4110Permit1997 - Batch No.___

4/10/1997

GUILFORD CO.

# State of North Carolina

**Department of Environment, Health, and Natural Resources**
**Division of Waste Management**

## SOLID WASTE YARD WASTE FACILITY ANNUAL REPORT

### FOR THE PERIOD OF JULY 1, 1997 - JUNE 30, 1998

A copy of this report must be sent to the county manager of each county from which waste was received.

HIGH POINT CITY OF - YARD WASTE FAC
PO BOX 230
HIGH POINT, NC 27261

Permit: 4110 Id: P0491

Attn: PERRY KAIRIS

Phone: (910) 883-3215
Fax: (910) 883-3419

**If you have questions or require assistance in completing this report, contact your Regional Waste Management Specialist. Completed forms must be returned by August 1, 1998 to:**

Hugh Jernigan
585 Waughtown Street
Winston-Salem, NC 27107-2241 (910) 771-4600

Tipping Fee $ 36.00 /Ton (Attach a schedule of tipping fees if appropriate.)

1. Indicate yard waste received at this facility during the period of July 1, 1997, through June 30, 1998 by county of origin. (Note: Number of cubic yards divided by 5 equals number of tons. Also, one cubic yard equals 400 lbs.)

| MONTH | TONS FROM Guilford COUNTY | TONS FROM Randolph COUNTY | TONS FROM Davidson/Forsyth COUNTY | | TOTAL |
|---|---|---|---|---|---|
| July | 494.71 | .76 | .09 | .13 | 495.69 |
| August | 504.09 | .40 | - | .69 | 505.18 |
| September | 486.18 | 1.67 | - | .13 | 487.98 |
| October | 549.41 | - | .21 | - | 549.62 |
| November | 799.87 | - | - | - | 799.87 |
| December | 1,300.47 | .14 | - | .30 | 1,300.91 |
| January | 1,032.26 | - | - | - | 1,032.26 |
| February | 403.11 | .08 | - | .04 | 403.23 |
| March | 703.39 | .14 | .3 | 1.71 | 705.54 |
| April | 970.70 | .08 | .42 | .21 | 971.41 |
| May | 1,242.35 | 6.14 | - | 1.55 | 1,250.04 |
| June | 1,041.59 | 7.42 | .15 | .25 | 1,049.41 |
| TOTAL | 9,528.13 | 16.83 | 1.17 | 5.01 | 9,551.14 |

(Photocopy the Table and use when waste is received from more than three counties.)

# CITY OF HIGH POINT

NORTH CAROLINA

## The compost and mulch produced at Ingleside Compost Facility are Type 1 facility products:

- Contain minimal pathogenic organisms
- Are free from offensive odor
- Contain no sharp particles that would cause injury to persons handling compost
- Have unrestricted applications and distributions

- Recommended uses
  - soil additives for gardens and lawns
  - use for natural areas around shrubbery and flowers
  - newer mulch should not be placed around young plants

P.O. BOX 230, 211 S. HAMILTON STREET, HIGH POINT, NORTH CAROLINA 27261 FAX 910-883-3419 TDD 910-883-8517

## Part V. Mulching and Composting

*Yard waste may not be disposed in sanitary landfills, incinerators, or in unpermitted sites and it is illegal to burn. The following questions pertain to the management of yard waste and other organic materials.*

1. Did your municipality provide service for managing yard waste generated from residents? ☒ Yes (report tons in chart below) ☐ No

2. Do you accept pallets for mulching or composting?
   ☐ Yes (report tons in chart below) ☒ No

3. Do you accept Christmas trees for mulching or composting?
   ☒ Yes (report tons in chart below) ☐ No

4. What types and quantities of materials were managed in your program? **Provide information in TONS <u>OR</u> CUBIC YARDS of <u>material received</u>.** For conversion purposes, use 400 lbs./cubic yd.

| **Destination** | **Material Collected/ Accepted? (✓)** | **Material** (check appropriate boxes) | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Leaves and Grass** | | **Limbs ☐, Brush ☐, Trees ☐, Stumps ☐, and Pallets ☐** | | **Mixed** | |
| | | tons | Yds³ | Tons | yds³ | Tons | Yds³ |
| A. End user (to farmer or home-owner) | ☐ | | | | | | |
| B. Your own local government's mulch or compost facility | ☒ | 5,566.92 | | 3,929.88 | | | |
| C. Other public mulch or compost facility | ☐ | | | | | | |
| D. Private mulch or compost facility | ☐ | | | | | | |
| E. C&D landfill | ☐ | | | | | | |
| F. LCID Landfill | ☐ | | | | | | |
| **Total** | | 5,566.92 | | 3,929.88 | | | |

YARD WASTE MANAGEMENT FORMULA: Use this formula for each truck you use in your yard waste management program. Put the grand total for all trucks in the appropriate boxes above. *Ex. 10 yd³ truck x 3 days/wk x 16 wks = 480 yd³*

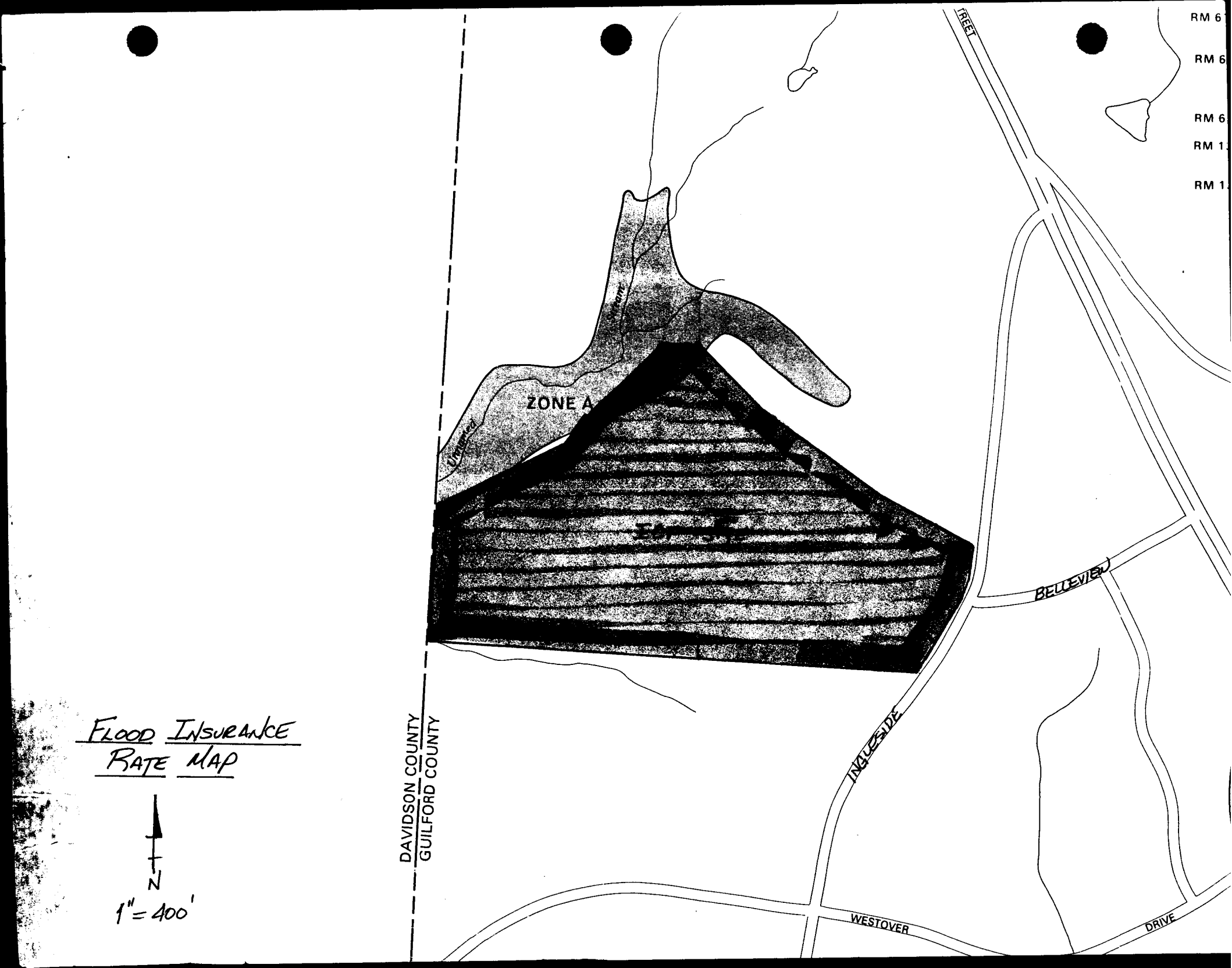
_____ X _____ X _____ = _____ *yd³*

Size of truck (in yards) Avg. no. of times truck fills each week # of weeks truck is used during year TOTAL

5. Did your municipality in any way provide either of the following?

   ☐ C&D recycling ☐ C&D salvage/reuse

   If yes, check all materials that were included (tonnages should be reported in tonnage table, pg 5):
   ☐ clean wood ☐ painted or treated wood ☐ brick, concrete, asphalt, etc ☐ gypsum/sheet rock
   ☐ vinyl siding/plastics ☐ asphalt shingles ☐ glass/porcelain ☐ other _____


FLOOD INSURANCE
RATE MAP
N
1" = 400'
DAVIDSON COUNTY
GUILFORD COUNTY
ZONE A
Stream
Unnamed
INGLESIDE
BELLEVIEW
WESTOVER
DRIVE
STREET
RM 6
RM 6
RM 6
RM 1
RM 1

4110Permit1998 - Batch No.___

4/10/1998

GUILFORD CO.

-Booklet-

41-10

Re: Report of Site Evaluation
Ingleside Composting Facility

Dec. 15th, 1998

**G.N. RICHARDSON & ASSOCIATES**
Engineering and Geological Services

December 15, 1998

Mr. Duane Jarman
Solid Waste Manager
Department of Public Services
P.O. Box 230
High Point, North Carolina 27261

**RE: Report of Site Evaluation**
**Ingleside Composting Facility**

Dear Duane:

G.N. Richardson & Associates (GNRA) is pleased to present this report of a site evaluation performed on December 9, 1998 at the referenced site. The evaluation consisted of a site reconnaissance and test pit investigation to characterize subsurface conditions, in partial fulfillment of NC DENR Division of Waste Management (NC DWM) requirements for a permit renewal application. This evaluation was performed at your request and was assisted by Mr. Steve Pendry and Mr. James Hussey of the City of High Point. This report describes the findings of our site evaluation and draws specific conclusions regarding facility capacity, as well as soil and ground water conditions at the site.

**Project Description**

The site is a Type 1 Composting Facility, as defined by North Carolina solid waste rule 15A NCAC 13B .1405 et seq. The facility is owned and operated by the City of High Point for the exclusive use of the City and its constituents. The facility accepts only yard wastes, pursuant to its permit, which was observed to comprise leaves, limbs, some larger wood debris, grass clippings and other vegetative debris that is considered to be yard wastes. There is an on-site scales, with a certified operator, and a full-time crew and supervisor. Mr. Pendry estimated that the facility receives approximately 10,000 tons of yard wastes annually (average, last 3 years).

Mr. Hussey described the overall material handling process. Woody vegetative debris, received all year long, are ground or shredded as needed prior to stockpiling as wood mulch. Leaves are received by the facility in the autumn months, comprising the chief carbon source. The leaves are stored in windrows on an asphaltic concrete composting pad, which measures approximately 500 by 175 feet. The windrows are turned periodically, as needed determined by temperature measurement — typically every week or two during the winter season, more often in the warmer seasons.

In the spring and summer months, grass clippings provide the chief nitrogen source, which is added to the windrows and blended as needed based on temperature. The compost typically matures in a few weeks following introduction of nitrogen sources, and the mature compost is screened (using the City's equipment) and stockpiled until sold to the public. The stock pile area has much more potential storage area than is typically required.

The entire site covers approximately 14 acres, with an active working area of about 5 acres, including the asphaltic concrete windrow pad. The concrete is supported on a soil embankment. The facility was constructed about 5 years ago. The site is located on a relatively broad ridge top, with drainage divided to the west (primary drainage direction for the active composting/storage areas) and toward the north east (mowed area north of scale house). Traffic access is from the east via Bellevue Street, crossing Ingleside Drive at the gate). The entire site is fenced. Surface water drainage is good, with very little surface ponding, despite the 0.8 inches of rain that fell overnight prior to the site visit. Sedimentation and erosion control features appear to be functional.

Original site preparation required minor grade cuts to the eastern side of the site, where natural rock exposures were noted, and embankment fills estimated to vary to 12 feet in thickness to the west side of the property. Much of the fill was brought in during construction of the Wal-Mart on U.S. 311, according to Mr. Pendry, including a layer of reddish clayey soils that reportedly "capped" the entire embankment area prior to construction of the composting facility. These soils were encountered in some of the test pits, described later.

**Facility Capacity**

Based on the facility operations descriptions provided by the site managers, a full autumn season's leaves can be stored on the asphaltic concrete pad, followed by a full spring/summer season's grass and other vegetative debris above the leaves. After composting (and associated bulk volume reduction), the stockpiles provide in excess of a full year's storage of finished compost. This provides, at a minimum, two year's operating capacity at the estimated 10,000 tpy intake. However, there are unused portions of the site within the 50-foot buffers that could be utilized for composting and/or storage, if needed, and ample space for storing completed compost adjacent to the asphaltic concrete pad. In short, the facility has more than sufficient space and buffer for the current operations.

**Soil and Ground Water**

Five (5) test pits were dug on the premises with a rubber-tire backhoe, as shown on the attached site map. Three pits (TP-1, -2 and -3) were dug near the asphaltic concrete pad, in the active composting and storage areas, underlain by man-made embankment. Two others (TP-4 and -5) were dug in the eastern areas, underlain by natural ground. The test pits were extended to depths of 4 to 6 feet, except where asphaltic concrete debris (in the embankment fill) or bedrock resulted in refusal conditions. Representative samples of the various soils were taken for visual identification per the Unified Soil Classification System and further evaluation, if needed. Table 1 presents a summary of conditions encountered at each test pit location.

Near the asphaltic concrete pad, test pits encountered a layered mix of organic soils (silty clay mixed with composted materials and/or gravel), stiff orange clayey silt (imported borrow) and a dry gravelly silt (resembling crusher run). The clayey soils, found in a 3 to 6+ foot thick horizon, were moist and very plastic, owing to the high clay content (estimated at 30 to 40 percent) and the presence of abundant mica. The plasticity is generally an indication of a high field capacity

(moisture retention) and a low permeability. The embankment soils appeared to be well compacted.

There were no saturated zones encountered within the soil embankment, except that the surficial soils were wet from the previous night's precipitation. There was no indication of ground water movement within the upper 4 to 6 feet beneath the asphaltic concrete pad. The test pits in the central and west portions of the site did not encounter natural soils, due to depth of the embankment, but past experience suggests that permanent ground water levels are deeper than the embankment section.

To the east of the asphaltic concrete pad, test pits encountered tan slightly clayey silty fine to coarse sands, derived from a parent bedrock exposed near one of the test pits (TP-4). The natural soils were dry to slightly moist and showed no residual texture or staining that would suggest the presence of shallow ground water. These soils exhibited slight to moderate plasticity, indicating a rather high (estimated 15 to 20 percent) clay content and a moderately high field capacity.

The asphaltic concrete pad and clayey fill soils observed near the pad limit surface water infiltration. Much of the site is graded and compacted, or covered with pavements. Based on topographic relationships and the test pit observations, ground water recharge from the active composting and storage areas is minimal. Ground water levels across the site are probably in excess of 20 feet, including both the active composting and storage areas and the undeveloped areas to the east.

**Summary of Findings**

- The site appears to be well managed, with adequate surface grades and storm water management features to minimize surface ponding.
- The active composting occurs on an asphaltic concrete pad, which is supported on a man-made embankment fill, with fill depths varying to an estimated 12 feet along the west side of the active area.
- The embankment fill was capped with a 2 to 3 foot thickness of compacted clayey silt during construction of the composting facility.
- The clayey horizon, in conjunction with the pavements and other hardened surfaces on the site, is believed to provide a barrier against downward migration of water.
- Drainage within active areas is to the west.
- The overall site is underlain by stable soils derived from a granitic bedrock.
- None of the excavated soils showed signs of ground water movement. The soils were generally slightly moist to dry, except in the upper few inches beneath the surface.

- No ground water or saturated zones were encountered within 4 to 6 feet beneath the ground surface.
- Based on topographic relationships and subsurface conditions encountered in the test pits, ground water depths are estimated to be in excess of 20 feet.
- At the estimated 10,000 tpy intake, there is more than ample developed space to conduct site operations, with at least 2+ years of available material processing and storage capacity.
- This estimated facility capacity discounts potential undeveloped areas and public demand for the finished compost.

**Closing**

GNRA appreciates the opportunity to be of continued service to the City of High Point. If you should have further questions, or if we may be of further service, please contact us at your convenience.

Very Truly Tours,
**G.N. Richardson & Associates**

G. David Garrett, P.G.
Vice President, Senior Geologist
N.C. Geology License No. 983

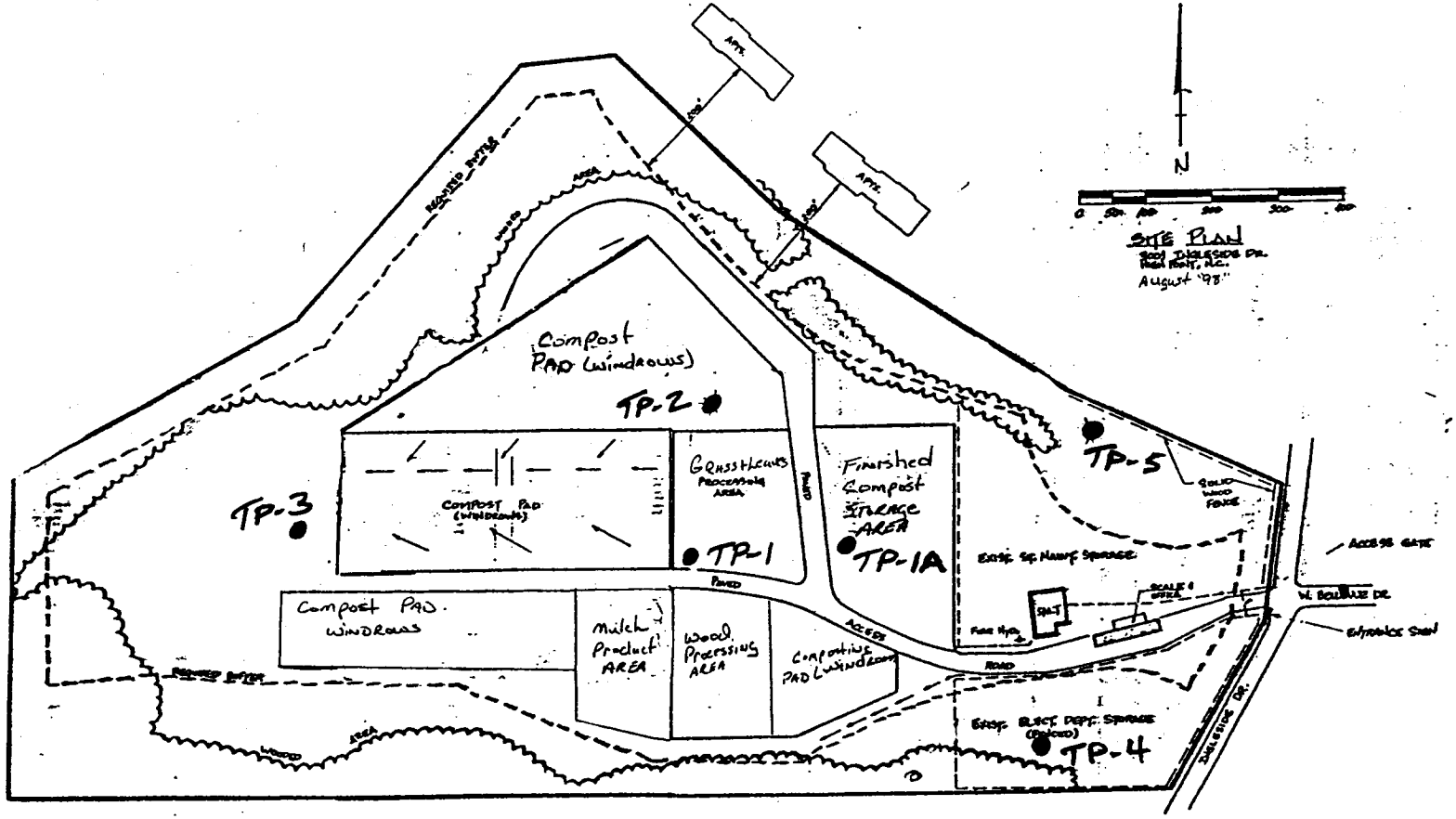
**Table 1**
**Summary of Test Pit Data**

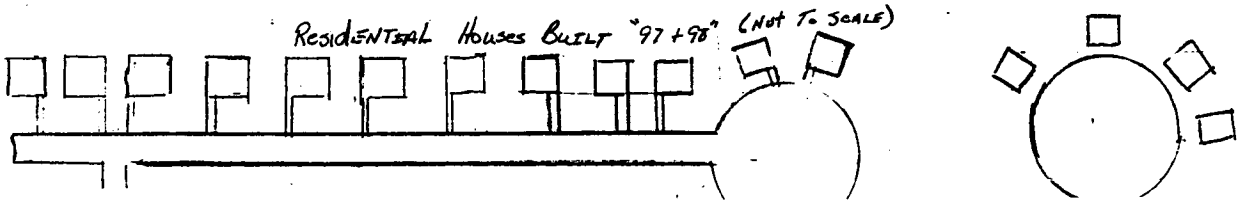
| | |
|---|---|
| **TP-1** | Southeast corner of asphaltic concrete pad |
| 0" | Gravel and old compost |
| 0 - 24" | Mixed clayey silt and gravelly silty fine sand — fill |
| | No water, difficult digging conditions due to relatively dense fill, no sample |
| **TP-1A** | Next to finished stockpile |
| 0 - 29" | Old compost, clay, gravel |
| 29 - 60" | Stiff orange-red micaceous clayey silt (CH-MH) — fill, sample taken |
| 60+" | Dense gray-green gravelly fine sand with silt (SM, GM) — fill, sample taken |
| | No water, fill had some wood and concrete debris, appeared well compacted |
| **TP-2** | Northeast corner of asphaltic concrete pad |
| 0 - 24" | Dense gravelly sand (SM) with old compost at surface — fill |
| | No water, difficult digging, no sample |
| **TP-3** | West side of asphaltic concrete pad, 150 feet from NW corner |
| 0- 24" | Old compost, clay and gravel |
| 24 - 72" | Stiff slightly fine sandy, clayey silt with mica (ML-MH) — fill, sample taken |
| | No water, uniform material, moderately well compacted, fill height estimated to be 10 - 12 feet at northwest corner |
| **TP-4** | Southeast side of property, about 200 feet south of scale house |
| 0" | Surficial grass, area likely has been graded |
| 0 - 24" | Dense, dry, tan slightly clayey silty fine sand with rock fragments (SM) — sample |
| | Difficult digging, refusal on bedrock (granite outcrop 45 feet west), no water, area high on slope with fairly good drainage (ground water several feet deep) |

| | |
|---|---|
| **TP-5** | Northeast side of property, 300 feet north of scale house |
| 0" | Surficial grass, little to no grading |
| 0 - 36" | Medium stiff, tan-white, very slightly moist, slightly clayey silty fine sand |
| | No water, no staining or residual texture, area high on slope with good drainage |

# INGLESIDE COMPOST FACILITY

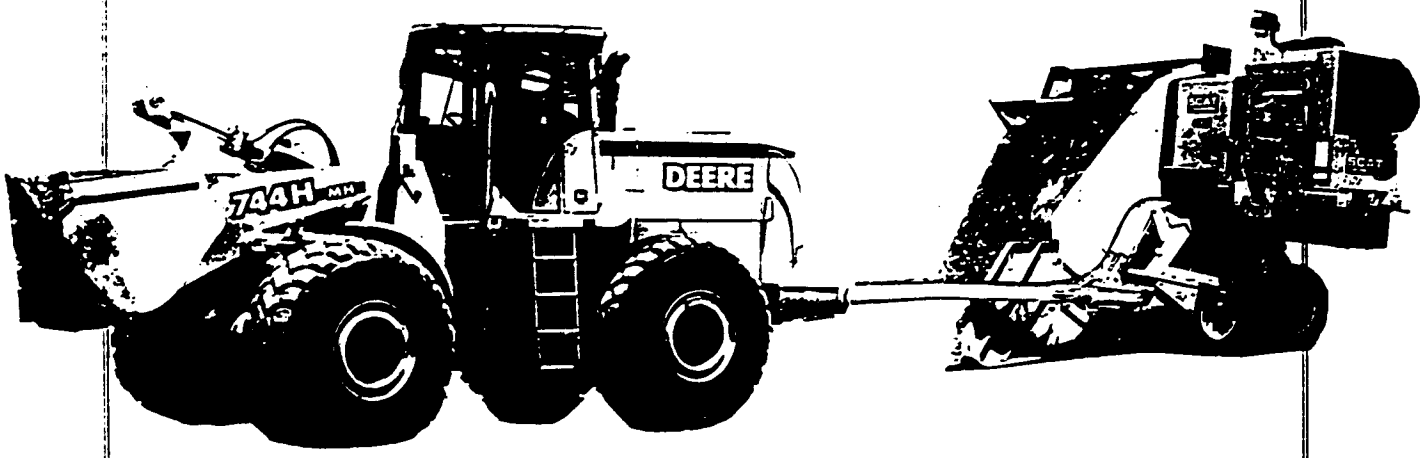
PUBLIC SERVICES DEPARTMENT



# OPERATIONS PLAN FOR THE INGLESIDE COMPOST FACILITY

CITY OF HIGH POINT
NORTH CAROLINA



# INGLESIDE COMPOSTING FACILITY OPERATIONS PLAN

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WINDROW REPORT FORM

# DESCRIPTION OF OPERATIONS

**NAME OF FACILITY**
Ingleside Compost Facility (ICF)

**ADDRESS**
3001 Ingleside Dr.
High Point, NC 27265

**RESPONSIBLE PERSONS**
Mr. James Hussey (Composting Supervisor)
Mr. Steve Pendry (Landfill Superintendent)

**PHONE NUMBER**

(336) 883-8514

**SITE PERSONNEL**

*Composting Supervisor*
Supervise site operations and site personnel under the direction of the Landfill Superintendent.

*Scalehouse Operator*
Weighs, records and directs incoming vehicles.

*(3) Landfill Equipment Operators I*
Operate various equipment associated with composting operations.

*Sanitation Worker*
Performs labor type tasks at the site.

**SCHEDULED HOURS OPEN TO THE PUBLIC**

| | |
|---|---|
| Monday - Friday | 9:00 am - 4:00 pm |
| Saturday | 9:00 am - 1:00 pm |
| Sunday | closed |

# GENERAL OPERATION PLAN

The Ingleside Compost Facility (ICF) is designed to be a large Type I composting facility. The overall operational goals shall be to compliment the integrated solid waste management plan instituted by the City of High Point. This plan is designed to meet or exceed the State of North Carolina Solid Waste Management Rules and Solid Waste Laws. Section .1400, and aid in conserving the environmental resources available to the City of High Point residents and corporate business interest. This will be accomplished by the removal, processing, use and sale of the organic portion of the municipal waste stream commonly referred to as "Wood and Yard" waste.

It is the intent of the ICF to accept all yard waste and acceptable wood from residential and commercial enterprises for recycling. This will encourage the use of the facility and minimize illegal disposal of materials. The city collection vehicles designated for yard waste collection, leaf collection, organic construction debris collection, etc. will also deliver acceptable materials to the ICF.

## RECEIVING

All vehicles entering the facility will be weighed and recorded according to the type of material. The scale-house attendant will then instruct the vehicle driver to the appropriate off-loading area (i.e. wood processing area, grass and leave processing area, etc.). A scalehouse attendant will notify the appropriate ICF employee to allow inspection of the materials as they are being off-loaded. The visual inspection insures received materials are compatible with the intent and goals of the ICF. Those materials not acceptable at the ICF shall be handled appropriately as outlined.

## PREPARATION AREA

The receiving areas will be that portion of the ICF so designated (see attached site plan) for the off-loading of incoming materials and temporary storage of said materials. The processing area(s) will be used for the appropriate processing of the materials (i.e. grinding of wood, de-bagging of leaves and grass, separation of large wood items, etc.).

This area will be designed and maintained to allow easy access and use in various weather conditions to facilitate the consistent use of the ICF.

## INCLEMENT WEATHER PRECAUTIONS

During wind, heavy rain, snow, freezing or other adverse conditions appropriate changes will be made. Receiving and preparation areas will be made as accessible as possible to incoming vehicles. Appropriate fences and boundaries will be installed to secure materials. All other operations will cease if necessary. If the situation warrants it, the facility will be closed.

## ACTIONS TO ELIMINATE NUISANCES

Since the opening of ICF, several actions have become established in our normal operating procedures to eliminate possible nuisances to the surrounding area. These include:

- construction of earthen berms which are approximately 8-10' high
- site is enclosed by 6' high chain-link fence with 2' of barbed wire
- 6' wooden fence on eastern boundary of site
- portable litter fences – used as needed around working areas
- deodorizer and insect control chemical is sprayed twice daily

Furthermore, the site is elevated higher than the surrounding area. Therefore, water run-on is minimal. Water run-off is controlled by the use of four sediment basins which surround the working areas.

## WINDROW METHOD

The technology to be employed at the ICF shall be open "windrow." The windrows will be constructed on the designated windrow areas. The windrows shall be constructed using layered feedstocks, as materials are available. The height and width of the windrows shall be determined by the mechanical design of the machinery used for the turning process. Current normal is

## STABILIZATION

The stabilizing of the compost product is achieved through a process which allows for the gradual reduction of microbial activity in the presence of moisture and aeration. This stabilizing usually requires two to four weeks and may be performed in the original windrow placement.

## CURING, SCREENING, QUALITY CONTROL

This stage of the Composting Process requires the movement of the stabilized compost to the final storage area. The compost product shall go through a screening process for the removal of large particles and improve the consistency and quality of the final product. Screening may occur as the compost is transferred from the windrow to the final storage area. If compost is transferred to the final storage without screening, final screening shall occur prior to transport of compost for final use.

## STORAGE, TRANSPORTATION

In the final storage area, compost shall be stockpiled and final curing of the product may occur. The storage area shall be maintained to allow easy access and movement of equipment for screening and loading of materials for transporting to end-users. Trucks arriving at the ICF to load compost shall weigh-in at the scales. The scale operator will give direction to the final storage area and notify the ICF staff of the need to load the customer. The loaded vehicle will then exit across the scales so materials may be recorded by weight.

## USE AND MARKETABILITY OF COMPOST

It is the intent of the City of High Point to develop products at the ICF which would have the ability to be used at parks, golf courses, road right-of-ways and beautification projects. In addition, commercial landscapers and private citizens could purchase the compost as soil amendments. Numerous studies conducted in North Carolina and the U.S. have proven the excellence of compost materials in the following uses: soil

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amendments are tilled into the soil to help retain the particle moisture, enhance soil drainage, improve nutrient transfer to plants, and enable deep root penetration resulting in healthier plants; soil mulch applied to the top of the soil to help control weeds, protect plant roots and prevent soil from drying. Compost may also be used to help replace topsoil and aid in the prevention of erosion. The bulk application of compost in agricultural uses has proven to be an effective, economically viable method of improving nutrient depleted soils while reducing the need for commercial fertilizers.

The key to successful marketing will be the perception and acceptance of the product by the public. With good ICF public relations, education and marketing expertise, the compost product should have readily available markets within the Piedmont/Triad metro in governmental, commercial, agricultural and private applications. Our previous experience has proven this to be true and we expect more of the same for the future.

# COMPOSTING PROCEDURES

The purpose of this section is to establish the procedures for producing compost at the ICF. These procedures may be refined or modified as experience is gained in the composting process.

## ACCEPTABLE MATERIALS

The ICF is designed as a wood and yard waste composting facility. Materials accepted at the ICF from the public (commercial & private) shall include:

- untreated wood waste
- yard waste (leaves, grass, brush, limbs)
- other biodegradable waste determined as suitable for the composting process by authorized personnel and by section .1400 of the Solid Waste Management Rules of North Carolina

After weighing in, the acceptable materials shall be off loaded at the appropriate location as determined by the ICF Staff (receiving area, windrow area, over-flow area). Each load will be examined for contaminants, non-conforming or unauthorized material. The ICF Staff will be responsible for the coordination of removal of these products. Acceptable materials may be expanded as knowledge, technology and expertise allow processing of these materials.

## PREPARATION OF MATERIALS

The preparation of materials will consist of grinding/mulching of wood waste, brush, leaves, etc., also the debagging of leaves and grass. This preparation will be performed at the designated areas. The ICF staff will be responsible for preparation of the material in a manner suitable for application as feedstock in the windrow area. The ICF staff will be responsible for the "timely" processing and transfer of material from the processing area to the windrow area.

Grass clippings shall be incorporated into windrows and turned within 48 hours of

on-site arrival. This will prevent odors and insure space availability at the receiving and processing areas for incoming materials.

WINDROW CONSTRUCTION

The windrows shall be constructed in the designated areas as shown on the attached site plan. The dimension of the windrows shall be approximately 12 feet wide by 4 - 6 feet high. The height and width of the windrows shall be determined by the mechanical design of the machinery used for the turning process. The windrows shall be constructed using layered feedstocks as materials are available. The materials may be placed in the original windrow by one of the following methods:

- Dumping bed or eject bed trucks may off-load the first layer of feedstock (leaves, wood chips, grass, etc.) in the windrow in a contiguous length dumping method. This method shall be done at the direction and supervision of the ICF staff.
- Materials may be moved from the receiving or processing area and placed in windrows by a front-end loader.

The original layer of feedstock may range in depth from 12 to 60 inches depending on the percentage and number of feedstocks being used to generate the desired type of compost. The second layer of feedstock may be placed on the windrow by dumping material from a truck onto the original layer, if the layer is less than 18 inches in depth. The preferred method is to place the second layer of feedstock on the windrow with a front end loader. The feedstock for the second and subsequent layers shall be placed by a front-end loader. These feedstock layers shall be placed 12 feet wide at the base, 4-6 feet high at the center and may be triangular or trapezoidal in shape.

The various feedstocks for the second and subsequent layers may be moved to the windrow area from the processing area by dump truck or front end loader. The feed-stocks may be dumped next to the windrow under construction to allow easy front-end loader application to the windrow. During the layering of the feedstocks it is permissible and desirable to have a "mixing" of feedstocks in the windrow. The

front-end loader, while placing feedstocks in the appropriate quantities, shall be accomplishing the desired windrow shape. During the layering of the feedstocks it is desirable to check and adjust the moisture of the windrow. This will assure a proper moisture level throughout the windrow during its construction.

*Moisture*

The percentage of water in the composting material is a vital element in achieving the desired aerobic composting results. The bacteria required in the aerobic process need adequate quantities of moisture, oxygen and nutrients to accomplish particle decomposition. The initial formation of the windrow should strive to achieve a 60% moisture to 40% solid ratio. The water should be applied during the layering of feed-stocks to assure adequate mixing and retard runoff. As the composting process begins, the initial turning and temperature rise will create a substantial loss of moisture. After this initial loss of moisture, the desired moisture content should be approximately 50% until initial stabilization of the material begins. A 40% moisture to 60% solid ratio is optimum during the stabilization and curing stages. The moisture content during the composting cycle is critical to producing a satisfactory final product. Excessive water will cause undesirable odors. Insufficient water will slow the decomposing process by "drying" of the bacteria prior to the final energy release of the process. The ICF staff has established good operating and testing procedures to insure proper moisture. The exposed windrows may allow rain to penetrate and change the moisture content. The ICF staff should be aware of current weather conditions and forecast weather when determining moisture additions to the windrows. The shape of the windrow will will help reduce moisture penetration by shedding the rain, thereby minimizing excess moisture. The grade of the pad will allow rapid drainage of the composting area. Free moisture on the compost pad should not be allowed to occur. The ICF staff will be responsible for proper drainage of the compost pad.

*Oxygen*

The composting process is best in the aerobic state -- in the presence of oxygen.

While decomposition will occur in the anaerobic (without oxygen) state, it is much slower and is normally associated with severe odor problems. The windrows should be formed without mechanical compaction. This will automatically leave voids in the materials allowing the area required for oxygen. The windrow should be turned periodically to "fluff" and mix the composting material. This will allow a more consistent availability of oxygen for microbial activity. While oxygen is necessary for aerobic composting, too much oxygen (turning too frequently) will slow down the metabolic process by allowing the heat formed in the pile to escape also causing excess moisture evaporation.

*Nutrients*

Wood and yard wastes have the nutrients of nitrogen, phosphorus and potassium of which nitrogen is the key element in the composting process. The carbon to nitrogen ratio is a critical element in determining the rate of decomposition. The carbon to nitrogen ratio must take into account the difference between decomposable carbon and total carbon. Different feedstocks will have various levels of decomposable carbon. Normally, during windrow construction, the layering of feedstocks will be designed to allot the proper carbon to nitrogen ratio. This ratio should ideally be in the 20:1 to 35:1 range. The average carbon to nitrogen ratios for specific materials are as follows:

| Materials | C:N Ratio |
|---|---|
| *Wood Chips | 800:1 |
| *Sawdust | 400:1 |
| *Straw | 100:1 |
| *Leaves (dry) | 90:1 |
| *Leaves (fresh) | 40:1 |
| *Grass | 20:1 |

The on-site construction of windrows should have goals of 20-35:1 ratios at the beginning of the composting process. The cured product may see reductions to 10-15:1 through carbon released during the decomposing process. The ICF staff should analyze

incoming materials to determine the availability of low C:N ratio materials to be mixed. The use of partially decomposed or composted materials as a layered feedstock is permissible. This material would have a lower C:N ration and would act as an inoculate and help reduce the C:N ratio of higher feed stocks. (example: materials in the middle of the composting process 3 - 6 weeks, may be layered into a new windrow of leaves and woodchips to provide a lower C:N ratio and aid in achieving the desired decomposition rate.)

Other nutrients, such as phosphorus and potassium are normally not a limiting factor in wood and yard composting activities.

*pH*

pH is the measure of acidity/alkalinity. The correct pH balance plays another critical role in the composting process. The pH balance affects the quantity of nutrients available to support the microbial activity. The overall metabolic rate may be affected and the heavy metal solubility is reduced if the correct pH balance is not maintained. It has been found through various programs and tests that a pH level in the 6 to 8 range (neutral) is the desired level for the composting process. Lime as an additive to the feedstock is recommended as necessary to increase pH levels.

It is of paramount importance to monitor temperature, nutrient levels, etc. The monitoring procedures shall be performed by the ICF staff.

*Physical Properties*

The physical properties include particle size, temperature and their relation during the composting process. The role of particle size affects the rate of decomposition. The smaller particle size allows more surface area for microbial activity which results in a rapid decomposition rate and a natural volume reduction. The small particle size must be balanced by the need to have voids (air space) available between particles for oxygen to the microorganisms. This often results in the blending of feedstocks to insure a good mix of small particles and larger "bulking" particles to maximize oxygen availability and microbial activity.

All microorganisms have an optimum temperature range. The ideal range for the decomposition process is 131 to 145 degrees Fahrenheit for several consecutive days. (minimum of 3 days). It is also necessary to insure that all portions of the compost are exposed to this temperature for the minimum number of days to insure the pathogen destruction that must occur to have a quality compost.

Temperature is also a key element to internal windrow activity. If microbial activity is so great that temperatures rise above 150 degrees, this results in destruction of the microorganisms and the retarding or stopping of the microbial activity prior to the complete aerobic decomposition of the feedstocks. If the temperatures do not exceed 131 degrees, the microbial activity is not sufficient and the ICF staff shall troubleshoot and correct the cause of the low temperature.

Temperatures will be taken daily with a Reotemp thermometer approximately 100 feet apart. When temperatures reach a sustained 131 degrees for three days, windrows will be turned with a SCAT compost turner.

The ICF staff will be responsible for mixing feedstocks to achieve the blend of properly sized material and will be responsible for the testing of windrows to insure temperatures are met.

## COMPOST STABILIZING AND CURING

The stabilizing and curing of compost are two separate steps which may take place at different locations at the facility.

Stabilizing is the gradual reduction of microbial activity while in the presence of oxygen and moisture. This microbial activity reduction results from the completion of the decomposition of the mixed feedstocks. The stabilizing process shall be done by combining windrows of similar feedstock age. This will maximize the utilization of the compost pad. The ICF staff should record when windrows are combined and keep appropriate records of materials. Stabilizing of the compost usually begins 9 to 12 weeks after windrow construction. Stabilizing is characterized by a substantial drop in temperature after the active composting period. The windrow will also visually be smaller with a distinct particle size reduction. The ICF staff shall use their discretion

on stabilizing periods (normally 3 - 4 weeks) and combining of windrows.

The final curing period of the compost shall be accomplished in the final storage area. The ICF staff shall determine the appropriate time to transfer the compost to the final storage area. Screening to achieve correct particle size and compost quality should occur at this point if the ICF staff determines work conditions are appropriate. The curing process allows for "piling" of materials. The process is characterized by low temperatures and low microbial activity. Some further decomposition of cellulose and lignin may occur during curing.

## COMPOST SCREENING AND STORAGE

Screening of the material should occur before transfer from the windrow to the final storage area or prior to off site shipping. The market and end use will have a direct effect on final product size. The screening is the sifting of the compost through a screen to remove large particles and improve the quality and consistency of the compost. Typical screen sizes range from .25 inches to 1.0 inches and are interchangeable. Often, the larger screened particles will have a market allowing this larger material to be the final product. Large material may also be reintroduced as feedstock (the bulking agent) in new windrow construction.

## WINDROW REPORT, SAMPLING, QUALITY CONTROL

The composting process is a natural biological process. A composting program may have various degrees of success when compared to the goals and objectives desired. To insure a successful composting program, a systematic approach to recording and reporting shall be employed. The ICF staff shall be the responsible party for recording information for each windrow constructed. The windrow report will contain the following: the amounts and types of feedstocks, percentage of moisture at windrow construction and subsequent applications, the initial temperature of the windrow, periodic temperature of windrow, approximate distance between testing points, date of each turning of windrow, date when windrows are combined, comments section for general notes on processing, weather, etc.

The compost will have unrestricted applications and distribution provided that it contains no pathogenic organisms, is free from offensive odor, and has no sharp particles which would cause injury to persons handling the compost.

The ICF staff should maintain a daily calendar where notations of weather conditions may be recorded. This information will be used in comparing and analyzing windrow reports for processing rates, volume reduction and compost suitability.

The ICF staff shall be the responsible party for achieving and maintaining Quality Controls in the composting process. The success of the composting program is directly related to the quality of the final product. The ICF staff should seek the advice and input of Public Services staff and independent experts when areas of concern develop with regards to quality control of the compost product.

## ODOR, DUST, AND VECTOR CONTROL

The ICF is intended to be a positive, environmentally friendly waste disposal alternative. The ICF shall be operated utilizing procedures which will minimize odor, dust and vectors.

Odor control shall be of paramount importance for favorable acceptance and good public relations with users of the facility and surrounding neighbors.

Grass clippings may present the most consistent problem of minimizing odor at the ICF. Grass clippings begin the decomposition process quickly and will go "anaerobic" quite easily. Odors are often released during mixing or turning of the windrow. Several factors should be incorporated to help negate the odor problem:

- Grass shall be processed and turned within 48 hours of arrival at the receiving area
- Windrows should be well aerated
- The ICF staff should be knowledgeable of "aerobic" and "anaerobic" characteristics of windrow composting
- Wind should be minimum or blowing away from neighbors when compost turning occurs (when feasible)
- ICF should maintain large natural buffers to help minimize the effect on neighbors

When areas in the windrows are deemed to be in the "anaerobic" state, an acidic condition occurs in the compost. Often, the application of lime will aid in the neutralizing of the acidic condition and be effective in odor control.

The ICF shall be regularly patrolled for trash, wind blown debris, etc. These materials shall be placed in the appropriate area or containers for proper disposal. It shall be the responsibility of the ICF staff to minimize any problems in this area. The ICF staff shall maintain proper drainage and minimize standing water at the ICF to reduce the possibility of vector problems.

# EQUIPMENT

The primary equipment required at the ICF and their general uses are listed below:

- Tubgrinder: used for grinding of bulk wood, limbs, etc. May also be used to reduce particle size of feedstocks
- Two Front-End Loaders: used to transport, move materials, load trucks, mix feedstocks and form windrows
- Dump Truck: used to transport feedstocks from mixing area to windrows and compost from windrows to final storage area.
- Compost Turning Machine: used to turn, mix, mulch and form the windrows of feedstocks
- Screening Machine: used to screen stabilized compost for product particle sizing, quality and consistency
- Compost Thermometer: used to determine temperatures in the windrows, stabilizing piles and curing piles

# STORM WATER CONTROL

The ICF shall be engineered to provide optimum drainage for all areas of the facility.

# SECURITY AND NON-CONFORMING MATERIALS

The ICF is intended for use by the public, commercial and governmental bodies for recycling of organic waste. Due to the use of the ICF by diverse groups, safety is of paramount importance. The implementation of the following guidelines should minimize incidents and allow ICF personnel suitable methods for reaction to any occurrences.

## SECURITY

The ICF is designed to be a restricted access facility. As a restricted access facility there are posted hours of operation. The various parties will be allowed to use the facility during the posted hours and at other times mutually agreed by City of High Point Public Services staff.

To prevent access during non-operational hours, fencing at all areas of access shall be installed, maintained and used by the ICF personnel. Fencing shall be adequate to control automobile, motorcycles etc. as well as capable of deterring foot traffic. Security of the facility shall be aided by strategic placement of lights to restrict theft and miscellaneous nuisance behavior.

If it is deemed in the best interest of the city, a security guard may be located at the ICF during non-operational hours.

## SAFETY

The safety of personnel and users at the ICF shall be of paramount importance. The categories of safety shall include: Human, Equipment and Environmental.

*Human safety*: shall encompass all people working, delivering materials, or receiving finished product at the ICF. The City of High Point ICF operation shall be conducted in compliance with the applicable safety mandates. All appropriate telephone numbers of emergency agencies should be prominently displayed and all ICF staff shall be familiar with said numbers and location of telephones. Guidelines shall be utilized to insure proper response and reporting in the event of injury.

*Property safety*: It is the intent of the City of High Point to acquire adequate equipment accomplish the goals and objectives of the ICF. As such, all equipment shall be used in the manner for which it was intended. The ICF staff shall take all necessary steps to maintain equipment in a safe and operational condition. The staff should be familiar with and follow all manufacturers' recommendations in the use and maintenance of the equipment.

*Environmental safety*: The ICF is designed to be an environmentally friendly yard waste facility. As such, the ICF is designed to generate products which will compliment our environment by replacing lost soil components. The layout and operation of the facility will control the by-products of the composting process to insure the environmental compatibility of the ICF.

## FIRE

The ICF will be implementing the natural process of composting. The process develops internal heat to aid in the natural decomposition process. When heat is in the presence of various flammable feedstocks, there is the potential for occasional fires.

The ICF personnel shall be trained in elementary, on-site fire reaction procedures. The ICF personnel shall have on-site, accessible equipment to aid in the early suppression of fire. This equipment shall include but not be limited to: fire extinguishers, fire hoses for the on-site fire hydrant and hand shovels.

The ICF operation shall allow access and movement of emergency fire fighting equipment at all times. The ICF management shall arrange fire drills to test ICF personnel on proper response. Any and all occurrences of fire shall be recorded and analyzed by City of High Point staff and procedures established to prevent the reoccurrence of similar circumstance. Fire shall be reported to the state of North Carolina as required by the permit (41-10-yw).

## NON-CONFORMING/UNAUTHORIZED MATERIALS

It is not the intent of the ICF to accept any materials not in the "Acceptable Material" category. Loads shall be inspected by ICF personnel prior to and during off loading to

insure acceptable material types. Any non-conforming/unauthorized materials shall not be allowed to off-load. Any materials found during off-loading shall be reloaded into the delivery vehicle by the driver of the vehicle. ICF personnel shall be knowledgeable of approved disposal options for various non-conforming/unauthorized materials. Drivers with said materials shall be directed to appropriate disposal locations. Prior to the vehicle exiting the ICF with non-conforming/unauthorized material, the vehicle should weigh at the ICF scalehouse to insure accurate weights of incoming materials.

In the event small quantities of non-conforming/unauthorized waste are found in the receiving/processing area, these materials shall be separated by the ICF staff. A location where shall be established for the temporary storage/disposal of these materials. ICF personnel shall be responsible for the loading and transporting of said materials to the appropriate disposal location. Weight and material reports shall be kept of all such disposal loads to facilitate accurate analysis of the ICF program.

Due to the mixing of various feedstocks during the windrow construction and varying sizes and decomposition rates, the final compost product is expected to have large and small particles. Screening of the final product will allow size separation according to screen dimensions. Materials too large for use as a soil amendment, mulch, or other suitable application, shall be classified as "Off Specification" material. Final compost materials which do not meet the conditions for unrestricted application shall also be considered "Off Specification" material. These "Off Specification" materials shall be handled as follows:

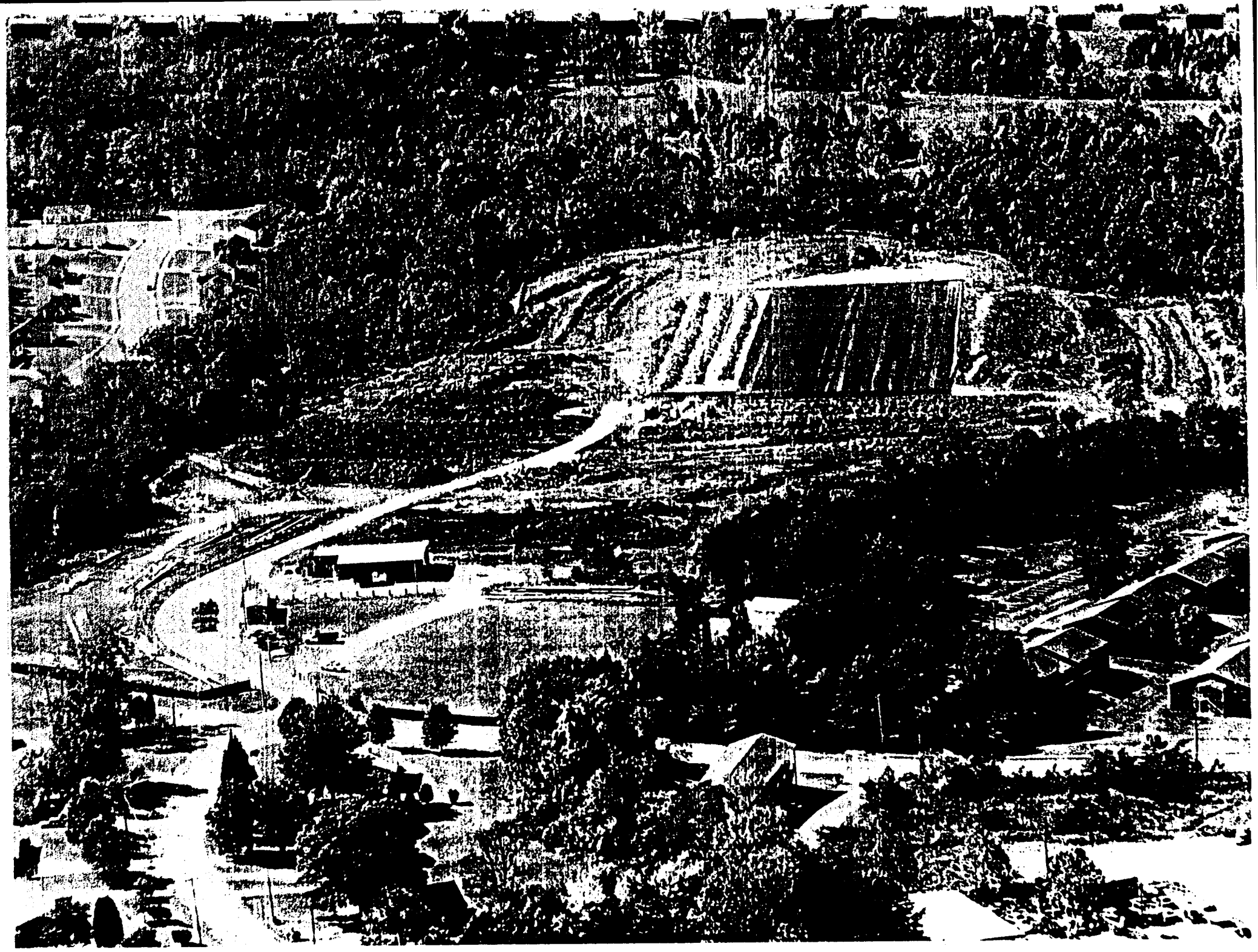
- If the Off Spec. material is suitable for use as a feedstock (bulking agent) it may be reintroduced in new windrow construction. Records of such use shall be included on the windrow report.
- If the Off Spec. material is not suitable for use as described above, and no alternative use is available, the Off Spec. material shall be disposed of in the same manner as described for non-conforming/unauthorized materials. Detail reports of weights, materials and reason for disposal shall be kept by the ICF staff.

# SUMMARY

It is the intent of this Operation Plan to provide the basic information required to operate the ICF. While many operational problems and situations have been addressed, not every circumstance can be listed. The plan is designed to allow amending and expansion as day to day operations and experience are realized. All changes or additions to the Operations Plan shall be done by Public Services staff with appropriate consultation if required.

The ICF is a positive method of recycling yard and wood waste generated in the City of High Point area. The ICF may address future growth by expanding the acceptable materials to include other biodegradable organic matter which would produce a marketable final product.

The composting of biodegradable organic matter is given priority on the EPA hierarchy of waste management methods. The ICF will allow the City of High Point a complimentary program to aid in the overall waste reduction goals as established in the Solid Waste Management Plan adopted by the City of High Point City Council.



# CITY OF HIGH POINT
# INGLESIDE COMPOST FACILITY

**Weekly Status Report Date:** _____

## 1. Windrow Formation

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

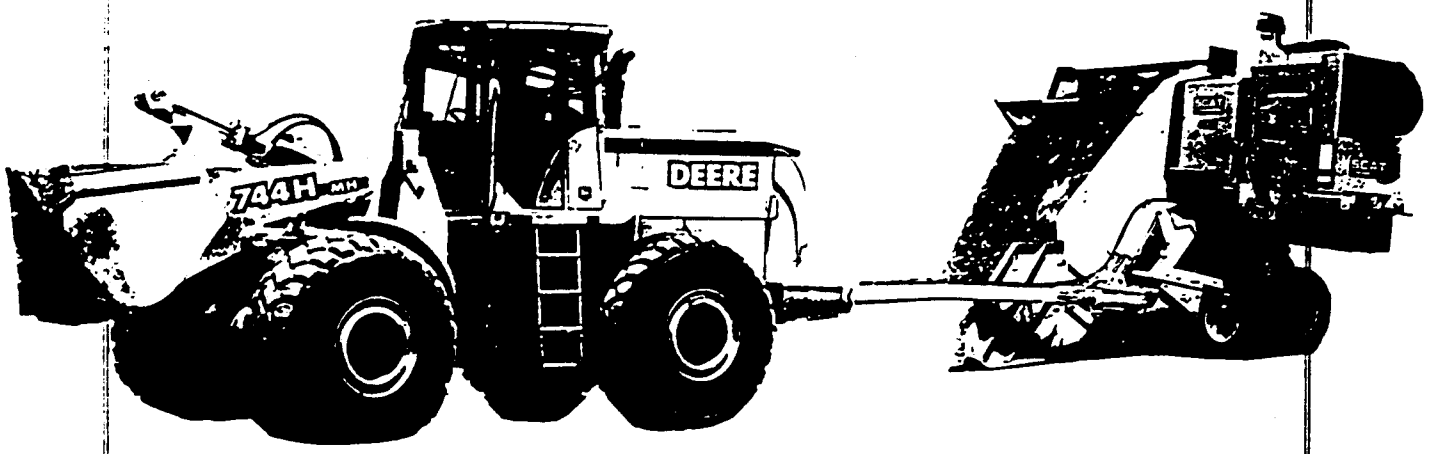
Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

# OPERATIONS PLAN FOR THE INGLESIDE COMPOST FACILITY

CITY OF HIGH POINT
NORTH CAROLINA



# INGLESIDE COMPOSTING FACILITY OPERATIONS PLAN

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# DESCRIPTION OF OPERATIONS

**NAME OF FACILITY**
Ingleside Compost Facility (ICF)

**ADDRESS**
3001 Ingleside Dr.
High Point, NC 27265

**RESPONSIBLE PERSONS**
Mr. James Hussey (Composting Supervisor)
Mr. Steve Pendry (Landfill Superintendent)

**PHONE NUMBER**

(336) 883-8514

**SITE PERSONNEL**

*Composting Supervisor*
Supervise site operations and site personnel under the direction of the Landfill Superintendent.

*Scalehouse Operator*
Weighs, records and directs incoming vehicles.

*(3) Landfill Equipment Operators I*
Operate various equipment associated with composting operations.

*Sanitation Worker*
Performs labor type tasks at the site.

**SCHEDULED HOURS OPEN TO THE PUBLIC**

| | |
|---|---|
| Monday - Friday | 9:00 am - 4:00 pm |
| Saturday | 9:00 am - 1:00 pm |
| Sunday | closed |

# GENERAL OPERATION PLAN

The Ingleside Compost Facility (ICF) is designed to be a large Type I composting facility. The overall operational goals shall be to compliment the integrated solid waste management plan instituted by the City of High Point. This plan is designed to meet or exceed the State of North Carolina Solid Waste Management Rules and Solid Waste Laws, Section .1400, and aid in conserving the environmental resources available to the City of High Point residents and corporate business interest. This will be accomplished by the removal, processing, use and sale of the organic portion of the municipal waste stream commonly referred to as "Wood and Yard" waste.

It is the intent of the ICF to accept all yard waste and acceptable wood from residential and commercial enterprises for recycling. This will encourage the use of the facility and minimize illegal disposal of materials. The city collection vehicles designated for yard waste collection, leaf collection, organic construction debris collection, etc. will also deliver acceptable materials to the ICF.

## RECEIVING

All vehicles entering the facility will be weighed and recorded according to the type of material. The scale-house attendant will then instruct the vehicle driver to the appropriate off-loading area (i.e. wood processing area, grass and leave processing area, etc.). A scalehouse attendant will notify the appropriate ICF employee to allow inspection of the materials as they are being off-loaded. The visual inspection insures received materials are compatible with the intent and goals of the ICF. Those materials not acceptable at the ICF shall be handled appropriately as outlined.

## PREPARATION AREA

The receiving areas will be that portion of the ICF so designated (see attached site plan) for the off-loading of incoming materials and temporary storage of said materials. The processing area(s) will be used for the appropriate processing of the materials (i.e. grinding of wood, de-bagging of leaves and grass, separation of large wood items, etc.).

This area will be designed and maintained to allow easy access and use in various weather conditions to facilitate the consistent use of the ICF.

## INCLEMENT WEATHER PRECAUTIONS

During wind, heavy rain, snow, freezing or other adverse conditions appropriate changes will be made. Receiving and preparation areas will be made as accessible as possible to incoming vehicles. Appropriate fences and boundaries will be installed to secure materials. All other operations will cease if necessary. If the situation warrants it, the facility will be closed.

## ACTIONS TO ELIMINATE NUISANCES

Since the opening of ICF, several actions have become established in our normal operating procedures to eliminate possible nuisances to the surrounding area. These include:

- construction of earthen berms which are approximately 8-10' high
- site is enclosed by 6' high chain-link fence with 2' of barbed wire
- 6' wooden fence on eastern boundary of site
- portable litter fences – used as needed around working areas
- deodorizer and insect control chemical is sprayed twice daily

Furthermore, the site is elevated higher than the surrounding area. Therefore, water run-on is minimal. Water run-off is controlled by the use of four sediment basins which surround the working areas.

## WINDROW METHOD

The technology to be employed at the ICF shall be open "windrow." The windrows will be constructed on the designated windrow areas. The windrows shall be constructed using layered feedstocks, as materials are available. The height and width of the windrows shall be determined by the mechanical design of the machinery used for the turning process.

## STABILIZATION

The stabilizing of the compost product is achieved through a process which allows for the gradual reduction of microbial activity in the presence of moisture and aeration. This stabilizing usually requires two to four weeks and may be performed in the original windrow placement.

## CURING, SCREENING, QUALITY CONTROL

This stage of the Composting Process requires the movement of the stabilized compost to the final storage area. The compost product shall go through a screening process for the removal of large particles and improve the consistency and quality of the final product. Screening may occur as the compost is transferred from the windrow to the final storage area. If compost is transferred to the final storage without screening, final screening shall occur prior to transport of compost for final use.

## STORAGE, TRANSPORTATION

In the final storage area, compost shall be stockpiled and final curing of the product may occur. The storage area shall be maintained to allow easy access and movement of equipment for screening and loading of materials for transporting to end-users. Trucks arriving at the ICF to load compost shall weigh-in at the scales. The scale operator will give direction to the final storage area and notify the ICF staff of the need to load the customer. The loaded vehicle will then exit across the scales so materials may be recorded by weight.

## USE AND MARKETABILITY OF COMPOST

It is the intent of the City of High Point to develop products at the ICF which would have the ability to be used at parks, golf courses, road right-of-ways and beautification projects. In addition, commercial landscapers and private citizens could purchase the compost as soil amendments. Numerous studies conducted in North Carolina and the U.S. have proven the excellence of compost materials in the following uses: soil

amendments are tilled into the soil to help retain the particle moisture, enhance soil drainage, improve nutrient transfer to plants, and enable deep root penetration resulting in healthier plants; soil mulch applied to the top of the soil to help control weeds, protect plant roots and prevent soil from drying. Compost may also be used to help replace topsoil and aid in the prevention of erosion. The bulk application of compost in agricultural uses has proven to be an effective, economically viable method of improving nutrient depleted soils while reducing the need for commercial fertilizers.

The key to successful marketing will be the perception and acceptance of the product by the public. With good ICF public relations, education and marketing expertise, the compost product should have readily available markets within the Piedmont/Triad metro in governmental, commercial, agricultural and private applications. Our previous experience has proven this to be true and we expect more of the same for the future.

# COMPOSTING PROCEDURES

The purpose of this section is to establish the procedures for producing compost at the ICF. These procedures may be refined or modified as experience is gained in the composting process.

## ACCEPTABLE MATERIALS

The ICF is designed as a wood and yard waste composting facility. Materials accepted at the ICF from the public (commercial & private) shall include:

- untreated wood waste
- yard waste (leaves, grass, brush, limbs)
- other biodegradable waste determined as suitable for the composting process by authorized personnel and by section .1400 of the Solid Waste Management Rules of North Carolina

After weighing in, the acceptable materials shall be off loaded at the appropriate location as determined by the ICF Staff (receiving area, windrow area, over-flow area). Each load will be examined for contaminants, non-conforming or unauthorized material. The ICF Staff will be responsible for the coordination of removal of these products. Acceptable materials may be expanded as knowledge, technology and expertise allow processing of these materials.

## PREPARATION OF MATERIALS

The preparation of materials will consist of grinding/mulching of wood waste, brush, leaves, etc., also the debagging of leaves and grass. This preparation will be performed at the designated areas. The ICF staff will be responsible for preparation of the material in a manner suitable for application as feedstock in the windrow area. The ICF staff will be responsible for the "timely" processing and transfer of material from the processing area to the windrow area.

Grass clippings shall be incorporated into windrows and turned within 48 hours of

on-site arrival. This will prevent odors and insure space availability at the receiving and processing areas for incoming materials.

WINDROW CONSTRUCTION

The windrows shall be constructed in the designated areas as shown on the attached site plan. The dimension of the windrows shall be approximately 12 feet wide by 4 - 6 feet high. The height and width of the windrows shall be determined by the mechanical design of the machinery used for the turning process. The windrows shall be constructed using layered feedstocks as materials are available. The materials may be placed in the original windrow by one of the following methods:

- Dumping bed or eject bed trucks may off-load the first layer of feedstock (leaves, wood chips, grass, etc.) in the windrow in a contiguous length dumping method. This method shall be done at the direction and supervision of the ICF staff.
- Materials may be moved from the receiving or processing area and placed in windrows by a front-end loader.

The original layer of feedstock may range in depth from 12 to 60 inches depending on the percentage and number of feedstocks being used to generate the desired type of compost. The second layer of feedstock may be placed on the windrow by dumping material from a truck onto the original layer, if the layer is less than 18 inches in depth. The preferred method is to place the second layer of feedstock on the windrow with a front end loader. The feedstock for the second and subsequent layers shall be placed by a front-end loader. These feedstock layers shall be placed 12 feet wide at the base, 4-6 feet high at the center and may be triangular or trapezoidal in shape.

The various feedstocks for the second and subsequent layers may be moved to the windrow area from the processing area by dump truck or front end loader. The feed-stocks may be dumped next to the windrow under construction to allow easy front-end loader application to the windrow. During the layering of the feedstocks it is permissible and desirable to have a "mixing" of feedstocks in the windrow. The

front-end loader, while placing feedstocks in the appropriate quantities, shall be accomplishing the desired windrow shape. During the layering of the feedstocks it is desirable to check and adjust the moisture of the windrow. This will assure a proper moisture level throughout the windrow during its construction.

*Moisture*

The percentage of water in the composting material is a vital element in achieving the desired aerobic composting results. The bacteria required in the aerobic process need adequate quantities of moisture, oxygen and nutrients to accomplish particle decomposition. The initial formation of the windrow should strive to achieve a 60% moisture to 40% solid ratio. The water should be applied during the layering of feed-stocks to assure adequate mixing and retard runoff. As the composting process begins, the initial turning and temperature rise will create a substantial loss of moisture. After this initial loss of moisture, the desired moisture content should be approximately 50% until initial stabilization of the material begins. A 40% moisture to 60% solid ratio is optimum during the stabilization and curing stages. The moisture content during the composting cycle is critical to producing a satisfactory final product. Excessive water will cause undesirable odors. Insufficient water will slow the decomposing process by "drying" of the bacteria prior to the final energy release of the process. The ICF staff has established good operating and testing procedures to insure proper moisture. The exposed windrows may allow rain to penetrate and change the moisture content. The ICF staff should be aware of current weather conditions and forecast weather when determining moisture additions to the windrows. The shape of the windrow will will help reduce moisture penetration by shedding the rain, thereby minimizing excess moisture. The grade of the pad will allow rapid drainage of the composting area. Free moisture on the compost pad should not be allowed to occur. The ICF staff will be responsible for proper drainage of the compost pad.

*Oxygen*

The composting process is best in the aerobic state -- in the presence of oxygen.

While decomposition will occur in the anaerobic (without oxygen) state, it is much slower and is normally associated with severe odor problems. The windrows should be formed without mechanical compaction. This will automatically leave voids in the materials allowing the area required for oxygen. The windrow should be turned periodically to "fluff" and mix the composting material. This will allow a more consistent availability of oxygen for microbial activity. While oxygen is necessary for aerobic composting, too much oxygen (turning too frequently) will slow down the metabolic process by allowing the heat formed in the pile to escape also causing excess moisture evaporation.

*Nutrients*

Wood and yard wastes have the nutrients of nitrogen, phosphorus and potassium of which nitrogen is the key element in the composting process. The carbon to nitrogen ratio is a critical element in determining the rate of decomposition. The carbon to nitrogen ratio must take into account the difference between decomposable carbon and total carbon. Different feedstocks will have various levels of decomposable carbon. Normally, during windrow construction, the layering of feedstocks will be designed to allot the proper carbon to nitrogen ratio. This ratio should ideally be in the 20:1 to 35:1 range. The average carbon to nitrogen ratios for specific materials are as follows:

| Materials | C:N Ratio |
|---|---|
| *Wood Chips | 800:1 |
| *Sawdust | 400:1 |
| *Straw | 100:1 |
| *Leaves (dry) | 90:1 |
| *Leaves (fresh) | 40:1 |
| *Grass | 20:1 |

The on-site construction of windrows should have goals of 20-35:1 ratios at the beginning of the composting process. The cured product may see reductions to 10-15:1 through carbon released during the decomposing process. The ICF staff should analyze

incoming materials to determine the availability of low C:N ratio materials to be mixed. The use of partially decomposed or composted materials as a layered feedstock is permissible. This material would have a lower C:N ration and would act as an inoculate and help reduce the C:N ratio of higher feed stocks. (example: materials in the middle of the composting process 3 - 6 weeks, may be layered into a new windrow of leaves and woodchips to provide a lower C:N ratio and aid in achieving the desired decomposition rate.)

Other nutrients, such as phosphorus and potassium are normally not a limiting factor in wood and yard composting activities.

*pH*

pH is the measure of acidity/alkalinity. The correct pH balance plays another critical role in the composting process. The pH balance affects the quantity of nutrients available to support the microbial activity. The overall metabolic rate may be affected and the heavy metal solubility is reduced if the correct pH balance is not maintained. It has been found through various programs and tests that a pH level in the 6 to 8 range (neutral) is the desired level for the composting process. Lime as an additive to the feedstock is recommended as necessary to increase pH levels.

It is of paramount importance to monitor temperature, nutrient levels, etc. The monitoring procedures shall be performed by the ICF staff.

*Physical Properties*

The physical properties include particle size, temperature and their relation during the composting process. The role of particle size affects the rate of decomposition. The smaller particle size allows more surface area for microbial activity which results in a rapid decomposition rate and a natural volume reduction. The small particle size must be balanced by the need to have voids (air space) available between particles for oxygen to the microorganisms. This often results in the blending of feedstocks to insure a good mix of small particles and larger "bulking" particles to maximize oxygen availability and microbial activity.

All microorganisms have an optimum temperature range. The ideal range for the decomposition process is 131 to 145 degrees Fahrenheit for several consecutive days. (minimum of 3 days). It is also necessary to insure that all portions of the compost are exposed to this temperature for the minimum number of days to insure the pathogen destruction that must occur to have a quality compost.

Temperature is also a key element to internal windrow activity. If microbial activity is so great that temperatures rise above 150 degrees, this results in destruction of the microorganisms and the retarding or stopping of the microbial activity prior to the complete aerobic decomposition of the feedstocks. If the temperatures do not exceed 131 degrees, the microbial activity is not sufficient and the ICF staff shall troubleshoot and correct the cause of the low temperature.

Temperatures will be taken daily with a Reotemp thermometer approximately 100 feet apart. When temperatures reach a sustained 131 degrees for three days, windrows will be turned with a SCAT compost turner.

The ICF staff will be responsible for mixing feedstocks to achieve the blend of properly sized material and will be responsible for the testing of windrows to insure temperatures are met.

## COMPOST STABILIZING AND CURING

The stabilizing and curing of compost are two separate steps which may take place at different locations at the facility.

Stabilizing is the gradual reduction of microbial activity while in the presence of oxygen and moisture. This microbial activity reduction results from the completion of the decomposition of the mixed feedstocks. The stabilizing process shall be done by combining windrows of similar feedstock age. This will maximize the utilization of the compost pad. The ICF staff should record when windrows are combined and keep appropriate records of materials. Stabilizing of the compost usually begins 9 to 12 weeks after windrow construction. Stabilizing is characterized by a substantial drop in temperature after the active composting period. The windrow will also visually be smaller with a distinct particle size reduction. The ICF staff shall use their discretion

on stabilizing periods (normally 3 - 4 weeks) and combining of windrows.

The final curing period of the compost shall be accomplished in the final storage area. The ICF staff shall determine the appropriate time to transfer the compost to the final storage area. Screening to achieve correct particle size and compost quality should occur at this point if the ICF staff determines work conditions are appropriate. The curing process allows for "piling" of materials. The process is characterized by low temperatures and low microbial activity. Some further decomposition of cellulose and lignin may occur during curing.

## COMPOST SCREENING AND STORAGE

Screening of the material should occur before transfer from the windrow to the final storage area or prior to off site shipping. The market and end use will have a direct effect on final product size. The screening is the sifting of the compost through a screen to remove large particles and improve the quality and consistency of the compost. Typical screen sizes range from .25 inches to 1.0 inches and are interchangeable. Often, the larger screened particles will have a market allowing this larger material to be the final product. Large material may also be reintroduced as feedstock (the bulking agent) in new windrow construction.

## WINDROW REPORT, SAMPLING, QUALITY CONTROL

The composting process is a natural biological process. A composting program may have various degrees of success when compared to the goals and objectives desired. To insure a successful composting program, a systematic approach to recording and reporting shall be employed. The ICF staff shall be the responsible party for recording information for each windrow constructed. The windrow report will contain the following: the amounts and types of feedstocks, percentage of moisture at windrow construction and subsequent applications, the initial temperature of the windrow, periodic temperature of windrow, approximate distance between testing points, date of each turning of windrow, date when windrows are combined, comments section for general notes on processing, weather, etc.

The compost will have unrestricted applications and distribution provided that it contains no pathogenic organisms, is free from offensive odor, and has no sharp particles which would cause injury to persons handling the compost.

The ICF staff should maintain a daily calendar where notations of weather conditions may be recorded. This information will be used in comparing and analyzing windrow reports for processing rates, volume reduction and compost suitability.

The ICF staff shall be the responsible party for achieving and maintaining Quality Controls in the composting process. The success of the composting program is directly related to the quality of the final product. The ICF staff should seek the advice and input of Public Services staff and independent experts when areas of concern develop with regards to quality control of the compost product.

## ODOR, DUST, AND VECTOR CONTROL

The ICF is intended to be a positive, environmentally friendly waste disposal alternative. The ICF shall be operated utilizing procedures which will minimize odor, dust and vectors.

Odor control shall be of paramount importance for favorable acceptance and good public relations with users of the facility and surrounding neighbors.

Grass clippings may present the most consistent problem of minimizing odor at the ICF. Grass clippings begin the decomposition process quickly and will go "anaerobic" quite easily. Odors are often released during mixing or turning of the windrow. Several factors should be incorporated to help negate the odor problem:

- Grass shall be processed and turned within 48 hours of arrival at the receiving area
- Windrows should be well aerated
- The ICF staff should be knowledgeable of "aerobic" and "anaerobic" characteristics of windrow composting
- Wind should be minimum or blowing away from neighbors when compost turning occurs (when feasible)
- ICF should maintain large natural buffers to help minimize the effect on neighbors

When areas in the windrows are deemed to be in the "anaerobic" state, an acidic condition occurs in the compost. Often, the application of lime will aid in the neutralizing of the acidic condition and be effective in odor control.

The ICF shall be regularly patrolled for trash, wind blown debris, etc. These materials shall be placed in the appropriate area or containers for proper disposal. It shall be the responsibility of the ICF staff to minimize any problems in this area. The ICF staff shall maintain proper drainage and minimize standing water at the ICF to reduce the possibility of vector problems.

# EQUIPMENT

The primary equipment required at the ICF and their general uses are listed below:

- Tubgrinder: used for grinding of bulk wood, limbs, etc. May also be used to reduce particle size of feedstocks
- Two Front-End Loaders: used to transport, move materials, load trucks, mix feedstocks and form windrows
- Dump Truck: used to transport feedstocks from mixing area to windrows and compost from windrows to final storage area.
- Compost Turning Machine: used to turn, mix, mulch and form the windrows of feedstocks
- Screening Machine: used to screen stabilized compost for product particle sizing, quality and consistency
- Compost Thermometer: used to determine temperatures in the windrows, stabilizing piles and curing piles

# STORM WATER CONTROL

The ICF shall be engineered to provide optimum drainage for all areas of the facility.

# SECURITY AND NON-CONFORMING MATERIALS

The ICF is intended for use by the public, commercial and governmental bodies for recycling of organic waste. Due to the use of the ICF by diverse groups, safety is of paramount importance. The implementation of the following guidelines should minimize incidents and allow ICF personnel suitable methods for reaction to any occurrences.

## SECURITY

The ICF is designed to be a restricted access facility. As a restricted access facility there are posted hours of operation. The various parties will be allowed to use the facility during the posted hours and at other times mutually agreed by City of High Point Public Services staff.

To prevent access during non-operational hours, fencing at all areas of access shall be installed, maintained and used by the ICF personnel. Fencing shall be adequate to control automobile, motorcycles etc. as well as capable of deterring foot traffic. Security of the facility shall be aided by strategic placement of lights to restrict theft and miscellaneous nuisance behavior.

If it is deemed in the best interest of the city, a security guard may be located at the ICF during non-operational hours.

## SAFETY

The safety of personnel and users at the ICF shall be of paramount importance. The categories of safety shall include: Human, Equipment and Environmental.

*Human safety*: shall encompass all people working, delivering materials, or receiving finished product at the ICF. The City of High Point ICF operation shall be conducted in compliance with the applicable safety mandates. All appropriate telephone numbers of emergency agencies should be prominently displayed and all ICF staff shall be familiar with said numbers and location of telephones. Guidelines shall be utilized to insure proper response and reporting in the event of injury.

*Property safety*: It is the intent of the City of High Point to acquire adequate equipment accomplish the goals and objectives of the ICF. As such, all equipment shall be used in the manner for which it was intended. The ICF staff shall take all necessary steps to maintain equipment in a safe and operational condition. The staff should be familiar with and follow all manufacturers' recommendations in the use and maintenance of the equipment.

*Environmental safety*: The ICF is designed to be an environmentally friendly yard waste facility. As such, the ICF is designed to generate products which will compliment our environment by replacing lost soil components. The layout and operation of the facility will control the by-products of the composting process to insure the environmental compatibility of the ICF.

## FIRE

The ICF will be implementing the natural process of composting. The process develops internal heat to aid in the natural decomposition process. When heat is in the presence of various flammable feedstocks, there is the potential for occasional fires.

The ICF personnel shall be trained in elementary, on-site fire reaction procedures. The ICF personnel shall have on-site, accessible equipment to aid in the early suppression of fire. This equipment shall include but not be limited to: fire extinguishers, fire hoses for the on-site fire hydrant and hand shovels.

The ICF operation shall allow access and movement of emergency fire fighting equipment at all times. The ICF management shall arrange fire drills to test ICF personnel on proper response. Any and all occurrences of fire shall be recorded and analyzed by City of High Point staff and procedures established to prevent the reoccurrence of similar circumstance. Fire shall be reported to the state of North Carolina as required by the permit (41-10-yw).

## NON-CONFORMING/UNAUTHORIZED MATERIALS

It is not the intent of the ICF to accept any materials not in the "Acceptable Material" category. Loads shall be inspected by ICF personnel prior to and during off loading to

insure acceptable material types. Any non-conforming/unauthorized materials shall not be allowed to off-load. Any materials found during off-loading shall be reloaded into the delivery vehicle by the driver of the vehicle. ICF personnel shall be knowledgeable of approved disposal options for various non-conforming/unauthorized materials. Drivers with said materials shall be directed to appropriate disposal locations. Prior to the vehicle exiting the ICF with non-conforming/unauthorized material, the vehicle should weigh at the ICF scalehouse to insure accurate weights of incoming materials.

In the event small quantities of non-conforming/unauthorized waste are found in the receiving/processing area, these materials shall be separated by the ICF staff. A location shall be established for the temporary storage/disposal of these materials. ICF personnel shall be responsible for the loading and transporting of said materials to the appropriate disposal location. Weight and material reports shall be kept of all such disposal loads to facilitate accurate analysis of the ICF program.

Due to the mixing of various feedstocks during the windrow construction and varying sizes and decomposition rates, the final compost product is expected to have large and small particles. Screening of the final product will allow size separation according to screen dimensions. Materials too large for use as a soil amendment, mulch, or other suitable application, shall be classified as "Off Specification" material. Final compost materials which do not meet the conditions for unrestricted application shall also be considered "Off Specification" material. These "Off Specification" materials shall be handled as follows:

- If the Off Spec. material is suitable for use as a feedstock (bulking agent) it may be reintroduced in new windrow construction. Records of such use shall be included on the windrow report.
- If the Off Spec. material is not suitable for use as described above, and no alternative use is available, the Off Spec. material shall be disposed of in the same manner as described for non-conforming/unauthorized materials. Detail reports of weights, materials and reason for disposal shall be kept by the ICF staff.

# SUMMARY

It is the intent of this Operation Plan to provide the basic information required to operate the ICF. While many operational problems and situations have been addressed, not every circumstance can be listed. The plan is designed to allow amending and expansion as day to day operations and experience are realized. All changes or additions to the Operations Plan shall be done by Public Services staff with appropriate consultation if required.

The ICF is a positive method of recycling yard and wood waste generated in the City of High Point area. The ICF may address future growth by expanding the acceptable materials to include other biodegradable organic matter which would produce a marketable final product.

The composting of biodegradable organic matter is given priority on the EPA hierarchy of waste management methods. The ICF will allow the City of High Point a complimentary program to aid in the overall waste reduction goals as established in the Solid Waste Management Plan adopted by the City of High Point City Council.

# CITY OF HIGH POINT
# INGLESIDE COMPOST FACILITY

**Weekly Status Report Date:** _____

## 1. Windrow Formation

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

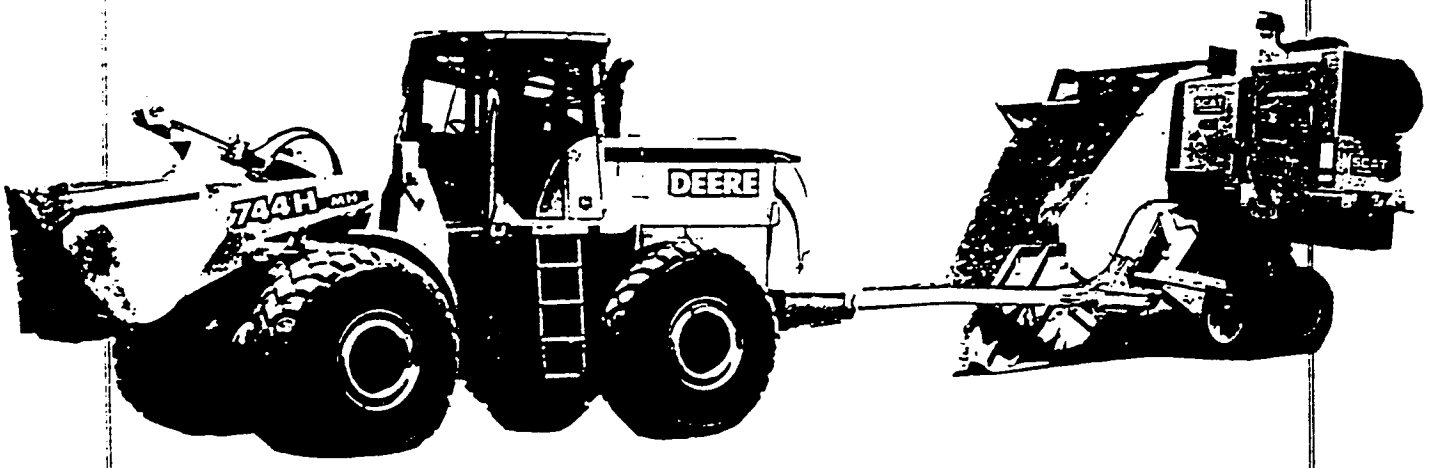
Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

# OPERATIONS PLAN FOR THE INGLESIDE COMPOST FACILITY

CITY OF HIGH POINT
NORTH CAROLINA



# INGLESIDE COMPOSTING FACILITY OPERATIONS PLAN

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# DESCRIPTION OF OPERATIONS

**NAME OF FACILITY**
Ingleside Compost Facility (ICF)

**ADDRESS**
3001 Ingleside Dr.
High Point, NC 27265

**RESPONSIBLE PERSONS**
Mr. James Hussey (Composting Supervisor)
Mr. Steve Pendry (Landfill Superintendent)

**PHONE NUMBER**

(336) 883-8514

**SITE PERSONNEL**

*Composting Supervisor*
Supervise site operations and site personnel under the direction of the Landfill Superintendent.

*Scalehouse Operator*
Weighs, records and directs incoming vehicles.

*(3) Landfill Equipment Operators I*
Operate various equipment associated with composting operations.

*Sanitation Worker*
Performs labor type tasks at the site.

**SCHEDULED HOURS OPEN TO THE PUBLIC**

| | |
|---|---|
| Monday - Friday | 9:00 am - 4:00 pm |
| Saturday | 9:00 am - 1:00 pm |
| Sunday | closed |

# GENERAL OPERATION PLAN

The Ingleside Compost Facility (ICF) is designed to be a large Type I composting facility. The overall operational goals shall be to compliment the integrated solid waste management plan instituted by the City of High Point. This plan is designed to meet or exceed the State of North Carolina Solid Waste Management Rules and Solid Waste Laws. Section .1400. and aid in conserving the environmental resources available to the City of High Point residents and corporate business interest. This will be accomplished by the removal. processing, use and sale of the organic portion of the municipal waste stream commonly referred to as "Wood and Yard" waste.

It is the intent of the ICF to accept all yard waste and acceptable wood from residential and commercial enterprises for recycling. This will encourage the use of the facility and minimize illegal disposal of materials. The city collection vehicles designated for yard waste collection. leaf collection. organic construction debris collection. etc. will also deliver acceptable materials to the ICF.

## RECEIVING

All vehicles entering the facility will be weighed and recorded according to the type of material. The scale-house attendant will then instruct the vehicle driver to the appropriate off-loading area (i.e. wood processing area. grass and leave processing area. etc.). A scalehouse attendant will notify the appropriate ICF employee to allow inspection of the materials as they are being off-loaded. The visual inspection insures received materials are compatible with the intent and goals of the ICF. Those materials not acceptable at the ICF shall be handled appropriately as outlined.

## PREPARATION AREA

The receiving areas will be that portion of the ICF so designated (see attached site plan) for the off-loading of incoming materials and temporary storage of said materials. The processing area(s) will be used for the appropriate processing of the materials (i.e. grinding of wood, de-bagging of leaves and grass, separation of large wood items, etc.).

This area will be designed and maintained to allow easy access and use in various weather conditions to facilitate the consistent use of the ICF.

## INCLEMENT WEATHER PRECAUTIONS

During wind, heavy rain, snow, freezing or other adverse conditions appropriate changes will be made. Receiving and preparation areas will be made as accessible as possible to incoming vehicles. Appropriate fences and boundaries will be installed to secure materials. All other operations will cease if necessary. If the situation warrants it, the facility will be closed.

## ACTIONS TO ELIMINATE NUISANCES

Since the opening of ICF, several actions have become established in our normal operating procedures to eliminate possible nuisances to the surrounding area. These include:

- construction of earthen berms which are approximately 8-10' high
- site is enclosed by 6' high chain-link fence with 2' of barbed wire
- 6' wooden fence on eastern boundary of site
- portable litter fences – used as needed around working areas
- deodorizer and insect control chemical is sprayed twice daily

Furthermore, the site is elevated higher than the surrounding area. Therefore, water run-on is minimal. Water run-off is controlled by the use of four sediment basins which surround the working areas.

## WINDROW METHOD

The technology to be employed at the ICF shall be open "windrow." The windrows will be constructed on the designated windrow areas. The windrows shall be constructed using layered feedstocks, as materials are available. The height and width of the windrows shall be determined by the mechanical design of the machinery used for the turning process.

## STABILIZATION

The stabilizing of the compost product is achieved through a process which allows for the gradual reduction of microbial activity in the presence of moisture and aeration. This stabilizing usually requires two to four weeks and may be performed in the original windrow placement.

## CURING, SCREENING, QUALITY CONTROL

This stage of the Composting Process requires the movement of the stabilized compost to the final storage area. The compost product shall go through a screening process for the removal of large particles and improve the consistency and quality of the final product. Screening may occur as the compost is transferred from the windrow to the final storage area. If compost is transferred to the final storage without screening, final screening shall occur prior to transport of compost for final use.

## STORAGE, TRANSPORTATION

In the final storage area, compost shall be stockpiled and final curing of the product may occur. The storage area shall be maintained to allow easy access and movement of equipment for screening and loading of materials for transporting to end-users. Trucks arriving at the ICF to load compost shall weigh-in at the scales. The scale operator will give direction to the final storage area and notify the ICF staff of the need to load the customer. The loaded vehicle will then exit across the scales so materials may be recorded by weight.

## USE AND MARKETABILITY OF COMPOST

It is the intent of the City of High Point to develop products at the ICF which would have the ability to be used at parks, golf courses, road right-of-ways and beautification projects. In addition, commercial landscapers and private citizens could purchase the compost as soil amendments. Numerous studies conducted in North Carolina and the U.S. have proven the excellence of compost materials in the following uses: soil

amendments are tilled into the soil to help retain the particle moisture, enhance soil drainage, improve nutrient transfer to plants, and enable deep root penetration resulting in healthier plants; soil mulch applied to the top of the soil to help control weeds, protect plant roots and prevent soil from drying. Compost may also be used to help replace topsoil and aid in the prevention of erosion. The bulk application of compost in agricultural uses has proven to be an effective, economically viable method of improving nutrient depleted soils while reducing the need for commercial fertilizers.

The key to successful marketing will be the perception and acceptance of the product by the public. With good ICF public relations, education and marketing expertise, the compost product should have readily available markets within the Piedmont/Triad metro in governmental, commercial, agricultural and private applications. Our previous experience has proven this to be true and we expect more of the same for the future.

# COMPOSTING PROCEDURES

The purpose of this section is to establish the procedures for producing compost at the ICF. These procedures may be refined or modified as experience is gained in the composting process.

## ACCEPTABLE MATERIALS

The ICF is designed as a wood and yard waste composting facility. Materials accepted at the ICF from the public (commercial & private) shall include:

- untreated wood waste
- yard waste (leaves, grass, brush, limbs)
- other biodegradable waste determined as suitable for the composting process by authorized personnel and by section .1400 of the Solid Waste Management Rules of North Carolina

After weighing in, the acceptable materials shall be off loaded at the appropriate location as determined by the ICF Staff (receiving area, windrow area, over-flow area). Each load will be examined for contaminants, non-conforming or unauthorized material. The ICF Staff will be responsible for the coordination of removal of these products. Acceptable materials may be expanded as knowledge, technology and expertise allow processing of these materials.

## PREPARATION OF MATERIALS

The preparation of materials will consist of grinding/mulching of wood waste, brush, leaves, etc., also the debagging of leaves and grass. This preparation will be performed at the designated areas. The ICF staff will be responsible for preparation of the material in a manner suitable for application as feedstock in the windrow area. The ICF staff will be responsible for the "timely" processing and transfer of material from the processing area to the windrow area.

Grass clippings shall be incorporated into windrows and turned within 48 hours of

on-site arrival. This will prevent odors and insure space availability at the receiving and processing areas for incoming materials.

WINDROW CONSTRUCTION

The windrows shall be constructed in the designated areas as shown on the attached site plan. The dimension of the windrows shall be approximately 12 feet wide by 4 - 6 feet high. The height and width of the windrows shall be determined by the mechanical design of the machinery used for the turning process. The windrows shall be constructed using layered feedstocks as materials are available. The materials may be placed in the original windrow by one of the following methods:

- Dumping bed or eject bed trucks may off-load the first layer of feedstock (leaves, wood chips, grass, etc.) in the windrow in a contiguous length dumping method. This method shall be done at the direction and supervision of the ICF staff.
- Materials may be moved from the receiving or processing area and placed in windrows by a front-end loader.

The original layer of feedstock may range in depth from 12 to 60 inches depending on the percentage and number of feedstocks being used to generate the desired type of compost. The second layer of feedstock may be placed on the windrow by dumping material from a truck onto the original layer, if the layer is less than 18 inches in depth. The preferred method is to place the second layer of feedstock on the windrow with a front end loader. The feedstock for the second and subsequent layers shall be placed by a front-end loader. These feedstock layers shall be placed 12 feet wide at the base, 4-6 feet high at the center and may be triangular or trapezoidal in shape.

The various feedstocks for the second and subsequent layers may be moved to the windrow area from the processing area by dump truck or front end loader. The feedstocks may be dumped next to the windrow under construction to allow easy front-end loader application to the windrow. During the layering of the feedstocks it is permissible and desirable to have a "mixing" of feedstocks in the windrow. The

front-end loader, while placing feedstocks in the appropriate quantities, shall be accomplishing the desired windrow shape. During the layering of the feedstocks it is desirable to check and adjust the moisture of the windrow. This will assure a proper moisture level throughout the windrow during its construction.

*Moisture*

The percentage of water in the composting material is a vital element in achieving the desired aerobic composting results. The bacteria required in the aerobic process need adequate quantities of moisture, oxygen and nutrients to accomplish particle decomposition. The initial formation of the windrow should strive to achieve a 60% moisture to 40% solid ratio. The water should be applied during the layering of feed-stocks to assure adequate mixing and retard runoff. As the composting process begins, the initial turning and temperature rise will create a substantial loss of moisture. After this initial loss of moisture, the desired moisture content should be approximately 50% until initial stabilization of the material begins. A 40% moisture to 60% solid ratio is optimum during the stabilization and curing stages. The moisture content during the composting cycle is critical to producing a satisfactory final product. Excessive water will cause undesirable odors. Insufficient water will slow the decomposing process by "drying" of the bacteria prior to the final energy release of the process. The ICF staff has established good operating and testing procedures to insure proper moisture. The exposed windrows may allow rain to penetrate and change the moisture content. The ICF staff should be aware of current weather conditions and forecast weather when determining moisture additions to the windrows. The shape of the windrow will will help reduce moisture penetration by shedding the rain, thereby minimizing excess moisture. The grade of the pad will allow rapid drainage of the composting area. Free moisture on the compost pad should not be allowed to occur. The ICF staff will be responsible for proper drainage of the compost pad.

*Oxygen*

The composting process is best in the aerobic state -- in the presence of oxygen.

While decomposition will occur in the anaerobic (without oxygen) state, it is much slower and is normally associated with severe odor problems. The windrows should be formed without mechanical compaction. This will automatically leave voids in the materials allowing the area required for oxygen. The windrow should be turned periodically to "fluff" and mix the composting material. This will allow a more consistent availability of oxygen for microbial activity. While oxygen is necessary for aerobic composting, too much oxygen (turning too frequently) will slow down the metabolic process by allowing the heat formed in the pile to escape also causing excess moisture evaporation.

*Nutrients*

Wood and yard wastes have the nutrients of nitrogen, phosphorus and potassium of which nitrogen is the key element in the composting process. The carbon to nitrogen ratio is a critical element in determining the rate of decomposition. The carbon to nitrogen ratio must take into account the difference between decomposable carbon and total carbon. Different feedstocks will have various levels of decomposable carbon. Normally, during windrow construction, the layering of feedstocks will be designed to allot the proper carbon to nitrogen ratio. This ratio should ideally be in the 20:1 to 35:1 range. The average carbon to nitrogen ratios for specific materials are as follows:

| Materials | C:N Ratio |
|---|---|
| *Wood Chips | 800:1 |
| *Sawdust | 400:1 |
| *Straw | 100:1 |
| *Leaves (dry) | 90:1 |
| *Leaves (fresh) | 40:1 |
| *Grass | 20:1 |

The on-site construction of windrows should have goals of 20-35:1 ratios at the beginning of the composting process. The cured product may see reductions to 10-15:1 through carbon released during the decomposing process. The ICF staff should analyze

incoming materials to determine the availability of low C:N ratio materials to be mixed. The use of partially decomposed or composted materials as a layered feedstock is permissible. This material would have a lower C:N ration and would act as an inoculate and help reduce the C:N ratio of higher feed stocks. (example: materials in the middle of the composting process 3 - 6 weeks, may be layered into a new windrow of leaves and woodchips to provide a lower C:N ratio and aid in achieving the desired decomposition rate.)

Other nutrients, such as phosphorus and potassium are normally not a limiting factor in wood and yard composting activities.

*pH*

pH is the measure of acidity/alkalinity. The correct pH balance plays another critical role in the composting process. The pH balance affects the quantity of nutrients available to support the microbial activity. The overall metabolic rate may be affected and the heavy metal solubility is reduced if the correct pH balance is not maintained. It has been found through various programs and tests that a pH level in the 6 to 8 range (neutral) is the desired level for the composting process. Lime as an additive to the feedstock is recommended as necessary to increase pH levels.

It is of paramount importance to monitor temperature, nutrient levels, etc. The monitoring procedures shall be performed by the ICF staff.

*Physical Properties*

The physical properties include particle size, temperature and their relation during the composting process. The role of particle size affects the rate of decomposition. The smaller particle size allows more surface area for microbial activity which results in a rapid decomposition rate and a natural volume reduction. The small particle size must be balanced by the need to have voids (air space) available between particles for oxygen to the microorganisms. This often results in the blending of feedstocks to insure a good mix of small particles and larger "bulking" particles to maximize oxygen availability and microbial activity.

All microorganisms have an optimum temperature range. The ideal range for the decomposition process is 131 to 145 degrees Fahrenheit for several consecutive days. (minimum of 3 days). It is also necessary to insure that all portions of the compost are exposed to this temperature for the minimum number of days to insure the pathogen destruction that must occur to have a quality compost.

Temperature is also a key element to internal windrow activity. If microbial activity is so great that temperatures rise above 150 degrees, this results in destruction of the microorganisms and the retarding or stopping of the microbial activity prior to the complete aerobic decomposition of the feedstocks. If the temperatures do not exceed 131 degrees, the microbial activity is not sufficient and the ICF staff shall troubleshoot and correct the cause of the low temperature.

Temperatures will be taken daily with a Reotemp thermometer approximately 100 feet apart. When temperatures reach a sustained 131 degrees for three days, windrows will be turned with a SCAT compost turner.

The ICF staff will be responsible for mixing feedstocks to achieve the blend of properly sized material and will be responsible for the testing of windrows to insure temperatures are met.

## COMPOST STABILIZING AND CURING

The stabilizing and curing of compost are two separate steps which may take place at different locations at the facility.

Stabilizing is the gradual reduction of microbial activity while in the presence of oxygen and moisture. This microbial activity reduction results from the completion of the decomposition of the mixed feedstocks. The stabilizing process shall be done by combining windrows of similar feedstock age. This will maximize the utilization of the compost pad. The ICF staff should record when windrows are combined and keep appropriate records of materials. Stabilizing of the compost usually begins 9 to 12 weeks after windrow construction. Stabilizing is characterized by a substantial drop in temperature after the active composting period. The windrow will also visually be smaller with a distinct particle size reduction. The ICF staff shall use their discretion

on stabilizing periods (normally 3 - 4 weeks) and combining of windrows.

The final curing period of the compost shall be accomplished in the final storage area. The ICF staff shall determine the appropriate time to transfer the compost to the final storage area. Screening to achieve correct particle size and compost quality should occur at this point if the ICF staff determines work conditions are appropriate. The curing process allows for "piling" of materials. The process is characterized by low temperatures and low microbial activity. Some further decomposition of cellulose and lignin may occur during curing.

## COMPOST SCREENING AND STORAGE

Screening of the material should occur before transfer from the windrow to the final storage area or prior to off site shipping. The market and end use will have a direct effect on final product size. The screening is the sifting of the compost through a screen to remove large particles and improve the quality and consistency of the compost. Typical screen sizes range from .25 inches to 1.0 inches and are interchangeable. Often, the larger screened particles will have a market allowing this larger material to be the final product. Large material may also be reintroduced as feedstock (the bulking agent) in new windrow construction.

## WINDROW REPORT, SAMPLING, QUALITY CONTROL

The composting process is a natural biological process. A composting program may have various degrees of success when compared to the goals and objectives desired. To insure a successful composting program, a systematic approach to recording and reporting shall be employed. The ICF staff shall be the responsible party for recording information for each windrow constructed. The windrow report will contain the following: the amounts and types of feedstocks, percentage of moisture at windrow construction and subsequent applications, the initial temperature of the windrow, periodic temperature of windrow, approximate distance between testing points, date of each turning of windrow, date when windrows are combined, comments section for general notes on processing, weather, etc.

The compost will have unrestricted applications and distribution provided that it contains no pathogenic organisms, is free from offensive odor, and has no sharp particles which would cause injury to persons handling the compost.

The ICF staff should maintain a daily calendar where notations of weather conditions may be recorded. This information will be used in comparing and analyzing windrow reports for processing rates, volume reduction and compost suitability.

The ICF staff shall be the responsible party for achieving and maintaining Quality Controls in the composting process. The success of the composting program is directly related to the quality of the final product. The ICF staff should seek the advice and input of Public Services staff and independent experts when areas of concern develop with regards to quality control of the compost product.

## ODOR, DUST, AND VECTOR CONTROL

The ICF is intended to be a positive, environmentally friendly waste disposal alternative. The ICF shall be operated utilizing procedures which will minimize odor, dust and vectors.

Odor control shall be of paramount importance for favorable acceptance and good public relations with users of the facility and surrounding neighbors.

Grass clippings may present the most consistent problem of minimizing odor at the ICF. Grass clippings begin the decomposition process quickly and will go "anaerobic" quite easily. Odors are often released during mixing or turning of the windrow. Several factors should be incorporated to help negate the odor problem:

- Grass shall be processed and turned within 48 hours of arrival at the receiving area
- Windrows should be well aerated
- The ICF staff should be knowledgeable of "aerobic" and "anaerobic" characteristics of windrow composting
- Wind should be minimum or blowing away from neighbors when compost turning occurs (when feasible)
- ICF should maintain large natural buffers to help minimize the effect on neighbors

When areas in the windrows are deemed to be in the "anaerobic" state, an acidic condition occurs in the compost. Often, the application of lime will aid in the neutralizing of the acidic condition and be effective in odor control.

The ICF shall be regularly patrolled for trash, wind blown debris, etc. These materials shall be placed in the appropriate area or containers for proper disposal. It shall be the responsibility of the ICF staff to minimize any problems in this area. The ICF staff shall maintain proper drainage and minimize standing water at the ICF to reduce the possibility of vector problems.

# EQUIPMENT

The primary equipment required at the ICF and their general uses are listed below:

- Tubgrinder: used for grinding of bulk wood, limbs, etc. May also be used to reduce particle size of feedstocks
- Two Front-End Loaders: used to transport, move materials, load trucks, mix feedstocks and form windrows
- Dump Truck: used to transport feedstocks from mixing area to windrows and compost from windrows to final storage area.
- Compost Turning Machine: used to turn, mix, mulch and form the windrows of feedstocks
- Screening Machine: used to screen stabilized compost for product particle sizing, quality and consistency
- Compost Thermometer: used to determine temperatures in the windrows, stabilizing piles and curing piles

# STORM WATER CONTROL

The ICF shall be engineered to provide optimum drainage for all areas of the facility.

# SECURITY AND NON-CONFORMING MATERIALS

The ICF is intended for use by the public, commercial and governmental bodies for recycling of organic waste. Due to the use of the ICF by diverse groups, safety is of paramount importance. The implementation of the following guidelines should minimize incidents and allow ICF personnel suitable methods for reaction to any occurrences.

## SECURITY

The ICF is designed to be a restricted access facility. As a restricted access facility there are posted hours of operation. The various parties will be allowed to use the facility during the posted hours and at other times mutually agreed by City of High Point Public Services staff.

To prevent access during non-operational hours, fencing at all areas of access shall be installed, maintained and used by the ICF personnel. Fencing shall be adequate to control automobile, motorcycles etc. as well as capable of deterring foot traffic. Security of the facility shall be aided by strategic placement of lights to restrict theft and miscellaneous nuisance behavior.

If it is deemed in the best interest of the city, a security guard may be located at the ICF during non-operational hours.

## SAFETY

The safety of personnel and users at the ICF shall be of paramount importance. The categories of safety shall include: Human, Equipment and Environmental.

*Human safety*: shall encompass all people working, delivering materials, or receiving finished product at the ICF. The City of High Point ICF operation shall be conducted in compliance with the applicable safety mandates. All appropriate telephone numbers of emergency agencies should be prominently displayed and all ICF staff shall be familiar with said numbers and location of telephones. Guidelines shall be utilized to insure proper response and reporting in the event of injury.

*Property safety*: It is the intent of the City of High Point to acquire adequate equipment accomplish the goals and objectives of the ICF. As such, all equipment shall be used in the manner for which it was intended. The ICF staff shall take all necessary steps to maintain equipment in a safe and operational condition. The staff should be familiar with and follow all manufacturers' recommendations in the use and maintenance of the equipment.

*Environmental safety*: The ICF is designed to be an environmentally friendly yard waste facility. As such, the ICF is designed to generate products which will compliment our environment by replacing lost soil components. The layout and operation of the facility will control the by-products of the composting process to insure the environmental compatibility of the ICF.

## FIRE

The ICF will be implementing the natural process of composting. The process develops internal heat to aid in the natural decomposition process. When heat is in the presence of various flammable feedstocks, there is the potential for occasional fires.

The ICF personnel shall be trained in elementary, on-site fire reaction procedures. The ICF personnel shall have on-site, accessible equipment to aid in the early suppression of fire. This equipment shall include but not be limited to: fire extinguishers, fire hoses for the on-site fire hydrant and hand shovels.

The ICF operation shall allow access and movement of emergency fire fighting equipment at all times. The ICF management shall arrange fire drills to test ICF personnel on proper response. Any and all occurrences of fire shall be recorded and analyzed by City of High Point staff and procedures established to prevent the reoccurrence of similar circumstance. Fire shall be reported to the state of North Carolina as required by the permit (41-10-yw).

## NON-CONFORMING/UNAUTHORIZED MATERIALS

It is not the intent of the ICF to accept any materials not in the "Acceptable Material" category. Loads shall be inspected by ICF personnel prior to and during off loading to

insure acceptable material types. Any non-conforming/unauthorized materials shall not be allowed to off-load. Any materials found during off-loading shall be reloaded into the delivery vehicle by the driver of the vehicle. ICF personnel shall be knowledgeable of approved disposal options for various non-conforming/unauthorized materials. Drivers with said materials shall be directed to appropriate disposal locations. Prior to the vehicle exiting the ICF with non-conforming/unauthorized material, the vehicle should weigh at the ICF scalehouse to insure accurate weights of incoming materials.

In the event small quantities of non-conforming/unauthorized waste are found in the receiving/processing area, these materials shall be separated by the ICF staff. A location shall be established for the temporary storage/disposal of these materials. ICF personnel shall be responsible for the loading and transporting of said materials to the appropriate disposal location. Weight and material reports shall be kept of all such disposal loads to facilitate accurate analysis of the ICF program.

Due to the mixing of various feedstocks during the windrow construction and varying sizes and decomposition rates, the final compost product is expected to have large and small particles. Screening of the final product will allow size separation according to screen dimensions. Materials too large for use as a soil amendment, mulch, or other suitable application, shall be classified as "Off Specification" material. Final compost materials which do not meet the conditions for unrestricted application shall also be considered "Off Specification" material. These "Off Specification" materials shall be handled as follows:

- If the Off Spec. material is suitable for use as a feedstock (bulking agent) it may be reintroduced in new windrow construction. Records of such use shall be included on the windrow report.
- If the Off Spec. material is not suitable for use as described above, and no alternative use is available, the Off Spec. material shall be disposed of in the same manner as described for non-conforming/unauthorized materials. Detail reports of weights, materials and reason for disposal shall be kept by the ICF staff.

# SUMMARY

It is the intent of this Operation Plan to provide the basic information required to operate the ICF. While many operational problems and situations have been addressed, not every circumstance can be listed. The plan is designed to allow amending and expansion as day to day operations and experience are realized. All changes or additions to the Operations Plan shall be done by Public Services staff with appropriate consultation if required.

The ICF is a positive method of recycling yard and wood waste generated in the City of High Point area. The ICF may address future growth by expanding the acceptable materials to include other biodegradable organic matter which would produce a marketable final product.

The composting of biodegradable organic matter is given priority on the EPA hierarchy of waste management methods. The ICF will allow the City of High Point a complimentary program to aid in the overall waste reduction goals as established in the Solid Waste Management Plan adopted by the City of High Point City Council.

# CITY OF HIGH POINT
# INGLESIDE COMPOST FACILITY
**Weekly Status Report Date: _____**

## 1. Windrow Formation

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

Row: ___ Length _____ Height _____ Width _____

Primary Materials _____

Temperature: Mon_____Tue_____Wed_____Thur_____Fri_____

Moisture: Mon_____Tue_____Wed_____Thur_____Fri_____

Turned: _____ Misc._____

NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT

NCDENR

JAMES B. HUNT JR.
GOVERNOR

WAYNE MCDEVITT
SECRETARY

WILLIAM L. MEYER
DIRECTOR

November 12, 1998

Mr. Duane Jarman
Solid Waste Manager
City of High Point
P.O. Box 230
High Point, North Carolina 27261

Permitted
Expires - 07.29.2004

Re: City of High Point - Permit #41-10

Dear Mr. Jarman:

The NC Division of Waste Management, Solid Waste Section has reviewed the information you submitted to have the City of High Point's Ingleside Compost Facility repermitted. The information submitted does not meet the minimum requirements of Section .1405 of the Solid Waste Compost Rules.

Following is a list of problems noted with the application:

1) An aerial photograph meeting the requirements of .1405(a)(1) was not included. Aerial photographs are available from Guilford County.

2) .1405(a)(2) was not addressed. Changes in adjacent property use that have occurred since the initial permitting should be noted. Any use changes should not affect repermitting as noted in .1404(a).

3) A letter or inspection report must be provided by the Division of Land Quality that indicates the erosion and sedimentation control structures installed are still in place and are functioning correctly.

4) The list of wastes provided included manure which cannot be accepted at a Type 1 facility.

5) .1405(a)(4)(B) was not addressed. The list of wastes provided included manure which cannot be accepted at a Type 1 facility.

401 OBERLIN ROAD, SUITE 150, RALEIGH, NC 27605
PHONE 919-733-4996 FAX 919-715-3605
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6) The site plan submitted does not meet the requirements of .1405(a)(5).

7) .1405(a)(6)(D) was not addressed.

8) .1405(a)(7)(A),(B),(E),(F),(G) and (H) were not addressed.

9) .1405(a)(9) was not addressed.

The information submitted is well written and meets the majority of the requirements of .1405(a)(10). The following items should be added to this document if it is to serve as an operation and maintenance manual:

1) Wastes other than those specifically approved for the facility shall not be managed without approval from the Solid Waste Section, NC Division of Waste Management.

2) The minimum temperature requirements is 131 degrees for 3 days, not 130 degrees.

3) Specific information should be provided in III F on when and how temperature is monitored. This should include how often temperatures are taken, how far part readings are made and to what depth.

4) In the event that manure or other high nitrogen wastes are received at the facility, they should be processed within 48 hours as is the case with grass.

The information you submitted indicates that you are applying for a Large Type I compost facility and that manure will be managed at the facility. Manure may only be accepted at a Type III or IV facility. If you have documentation the facility has been receiving manure as allowed by the old yard waste rules, then the facility can be repermitted as a Large Type III, meeting the setback requirements of the original permit. Application requirements for a Large Type III facility are in Section .1405(b) of the rules. Please note that an application for a permit for a Large Type III facility must bear the seal of a Professional Engineer licensed to practice in North Carolina.

If you have questions, please feel free to contact me at 919-733-0692, extension 253.

Sincerely,

Ted Lyon

Ted Lyon, Supervisor
Composting & Land Application Branch

cc: Hugh Jernigan, Waste Management Specialist

h:cla/compost/apprev/41-guil/highpoint/98-ywrev#1

NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT

NCDENR

JAMES B. HUNT JR.
GOVERNOR

WAYNE MCDEVITT
SECRETARY

WILLIAM L. MEYER
DIRECTOR

***CERTIFIED MAIL***

August 17, 1998

Mr. Perry Kairis
City of High Point
P.O. Box 230
High Point, North Carolina 27261

RE: City of High Point - 3001 Ingleside Drive - Permit #41-10

Dear Mr. Kairis:

A review of our files has indicated that your permit to operate a Yard Waste Facility, Permit #41-10, **will expire on December 20, 1998.** A properly completed permit application should be received within ninety (90) days prior to the expiration date.

Application requirements for Solid Waste Compost Facilities are in Section .1405 of the Solid Waste Compost Rules. The Yard Waste Rules under which this facility was originally permitted were combined with the Solid Waste Compost Rules in May, 1996. Yard Waste Compost Facilities are now considered Type I Solid Waste Compost Facilities.

As explained in Section .1402 of the Solid Waste Compost Rules, Type I Solid Waste Compost Facilities may only receive Yard Waste. If you wish to receive other wastes at the facility you may want to consider applying for a Type II or III compost facility permit.

One of the application requirements is a detailed operation and maintenance manual for the facility. This should be a separate document that thoroughly outlines procedures to be followed in operating the facility.

If I can be of assistance to you please feel free to contact me at 919-733-0692, extension 253. If you need a copy of the Solid Waste Compost Rules, Section .1400 of the Solid Waste Management Rules, please contact B.J. Stanfield

(over)

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at 919-733-0692, extension 264.

Sincerely,

Ted Lyon

Ted Lyon, Supervisor
Composting & Land Application Branch

cc: Julian Foscue, Western District Supervisor
Central Files - Solid Waste Section

h:cla/compost/expnotic/41-guilf/41-10-98

(over)

Is your RETURN ADDRESS completed on the reverse side?

**SENDER:**

- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write *"Return Receipt Requested"* on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

MR PERRY KAIRIS
CITY OF HIGH POINT
P O BOX 230
HIGH POINT NC 27261
YW

4a. Article Number
Z562272554

4b. Service Type
☐ Registered ☑ Certified
☐ Express Mail ☐ Insured
☐ Return Receipt for Merchandise ☐ COD

7. Date of Delivery
8-19-98

5. Received By: *(Print Name)*
Eric Davis

6. Signature: *(Addressee or Agent)*
X Eric Davis

8. Addressee's Address *(Only if requested and fee is paid)*

PS Form **3811**, December 1994 102595-97-B-0179 Domestic Return Receipt

Thank you for using Return Receipt Service.