

State of North Carolina  
Department of Environment,  
Health and Natural Resources  
Division of Solid Waste Management



James B. Hunt, Jr., Governor  
Jonathan B. Howes, Secretary  
William L. Meyer, Director

August 11, 1994

Mr. Dean Brooks  
1195 Beal Road  
Goldston, NC 27252

Dear Mr. Brooks:

The Division of Solid Waste Management, Solid Waste Section, has reviewed your request for approval of a Municipal Solid Waste (MSW) Pilot Composting Project. Approval of this activity is in accordance with the N.C. Solid Waste Management Rules, 15A NCAC 13B .1409 and subject to the following conditions:

- (1) The approval period is from August 16, 1994 to August 16, 1995. If an extension is needed it must be requested by July 1, 1995, with a justification for the extension.
- (2) Composting at this site shall be limited to the materials specified in the application.
- (3) The site shall be prepared to control run-off and run-on. Best management practices shall be utilized for this purpose.
- (4) Within 30 days of completion of the pilot project, or by September 16, 1995, which ever occurs first, two copies of the final report shall be submitted to the Solid Waste Section. The report shall include:
  - a) Volume of each type of waste composted and the mix(es) used;
  - b) Temperature monitoring, pile turning and temperature/time relationship records;
  - c) Testing results of final product; and
  - d) Distribution of final products.
- (5) This approval is subject to immediate revocation if activities on site result in a direct or potential threat to the public health or environment, or significant odor problems. The Division of Solid Waste management reserves the right to apply any other requirements of 15A NCAC 13B Section .1400 as the Division deems necessary during the above approval period.

Mr. Dean Brooks  
August 11, 1994  
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- (6) Operations of the facility and compost monitoring activities will be in accordance with the approved application and Section .1406 of the Solid Waste Management Rules.
- (7) Compost testing, frequency of testing, and reporting of test results shall be in accordance with the approved application and Section .1408 of the Solid Waste Management Rules. All compost shall be tested prior to distribution.
- (8) Classification and distribution of compost shall be in accordance with Section .1407 of the Solid Waste Management Rules.
- (9) This approval is not transferable.
- (10) Prior to commencement of composting activities, notify the Regional Waste Management Specialist, Mr. Mark Fry, at (919) 486-1191. Mr. Fry will be responsible for oversight and inspection of the facility and activities.

Sincerely,



Dexter R. Matthews, Chief  
Solid Waste Section

DRM/sh

cc: Mark Fry



# North Carolina Cooperative Extension Service

NORTH CAROLINA STATE UNIVERSITY  
COLLEGE OF AGRICULTURE & LIFE SCIENCES

Department of Biological and Agricultural Engineering • Box 7625 • Raleigh, NC 27695-7625 • Tel: (919) 515-2675 • FAX: (919) 515-6772

E-Mail: arubin@bae.ncsu.edu  
Fax : 919/515-6772  
Phone : 919/515-6781

Mr. Ted Lyon  
NCDEHNR-DSW  
P. O. Box 27687  
Raleigh, NC 27611

Dear Mr. Lyon:

*Subject: Supplemental Demonstration Permit for Solid Waste Composting With  
Earth Technologies Environmental, Inc., and Dean Brooks to  
Compost Solid Waste Generated at American Dehydrated Foods Facility,  
Harnett County, North Carolina*

The American Dehydrated Foods Company is headquartered in Maryland and has recently constructed an egg waste processing facility in Harnett County, North Carolina. This facility extracts the liquid from waste eggs and chick embryos and process that material into useable protein. The waste or byproduct shell, membrane, cartilage, yolk and albumen are then blended and reduced to a nutrient-rich mixture containing approximately 10% to 12% moisture. This material does compost very well when blended with a suitable bulking material.

Earth Tech Environmental, Inc., in cooperation with Mr. Dean Brooks, desires to utilize these poultry by-products in ongoing compost operations. The site on which the egg waste will be blended with other materials is currently not permitted by any agency. The composting of these poultry by-products will require a permit from the Solid Waste Management Division. The poultry by-products will be blended with wood waste, hatchery waste and other bulking materials to produce a stable compost. Experimental windrows will be created utilizing the egg waste by-product in these ongoing compost operations.

A one-year solid waste demonstration permit should be adequate to thoroughly evaluate compost options, mixtures or blends, and potential uses of the material. Please consider this request submitted on behalf of Mr. O. A. (Buddy) Keller, Mr. Joel Patterson and Mr. Dean Brooks as a formal request for a demonstration permit to compost the egg by-product waste generated at the American Dehydrated Foods (ADF) facility in Harnett County, North Carolina, on the Brooks' site. The facility on which this demonstration will be conducted is located in Chatham County. The proposed site is located on SR2303 in the extreme southern portion of Chatham County, near Goldston. The approximate location of the site is depicted on the attached map of Chatham County.

Employment and program opportunities are offered to all people regardless of race, color, national origin, sex, age, or disability.  
North Carolina State University, North Carolina A&T State University, U.S. Department of Agriculture, and local governments cooperating.

The specifics of this project are:

I. Contact Persons:

O. A. (Buddy) Keller  
919/774-4517

Ken Valdez  
(ADF)  
800/626-3567

Joel Patterson  
919/774-4517

A. R. Rubin  
919/515-6791

Dean Brooks  
919/837-5914

II. Location:

South Central portion of Chatham County on SR 2303 (see attached map)

III. Primary Materials To Be Composted:

The egg waste by-product from the ADF facility will be mixed with woodchip and reed canary grass straw as bulking materials. Experimental windrows will be developed utilizing the egg waste by-product from ADF, the hatchery waste from the facility currently served by Mr. Brooks, and the woodchip/reed canary grass materials previously described. These materials will be mixed or blended prior to preparing the windrow. The purpose of mixing these materials prior to placing them in the windrow is to:

- (1) To provide optimum conditions for rapid decomposition of the organic material.
- (2) Produce a more beneficial product suitable for widespread reuse.
- (3) To promote the beneficial reuse of these waste residuals.

The additives will be blended and mixed prior to placing them in windrows. Materials will be placed in thin (4 inch to 5 inch) lifts beginning at the soil surface and extending up to a height of 18" to 24". The bulking material will be placed in immediate contact with the soil surface, the waste residuals will be placed over the bulking material. A second layer of bulking material will be placed atop the waste residuals. And a final layer of compostable waste will be placed atop the mix pile. This material will then be lifted to a height of 5 feet to 8 feet with a front end loader bucket and tipped to blend, mix and aerate as it falls back to the soil surface. This process of mixing and blending will continue until materials are thoroughly mixed and blended. This process of mixing and blending will continue until the material appears to be homogenous and large clumps of material are broken to particles no more than 2 inches or 3 inches in diameter.

There no specific test which can be conducted to quantify mixing. However, wide variation in the observed characteristics or wide variation in moisture content and solids content with test results from the finish product may indicate that mixing was inadequate and these tests will help to guide the mixing and blending activities in the future. Moisture content will serve as the primary indicator of the efficiency of the mixing, blending, and turning activities. Moisture content in finish product should not vary by more than 10% between composting batches tested for compliance.

Initially, the egg waste by-products from the American Dehydrated Foods will be blended on a 1:1 ratio with the woodchip or reed canary grass straw. The experimental windrows utilizing the egg waste by-product from American Dehydrated Foods, the untreated hatchery waste and the woodchip or reed canary grass bulky agent will be mixed on a 1:1:1 ratio or a 1:1:2 ratio to determine the optimum mix or blend for the dried egg waste, the fresh hatchery waste, and these other bulky material. As the experimental windrows develop, the optimum recipe for composting will be determined. The raw hatchery waste will comprise no more than 25% of any windrow initially.

#### IV. Monitoring :

The temperature in the compost windrows will be monitored 3 times per week using a 36" dial thermometer capable of measuring temperature to 180°F. The purpose of temperature monitoring is to maintain an environment in which the microbial activity within the compost windrows proceeds at a most efficient rate. Careful monitoring of temperature minimizes the time required to produce compost. The optimum temperature for microbial activity in a compost pile is 120°F to 130°F. Microbial activity can be inhibited at temperatures in excess of 160°. Temperature will begin to increase as soon as windrows are formed. Temperature will rise from ambient temperature to 120°F or more during the initial stages of composting. As the temperature reaches a peak at 130°F or 140°F it will then fall. The temperature will fall to below 120° if allowed. Ideally, when the temperature falls from the peak to 120°F windrows will be turned. This will prevent temperatures from falling much below 120°. At least 3 heat cycles will be accomplished before material is considered to be a stable compost.

#### V. Compost Process :

Materials will be blended and mixed as discussed in section 2 above. The material will then be placed in windrows with a maximum height of 5 feet. The maximum width of each windrow will be no more than 20 feet. Temperature monitoring will be accomplished at least 3 times per week and temperatures will be recorded. Windrows will be turned as the temperature falls below 120°F following at least 15 days in the thermophilic range (above 130°F).

The product quality will be evaluated utilizes standard nutrient analyses for nitrogen, phosphorus and potassium, and atomic absorption spectrophometry to measure the levels of calcium, magnesium, sodium, lead, nickel, cadmium, zinc, and copper. These chemical test will be accomplished after the material has proceeded through at least three heatings and a cool cycle.

VI. Compost Process :

Material will be blended as listed in Section III and placed in windrows. The temperature monitoring will be used to determine when windrows will be turned. A SKAT<sup>(tm)</sup> Turner will be used to turn windrows as temperature dictates. Windrows will be turned as temperature falls to levels below 120°F following at least 15 days in the thermophylic range (130°F or above).

Once placed in windrow, material must be covered with 4 inches to 6 inches of product to control odor and reduce exposure of raw waste to insects. Finished compost or yard waste compost will serve as an excellent cover.

VII. By-Product Volume:

The volume of by-product egg waste should be no more than 150 tons/week. Preliminary compost trials do suggest that the material will require approximately 6-8 weeks to compost and approximately 4-6 weeks to cure. Estimated loss through volatilization should be 20-25 percent of the original volume. This is somewhat less than other composts because a significant portion of the material is egg shell or calcium carbonate which will not volatilize. A 16-week cycle is suggested for composting and curing. This 16-week cycle will generate:

$$.75 (150 \text{ tons/week}) \times (12 \text{ wk}) = 1350 \text{ tons}$$

Based on earlier compost trials, the finished compost weighs approximately 1200 lbs/cubic yard. Consequently, the area required for composting must hold:

$$\frac{1350 \text{ tons} \times 2000 \text{ lbs/ton}}{1200 \text{ lbs/cubic yards}} = 2250 \text{ yd}^3$$

The area available must accommodate the 2250 yd<sup>3</sup> produced. A "pad" containing this volume must run a length (L) calculated as:

$$2250 \text{ yds}^3 = \frac{.5 (20 \text{ ft} \times L \times 5 \text{ ft})}{27 \text{ ft}^3/\text{yd}^3}$$

$$L = \frac{2250 \text{ yd}^3 \times 27 \text{ ft}/\text{yd}^3}{.5 (20 \text{ ft}/\text{width}) \times 5 \text{ ft height}}$$

VI. Reporting:

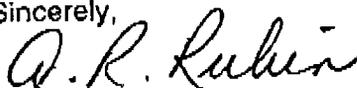
Upon completion of this project, a report will be submitted to the state Solid Waste Management Branch indicating:

- a) The volume of product composted
- b) The time-temperature relationships obtained
- c) The final product quality as nitrogen, phosphorus, potassium, calcium, magnesium, sodium, copper and zinc

Additional metal analyses will be accomplished if deemed necessary. Since the material is primarily food quality by-product, the presence of potentially toxic metals should not be detected; nonetheless, if analyses are required, this will be accomplished as deemed necessary.

I hope this information is adequate to obtain the necessary demonstration permit. If you require additional assistance, please free to contact either Mr. Keller, Mr. Patterson, Mr. Brooks, Mr. Valdez or myself at the telephone numbers provided. I do look forward to working with you on this project to convert this waste material to a valuable by-product.

Sincerely,



A. R. Rubin, Extension Specialist  
and Associate Professor  
Biological and Agricultural Engineering

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encl.

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July 10, 1995

**Dean Brooks**  
1195 Beal Road  
Goldston, NC 27252  
(919)837-5914

Ted Lyon  
State of NC Dept. of Environment  
Health and Natural Resources  
P.O. Box 27687  
Raleigh, NC 27611-7687



Dear Sir:

We are requesting permission to continue composting on our farm site. We feel like we have an ideal location because we own 332 acres in one large track. Most of our close neighbors are poultry growers who are familiar with the smells of composting. We have learned a lot over the last 2 years since we began composting. We feel that we have improved the quality of the compost considerable, and continue to learn more helpful practices through talking to managers of existing composting sites and through reading the large volume of composting journals that we receive. We feel that we are taking a useless product, recycling it back into an organic matter that can better the land. We have sold compost to vegetable growers who have been very pleased with the product. The pasture land that we have spread compost on is doing remarkably well. We have also planted a small garden and flowers in straight compost. Everything is growing very well, with the tomato plants full of tomatoes. Sales are definitely picking up and we hope to have a real strong selling period next spring. Because we were not permitted for sales until May 1, 1995, we missed the larger volume sales. Most of the large volume users, like baggers, locate and purchase their compost in the fall and winter months for the following spring season. We have several baggers that have already requested more information and seem very interested in the compost. We have had some problems with the water run-off containment pond, but hopefully we will have some dry weather soon, and can continue the project. We are committed to doing whatever it takes to finish the job correctly. We are very hopeful that we can have the pond completed by August 16, 1995.

Sincerely,

Dean Brooks

State of North Carolina  
Department of Environment,  
Health and Natural Resources  
Division of Solid Waste Management



James B. Hunt, Jr., Governor  
Jonathan B. Howes, Secretary  
William L. Meyer, Director

August 10, 1995

Mr. Dean Brooks  
1195 Beal Road  
Goldston, N.C. 27252

Dear Mr. Brooks;

The Division of Solid Waste Management, Solid Waste Section, has reviewed your application to continue to operate a Municipal Solid Waste (MSW) Pilot Composting Project on your farm in Chatham Co. The application is considered approved in accordance with the N.C. Solid Waste Management Rules, 15A NCAC 13B .1409 and is subject to the following conditions:

- (1) The approval period is from August 1, 1995 to July 31, 1996. If an extension is desired it must be requested by July 1, 1996 with a justification for the extension.
- (2) Composting at this site shall be limited to the materials specified in the application.
- (3) Best management practices shall be utilized to control run-off and run-on. Appropriate erosion and run-off control measures shall be installed by November 1, 1995.
- (4) An interim report shall be submitted by August 1, 1996 indicating the amount of material composted from July 1, 1995 until June 30, 1996.
- (5) Two copies of a final report shall be submitted to the Solid Waste Section by September 1, 1996. The report shall include:
  - a) Volume of each type of waste composted and the mix(es) used;
  - b) Temperature monitoring, pile turning and temperature/time relationship records;
  - c) Testing results of final product; and
  - d) Distribution of final products.
- (6) This approval is subject to immediate revocation if activities on site result in a direct or potential threat to the public health or environment. The Division of Solid Waste Management reserves the right to apply any other requirements of 15A NCAC 13B Section .1400 as the Division deems necessary during the above approval period.

Mr. Dean Brooks  
August 10, 1995  
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- (7) Operations of the facility and compost monitoring activities will be in accordance with the approved application and Section .1406 of the Solid Waste Management Rules.
- (8) Compost testing, frequency of testing, and reporting of test results shall be in accordance with the approved application and Section .1408 of the Solid Waste Management Rules, except that only the testing provided by the NCDA Waste Analysis and Soils Laboratories and testing for salmonella or coliform bacteria shall be required. Soluble salts, lead, cadmium, and nickel shall be included in the analysis. Copies of the waste analysis shall be forwarded to the Division. All compost shall be tested prior to distribution.
- (9) Classification and distribution of compost shall be in accordance with Section .1407 of the Solid Waste Management Rules. Based on the analysis submitted with the application, the compost is approved for unlimited distribution in accordance with the MSW compost rules.
- (10) This approval is not transferable.
- (11) Mr. Mark Fry, Waste Management Specialist will be responsible for oversight and inspection of the facility and activities. Mr. Fry can be contacted at, 910-486-1191.

Should you have any questions concerning this approval please contact Mr. Ted Lyon at 919-733-0692.

Sincerely,



Dexter R. Matthews, Chief  
Solid Waste Section

DRM/sh  
cc: Mark Fry

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State of North Carolina  
Department of Environment,  
Health and Natural Resources  
Division of Solid Waste Management

James B. Hunt, Jr., Governor  
Jonathan B. Howes, Secretary  
William L. Meyer, Director



August 28, 1996

Mr. Dean Brooks  
1195 Beal Road  
Goldston, NC 27252

Dear Mr. Brooks;

The Division of Solid Waste Management, Solid Waste Section, has reviewed the request from E & A Environmental Consultants to conduct a compost pilot project at your Solid Waste Pilot Composting Facility in Chatham County. Approval of this request is granted in accordance with the NC Solid Waste Management Rules, 15A NCAC 13B .1409 and subject to the following conditions:

- (1) The approval period is from September 1, 1996, to March 1, 1997. If an extension is desired it must be requested prior to February 1, 1997.
- (2) Composting for this project shall be limited to the materials specified in the application submitted by E & A Consultants.
- (3) Best management practices shall be utilized to control surface water run-off and run-on.
- (4) Two copies of a final report shall be submitted to the Solid Waste Section by April 1, 1997. The report shall include the information specified in the proposal.
- (5) This approval is subject to immediate revocation if activities result in a direct or potential threat to the public health or environment, or if the activities create significant undesirable conditions such as odors. The Division of Solid Waste Management reserves the right to apply any other requirements of 15A NCAC 13B Section .1400 as the Division deems necessary during the above approval period.
- (6) Operations of the facility and compost monitoring activities will be in accordance with the approved application and Section .1406 of the Solid Waste Management Rules. Process to further reduce pathogens (PFRP) standards shall be met.
- (7) Compost testing, frequency of testing, and reporting of test results shall be in accordance with the approved application and Section .1408 of the Solid Waste Management Rules. Copies of the test results shall be forwarded to the Division. **All compost shall be tested prior to distribution.**

Mr. Dean Brooks

August 28, 1996

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- (8) Classification and distribution of compost shall be in accordance with Section .1407 of the Solid Waste Management Rules. Compost shall not be distributed prior to Division approval.
- (9) This approval is not transferable.
- (10) Mr. Mark Fry will be responsible for oversight and inspection of the facility and related activities. Mr. Fry should be contacted at 910-486-1191 and Ted Lyon should be contacted at 919-733-0692-ext. 253 prior to the actual start of this demonstration.

Should you have any questions concerning this approval please contact Mr. Ted Lyon at 919-733-0692.

Sincerely,



Dexter R. Matthews, Chief  
Solid Waste Section

DRM/sh

cc: Mark Fry  
Ron Alexander

h/cla/compost/demo/approval/19-Chatham/Brooks/brooke&a.app

## **E & A Environmental Consultants, Inc.**

1130 Kildaire Farm Road, Suite 200

Cary, North Carolina 27511

(919) 460-6266 Fax (919) 460-6798

August 16, 1996

Mr. Ted Lyon  
North Carolina Department of Environment,  
Health and Natural Resources  
P.O. Box 27687  
Raleigh, NC 27611-7687

Dear Ted:

E&A Environmental Consultants, Inc. (E&A) would like to request approval to operate a refuse derived fuel (RDF) unders pilot/demonstration composting project at Brooks Egg Farm's composting facility in Chatham County. We are interested in beginning the project as soon as possible and would be very appreciative of your timely response. The following summarizes key aspects of the project:

### **Project Participants and Responsibilities:**

E&A Environmental Consultants, Inc.  
1130 Kildaire Farm Road, Suite 200  
Cary, NC 27511-4561  
Phone: (919) 460-6266  
Fax: (919) 460-6798

***E&A Project Management:*** Ron Alexander and Todd Williams  
E&A is responsible for designing, directing and overseeing all aspects of the project and will provide some process monitoring services.

Brooks Egg Farm (Brooks)  
1195 Beal Road  
Goldston, NC 27252  
Phone: (919) 837-5914

***Brooks Project Management:*** Dean and July Brooks  
Brooks is responsible for providing yard waste, specialty equipment, skilled personnel and some process monitoring services for the project.

Vedco Energy (Vedco)  
11757 Katy Freeway, Suite 1420  
Houston, TX 77079  
Phone: (713) 558-4300  
Fax: (713) 293-0240

***Vedco Project Management:*** Alan McDonald  
Vedco is responsible for providing the RDF unders and funding the project.



Mr. Ted Lyon  
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### Location

We will operate the pilot project at Brooks' Beal Road composting facility which is currently operating under a pilot composting project letter of approval with the Department of Environment, Health and Natural Resources. The pilot will be performed on Brooks' upper composting pad which is constructed out of compacted clay and gravel.

### Materials to be Composted

Refuse derived fuel unders from Vedco/BCH Energy's waste-to-energy facility in Fayetteville, North Carolina will be composted alone and blended with locally obtained yard waste. RDF unders are the moist organic fraction of refuse which is not suitable for burning at a waste-to-energy-facility. Four piles will be constructed. Three piles will contain a 50/50 mix of RDF unders and yard waste, 25 cubic yards of each, and the other pile will be pure RDF unders (25 cubic yards). Approximately one hundred cubic yards (100 CY) of RDF unders and seventy five cubic yards (75 CY) of yard waste will be composted during the pilot. The three RDF unders/yard waste piles will be composted using different techniques, aerated static pile, aerated windrow and unaerated windrow. The pure RDF unders will be composted using the turned windrow method (unaerated). A chemical analysis of the RDF unders is attached.

### Project Timeframe

We seek approval for operating the composting pilot for up to 90 days. Our initial goal is to actively compost for three weeks, followed by three weeks of curing to determine if a suitable landfill cover material may be produced. If not, curing may be continued for several more weeks. Depending upon economic factors, the pilot may be operated for an additional six weeks past the initial composting/curing phase to determine the length of time necessary to produce a horticultural grade product.

### Project Goals

There are several objectives of the pilot project. The goal of Vedco is to determine if composting is an economic alternative to landfilling RDF unders. Our main technical goal is to determine process parameters necessary to effectively compost RDF unders in an economic and nuisance free manner. Other technical goals are as follows:

1. Evaluate composting performance using various low tech methods.
2. Determine benefits of, and necessity to use a bulking agent such as yard waste.
3. Determine the processing time necessary to produce a product suitable for landfill cover and possibly, horticultural use.
4. Evaluate odor generation and identify means to reduce and control it during full scale production.

### Process Description

Four piles will be constructed and composted as described below:  
Feedstock preparation and pile construction will entail the following steps:



Mr. Ted Lyon

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1. Shred the bulking material (yard waste) separately to a particle size of two inches minus (will be done before RDF unders arrive on site)
2. Combine RDF unders with bulking material at the volumetric ratio previously determined. RDF unders will be mixed with bulking material using a front-end loader or windrow turner.
3. Construct a wood chip base over aeration pipe to form an aeration plenum. This will allow for the efficient distribution of air throughout the compost pile.
4. The mixed material from Step 2 will then be formed into a windrow. The mix will be turned at least five times by a turning machine, or other suitable device, in the windrow piles.
5. Cover the aerated static pile with a one-foot insulation layer of shredded yard waste.
6. Three of the four piles will have blowers that will be timer controlled based on temperature measurements independent of the other piles.

All piles will be composted using methods approved by the DEHNR to assure the protection of public health. Appropriate temperatures and number of pile turnings will be met.

The following table summarizes the planned pile mixtures and configurations:

Compost Pile Design Information

|   | ASP <sup>a</sup> | ATW1 <sup>b</sup>           | ATW2 <sup>c</sup>           | UTW <sup>d</sup>   |
|---|------------------|-----------------------------|-----------------------------|--------------------|
| Number of Piles                                 | 1                | 1                           | 1                           | 1                  |
| Pile Volume (yd <sup>3</sup> )                  | 50               | 50                          | 50                          | 25                 |
| Pile Dimensions (LxWxH ft)                      | 31 x 15 x 6      | 31 x 15 x 6                 | 15 x 15 x 6                 | 31 x 15 x 6        |
| Aeration  | negative         | negative mechanical turning | negative mechanical turning | mechanical turning |
| Aeration Capacity (cfm)                         | 1,000            | 1,000                       | 1,000                       | none               |
| Processing Time (weeks)                         |                  |                             |                             |                    |
| Composting                                      | 3                | 3                           | 3                           | 3                  |
| Curing  | 3                | 3                           | 3                           | 3                  |
| RDF Unders Required (yd <sup>3</sup> )          | 25               | 25                          | 25                          | 25                 |
| Bulking Agent (yd <sup>3</sup> )<br>Yard Debris | 25               | 25                          | 0                           | 25                 |

<sup>a</sup>Aerated Static Pile

<sup>d</sup>Un-aerated Turned Windrow

<sup>c</sup>Aerated Turned Windrow 2

<sup>b</sup>Aerated Turned Windrow 1

Pile Dimensions (l x w)



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Testing Procedures

Intensive testing will be performed during the pilot in order to closely monitor the composting process. The process monitoring schedule below outlines the parameters to be tested and their frequency.

**Process Monitoring Schedule**

| NUMBER OF TESTS TO BE PERFORMED<br>LABORATORY ANALYSES |            |             |                 |    |    |             |    |    |             |
|--|------------|-------------|-----------------|----|----|-------------|----|----|-------------|
| Analyses   | Feed-stock | Initial Mix | Composting Week |    |    | Curing Week |    |    | Total Tests |
|  |            |             | 1               | 2  | 3  | 1           | 2  | 3  |             |
| Total Solids   | 2          | 4           |                 | 8  | 8  | 8           | 8  | 8  | 51          |
| Volatile Solids  | 2          | 4           |                 | 8  | 8  | 8           |    | 8  | 43          |
| pH   | 2          | 4           |                 | 8  | 8  | 8           |    | 8  | 43          |
| TKN  | 2          | 4           |                 |    | 4  |             |    | 4  | 19          |
| NH <sub>4</sub> -N                                     | 2          | 4           |                 |    | 4  |             |    | 4  | 19          |
| NO <sub>3</sub> -N                                     | 2          | 4           |                 |    | 4  |             |    | 4  | 19          |
| Carbon Dioxide Respiration Rate                        |            |             |                 |    | 4  |             |    | 4  | 8           |
| Heavy Metals   |            |             |                 |    | 1  |             |    | 1  | 2           |
| Temperature <sup>a</sup>                               |            |             | 60              | 60 | 60 | 60          | 60 | 60 | 360         |
| Oxygen <sup>b</sup>                                    |            |             | 16              | 16 | 16 | 6           | 6  | 6  | 36          |
| Bulk Density   | 2          | 8           |                 | 4  | 4  | 4           | 4  | 4  | 35          |
| Pile Height  |            | 8           |                 | 8  | 8  | 8           | 8  | 8  | 48          |
| Headloss   |            |             | 3               |    | 3  | 3           |    | 3  | 12          |
| Odorous Compounds <sup>c</sup>                         |            |             | √               | √  | √  | √           |    | √  |             |

<sup>a</sup>Temperature will be determined daily in each pile at three locations.

<sup>b</sup>Oxygen levels will be determined two times per week in each pile at three locations.

<sup>c</sup>Odorous compounds analysis entails the field analysis of gases collected from each pile using gas detection tubes for specific compounds such as ammonia, hydrogen sulfide, mercaptans, amines and organic acids.

Following the six weeks of processing, aside from the tests to be completed at the end of the third week of curing (outlined above) we will also test the final product for soluble salts content, pathogen content, particle size



Mr. Ted Lyon  
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gradation, carbon-to-nitrogen ratio, maturity, foreign matter content, and other less quantitative parameters such as odor, texture, color and visual appearance. This evaluation will assist us in determining the products potential end use applications.

Specific test protocols or methodologies to be used can be supplied upon request.

**Final Disposition of Compost**

Except for a small sample of product which will be preserved by Vedco Energy and E&A, all of the finished product will be disposed of at a permitted sanitary landfill. If allowed by the Solid Waste Section, we would consider testing the product as a landfill cover material or perhaps using it in an associated application. We plan to discuss this possibility with Department staff at a later date.

**Final Report**

E&A will submit a final report to the DEHNR at the conclusion of the project. The report will include section outlines as follows:

1. Project background and purpose
2. Composting trial protocols and testing procedures
3. Process description and monitoring results
4. Project management
5. Final product characterization and potential usage
6. Conclusions/Results

We hope this request for authorization provides the data necessary for the Solid Waste Section to evaluate and approve this demonstration project. E&A and Brooks will work closely together throughout the project and are in agreement as to project responsibilities, procedures and goals.

If you require any additional information, please do not hesitate to contact me or Todd Williams. Thank you for your consideration.

Sincerely,

E&A Environmental Consultants, Inc.



Ronald Alexander  
Product Marketing Specialist/Senior Scientist

RA:jwl



Customer: **QCH Energy, L.P.**  
 Fayetteville, NC 28301



# Waste Analysis Report

Farm:

Cumberland County

Report No: **W00788 W**  
 Copies To: County Extension Director  
 USDA, ARS-Cumberland  
 Woodruff, Fenneth L.  
 Woodruff, Fenneth L.  
 PO Box 42  
 Morrisville, PA 19067

3: 6:96

**Sample Info:** Laboratory Results (parts per million unless otherwise noted)

| Sample ID:                                | DMP%  | N    | P    | K    | Ca   | Mg    | S    | Fe   | Mn   | Zn   | Cu   | B    | Mo   | Cl   | Na   | Ni   | Cd | Pb |
|---|-------|------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|----|----|
| 7696                                      | 10772 | 2938 | 1481 | 3375 | 1082 | 14127 | 2183 | 589  | 190  | 348  | 162  | 2425 | 611  | 0.00 | 48.4 |      |    |    |
| <b>Nutrients Available for First Crop</b> |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |    |    |
| <i>Application Method</i>                 |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |    |    |
| Broadcast                                 | N     | P205 | K20  | Ca   | Mg   | S     | Fe   | Mn   | Zn   | Cu   | B    | Mo   | Cl   | Na   | Ni   | Cd   | Pb |    |
| Soil Incorp                               | 8.3   | 6.0  | 2.2  | 31.0 | 1.0  | 13.1  | 2.0  | 0.05 | 0.18 | 0.05 | 0.01 | 3.7  | 0.01 | 0.00 | 0.00 | 0.07 |    |    |
| <i>Soil Incorp</i>                        |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |    |    |
|   | 10.0  | 7.5  | 2.5  | 38.8 | 1.3  | 16.3  | 2.5  | 0.07 | 0.22 | 0.04 | 0.02 |      |      |      |      |      |    |    |

**Recommendations:**  
 We found low concentrations of Ni and Pb in the samples. Nutrient levels are generally low. Nitrogen, calcium, and sulfur are generally in highest concentrations. Zinc and copper are also very low. The material should be fine for composting.

C. Pat Campbell, Agronomist

**Sample Info:** Laboratory Results (parts per million unless otherwise noted)

| Sample ID:                                | DMP%  | N    | P    | K     | Ca   | Mg    | S    | Fe   | Mn   | Zn   | Cu   | B    | Mo  | Cl   | Na   | Ni   | Cd | Pb |
|---|-------|------|------|-------|------|-------|------|------|------|------|------|------|-----|------|------|------|----|----|
| 7229                                      | 12599 | 2520 | 321  | 36858 | 2520 | 13709 | 3740 | 546  | 513  | 249  | 217  | 2576 | 293 | 0.00 | 21.2 |      |    |    |
| <b>Nutrients Available for First Crop</b> |       |      |      |       |      |       |      |      |      |      |      |      |     |      |      |      |    |    |
| <i>Application Method</i>                 |       |      |      |       |      |       |      |      |      |      |      |      |     |      |      |      |    |    |
| Broadcast                                 | N     | P205 | K20  | Ca    | Mg   | S     | Fe   | Mn   | Zn   | Cu   | B    | Mo   | Cl  | Na   | Ni   | Cd   | Pb |    |
| Soil Incorp                               | 9.4   | 5.2  | 0.46 | 33.0  | 2.3  | 12.3  | 3.4  | 0.05 | 0.05 | 0.02 | 0.02 | 3.8  | T   | 0.00 | 0.00 | 0.03 |    |    |
| <i>Soil Incorp</i>                        |       |      |      |       |      |       |      |      |      |      |      |      |     |      |      |      |    |    |
|   | 11.3  | 6.5  | 0.52 | 41.2  | 2.8  | 15.3  | 4.2  | 0.06 | 0.06 | 0.03 | 0.02 |      |     |      |      |      |    |    |

**Sample Info:** Laboratory Results (parts per million unless otherwise noted)

| Sample ID:                                | DMP%  | N    | P    | K     | Ca   | Mg   | S    | Fe   | Mn   | Zn   | Cu   | B    | Mo   | Cl   | Na   | Ni   | Cd | Pb |
|---|-------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|----|----|
| 3229                                      | 14733 | 1635 | 1941 | 15384 | 1058 | 5982 | 4693 | 92.2 | 149  | 259  | 139  | 3221 | 488  | 0.00 | 37.4 |      |    |    |
| <b>Nutrients Available for First Crop</b> |       |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |    |    |
| <i>Application Method</i>                 |       |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |    |    |
| Broadcast                                 | N     | P205 | K20  | Ca    | Mg   | S    | Fe   | Mn   | Zn   | Cu   | B    | Mo   | Cl   | Na   | Ni   | Cd   | Pb |    |
| Soil Incorp                               | 11.1  | 3.4  | 2.8  | 34.1  | 0.96 | 5.4  | 4.3  | 0.08 | 0.14 | 0.02 | 0.01 | 4.9  | 0.01 | 0.00 | 0.00 | 0.06 |    |    |
| <i>Soil Incorp</i>                        |       |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |    |    |
|   | 13.4  | 4.2  | 3.2  | 17.7  | 1.2  | 6.8  | 5.3  | 0.10 | 0.17 | 0.03 | 0.02 |      |      |      |      |      |    |    |

Sample Info:

Sample ID: 4319

Waste Code: V50

Description: Municipal (Other)

Laboratory Results (Parts Per million unless otherwise noted)

| DNM  | N     | P    | K   | Ca    | Mg   | S     | Fe   | Mn  | Zn   | Cu   | B    | Mo | Cl | Na   | Ni  | Cd   | Pb   |
|------|-------|------|-----|-------|------|-------|------|-----|------|------|------|----|----|------|-----|------|------|
| 7960 | 14304 | 2296 | 835 | 42901 | 1842 | 15856 | 4986 | 115 | 91.8 | 41.3 | 23.7 |    |    | 3195 | 420 | 1.39 | 42.8 |

Nutrients Available for First Crop

| Ibs/ton (wet basis) |      |      |     |      |     |      |     |      |      |      |      |    |    |     |      |    |      |
|---------------------|------|------|-----|------|-----|------|-----|------|------|------|------|----|----|-----|------|----|------|
| Application Method  | N    | P2O5 | K2O | Ca   | Mg  | S    | Fe  | Mn   | Zn   | Cu   | B    | Mo | Cl | Na  | Ni   | Cd | Pb   |
| Broadcast           | 11.4 | 5.0  | 1.3 | 41.0 | 18  | 15.2 | 4.8 | 0.11 | 0.09 | 0.04 | 0.02 |    |    | 5.5 | 0.01 | T  | 0.07 |
| Soil Incep          | 13.7 | 6.3  | 1.4 | 51.2 | 2.2 | 18.9 | 6.0 | 0.14 | 0.11 | 0.05 | 0.03 |    |    |     |      |    |      |

Other Elements

Diston (wet basis)

Soil Incep

## ANALYTICAL REPORT FOR:

KENNETH L. WOODRUFF ASSOCIATES  
182 WALTON DRIVE  
P.O. BOX 42  
MORRISVILLE, PA 19067

ATTN: MR. KENNETH L. WOODRUFF

Project: VEDCO OOB/BCH ENERGY, L.P.-COMPOST

Test Report Date: March 14, 1996

MAC Job Number: L960597

Sample Receive Date: March 04, 1996

| Lab No.   | Client ID | Coll. Date | Parameter            | Result | MDL | Qual Units | Ext. Date | Anal. Date |
|-----------|-----------|------------|----------------------|--------|-----|------------|-----------|------------|
| L960597-1 | 1229      | 29 FEB-96  | Percent Moisture     | 38     | 0.5 | %          |           | 06-MAR-96  |
| L960597-1 | 1229      | 29-FEB-96  | Total Organic Carbon | 26000  | 450 | > mg/kg dw |           | 13-MAR-96  |
| L960597-1 | 1229      | 29-FEB-96  | Total Solids         | 62.4   | 0.5 | %          |           | 06-MAR-96  |
| L960597-2 | 2229      | 29-FEB-96  | Percent Moisture     | 27     | 0.5 | %          |           | 06-MAR-96  |
| L960597-2 | 2229      | 29-FEB-96  | Total Organic Carbon | 38000  | 720 | > mg/kg dw |           | 13-MAR-96  |
| L960597-2 | 2229      | 29-FEB-96  | Total Solids         | 72.1   | 0.5 | %          |           | 06-MAR-96  |
| L960597-3 | 3229      | 29-FEB-96  | Percent Moisture     | 39     | 0.5 | %          |           | 06-MAR-96  |
| L960597-3 | 3229      | 29-FEB-96  | Total Organic Carbon | 41000  | 880 | > mg/kg dw |           | 13-MAR-96  |
| L960597-3 | 3229      | 29-FEB-96  | Total Solids         | 61.4   | 0.5 | %          |           | 06-MAR-96  |

## Method References:

\* PERCENT MOISTURE - 2540G/D TOC - 415.1 TS - 160.3

## Explanation of Symbols:

- \* ND - Not detected above the Method Detection Level (MDL).
- \* dw - dry weight
- \* J - Estimated value

Ign Lambert  
Laboratory Director

Signature

## Certifications:

PH-0726(CT), 2035(NH), 03117(NJ), 11022(NY), 68-379(PA), 160(MD)

State of North Carolina  
Department of Environment,  
Health and Natural Resources  
Division of Solid Waste Management

James B. Hunt, Jr., Governor  
Jonathan B. Howes, Secretary  
William L. Meyer, Director



August 16, 1996

Mr. Dean Brooks  
1195 Beal Road  
Goldston, NC 27252

Dear Mr. Brooks;

The Division of Solid Waste Management, Solid Waste Section, has reviewed your request for an extension of your Solid Waste Pilot Composting Project in Chatham County. Approval of this request is granted in accordance with the NC Solid Waste Management Rules, 15A NCAC 13B .1409 and subject to the following conditions:

- (1) The approval period is extended to March 1, 1997. If you wish to continue the operation of this facility after that date all appropriate steps shall be taken to obtain a permit for the operation of the facility prior to March 1, 1997.
- (2) Composting at this site shall be limited to the materials specified in the original application for the site except that source separated mixed paper may also be composted at the facility.
- (3) Best management practices shall be utilized to control surface water run-off and run-on.
- (4) Two copies of a final report shall be submitted to the Solid Waste Section by April 1, 1997. The report shall include:
  - a) Volume of each type of waste composted and the mixes used;
  - b) Temperature monitoring and pile turning records;
  - c) Testing results of the final product; and
  - d) Distribution of final products.
- (5) This approval is subject to immediate revocation if activities on site result in a direct or potential threat to the public health or environment, or if the activities create significant undesirable conditions such as odors. The Division of Solid Waste Management reserves the right to apply any other requirements of 15A NCAC 13B Section .1400 as the Division deems necessary during the above approval period.
- (6) Operations of the facility and compost monitoring activities will be in accordance with the approved application and Section .1406 of the Solid Waste Management Rules. Process to further reduce pathogens (PFRP) standards shall be met.

Mr. Dean Brooks

August 16, 1996

Page 2

- (7) Compost testing, frequency of testing, and reporting of test results shall be in accordance with the approved application and Section .1408 of the Solid Waste Management Rules and the application. Copies of the test results shall be forwarded to the Division. **All compost shall be tested prior to distribution.**
- (8) Classification and distribution of compost shall be in accordance with Section .1407 of the Solid Waste Management Rules. Compost shall not be distributed prior to Division approval.
- (9) This approval is not transferable.
- (10) Mr. Mark Fry will be responsible for oversight and inspection of the facility and related activities. Mr. Fry may be contacted at 910-486-1191

Should you have any questions concerning this approval please contact Mr. Ted Lyon at 919-733-0692.

Sincerely,



Dexter R. Matthews, Chief  
Solid Waste Section

DRM/sh

cc: Mark Fry

<h:/cla/compost/demo/approval/19-Chatham/Brooks/brooks.app>