0.0058
2a	0.7639
2b	0.7375
Recipe 2 Mean	0.7507
Recipe 2 St.Dev.	0.0187
3a	0.7201
3b	0.7541
Recipe 3 Mean	0.7371
Recipe 3 St.Dev.	0.0241
4a	0.8223
4b	0.8411
Recipe 4 Mean	0.8317
Recipe 4 St.Dev.	0.0133

T-test Results (shows the probability that Recipe 1 is statistically the same as Recipe 2, etc.)		
Compare Recipe 1 to Recipe 2 0.072942785		
Compare Recipe 1 to Recipe 3 0.077523594	Compare Recipe 2 to Recipe 3 0.297413632	
Compare Recipe 1 to Recipe 4 0.067990119	Compare Recipe 2 to Recipe 4 0.023215271	Compare Recipe 3 to Recipe 4 0.031775294

Phase 2 - Statistical Analysis of g Hemicellulose / g Ash (Day 180)

Reactor	180
1a	-0.1681
1b	-0.1751
Recipe 1 Mean	-0.1716
Recipe 1 St.Dev.	0.0050
2a	-0.0709
2b	-0.0620
Recipe 2 Mean	-0.0804
Recipe 2 St.Dev.	0.0063
3a	-0.0815
3b	-0.1835
Recipe 3 Mean	-0.1325
Recipe 3 St.Dev.	0.0721
4a	-0.1318
4b	-0.1525
Recipe 4 Mean	-0.1421
Recipe 4 St.Dev.	0.0146

No Statistical Analysis Performed on Hemicellulose Data (All Values <0)

Phase 2 - Hemicellulose Determination

Technician: Janice Haines/Scott Chapman
Date: February 5, 2003

Samp ID	Day No.	Date	% NDF DM Basis	% ADF DM Basis	Hemicellulose %DM
1A	18	June 18/02	73.6682395	60.5729267	13.09531287
1B	18	June 18/02	74.207179	56.8146216	17.39255741
2A	18	June 18/02	68.0195347	66.7912189	1.228315797
2B	18	June 18/02	57.8378754	48.8176144	9.020260975
3A	18	June 18/02	62.6861118	47.267651	15.41846084
3B	18	June 18/02	60.5043816	48.2128609	12.29152072
4A	18	June 18/02	62.129488	46.9600137	15.16947424
4B	18	June 18/02	59.0590944	48.3375284	10.72156606
1A	46	July 16/02	62.3106268	59.5147997	2.79582712
1B	46	July 16/02	63.9670368	52.7459473	11.22108952
2A	46	July 16/02	52.6809759	42.4439476	10.23702833
2B	46	July 16/02	46.8464526	42.3350756	4.511377009
3A	46	July 16/02	52.2611139	42.70842	9.55269386
3B	46	July 16/02	42.2934408	34.1511343	8.142306498
4A	46	July 16/02	50.8597693	42.8644687	7.995300611
4B	46	July 16/02	53.2820903	44.994591	8.287499287
1A	74	Aug 13/02	60.204494	47.7294169	12.47507712
1B	74	Aug 13/02	58.2248728	54.0248166	4.20005624
2A	74	Aug 13/02	48.1384008	42.5332785	5.605122277
2B	74	Aug 13/02	43.7444568	41.3759192	2.368537567
3A	74	Aug 13/02	38.8983266	39.9101942	-1.011867595
3B	74	Aug 13/02	41.0102287	40.5732688	0.436959863
4A	74	Aug 13/02	51.8099703	55.5022182	-3.692247963
4B	74	Aug 13/02	55.4446895	53.3658461	2.078843333
1A	109	Sept 17/02	42.4307856	44.8487471	-2.417961471
1B	109	Sept 17/02	51.5813808	50.3129232	1.268457593
2A	109	Sept 17/02	38.3723822	42.5831626	-4.210780402
2B	109	Sept 17/02	35.358529	45.9719659	-10.61343687
3A	109	Sept 17/02	41.8589152	49.8952338	-8.036318612
3B	109	Sept 17/02	39.3868236	40.991613	-1.604789339
4A	109	Sept 17/02	48.6141579	51.7903077	-3.176149806
4B	109	Sept 17/02	54.4912941	50.172728	4.318566044

Phase 2 - Hemicellulose Determination

Technician: Janice Haines/Scott Chapman
Date: February 5, 2003

Samp ID	Day No.	Date	% NDF DM Basis	% ADF DM Basis	Hemicellulose %DM
1A	123	Oct 1/02	46.4543462	49.9198144	-3.465468194
1B	123	Oct 1/02	51.6638179	45.893709	5.770108845
2A	123	Oct 1/02	46.7957693	40.7722034	6.02356586
2B	123	Oct 1/02	45.7266334	42.7597598	2.966873625
3A	123	Oct 1/02	43.9664454	44.8714067	-0.904961291
3B	123	Oct 1/02	38.7613771	49.0401689	-10.27879176
4A	123	Oct 1/02	46.5797297	51.0429786	-4.463248933
4B	123	Oct 1/02	53.0438765	54.4591877	-1.415311257
1A	137	Oct 15/02	39.664833	41.7686499	-2.10381693
1B	137	Oct 15/02	40.9936127	47.4504626	-6.456849959
2A	137	Oct 15/02	47.6396867	46.2699444	1.3697423
2B	137	Oct 15/02	45.5824026	47.144973	-1.56257043
3A	137	Oct 15/02	47.1699905	43.7050056	3.46498489
3B	137	Oct 15/02	41.2865047	40.7483964	0.538108273
4A	137	Oct 15/02	49.2037788	45.8185234	3.385255343
4B	137	Oct 15/02	51.8830956	45.5368521	6.346243564
1A	158	Nov 5/02	37.8090235	51.005087	-13.19606351
1B	158	Nov 5/02	42.0024328	48.4474608	-6.445028024
2A	158	Nov 5/02	36.7968872	45.3208169	-8.523929719
2B	158	Nov 5/02	40.3688389	45.5217013	-5.15286242
3A	158	Nov 5/02	40.481603	48.0625514	-7.580948442
3B	158	Nov 5/02	36.7985718	41.11426	-4.315688202
4A	158	Nov 5/02	45.9284304	49.5011056	-3.572675177
4B	158	Nov 5/02	47.1734171	48.2879188	-1.114501689
1A	180	Nov 27/02	43.6319303	50.0671577	-6.435227454
1B	180	Nov 27/02	41.8345106	48.2540268	-6.419516143
2A	180	Nov 27/02	43.9679687	46.7499945	-2.782025854
2B	180	Nov 27/02	44.0693737	46.5340065	-2.464632768
3A	180	Nov 27/02	43.3182762	46.7094979	-3.391221747
3B	180	Nov 27/02	40.8134593	48.5253717	-7.711912349
4A	180	Nov 27/02	45.7875616	50.5401608	-4.752599186
4B	180	Nov 27/02	45.7239865	51.0268757	-5.302889172
KWSTD			36.9425157	29.5068445	7.435671205

Phase 2 - Cellulose Determination

Technician: Janice Haines/Scott Chapman
Date: February 5, 2002

Samp ID	Day No.	Date	% ADF DM Basis	% Lignin DM Basis	% Cellulose DM Basis
1A	18	June 18/02	60.57292666	15.6958286	44.87709803
1B	18	June 18/02	56.81462163	13.2472323	43.56738932
2A	18	June 18/02	66.79121885	17.6170369	49.17418193
2B	18	June 18/02	48.81761443	13.1455359	35.67207854
3A	18	June 18/02	47.26765098	14.1692018	33.09844917
3B	18	June 18/02	48.21286091	14.0835151	34.12934578
4A	18	June 18/02	46.96001374	14.3527733	32.60724047
4B	18	June 18/02	48.33752837	14.3345004	34.00302797
1A	46	July 16/02	59.51479971	16.5053494	43.00945035
1B	46	July 16/02	52.74594729	15.1915793	37.55436803
2A	46	July 16/02	42.4439476	14.1040266	28.33992102
2B	46	July 16/02	42.33507557	15.4709513	26.86412426
3A	46	July 16/02	42.70841999	15.0184953	27.68992467
3B	46	July 16/02	34.15113426	13.00991	21.14122424
4A	46	July 16/02	42.86446867	15.2737355	27.59073317
4B	46	July 16/02	44.99459101	15.8609659	29.13362515
1A	74	Aug 13/02	47.72941691	17.1931615	30.53625545
1B	74	Aug 13/02	54.02481657	17.6035751	36.42124147
2A	74	Aug 13/02	42.5332785	14.7487011	27.78457736
2B	74	Aug 13/02	41.37591925	17.0398724	24.33604689
3A	74	Aug 13/02	39.91019417	15.1296409	24.78055325
3B	74	Aug 13/02	40.57326881	15.7846916	24.78857724
4A	74	Aug 13/02	55.50221825	22.0074409	33.49477731
4B	74	Aug 13/02	53.36584613	20.6992819	32.66656422
1A	109	Sept 17/02	44.84874707	17.1289817	27.71976535
1B	109	Sept 17/02	50.31292323	16.3861253	33.9267979
2A	109	Sept 17/02	42.58316261	16.0575546	26.52560803
2B	109	Sept 17/02	45.9719659	16.8761452	29.09582068
3A	109	Sept 17/02	49.8952338	17.6521352	32.2430986
3B	109	Sept 17/02	40.99161296	15.6229836	25.36862935
4A	109	Sept 17/02	51.79030773	21.2619226	30.5283851
4B	109	Sept 17/02	50.17272804	21.2028648	28.96986325

Phase 2 - Cellulose Determination

Technician: Janice Haines/Scott Chapman
Date: February 5, 2002

Samp ID	Day No.	Date	% ADF DM Basis	% Lignin DM Basis	% Cellulose DM Basis
1A	123	Oct 1/02	49.91981442	18.535703	31.38411145
1B	123	Oct 1/02	45.89370901	16.6896889	29.20402016
2A	123	Oct 1/02	40.77220345	16.1798691	24.59233436
2B	123	Oct 1/02	42.75975977	15.1818535	27.57790627
3A	123	Oct 1/02	44.87140673	16.2850414	28.58636532
3B	123	Oct 1/02	49.04016889	16.9073296	32.13283933
4A	123	Oct 1/02	51.04297861	21.9262994	29.11667918
4B	123	Oct 1/02	54.45918772	23.881458	30.57772972
1A	137	Oct 15/02	41.76864989	16.5813886	25.18726127
1B	137	Oct 15/02	47.45046265	17.9669217	29.48354098
2A	137	Oct 15/02	46.26994438	17.1941194	29.07582498
2B	137	Oct 15/02	47.144973	16.3894889	30.75548408
3A	137	Oct 15/02	43.70500565	15.5136974	28.19130821
3B	137	Oct 15/02	40.7483964	14.1476765	26.60071994
4A	137	Oct 15/02	45.81852343	19.452041	26.36648244
4B	137	Oct 15/02	45.53685206	20.549303	24.98754909
1A	158	Nov 5/02	51.00508704	18.1157589	32.8893281
1B	158	Nov 5/02	48.44746082	17.9357852	30.51167561
2A	158	Nov 5/02	45.32081694	15.4811377	29.83967919
2B	158	Nov 5/02	45.52170129	15.8877805	29.63392079
3A	158	Nov 5/02	48.0625514	15.9620145	32.10053686
3B	158	Nov 5/02	41.11426003	14.2056982	26.90856181
4A	158	Nov 5/02	49.50110558	19.8066787	29.69442692
4B	158	Nov 5/02	48.2879188	19.1910191	29.09689973
1A	180	Nov 27/02	50.06715774	19.3266388	30.74051892
1B	180	Nov 27/02	48.25402679	19.1239849	29.13004194
2A	180	Nov 27/02	46.74999451	16.7692412	29.9807533
2B	180	Nov 27/02	46.53400648	17.2145438	29.31946273
3A	180	Nov 27/02	46.70949794	16.7574435	29.95205439
3B	180	Nov 27/02	48.52537169	16.8257445	31.69962721
4A	180	Nov 27/02	50.54016081	20.8878436	29.65231724
4B	180	Nov 27/02	51.02687568	21.7822076	29.24466806
KWSTD			29.50684446	5.05205799	24.45478647

Phase 2 - Lignin Determination

Technician: Janice Haines
Date: February 5, 2003

Blank:	1.00034545

Sample ID	Day No.	Sample Date	Sample Dry Weight (g)	Bag Weight (g)	Weight of Bag+Sample (after acid wash) (g)	Weight of Container (g)	Weight of Container + Ash (g)	Weight of Ash (g)	Weight Loss (after Ig) (g)	% Lignin (dry matter basis) (g)
1A	18	June 18/02	0.48103173	0.5734	0.6813	32.7255	32.7577	0.0322	0.6491	15.69582863
1B	18	June 18/02	0.49824322	0.569	0.6617	32.6318	32.6583	0.0265	0.6352	13.24723231
2A	18	June 18/02	0.49044621	0.5729	0.7165	33.6051	33.6621	0.0570	0.6595	17.61703692
2B	18	June 18/02	0.4868632	0.5767	0.6711	38.5213	38.5515	0.0302	0.6409	13.1455359
3A	18	June 18/02	0.48632626	0.5542	0.6571	33.8542	33.888	0.0338	0.6233	14.16920181
3B	18	June 18/02	0.50417045	0.5647	0.6807	33.8069	33.8517	0.0448	0.6359	14.08351513
4A	18	June 18/02	0.49952072	0.5932	0.6962	32.6958	32.7269	0.0311	0.6651	14.35277328
4B	18	June 18/02	0.50162888	0.5616	0.6666	32.7818	32.8147	0.0329	0.6337	14.33450039
1A	46	July 16/02	0.49983366	0.5810	0.7131	33.8708	33.9202	0.0494	0.6637	16.50534936
1B	46	July 16/02	0.48965847	0.6170	0.7298	33.3641	33.4023	0.0382	0.6916	15.19157926
2A	46	July 16/02	0.50342867	0.5682	0.6783	33.8111	33.85	0.0389	0.6394	14.10402658
2B	46	July 16/02	0.49385763	0.5660	0.6827	32.4863	32.5264	0.0401	0.6426	15.4709513
3A	46	July 16/02	0.49539412	0.5768	0.6999	32.4905	32.539	0.0485	0.6514	15.01849532
3B	46	July 16/02	0.49039367	0.5796	0.6797	38.708	38.7441	0.0361	0.6436	13.00991002
4A	46	July 16/02	0.48775829	0.5821	0.6931	33.236	33.2723	0.0363	0.6568	15.27373551
4B	46	July 16/02	0.49689306	0.5441	0.6587	33.6943	33.7299	0.0356	0.6231	15.86096586
1A	74	Aug 13/02	0.48916374	0.5711	0.7034	32.8745	32.9225	0.048	0.6554	17.19316146
1B	74	Aug 13/02	0.49990915	0.5735	0.7082	32.8645	32.911	0.0465	0.6617	17.6035751
2A	74	Aug 13/02	0.49226161	0.5726	0.6995	33.9424	33.9965	0.0541	0.6454	14.74870114
2B	74	Aug 13/02	0.49588022	0.5866	0.7326	33.1375	33.1988	0.0613	0.6713	17.03987236
3A	74	Aug 13/02	0.50231527	0.5833	0.7197	39.2676	39.3278	0.0602	0.6595	15.12964092
3B	74	Aug 13/02	0.50618303	0.5806	0.7342	33.0293	33.1028	0.0735	0.6607	15.78469157
4A	74	Aug 13/02	0.49254788	0.5871	0.7665	34.3697	34.4405	0.0708	0.6957	22.00744094
4B	74	Aug 13/02	0.50289655	0.5906	0.7553	33.2161	33.2765	0.0604	0.6949	20.69928191
1A	109	Sept 17/02	0.50029268	0.5933	0.7369	33.1658	33.2235	0.0577	0.6792	17.12898173
1B	109	Sept 17/02	0.50836839	0.5735	0.7166	34.305	34.3646	0.0596	0.657	16.38612533
2A	109	Sept 17/02	0.50131316	0.5829	0.7402	33.2375	33.3141	0.0766	0.6636	16.05755457
2B	109	Sept 17/02	0.50068557	0.5893	0.764	32.786	32.876	0.09	0.674	16.87614522
3A	109	Sept 17/02	0.50480774	0.5519	0.7378	33.0442	33.1408	0.0966	0.6412	17.6521352
3B	109	Sept 17/02	0.51272684	0.5696	0.7363	38.2248	38.3112	0.0864	0.6499	15.62298361
4A	109	Sept 17/02	0.50699641	0.5871	0.7731	32.9152	32.9932	0.078	0.6951	21.26192263
4B	109	Sept 17/02	0.50042126	0.5684	0.7425	32.8556	32.9234	0.0678	0.6747	21.20286479
1A	123	Oct 1/02	0.49213925	0.5168	0.6896	34.0983	34.1797	0.0814	0.6082	18.53570297
1B	123	Oct 1/02	0.49674564	0.5636	0.7111	38.4015	38.4659	0.0644	0.6467	16.68968885
2A	123	Oct 1/02	0.5049396	0.5831	0.7465	32.8406	32.9221	0.0815	0.665	16.17986909
2B	123	Oct 1/02	0.49667024	0.5681	0.7262	34.1191	34.2016	0.0825	0.6437	15.1818535
3A	123	Oct 1/02	0.51029156	0.5755	0.7554	33.5769	33.6735	0.0966	0.6588	16.2850414
3B	123	Oct 1/02	0.50749213	0.5692	0.7606	38.7279	38.8333	0.1054	0.6552	16.90732955
4A	123	Oct 1/02	0.50579924	0.5701	0.7704	32.8726	32.9618	0.0892	0.6812	21.92629943
4B	123	Oct 1/02	0.50289953	0.5797	0.7793	33.1076	33.1869	0.0793	0.7	23.881458
1A	137	Oct 15/02	0.49696363	0.5689	0.7266	33.1688	33.2439	0.0751	0.6515	16.58138862
1B	137	Oct 15/02	0.50932064	0.5522	0.724	34.2875	34.3676	0.0801	0.6439	17.96692167
2A	137	Oct 15/02	0.50135137	0.5704	0.7457	34.2558	34.3447	0.0889	0.6568	17.1941194
2B	137	Oct 15/02	0.50286379	0.5303	0.7016	32.8577	32.9464	0.0887	0.6129	16.38948892
3A	137	Oct 15/02	0.50537689	0.5713	0.7354	33.0638	33.1493	0.0855	0.6499	15.51369744
3B	137	Oct 15/02	0.4990994	0.5472	0.706	38.8734	38.9614	0.088	0.618	14.14767646
4A	137	Oct 15/02	0.49668777	0.5329	0.7061	33.4156	33.492	0.0764	0.6297	19.45204099
4B	137	Oct 15/02	0.49888165	0.5306	0.708	38.6008	38.6755	0.0747	0.6333	20.54930297

Phase 2 - Lignin Determination

Technician: Janice Haines
Date: February 5, 2003

Blank:	1.00034545

Sample ID	Day No.	Sample Date	Sample Dry Weight	Bag Weight	Weight of Bag+Sample (after acid wash)	Weight of Container	Weight of Container + Ash	Weight of Ash	Weight Loss (after Ig)	% Lignin (dry matter basis)
			(g)	(g)	(g)	(g)	(g)	(g)	(g)	(g)
1A	158	Nov 5/02	0.49735235	0.5814	0.7677	33.5286	33.6246	0.096	0.6717	18.11575894
1B	158	Nov 5/02	0.50565086	0.6008	0.7829	33.3872	33.4784	0.0912	0.6917	17.93578522
2A	158	Nov 5/02	0.50125972	0.5769	0.744	38.3352	38.4245	0.0893	0.6547	15.48113775
2B	158	Nov 5/02	0.50036575	0.5876	0.7609	38.7031	38.7967	0.0936	0.6673	15.8877805
3A	158	Nov 5/02	0.49804888	0.5829	0.7653	39.3963	39.499	0.1027	0.6626	15.96201453
3B	158	Nov 5/02	0.50681929	0.5870	0.7593	33.4979	33.598	0.1001	0.6592	14.20569822
4A	158	Nov 5/02	0.50236252	0.5751	0.7629	38.2739	38.362	0.0881	0.6748	19.80667867
4B	158	Nov 5/02	0.50235133	0.5606	0.7391	32.7452	32.8271	0.0819	0.6572	19.19101906
1A	180	Nov 27/02	0.50607027	0.5605	0.76	33.2722	33.3737	0.1015	0.6585	19.32663882
1B	180	Nov 27/02	0.50353311	0.5917	0.7841	33.1602	33.2561	0.0959	0.6882	19.12398485
2A	180	Nov 27/02	0.49855621	0.5671	0.7461	33.04	33.1352	0.0952	0.6509	16.76924121
2B	180	Nov 27/02	0.49958088	0.5773	0.7606	33.5495	33.6466	0.0971	0.6635	17.21454375
3A	180	Nov 27/02	0.50070116	0.5653	0.7491	32.0792	32.1789	0.0997	0.6494	16.75744355
3B	180	Nov 27/02	0.4992749	0.5595	0.7524	32.8114	32.9201	0.1087	0.6437	16.82574448
4A	180	Nov 27/02	0.5064784	0.6009	0.8063	33.6252	33.7246	0.0994	0.7069	20.88784357
4B	180	Nov 27/02	0.50733069	0.5563	0.7626	34.0736	34.1692	0.0956	0.667	21.78220763
KWSTD			0.48191145	0.5174	0.5512	32.8566	32.8657	0.0091	0.5421	5.088333552
			0.48039332	0.5233	0.5556	34.1596	34.1671	0.0075	0.5481	5.124805614
			0.48143704	0.5856	0.6267	33.6766	33.6915	0.0149	0.6118	5.400021225
			0.48086774	0.5899	0.6196	32.5049	32.5123	0.0074	0.6122	4.595071573
Blank				0.5224	0.5266	33.0027	33.0082	0.0055		
				0.5387	0.5532	32.5602	32.5738	0.0136		
				0.6031	0.6322	33.7997	33.8224	0.0227		
				0.5706	0.571	33.6177	33.6229	0.0052		

Blank Correction Factor

						Wt Loss	Corr Factor
	Weight of Material in Bag	Weight of Bag after Acid Wash	Weight of Container	Weight of Container + Ash	Weight of Ash	Weight Loss (Acid to Ash)	Wt loss/Bag Wt
	(g)	(g)					
Blank	0.5224	0.5266	33.0027	33.0082	0.0055	0.5211	0.997511485
	0.5387	0.5532	32.5602	32.5738	0.0136	0.5396	1.001670689
	0.6031	0.6322	33.7997	33.8224	0.0227	0.6095	1.010611839
	0.5706	0.571	33.6177	33.6229	0.0052	0.5658	0.991587802
						avg	1.000345454

Phase 2 - Neutral Detergent Fibre (NDF) Determination

Technician: Janice Haines, Soil Science
Date: September 27, 2002

Blank:	0.0086	Correction Factor:	2.1621

Sample Identification	Day of Experiment	Date of Sample	Bag Wt (g)	Wet Wt (g)	Dry Wt + Bag (g)	Dry Wt - Blank (g)	% NDF	% DM	% NDF (dry matter basis)	Corrected %NDF
1A	4	June 4/02	0.5644	0.5027	0.9554	0.3824	76.0692	95.3451	79.7830	77.6209
1B	4	June 4/02	0.5583	0.5016	0.9425	0.3756	74.8804	95.7610	78.1950	76.0329
2A	4	June 4/02	0.5468	0.5184	0.9226	0.3672	70.8333	96.6770	73.2681	71.1059
2B	4	June 4/02	0.5727	0.5067	0.9448	0.3635	71.7387	96.8094	74.1031	71.9409
3A	4	June 4/02	0.5731	0.5176	0.9791	0.3974	76.7774	97.1473	79.0320	76.8698
3B	4	June 4/02	0.5736	0.5038	0.9529	0.3707	73.5808	97.3233	75.6045	73.4424
4A	4	June 4/02	0.5850	0.5044	0.9337	0.3401	67.4266	97.1903	69.3759	67.2137
4B	4	June 4/02	0.5721	0.5066	0.9437	0.3630	71.6542	97.0623	73.8229	71.6608
1A	25	June 25/02	0.5791	0.5134	0.9233	0.3356	65.3681	95.7696	68.2556	66.0935
1B	25	June 25/02	0.5774	0.5177	0.9391	0.3531	68.2055	96.2830	70.8386	68.6764
2A	25	June 25/02	0.5962	0.5126	0.9182	0.3134	61.1393	96.6839	63.2363	61.0742
2B	25	June 25/02	0.5697	0.5151	0.8820	0.3037	58.9594	96.2485	61.2575	59.0954
3A	25	June 25/02	0.5848	0.5024	0.8966	0.3032	60.3503	96.0874	62.8077	60.6456
3B	25	June 25/02	0.5657	0.5048	0.8828	0.3085	61.1133	96.5246	63.3137	61.1516
4A	25	June 25/02	0.5894	0.5025	0.8558	0.2578	51.3035	96.7672	53.0175	50.8553
4B	25	June 25/02	0.5901	0.5030	0.8896	0.2909	57.8330	95.7148	60.4222	58.2601
1A	60	July 30/02	0.5639	0.5073	0.8316	0.2591	51.0743	97.6200	52.3195	50.1574
1B	60	July 30/02	0.5939	0.5165	0.9094	0.3069	59.4192	97.7535	60.7847	58.6226
2A	60	July 30/02	0.5692	0.5144	0.8378	0.2600	50.5443	98.3422	51.3964	49.2342
2B	60	July 30/02	0.5878	0.5199	0.8374	0.2410	46.3551	98.2045	47.2026	45.0405
3A	60	July 30/02	0.5659	0.5128	0.7978	0.2233	43.5452	98.2522	44.3199	42.1578
3B	60	July 30/02	0.5924	0.5043	0.8097	0.2087	41.3841	98.4473	42.0368	39.8747
4A	60	July 30/02	0.5619	0.5049	0.8385	0.2680	53.0798	96.5009	55.0045	52.8424
4B	60	July 30/02	0.5646	0.5055	0.8592	0.2860	56.5776	97.1069	58.2632	56.1011
1A	95	Sept 3/02	0.5576	0.5065	0.8202	0.2540	50.1481	97.4056	51.4838	49.3216
1B	95	Sept 3/02	0.5558	0.5125	0.8435	0.2791	54.4585	97.1570	56.0521	53.8900
2A	95	Sept 3/02	0.5596	0.5103	0.7883	0.2201	43.1315	98.3028	43.8762	41.7140
2B	95	Sept 3/02	0.5697	0.5045	0.7659	0.1876	37.1853	98.2661	37.8415	35.6793
3A	95	Sept 3/02	0.5753	0.5006	0.8128	0.2289	45.7251	99.2233	46.0831	43.9209
3B	95	Sept 3/02	0.5471	0.5093	0.7317	0.1760	34.5572	98.5891	35.0518	32.8897
4A	95	Sept 3/02	0.5627	0.5064	0.8345	0.2632	51.9747	98.4971	52.7678	50.6056
4B	95	Sept 3/02	0.5718	0.5077	0.8573	0.2769	54.5401	98.4740	55.3852	53.2231
1997 straw		22/04/02	0.5911	0.5085	0.9556	0.3559	69.9902	94.9931	73.6792	71.5171
1999 straw		22/04/02	0.5708	0.5018	0.9412	0.3618	72.1004	95.7858	75.2726	73.1104
2000 straw		22/04/02	0.5627	0.5032	0.9483	0.3770	74.9205	96.1167	77.9474	75.7853

KWSTD	0.5892	0.5114	0.7802	0.1824	35.6668	92.8907	38.3965	36.2344
	0.5780	0.5159	0.7750	0.1884	36.5187	92.8907	39.3136	37.1515
	0.5608	0.5083	0.7463	0.1769	34.8023	92.8907	37.4658	35.3037
	0.5784	0.5141	0.7820	0.1950	37.9304	92.8907	40.8333	38.6712
						Mean =	39.0023	36.8402
							Correction Factor =	2.1621

Blank	0.5707		0.5811	0.0104
	0.5880		0.5948	0.0068
			Mean =	0.0086

Phase 2 - Neutral Detergent Fibre (NDF) Determination

Technician: Janice Haines, Soil Science
Date: January 30, 2003

Blank:	0.0104

Sample Identification	Day of Experiment	Date of Sample	Bag Wt (g)	Wet Wt (g)	Dry Wt + Bag (g)	Dry Wt - Blank (g)	% NDF	% DM	% NDF (dry matter basis)
1A	18	June 18/02	0.5837	0.5014	0.9472	0.3531	70.4228	95.5945	73.6682
1B	18	June 18/02	0.5824	0.5143	0.9611	0.3683	71.6119	96.5027	74.2072
2A	18	June 18/02	0.5676	0.5183	0.9189	0.3409	65.7727	96.6968	68.0195
2B	18	June 18/02	0.5635	0.5168	0.8619	0.2880	55.7276	96.3513	57.8379
3A	18	June 18/02	0.5978	0.5042	0.9106	0.3024	59.9762	95.6770	62.6861
3B	18	June 18/02	0.5716	0.5142	0.8851	0.3031	58.9459	97.4242	60.5044
4A	18	June 18/02	0.5786	0.5110	0.8982	0.3092	60.5088	97.3914	62.1295
4B	18	June 18/02	0.5757	0.5046	0.8757	0.2896	57.3920	97.1772	59.0591
1A	46	July 16/02	0.5841	0.5048	0.8986	0.3041	60.2417	96.6796	62.3106
1B	46	July 16/02	0.5830	0.5131	0.9131	0.3197	62.3075	97.4057	63.9670
2A	46	July 16/02	0.5741	0.5038	0.8446	0.2601	51.6276	98.0005	52.6810
2B	46	July 16/02	0.5885	0.5011	0.8248	0.2259	45.0808	96.2310	46.8465
3A	46	July 16/02	0.5937	0.5143	0.8632	0.2591	50.3792	96.3989	52.2611
3B	46	July 16/02	0.6089	0.5097	0.8293	0.2100	41.2007	97.4163	42.2934
4A	46	July 16/02	0.5761	0.5059	0.8375	0.2510	49.6145	97.5517	50.8598
4B	46	July 16/02	0.6051	0.5121	0.8801	0.2646	51.6696	96.9737	53.2821
1A	74	Aug 13/02	0.5753	0.5047	0.8795	0.2938	58.2128	96.6918	60.2045
1B	74	Aug 13/02	0.5917	0.5050	0.8888	0.2867	56.7723	97.5052	58.2249
2A	74	Aug 13/02	0.5810	0.5043	0.8295	0.2381	47.2140	98.0796	48.1384
2B	74	Aug 13/02	0.5749	0.5122	0.8054	0.2201	42.9715	98.2330	43.7445
3A	74	Aug 13/02	0.5832	0.5048	0.7870	0.1934	38.3122	98.4932	38.8983
3B	74	Aug 13/02	0.5696	0.5067	0.7844	0.2044	40.3395	98.3644	41.0102
4A	74	Aug 13/02	0.5784	0.5050	0.8448	0.2560	50.6931	97.8442	51.8100
4B	74	Aug 13/02	0.5801	0.5083	0.8684	0.2779	54.6724	98.6072	55.4447
1A	109	Sept 17/02	0.5858	0.5031	0.8061	0.2099	41.7213	98.3280	42.4308
1B	109	Sept 17/02	0.6029	0.5120	0.8743	0.2610	50.9766	98.8274	51.5814
2A	109	Sept 17/02	0.5811	0.5059	0.7836	0.1921	37.9719	98.9564	38.3724
2B	109	Sept 17/02	0.5768	0.5001	0.7629	0.1757	35.1330	99.3621	35.3585
3A	109	Sept 17/02	0.5844	0.5098	0.8059	0.2111	41.4084	98.9237	41.8589
3B	109	Sept 17/02	0.5768	0.5054	0.7860	0.1988	39.3352	99.8689	39.3868
4A	109	Sept 17/02	0.5783	0.5092	0.8344	0.2457	48.2522	99.2554	48.6142
4B	109	Sept 17/02	0.5457	0.5001	0.8255	0.2694	53.8692	98.8584	54.4913
1A	123	Oct 1/02	0.5713	0.5082	0.8125	0.2308	45.4152	97.7631	46.4543
1B	123	Oct 1/02	0.5466	0.5108	0.8149	0.2579	50.4894	97.7269	51.6638
2A	123	Oct 1/02	0.5799	0.5119	0.8259	0.2356	46.0246	98.3521	46.7958
2B	123	Oct 1/02	0.5768	0.5067	0.8163	0.2291	45.2141	98.8792	45.7266
3A	123	Oct 1/02	0.5875	0.5107	0.8206	0.2227	43.6068	99.1820	43.9664
3B	123	Oct 1/02	0.5697	0.5073	0.7760	0.1959	38.6162	99.6255	38.7614
4A	123	Oct 1/02	0.5340	0.5040	0.7765	0.2321	46.0516	98.8662	46.5797
4B	123	Oct 1/02	0.5424	0.5097	0.8181	0.2653	52.0502	98.1267	53.0439

Phase 2 - Neutral Detergent Fibre (NDF) Determination

Technician: Janice Haines, Soil Science
Date: January 30, 2003

Blank:	0.0104

Sample Identification	Day of Experiment	Date of Sample	Bag Wt (g)	Wet Wt (g)	Dry Wt + Bag (g)	Dry Wt - Blank (g)	% NDF	% DM	% NDF (dry matter basis)
1A	137	Oct 15/02	0.5705	0.5072	0.7803	0.1994	39.3139	99.1152	39.6648
1B	137	Oct 15/02	0.5251	0.5077	0.7429	0.2074	40.8509	99.6519	40.9936
2A	137	Oct 15/02	0.5874	0.5059	0.8374	0.2396	47.3611	99.4153	47.6397
2B	137	Oct 15/02	0.5256	0.5052	0.7659	0.2299	45.5067	99.8340	45.5824
3A	137	Oct 15/02	0.5632	0.5150	0.8157	0.2421	47.0097	99.6602	47.1700
3B	137	Oct 15/02	0.5832	0.5035	0.8004	0.2068	41.0725	99.4816	41.2865
4A	137	Oct 15/02	0.5730	0.5124	0.8334	0.2500	48.7900	99.1591	49.2038
4B	137	Oct 15/02	0.5779	0.5005	0.8459	0.2576	51.4685	99.2010	51.8831
1A	158	Nov 5/02	0.6201	0.5074	0.8197	0.1892	37.2881	98.6223	37.8090
1B	158	Nov 5/02	0.6252	0.5063	0.8474	0.2118	41.8329	99.5964	42.0024
2A	158	Nov 5/02	0.5671	0.5034	0.7614	0.1839	36.5316	99.2790	36.7969
2B	158	Nov 5/02	0.5780	0.5099	0.7930	0.2046	40.1255	99.3972	40.3688
3A	158	Nov 5/02	0.5348	0.5052	0.7477	0.2025	40.0831	99.0157	40.4816
3B	158	Nov 5/02	0.5837	0.5089	0.7802	0.1861	36.5691	99.3763	36.7986
4A	158	Nov 5/02	0.5596	0.5081	0.8010	0.2310	45.4635	98.9877	45.9284
4B	158	Nov 5/02	0.5730	0.5035	0.8180	0.2346	46.5938	98.7714	47.1734
1A	180	Nov 27/02	0.6076	0.5020	0.8359	0.2179	43.4064	99.4830	43.6319
1B	180	Nov 27/02	0.5580	0.5074	0.7793	0.2109	41.5648	99.3554	41.8345
2A	180	Nov 27/02	0.5868	0.5082	0.8200	0.2228	43.8410	99.7112	43.9680
2B	180	Nov 27/02	0.6062	0.5088	0.8397	0.2231	43.8483	99.4983	44.0694
3A	180	Nov 27/02	0.6052	0.5034	0.8331	0.2175	43.2062	99.7413	43.3183
3B	180	Nov 27/02	0.5737	0.5024	0.7884	0.2043	40.6648	99.6358	40.8135
4A	180	Nov 27/02	0.5921	0.5059	0.8334	0.2309	45.6414	99.6809	45.7876
4B	180	Nov 27/02	0.5736	0.5017	0.8126	0.2286	45.5651	99.6525	45.7240

KWSTD	0.5725	0.5088	0.7646	0.1817	35.7115	94.8831	37.6373
	0.5829	0.5047	0.7699	0.1766	34.9911	94.8831	36.8781
	0.5983	0.5000	0.7851	0.1764	35.2800	94.8831	37.1826
	0.5812	0.5002	0.7628	0.1712	34.2263	94.8831	36.0721
						Mean =	36.9425

Blank	0.5504		0.5641	0.0137
	0.5907		0.6008	0.0101
	0.5517		0.5614	0.0097
	0.574		0.5821	0.0081
			Mean =	0.0104

Phase 2 - Lab Dry Matter Determination

Technician: Janice Haines/Scott Chapman
Date: January 30, 2003

Samp ID	Day No.	Tube #	Date	Tin Wt (g)	Wet Wt (g)	Dry Wt Tin (g)	Dry Wt (g)	% DM
1A	18	1	June 18/02	18.0143	0.5130	18.5047	0.4904	95.5945
1B	18	2	June 18/02	17.6913	0.5833	18.2542	0.5629	96.5027
2A	18	3	June 18/02	16.7100	0.5419	17.2340	0.5240	96.6968
2B	18	6	June 18/02	17.4719	0.7674	18.2113	0.7394	96.3513
3A	18	13	June 18/02	19.4900	0.5251	19.9924	0.5024	95.6770
3B	18	14	June 18/02	17.0918	0.5940	17.6705	0.5787	97.4242
4A	18	15	June 18/02	18.3746	0.6172	18.9757	0.6011	97.3914
4B	18	17	June 18/02	17.6455	0.6483	18.2755	0.6300	97.1772
1A	46	20	July 16/02	20.1668	0.6174	20.7637	0.5969	96.6796
1B	46	27	July 16/02	17.6582	0.5435	18.1876	0.5294	97.4057
2A	46	A30	July 16/02	12.4840	0.7702	13.2388	0.7548	98.0005
2B	46	32A	July 16/02	12.6582	0.7774	13.4063	0.7481	96.2310
3A	46	32	July 16/02	17.4367	0.6748	18.0872	0.6505	96.3989
3B	46	37B	July 16/02	12.6533	0.5496	13.1887	0.5354	97.4163
4A	46	39	July 16/02	19.7528	0.5759	20.3146	0.5618	97.5517
4B	46	40	July 16/02	17.2822	0.6873	17.9487	0.6665	96.9737
1A	74	42	Aug 13/02	18.1382	0.5441	18.6643	0.5261	96.6918
1B	74	42B	Aug 13/02	17.6081	0.6253	18.2178	0.6097	97.5052
2A	74	43	Aug 13/02	17.2925	0.7134	17.9922	0.6997	98.0796
2B	74	D	Aug 13/02	12.5171	0.8489	13.3510	0.8339	98.2330
3A	74	A36	Aug 13/02	12.0724	0.6902	12.7522	0.6798	98.4932
3B	74	QK	Aug 13/02	17.6866	0.9721	18.6428	0.9562	98.3644
4A	74	T	Aug 13/02	18.6043	0.9463	19.5302	0.9259	97.8442
4B	74	B13	Aug 13/02	12.6356	0.7395	13.3648	0.7292	98.6072
1A	109	B3	Sept 17/02	12.7425	0.6519	13.3835	0.6410	98.3280
1B	109	B27	Sept 17/02	12.6006	0.7505	13.3423	0.7417	98.8274
2A	109	B27	Sept 17/02	18.0038	0.9199	18.9141	0.9103	98.9564
2B	109	J	Sept 17/02	17.6052	0.9876	18.5865	0.9813	99.3621
3A	109	R	Sept 17/02	17.5983	0.7433	18.3336	0.7353	98.9237
3B	109	F	Sept 17/02	17.0290	0.6864	17.7145	0.6855	99.8689
4A	109	E	Sept 17/02	17.8728	0.6849	18.5526	0.6798	99.2554
4B	109	G	Sept 17/02	17.4400	0.5869	18.0202	0.5802	98.8584

Phase 2 - Lab Dry Matter Determination

Technician: Janice Haines/Scott Chapman
Date: January 30, 2003

Samp ID	Day No.	Tube #	Date	Tin Wt (g)	Wet Wt (g)	Dry Wt Tin (g)	Dry Wt (g)	% DM
1A	123	V	Oct 1/02	18.0210	0.6795	18.6853	0.6643	97.7631
1B	123	Y	Oct 1/02	19.5762	0.5543	20.1179	0.5417	97.7269
2A	123	3A	Oct 1/02	12.6929	0.6311	13.3136	0.6207	98.3521
2B	123	9	Oct 1/02	14.5394	0.8030	15.3334	0.7940	98.8792
3A	123	19	Oct 1/02	17.9698	0.7213	18.6852	0.7154	99.1820
3B	123	21A	Oct 1/02	17.5525	0.6942	18.2441	0.6916	99.6255
4A	123	26	Oct 1/02	17.2259	0.7673	17.9845	0.7586	98.8662
4B	123	28	Oct 1/02	20.1275	0.6833	20.7980	0.6705	98.1267
1A	137	30	Oct 15/02	18.0605	0.5538	18.6094	0.5489	99.1152
1B	137	31	Oct 15/02	17.8597	0.6032	18.4608	0.6011	99.6519
2A	137	35	Oct 15/02	16.7326	0.5986	17.3277	0.5951	99.4153
2B	137	36A	Oct 15/02	17.6370	0.6626	18.2985	0.6615	99.8340
3A	137	36B	Oct 15/02	17.4053	0.5003	17.9039	0.4986	99.6602
3B	137	37	Oct 15/02	17.3362	0.6945	18.0271	0.6909	99.4816
4A	137	38	Oct 15/02	19.0669	0.8443	19.9041	0.8372	99.1591
4B	137	41	Oct 15/02	19.6988	0.6633	20.3568	0.6580	99.2010
1A	158	B35	Nov 5/02	12.6666	0.5081	13.1677	0.5011	98.6223
1B	158	B36	Nov 5/02	18.0332	0.5203	18.5514	0.5182	99.5964
2A	158	A22	Nov 5/02	12.7676	0.7351	13.4974	0.7298	99.2790
2B	158	M	Nov 5/02	17.1732	0.8793	18.0472	0.8740	99.3972
3A	158	P	Nov 5/02	16.1948	0.5994	16.7883	0.5935	99.0157
3B	158	Q	Nov 5/02	16.4588	0.6574	17.1121	0.6533	99.3763
4A	158	U	Nov 5/02	17.4834	0.7310	18.2070	0.7236	98.9877
4B	158	0	Nov 5/02	17.7298	0.7244	18.4453	0.7155	98.7714
1A	180	16	Nov 27/02	20.2541	0.8318	21.0816	0.8275	99.4830
1B	180	25	Nov 27/02	18.1554	0.8222	18.9723	0.8169	99.3554
2A	180	33	Nov 27/02	19.4669	1.0043	20.4683	1.0014	99.7112
2B	180	34	Nov 27/02	17.9362	0.7574	18.6898	0.7536	99.4983
3A	180	44	Nov 27/02	17.4891	0.6957	18.1830	0.6939	99.7413
3B	180	46	Nov 27/02	17.3522	0.6864	18.0361	0.6839	99.6358
4A	180	50	Nov 27/02	17.4177	0.8460	18.2610	0.8433	99.6809
4B	180	72	Nov 27/02	16.9521	0.6618	17.6116	0.6595	99.6525
KWSTD			Jan 30/03	12.3535	0.5436	12.8694	0.5159	94.9043
			Jan 30/03	19.6473	1.0140	20.6092	0.9619	94.8619

Phase 2 - Acid Detergent Fibre (ADF) Determination

Technician: Janice Haines, Soil Science
Date: September 27, 2002

Blank 1:	0.0070
Blank 2:	0.0013

Sample Identification	Day of Experiment	Date of Sample	Bag Wt (g)	Wet Wt (g)	Dry Wt + Bag (g)	Dry Wt - Blank (g)	% ADF	% DM	% ADF (dry matter basis)
1A	4	June 4/02	0.5950	0.5119	0.8869	0.2849	55.6505	95.3451	58.3674
1B	4	June 4/02	0.5911	0.5138	0.8893	0.2912	56.6709	95.7610	59.1795
2A	4	June 4/02	0.5906	0.5102	0.8695	0.2719	53.2879	96.6770	55.1196
2B	4	June 4/02	0.5769	0.5031	0.8488	0.2649	52.6486	96.8094	54.3838
3A	4	June 4/02	0.5683	0.5107	0.8645	0.2892	56.6193	97.1473	58.2819
3B	4	June 4/02	0.5507	0.5054	0.8340	0.2763	54.6646	97.3233	56.1681
4A	4	June 4/02	0.6098	0.5161	0.9265	0.3097	60.0029	97.1903	61.7375
4B	4	June 4/02	0.5422	0.5037	0.8327	0.2835	56.2785	97.0623	57.9819
1A	25	June 25/02	0.6012	0.5127	0.8845	0.2763	53.8863	95.7696	56.2666
1B	25	June 25/02	0.5676	0.5117	0.8499	0.2810	54.9150	96.2830	57.0350
2A	25	June 25/02	0.5939	0.5133	0.8675	0.2666	51.9336	96.6839	53.7148
2B	25	June 25/02	0.5527	0.5112	0.7877	0.2280	44.5960	96.2485	46.3343
3A	25	June 25/02	0.5956	0.5032	0.8261	0.2235	44.4167	96.0874	46.2254
3B	25	June 25/02	0.5885	0.5052	0.8315	0.2360	46.7092	96.5246	48.3910
4A	25	June 25/02	0.5636	0.5114	0.8158	0.2452	47.9419	96.7672	49.5436
4B	25	June 25/02	0.6197	0.5030	0.8589	0.2322	46.1581	95.7148	48.2245
1A	60	July 30/02	0.5891	0.5099	0.8329	0.2368	46.4356	97.6200	47.5677
1B	60	July 30/02	0.5756	0.5029	0.8595	0.2769	55.0557	97.7535	56.3209
2A	60	July 30/02	0.5588	0.5110	0.7872	0.2214	43.3219	98.3422	44.0522
2B	60	July 30/02	0.5564	0.5063	0.7669	0.2035	40.1886	98.2045	40.9234
3A	60	July 30/02	0.5912	0.5020	0.7918	0.1936	38.5608	98.2522	39.2467
3B	60	July 30/02	0.6016	0.5023	0.8021	0.1935	38.5178	98.4473	39.1253
4A	60	July 30/02	0.6016	0.5150	0.8765	0.2679	52.0146	96.5009	53.9006
4B	60	July 30/02	0.5836	0.5134	0.8578	0.2672	52.0403	97.1069	53.5907
1A	95	Sept 3/02	0.5510	0.5119	0.8066	0.2543	49.6777	97.4056	51.0008
1B	95	Sept 3/02	0.5677	0.5070	0.8177	0.2430	47.9241	97.1570	49.3264
2A	95	Sept 3/02	0.6100	0.5144	0.8365	0.2195	42.6662	98.3028	43.4028
2B	95	Sept 3/02	0.5659	0.5047	0.7733	0.2061	40.8361	98.2661	41.5567
3A	95	Sept 3/02	0.5720	0.5086	0.8202	0.2412	47.4194	99.2233	47.7906
3B	95	Sept 3/02	0.5839	0.5157	0.8189	0.2337	45.3170	98.5891	45.9656
4A	95	Sept 3/02	0.5982	0.5127	0.8681	0.2629	51.2727	98.4971	52.0550
4B	95	Sept 3/02	0.5715	0.5140	0.8509	0.2781	54.1051	98.4740	54.9435
1997 straw		April 22/02	0.5795	0.5051	0.8307	0.2442	48.3419	94.9931	50.8899
1999 straw		April 22/02	0.5691	0.5045	0.8344	0.2583	51.1943	95.7858	53.4466
2000 straw		April 22/02	0.5690	0.5009	0.8511	0.2751	54.9162	96.1167	57.1349

KWSTD	0.5569	0.5011	0.6878	0.1239	24.7206	92.8907	26.6126
	0.5309	0.5125	0.6764	0.1385	27.0195	92.8907	29.0874
	0.5681	0.5059	0.6992	0.1241	24.5256	92.8907	26.4026
	0.5856	0.5084	0.7492	0.1566	30.7976	92.8907	33.1546
						KWSTD Mean =	28.8143

Blank	0.6377		0.6423	0.0046
	0.5617		0.5710	0.0093
	0.5394		0.5420	0.0026
	0.5399		0.5515	0.0116
			Blank Mean =	0.0070

Phase 2 - Acid Detergent Fibre (ADF) Determination

Technician: Janice Haines, Soil Science

Date: January 30, 2003

Blank: 0.0216

Sample Identification	Day of Experiment	Date of Sample	Bag Wt (g)	Wet Wt (g)	Dry Wt + Bag (g)	Dry Wt - Blank (g)	% ADF	% DM	% ADF (dry matter basis)
1A	18	June 18/02	0.5734	0.5032	0.8864	0.2914	57.9044	95.5945	60.5729
1B	18	June 18/02	0.5690	0.5163	0.8737	0.2831	54.8276	96.5027	56.8146
2A	18	June 18/02	0.5729	0.5072	0.9221	0.3276	64.5850	96.6968	66.7912
2B	18	June 18/02	0.5767	0.5053	0.8360	0.2377	47.0364	96.3513	48.8176
3A	18	June 18/02	0.5542	0.5083	0.8057	0.2299	45.2243	95.6770	47.2677
3B	18	June 18/02	0.5647	0.5175	0.8294	0.2431	46.9710	97.4242	48.2129
4A	18	June 18/02	0.5932	0.5129	0.8494	0.2346	45.7350	97.3914	46.9600
4B	18	June 18/02	0.5616	0.5162	0.8257	0.2425	46.9731	97.1772	48.3375
1A	46	July 16/02	0.5810	0.5170	0.9001	0.2975	57.5387	96.6796	59.5148
1B	46	July 16/02	0.6170	0.5027	0.8969	0.2583	51.3776	97.4057	52.7459
2A	46	July 16/02	0.5682	0.5137	0.8035	0.2137	41.5953	98.0005	42.4439
2B	46	July 16/02	0.5660	0.5132	0.7967	0.2091	40.7395	96.2310	42.3351
3A	46	July 16/02	0.5768	0.5139	0.8100	0.2116	41.1705	96.3989	42.7084
3B	46	July 16/02	0.5796	0.5034	0.7687	0.1675	33.2688	97.4163	34.1511
4A	46	July 16/02	0.5821	0.5000	0.8128	0.2091	41.8150	97.5517	42.8645
4B	46	July 16/02	0.5441	0.5124	0.7893	0.2236	43.6329	96.9737	44.9946
1A	74	Aug 13/02	0.5711	0.5059	0.8262	0.2335	46.1504	96.6918	47.7294
1B	74	Aug 13/02	0.5735	0.5127	0.8652	0.2701	52.6770	97.5052	54.0248
2A	74	Aug 13/02	0.5726	0.5019	0.8036	0.2094	41.7165	98.0796	42.5333
2B	74	Aug 13/02	0.5866	0.5048	0.8134	0.2052	40.6448	98.2330	41.3759
3A	74	Aug 13/02	0.5833	0.5100	0.8054	0.2005	39.3088	98.4932	39.9102
3B	74	Aug 13/02	0.5806	0.5146	0.8076	0.2054	39.9096	98.3644	40.5733
4A	74	Aug 13/02	0.5871	0.5034	0.8821	0.2734	54.3057	97.8442	55.5022
4B	74	Aug 13/02	0.5906	0.5100	0.8806	0.2684	52.6225	98.6072	53.3658
1A	109	Sept 17/02	0.5933	0.5088	0.8393	0.2244	44.0989	98.3280	44.8487
1B	109	Sept 17/02	0.5735	0.5144	0.8509	0.2558	49.7230	98.8274	50.3129
2A	109	Sept 17/02	0.5829	0.5066	0.8180	0.2135	42.1388	98.9564	42.5832
2B	109	Sept 17/02	0.5893	0.5039	0.8411	0.2302	45.6787	99.3621	45.9720
3A	109	Sept 17/02	0.5519	0.5103	0.8254	0.2519	49.3582	98.9237	49.8952
3B	109	Sept 17/02	0.5696	0.5134	0.8014	0.2102	40.9379	99.8689	40.9916
4A	109	Sept 17/02	0.5871	0.5108	0.8713	0.2626	51.4047	99.2554	51.7903
4B	109	Sept 17/02	0.5684	0.5062	0.8411	0.2511	49.6000	98.8584	50.1727
1A	123	Oct 1/02	0.5168	0.5034	0.7841	0.2457	48.8031	97.7631	49.9198
1B	123	Oct 1/02	0.5636	0.5083	0.8132	0.2280	44.8505	97.7269	45.8937
2A	123	Oct 1/02	0.5831	0.5134	0.8106	0.2059	40.1003	98.3521	40.7722
2B	123	Oct 1/02	0.5681	0.5023	0.8021	0.2124	42.2805	98.8792	42.7598
3A	123	Oct 1/02	0.5755	0.5145	0.8261	0.2290	44.5044	99.1820	44.8714
3B	123	Oct 1/02	0.5692	0.5094	0.8397	0.2489	48.8565	99.6255	49.0402
4A	123	Oct 1/02	0.5701	0.5116	0.8499	0.2582	50.4642	98.8662	51.0430
4B	123	Oct 1/02	0.5797	0.5125	0.8752	0.2739	53.4390	98.1267	54.4592

Phase 2 - Acid Detergent Fibre (ADF) Determination

Technician: Janice Haines, Soil Science
Date: January 30, 2003

Blank:	0.0216

Sample Identification	Day of Experiment	Date of Sample	Bag Wt (g)	Wet Wt (g)	Dry Wt + Bag (g)	Dry Wt - Blank (g)	% ADF	% DM	% ADF (dry matter basis)
1A	137	Oct 15/02	0.5689	0.5014	0.7981	0.2076	41.3991	99.1152	41.7686
1B	137	Oct 15/02	0.5522	0.5111	0.8155	0.2417	47.2853	99.6519	47.4505
2A	137	Oct 15/02	0.5704	0.5043	0.8240	0.2320	45.9994	99.4153	46.2699
2B	137	Oct 15/02	0.5303	0.5037	0.7890	0.2371	47.0667	99.8340	47.1450
3A	137	Oct 15/02	0.5713	0.5071	0.8138	0.2209	43.5565	99.6602	43.7050
3B	137	Oct 15/02	0.5472	0.5017	0.7722	0.2034	40.5372	99.4816	40.7484
4A	137	Oct 15/02	0.5329	0.5009	0.7821	0.2276	45.4332	99.1591	45.8185
4B	137	Oct 15/02	0.5306	0.5029	0.7794	0.2272	45.1730	99.2010	45.5369
1A	158	Nov 5/02	0.5814	0.5043	0.8567	0.2537	50.3024	98.6223	51.0051
1B	158	Nov 5/02	0.6008	0.5077	0.8674	0.2450	48.2519	99.5964	48.4475
2A	158	Nov 5/02	0.5769	0.5049	0.8257	0.2272	44.9941	99.2790	45.3208
2B	158	Nov 5/02	0.5876	0.5034	0.8370	0.2278	45.2473	99.3972	45.5217
3A	158	Nov 5/02	0.5829	0.5030	0.8439	0.2394	47.5895	99.0157	48.0626
3B	158	Nov 5/02	0.5870	0.5100	0.8170	0.2084	40.8578	99.3763	41.1143
4A	158	Nov 5/02	0.5751	0.5075	0.8454	0.2487	49.0000	98.9877	49.5011
4B	158	Nov 5/02	0.5606	0.5086	0.8248	0.2426	47.6947	98.7714	48.2879
1A	180	Nov 27/02	0.5605	0.5087	0.8355	0.2534	49.8083	99.4830	50.0672
1B	180	Nov 27/02	0.5917	0.5068	0.8563	0.2430	47.9430	99.3554	48.2540
2A	180	Nov 27/02	0.5671	0.5000	0.8218	0.2331	46.6150	99.7112	46.7500
2B	180	Nov 27/02	0.5773	0.5021	0.8314	0.2325	46.3005	99.4983	46.5340
3A	180	Nov 27/02	0.5653	0.5020	0.8208	0.2339	46.5886	99.7413	46.7095
3B	180	Nov 27/02	0.5595	0.5011	0.8234	0.2423	48.3486	99.6358	48.5254
4A	180	Nov 27/02	0.6009	0.5081	0.8785	0.2560	50.3789	99.6809	50.5402
4B	180	Nov 27/02	0.5563	0.5091	0.8368	0.2589	50.8495	99.6525	51.0269

KWSTD	0.5174	0.5079	0.6784	0.1394	27.4414	94.8831	28.9213
	0.5233	0.5063	0.6850	0.1401	27.6664	94.8831	29.1584
	0.5856	0.5074	0.7602	0.1530	30.1488	94.8831	31.7747
	0.5899	0.5068	0.7470	0.1355	26.7315	94.8831	28.1730
						KWSTD Mean =	29.5068

Blank	0.5224		0.5331	0.0107
	0.5387		0.5619	0.0232
	0.6031		0.6467	0.0436
	0.5706		0.5796	0.0090
			Blank Mean =	0.0216

Scott Chapman-Results

Technician: SC/JH
Date: Feb, 2002

Samp ID	Day No.	Samp Date	%NDF DM Basis	%ADF DM Basis	% Lignin DM Basis	%Cellulose DM Basis	%Hemicell DM Basis	%DM
1A	18	June 18/02	73.6682	60.5729	15.6958	44.877098	13.095313	95.5945
1B	18	June 18/02	74.2072	56.8146	13.2472	43.567389	17.392557	96.5027
2A	18	June 18/02	68.0195	66.7912	17.6170	49.174182	1.2283158	96.6968
2B	18	June 18/02	57.8379	48.8176	13.1455	35.672079	9.020261	96.3513
3A	18	June 18/02	62.6861	47.2677	14.1692	33.098449	15.418461	95.6770
3B	18	June 18/02	60.5044	48.2129	14.0835	34.129346	12.291521	97.4242
4A	18	June 18/02	62.1295	46.9600	14.3528	32.60724	15.169474	97.3914
4B	18	June 18/02	59.0591	48.3375	14.3345	34.003028	10.721566	97.1772
1A	46	July 16/02	62.3106	59.5148	16.5053	43.00945	2.7958271	96.6796
1B	46	July 16/02	63.9670	52.7459	15.1916	37.554368	11.22109	97.4057
2A	46	July 16/02	52.6810	42.4439	14.1040	28.339921	10.237028	98.0005
2B	46	July 16/02	46.8465	42.3351	15.4710	26.864124	4.511377	96.2310
3A	46	July 16/02	52.2611	42.7084	15.0185	27.689925	9.5526939	96.3989
3B	46	July 16/02	42.2934	34.1511	13.0099	21.141224	8.1423065	97.4163
4A	46	July 16/02	50.8598	42.8645	15.2737	27.590733	7.9953006	97.5517
4B	46	July 16/02	53.2821	44.9946	15.8610	29.133625	8.2874993	96.9737
1A	74	Aug 13/02	60.2045	47.7294	17.1932	30.536255	12.475077	96.6918
1B	74	Aug 13/02	58.2249	54.0248	17.6036	36.421241	4.2000562	97.5052
2A	74	Aug 13/02	48.1384	42.5333	14.7487	27.784577	5.6051223	98.0796
2B	74	Aug 13/02	43.7445	41.3759	17.0399	24.336047	2.3685376	98.2330
3A	74	Aug 13/02	38.8983	39.9102	15.1296	24.780553	-1.011868	98.4932
3B	74	Aug 13/02	41.0102	40.5733	15.7847	24.788577	0.4369599	98.3644
4A	74	Aug 13/02	51.8100	55.5022	22.0074	33.494777	-3.692248	97.8442
4B	74	Aug 13/02	55.4447	53.3658	20.6993	32.666564	2.0788433	98.6072
1A	109	Sept 17/02	42.4308	44.8487	17.1290	27.719765	-2.417961	98.3280
1B	109	Sept 17/02	51.5814	50.3129	16.3861	33.926798	1.2684576	98.8274
2A	109	Sept 17/02	38.3724	42.5832	16.0576	26.525608	-4.21078	98.9564
2B	109	Sept 17/02	35.3585	45.9720	16.8761	29.095821	-10.61344	99.3621
3A	109	Sept 17/02	41.8589	49.8952	17.6521	32.243099	-8.036319	98.9237
3B	109	Sept 17/02	39.3868	40.9916	15.6230	25.368629	-1.604789	99.8689
4A	109	Sept 17/02	48.6142	51.7903	21.2619	30.528385	-3.17615	99.2554
4B	109	Sept 17/02	54.4913	50.1727	21.2029	28.969863	4.318566	98.8584
1A	123	Oct 1/02	46.4543	49.9198	18.5357	31.384111	-3.465468	97.7631
1B	123	Oct 1/02	51.6638	45.8937	16.6897	29.20402	5.7701088	97.7269
2A	123	Oct 1/02	46.7958	40.7722	16.1799	24.592334	6.0235659	98.3521
2B	123	Oct 1/02	45.7266	42.7598	15.1819	27.577906	2.9668736	98.8792
3A	123	Oct 1/02	43.9664	44.8714	16.2850	28.586365	-0.904961	99.1820
3B	123	Oct 1/02	38.7614	49.0402	16.9073	32.132839	-10.27879	99.6255
4A	123	Oct 1/02	46.5797	51.0430	21.9263	29.116679	-4.463249	98.8662
4B	123	Oct 1/02	53.0439	54.4592	23.8815	30.57773	-1.415311	98.1267

Scott Chapman-Results

Technician: SC/JH
Date: Feb, 2002

Samp ID	Day No.	Samp Date	%NDF DM Basis	%ADF DM Basis	% Lignin DM Basis	%Cellulose DM Basis	%Hemicell DM Basis	%DM
1A	137	Oct 15/02	39.6648	41.7686	16.5814	25.187261	-2.103817	99.1152
1B	137	Oct 15/02	40.9936	47.4505	17.9669	29.483541	-6.45685	99.6519
2A	137	Oct 15/02	47.6397	46.2699	17.1941	29.075825	1.3697423	99.4153
2B	137	Oct 15/02	45.5824	47.1450	16.3895	30.755484	-1.56257	99.8340
3A	137	Oct 15/02	47.1700	43.7050	15.5137	28.191308	3.4649849	99.6602
3B	137	Oct 15/02	41.2865	40.7484	14.1477	26.60072	0.5381083	99.4816
4A	137	Oct 15/02	49.2038	45.8185	19.4520	26.366482	3.3852553	99.1591
4B	137	Oct 15/02	51.8831	45.5369	20.5493	24.987549	6.3462436	99.2010
1A	158	Nov 5/02	37.8090	51.0051	18.1158	32.889328	-13.19606	98.6223
1B	158	Nov 5/02	42.0024	48.4475	17.9358	30.511676	-6.445028	99.5964
2A	158	Nov 5/02	36.7969	45.3208	15.4811	29.839679	-8.52393	99.2790
2B	158	Nov 5/02	40.3688	45.5217	15.8878	29.633921	-5.152862	99.3972
3A	158	Nov 5/02	40.4816	48.0626	15.9620	32.100537	-7.580948	99.0157
3B	158	Nov 5/02	36.7986	41.1143	14.2057	26.908562	-4.315688	99.3763
4A	158	Nov 5/02	45.9284	49.5011	19.8067	29.694427	-3.572675	98.9877
4B	158	Nov 5/02	47.1734	48.2879	19.1910	29.0969	-1.114502	98.7714
1A	180	Nov 27/02	43.6319	50.0672	19.3266	30.740519	-6.435227	99.4830
1B	180	Nov 27/02	41.8345	48.2540	19.1240	29.130042	-6.419516	99.3554
2A	180	Nov 27/02	43.9680	46.7500	16.7692	29.980753	-2.782026	99.7112
2B	180	Nov 27/02	44.0694	46.5340	17.2145	29.319463	-2.464633	99.4983
3A	180	Nov 27/02	43.3183	46.7095	16.7574	29.952054	-3.391222	99.7413
3B	180	Nov 27/02	40.8135	48.5254	16.8257	31.699627	-7.711912	99.6358
4A	180	Nov 27/02	45.7876	50.5402	20.8878	29.652317	-4.752599	99.6809
4B	180	Nov 27/02	45.7240	51.0269	21.7822	29.244668	-5.302889	99.6525
KWSTD		KWSTD	36.627325	29.5068	5.0521	24.454786	7.4356712	94.8831