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MACCONNELL
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August 14, 2013

Ms. Donna J. Wilson
Environmental Engineer
Composting and Land Application Branch
NCDENR - Division of Waste Management
Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Re: Craven Ag Services Compost Facility
Comment Responses
MacConnell & Associates, P.C. Project No.: A45201.00

Dear Ms. Wilson:

In response to your comment letter dated April 5, 2013, relative to the above referenced project, the following additional information and responses are provided. One hard copy and one electronic copy of the revised information is provided for your review to the address above.

1. Groundwater:
   a. Prior to development of the groundwater monitoring plan, a field investigation should be conducted at the site. Temporary piezometers should be installed upgradient and downgradient of the composting area, and also between the northern area and the drainage ditch, to accurately determine the potentiometric groundwater surface. Soil boring logs should be prepared for each piezometer well installation to characterize site hydrogeology. The study should include an evaluation of potential groundwater to surface water discharge in the site drainage ditches.

      Response: Please see attached "Water Quality Monitoring Plan" prepared by Cpec Environmental, Inc.

   b. The water quality monitoring plan must be prepared by an environmental consulting firm under the seal of a board certified licensed/professional geologist that has experience with the design and construction of groundwater monitoring wells and plans. Since groundwater monitoring wells are significantly different in design from drinking water

wells, the wells should be installed by a certified well driller with experience in the construction of groundwater monitoring wells.

Response: Please see attached "Water Quality Monitoring Plan" prepared by Cpec Environmental, Inc.

c. The number, spacing and depths of monitoring wells is determined based upon site specific technical information that should include investigation of aquifer thickness, groundwater flow rate, and groundwater flow direction, including seasonal and temporal fluctuations in groundwater flow.

Response: Please see attached "Water Quality Monitoring Plan" prepared by Cpec Environmental, Inc.

d. The groundwater monitoring plan must include a site map showing the location of the composting areas with respect to the entire property; a site specific topographic map with the location of the composting facility; a discussion of the site geology and hydrogeology including the results of the field study; an evaluation of whether there could be groundwater to surface water discharge for the compost areas at the site; and a sampling and analysis plan that describes sample collection and handling. The groundwater monitoring system should have at least one upgradient well. The number of downgradient wells is site specific. Detection monitoring wells are designed to monitor the upper portion of the aquifer. Groundwater monitoring wells are typically constructed on 2-inch PVC pipe and have a screened interval to allow the infiltration of water. They are installed in a borehole with a sand filter pack around the screen and a bentonite clay seal over the sand filter. The remainder of the borehole is grouted to the ground surface and a protective casing is installed over the riser. Groundwater monitoring wells must be installed in accordance with 15A NCAC 2C, and a well record form GW-1 must be filled out for each groundwater monitoring well and a copy submitted to the Solid Waste Section.

Response: Please see attached "Water Quality Monitoring Plan" prepared by Cpec Environmental, Inc.

e. The groundwater monitoring plan should describe consistent sampling and analysis procedures that are designed to ensure monitoring results provide an accurate representation of groundwater quality at the background and downgradient wells. The plan must include procedures and techniques for sample collection, sample preservation and shipment, chain-of-custody control, and quality assurance and quality control.

Response: Please see attached "Water Quality Monitoring Plan" prepared by Cpec Environmental, Inc.

f. An initial baseline groundwater sampling event should be implemented prior to operation of the new areas. Well samples should be analyzed for total metals/Method SW846 (arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, and

coliform. Based on results of the baseline sampling event, a site specific list of parameters will be considered for continued semi-annual detection monitoring events. Groundwater monitoring wells must be surveyed and tied to a permanent benchmark of known elevation measured from a USGS Survey benchmark.

Response: Please see attached "Water Quality Monitoring Plan" prepared by Cpec Environmental, Inc.

2. Some of the text changes and corrections that were made to the application in the second submittal, based on the review comments, have incorrectly returned in this third submittal. For example, in G.11, "present escape of odors" was in the first submittal, and was changed to "prevent escape of odors" in the second submittal, and is now back to "present escape of odors" in the third submittal. It is possible that the review changes were made to the wrong version of the application. Please correct these errors and check the entire application.

   Response: Application text errors are corrected including replacing LLC with Inc. and "prevent escape of odors."

3. The feedstocks to be received at the facility are listed in three sections of the application: Section D.1, Section G.3, and Section 1.0. The list in all three places should be the same but they are not. For example, clean wood from construction operations is listed as a feedstock in Section D.1, but it is not included in the other two lists. Please correct. Where will the DAF skimmings be coming from?

   Response: Feedstocks are combined into Table 3-1 located in Section G - Part 3 of the Application. The maximum tonnage expected for each item is included. DAF skimmings are from Maola.

4. Background and Intro, 2nd paragraph, 1st sentence - The acreages of the areas and total area appear to be incorrect.

   Response: Paragraph is revised to include acreages provided by surveyor.

5. Section A, 1st paragraph - The text states that the total property is over 100 acres. The property is listed as 89.34 acres on the county property website.

   Response: Please see revised paragraph.

6. Section A - 2nd paragraph - Please clarify the 1st sentence.

   Response: Please see revised paragraph.

7. Sections A and G - Please change Crave Ag Services, LLC to Craven Ag Services, Inc. The Secretary of State's office does not have a listing for Craven Ag Service, LLC.

   Response: Please revised Sections A and G.

8. Text and drawings should indicate that permanent markers will be maintained for (1) the curing area boundary along the north side of Area 3, to maintain the 500 foot buffer to the offsite residence, and (2) the boundaries adjacent to the floodplains and property line in all three areas.

   Response: Please see revised marker location and Note 6 on Sheet C-102. Section A - Paragraph 1 of the application is revised accordingly.

9. Section E, 2nd paragraph - Please state that the 500 foot buffer to the residence across the road will be maintained in the northern area (or Site 3) by the placement of buffer line markers.

   Response: Please see revised paragraph.

10. The analysis of the wood ash that was provided in consideration for the compost soil texture amendment is too high for arsenic, for both use in the pad and for a feedstock in the compost process. Is this sample from the wood ash proposed for composting? If yes, the wood ash analysis should be removed from Attachment 13. The wood ash is proposed for composting, please provide the quantity to be received as feedstock. Because of the metals, the quantity should be a small percentage of the overall volume of feedstocks received. Coal ash is not acceptable at a Type 3 compost facility.

    Response: Please Table 3-1 in Section G Part 3. Wood ash is only added to the finished product. Coal ash is removed from the feedstock list.

11. For the lime mud and the wood ash, please address how the pH will be monitored and managed in the initial mix.

    Response: Lime mud and wood ash are added to the finished product and will not be used in the initial mix.

12. Please provide an update to the DWQ stormwater/process wastewater permit application, and the sedimentation and erosion control permit application.

    Response: A DWQ stormwater/process wastewater permit is not required for this site. Erosion & Sedimentation Control plan is being concurrently resubmitted to the Washington Regional Office.

13. In addition to the description of changing the soil texture in the Note #4 on Drawing C-102, it should also be described in the text of the application. The modified soil texture is required for areas used for waste receiving and storage, active composting, and curing (not just composting and curing as stated on the drawing). Please provide a sketch or drawing of the boundary of areas that will receive soil amendment, or state that the entire boundaries of Sites 1, 2, and 3 will receive the amendment in soil texture.

Response: Please see revised Note #4 on Sheet C-102 and Application Section G - Part 1 - Paragraph 4.

14. How will the reworked areas be tested/soil classified to ensure that the modified soil texture meets the requirements of 1404(a)(10)(B), that is, finer than loamy sand? The depth of soil texture modification should be 9 to 12 inches deep. Will 2 or 3 inches of ash and compost fines be enough to modify the soil texture to that depth? Drawing C-103 indicates the soil texture will be modified to 4 inches.

    Response: Please Application Section G - Part 1 - Paragraph 4. Modified soil texture and depth will be confirmed by the Design Team (Rubin and MacConnell). 2 to 3 inches each of ash and compost blended with the top few inches of native soil should adequately modify the soil texture as required. Please see revised Note #4 on Sheet C-102.

15. Section G.1 - Please update the sentence that states that the western site area will be developed as compost production dictates. Please update the sentence that states that a concrete pad will be developed as the facility expands.

    Response: Please see revised paragraphs 3 and 6.

16. Section G.3 - Please provide the (expected) volumes of all feedstocks.

    Response: Please Table 3-1 in Section G Part 3.

17. The floodplain map in Attachment 6 should show the boundaries for all three areas. There are currently two that are outlined on the figure.

    Response: Please see updated FEMA map.

18. In the text describing the mixer, provide a reference to the mixer equipment specifications in Appendix 2 of Attachment 4 or Attachment 5.

    Response: Section G.4 (Paragraph 1) is updated to reference Attachment 5 for the Knight RC 200 Series mixer.

19. Section G.5 - Please clarify 1st sentence.

    Response: Please see revised paragraph. References to runoff collection areas are removed.

20. Section G.8 - Compost failing the fecal coliform test returning to the compost process should meet the time and temperature requirements (remove the "up to" prior to the temperature).

    Response: Please see revised Section.

21. Section G.11 - The temperature and time requirements for VAR in this section are not stated correctly. However, because the facility is following the windrow composting method, 15 days at a minimum temperature of 131 degrees F, with five turnings, the PFRP process will also satisfy the VAR requirement.

    Response: Please see revised Section.

22. The report states that the pile size for PFRP composting will be 5 feet high and 15 feet wide. Please provide the maximum pile size for curing piles, finished product piles, and for storage of dry feedstocks. This is an indirect way of determining the maximum capacity of each area of the facility (previous comment #40 in the Nov. 2011 comments). The pile size of dry feedstocks and finished product should be no more than 30 feet high and 50 feet wide. Also, what is the distance between windrows in each of these areas?

    Response: Please see chart at bottom of Page 5 in the Operations Guide.

23. What is the frequency of turning in the curing area?

    Response: Compost in the curing area is turned approximately once per week. Please see revised paragraph on page 6 in the Operations Guide.

24. Operations Guide:
    a. Please clarify where records will be kept.

       Response: All records will be kept on site. Please see Section 5.0 - Paragraph 1.

    b. Page 5 - Please clarify last sentence of first paragraph.

       Response: Please see revised sentence in paragraph 2 of Section 1.1.

    c. Pages 5 (2nd paragraph) and 8 (last paragraph) - Please change "bin" to "mixer" or "mix pad." I assumed "bin" was a storage container or bunker.

       Response: Please see revised paragraph 3 of Section 1.1.

    d. Excess liquid, leachate, and process wastewater/runoff cannot be collected in the sinks or basins along the site boundaries. Please change text to state that the process wastewater/leachate will be diverted to ditches, included with stormwater, and will be regulated by the DWQ permit (or something similar). Drawings and G.5 should also be changed.

       Response: References to sinks or basins along the compost site boundaries are removed. Runoff will be treated through vegetated buffers along the compost boundaries.

e. Please change "Bay" to "Area."

Response: Please see revised Operations Guide.

25. Drawings - In Site 2 and Site 3, the orientation of the compost windrow, curing windrows, and finished product piles are shown in different directions. To prevent ponding of surface water, the windrows and piles should all be oriented parallel to the direction of the slope, or just slightly angled to the slope. Please orient the windrows on the diagram, and indicate the planned slope for the areas.

Response: Please see revised drawings with anticipated compost windrow orientation.

26. Please provide the location of the nearest USGS survey benchmark. The groundwater wells will have to be surveyed in after installation.

Response: Location of nearest USGS survey benchmark is not known. Surveyor to provide upon installation if monitoring wells.

If you have any questions please call me or Zachary L. Fuller, PE at (919) 467-1239. Thank you for your assistance.

Sincerely,

Gary S. MacConnell, PE
President

A. R. Rubin

Enclosures

cc: J. W. (Billy) Dunham – Craven Ag Services

GRID NORTH

SCALE 1" = 1000' (1 : 12,000)

0 0 1000 2000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 5544J

FIRM

FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 5544

(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CRAVEN COUNTY	370072	5544	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

EFFECTIVE DATE
JULY 2, 2004

MAP NUMBER
3720554400J

State of North Carolina
Federal Emergency Management Agency

Background and Introduction: Materials Contained herein are derived from North Carolina Administrative Code (NCAC) and the compost requirements contained in 15 A NCAC 13B 1400 et seq. and are intended to support the application to permit and operate a Compost Production facility in Craven County, NC.

The operation proposed involves expanding the permitted 3.005 acre demonstration site including a 4.7 acre and 1.8 acre site for a total of 9.505 acres. The expansion will create a new mix/blend area and windrow area, expand the finish product and blending area, and develop a more permanent and sustainable compost operation utilizing the entire area specified as the CAS compost operation. Site 1 is the 1.8 acre site to the south containing Area 1, Site 2 is the large 4.7 acre site to the southwest containing Area 2, and Site 3 is the existing 3.005 acre demonstration site containing Areas 3 and 4 as shown on plan Sheet C-102. The operation will take place on the three portions of the site listed in the permit application. Areas with jurisdictional wetland and areas in flood prone portions of the large acreage tract are not intended for coverage under this permit.

The effort is intended to allow Craven Ag Service (CAS) to remain in operation while the activities necessary for expansion onto the larger proposed site occur. The operations on the existing site have demonstrated to CAS and NCDWM the viability of a compost operation. The existing demonstration site has capacity to function satisfactorily for approximately 18 additional months while the expansion areas are developed. The intent is to permit the entire facility as a permanent compost operation.

This application is intended to support requirements in the .1400 rule to permit a septage/FOG/MSW compost facility.

A. Site Location (.1405 (b)(1))

The Craven Ag Service, Inc. Compost Facility is currently operating through a demonstration permit. The site is located on River Road in Craven County, NC. The site is located between River Road and the Neuse River. The property contains 89.34 acres, but only those portions of the large acreage tract located on the higher elevations will be utilized in the compost operation. The specific location of the compost facility is shown on a site map and aerial photographic maps included in Attachment 1. The Craven Ag Service, Inc. Compost Site is located so as to meet or exceed all the applicable buffers for a Large Type 3 composting facility posed in NC Rule. The buffer distances between existing residences and active compost production is over 500 feet. No product will be stored within 500 feet of existing off-site residences, however finished product storage, haul roads, ingress and egress to storage is within the 500 foot buffer. The 500 foot buffer to Area 3 (Curing) and composting area boundaries will be field delineated with markers. These markers will show the location of the 100 year flood plain. The applicable buffers are shown on the site map provided in Attachment 1.

The proposed compost site is currently permitted as a septage receiver site. Land application of septage will be halted in areas permitted for composting activities. The entire area was investigated previously by Mr. Fred Smith. His site and soils report were submitted as a portion of the permitting package submitted to obtain the septage land application permit and are included as an attachment to this report. This previously submitted report contains the relevant site and soil information required to obtain a land application permit and similar information is required for the compost operation. This site and soil report is in the record for the CAS site and is considered as representative of the current underlying soil features.

The application for the compost site permit does include feedstocks from the ongoing CAS septage and grease trap dewatering operation currently permitted at the Highway 55 facility. In addition to these regulated wastes, bulking materials and feedstocks will be as listed in Section D, Part 1 of this document.

B. Letter from Craven County Planning (1405(a)(2))

The Craven County Zoning letter, 12 May, 2011 is attached as appendix A.

C. Compliance: (.1405(b)(3) and .1404 (a)

(1) The Craven Ag site is located on a terrace landscape position adjacent to the Neuse River in Craven County, NC. Portions of the property are in designated 100 year flood elevation areas and designated as AE in the FEMA flood maps (FIRM Map, Map Number 37205544001, 2 July, 2004). The areas designated as Zone AE or the AE floodway are not intended to host compost operations.
(2) The site map attached identifies property boundaries and demonstrates compliance with mandated buffer requirements (NO active compost operations will take place within 500 feet of off-site residences).
(3) The site map attached indicates adequate buffer between site operations and adjacent residences or dwellings.
(4) The site map attached indicates adequate buffer between site operations and wells.
(5) The site map attached indicates adequate buffer between compost operations and waterways.
(6) There is no direct discharge of pollutants from the site. An assessment by Ken Pickle, NCDENR - DWQ indicates no direct runoff. Water quality standards apply to discharge systems; non-point sources of discharge have been addressed through the operations plan.
(7) No portion of the operation is located over a closed solid waste operation.
(8) No portion of the operation is located within 25 feet of a berm or swale.
(9) No discharge of pollutants will impact section 404 waters or areas or violate water quality standards.
(10) Site assessments confirm no groundwater within 24 inches of soil surface.

Compliance: 1404(b)

1. Not applicable

Compliance: .1404(c)

1. Access to the site is controlled at locked gate along River Road
2. Effective sediment control practices are in place and practiced
3. Air emissions are controlled by turning appropriately and maintaining required buffers
4. Odor emissions are controlled by managing compost turning operations and feedstock management

D. Operational Details:

1. Waste types: See Table 3-1 (Section G, Part 3 - Raw Materials, Proposed Feedstock Volumes and Protocol For Compost).

2. Site assessment: The soil evaluations indicate seasonal groundwater elevations at a depth of well over 24 inches. Soil evaluation indicated the predominant soil texture in the western portion of the site proposed as the windrow area as loamy sand. The soil materials in this area will be modified by addition and subsequent incorporation of 2 to 3 inches coal dust/ash/compost fines to introduce fine particles and modify soil texture in the control zone. This will be accomplished with a disk. The current demonstration area has been modified over the last two (2) years through continued use as a compost production facility and the natural and planned addition of compost fines and coal combustion dust to the site. The soil texture in the existing compost manufacturing area currently serving as the demonstration site is fine sandy loam to sandy loam as determined by hand-texture method and to be confirmed by laboratory analysis. This meets requirements contained in DWM Rule NCAC.1404 10 b. This texture has been modified over the original texture by the years of operation during which fine textured soil particles were deposited on the site. These materials consist of: fine textured ash, organic materials such as fine organics and fine soil particles from yard and leaf waste, and compost produced on the site.

   The site had been investigated previously to obtain the permit to operate a septage land application site. This report was submitted by Mr. Fred Smith, CPSS. Mr. Smith indicated that the report was on file at DWM and if additional site/soil work were required, he would be willing to accommodate DWM needs, but that the initial investigation did provide information relevant to the subsurface soil conditions along the western side of the site.

The area proposed as the mix/blend area will contain a concrete pad and push wall to serve as a mixing and blending. Site 1 (1.8 acre site) will contain a concrete pad to serve as a receiving area for all putrescible material (see plan Sheet C-102). Site will also be the area (Area 1) used to store bulking material for the composting operation. When the putrescible material arrives on the concrete pad, a Kuhn/Knight Mixer will be used to mix and blend this material with the bulking material. Once the mixing is done it will be hauled in the mixer to the composting site and windrowed (Site 2/Area 2).

The area proposed as an active compost windrow area will be developed for active compost production operations using a compacted ash base with incorporation of the coal ash using a disk (TCLP Attached) to provide a working surface, to reduced soil permeability and to provide an area compliant with the texture requirement in rule. The ash material contains a mix of particle sizes and when compacted, the variation in particle size results in reduced permeability. The permeability will be confirmed by the project team (Mr. MacConnell and Mr. Rubin) and reported to DWM.

Groundwater monitoring wells are proposed as indicated in the attached report by Cpec Environmental, Inc. A single up-gradient well is proposed to establish and benchmark background levels of groundwater quality. One well is proposed between Area 2 and Areas 3/4 and two down gradient wells will be provided.

E. Site Plan: Site plan is attached, see attachment 1

The site plan indicates that NO wells are located on the site and no surface water storage facilities are on the site nor will they be proposed. Drinking water for operators is provided as bottled water and supplements process water required for compost operations is provided by the wet waste accepted at the facility.

The plan indicates that no residences are located within 500 feet of the active compost production sites or storage areas, however haul roads are located within 500 feet of existing off-site residences. Markers will be maintained marking the 500 foot setback along the northern edge of Area 3 (Curing).

Portions of the large acreage site do contain areas that are clearly wetlands, BUT NO area proposed for the compost production or storage are located in jurisdictional wetland areas. Markers will be installed and maintained delineating composting areas. Portions of the tract located between the Neuse River and the western portion of the site are wetlands; these areas are unsuited for any of the operations proposed, they are untrafficable and are NOT proposed as a part of the compost operation. The site had been investigated previously by Fred Smith and those areas designated as suited for land application are NOT wetlands. The flood hazard map attached demonstrates flood plain issues do not influence the site selected to host the compost operations. Portions of the site had been previously permitted as septage receivers, portions of the permitted septage receiver areas are proposed to host the compost production and storage. Those areas currently permitted as septage receivers will be excluded from land application as the compost

operation expands.

F. Compost Facility Permittee and general operation guide

1. Mr. J. W. (Billy) Dunham is the Permittee for this facility. The Craven Ag operation is a family business. Personnel involved in the compost operation are:

    a. J. W. (Billy) Dunham, Operator in responsible charge
    b. Mack Dunham, Assistant Facility Operator
    c. John Dunham, Assistant Facility Operator
    d. Maintenance crew
    e. Equipment crew
    f. Transportation crew (over-the-road crew)

2. Operations Schedule: The Craven Ag compost operation may be open between 7:00 A.M. through 7:00 P.M. Monday through Saturday depending on the need to process and move compost. These operating hours will accommodate inflow, outflow of finish product and required compost production operations. Hours of operation may be less than reported here. Upon completion of a typical work day, the compost windrows will be checked to assure proper cover is in-place and the gate will be closed and locked as staff exit the site.

3. HHW - Household Hazardous Wastes are not composted at the site. If these materials are ever received on the site, they will be removed and handled through approved HHW operations.

4. Special precautions: During inclement weather (excessive rain, severe winds, snow, ice, or weather warning associated with tornado or hurricane), the facility will not actively mix or blend incoming feedstock materials. Compost windrow turning may proceed if site and soil conditions permit access to the site and the operation can be conducted safely without generating runoff or endangering staff.

5. Vector and nuisance conditions will be addressed by maintaining proper cover over windrows to prevent vector attraction. Noise associated with equipment operations will be controlled by operating only during posted hours of operation, no Sunday morning operation, and by controlling vehicle speed along River Road. Dust control if needed will be achieved by wetting roadways and other surfaces generating dust.

6. Finished compost will be utilized as a component of bioretention mix in stormwater systems, as a medium for plant growth, as a landscape material and for agricultural, horticultural, and silvicultural operations and as substrate for plant growth. All compost materials will be certified as PFRP and representative samples of the material will be tested as accomplished by NCDA for organic matter, nutrient, regulated metals, and salt levels as required in rule.

7. An operations and maintenance manual is provided. The Operations manual lists activities of individuals involved, operational requirements during normal operations and adverse weather, turning frequencies, temperature monitoring requirements, product quality testing and disposition for the compost, groundwater monitoring, safety, and other operational issues.

G. Compost Facility Design

1. The current Craven Ag, Inc. Compost Facility consists of a series of compacted marl gravel, compost and compacted soil/ash pads each of varying size. The compost site proposed contains several distinct areas to be developed using the coal ash as a soil amendment to develop suitable soil texture in the compost operations or a concrete pad in the mix/blend area. These are identified on the site map attached:

   Area 1 – Receiving Area - material receiving and mix pit
   Area 2 – Active Composting Area - material composting/processing area to assure PFRP and VAR compliance,
   Area 3 – Storage/Curing Area - screening and material curing,
   Area 4 – Finished Product Storage Area - areas suited for storing finished compost or dry feedstock materials and for short term storage while materials are held waiting distribution and marketing.

   In addition to these defined areas, the site may also contain temporary tank trucks for storage and treatment of the raw materials to be processed and composted. These consist of above ground portable tanks ranging from 1,500 to 6,500 gallons capacity. The proposed area involves development of a concrete mixing/blending pad (Area 1).

   The design team will certify to DWM that Sites 1, 2, and 3 are developed as permitted with the ash materials to reduce permeability and prepare a stable working surface. 2 to 3 inches of ash and 2 to 3 inches of compost fines will be applied over the site with a loader, spread evenly, and disked into all three sites. This will provide a 6 to 9 inch thick slowly permeable pad suitable for this type facility. Groundwater wells are proposed as indicated in the attached report by Cpec Environmental. The Groundwater monitoring plan is included in the O and M manual.

   The compost is to be manufactured from ingredients listed in Table 3-1 (Section G, Part 3 - Raw Materials, Proposed Feedstock Volumes and Protocol For Compost) of this document. New feedstock sources will be tested to determine levels of nutrients, regulated metals, organic carbon and salt prior to receipt and these new feedstocks will be submitted to DWM as needed for approval. No new feedstock will be allowed if regulated metal levels exceed the Table 1 values listed in 40 CFR Part 503 or if excluded by TCLP or as a toxic or hazardous waste.

All of the putrescible material is mixed and blended with a suitable substrate on the concrete pad on the day of arrival to prevent nuisance problems. On day of arrival, the non-putrescible materials are stored in the raw material storage areas for subsequent use as needed for staging purposes. A mixer with a feed auger is used to combine the blended raw materials, which are then placed into the windrow compost production area. The windrow compost process continues in these open windrows for approximately 60 days from placement to product. At the end of the composting process, the PFRP/VAR compliant compost is moved by loader onto the compacted finished compost storage pad for curing. The finished compost is to be stored for a period of not less than 120 days and not to exceed 270 days for curing. A maturity test will be used to assess the stage of maturity of the compost. The finished compost may be sold in bulk as a soil amendment, blended with topsoil or sand marketed as finish compost, topsoil or bio-retention blend.

The facility is intended to accommodate up to 50,000 tons per year of compostable materials. These materials will be received on a varying schedule and daily receipts may exceed 100 tons, while annual processing will not exceed 50,000 tons. This schedule supports 300 days of active operation per year. Compost mixes or blends will be developed each day based on incoming feedstocks and ultimate market opportunity. Coarse materials will be used to produce silvicultural product while the finer textured materials will be mixed and blended for the horticulture and bioretention blend markets.

2. Compost Recipes

The exact blends and mixtures are developed based on proprietary mixes and blends developed by Craven Ag Service, Inc., for specific end uses or general compost production. The characteristics of a portion of the raw materials used for compost mixture calculations are described in the Operations and Maintenance Manual.

The composting operation serves primarily to receive feedstocks and bulking materials listed in Table 3-1 (Section G, Part 3 - Raw Materials, Proposed Feedstock Volumes and Protocol For Compost) of this document. Composting septage and dewatered grease trap wastes will allow an increase in the hydraulic loads onto the land treatment operation permitted for Craven Ag Service and to provide an outlet for solids produced in dewatering operations operated by CAS. The mixtures of substrate and waste should result in an initial C:N ratio of ~30:1 and a moisture content of ~75%.

3. Raw Materials, Proposed Feedstock Volumes and Protocol For Compost

The maximum waste production and processing assumptions for the compost operation are:

a. 50,000 gallons grease trap waste processed 5 days per week (10 to 20 dry tons/day after dewatering)
b. 50,000 gallons of septage processed 5 days per week (10 to 20 dry tons per day after dewatering)
c. 5,000 gallons of portable toilet waste processed 5 days/week (0.5 DT/D)
d. 20,000 pounds (10 tons) of vegetative waste per day received
e. 100,000 pounds (50 tons) per day feedstock from municipal, commercial, agricultural/agribusiness, and industrial sources.

These volumes will vary seasonally, but total production from all sources will not exceed 50,000 dry tons annually.

The solids portion of the processed liquid waste is to be composted. The liquid will be accommodated through land application, transported to a separate and properly permitted land treatment facility or to a permitted POTW (such as Kinston POTW). In addition to the nitrogen sources available from the septage and dewatered grease trap waste, several sources of carbonaceous bulking materials are readily available for utilization in the composting process. These materials are listed below and the estimated quantity received per week is estimated in Table 3-1 Please note that quantities received vary depending on market conditions and are subject to change:

Table 3-1

Compost Feedstocks

Feedstock	Estimated Quantity (Tons)
hardwood and softwood sawdust from local manufacturing plants	15
wood shavings	15
mixed wood chips and sawdust from ground pallets (nail free)	15
animal litter or transport bedding materials from livestock operations	15
DAF skimmings (from Maola)	6
scraped animal manure	3
straw bedding material from the on-site free-stall dairy, horse, or cattle barns	12
poultry litter from local poultry growers	15
untreated wallboard from home/mobile home construction/manufacture	6
pre and post consumer food waste	12
hay/straw harvested from the land	15

application fields	
ground corn cobs	3
ground and un-ground yard waste	15
dewatered septage	30-60
dewatered grease trap wastes	30-60
field crop residue	6
construction debris (clean wood scrap from construction operations)	6
vegetative agricultural/agribusiness wastes (wet indigestible hay or forage, corn stover, cotton gin trash, peanut hulls, tobacco scraps/spoilage, tobacco dust)	12
land clearing debris material	6
seafood processing wastes (crab scrap, fish processing wastes)	3

Items Incorporated with Finished Product

Feedstock	Estimated Quantity (Tons)
lime mud from water treatment operations	3
non-toxic/non-hazardous wood combustion dust and ash	6

Prohibited Materials

Municipal sludge
Hazardous waste
Infectious waste

Entrance signage and property boundary marking will be accomplished listing the type of facility, the permit number, and appropriate contact information.

4. Flow Diagram

The composting process at the Craven Ag Service Compost Facility is depicted on the site plan showing the processing area, mixing pad, the compost production windrows, the curing area and the screening/mixing area and may described as follows: dry raw materials are received and stored prior to use in the "dry material" storage areas. These materials are combined with a daily delivery of wet raw materials and the dewatered materials generated off-site at the Craven Ag dewatering facility. The dry materials are placed directly onto the pad and the dewatered or processed septage/grease trap materials are placed over the top of the material, these materials are mixed and blended using a

loader in an approximate 50/50 ratio. These raw feedstock materials are loaded via loader into the bulk mixer (Knight Mixer - RC 200 Series, see Attachment 5). The proper ratio of material introduced onto the mixing pad is determined by the number of "buckets" of material placed by the loader. The bulk mixing operation thoroughly combines the raw material and "mixed" raw materials are transferred to the compost production area. After initial treatment in the compost windrows for PFRP and VAR compliance, the compost is removed to the initial storage or curing area, where it is allowed to complete the compost curing process. A **Solvita** test will be used to assess the maturity of the compost.

A process flow diagram, showing the equipment and flow of materials through the composting system is included in Attachment 2. The critical flow duration in the active windrow is 15 days at required temperature with 5 consecutive turnings as required in rule. Typical time in an active windrow will be 4 to 6 weeks to allow for temperature rise from ambient to thermophilic and required mixing. Mixing and blending will be accomplished in a single day. Composting will require an estimated 21 days. Curing may require between 2 and 3 months depending on end use and Solvita test results. Storage can be accomplished following a Solvita test indication that the material is stable. Storage will be dependent on end use and may require op to 9 months depending on users.

5. Leachate Collection and Recycle System

The concrete mixing pad will collect leachate for transport to the compost for use in the process or to a permitted wastewater receiver site. Leachate is removed as needed or as required and incorporated back into compost batch as a liquid and nitrogen source or allowed to evaporate. Any addition of leachate back to the windrow is carried out in the primary loading of the windrow and results in an additional full processing and heat cycle which results in the Process to Further Reduce Pathogens (PFRP) to be repeated. In very wet conditions or in an emergency, such as a sustained power outage or equipment breakdown, the collected leachate will be transferred to the nearby permitted wastewater treatment facility in Kinston, NC.

6. Preliminary Compost Analysis/Quality

Detailed compost characterizations have been performed previously by NCDA on several samples of the finished compost. All units in the analysis are measured on a dry weight basis (mg/kg). Attachment 3 shows a summary of the results from NCDA sampling. The finished compost does not exhibit high concentration of regulated or heavy metals. The raw material sources are primarily agricultural in nature and do not have significant heavy metal concentrations.

7. Pathogen Reduction Verification

Pathogens are to be reduced as required in the NC Solid Waste Compost Rules, Section .1406. The CAS Facility shall maintain the compost process at a temperature above 55 degrees C (131 degrees F) for 15 days with the required 5 turning events and the material may be retained longer on the active compost portion of the site following the PFRP compliance. This satisfies both the VAR and PFRP requirement.

The completed compost from the CAS Compost Facility will have a fecal coliform density of less than 1,000 colonies Most Probable Number (MPN) per gram of dry solids. The materials will demonstrate pathogen reduction requirements by process monitoring (time and temperature).

8. Protocol For Compost Which does not Meet Pathogen Reduction Level

All finished compost which does not meet the time temperature requirements listed in rule (131 degrees F for 15 days) or tested fecal coliform level of 1,000 colonies per gram of dry material are to be returned to the windrow and subjected to an additional, high heat cycle (131 degrees Fahrenheit for 15 or more days with required turnings). Product may be re-sampled if readings are believed to be a "false positive." Temperature probes will be calibrated annually to assure reliable measures. In the event that this process does not reduce the fecal coliform count or the manager/operator decides that the additional composting is of no value, then the material will be land applied to an appropriate, permitted off-site disposal area (permitted for class B material through NCDWQ or NCDWM) or transported to a permitted landfill.

9. Contingency Plans for the Operation

An operating manual detailing the composting facility operations and procedures, including recipes, equipment, monitoring, maintenance, and record keeping is included as Attachment 4.

Contingency plans for operation in the event of equipment breakdown or temporary power failure or inclement weather essential operations will be accomplished with alternative equipment; for example, if turning is required and the turner is inoperable, turning will be accomplished with front end loader.

Problems with operation of the composting facility during extreme weather conditions such as heavy rain or high winds will be minimized because of limited ingress to the site. Essential operations will be accomplished as required with equipment available.

In freezing conditions, it may be necessary to modify the compost cycle to assure temperatures are maintained adequately. This may require turning during late morning and early afternoon hours to take advantage of warmer day-time temperatures. This practice should allow the temperature to reach and maintain the desired level in excess of 131 degrees Fahrenheit for at least 15 days with the required turnings to meet the PFRP requirements. Special caution will need to be taken with the operation of skid loader equipment in any areas where the small amount of leachate could freeze and present a slippage hazard. Operators will be trained in proper operation of all equipment to assure a safe and sound operation.

10. Compost Equipment: The equipment proposed for the compost operation is described in the Operations and Maintenance Manual, attached. The equipment is identical to that currently utilized in the ongoing compost demonstration.

11. Vector Reduction

On day of arrival, putrescible materials will be mixed, blended and prepared for composting, then placed into the compost windrow on that same day to reduce nuisance vectors. These materials will be covered with 3 to 6 inches of finished compost, 3 to 6 inches of a carbon rich material such as sawdust or a layer of plastic as described in the operation and maintenance manual to prevent escape of odor. Other dry stock component materials may be stored for longer periods. The VAR requirements established in rule shall be met through the windrow composting method (minimum temperatures of 131 degrees with 5 turnings) for PFRP compliance.

12. Traffic Flow

Based on the maximum throughput production of the compost operation a maximum of two tractor trailer loads of compost per day would leave the facility on average. The over the road tractor trailers are anticipated to move on the gravel access road leading from the facility to River Road, thence to NC Highways and roads for ultimate distribution in the area. Given the existing truck traffic from the facility, the additional effect on local traffic of a maximum of two trucks of finish compost per day, 4 to 5 loads of dry feedstock materials, and 2 to 3 loads of dewatered material on average will be negligible.

H. Marketing Plan and Materials

A portion of the finished compost has normally been sold by bulk to local buyers. At present, CAS Compost Facility has established a strong working relationship and goodwill with growers and producers in the area to continue with expansion of markets for soil amendment, compost and bioretention area soil mixes. A comprehensive set of

information sheets will be provided to end users depending on the use. Information sheets will be provided for horticultural, agricultural and silvicultural uses. Samples are contained in the O and M Manual.

Copies of the previous communication from the NC Division of Solid Waste regarding the Compost Facility are included as Attachment 9.

I. SUBMITTAL

Gary MacConnell and Zach Fuller with MacConnell and Associates and I appreciate the opportunity to compile this permit application for the CAS Compost Facility. Initial development and final review of these materials was provided by Billy Dunham, Gary MacConnell, Zach Fuller and A. R. Rubin. If either you or the NC DENR DWM representatives/reviewers have any questions regarding this report, please contact us directly.

Sincerely,

Gary MacConnell, P.E.

A. R. Rubin

attachments

Craven Ag Service, Inc. Compost Facility Operations Guide For Large Type III Facility

August 2013

Prepared for: Craven Ag Service, Inc.
River Road
New Bern, NC

Developed by: J. W. (Billy) Dunham, Craven Ag Service
Dr. A. R. Rubin,
Gary MacConnell, P.E., and
Zach Fuller, P.E.

Craven Ag Service, Inc.; Large Type III Compost Facility Information

Owner: J. W. (Billy) Dunham

Location: Site Location: River Road
Office Location:
2115 W. Highway 55
New Bern NC

Permit: Pending

Primary Contact: J. W. (Billy) Dunham

Office: 252 663 5334 (CAS Office, Highway 55 – NO office is located on the site, but a shed will be provided for equipment, supplies and shelter)
Cell: 252 670 8530

Regulatory Agency Emergency Contact:

NCDWM, Eastern Region: Ray Williams (2529483955)

Hours of Operation:

Monday to Friday: 7:00 AM – 7:00 PM
Saturday: 7:00 am – 3:00PM
Sunday: Closed

Prohibited Feedstocks:

Hazardous waste
Infectious waste

Craven Ag Service Compost Facility - Operations Guide

1.0 Introduction

The Craven Ag Service Compost Facility is located in the northern part of Craven County, North Carolina, near the intersection of River Road and Highway 4, approximately 5 miles southwest of Vanceboro, NC. This facility currently operates in accordance with a demonstration permit, and will be permitted by NCDENR-DWM as a Large Type 3 composting operation. The purpose of this operations guide is to comply with Section 1406 of the DWM regulations. Key personnel involved in the production of compost at this facility will acknowledge reading of this manual (below) to assure a basic understanding of the policies and procedures contained herein.

NAME:	DATE:
NAME:	DATE
NAME:	DATE:

Site management personnel will receive training as provided by the U.S. Compost Council, NC DWM, NCSU and the training activities shall be documented. The site owner is certified through DWQ as a residuals Land Applicator and through DWM a Septage Land Applier.

The raw feedstock materials for the composting operation will come from permitted sources. Please see Table 3-1 (Section G, Part 3 - Raw Materials, Proposed Feedstock Volumes and Protocol For Compost) in the Application.

Materials composted must be permitted in the DWM permit. New feedstocks will be tested (typically by NCDA) and approved by consultants to Craven Ag Service or DWM prior to receipt.

The composting operation will be conducted in open windrows specifically designed for compost production. Feedstock storage and final composting/curing will occur on compacted soil based pads. The windrows are fed from a concrete mixing pad and fresh compost is discharged following the PFRP and VAR compliance stage of the windrow process to a second portion of the compacted soil pad. The Concrete mix/blend pad will be developed as soon as permitted. The pad consists of a mix/blend area located in Area 1. The concrete pad consists of a reinforced concrete pad as designed. The pad contains a sloping bottom mix/blend area and a flat storage/receiving area as specified on the attached drawing. The mixed/blended materials will be transported to the active compost production pads located as shown on the site plan for composting. These areas will be slowly permeable pads.

Construction assurance for the concrete area will be documented by the design team and certified by the project team to DWM. Should documentation be required for the current compacted soil pads that will be provided by the team to DWM. The compacted pads help prevent introduction of undesirable material such as stones into the compost. Liquid or leachate generated during the compost feedstock mixing will be collected in a tanker, reused as a moisture source in compost, or transported off site to an approved wastewater facility.

1.1 Composting Requirements and General Operations

Compost is defined by the U.S. Composting Council as "the product resulting from the controlled biological decomposition of organic matter that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth." Composting is accomplished by mixing an energy source (carbonaceous material) with a nutrient source (nitrogen and phosphorus containing materials) in a prescribed manner to meet microbial requirements necessary to support metabolic processes. Moisture levels, solids levels, and nutrient levels in the compost feedstocks are controlled to assure the process reaches the required temperatures for the time prescribed by rule (15 days above 131 degrees F with 5 turnings in that 15 day time). The process is carried out under specific moisture and temperature conditions for a specified period of time. Critical steps and procedures are necessary to ensure that the composting process proceeds properly with a minimum of odors, adverse environmental impacts, and other process related problems. This O and M Manual is intended to enumerate many of these steps and procedures.

The facility will be divided into four (4) distinct areas. A process flow diagram is provided in the attachment to this report. These processes are accomplished in the areas as listed herein: receiving area, active composting area, curing area, and storage area.

Receiving area (mix pad): Here raw materials are received, this does include the concrete mix pad at the entrance to the process; here incoming materials are mixed and blended in preparation for subsequent placement in the windrows and these materials are inspected visually to assure only permitted products are present (unpermitted materials will be removed placed in a small 8 to 10 cubic yard dumpster and transported to a MSW landfill). Mixing, blending and measures will be accomplished on a "by volume" basis. Weight measures may be accomplished at the various sources, but compost operations will be based on volumetric assessments. Wood waste, wood chip, and yard waste will be chipped prior to use as feedstock.

Active Composting (Windrow) area: here the mixed/blended materials from the mix pad are placed into the long windrows for compost operations and where PFRP and VAR compliance will take place;

Curing area: here composted materials stored or cured, screened and prepared for distribution; and

Storage and final processing area: here finished, screened materials are stored prior to distribution and marketing or transport off site. This is a compacted, exterior storage area where finish compost is field stored and awaiting transport to various markets.

Materials permitted for receipt at the facility will be received in the receiving area. Solid and Semi Dry materials from off-site sources (litter, shavings, etc) will be stored for short times to prevent addition of moisture on the compacted pad or the concrete pad waiting blending with the dewatered septage and FOG. If necessary, dry materials will be covered with a tarp to prevent moisture accumulation. Dewatered Grease Trap and Septic Waste which has been processed through the Dewatering box at the Craven Ag Dewatering facility off Highway 55 will be placed

onto the concrete mixing pad for proper mixing with the dry bulking materials using the loader bucket and the lift and drop mix method. The dewatered materials will be stored at the CAS Dewatering site and will be transported to the compost area only for processing into compost; NO FOG/septage will be stored on the compost site. The dewatered material from the dewatering site will be transported to the compost site in 20 cubic yard leak proof boxes as currently accomplished for immediate mixing and blending – NO dewatered material storage is proposed. All putrescible materials will be mixed and blended during a workday. Prior to daily closing, mixed/blended material will be placed into a windrow. NO putrescible will be stored overnight without blending as a compost feedstock.

A volume of wood shavings or litter equal to the volume of dewatered material will be placed on the pad. The material volumes are determined by loader scoop volume (typically 2 cubic yards per loader). The dewatered material and the dry bulking material will be mixed together for approximately 10 to 20 minutes to assure complete mixing. This process is not intended to generate excess liquid. Should liquid be generated during this initial mixing, it will be collected by gravity flow to the base of the pad and discharged to the dry bulking materials for subsequent use or be collected in a tanker for subsequent use as liquid; any excess moisture can be transported to Kinston for processing, but that is not anticipated. Materials will not be accepted at the site during inclement weather since ingress and egress is difficult.

Prior to blending or transport into the compost windrows area, all materials will be examined to assure proper moisture level (upon firm squeezing, material will release a thin film of water to hand or a few drops of water). If material is too wet, additional bulking material will be added to dry the mixture; if too dry, liquid from the tanker described above will be added to the mixture to provide moisture. Dry materials will be mixed or blended at the proprietary mix or blend ratios developed at Craven Ag Service for various compost end uses and markets.

Materials will be formed into the windrows using the loader-mixer buckets or by dump truck. Feedstock materials will be transported to the windrows and placed carefully in windrows by lifting and dropping materials to provide final mixing and blending, preliminary aeration, and minimal compaction prior to windrow activities. Windrow dimensions shall be as shown in the chart below. Material placed in this manner should heat adequately to assure PFRP compliance. Temperatures will be monitored and recorded daily to demonstrate compliance with PFRP and VAR requirements. Windrow areas are designated on the facility permit and all windrows will be marked with date of formation and dates of turning.

Windrow/Pile Type	Maximum Height	Maximum Width	Average Windrow Spacing
Active	6 feet	15 feet	8 feet
Curing	20 feet	25 feet	4 feet
Finished Product	30 feet	50 feet	4 feet
Dry Feedstocks	30 feet	50 feet	N/A

The windrow compost process achieves the VAR and PFRP compliance. Demonstrated compliance with VAR requires temperatures exceeding 104 degrees F for 14 days or longer, and averaging 114 degrees F or higher for the 14 day period. This is the minimum temperature

required and this is intended as PFRP, not PSRP consequently the higher temperature/longer time is required.

Compliance with PFRP requires maintaining temperatures above 131 degrees F for 15 days with at least 5 turnings of the windrows. The intent of this activity is to expose all particles in the windrow to the high PFRP temperatures. These PFRP temperatures have consistently been exceeded in the VAR area of windrow operations and a PFRP windrow is a "de facto" VAR. Material will be moved through the active compost production area (area 2) using a front-end-loader bucket to lift and drop or windrow turner (as available) until material has achieved required VAR and PFRP compliance and has been rotated in the windrow for a minimum of 60 days to cure unless a row crop operation has a need for the PFRP compliant product.

Temperatures will be monitored during active composting at specified locations located every 25 feet along each windrow and at depths of 24" and 36" into the windrow at each of these locations. Temperature monitoring will be accomplished Monday through Saturday. Once compliance with all PFRP and VAR requirements has been established through the time/temperature monitoring, the compost shall be moved to area 3 for curing and screening. Materials not meeting the required time/temperature standard will be transported to a permitted MSW facility, applied to a permitted septage site, or returned to the head of a windrow for reprocessing.

The curing/screening area is intended as the portion of the site where the compost matures and is prepared for distribution. Compost in the curing area will be turned approximately once per week. This process is important in developing stable compost suitable for a wide variety of end-use applications. The stability and maturity of the compost will be assessed through the Solvita test. Once a material has met standards for the Solvita test, curing is complete and the material is mature compost suitable for any use. Compost material can be used any time following compliance with the 15 day, 5 turning, temperature over 131 degrees F if a suitable receiver crop is available. Typically this fresh compost is best suited to row crop applications.

Once ready for distribution, the compost will be transported by loader to a screening operation collocated with storage in the storage area. The screen separates fine material from coarse material. The fines are placed into the final stage of the operation while the larger materials are recycled back through the compost operation by transport back to the initial mix pad area in dump-truck or loader to feedstock storage/mix/blend area. Here these coarse materials are mixed and blended with incoming material and returned to compost windrows as "seed". Undesirable materials removed during screening will be collected on site in a small dumpster and transported to a MSW landfill for disposal as required. These undesirable materials will be stored in a small dumpster located near the screen until sufficient volume is available for MSW disposal.

A quality assurance/quality control program will be instituted at Craven Ag Service. This process will help to assure:

A. Compliance with appropriate rules and regulations
B. Product quality consistent with specified or designated end use
C. Trained personnel remain available to manufacture quality compost

The QA/QC effort will involve the compliance testing and monitoring including: routine temperature monitoring and recording, nutrient and regulated metals testing, foreign material content and bacteriologic sampling. Nutrient sampling will be conducted by NCDA. The compliance testing for regulated metals and bacteria will be conducted by a private certified laboratory. Sampling will be conducted initially for every 10,000 tons of material produced or four times (3 month intervals) per year to assure compliance with rule and adequate QA/QC is in place. This is more rigid than current rule and is deemed necessary to demonstrate compliance. Annual calibration will be required on temperature probes. An annual report submitted to DWM is required as a part of the QA/QC program.

In the event that an additional raw material stream becomes available to be added to the composting operation, the material will be submitted for review and approval by the DWM-Solid Waste Section or to this consultant prior to use as a feedstock. The following procedure will be utilized to submit raw materials for approval to the Solid Waste Section:

1. A sample of the raw material will be taken according to the protocol detailed in Section 5.2 of this manual.
2. The sample will be analyzed for the parameters listed in Table 2, Section 5.3 of this manual.
3. A report of the analysis results and a written request for inclusion of the raw material, including proposed handling instructions for the raw material, will be submitted to the Solid Waste Section. The request will include: source, volume, and assurance that the volume proposed will not facilitate permit violation.
4. Upon notification of approval of the raw material by the Solid Waste Section, the raw material may be incorporated into the process used for compost production.

Incoming or raw material will be inspected visually prior to and during the initial mix/blend operation by the facility operator to assure unwanted trash is not present, that no material received is prohibited by permit, and that the material received is authorized under the permit. This will occur as material is placed on the mix pad and as material is placed in the mixer. As stated, undesirable materials will be transported to a MSW landfill or returned to the generator where possible.

During periods of excessive rainfall, runoff will result. The vegetated buffers down gradient of the site are intended to treat this runoff and allow infiltration. The soil material present above the water-table is well suited to treat this runoff during the infiltration process. Groundwater monitoring wells will be installed as recommended by Cpec Environmental, Inc.

1.2 Moisture

Appropriate moisture is necessary to compliment the biological processes of the microorganisms responsible for the degradation of organic matter and stabilization of compost. Composting is a naturally occurring aerobic process. Consequently, the moisture content is influenced by the necessity of supplying oxygen and venting off-gasses. As moisture increases, the particles in the compost become more dense and air spaces shrink, limiting the supply of oxygen and the ability to off-gas. If oxygen supply drops to below 8%, the process becomes anaerobic and slows dramatically. The results are foul odors, and the need to restore the aerobic conditions, which will delay the processing time and reduce production rates.

Experience has shown that oxygen consumption in compost operations increase at moisture levels above 40% and reaches a maximum at 60%. Based on the proposed ratio of materials, the initial moisture content will be reduced from approximately 70% to the optimum initial moisture level of 60 % by mixing the wetter feedstocks with dry materials. The initial moisture levels encountered of near 70% will possibly slow the degradation process of the compost materials until moisture reduces to approximately 60%. As a consequence, the wetter feedstocks will be mixed with dry materials on a 50/50 volume ratio to increase solids levels and reduce moisture levels to a more optimum level prior to feeding the materials into the bin. The optimum moisture content for compost materials transported to the windrow is 60% to 65%. This is the target for this operation and it will be met by the 50/50 mix (by loader bucket volume) using the front-end-loader to lift and drop, mix and blend feedstocks. All blending of feedstocks will occur on the concrete pad located at the end of the initial receiving area and in the mix pit collocated with the pad.

The composting process may also be inhibited when moisture levels fall below 40%. Moisture levels will be maintained such that compost materials are thoroughly wetted without being waterlogged or dripping excess water. As a rule of thumb, the compost materials are too wet if water can be squeezed out of a handful and too dry if the handful does not feel moist to the touch or if firm squeezing does not result in a film of water on the hand or gloved hand. A moisture meter, similar to that described in the Equipment Specifications (Appendix 2), would provide a more accurate determination of the initial moisture content of the compost material, but is not considered necessary for operation of the facility.

No additional moisture is needed for the compost process, should excessively hot and dry weather prevail and supplemental moisture is required, it will be supplied from a potable system and the time temperature requirements will restart. The basic compost materials, with the exception of the sawdust, litter, cotton wastes or gin trash and corncobs, are wet and therefore it is unlikely that very much additional moisture will be needed. In all likelihood, the material will normally compost "as-is" as achieved through blending with semi-solid and dry feedstock materials.

Given that multiple windows are presently used, excess moisture can be managed by simply allowing the initial heating cycle to rise, or by turning the windrows frequently to drive water vapor off by venting excess moisture to the atmosphere. The higher the heat generated in the

process will also have the additional beneficial effect of killing off potentially pathogenic organisms such as coliform or salmonella, helminthes eggs or cysts, or inactivating viruses and other organisms regulated in waste treatment processes.

Particle size and structure are also important when determining the optimum moisture content. Generally, the smaller the particles the more available the surface area for microorganism habitat and the greater the microbial activity. This is only the case if sufficient oxygen is available. Insufficient oxygen presents the same problem described earlier with too much moisture. A combination of excessive moisture and small particles is doubly detrimental. A typical target for particles 15 mm (1/2 inch) in diameter or larger is to keep the compost mixture content at 55-65% moisture. If the particles are 5-15 mm (less than ½ inch), a 45-55% moisture content is recommended. If particles are too small and/or wet, bulking materials such as sawdust, ground corn stover or ground wall-board can be added. This is also subject to variation depending on the specific materials available for the compost

1.3 Temperature

Temperature should be monitored closely every 25 feet along the windrow length in all active windrows and recorded daily. Metabolic or biological activity increases with increasing temperature. The optimum temperature range for composting and pathogen reduction is between 131° F (54.4° C) and 160° F (71.1° C) once the process has begun. As stated in the North Carolina Solid Waste Compost Rules section .1406, the facility shall maintain the compost process at a temperature above 131° F (55° C) for 15 consecutive days or longer, with 5 turnings to ensure the highest level of pathogen reduction. If pile temperature falls significantly during the composting period, odors may develop. If the pile material does not reach operating temperature, investigate piles for moisture content, porosity, and thoroughness of mixing. Compost managed at the required temperatures will favor destruction of pathogens.

Monitor temperature of the compost windrows **daily – except Sunday.** Appendix 1 provides a Temperature Record form. The system operator should monitor temperatures at specified monitoring locations along the windrow. Temperature monitoring locations are every 25 feet along active windrows. The temperature monitoring probes consist of 36 inch to 48 inch long dial stem thermometers. Temperature monitoring shall be accomplished at the 24 to 30 inch depth at each monitoring location. The temperature probes must be calibrated annually to assure they are reading temperatures accurately.

1.4 Mixing and Process Time

Mixing the compost with the loader bucket turner method is necessary to ensure that all particles are exposed to the high temperatures required to inactivate potentially pathogenic microorganisms. The mixing redistributes air pockets to insure proper oxygen levels for the composting process. The mixing is accomplished by the rotation of the composting mass. Mixing in the windrow with the lift and drop loader bucket turning method assures that all particles in the compost mass are exposed to the required temperatures for the required time. Pathogen reduction (PFRP) is achieved in the active compost windrow. Should any batch of material fail the PFRP requirement it will be reprocessed to achieve the 131 degree for 15 day

with 5 turning requirement, transported to an approved MSW facility or applied to a permitted land receive site in accordance with septage/FOG land treatment rules. The operator recognizes this will reduce the volume of septage and FOG which can be applied and the nutrient management plan will be adjusted accordingly. Records indicate NO "off spec" material has been produced during the CAS demonstration and the "recipe" for success is well established.

Mixing of raw materials with the loader is done to evenly distribute additives and bulk materials throughout the composting material. Feedstock mixing and blending shall be done on the concrete pad proposed; the pad is shown on the drawing attached. Feedstock mixing and blending prior to composting shall be done by mixing approximately 50% by volume active materials such as the dewatered septage and grease trap wastes with approximately 50% by volume wood chip/sawdust, 50% yard and leaf waste, etc. The pre-compost mixing shall be accomplished by successive scooping, lifting and dropping of materials with a 5 to 8 cubic yard front-end-loader bucket. At least three scoop/lift/fall cycles will be required to mix materials adequately. Liquids will be placed in the mass of material by creating a "v" shaped trough in the dry materials prior to adding the liquid materials.

The PFRP compliance temperature is achieved in the compost windrow area, and the curing stage follows the active compost phase. The curing phase will require between 60 days and 270 days of storage in the windrow. Curing time depends on end use; agricultural use is typically a 60 day cure time while horticultural uses may require up to 270 days of curing. Materials processed in the curing area will be tested using a Solvita test to assure adequate curing. Materials may be bagged or moved to bulk outside storage at off-site locations following finishing in the storage area. Disposition of compost following compliance depends on market outlets. The finished product is normally dark brown to black in color with a 60%-65% solids composition based on analysis. The odor is slightly earthy or musty and texture is loose. The volume is roughly half of the original volume.

Composting time required is primarily a function of the amount of air supplied. The efficiency can be increased and composting time decreased with added aeration by forced air or increasing turning cycles. This also produces a cooling effect which must be monitored. Once the most active of the composting processes is complete (as measured by PFRP Compliance), the compost can be stockpiled without further temperature monitoring until used.

1.5 Carbon:Nitrogen Ratio (C:N)

The carbon to nitrogen ratio is the most important chemical consideration in compost. The C:N ration desired is between 25:1 and 40:1. Other nutrients are generally contained in sufficient ratios for composting in most organic wastes. Carbon and nitrogen are consumed in the decomposition process at a rate which is proportional to one another.

The main goal is to produce compost which will not deprive soil of its natural nitrogen due to a nitrogen deficiency in the compost. A low carbon to nitrogen ratio during decomposition will result in ammonia volatilization. A high carbon to nitrogen ratio reduces the efficiency of the process, because more microbial activity is required to reduce the C:N ratio. The optimum C:N ratio for finished compost is between 25:1 and 40:1 (carbon to nitrogen). The NCDA tests (waste

analysis) will be used to assess C:N ratios. To assure levels are appropriate, C:N ratios will be assessed through routine sampling and when new feedstocks are added to the system.

1.6 Compost Recipes

Ongoing analysis has produced several compost recipes with potential for use at the composting facility. These recipes assume a "Plug Flow" batch of compost. The process time for the compost batch is normally 30 days in a windrow to comply with VAR and PFRP requirements and another 60 to 270 days in the Curing Pile prior to being screened and ready for market. Once cured and compliant with a Solvita test, the process can be considered a finish product and is suitable for distribution and beneficial use. The finish product may be moved off site and stocked for ultimate use. Typical chemical and moisture characteristics of common raw materials used in composting operations are shown in the following table.

Table 1. Raw Material Characteristics

Raw Material[1]	% N	C:N Ratio	% Moisture Content
Vegetable Waste	4.2	10:1	82
Dewatered Septage	3	25:1	70
Dewatered FOG	1.5	50-60:1	70
Hardwood Sawdust	0.09	560:1	25
Sawdust Bedding	0.24	442:1	40
Ground Corn Cobs	.6	98:1	15
Ash	<0.5	400:1	5
Gin trash/cotton waste	.5	120:1	10
Tobacco Dust	0.75 to 1.5	40:1	15
Ground Yard Waste	.9	80:1	40
Land Clearing Debris	.09	560:1	--

[1]Nitrogen and Carbon Information based on data from "On-Farm Composting Handbook" or testing on-site materials

2.0 Operations

The Craven Ag Service Compost Facility will be operated daily, from 7:00 am until 7:00 pm Monday through Friday and 7:00 am through 3:00 PM on Saturday. Additional hours of operation may occur during periods of high demand for the finished compost material; however, no Sunday operations are planned and these will be accomplished on a strict as needed basis. Operations will proceed according to the requirements and procedures detailed in this operations manual.

2.1 Personnel Duties and Requirements

1. Compost Facility Operator - This individual is responsible for overall operation of the Compost facility. He is responsible for loading the proper amount of the selected raw material into the mixer to insure a good quality finished compost. In addition, the facility operator is responsible for maintaining all the temperature monitoring logs and collecting samples of the finished compost for analysis.

2. Assistant Facility Operator(s) - This individual will assist the facility operator, as necessary, and additionally will be responsible for upkeep and clean up around the compost facility. This individual will perform routine preventative maintenance on the composting equipment. This position will be filled as required, and may require more than one person.

3. Maintenance crew - These personnel will be provided from the on-site Craven Ag Service staff available to Craven Ag Environmental or from other operations as maintenance staff required to perform major maintenance or repairs on the equipment required for the composting activities.

4. Equipment crew - These personnel will be responsible for screening and custom blending the finished compost material, and for loading trucks for delivery.

5. Transport - These personnel will operate over-the-road transfer trucks. The compost will either be trucked to the final destination by over-the-road trucks, or may be removed by vendor trucks as well, depending on size of the order. It is anticipated that direct sale of bulk material to local contractors would be accommodated by direct loading of the buyer vehicles (private trucks or trailers).

2.2 Compost Testing Needs

In addition to the routine testing of the compost material every 10,000 tons or every 3 months for the parameters specified in Section 5 of this manual, and the 6 day/wk monitoring of the composting process for temperature, it may be advantageous to test compost material for carbon, nitrogen, moisture, and pH should compost fail to reach desired temperature or if odor problems develop. The finished compost material will be monitored every 3 months or 10,000 tons of compost processed (the smaller of the two) for nutrients and regulated metals tested by the North Carolina Department of Agriculture. More frequent testing will be accomplished as additional feedstock is added or as process optimization begins, to ensure that the composting process has been successful and that the NC Solid Waste Section annual reporting requirements have been met. Testing may be accomplished on a more frequent basis than required by rule as varying feedstocks are added to the compost and as end users require test product quality information.

2.3 Storage

Storage of finished compost should be limited to 4 to 6 months after completion of the process depending on market needs. Compost should be utilized within this time period if at all possible. Storage will be provided in either open areas of the on-site storage area in the area designated, immediately south of the processing area, on land out of the flood-plain or at off site locations awaiting disposition and use.

2.4 Maintenance Practices and Cleanliness

In order to optimize the composting process, proper maintenance of the facility and equipment is recommended. Listed below are some maintenance practices that can be implemented to ensure the productivity of the facility.

1. Do not allow any equipment that exceeds design load limits on or within twenty feet of the concrete pad.

2. Maintain all electrical and mechanical equipment in good operating condition by following electrical codes and manufacturers' recommendations. Inspect and repair grounding rods, switches, wiring, and all vehicles and equipment involved in the process.

3. Fences, railing, roofing, and/or warning signs must be maintained to provide warning and prevent unauthorized entry.

4. Repair any vehicular, vandalism or animal damage. Inspect and maintain runoff control structures.

5. Keep the area around the composting facility mowed and free of tall weeds and brush.

6. Clean, shovel, or dry sweep compost production and bagging areas as required to maintain pleasant work environment. Clean and dry any oil spills, wet material spills immediately to sustain reasonably safe work environment.

7. A small liquid collection basin or sink will be used to handle any leachate from the compost mixing area. This is depicted on the plans. Liquid will flow by gravity gradient into the sink and contents of the sink will be pumped or removed as needed and will normally be incorporated back into compost batch as a liquid and nitrogen source. DWQ has determined no runoff generated in design events exits the site to surface water. The addition of leachate to any of the compost requires the Process to Further Reduce Pathogens (PFRP) to start at the time the leachate is added to the compost. In an emergency, the collected leachate will be transferred to the City Of Kinston, NC WWTP.

The following is a list of practices that will reduce the potential of odors being emitted from the Compost Site. Where practical, some or all of these practices may be utilized. The odor management practices include:

1. Avoid overly wet feedstocks and compost. The use of relatively coarse co-composting materials that allow oxygen diffusion into the pile can help avoid odor problems.

2. Activities such as mixing and movement of odorous raw materials shall be scheduled to minimize the impact of odors. Accomplish these activities only early in the work day to take advantage of rising air currents. Avoid doing these activities on hot, still days or holidays and weekends. Windy conditions or early morning hours are better times to conduct such activities. Monitor the wind direction and postpone activities that may release significant odors when the wind is blowing toward the most sensitive neighbors.

3. Prevent puddles and standing water on the compost pad.

4. Minimize dust, which can transport odor by spraying a fine mist over roads and other surfaces.

5. Ensure that proper aeration, pH, and temperature control is maintained during the composting process.

6. Covering the upper third of the windrow with either 3 to 6 inches of finished compost, 3 to 6 inches of a stable, carbon rich material such as wood chip, or covering the area with a heavy (20 ml) plastic sheet or tarp.

2.5 Seasonal and Weather Management

Composting can continue year round, even during cold weather. Seasonal and weather variations may require operational adjustments that compensate for the change in weather conditions. The insulation layer covering the windrows should sufficiently buffer the mass of materials in the windrow against temperature variation, and changes in the operation should not be required.

Cold weather can slow the composting process by increasing the heat transfer rate from the composting operation into the atmosphere, but the insulation layer should mitigate this transfer. The lower air temperatures reduce the microbial activity, especially near the surface. This, in turn, decreases the amount of heat generated.

Warm weather enhances water loss due to evaporation from the windrows. Water or recovered leachate should be added if materials become too dry (moisture content drops below 40%). Again, the loss should not be excessive from the windrow, and controls can be implemented by scheduling turning operations or adding moisture as required.

In event excess liquid accumulates on the site because of wet weather or other adverse conditions, that excess liquid (runoff) will be treated by the vegetated buffers located along site boundaries.

2.6 Contingency Plans

1. Equipment Breakdown

In the event of a breakdown of the compost equipment (mixer, loader, screens, etc.), delivery of raw materials from the Craven Ag Service septage/FOG dewatering facility will be suspended until the equipment is repaired or replaced and material passes all VAR and PFRP requirements.

2. Fire

In the case of a fire, immediately notify the local fire department. If employee safety is not compromised, the company pump truck may be utilized to extinguish the fire.

3. Freezing Conditions

Operation in freezing conditions requires inspection of system components to assure cold weather will not produce safety hazards. Additional caution in operation of the loader is necessary during conditions where ice may have formed on the site. Frozen raw materials should not be added to the bulk mixer (Knight) due to the possibility of damaging the mixer blades and auger.

4. Extended Power Failure

Operations during an extended power failure may be accomplished by the use of a portable generator for any system components requiring electricity. No critical process equipment requires electricity and a power loss will not impact operation of the equipment either on the site or proposed. Temperature monitoring of the composting windrows during a power failure must be continued, and any compost which does not meet the temperature criteria must be re-processed. Again, no critical equipment requires electricity.

5. Windy Conditions

Windy conditions should have little effect on the composting operation since windrows are located in open areas surrounded by trees. However, during excessively windy conditions (over 25 MPH) special attention must be given while turning the windrows and during the loading of raw materials (especially light materials such as sawdust) which could tend to "blow off" the composting area. It is anticipated that the local vegetation (tree line) will tend to block a great deal of the wind from the facility. However, if windy conditions are demonstrated to have a detrimental effect on the

continued processing of the compost, consideration will be given to planting additional windbreaks.

6. Disposal or Re-Processing of Poor Quality Products

The design team anticipates that the compost produced at this facility will easily meet the standards for Class A compost. In the event that a batch of compost does not meet the requirements for Class A compost, several options exist. An initial option would be to re-process the batch in an attempt to meet the Class A compost requirements. This option would be selected if the controlling factor indicating poor quality was pathogen reduction.

Compost materials which do not meet Class A compost requirements but meet the Class B or PSRP compost may be land applied under specific circumstances in accordance with a separate permit. Specifically, these materials could be applied to agricultural land, provided the land is used for silvicultural or non-food chain related production, or the material could be used for land reclamation projects. Compost which does not meet either Class A or Class B criteria, and is deemed undesirable for any attempt at re-processing, will be disposed of in an appropriate approved, sub-part D landfill site such as CRSWMA.

3.0 Equipment Specifications

The equipment required to operate the Craven Ag Service Composting Site can be characterized as either processing or monitoring equipment.

3.1 Processing Equipment

The primary processing equipment currently utilized at the site for composting is a Loader to serve as a Compost Windrow Turner, a mixer to assure feedstocks are properly mixed prior to placement in the windrow and a screen to assure high quality end product is generated. The windrow turning is achieved by lifting and cascading compost to allow reaeration. Equipment may change with time, but basic functions associated with each will remain as critical to the process. Equipment may be replaced with like equipment and new equipment will be reported to NCDWM as it is obtained.

A rubber tired Loader and a dump truck will be used to transport the raw compost mix to the windrows. Finished compost shall be transported by loader or dump truck to the curing area and ultimately to the finish product storage area (Area 4) and segregated into batches in the storage area. Final screening will be accomplished in a rotating screen as material is transported off site or as finished/cured material is placed into storage. Large screened particles (over 1.5 inch diameter) will be reused in the compost operation as bulking material. This coarse material will be moved to the initial mix/blend area and reused to inoculate incoming material and facilitate aeration in the process.

3.2 Monitoring Equipment

A probe-type dial stem thermometer (as manufactured by REOTEMP) with a 36" stainless steel stem is currently used to measure the temperature of the compost in the windrows or compost piles in the active compost production area (area 2). The thermometer has a temperature range of 0-200 degrees Fahrenheit. CAS has several thermometers available on site. These will be calibrated annually and replacement thermometers will be purchased as needed. Calibration of all thermometers shall be accomplished annually.

An additional, optional device that can prove very useful in the production of compost is a moisture meter. This device is more accurate than the "hand squeeze" method of moisture determination. REOTEMP Instrument Corporation has developed a moisture meter which determines moisture levels via a sensor that measures electrical conductivity of the raw materials. The device is available in lengths of 36", 48", and 60". CAS has purchased this process monitoring device and has been using it throughout the demonstration process.

Equipment specifications for the equipment discussed above can be found in Appendix 2.

4.0 Nutrient Management Plan

The majority of the compost produced by the Composting Facility will ideally be sold as a soil amendment. Additional or excess compost will be sold in bulk to local greenhouses and landscape contractors for use as a soil amendment or to the NCDOT for use in highway landscape projects.

In the event of a long term market decline, it may be desirable to land apply some compost off-site. In this case, the material must be a Class A product, or an approval from the NCDWM must be obtained. Land application to agricultural cropland may be used as long as appropriate records are maintained. Compost application rates will vary depending on the agronomic needs of the crop and whether the compost is being used as a primary nutrient source. If the finished compost is used as a primary nutrient source, it should be spread following agronomic practices used for spreading manure. However, compost is generally spread onto land at a thickness of 0.5 to 1 inch. If it is applied at a rate greater than this, it becomes too difficult to incorporate into the soil. Conventional manure spreaders are ideal for handling and spreading compost.

5.0 Compost Record Keeping, Analysis and Reporting Requirements

The compost produced at the Craven Ag Service Compost Facility will be routinely analyzed to insure quality control is maintained. Analysis shall be conducted by the North Carolina Department of Agriculture (NCDA), Soil Test Laboratory on Blue Ridge Road in Raleigh, or by a certified analytical laboratory (A and L, Prism Laboratories, Southern Testing, etc.). The compost will be monitored for temperature daily to insure vector and pathogen reduction compliance (see record keeping forms in Appendix 1). An annual report will be submitted to the NC Solid Waste Section by August 1st of each year, in compliance with NCAC 13B Section .1408 (c). All records will be kept on site.

5.1 Daily Record Keeping

The compost facility will maintain daily (except Sunday) temperature, compost processing length and daily volume of compost processed records for the composting operation. In addition, the volumes of the various feedstocks will be recorded to ascertain the optimum mix and blend ratios for the continued operation at this facility. Each day's production will be flagged as it is transported from the mix/blend area to the windrow. Each section of windrow will be identified with the day of mixing and placement and these areas will be tracked through the entire process. Each area within the windrows will be monitored for temperature and turn date to assure the 15 day/131 degree/5 turning requirements are met. In addition, once a windrow is completed, similar records will be developed until the time requirement is met for the entire windrow. The existing recordkeeping program has indicated the PFRP compliance is addressed by the ongoing program.

5.2 Routine Compost Sampling Procedure

The compost must be sampled at intervals of once per every 20,000 tons of compost produced or every six (6) months, whichever comes first; for purposes of this project more frequent testing shall be accomplished (every 10,000 T) and every quarter. Composite samples are to be collected through the sample period and composited for final testing. A minimum of three 100 Ml composites will be through the period, refrigerated and composited for nutrient and metal analysis. Bacteria samples will be collected in accord with test laboratory procedures. The sample tested is to be a representative sample of the compost produced during the compost cycle.

The samples will be obtained in a sterile manner according to the following procedure. The sample will be obtained from the batch of finished compost from piles, immediately prior to the screening and bagging equipment. The sample will consist of a multiple position composite grab sample. A minimum of 5 discrete locations within the finished compost pile in Area 3, immediately prior to the screening /bagging and bulk loading processing of the pile, will be sampled as a composite sample.

These sample locations will be taken from within the finished pile, and will represent a "cross section" of the pile, not just the "surface". The sampling will be conducted wearing latex or nitrile gloves, and the composite samples will be well mixed to insure a representative sample is tested. Samples will be refrigerated immediately or placed in sealed containers in a cooler for transport to the laboratory. Collected composite samples will be placed in sterile bags provided by the laboratory when pathogen samples are to be run on the material. Samples shall be delivered to the laboratory within 24 hours if pathogen testing is to be performed. It is essential to coordinate with the laboratory ahead of sampling to insure that the proper "hold times" for the various parameters to be tested are not exceeded. It may be desirable to run intermediate nutrient and heavy metal content samples at a more frequent interval than the once every 20,000 tons as specified by regulation and CAS has agreed to accomplish testing at a more frequent basis.

5.3 Routine Compost Analysis

The analysis must include the parameters listed in Table 2. Metal testing must comply with measurements less than the regulatory limits in 40 CFR part 503, Table 3 based on dry weight (mg/kg). Testing shall be conducted by private certified laboratories for regulated metals and bacteria. NCDA testing is adequate for nutrients, metals as process (non-compliance) values and foreign matter can be tested by trained personnel.

Foreign matter testing will be determined as follows. The compost material will be dried (EPA Method 160.3), weighed and passed through a one quarter inch (1/4") screen. All materials remaining on the screen will be visually inspected and all foreign material (glass, plastic, metal, etc.) will be removed and weighed. The weight of the removed foreign material, divided by the weight of the total dried sample, multiplied by 100% will be recorded and reported as the percentage foreign material observed in the sample.

Table 2. Routine Compost Analysis Requirements

Parameter	Reporting Unit	Test Method
Foreign Matter	%	As described in Subparagraph (5) of 13B Section .1408
Cadmium	mg/kg dry weight basis	EPA Standard Methods 3050/3051
Copper	mg/kg dry weight basis	"
Lead	mg/kg dry weight basis	"
Nickel	mg/kg dry weight basis	"
Zinc	mg/kg dry weight basis	"
Pathogens (Fecal Coliform)	MPN/1000 grams of Sample	Standard Methods for the Examination of Water and Wastewater, Part 9221 E or Part 9222 D
Total Kjeldahl Nitrogen*	%	NCDA
Phosphorus*	%	NCDA
Potassium*	%	NCDA
Salts*		NCDA Standard Analysis

* Not required by statute, but these analyses provide useful information on product quality

5.4 Annual Report

Craven Ag Service will submit an annual report to the NC Solid Waste Section by August 1st of each year, in compliance with NCAC 13B Section .1408 (c). The annual report will contain the facility name, address, permit number, a summary of the total quantities of raw material received at the facility, the total quantity of compost produced by the facility, and the total quantity of compost removed from the facility (marketed or disposed of off-site). The annual report will also include temperature monitoring records and the results of the required analysis for metals, pathogen reduction analysis (fecal coliform), and for the percentage of foreign matter in the finished compost.

6.0 Safety & Health

Proper attention to health and safety at composting facilities can prevent most occupational risks. The safety concerns in composting relate primarily to the use of equipment. If front-end loaders or other standard farm equipment is used, eye and ear protection should be used. Normal safety precautions, such as those provided with the equipment, should be followed. The Farm Safety Association has developed a fact sheet (No. F-017 - Agricultural Machinery Hazards - See Appendix 3) which should be reviewed by all personnel operating or working near machinery.

Fires are rarely a problem in outdoor composting, as properly moist composting material does not readily burn. However, if material does dry out and if storage piles are too large, spontaneous combustion becomes a possibility. This phenomenon occurs at moisture contents approximately between 25% and 45%. In piles over 12 feet high, it is possible for the internal heat of the compost to initiate chemical reactions, which then lead to spontaneous combustion. Proper attention to moisture, temperature, and pile size is the best protection against this problem. An accessible water supply is a valuable safety precaution.

Human health concerns relating to compost depend both on the individual and on the material being composted. While few pathogenic organisms found in farm animal manures or vegetative wastes affect humans, normal sanitary measures are important (such as washing hands before touching food, eyes, etc.). Some individuals may be hyper-sensitive to some of the organisms in compost. The high population of many of the species of mold and fungi in an active compost process can cause allergic reactions in sensitive individuals. Simple precautions, such as wearing dust masks or even half-mask respirators with disposable cartridges, can help limit human exposure to organisms that may cause allergic reactions. Conditions which may predispose individuals to an infection or allergic response include allergies, asthma, such medication conditions such as antibiotics, punctured eardrum, weakened immune system, adrenal cortical hormones, etc. Workers with any of these conditions should not be assigned to a composting operation. If a worker does develop an allergic reaction to compost, it is important to recognize the problem promptly so that it does not develop into a chronic condition. To prevent health concerns during particularly dry and dusty conditions, a dust mask or half mask respirators should be worn.

Blood borne pathogen testing should be accomplished on employees of the compost operation as a part of the annual physical.

With proper knowledge, equipment, caution, and precautions, these sources of harm can be removed or limited, and injuries, illnesses, and deaths can be prevented.