Schnabel Engineering

Schnabel Engineering Associates, Inc.
10215 Fernwood Road, Suite 250
Bethesda, MD 20817-1106
301-564-9355 • Fax 301-530-6376

October 31, 1997

Mr. Marc Mezzanotte
MK Enterprises, Inc.
2900 Linden Lane
Suite 200
Silver Spring, Maryland 20910

Subject: **Report, Additional Hydrogeological Investigations for Design of Stormwater Management Structures, Proposed Clarksburg Town Center, Clarksburg Road, Clarksburg, Maryland (972506)**

Dear Mr. Mezzanotte:

Schnabel Engineering Associates is pleased to submit this report that presents the results of our further hydrogeologic investigations for use in design of stormwater management structures at the Clarksburg Town Center. This report represents follow-up investigations to those presented in our previous "Report, Hydrogeologic Analysis, Clarksburg Town Center, Special Protection Area, Montgomery County, Maryland" dated July 25, 1997. This previous report was completed for Biohabitats, Inc. The location of the proposed development is presented on Figure 1.

A Final Water Quality Plan for the proposed development was submitted by Biohabitats to Montgomery County (County) dated July 30, 1997. The review of that plan indicated several areas that required additional investigation and evaluation prior to plan approval. One of the major areas of concern was the requirement in the Special Protection Area regulations for maintenance of pre-construction baseflow within the stream and the desire to use infiltration practices to recharge the ground water system to maintain the baseflow. The reviewing agencies were specifically concerned that insufficient infiltration had been proposed and that insufficient testing of potentially infiltrating areas had been completed.

1-95042

GEO-TECHNOLOGY ASSOCIATES, INC.

Geotechnical &Environmental Consultants
Frederick Satellite Office
5115 Pegasus Court, Suite C
Frederick, Maryland 21704

LETTER OF FAX TRANSMITTAL

DATE: 3-9-2004 RE: Clarksburg Town Center

TO: MC - Sediment Control/Stormwater Management

ATTN: Richard Gee

FAX#: 240 777 6339

FROM: Stephen Cutter

REMARKS:

For your review, per our conversation this morning. Please call if you have any questions 410 598 6679

****

WE ARE TRANSMITTING 25 PAGE (S), INCLUDING THE COVER PAGE. IF TRANSMISSION IS INCOMPLETE, PLEASE CALL OUR OFFICE IMMEDIATELY AT:

(301) 682-5226 - Frederick

(301) 682-9254 - Facsimile

Bioretention Areas Soil Materials

Submittal For: Pleasants Construction Inc.
24012 Frederick Road
Clarksburg, MD 20871

Project: Clarksburg Town Center Section 1-A
Pleasants Construction Project # 5461

Attention: Mr. Michael Hamilton,
Assistant General Superintendent,
Pleasants Construction Inc.

Dear Sir,

I have reviewed the bioretention area soil specifications for the above referenced project and submit the herein attached materials data for review and consideration. All necessary blending will occur at our location prior to shipment if that meets with your approval.Thank you.

If you should have any questions, please contact me, Jim Stewart @ (240) 375-3709

Very truly yours,

James M. Stewart

James M. Stewart
Ritchie Land Reclamation

Bioretention Specification

Soil Filter/Planting Media

The planting media shall consist of 1/3 perlite, 1/3 compost and 1/3 topsoil. The perlite shall be coarse grade horticultural perlite. The compost shall be high grade compost free of stones and partially composted woody material. The soil shall meet the following minimum criteria: contain no more than 10% clay, 30-55% silt and 35-60% sand. The soil shall be free of stones, stumps, roots or other similar objects larger than 2 inches. The first layer of the planting media shall be lightly tilled to mix it into the sand layer, so not to create a definitive boundary. The planting material shall be flooded after placement. Any settlement that occurs shall be filled back to design elevation.

EA Engineering, Science, and Technology

15 Loveton Circle
Sparks, MD 21152
Telephone: 410-771-4950
Fax: 410-771-4204
www.eaest.com

16 January 2004
EA Project No. 61179.16

Mr. Jim Stewart
Ritchie Land Reclamation
24012 Frederick Rd., Suite 200
Clarksburg, Maryland 20871

Subject: Bioretention Area Soil Specifications

Dear Mr. Stewart:

I have reviewed the bioretention area soil specifications and the materials proposed to meet the specifications. Coarse-grade horticultural perlite from Schundler Company, Leafgro compost from MES, and the topsoil tested by A&L Eastern Agricultural Laboratories mixed in equal portions will meet the project specifications for the bioretention area.

If you should have any questions, please contact me.

Very truly yours,

Mark J. Gutberlet, P.E.
Geotechnical Engineer

P:\Industrial & Other\Industrial\Ritchie Landfill\Projects\61179\2003-01-16 JS.doc

STATE OF MARYLAND
MARK JOSEPH GUTBERLET
No. 23402
PROFESSIONAL ENGINEER

Bioretention Areas Soil Materials

Incubation Test for Noxious Weeds in Topsoil

Soil Testing Procedures: **Ritchie Land Reclamation**

To insure that screened topsoil for use in Bioretention ponds are free of Bermuda grass, Johnson grass, Quack grass or other noxious weeds the following procedure is used.

a). Topsoil is fine screened to remove any root matter, plants or grasses.

b). Screened topsoil is stockpiled and monitored for a 1 month incubation period. Any soil found to contain noxious weeds is promptly removed from stockpile.

c). Stockpiled topsoil is covered to prevent exposure to possible contamination of weed seeds.

Standard
Gradations for
Horticultural
Perlite

From the
Perlite Institute

PERLITE

PLANT GUIDE

The Schundler Company
150 Whitman Avenue, P.O. Box 513
Metuchen, New Jersey 08840-0513
732-287-2244 www.schundler.com

STANDARD GRADATIONS OF HORTICULTURAL PERLITE
FINE, MEDIUM, AND COARSE DEFINED

By Bruce Schundler

For many years, horticultural perlite was understood to mean relatively large and often screened material. Usually it was used to provide aeration and drainage, and fine and medium grades were usually avoided.

In newer hydroponic applications, both coarse and screened perlite was initially being used and, again there was a little confusion about what size or type of perlite was appropriate.

Beginning in the late 1980's and early 1990's, however, the grades of perlite being used and tested began to change. David Hall and others began working with 100% perlite media where the size and type of perlite being used was much smaller and was not screened. New horticultural studies by Hall and others began referring to fine and medium grades of perlite. Perlite Institute reports from The Netherlands in March and December of 1993, and work in hydroponics from Israel to England began referring to medium and fine grades of perlite being, and reports of turf and agricultural applications in India indicated finer grades were used. Eventually at meetings of the Perlite Institute and particularly during its Horticultural Committee meetings, there was confusion about what sizes and grades of perlite were being used and discussed in the many horticultural and agricultural uses of perlite, and in response a basic grading systems was developed.

Generally everyone in the perlite industry seemed to understand the basic parameters of "fine", "medium", and "coarse." Fines are those grades traditionally used in cryogenic insulation and fine plasters, medium grades have been used for plaster and concrete aggregates, and coarse grades are the two or three coarsest grades available from any perlite mining operation. To more carefully define these three grades, most studies have come up with sieve sizes or basic parameters, while others have just referred to "fine, medium, or coarse" grades in the hope that everyone will understand.

To avoid future problems, and misunderstandings, the Horticultural Committee of the Perlite Institute at the 1994 Mid-Year Meeting in Charleston, South Carolina approved a very basic specification for use within the perlite industry and others.

Standard Sieve or Micron Size	PERLITE GRADATION		
	Fine	Medium	Coarse
+16 mesh or 1 mm	10% Max.	60% Max.	70% Min.
+100 mesh or 150 µm	60% Min	85%Min.	

When compared to the former (and now defunct) NBS Voluntary Product Standard for Horticultural Perlite (PS-23-70), these screen sizes are a little different (calling for a horticultural grade that is not as coarse as today's "coarse". Although this standard is not used anymore, we have included it here as a general reference:

U.S.Standard Sieve Number	Cumulative Volume Retained
3/8 inch	0.0% (max.)
+8 mesh	20.0 % (min.)
+20 mesh	80.0 % (min.)
+100 mesh	97.0% (min.)

For more information about these uses of perlite in turf grass applications, landscaping, and/or container growing, please call or contact us at:

The Schundler Company P.O. Box 513 Metuchen, New Jersey 08840
(ph)732-287-2244 (fax) 732-287-4185
www.schundler.com

THE SCHUNDLER COMPANY

BASIC PERLITE INFORMATION AND DATA

(Click here for our current MSDS on Perlite)

(Click here for our summary page Perlite Health Issues: Studies and Effects)

(Click here to read about how Perlite Is Not Contaminated With Asbestos)

Origins and Characteristics....

Perlite is not a trade name but a generic term for a naturally occurring siliceous rock. The distinguishing feature that sets perlite apart from other volcanic glasses is that when heated to a suitable point in its softening range, it expands from four to twenty times its original volume.

This expansion is due to the presence of two to six percent combined water in the crude perlite rock. Then quickly heated to above 1600 degrees F (871 degrees C), the crude rock pops in a manner similar to popcorn as the combined water vaporizes and creates countless tiny bubbles that account for the amazing light weight and other exceptional physical properties of expanded perlite.

Three stages of perlite production shown above illustrate the great increase in volume after funacing. The same weight of perlite, 1 oz. (28 gm.), is shown as crude perlite, crushed crude perlite, and expanded perlite.

The expansion process also creates one of perlite's most distinguishing characteristics: its white color. While the crude rock may range from transparent light gray to glossy black, the color of expanded perlite ranges from snowy white to grayish white.

Expanded perlite can be manufactured to weigh as little as 2 pounds per cubic foot (32 kg/m3) making it adaptable for numerous applications.

Since perlite is a form of natural glass, it is classified as chemically inert and has a pH of approximately 7.

TYPICAL ELEMENTIAL ANALYSIS

Silicon	33.8
Aluminum	7.2
Potassium	3.5
Sodium	3.4
Iron	0.6
Calcium	0.6
Magnesium	0.2
Trace	0.2
Oxygen (by difference)	47.5
Net Total	97.0
Bound Water	3.0
Total	100.00

TYPICAL PHYSICAL PROPERTIES

Color	White
Refractive Index	1.5
Free Moisture, Maximum	0.5%
pH (of water slurry)	6.5-8.0
Specific Gravity	2.2-2.4
Bulk Density (normal)	2-15 lb/ft^3
Mesh Sizes (normal)	4-40 and finer mesh
Softening Point	1600-2000F
Fusion Point	2300-2450F
Specific Heat	0.2BTU/lb F
Thermal Conductivity	.27-.41 $BTU.in/h.ft^2.F$

THERMAL RESISTANCE VALUES
Thermal "R" Values for 1 in (0.0254m) Thickness

Density	Mean Temperature, F^0 (C^0)		
	40 (4)	75 (24)	105 (41)
2.0-4.1 (32.0-65.6)	4.3-3.9 (0.78-0.69)	3.7-3.3 (0.65-0.58)	3.7-3.2 (0.65-0.56)
4.1-7.4 (65.6-118.4)	3.9-3.3 (0.69-0.58)	3.3-2.8 (0.58-0.49)	3.2-2.7 (0.56-0.47)
7.4-11.0 (118.4-176.0)	3.3-2.9 (0.58-0.51)	2.8-2.4 (0.49-0.42)	2.7-2.4 (0.47-0.42)

For more information about perlite, you might want to look at:

- ***Incon Corporation***

http://www.schundler.com/techperl.htm

Incon Corporation is a leading manufacturer of perlite processing equipment and systems. They also maintain another large and **very** helpful site about the many uses and characteristics of perlite.

- Incon Corporation maintains an "Index Page" with cross links and references to an incredible amount of information. ***The Incon Indexes***

- ***Perlite Statistics and Information***
(http://minerals.usgs.gov/minerals/pubs/commodity/perlite/index.html
(published by the United States Geological Survey)

- or, look through the rest of our website, or call or contact us at:

The Schundler Company P.O. Box 513 Metuchen, New Jersey 08840
(ph)732-287-2244 (fax) 732-287-4185
www.schundler.com
email: info@schundler.com

Back to *Main*

MATERIAL SAFETY DATA SHEET---PERLITE

I. PRODUCT IDENTIFICATION

TRADE NAME (as labeled)	Schundler Company Perlite (Expanded)
MANUFACTURERS NAME	THE SCHUNDLER COMPANY **www.schundler.com**
Address (complete mailing address):	150 Whitman Avenue, P.O. Box 513, Metuchen, N.J. 08840-0515
Phone number:	(732) 287-2244 info@schundler.com
Date Prepared or Revised:	February 21, 2001

II. HAZARDOUS INGREDIENTS

Chemical Name	CAS Numbers	EXPOSURE LIMITS		
		ACGIH TLV (Total)	ACGIH TLV (Respirable)	OTHER
Perlite	93763-70-3*	10 mg/M³	3 mg/M³	30 mppcf

Perlite is essentially an amorphous, hydrated glassy volcanic rock of rhyolitic composition, consisting primarily of fused sodium potassium aluminum silicate.

Perlite is considered a nuisance dust (also called "Particulates Not Otherwise Classified (PNOC) by ACGIH).

Alpha-Cristobalite & Tridymite:	Less than 0.1%
Alpha Quartz:	0.01 to 0.05%

III. PHYSICAL PROPERTIES

Vapor Density (air = 1)	N/A	**Melting point or range. F°**	2000+
Specific Gravity	2.35	**Boiling point or range. F°**	N/A
Solubility in Water	<1%	**Evaporation rate** (butyl acetate = 1)	N/A
Vapor Pressure, mmHg at 20°C	N/A		
Appearance and odor:	White to off white granules, no odor.		

HOW TO DETECT THIS SUBSTANCE (warning properties of substance as a gas, vapor, dust or mist)

Visual only (dust), No gas, vapors, or mist emitted.

IV. FIRE AND EXPLOSION

Flash Point, F° (give method)	Perlite is a fully oxidized non-flammable mineral. It is noncombustible and non-flammable.
Auto ignition temperature, F°	N/A
Flammable limits in air, Volume%:	N/A **lower (LEL)** N/A **upper(UEL)** N/
Fire extinguishing materials:	N/A

_____water spray **_____carbon dioxide** **_____other:**

_____foam **_____dry chemical**

Special fire fighting procedures: N/A

Unusual fire and explosion hazards: N/A

V. HEALTH HAZARD INFORMATION

SYMPTOMS OF OVEREXPOSURE for each potential route of exposure

Inhaled:	Coughing
Contact with skin or eyes:	Possible eye irritation from dust particles; wear eye protection
Absorbed through skin:	N/A
Swallowed:	N/A

HEALTH EFFECTS OR RISKS FROM EXPOSURE.

Acute:	None
Chronic:	Excessive inhalation over long period may cause harmful irritation; use mask suitable for nuisance dust.
Target Organ:	None

FIRST AID: EMERGENCY PROCEDURES

Eye Contact:	Attempt to wash out with clear water; if unable have particle removed by doctor
Skin Contact:	None
Inhaled:	Remove affected individual from dusty area to area with clean air

Swallowed: None

SUSPECTED CANCER AGENT?

__X__ **NO: This product's ingredients are not found in the lists below.**

YES: _____ **Federal OSHA** _____ **NTP** _____ **IARC**

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Any Respiratory illnesses which a nuisance dust may aggravate

VI. REACTIVITY DATA

Stability: __X__ **Stable** _____ **Unstable**

Incompatibility (Materials to avoid): None

Hazardous decomposition products (including combustion products): None

Hazardous Polymerization: _____ **May Occur** __X__ **Will not occur**

Conditions to Avoid: None

VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill response procedures (include employee protection measures):

Vacuum clean or sweep material; Use respirators suitable for nuisance dust and eye protection.

Preparing wastes for disposal (container types, neutralization, etc.):

Dispose in bulk or containers according to local dump requirements. No special treatment required.

Note: Dispose of all wastes in accordance with federal, state, and local regulations.

VIII. SPECIAL HANDLING INFORMATION

Ventilation and engineering controls:

Maintain dust level below TLV.

Respiratory protection (type)

Masks suitable for nuisance dust.

Eye Protection (type)

Protective goggles.

Gloves (specify material)

Not required.

Other Clothing and equipment

Not required.

Work practices, hygienic practices

Use good housekeeping to avoid transient dust.

Other handling and storage requirements

Use good housekeeping to avoid transient dust.

Protective measures during maintenance of contaminated equipment

None special other than respirators and goggles.

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state laws. However, no warranty or representation with respect to such information is intended or given; and it is the responsibility of the user to comply with all applicable federal, state, and local laws and regulations.

Back to ***Main***

US COMPOSTING COUNCIL
Seal of Testing Assurance

Maryland Environmental Service
Karen Fields
2011 Commerce Park Drive
Annapolis
MD 21401

Date Sampled/Received: 05 Aug. 03 / 17 Sept. 03

Product Identification Compost
PG Yard Waste

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.62	1.6
Phosphorus	P_2O_5	0.16	0.42
Potassium	K_2O	0.47	1.2
Calcium	Ca	1.0	2.5
Magnesium	Mg	0.18	0.48
Moisture Content	%, wet weight basis	61.9	
Organic Matter Content	%, dry weight basis	57.0	
pH	units	7.45	
Soluble Salts *(electrical conductivity EC_s)*	dS/m (mmhos/cm)	2.89	
Particle Size	% under 9.5 mm, dw basis	100.0	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	1.6	
	mg CO_2-C/g TS/day	0.9	Very Stable
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100	
Relative Seedling Vigor	average % of control	100	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal Coliform*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As, Cd, Cr, Cu, Pb, Hg* Mo, Ni, Se, Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Batch Number: Sept.-4-03 Laboratory Number: 1764224172213

Analyst: Frank Shields

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY

42 Hangar Way
Watsonville Ca 95076

Tel: 831 724-5422
FAX: 831 724-3188

Account No.:
176422-4-1722
Group: Sept.-4-03 13

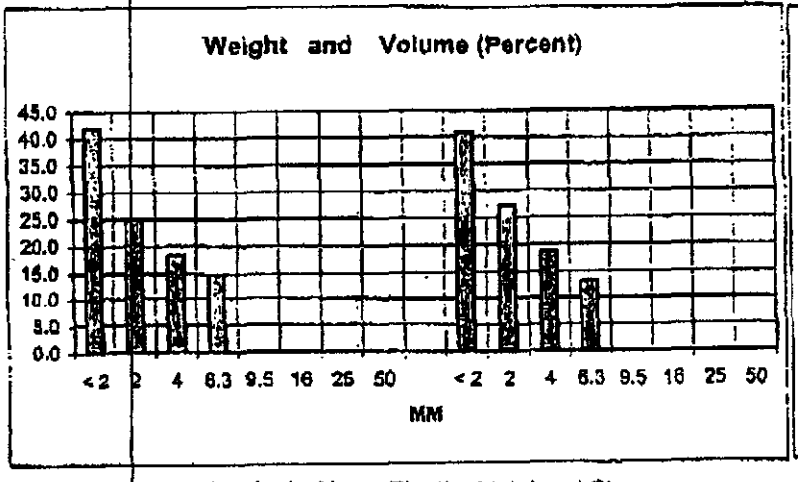
Karen Fields
Maryland Environmental Service
Six page report
Annapolis, MD 21401

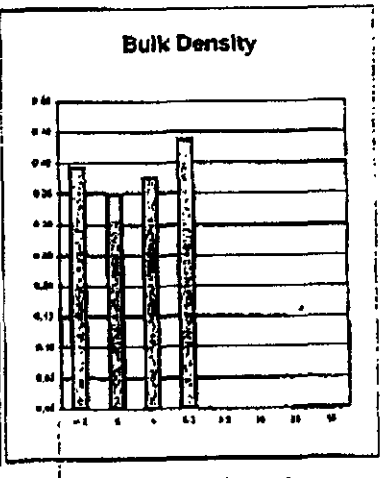
DATE RECEIVED: 17 Sept. 03
SAMPLE ID: Compost PG Yard Weste
SAMPLE ID. No.: 4 176422

Size & Volume Distribution, Bulk Density and Inerts

Method: TMECC 02.02-B		Weight	Volume	Bulk Density
MM	Inches	percent	percent	g/cc
> 50	> 2.0	0.0	0.0	0.00
25 to 50	1.0 to 2.0	0.0	0.0	0.00
16 to 25	0.64 to 1.0	0.0	0.0	0.00
9.5 to 16	0.38 to 0.64	0.0	0.0	0.00
6.3 to 9.5	0.25 to 0.38	14.8	13.0	0.44
4.0 to 6.3	0.16 to 0.25	18.3	18.6	0.38
2.0 to 4.0	0.08 to 0.16	24.9	27.3	0.35
< 2.0	< 0.08	42.0	41.0	0.39
	Total	100.0	100.0	

Bulk density = < 0.35 Light materials; 0.35 to 0.60 Mid Weight materials; > 0.60 Heavy Materials





Percent (> 4mm fraction): Glass, Plastic, Metal and Sharps. Method: TMECC 02-02-C

Plastic	Trace	Glass	< 1	Metal	< 1	Sharps	< 1

PAGE 1

Analyst: Frank Shields

Frank Shields

and
BACTERIOLOGISTS
Approved by State of California

Tel: 831 724-5422
FAX: 831 724-3188

SOIL CONTROL LAB

42 Hangar Way
Watsonville Ca 95076

42 HANGAR WAY
WATSONVILLE

Account No.:
176422 4 1722
Group: Sept.-4-03 13

Karen Fields
Maryland Environmental Service
2011 Commerce Park Drive
Annapolis, MD 21401

DATE RECEIVED: 17 Sept. 03
SAMPLE ID: Compost PG Yard Waste
SAMPLE ID. No.: 4 176422

GERMINATION & GROWTH	Cucumber TMECC 05.05-A	Clopyralid Sensitive Plants: Red Clover	Red Clover
Emergence (relative to control)	100 %	100 %	100 %
Relative Seedling Vigor	100 %	100 %	100 %
Description of plants:	healthy	healthy	healthy
Test Conditions:	50%:50% v/v Compost/Vermiculite	Direct planting	1:4 with potting mix
Clopyralid-Control: Potting Mix watered 50% with 25ppb solution:		Results: Less than 25 ug/kg dw (ppb)	
Positive Control: Sunland Garden Products (Watsonville, CA) potting mix: Negative Control:Grace Vermiculite			

This test uses a salt tolerant plant (cucumber) grown in a high concentration of test compost and a salt sensitive plant (clover) grown in compost diluted with potting mix. The degree of toxicity can be determined using both a concentrated mix and diluted mix. If both show toxicity the compost is very toxic. If the diluted mix indicated no toxicity it may mean the compost could be diluted with receiving soil. Also, red clover is sensitive to clopyralid therefore toxic effects shown in the red clover may indicate presence of clopyralid. Compost that show phytotoxic effects under test conditions may not show toxic effect when used in actual field conditions. Conditions of high salts, acid or alkali pH and ammonia toxicity can be corrected with added dilution or adjustments resulting from mixing with receiving soil. Composts showing phytotoxic effects should be used with caution.

Carbon Dioxide Evolution Rate		Respiration Rate	Biological Available Carbon
	Test Conditions:	(as received)	(carbon made the limiting factor)
	Pre-incubated:	3 day-20 deg.C	3 day-36 deg. C
	Incubation:	36 deg.C	36 deg.C
	Moisture adjusted:	saturated	saturated
	pH	Not adjusted	6.5 to 7.5
	Porosity	Not provided	#20 quartz sand
	Nutrients	Not provided	NPK+trace
	TMECC Method	05.08-B	05-08-F
RESULTS:	mg CO2-C/g OM/day	1.6	3.8
	mg CO2-C/g OC/day	3.2	7.9
	mg CO2-C/g TS/day	0.9	2.2
INTERPRETATION:	Very Stable	< 2	< 2
	Stable	2 to 8	2 to 10
	Moderately Unstable	8 to 15	10 to 20
	Unstable	15 to 40	20 to 40
	Very Unstable	> 40	> 40

RESPIRATION RATE Analyst: Frank Shields
Optimizing moisture with pre-incubation to simulate maximum biological activity in a source pile.
BIOLOGICAL AVAILABLE CARBON
Optimizing all conditions (except carbon) makes rate of degradation limited by the available carbon in the compost. Purpose is to simulate condition of end use in an agriculture environment where nutrients, porosity, pH adj. and moisture are provided from the grower or receiving soil when optimizing conditions for plant growth.

ANALYTICAL CHEMISTS and BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

Tel: 831 724-5422
FAX: 831 724-3188

42 HANGAR WAY

42 Hangar Way
Watsonville Ca 95076

Account No.:
176422 - 4 - 1722
Sept.-4-03 13

Karen Fields
Maryland Environmental Service
2011 Commerce Park Drive
Annapolis, MD 21401

DATE RECEIVED: 17 Sept. 03
SAMPLE ID: Compost PG Yard Waste
SAMPLE ID. No.: 4 176422

		WET Basis	DRY Basis	TMECC Method
Nutrients-Primary + Secondary				
Total Nitrogen:	%	0.62	1.6	4.02-D
Ammonia (NH4-N):	mg/kg	17	45	4.02-C
Nitrate (NO3-N):	mg/kg	76	200	4.02-B
Organic Nitrogen (Org.-N):	%	0.61	1.6	Calc.
Phosphorus (as P2O5):	%	0.16	0.42	Calc.
Phosphorus (P):	mg/kg	711	1867	4.03-A
Potassium (as K2O)	%	0.47	1.2	Calc.
Potassium (K):	mg/kg	3938	10345	4.04-A
Calcium (Ca):	%	0.96	2.5	4.05
Magnesium (Mg):	%	0.18	0.48	4.05
Sulfate (SO4):	mg/kg	111	293	4.12-D/IC
Nutrients - Trace elements				
Copper (Cu):	mg/kg	12	31	4.05-Cu
Zinc (Zn):	mg/kg	46	121	4.05-Zn
Iron (Fe):	mg/kg	2738	7194	4.05-Fe
Manganese (Mn):	mg/kg	234	615	4.05-Mn
Boron (B):	mg/kg	22	58	4.05-B
Salts, pH, Bulk Density, Carbonates				
Sodium (Na):	%	0.0088	0.023	4.05-Na
Chloride (Cl):	%	0.068	0.17	04.05/IC
pH Value:	units	7.46	NA	04.11-A
Electrical Conductivity (EC5 dw):	mmhos/cm	1.10	2.89	04.08-A
Bulk Density :	lb/cu ft	48	18	SCL
Carbonates : as CaCO3	lb/ton	1	1	04.08-A
Organic Matter:	%	21.7	57.0	05.07-A
Organic Carbon:	%	10.5	27.7	4.01
Ash:	%	16.4	43.0	3.02
C/N Ratio	ratio	17.0	17.0	calc.
Moisture:	%	61.9	0.0	3.09

NOTE: Wet Basis values baesd on a moisture content 61.9 percent. Analyst: Frank Shields

To Calculate: WetBasis = (Dry Basis) X ((100-%Moisture)/100)
To Calculate: lb/cu yd = % WetBasis X 18.44 X (27)/(100-%moisture)
PAGE 3 To Calculate: lb/cu yd = mg/kg WetBasis X 18.44 X (0.0027)/(100-%moisture)

A Division of Control Laboratories Inc.

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

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Maryland Environmental Service
2011 Commerce Park Drive
Annapolis, MD 21401

DATE RECEIVED: 17 Sept. 03
SAMPLE ID: Compost PG Yard Waste
SAMPLE ID. No.: 4 176422

Metals & Coliform Bacteria

Method (metals): EPA 3060B / EPA 6010
Method (metals): TMECC 04.12-B / 04.14-A
Method (Mercury Hg) TMECC 04.06 / EPA 7471
Method (Fecal Coliform): Standard Methods 9221E

			Units	MDL	% Recovery	Date Tested
Arsenic (As):		3	mg/kg dw	1 mg/kg	96	23 Sept. 03
Cadmium (Cd):		1	mg/kg dw	1 mg/kg	93	23 Sept. 03
Chromium (Cr):		14	mg/kg dw	1 mg/kg	100	23 Sept. 03
Copper (Cu):		31	mg/kg dw	1 mg/kg	116	23 Sept. 03
Lead (Pb):		17	mg/kg dw	1 mg/kg	93	23 Sept. 03
Mercury (Hg):	Less than	1	mg/kg dw	0.1 mg/kg	113	23 Sept. 03
Molybdenum (Mo):		2	mg/kg dw	1 mg/kg	106	23 Sept. 03
Nickel (Ni):		10	mg/kg dw	1 mg/kg	106	23 Sept. 03
Selenium (Se):	Less than	1	mg/kg dw	1 mg/kg	107	23 Sept. 03
Zinc (Zn):		121	mg/kg dw	1 mg/kg	94	23 Sept. 03
Total Solids (tmecc 03.09)		38.1	Percent	0.05%	12	Sept. 03

Fecal Coliform 240 MPN/g dry weight 17 Sept. 03

Pollutant Loading Rate:
Multiply mg/kg dry weight values times 0.0345 to give you kilograms pollutant per 100 metric ton compost as-received based on a moisture content of 61.94 percent.

Analyst: Frank Shields

PAGE 4

and
BACTERIOLOGISTS
Approved by State of California

Tel: 831 724-5422
FAX: 831 724-3188

SOIL CONTROL LAB

42 Hangar Way
Watsonville CA 95076

42 HANGAR WAY
WATSONVILLE

Account No.:
176422 4 1722

Batch
Sept.-4-03 13

Karen Fields
Maryland Environmental Service
2011 Commerce Park Drive
Annapolis MD 21401

DATE RECEIVED: 17 Sept. 03
SAMPLE ID: Compost PG Yard Waste
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Compost Filter Berm and Compost Blanket Parameters
American Association of State Highway & Transportation Officials
2003 AASHTO Provisional Standards manual; Filter Berm MP9-03; Compost Blankets MP10-03

	Your Value	Filter Berm: When Vegetated		Filter Berm: Not Vegetated		Compost Blanket: When Vegetated		Compost Blanket: Not Vegetated	
pH value	7.5	5.0 - 8.5	P	N/A	X	5.0 - 8.5	P	N/A	X
Soluble Salts (EC5 dS/m)	3	< 5	P	N/A	X	< 5	P	< 5	P
Moisture %	62	30 - 60	F	30 - 60	F	30 - 60	F	30 - 60	F
Organic Matter %	57	25 - 65	P	25 - 100	P	25 - 65	P	25 - 100	P
Stability (mgCO2-C/g om/day)	2	< 8	P	N/A	X	< 8	P	N/A	P
Inerts %	0	< 1	P	< 1	P	< 1	P	< 1	P

Size Distribution Minimum Percent Passing		Your Value	Filter Berm: When Vegetated		Filter Berm: Not Vegetated		Compost Blanket: When Vegetated		Compost Blanket: Not Vegetated	
Inch	mm									
3	75	100	100	P	100	P	100	P	100	P
1	25	100	90	P	90	P	90	P	90	P
3/4	19	100	70	P	70	P	65	P	65	P
1/4	6.4	85	30 - 75	F	30 - 75	F	0 - 75	F	0 - 75	F
High rainfall/flow rate										
1/4	6.4	85	<60	F	<60	F	NA		NA	

www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/us_12-month_precip.html ,

Length (% Less w/w)		Your Value							
Inch	mm								
6	152	100	100	P	100	P	100	P	100	P

Note: P = Pass; F = Fail

Methods from Test Methods for the Examination of Composting and Compost (TMECC)
www.compostingcouncil.org

pH value	TMECC 04.11-A	Stability	TMECC 05.08-B
Soluble Salts	TMECC 04.10-A	Inerts	TMECC 03.08-A
Moisture	TMECC 03.09-A	Particle Size	TMECC 02.12-B
Organic Matter	TMECC 05.07-A		

Analyst: Frank Shields

Account No.: 176422 - 4 - 1722
Batch No. Sept.-4-03 13

Date Received 17 Sept. 03
Sample I.d. Compost PG Yard Waste
Sample I.d. No. 4 176422

INTERPRETATION:

Nutrients (N+P2O5+K2O)

3.3 Average nutrient content

This is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with units on fertilizer formulations. A sum greater than five indicates a compost with a high nutrient content and best used when intended to supply nutrients to a receiving soil. A value below two indicates a low nutrient content and best used where soil structure needs improving and nutrients can be added from another source. Most compost fall within the range between two and five.

AgIndex (Nutrients/Na+Cl)

> 10 High nutrient ratio

Repeated use of a compost with a low AgIndex (below 2) result in sodium and/or chloride becoming the limiting factor governing application rates (ie. sodium and/or chloride become toxic before nutrients become optimum). May be used on well drained soils with salt tolerant plants. Additional nutrients from another source may be needed. An AgIndex above 10 result in a build-up of nutrients to optimum for plant growth without a concern of a toxic build-up of sodium and/or chloride from the compost. Good for increasing nutrients on all soils. Most compost fall in the range between 2 and 10 and concentrations of both nutrients and sodium plus chloride in the receiving soil should be considered when determining application rates. AgIndex is a product of feedstock quality. Feedstock from dairy manure, ocean fish waste, un-washed kelp, industrial wastes, cheese & pickle waste, salt tolerant plants, can produce a finished compost with a low AgIndex.

Lime Content (lbs. per ton)

1 Low lime content

Compost produced from chicken manure (layers), ash materials, and lime products can result in a finished compost high in carbonates. An excellent product when used on a receiving soil where an addition of lime is recommended from a soil analysis, but caution should be used when applying to a soil wanting a lower pH.

C/N Ratio

17.0 Indicates immature

A C/N ratio below 13 indicates Mature and above 15 indicates Immature. But there are many exceptions. Example; large (> 6.3mm) woodchips is slow to breakdown and can result in a Stable product based on Biological Available Carbon (BAC) yet the C/N ratio value is high. Some organic feedstock like bark and redwood are resistant to degradation result in a Stable compost with a high C/N ratio. And some mixes with chicken manure and green grasses can start below 15 and are very un-Stable.

AmmoniaN/NitrateN ratio

0 very mature

Ammonia N ppm
45 very mature
Nitrate N ppm
200 mature
pH value
7.45 mature

Typically ammonia is in excess with the break-down of organic materials resulting in a increase in pH. This combination result in a loss of volatile ammonia (it smells). Once the toxic ammonia has gone off and the pH drops the microbes convert ammonia to nitrates. A low ammonia + high nitrate indicates Mature. Exceptions are many. A compost with a low pH value (< 7) will retain ammonia and a compost with high lime content can lose ammonia before the organic fraction become stable.

Account No.: Date Received 17 Sept. 03

176422 - 4 - 1722 Sample i.d. Compost PG Yard Waste
Batch No. Sept.-4-03 13 Sample I.d. No. 4 176422
INTERPRETATION: Page two of two

Ash to Organic Matter ratio
0.76 Average ash content
High Ash content indicates possible 1) excess mineralization (old compost) 2) contamination with dirt base material during turning 3) poor quality feedstock or 4) soil or mineral products added. Finding the source and reducing Ash is often the fastest means of increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")
14.8 May restrict use
Large particles may restrict use for greenhouses, golf courses, seedlings etc. where a fine size distribution is required. Can still be used for field soils, shrub mixes and mulches.

Soluble Nutrients & Salts (EC5 dw - umhos/cm)
2.89 Average salts
Salts refers to all soluble ions including nutrients and sodium and chloride. High salts + high AgIndex indicates a compost high in readily available nutrients. Application rate should be limited to obtaining optimum nutrients. High Salts and low AgIndex indicates a compost low in nutrients and high concentrations of sodium and/or chloride limiting application rate to toxicity of sodium and/or chloride. Low salts indicates more compost can be applied before salt toxicity and nutrients are not readily available but in a slo-release form.

Respiration Rate
1.6 Low for all uses mg CO2-C/g OM/day
Biological Available Carbon
4 Low for all uses mg CO2-C/g OM/day
The Respiration Rate (RR) and Biological Available Carbon (BAC) measure the rate CO2 is released under the same moisture and temperature conditions. Additionally for the BAC test porosity, nutrients, pH and microbes are adjusted for optimum. If both RR and BAC results are about the same indicates the compost conditions are optimum. If the BAC results are higher than RR indicates a compost pile activity limited by one or more of the conditions corrected in the BAC test. A Stable RR and BAC test indicates a Stable product. A Stable RR but un-Stable BAC test indicates an un-Stable product that, if used, should be on well drained field soils at a low application rate applied several weeks before planting.

Particle Size Distribution
Each size fraction is measured on weight, volume and bulk density basis. Aids in decisions to screen or not, size screen to use and if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Clopyralid Indicator (Red Clover)
Results: Less than 25 ug/kg dw (ppb)
Your compost is seeded direct and 1:4 v/v compost/potting mix. They are watered and spread seeded with red clover. Along side the compost/potting mix samples, potting mix alone is watered with a series of clopyralid concentrations ranging from 200 ug/L to 6 ug/L (ppb) at 50% moisture. Visable effects start at the higher concentrations and, with time, effects the lower concentrations. When the 25 ppb std. show effect from the clopyralid the samples are observed. If growth occurres in the direct planting the detection limit is ~25 ug/kg dry weight. If the 1:4 mix (5 X dilution) is required due to growth inhibition in the direct planting the detection limit is ~125 ug/kg dw. If poor or no growth occur in either dilution NA is reported.
Page 6 A positive results indicate there may be clopyralid present.

Leafgro®
Compost Quality Information

Leafgro® brand compost is a compost and soil amendment manufactured from municipally collected leaves and grass that provides many benefits to soils and plants. **Leafgro®** is rated as 'General Use' compost by the Maryland Department of Agriculture. This compost is approved for unrestricted use and distribution and can be used to improve soils in landscapes, ornamental and vegetable gardens, lawns and in potting mixes.

As a soil amendment, **Leafgro®** brand compost has the following properties:

Quality Parameters	Leafgro® Range	Leafgro® 2002 Average
Nitrogen	1.8 - 2.4 %	2.0 %
Phosphorus	0.2 - 0.6 %	0.51 %
Potassium	0.12 - 1.91 %	1.43 %
Calcium	1.7 – 3.1	2.51 %
Soluble Salts	1.29 – 5.08	3.52 mmhos/c
Bulk Density	15 - 24	19 lbs/cu ft
Organic Matter	44.8 % - 77%	59 %
pH Value	7.0 – 8.19	7.79
Particle Size	Passes 3/8" mesh	
C/N Ratio	12.6 – 23.7	15.5

Extensive testing and continued customer usage have proven this product to be both stable and mature.

Usage Instructions

Leafgro® brand compost has detailed usage instructions listed on the bag. For additional information, please contact the **Maryland Environmental Service** at:

2011 Commerce Park Drive
Annapolis, MD 21401
301.261.8396 (Washington) 410.974.7268 (Baltimore)
888.214.8687 (Toll Free) 410.974.7957 (FAX)
www.menv.com

A&L EASTERN AGRICULTURAL LABORATORIES, INC.

7621 Whitepine Road • Richmond, Virginia 23237 • (804) 743-9401
Fax No. (804) 271-6446

ACCT # 27037

SEND TO:	GROWER:	SUBMITTED BY:
RITCHIE LAND RECLAMATION	RITCHIE LAND RECLAMATION	J STEWART
24024 FREDERICK RD CLARKSBURG MD 20871		

DATE 09/17/03 PAGE 1

SAMPLE ID	LAB NUMBER	PERCENT SAND	PERCENT SILT	PERCENT CLAY	TEXTURAL CLASSIFICATION
BDM1	01691	54.0	37.6	8.4	SANDY LOAM

This report applies only to the sample(s) tested. Samples are retained a maximum of thirty days after testing.

A&L EASTERN AGRICULTURAL LABORATORIES, INC.

* ASTM C-33

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APR 25 2003

STATE OF MARYLAND
STATE HIGHWAY ADMINISTRATION
MATERIALS AND RESEARCH
AGGREGATE TEST REPORT

Original ____
Acceptance ____
I.A.S.T. ____
Final ____

Sampled 3/6/03 Lab. No. 630041 Project Serial No. ____ Other Quality (Experimental, Resample, Re-Stock, Etc.)

of Material FAPCC Quantity Represented ____

No. AAC60B51 F.A.P. No. AC-NH-G-118-1 (53) N

No. ____ Type of Construction Quality Check For All Concrete Items (Description of Exact Use of Material)

Taken From Stockpile Source ✓ Job Site ____

ed By Kent Sand & Gravel (Full Name and Address) Size of Sample 2 Bags

of Supply Massey MD

led By (Full Name) [signature] Witnessed By ____ Federal, County, Municipal Representative's Name

rks: ASR NEEDED

TEST RESULTS

ation	3½	3	2½	2	1¾	1½	1¼	1	¾	⅝	½	⅜	#4	#8
	¾	½	⅜	#4	#8	#10	#16	#20	#30	#40	#50	#80	#100	#200
			100	99	94		81		44		10		1	

ity:

ness Modulus	2.71	Los Angeles Abrasion, % Loss		P.I. Clay Lumps	SAT
hing over #200, % Loss	1.1	Sand Equivalent		L.L. Lt. Wt. Pieces	SAT
r	0	Strength, %		Soft Particles	
ific Gravity	2.61	Sodium Sulfate, % Loss	3.8	Unit Wt - Loose	93.0
rption, %	0.7	Thin or Elongated, %		Unit Wt. - Rodded	101.9

emarks: Results of tests on this sample DO meet specified requirements.

COST PICKED UP
MAR 21 2003
EASTERN REGIONAL LAB

Reviewed & Noted
[signature]
(FOR) JEFFREY E. [illegible]
TRANS. ENGR. MANAGER 1
EASTERN REGIONAL LABORATORY
3-21-03