

Permit No.	Date	Document ID No.
25-09	April 19, 2016,	25978

Received by an e-mail
Date: April 19, 2016
Solid Waste Section
Raleigh Central Office

Chao, Ming-tai

From: Amy Davis <adavis@joyceengineering.com>
Sent: Tuesday, April 19, 2016 2:02 PM
To: Chao, Ming-tai
Cc: Mousa A. Maimoun; Alex Everhart; Bobby Darden
Subject: RE: Comments on the Permit Amendment Application, CRSWMA, 25-09
Attachments: 2016 - 19 - 04 Permit Renewal Submittal Letter (RTC letter#2).pdf

Ming,

On behalf of the Coastal Regional Solid Waste Management Authority (CRSWMA), we are pleased to submit our response to comments for the Tuscarora Landfill.

Hard copies will follow. If you have any questions, please do not hesitate to contact us.

Thanks,

Amy R. Davis, PE | *Senior Project Consultant* |

JOYCE ENGINEERING

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From: Chao, Ming-tai [mailto:ming.chao@ncdenr.gov]
Sent: Wednesday, January 27, 2016 1:44 PM
To: Bobby Darden <bdarden@crswma.com>
Cc: Amy Davis <adavis@joyceengineering.com>; Mousa A. Maimoun <mmainoun@joyceengineering.com>; Ritter, Christine <christine.ritter@ncdenr.gov>; Williams, Ray <ray.williams@ncdenr.gov>; Watkins, Jason <jason.watkins@ncdenr.gov>
Subject: Comments on the Permit Amendment Application, CRSWMA, 25-09

Dear Mr. Darden:

The Solid Waste Section (SWS) completed a review of the Permit Amendment Application for the Tuscarora Long-term Regional Landfill- IRL, & Phases 1 through 3, Permit No. 2509-MSWLF -1999 (DIN 25278 & 25403) including the Type 1 Composting Facility. The electronic copy of the comment letter that focuses on the engineering portions of the permit application is attached for your quick review and reference. The hard copy of the letter will be mailed to your attention today.

Ms. Christine Ritter, the Hydrogeologist of the SWS will send out the additional comments on the environmental media monitoring in the permit application shortly.

Please contact me or Christine if you have any questions or requests for further clarification of the comments. Thanks and have a wonderful day.

Ming Chao

Ming-Tai Chao, P.E.

Environmental Engineer

Permitting Branch, Solid Waste Section

NCDEQ, Division of Waste Management
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Raleigh, NC 27699-1646

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April 19, 2016

Mr. Ming-Tai Chao
NC DEQ
Division of Waste Management
1646 Mail Service Center
Raleigh, North Carolina 27699

**RE: Comments on the Permit Amendment Application for Continued Operations
Tuscarora Long-Term Regional Landfill- IRL, Phases 1 through 3
Craven County, North Carolina
Permit No. 2509-MSWLF-1999, Doc ID No. (DIN) 25342**

Dear Mr. Chao:

On behalf of the Coastal Regional Solid Waste Management Authority (CRSWMA), Joyce Engineering, Inc. (JOYCE) is submitting this response to your comments on the Permit Renewal Application in the email dated January 27, 2016, for the above-referenced project. For your reference, your comment is repeated below in *italicized print*, with our response provided in **bold print**.

Facility Plan

1. (Section 3.2, Operating Capacity) What is the remaining capacity of the Phase 3 based on the latest (June 30, 2015) survey result in consistent with Drawing No. FP-09? What is estimated remaining service life of the Phase 3?

Phase 3 gross designed capacity is 1,851,000 cy (presented on Drawing No. FP-09 and Table 1). As of June 30, 2015, the remaining volume is 1,126,375 cy, of which 123,508 cy is required for final cover. As a result, 1,002,867 cy remains for waste disposal and daily/intermediate cover soil. Assuming an annual tonnage of 196,862 and a compaction efficiency 1,000 lbs/cy, the remaining life of the landfill is about three years as of June 30, 2015 (Table 1).

2. (Section 3.2, Soil Resources) The volume ratio of waste to daily cover soil was 7 to 1 which was used for the calculations of the landfill capacity and required soil amount for landfill operations in the previously permit application (DIN 12653) approved January 25, 2011. Please provide explanation (s) why this ratio changes to 20 to 1.

Paragraph 3.2 Soil Resources has been revised to reflect waste to soil ration per operations.

Operations Plan

3. (Section 2.1, Active Area) Two sumps for Phases 3 are located on the north side of the cells according to the Engineering Plan Drawing No. EP-02. Please revise the description accordingly.

The description was revised to match the Engineering Plan Drawing No. EP-02.

4. (Section 5.3) Please provide explanation (s) why the volume ratio of waste to daily cover soil changes to 20 to 1 (see Comment No. 2).

Section 5.3 has been revised to reflect waste to soil ration per landfill operations.

5. (Section 9.3) Please describe the leachate sample locations which must be identified on the Operations Plan Drawings.

A description has been added and the sampling location on Drawing OP-01.

6. (Section 9.4 Leachate Disposal) If available, please provide the layout and detail drawings including forcemain alignments/runs, the entrance or connection location where the leachate drains from the lagoon into the sewer line inside the landfill property. However, if the project is in the planning stage, the as-built drawings including the above-mention items must be provided the SWS upon available. Please add this requirement to this Section.

Requested comment has been added to section 9.4.

Appendix VI-4 – Type 1 Yard Waste Composting – Operational Manual

7. (Section 1.3) The contact info – address and phone number of the SWS has been changed to:

- Mailing Address: 1646 Mail Service Center, Raleigh NC 27699-1646.
- Physical Address: 217 West Jones Street, Raleigh NC 27603.
- Phone Number: 919 -707-8200.

Please place the update info to this Section.

The updated information is placed into the Operational Manual.

8. (Section 2.2) Please correct the typographic errors observed in this Section.

i. The subsection 2.3.1 – Design Capacities and Product Data is likely the subsection 2.2.1.

The typographic error was corrected.

ii. The Site Plan is likely included in Appendix 3, not in Appendix 6. Please make necessary corrections in Sections 2.2.1 & 2.2.2.

The typographic error was corrected.

iii. Appendix 6, not Appendix 7 likely contains a table summarizing product quality.

The typographic error was corrected.

9. Please describe the structures (such as the sediment basin and the covered building), measures, and /or practices that are implementing to control surface water run-on and run-off and the approaches to collect, store, treat, and /or dispose of leachate that is generated at this composting facility according to Rules 15A NCAC 13B .1405(a)(7) and .1406(2), (3) & (4).

No changes to sediment basin, surface water run-on and run-off controls have been made since permit to operate was issued in 2010.

10. (Section 2.3.1) *The referenced Section 2.4.14(c) in the last paragraph of the Section 2.3.1 is not available in the Appendix VI-4 – Type 1 Yard Waste Composting – Operational Manual. Please provide the referenced Section.*

Reference has been corrected to read Section 2.3.9(c).

11. (Section 2.3.3) *Please describe the implementation of the minimum distance requirement for adequate access of firefighting equipment [Rule 15A NCAC 13B .1404(a)(8)].*

Rule .1404 (8) has been added in Section 2.3.3.

12. (Section 2.4.3) *Please correct the typographic errors observed in this section.*

i. *The referenced Rules .1408(3) and 1406(9)(c) don't exist and are likely typos. Please make the necessary corrections.*

References have been corrected to read Rule .1408 (c) and .1406 (9).

ii. *The DENR officially became the Department of Environmental Quality (DEQ) on Sept. 18, 2015 when Governor McCrory signed the 2015-2016 state budget into law. Please use the correct department name in the Section.*

All references to DENR have been updated to read DEQ.

Closure & Post-Closure Plan

13. *The SWS records show that the permanent closed areas of the landfill are IRL (20.2 acres), Phase 1 (20.5 acres) and the west slope area of Phase 2 (7.3-acre). Phases 2 that has the approved waste footprint of 17.2 acres has approximately 9.9-acre remaining area subjected to final/permanent closure. Therefore, please*

i. *Submitting the update Section 1.1.2 of the Closure Plan. According to the Rule 15A NCAC 13B .1629(b)(1), the largest area of the landfill might be closed in the next permit cycle should be 29.6 acres including Phases 2 remaining area (9.9 acres) and Phase 3 area (19.7 acres).*

Section 1.1.2 has been revised to reflect the areas remaining to be closed.

ii. *Please revise the closure area in the closure cost estimates in Appendix VII-2 accordingly. The costs shall be in 2015 dollar values (Section 1.7). The associated costs in Appendix VII-2 that were likely approved in 2011 must be adjusted annually (from 2012 through 2015) for inflation accordingly. The inflation factor can be found in the SWS website*

<http://portal.ncdenr.org/web/wm/sw/financialassurance>.

Closure cost estimates have been revised to reflect the areas to be closed in 2015 dollars.

14. *The Post-Closure Plan must describe the requirements of inspection, maintenance, and decommissioning of the LFGCCs.*

Section 2.3 Post Closure Maintenance is included in the Plan. No changes have been made.

Section 2.4 Inspection Plan is included. No changes have been made.

Section 2.5.3 Landfill Gas Monitoring includes the LFGCC decommissioning. No changes have been made.

15. (Section 2.1) *The Facility Contact must be updated accordingly.*

The facility contact information has been updated.

16. (Section 2.8 & Appendix VII-6) *The costs for the 30-year post-closure cares shall be in 2015 dollar values. The associated costs in Appendix VII-6 that were likely approved in the 2011 must be adjusted annually (from 2012 through 2015) for inflation accordingly. The inflation factor can be found in the SWS website <http://portal.ncdenr.org/web/wm/sw/financialassurance>*

Section 2.8 and Appendix VII-6 have been updated to reflect 2015 costs.

17. *The costs for surface water monitoring are not included in the Post- Closure Cost Estimates. Please revise the cost estimate by adding the requested cost item.*

Surface water monitoring has been added to the Post-Closure period cost estimate.

18. (Appendix VII-6, Post- Closure Cost Estimates) *Please address the following concerns associated with the costs of the landfill gas monitoring system:*

i. *Why does the landfill gas monitoring system maintenance last for 20 years, not 30 years required by the rules 15A NCAC 13B .1627(d)? If the costs are directly related to the existing landfill gas collection and control system (LFGCCs), the 20-year period may be acceptable, but not for the on-site explosive gas monitoring & reporting which must be conducted quarterly for at least 30-year period. Please separate the costs for LFGCCs and explosive gas monitoring.*

Explosive gasses monitoring beyond 20 years has been added to the Post-Closure Care Plan and the cost estimate.

ii. *What are the costs for decommissioning of the LFGCCs? Please add the costs to the post-closure cost estimates.*

Decommissioning and estimated costs have been added to the post-closure cost estimate.

19. (Appendix VII-6, Post- Closure Cost Estimates) *Please address the following concerns associated with the costs for Leachate Management:*

i. *The costs associated with semi-annually leachate sampling are not available.*

Semiannual leachate sampling cost has been added to the post-closure care cost estimate.

ii. *The leachate amount of 0.089 gallons per acre per day is not suitable for the proposed site closure scenario. The referenced leachate amount would be generated (from HELP model) when the height of waste is 200 feet (Profile 5, Appendix IV-3). The maximum waste height at a probable closure for Phases 1 - 3 in this permit cycle is likely ranging from 40 to 80 feet (referring Drawing No. FP-09). Therefore, the associated costs for leachate management are calculated based on the questionable assumptions. Please provide the reasonable estimate leachate amount and revise the cost estimate.*

The probable post-closure leachate generation has been calculated by HELP model for the Phases 1-3 utilizing 50 foot maximum height resulting on 0.3 gallons per acre per day. The Post-Closure care estimate has been revised according the calculated leachate generation rate.

iii. (Continue the previous Comment No. 19ii) After completing the proposed leachate disposal project, the leachate would be discharged into the city sewer system according to the Leachate Agreement between the City of New Bern and CRSWMA. The costs associated with leachate disposal might be eliminated from the 30-year post-closure care cost estimates after CRSWMA submits the SWS a permit modification application including the as-built drawings (see Comment No. 6) requesting an approval of cost reduction.

Leachate disposal post-closure cost estimate is currently base on direct discharge to POTW.

20. (Appendix VII-6, Post- Closure Cost Estimates) Please add the following the costs to the Routine Maintenance and Repairs: fencing, gates, & signage, access roads toward monitoring locations, stormwater, erosion, and sedimentation control facilities, leachate seeps, integrity of the final cap system (Sections 2.3 of the Post-Closure Plan).

Section 2.3 has been expanded to include noted routine maintenance and repairs.

According to NCGS 130A-295.2(h1), the minimum cost in the amount of two million dollars for potential assessment and corrective action (PACA) at the facility, which is additional costs to the closure and post-closure care activities, must be included to the CRSWMA financial assurance (Rule 15A NCAC 13B .1628). Please add this PACA requirements & cost to the Closure & Post Closure Plans.

PACA has been added to the Post-Closure Cots estimate according to NCGS 130A-295.2(h).

Please do not hesitate to contact us during the review process with any questions or comments you may have. We look forward to working with you to get the authority's permit renewed for continued operation of the landfill.

Sincerely,
JOYCE ENGINEERING, INC.



Amy Davis, P.E.
Technical Consultant

Attachments

Revised Facility Plan
Revised Operations Plan
Revised Closure & Post Closure Plan

C: Bobby Darden, CRSWMA – Tuscarora Landfill

PREPARED FOR:



COASTAL REGIONAL SOLID WASTE AUTHORITY
TUSCARORA LONG-TERM REGIONAL LANDFILL
7400 OLD HIGHWAY 70 WEST
TUSCARORA, NC 28523

PERMIT No. 25-09

TUSCARORA LANDFILL PERMIT TO OPERATE RENEWAL

VOLUME 1, SECTION III FACILITY PLAN

NOVEMBER 2009
REVISED SEPTEMBER 2010
REVISED NOVEMBER 2015
REVISED APRIL 2016

PREPARED BY:



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**VOLUME 1, SECTION III
FACILITY PLAN**

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TABLES

Table No. 1	Waste Disposal Rates and Volume Requirements
Table No. 2	Soil Requirements

APPENDICES

Appendix III-1	Property Deed Information
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DRAWINGS

Drawing No. FP-T	Title Sheet
Drawing No. FP-L	Legend and General Notes
Drawing No. FP-01	Site Development All Facilities
Drawing No. FP-02	Site Development Landfill Phases and Leachate Facilities
Drawing No. FP-03	Site Development Base Grades
Drawing No. FP-04	Site Development Final Contours
Drawing No. FP-05	Site Development

Drawing No. FP-06	Leachate Drainage Plan Landfill Operations Phasing Plan – Phases 3 and 4
Drawing No. FP-07	Landfill Operations Phasing Plan – Phases 5 and 6
Drawing No. FP-08	Closure Plan Landfill Gas System Layout
Drawing No. FP-09	Phases 1-6 Cross Sections

1.0 INTRODUCTION AND OVERVIEW

The facility plan describes the comprehensive development of the MSWLF facility prepared in accordance with subsection .1619 of the North Carolina Solid Waste Management Rules. The plan includes a set of drawings and a report which present the long-term, general design concepts related to construction, operation, and closure of the MSWLF unit(s), including leachate management.

2.0 FACILITY DRAWINGS

2.1. Site Development

The overall landfill facility is illustrated on Drawing FP-01. CRSWMA's property boundary comprises 502 acres. Property information, including copies of deeds and a map with deed book and page callouts is provided in Appendix III-1.

There is one waste disposal unit of 101 acres. The waste disposal unit consists of two closed areas - the Interim Regional Landfill (IRL - 20.2 acres) and Phase 1 (20.5 acres); Phase 2 (17.2 acres) - temporary closure; the Phase 3 an active disposal area (19.7 acres); and the Phase 4 expansion (23.4 acres). Phases 5 and 6 are planned as vertical expansions. Near the facility entrance at the south end of the property there are truck scales and the landfill office/scalehouse which is connected to a maintenance shop. Just beyond the scales there is a public convenience center which accepts household municipal solid waste, which is landfilled, and oyster shells which are recycled. Continuing to the north there is a composting facility (CRSWMA holds a separate permit, Solid Waste Compost Facility Permit Number SWC-25-11, for the composting facility) where yard waste and clean wood debris is processed. Wood pallets that are brought to the landfill are processed at the composting facility as well. Next to the composting facility is a covered concrete pad (approximately 100' x 250') where scrap tires are collected and loaded onto trailers for removal from the facility. This area is also used for miscellaneous material storage.

The waste disposal unit begins approximately 2,300 feet north of the facility entrance and extends to the north and east. The Phase 3 disposal area is located immediately north of the existing municipal solid waste disposal area (Phase 2). Phase 3 will be developed to a maximum elevation of approximately 150 feet, and Phase 4 will be developed to a maximum elevation of approximately 130 feet. Phases 5 and 6 represent further vertical development of the footprint established by previous phases, with Phase 5 reaching a maximum elevation of 200 feet, and Phase 6 reaching the final elevation of 270 feet.

Site suitability has previously been established, and therefore information regarding site suitability is not provided in this renewal application.

2.2. Landfill Construction

Landfill construction is proposed to occur in three phases (4, 5 and 6) beyond the current phase, each with an operating life of approximately five years. Base grades for the Phase 4 expansions are shown on Drawing FP-03. Final grades for all future phases are shown Drawings FP-06 through FP-

07. Base grades are designed to be a minimum of four feet above groundwater. Final grades shown were developed for fill slopes of 3 horizontal to 1 vertical (3H:1V).

2.3 Landfill Operation

Drawing No. FP-05 includes the general drainage grade and flow direction for the leachate system and pipelines to the leachate management facility.

Phasing for the facility is included on Drawings No. FP-06 through FP-07. The phasing plans include transitional contours for each phase of development and the location of stormwater segregation features. Stormwater control features are included in the Erosion and Sediment Control plans (submitted under separate cover) and Engineering Plan (included with this submittal).

3.0 FACILITY REPORT

3.1 Waste Stream

Types of Waste Specified for Disposal: The facility will accept residential, commercial, and industrial waste, wastewater treatment sludges, and construction and demolition (C&D) debris for disposal. C&D waste is co-disposed in the lined MSW landfill.

Further detail regarding acceptable wastes, prohibited wastes and special wastes are presented in section 3.3 through 3.5 of the Operations Plan.

Disposal Rates and Estimated Variances: The Franchise Agreement and Intercounty Solid Waste Agreement for the Tuscarora Landfill do not limit the tonnages that may be disposed of at the facility. Disposal rates for the Tuscarora Landfill are presented in Table 1, and were obtained from the CRSWMA Comprehensive Annual Financial Report and the scale house records. The table shows the annual waste disposal quantities for FY1994 through FY2015, with projected values thereafter. Between 1995 and 2015, annual growth in waste disposal has varied from a low of -13% (2012-2013) to a high of 57% (1995-1996). The average annual growth rate during the period FY1994 through FY2015 is 5%, although the average appears to be skewed on the high side due to abnormally high increases from 1995-1996 and 1996-1997. The large degree of variation may reflect fluctuations in clean up debris. Over the past four years, the average annual growth rate has been 3.27%. For planning purposes, a growth rate of 2% per year has been assumed for 2016 through 2018. Beyond 2018, a growth rate of 5% per year was assumed. Projected disposal amounts by phase are shown in Table 1. Based on these figures, the facility has the capacity to operate until year 2030. For purposes of this Renewal Application, CRSWMA is requesting an allowable annual tonnage rate of 249,000.

Facility Service Area: The Tuscarora Landfill accepts waste generated within the boundaries of Carteret, Craven, Jones and Pamlico Counties. Municipalities and federal facilities within these boundaries are included.

Waste Management Procedures: The following procedures are in use at the facility and are proposed to continue. During operating hours, traffic is routed from the entrance gate and scalehouse to a paved road that becomes a gravel road leading to the disposal area. A convenience center is provided near the scalehouse for residential drop-off. The convenience center enables residential users to dispose of waste without having to drive to the working face of the landfill.

Equipment Requirements: The following equipment is used at the landfill. In general, the type and number of pieces of equipment listed here is expected to be suitable for handling the anticipated waste stream for the duration of Phase 3. Equipment needs will be reviewed annually, and additional equipment will be purchased or leased as needed. New equipment will be phased in as older equipment is retired.

Type	Status	Quantity
Compactor	Active	2
Compactor	Reserve	2
Dozer	Active	1
Dozer	Reserve	1
Excavator	Active	2
Off-road Dump Truck	Active	1
Loader	Active	2
Motor Grader	Active	1
Tractor	Active	1
Water Truck	Active	1
Vacuum	Active	1
Fuel Truck	Active	1

3.2 Landfill Capacity

Landfill capacity and soil requirements, by phase, were calculated using airspace volumes obtained using AutoDesk Civil3D/Survey software. The data and assumptions used are consistent with the disposal rates discussed in the preceding section, and are representative of the operational requirements and conditions anticipated for the facility.

Operating Capacity:

The property totals approximately 502 acres in size, of which 101 acres make up the overall landfill footprint. The operating capabilities, by phase and total, are shown in Table 1 and are summarized below:

Phase	Area (Acres)	Gross Capacity ⁽¹⁾ (cubic yards)	Status
IRL	20.2	5,198,300	closed
1	20.5		closed
2	17.2		temporary closure
3	19.7	1,851,000	active
4	23.4	2,354,000	not constructed
5	vertical	2,745,000	not constructed
6	vertical	1,800,400	not constructed
Total	101	13,948,700	

(1) Gross capacity is defined as the airspace between top of drainage layer and approximate final Phase elevation.

Phase 3 is the current active disposal area (19.7 acres) with a gross designed capacity of 1,851,000 cy (presented on Drawing No. FP-09 and Table 1). As of June 30, 2015, the remaining volume is 1,126,375 cy, of which 123,508 cy is required for final cover. As a result, 1,002,867 cy remains for waste disposal and daily/intermediate cover soil. Assuming an annual tonnage of 196,862 and a compaction efficiency of 1,000 lbs/cy, the remaining life of the landfill is about three years as of June 30, 2015 (Table 1).

Soil Resources:

The in-place ratio of waste to soil used to calculate the operating life and operating soil requirements for each phase was assumed to be 26 to 1 which is generally consistent with results observed from air space utilization studies. The on-site soil requirements are shown by year and cumulatively in Table 2. The deficit of soil during the operation of Phase 3 (and future Phases 4 through 6) can be satisfied by borrowing soil from other locations within the limits of the facility property or from off-site sources. Based on the conceptual design volumes, the total soil requirement over the life of the facility (Phases 3 – 6) is approximately 1,007,164 cubic yards.

Structural fill materials for the construction of the base grades may come from off-site sources such as the Martin Marietta quarry, located approximately 5 miles east from the site. Borrow studies were previously completed to identify the quality and quantity of on-site soil resources. Soils that are suitable for final cover or base liner construction were identified and will be reserved for that purpose so they will not be used for daily cover.

3.3 Containment and Environmental Control Systems

Base Liner System:

The proposed liner system will consist of the following components from top to bottom. This is an alternate liner that was previously approved for Phases 2 and 3 of the Tuscarora Landfill.

- 24-inch granular protective and/or drainage layer;
- Non-woven geosynthetic cushion;
- 60 mil high density polyethylene (HDPE) textured geomembrane;
- Geosynthetic clay liner (GCL) adhered to a 60-mil textured HDPE membrane (GCL side up); and
- 12-inch compacted soil layer having permeability no greater than 1×10^{-5} cm/sec.

Leachate Management System:

The leachate collection and removal system (LCRS) is designed to meet the requirements of the North Carolina Solid Waste Management Regulations. The LCRS will include the following components:

- Drainage layer;
- Leachate header pipes;
- Leachate pump stations; and
- Existing leachate lagoons (2).

Leachate will be conveyed through the drainage layer consisting of at least 24 inches of free-draining granular material. Within the drainage layer, a network of perforated collection pipes will intercept the leachate, conveying the leachate by gravity to the sump areas. Leachate will be pumped from the sump areas via pumping stations and a force main system to the existing leachate lagoons. At this time, the lagoons' leachate levels are lowered periodically for transport by tanker truck to the City of New Bern Wastewater Treatment Facility. An agreement to pump leachate through a sewer pipe to the City of New Bern Wastewater Treatment Facility will be in effect by summer 2016. This newest agreement was put in place for the force-main project. Under this agreement, the lagoons' leachate levels will be controlled by pumping it through the recently constructed sewer pipe to the City of New Bern Wastewater Treatment Facility. A copy of the new leachate agreement is provided in Appendix VI-2 of the Operations Plan. Additional information pertaining to the quantity of leachate generated, the storage capacity of the lagoons, and the offsite disposal capacity are provided in the Engineering Plan.

Cleanouts will be provided for the leachate collector lines and leachate header pipe to provide access for video inspection and to clean the pipes. Pipes will be cleaned using either hydraulic or mechanical methods.

Cap System:

The cap system is described from bottom to top in the following paragraphs.

- a. Intermediate Cover and Leveling Course - Local soil will be placed over the daily cover soil to provide at least 12 inches of intermediate cover and a uniform base for construction of the cap.

- b. Gas Migration Layer – A geonet composite will be installed between the intermediate cover and the overlying infiltration layer. The geonet composite will provide a pathway for accumulated gas to move laterally to the vents.
- c. Composite Cap: GCL Component - The infiltration layer is proposed to consist of a geosynthetic clay liner. This layer will be constructed over the geonet composite that will serve as the gas migration layer. Installation and testing requirements for the cap are provided in the Specifications (Appendix IV-6) and the CQA Plan.
- d. Composite Cap: Geomembrane Component - The geomembrane component of the infiltration layer will consist of a textured 40 mil flexible geomembrane. The membrane will be in direct contact with the underlying layer. The testing program and quality assurance requirements for the geomembrane are described in the CQA Plan.
- e. Drainage Layer - A drainage layer consisting of a geonet and geotextile composite will be placed over the geomembrane to promote drainage.
- f. Protective Layer - A layer consisting of at least 18 inches of local soil will be placed above the drainage layer to provide a protective cover for the underlying cap components.
- g. Vegetative Layer - A layer of topsoil material or organically amended local soil will be placed above the protective layer. This soil layer will be at least 6 inches in thickness. The topsoil material will be lightly compacted so that a good stand of vegetation can be established. Soil tests may be conducted prior to seeding to determine if soil additives are needed to establish and maintain the vegetation.

Gas Management System:

Active Landfill Gas Collection and Control

MSW landfills that have permitted capacities greater than 2.5 million Mg or 2.5 million cubic meters and that have an emission rate for non-methane organic compounds (NMOC) in excess of 50 Mg/year, must install and operate active landfill gas collection and control systems in accordance with the New Source Performance Standards (NSPS) for MSW landfills (40 CFR 60, Subpart WWW). Such is the case for the Tuscarora Landfill.

An active landfill gas collection and control system is in place on the IRL and Phase I and Phase 2 of the landfill. Expansion of the gas collection system to cover all areas where waste has been in place for at least five years will occur as required by the NSPS.

The NSPS regulations require that a Gas Collection and Control System (GCCS) Design Plan be prepared to demonstrate how landfill gas will be collected and controlled for the life of the facility.

The North Carolina Department of Environmental Quality (NC DEQ), formerly known as Department of Environment and Natural Resources (NC DENR), Division of Air Quality (DAQ) has the responsibility of approving GCCS Plans and enforcing compliance with the NSPS regulations.

A GCCS Plan for the Tuscarora Landfill was submitted to the DAQ in October, 2007 and approved in September, 2008. The approved GCCS Plan was provided in the Phase 3 Expansion Permit Application Engineering Plan as Appendix IV-10. The proposed layout for the gas system at final closure of the facility is shown on FP-08.

Operations of the active landfill gas system is regulated by DAQ. The Tuscarora Landfill Operates the gas system under Air Quality Permit No. 09755T01 which is provided as Appendix VI-3 of the Operations Plan.

Monitoring for Explosion Hazards

To protect public health and safety in the vicinity of the landfill, landfill gas produced by the decomposition of refuse will be controlled and monitored during the operational, closure, and post-closure periods. The following regulatory levels must be maintained:

- The concentration of methane gas generated is not to exceed 25 percent of the lower explosive limit (LEL) for methane in on-site structures (excluding gas control or recovery system components); and
- The concentration of methane gas is not to exceed the LEL for methane at the facility property boundary.

Gas monitoring will be conducted during the active life of the landfill and throughout the closure and post-closure periods to ensure compliance with the regulatory limits. At a minimum, quarterly monitoring of explosive gases will be conducted in on-site structures. If additional structures are built, the monitoring program will be expanded to include the new structures.

The Tuscarora Landfill does not have the potential for subsurface methane migration since the base grades of the landfill are elevated above the existing ground in order to achieve the required separation from groundwater and slopes. Therefore, the waste and the generation of landfill gas occurs above the surrounding ground and any lateral migration from the landfill would release the gas to the atmosphere within the landfill property boundary. Additionally, the water table, which is near ground surface, and the ditches around the landfill hold water year around, serve as a barrier to subsurface migration. However, quarterly landfill gas monitoring will include probes GP-6, GP 7 and GP-8 for continued monitoring of the IRL and Phase 1 of the Tuscarora Landfill for potential subsurface migration. Landfill gas monitoring probes GP-2, GP-3, GP-4 and GP-5 will no longer be monitored for landfill gas migration. GP-8 has replaced GP-2 and GP-3 as a more acceptable location for monitoring at the property boundary southwest of the IRL. GP-4 and GP 5 are located to the south of the IRL, centrally located away from the property boundary, and no longer satisfy the requirements of monitoring for landfill gas migration toward the property boundary. Finally, fifteen

bar-hole probes (hand-driven hole approximately 0.5-inch by 2.5 to 4-feet deep) surrounding the parameter of Phases 2, 3 and 4 are monitored quarterly.

3.4 Special Engineering Features

Stormwater Management System:

Phase 3 is designed to drain leachate to two sumps. Initial waste placement in the new phase will be done in one half of the phase so that stormwater will be segregated in the other half until filling progresses to cover the entire base of the landfill. Stormwater will be pumped from the landfill sump into the drainage ditch until drainage to the sump becomes leachate, at which time it will be pumped from the sump into a forcemain pipe to the leachate lagoons onsite for storage.

(End)

TABLES

Table 2: Projected Soil Requirements

YEAR	DAILY COVER				CONSTRUCTION	CLOSURE	CUMULATIVE
	WASTE TONS	WASTE CY ⁽¹⁾	VOL. RATIO WASTE/SOIL	SOIL REQ. CY	SOIL REQ. CY ⁽²⁾	SOIL REQ. CY ⁽³⁾	SOIL REQ. CY
2016	193,002	386,003	26.0	14,846			14,846
2017	196,862	393,724	26.0	15,143			15,143
2018	200,799	401,598	26.0	15,446			15,446
2019	210,839	421,678	26.0	16,218	410,323	Phase 3 Partial Closure	426,541
2020	221,381	442,762	26.0	17,029			17,029
2021	232,450	464,900	26.0	17,881		57,112	74,993
2022	244,072	488,145	26.0	18,775			18,775
2023	256,276	512,552	26.0	19,714			19,714
2024	269,090	538,180	26.0	20,699		Phase 4 Partial Closure	20,699
2025	282,544	565,089	26.0	21,734			21,734
2026	296,672	593,343	26.0	22,821		51,256	74,076
2027	311,505	623,010	26.0	23,962			23,962
2028	327,080	654,161	26.0	25,160			25,160
2029	343,434	686,869	26.0	26,418		106,044	132,462
2030	360,606	721,212	26.0	27,739		Phase 5 Partial Closure	27,739
2031						78,844 Phase 6 Partial Closure	78,844
							1,007,164

NOTES:

(1) Volume consumption based on an assumed in place density of 1000 lbs/cy, or 0.5 tons/cy.

Waste to soil ratio 26 based on 13 foot lift of waste covered by 6 inch layer of soil.

(2) Volume of soil required for construction is based on grading plans and calculated using AutoCAD

(3) Volume of soil required for closure based on 3' of cover soil over the following areas:

- Phase 3 11.80 acres
- Phase 4 10.59 acres
- Phase 5 21.91 acres
- Phase 6 16.29 acres

PREPARED FOR:



COASTAL REGIONAL SOLID WASTE AUTHORITY
TUSCARORA LONG-TERM REGIONAL LANDFILL
7400 OLD HIGHWAY 70 WEST
TUSCARORA, NC 28523

PERMIT No. 25-09

TUSCARORA LANDFILL PERMIT TO OPERATE RENEWAL

VOLUME 2, SECTION VI OPERATIONS PLAN

NOVEMBER 2009
REVISED MARCH 2012
REVISED DECEMBER 2015
REVISED APRIL 2016

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**VOLUME 2, SECTION VI
OPERATIONS PLAN**

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APPENDICES

Appendix VI – 1	Random Waste Screening Program Forms <ul style="list-style-type: none"> • Form A – Waste Inspection Forms • US EPA Hazardous Waste Inspection Decision Tree
Appendix VI – 2	Leachate Agreement
Appendix VI – 3	Title V Air Quality Permit
Appendix VI – 4	Type 1 Yard Waste Composting – Operations Manual

DRAWINGS

Drawing No. OP-T	Title Sheet
Drawing No. OP-L	Legend and General Notes
Drawing No. OP-01	Existing Conditions
Drawing No. OP-02	Site Development Plan
Drawing No. OP-03	Five year Phasing Plan

1.0 GENERAL

This operations plan describes how the design and construction plans will be implemented during the life of the facility. The plan consists of drawings and accompanying text that illustrate existing conditions, cell progression, waste placement and daily operations, leachate management, special waste management, and environmental monitoring.

The Tuscarora Landfill is owned and operated by CRSWMA. The landfill property is located in the western portion of Craven County, North Carolina, between Tuscarora and Cove City and is identified as Solid Waste Facility Permit #25-09. There is one waste disposal unit of 101 acres. The waste disposal unit consists of two closed areas - the Interim Regional Landfill (IRL - 20.2 acres) and Phase 1 (20.5 acres); Phase 2 (17.2 acres) -temporary closure; the Phase 3 an active disposal area (19.7 acres); and the Phase 4 expansion (23.4 acres). Phases 5 and 6 are planned as vertical expansions. Phase 1 received a permit to operate on August 25, 1999 and Phase 2 received a permit to operate on May 8, 2006. Placement of waste in Phase 2 began in February of 2007. Phase 2 which has reached capacity and was closed during the fall of 2013. Phase 3 was open for disposal on May 9, 2013. It is currently the active disposal area, and is expected to reach capacity in spring 2019.

Currently, an average of 700 tons of waste is managed daily at the site, approximately two thirds of which is municipal solid waste and one third construction and demolition debris. The facility is open six days per week. Yard wastes and storm debris are collected and composted at the site, and scrap tires are collected for off-site recycling or disposal. Ancillary structures including a scalehouse and a maintenance building are also on the site.

2.0 OPERATIONS DRAWINGS

2.1 Existing Conditions

Closed Areas

The closed portions of the landfill which include the IRL (20.2 acres), Phase 1 (20.5 acres), and Phase 2 (17.2 acres) have an active landfill gas collection system consisting of 59 extraction wells and a buried HDPE pipe network. The landfill gas is routed to an electricity generating facility onsite which is owned and operated by INGenco Wholesale Power, LLC, or a utility open flare for control. A modulating valve was installed on October 27, 2015 and placed in commission on October 29, 2015. The valve was installed on the header line after the knock out pot. This valve will allow both the flare and generator to operate simultaneously and maintain constant vacuum on the landfill. The Tuscarora Landfill has been issued a Title V Operating Permit by the Division of Air Quality (Air Permit #09755T01).

Leachate collected from the closed portions of the landfill is pumped into the leachate lagoons west of the landfill.

Active Area

Waste filling is currently under way in Phase 3, a 19.7 acre area adjoining Phase 2 to the north. Truck access to Phase 3 is provided by a road up the south side of the IRL and across the east side of Phase 1 and Phase 2. Perimeter road around the landfill allows personnel access to maintain and operate the facility.

The Phase 3 base grades slope from south to north, with two sumps located at the north side of the cell to collect leachate. Leachate is pumped through a 4" dual contained HDPE forcemain into the leachate lagoons.

Other On-site Facilities

Other on-site development consists of a scale house and office, maintenance garage, a yard waste/storm debris composting facility, tire collection, inert debris disposal, and a public convenience center area. See Drawing OP-1 for an illustration of existing conditions at the site.

2.2 Proposed Development

Three additional phases (Phases 4, 5 and 6) of development for municipal solid waste disposal are proposed. The proposed development is located in areas that have previously been designated as suitable for landfill development. Development of the Phase 4 will complete the footprint with an expansion to the south of Phase 3 and east of Phase 2. The final two phases will be vertical expansions. Development in accordance with the phasing plan will allow portions of the landfill side slopes to be closed at various times during its projected operating life.

The on-site soil resources, usage, and balances are shown by phase in the Facility Plan. The deficit of soil during the operation of Phase 3 can be satisfied by borrowing soil from on-site borrow areas or from off-site locations such as the Martin Marietta quarry. Overall, based on conceptual design volumes, there is an estimated soil requirement over the life of the facility of approximately 1,098,240 cubic yards.

2.3 Operations

The progression of operations is presented on Drawing No. OP-03. This drawing includes the progression of initial waste placement, transition contours and final contours.

3.0 GENERAL OPERATING CONDITIONS

3.1 Hours of Operation

The landfill is open to private waste haulers and the public from 7:30 a.m. to 4:30 p.m. Monday through Friday, and on Saturday from 7:30 a.m. to 2:00 p.m. Three holidays are observed; Thanksgiving, Christmas and New Year's Day.

3.2 Site Access and Safety

Access to the landfill is controlled through a single access road with a secure gate to prevent access when the landfill is not open. Other access roads located around the perimeter of the landfill are used for logging purposes with any entry points into the landfill being gated. A sign containing information required in Rule .1626(6)(e) (i.e., dumping procedures, hours, permit number, etc.) is posted at the landfill entrance. During operating hours, traffic is routed from the entrance gate and scale house to a paved and gravel road leading to the disposal area. Directional signs and speed limit signs are posted to provide traffic control. The road is maintained so that it is passable during all weather conditions. An attendant is on duty at the scale house at all times during operating hours.

3.3 Acceptable Waste

The landfill will accept only those solid wastes included in the current permit, including household, commercial and industrial solid wastes. These are defined in Rules .0532 and .1602 as follows:

- Household waste means any solid waste derived from households including single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas.
- Commercial solid waste means all types of solid waste generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.
- Industrial solid waste means solid waste generated by manufacturing or industrial processes that is not a hazardous waste regulated under Subtitle C of RCRA. Such waste may include, but is not limited to, waste resulting from the following manufacturing processes: electric power generation; fertilizer/agricultural chemicals; food and related products/by-products; inorganic chemicals; iron and steel manufacturing; leather and leather products; nonferrous metals manufacturing/ foundries; organic chemicals; plastics and resins manufacturing; pulp and paper industry; rubber and miscellaneous plastic products; stone, glass, clay, and concrete products; textile manufacturing; transportation equipment; and water treatment. This term does not include mining waste or oil and gas waste.
- Construction and Demolition Debris Waste means solid waste generated solely from the construction, remodeling, repair, or demolition operations on pavement and building structures.
- Land Clearing and Inert Debris means solid waste created during land clearing including untreated wood, yard trash, uncontaminated soils and rock.

On or before August 1 of each year, CRSWMA will report to the Solid Waste Section the amount of waste received in tons at this facility and disposed in the landfill units. Data will be transmitted on forms prescribed by the Section. The report will include the following:

- The reporting period shall be for the previous year beginning July 1 and ending on June 30.
- The amount of waste received and landfilled in tons, compiled on a monthly basis by county or transfer station of origin and by specific waste type if diverted to a specific unit within the permitted facility; and
- The completed report shall be forwarded to the Regional Waste Management Specialist for the facility. A copy of the completed report shall be forwarded to the County Manager of each county from which waste was received.

3.4 Prohibited Waste

A sign is posted at the landfill gate (see Section 2.2 above) that reads "No hazardous or liquid waste accepted without written permission from the Division of Solid Waste Management". The landfill will not accept:

- Hazardous waste as defined within 15A NCAC 13A, including hazardous waste from conditionally exempt small quantity generators;
- Polychlorinated biphenyl (PCB) wastes as defined in 40 CFR 761;
- Liquid wastes Rule .1626(9) (i.e., any waste material that is determined to contain "free liquids" as defined by SW-846 Method 9095 (Paint Filter Liquids Test), unless the waste is household waste other than septic waste or waste oil, or leachate or gas condensate derived from the landfill; and
- Barrels and drums unless they are empty and sufficiently perforated to ensure that no liquid or hazardous waste is contained therein, except fiber drums containing asbestos;
- Motor vehicle oil filters;
- Recyclable rigid plastic bottles;
- Wooden pallets;
- Discarded computer equipment and televisions (effective July 1, 2011);
- Other wastes specifically banned from landfill disposal by rule or statute, such as lead acid batteries.

CRSWMA will notify the Division within 24 hours of attempted disposal of any waste the landfill is not permitted to receive, including waste from outside the area the landfill is permitted to serve. The waste-screening program is described later in this Operation Plan.

3.5 Special Wastes

The landfill handles the following "special wastes" as described below.

Scrap Tires

The scrap tires are collected in a dedicated area and stored on-site where they can be loaded directly into trailers for off-site processing. Contracts with tire processors may vary from year to year. The current processor is Central Carolina Tire Disposal, 1616 McKoy Town Road, Cameron, North Carolina 28326. Tire collection must comply with the Rule .1107, *Scrap Tire Collection Site Operational Requirements*.

Yard Waste/Storm Debris

Yard waste and storm debris are accepted at this facility, but are not disposed of in the landfill. This waste stream is processed in the composting area (Permit #25-11), where it is chipped, shredded, and placed in windrows for composting. The operations manual for the Type 1 yard waste composting permit (Permit #25-11) is attached in Appendix VI – 4. The final product is sold to the public.

Animal Carcasses

Animal carcasses, slaughterhouse or hatchery waste, or other animal waste received will be immediately buried and covered with a layer of soil, followed by non-putrescible municipal solid waste.

Asbestos

Asbestos waste received shall be managed in accordance with 40 CFR 61. The waste will be covered immediately with soil in a manner that will not cause airborne conditions and must be disposed of separate and apart from other solid wastes, either at the bottom of the working face, or in an area not contiguous with other disposal areas.

Sludge

Wastewater treatment sludges may be accepted for disposal if the waste is utilized as a soil conditioner and incorporated or applied onto the vegetative growth layer, but in no greater than six inches in depth, or (ii) if the facility meets all design requirements contained within Rule .1624, and approved within the permit, or has been previously approved as a permit condition.

Oyster Shells

Oyster shells are collected at the public convenience center and recycled.

Wood Pallets

Pallets are shredded and used as road bed material as necessary on the landfill working face. CRSWMA occasionally supplies woodchips from pallets to a nearby energy plant as an alternative fuel source.

White Goods

A collection container for White Goods is located at the public convenience center. White goods are the responsibility of Craven County. The white goods collection container is removed and replaced by the County as needed. Chlorofluorocarbon refrigerant removal is not the responsibility of the Authority. No Chlorofluorocarbon refrigerant is removed at the facility.

3.6 Litter Control

Prompt compaction of waste at the working face is the primary method used to control blowing litter. Also, temporary fences are provided to contain windblown material during operations. In addition, landfill personnel pick up windblown litter at the conclusion of each day of operation and as needed along the access road and in locations around the active disposal area. The facility purchased a trailer mounted vacuum unit in 2002 to facilitate pick-up of windblown litter.

3.7 Equipment

The following list of equipment is currently in use at the landfill.

Type	Status	Quantity
Compactor	Active	2
Compactor	Reserve	2
Dozer	Active	1
Dozer	Reserve	1
Excavator	Active	2
Off-road Dump Truck	Active	1
Loader	Active	2
Motor Grader	Active	1
Tractor	Active	1
Water Truck	Active	1
Vacuum	Active	1
Fuel Truck	Active	1

As the waste stream changes during the operational life of the facility, equipment needs will be periodically reviewed and additional equipment purchased or leased as needed. New equipment will be phased in as older equipment is retired.

3.8 Air Quality

Open burning of solid waste including yard waste and brush is prohibited at the landfill. Burning of brush and/or stumps would only be requested on an infrequent basis in conjunction with clearing or construction events, if at all. Open burning will not be done without prior approval from Division of Air Quality and local fire department and will be subject to subject to the requirements of Rule .1626(5)(b).

The facility operates an active landfill gas collection and control system. Operations of the landfill gas collection and control system is regulated by the Division of Air Quality (DAQ). The Tuscarora Landfill operates under Air Permit #09755T01, which is included as Appendix VI-3.

3.9 Dust, Odor, Fire and Vector Control

Dusty road surfaces will be sprayed with water or leachate from the existing on-site leachate storage lagoons from a water truck during windy, dry weather. The working face of the landfill may also be sprayed with leachate from the existing on-site leachate storage lagoons via a water truck during windy, dry weather. Odors and disease vectors will be controlled by promptly covering the waste at the working face, and by the use of daily cover. Daily cover is described in more detail in a Section 5.4 of this Plan.

The following Operational Conditions shall be implemented to use leachate from the existing leachate storage lagoon as dust control:

- Using leachate for dust control is not an approved approach to dispose of leachate required by the Rule .0162(12)(d);
- The leachate to be used for dust control must come from the existing on-site leachate storage lagoons, not imported from other sources including off-site areas;
- Within the waste disposal areas the leachate can only be sprayed on working face which is 100 feet away from the edge of the waste footprints and/or haul roads which are 150 feet away from the edge of the waste footprints;
- The leachate may be transported by a water truck, must be sprayed by a control manner that will not cause a nuisance to the environment and airborne emission of pollutants, and must not be applied near people, animals, equipment, or vehicles;
- Odors and disease vectors becoming concerns resulting from spraying leachate must be controlled by promptly covering the waste at the working face by using daily cover;
- The amount of leachate to be sprayed on the working face and road surface must be properly designed and managed so that the following conditions shall not be observed:
 - a) Muddy and rutting surface conditions.
 - b) Runoff or sheet flow on the surfaces.
 - c) Seepage on the side slopes.
- No leachate shall be applied on less than one lift (10 feet) of wastes and be sprayed on working face and haul road when it is raining and the weather condition is not favorable to the practice such as strong windy condition;

- Leachate will be sprayed on working face or haul road during daylight hours only; and
- Records will be kept, including:
 - a) Daily/weekly record of leachate generated and used for dust control.
 - b) Weather conditions and other pertinent daily information when the leachate is used as dust suppressant.

Incoming waste loads shall be observed by site operators for evidence of fire, such as flames, smoke, or the odor of burning material. Burning loads will be extinguished before dumping if possible. If there is evidence of fire in the landfill itself, the CRSWMA Director will be notified immediately. If possible, the waste will be removed or segregated from other waste in the disposal area. The landfill operator will evaluate the situation to determine whether the fire can be extinguished using fire extinguishers or equipment present at the site, or if off-site equipment will be needed. If necessary, the local fire department will be called to render assistance in extinguishing the fire. The Division of Waste Management Rule .1626(5)(d) requires that the fires that occur at the landfill will be reported verbally to the Division within 24 hours and in writing within 15 days.

Fire extinguishers shall be located on each piece of equipment on site (Rule. 1626(5)(c)). Equipment operators shall be trained in the use of these extinguishers. Fire extinguishers will be used for small, localized fires. A stockpile of soil shall be maintained near the working face to be used for extinguishing small surface fires that may be too large to control with the fire extinguishers carried on the landfill equipment.

Emergency equipment will be called in the case of fires too large to be extinguished with fire extinguishers or soil as described above. Water contained in the sedimentation ponds can be used in an emergency to aid local firefighters in extinguishing large fires.

Owners and operators of municipal solid waste landfills must prevent and control on-site populations of disease vectors such as rodents, insects, or other animals capable of transmitting disease to humans (Rule .1626(3)).

3.10 Scavenging/Salvaging

The unauthorized removal of waste and scavenging at the landfill is prohibited. The general public is not allowed to scavenge items from the working face. Landfill personnel may remove recyclable salvageable materials and process them.

4.0 RANDOM WASTE SCREENING PROGRAM

4.1 Authority

CRSWMA has developed this "Random Waste Screening Program" in accordance with North Carolina's Solid Waste Management Regulations, Rule .1626(1)(f). Key elements of Rule .1626(1)(f) addressing waste screening are as follows:

No hazardous or liquid wastes as defined in 15A NCAC 13A, or materials shall be accepted at the landfill, except as specifically authorized by the facility permit or by the Division. The owner or operator shall implement an inspection program to detect and prevent disposal of hazardous and liquid wastes and polychlorinated biphenyls (PCB). This program shall include, at a minimum:

- Random inspections of incoming loads unless the owner or operator takes other steps to ensure that incoming loads do not contain regulated hazardous or liquid wastes or PCB wastes;
- Records of any inspections;
- Training of facility personnel to recognize regulated hazardous waste, liquid waste, and PCB wastes; and
- Development of a contingency plan to properly manage any identified hazardous and/or liquid wastes.

4.2 Random Selection

Random selection of vehicles to be inspected will be conducted on a regular basis. The selection may be at least one vehicle per week, but not less than one percent by weight of the waste stream based on the previous week's total. The personnel conducting the inspection will randomly select the load at the working face. A random truck and time will be selected (e.g., the tenth load after 10:00 a.m.) on the day of inspections.

4.3 Record Keeping

Report forms for record-keeping purposes are included in Appendix VI-1. These forms are completed at each inspection. All reports and resulting correspondence are maintained at the CRSWMA Landfill office for the life of the landfill and during the post-closure period.

4.4 Training

The Landfill Operations Manager and/or staff from the Department of Solid Waste who are trained to identify and manage MSW waste and hazardous and liquid waste will supervise inspections. Landfill operators, recycling attendants, and landfill clerks responsible for screening waste will be properly trained to identify hazardous and liquid waste.

4.5 Inspection Site

Inspections will be conducted in a designated area near the working face of the landfill.

4.6 Action Plan

The following action plan details the procedure for conducting random waste inspections.

- 1) Dump single load in prepared area. Detain truck and driver until inspection is completed.

2) Spread waste with compactor and/or hand tools as appropriate. Hand rake loads that include large closed containers to avoid possible rupturing of the containers. Have appropriate safety equipment present. Minimum safety equipment will include:

- Rubber gloves;
- Rubber boots;
- Safety glasses; and
- Long handled hoe.

3) Examine waste for excluded waste and/or safety hazards:

- Containers labeled hazardous;
- Excessive or unusual moisture;
- Regulated biomedical (red bag) waste;
- Powders, dusts, smoke, vapors, or chemical odors;
- Sludges, pastes, slurries, or bright colors (such as dyes); and
- Unauthorized out-of-area waste.

4) Take appropriate action(s) as follows:

- Incorporate acceptable waste into working face.
- Hold suspect waste for identification by on-site personnel and, if necessary, confirmation by others such as a contract laboratory, hazardous waste management firm, or state and/or federal regulator.
- Interview driver and hauler to identify the source of suspect waste in the load.
- Hold rejected hazardous or liquid waste for generator.
- Arrange for hazardous or liquid waste collection by licensed collector.

5) Document Actions:

- Record Inspection.
- Retain Reports.
- Report hazardous, liquid, or PCB wastes to Solid Waste Section – NC DEQ.

5.0 SUBCELL PROGRESSION AND WASTE PLACEMENT

5.1 Subcell Progression

The method of filling shall be the area method in accordance with the filling sequence shown on Drawing OP-3.

Uncontaminated stormwater can be collected and removed along the southern portion of the Phase 4 which will be separated from the northern portion by a berm. Stormwater will be pumped from the collection area into the stormwater channels that convey flow into a sediment basin.

5.2 Waste Placement and Compaction

The waste will be tipped in the active subcell as closely as possible to the working face, then pushed to the desired area. The daily working face will be maintained so as to provide space for several trucks to unload at the same time. The width of the working face will vary depending on the rate of waste acceptance on a given day, weather conditions and other factors, but will be maintained as small as practicable. The waste will be compacted as described below with the compactor (see equipment list earlier in this report).

To minimize the chance of damage to the liner in any new subcell, the initial lift of waste will be at least 5 feet thick, and will consist of mostly residential, non-bulky waste. Compaction will be minimal because later lifts will surcharge the initial lift so that there is no net loss of density. Typical compaction procedures on lifts above the initial one will involve placement of waste in thin layers (1-2 feet thick) as flat as is practical. The compactor will roll across and slightly past the waste (to prevent wind-blown material leaving from the edge of the lift) a minimum of three times. Waste density calculation will be reviewed periodically, and operational procedures may be revised to improve the efficiency of the site.

5.3 Filling Operations

Each lift of waste shall be approximately 13 feet thick, which will be covered weekly with six-inch layer of soil. The waste to soil volume ratio is approximately 26:1. Daily cover is discussed below.

5.4 Daily Cover

At the end of each day's operation, compacted waste in the subcell shall be covered with either a minimum six inches of soil, or an approved alternative daily cover (ADC) as required in Rule .1626(2)(b). When soil is used, at least two passes of heavy equipment will be made over the area to provide adequate soil compaction. Waste may be covered more frequently than once per day if necessary to control fires, odors, or blowing litter.

As an alternate daily cover to soil, an Enviro™ Cover System (or equivalent) manufactured by EPI Environmental Technologies, Inc. (EPI) may be used to cover waste for up to one week. At least once per week, soil will be used as daily cover as prescribed in the facility's permit to operate. Following a trial period, CRSWMA was granted permission by the Solid Waste Section to use a degradable plastic film as an approved alternate daily cover in October 2000. The 2-mil film will be deployed by 16 foot wide rolls from an applicator attached to the dozer blade. The applicator, manufactured by In-Line Plastics, Inc. (the predecessor to EPI), also includes a hopper from which sand is dropped as ballast to hold the film in-place. In periods of high wind, more sand will be used as ballast, and in the occurrence of storm events, soil cover is

used. The film is deployed down the slope of the working face, with a 2 foot overlap on each side.

The following conditions apply to the use of alternate daily cover:

- The alternative daily cover, an Enviro™ Cover System (or equivalent), in lieu of a 6-inch soil material must be used to cover wastes at the end of each day's operation for up to 5 consecutive days. In the end of the fifth day, a 6-inch soil material must be used as daily cover; and
- The 6-inch soil material shall be used as daily cover material in the occurrence of inclement weather conditions (including strong wind and storm events).

5.5 Intermediate Cover

In areas where another lift of waste will not be placed for at least 12 months, an additional 6 inches of soil shall be placed over the daily cover for a total of 12 inches of intermediate cover (Rule .1626(2)(c)). Provisions for a vegetative ground cover sufficient to restrain erosion in accordance with Rule .1626(7)(c) shall be carried out within 30 working days or 120 calendar days following completion of each phase of development.

6.0 ENVIRONMENTAL MONITORING PROGRAMS

6.1 Water Quality

The water quality-monitoring program for groundwater and surface water is described in the Design Hydrogeological Report in Volume 3 of Phase 3 expansion application.

6.2 Landfill Gas

Active Landfill Gas Collection and Control

Operations of the active landfill gas system are regulated by the Rule .1626 (4). The Tuscarora Landfill Operates the gas system under Air Quality Permit No. 09755T01 which is provided as Appendix VI-3 of the Operations Plan.

Monitoring for Explosion Hazards

To protect public health and safety in the vicinity of the landfill, landfill gas produced by the decomposition of refuse will be controlled and monitored during the operational, closure, and post- closure periods. The following regulatory levels must be maintained:

- The concentration of methane gas generated is not to exceed 25 percent of the lower explosive limit (LEL) for methane in on-site structures (excluding gas control or recovery system components); and

- The concentration of methane gas is not to exceed the LEL for methane at the facility property boundary.

Gas monitoring will be conducted during the active life of the landfill and throughout the closure and post-closure periods to ensure compliance with the regulatory limits. At a minimum, quarterly monitoring of explosive gases will be conducted in on-site structures. Currently these structures include the scalehouse, a maintenance building, an office, and storage shed. If additional structures are built, the monitoring program will be expanded to include the new structures.

The Tuscarora Landfill does not have the potential for subsurface methane migration since the base grades of the landfill are elevated above the existing ground in order to achieve the required separation from groundwater. Therefore, the waste and the generation of landfill gas is occurring above-ground and any lateral migration from the landfill would release the gas to the atmosphere within the landfill property boundary. Additionally, the water table, which is near ground surface, and the ditches around the landfill hold water year around, serve as a barrier to subsurface migration. However, quarterly landfill gas monitoring will include probes GP-6, GP 7 and GP-8 for continued monitoring of the IRL and Phase 1 of the Tuscarora Landfill for potential subsurface migration. Landfill gas monitoring probes GP-2, GP-3, GP-4 and GP-5 will no longer be monitored for landfill gas migration. GP-8 has replaced GP-2 and GP-3 as a more acceptable location for monitoring at the property boundary southwest of the IRL. GP-4 and GP 5 are located to the south of the IRL, centrally located away from the property boundary, and no longer satisfy the requirements of monitoring for landfill gas migration toward the property boundary. Finally, fifteen bar-hole probes (hand-driven hole approximately 0.5-inch by 2.5 to 4-foot deep) surrounding the parameter of Phases 2, 3 and 4 are monitored quarterly.

6.2.1 Monitoring Procedure

Record Keeping: The operator will record the date, time, location, sampling personnel, atmospheric temperature, reported barometric pressure, and general weather conditions at the time of sampling, in addition to the concentration of combustible gases. The records will be maintained in the landfill operating record.

On-site Structures: Gas monitoring in on-site structures will attempt to identify the "worst case" concentrations. Monitoring will be conducted at the earliest possible time after the structure has been unused (e.g., a morning after a weekend or holiday). The monitoring locations will be in corners along floors and ceilings, at cracks in the floor, and at other areas likely to accumulate gas. Gas monitoring will also be conducted in any confined space requiring the entry of personnel for maintenance or inspection. The monitoring will take place prior to entry by personnel in accordance with OSHA regulations.

Equipment: A portable combustible gas monitor, measuring the concentration of combustible gases in units of percent of lower explosive limit, shall be used to conduct gas monitoring. Lower explosive limit (LEL) means the lowest percent by volume of a mixture of combustible gas in air that will propagate a flame at 25 degrees Celsius and atmospheric pressure. The gas

monitor shall be calibrated to methane using the manufacturer's calibration kit and procedure before the monitoring activities begin.

6.2.2 Response to Detected Combustible Gases

The regulatory (Rule .1626(4)) action levels for combustible gas monitoring in gas detection probes are 100% LEL at the facility boundary and 25% LEL in on-site structures. Readings exceeding the regulatory action levels shall be reported immediately. The Authority will notify the North Carolina Department of Environmental Quality (NC DEQ), formerly known as North Carolina Department of Environment and Natural Resources, Solid Waste Section in writing and will take immediate steps to ensure safety and protection of human health.

At a minimum, the following actions will be taken if the methane concentration exceeds 25% in any structure:

- Put out all smoking materials and turn off all ignition sources;
- Evacuate all personnel;
- Vent the structure;
- Do not allow personnel to reenter the building except to perform gas monitoring until the results of additional monitoring indicate that methane concentrations are sustained or stabilized below 25% LEL;
- Begin continuous monitoring within the structure; and
- Undertake an assessment to determine the origin and pathways of the gas migration.

Within seven days of detection (Rule .1626(4)(c)(ii)), the monitoring results will be placed in the Operating Record and the Authority will indicate actions taken and actions proposed to resolve the problem. Within 60 days of detection (iii), the Authority will develop and implement a landfill gas remediation plan for the combustible gas releases and notify the Division that the plan has been implemented. The plan will describe the nature and extent of the problem and the proposed remedy.

The Operator will also use monitoring action levels of 15% LEL in structures. If the monitoring action level is exceeded in structures, options will be evaluated to permanently reduce the current levels and to prevent a further increase in gas levels in the structures.

7. EROSION AND SEDIMENT CONTROL REQUIREMENTS

Erosion and sediment control features have been designed in accordance with all applicable requirements, as will all future structures. As required, the facility will be operated in a manner which will not cause a discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the Clean Water Act, including, but not limited to, the National Pollutant Discharge Elimination System (NPDES) requirements, pursuant to Section 402. The facility will not cause the discharge of a nonpoint source of pollution to waters of the United States, including wetlands, that violates any requirement of an area-wide or State-

wide water quality management plan that has been approved under Section 208 or 319 of the Clean Water Act, as amended.

Surface water shall be diverted from the operational area and shall not be impounded over or in waste. Drainage structures and embankment slopes are regularly inspected for erosion, and maintained as needed. The vegetation on the slopes is mowed at least once a year. These slopes are maintained with reseeding, fertilizer, and other means, as necessary, to promote a healthy stand of vegetation.

8. RECORD KEEPING REQUIREMENTS

The following records will be maintained in the Operating Record at the landfill office and made available to the Division upon request:

- The operating permit and pertinent correspondence;
- Operation Plan;
- Emergency Response Plan;
- Inspection records, waste determination records, and training procedures for waste screening programs;
- Amounts by weight of solid waste received at the facility, including the source of generation;
- Gas monitoring plan, monitoring results and any remediation plans developed in accordance with Division requirements if required as a response to elevated gas concentrations;
- Water Quality Monitoring Plan and any demonstration, certification, finding, monitoring, testing, or analytical data required by the water quality monitoring program at the site;
- Required cost estimates and financial assurance documentation;
- Closure and Post-Closure Plans;
- Leachate generation and disposal quantities (including the amount used as dust suppressant); and
- Safety training records.

9.0 LEACHATE MANAGEMENT PLAN

9.1 Maintenance of the Leachate Collection System

The operator will conduct weekly visual inspections of the leachate collection and storage system and perform maintenance as required. Leachate levels in the storage lagoons will be monitored at least weekly and after storm events to assess the need for leachate removal and hauling. Cleanouts are provided to allow access to the leachate collection system. Water under pressure has been and will continue to be introduced through these cleanouts periodically as preventive maintenance of the piping system. Mechanical equipment or chemical cleaning agents may also be used to mitigate clogging. Maintenance needs will be re-evaluated if there is an unexpected decrease or increase in leachate production rates.

9.2 Leachate Generation Records

CRSWMA maintains records of leachate hauled from the leachate pond at the landfill to the wastewater treatment plant. Records will be maintained at the landfill throughout the operating life and during the post-closure care period. In addition to leachate generation quantities, the Landfill maintains analytical data from leachate sampling events.

9.3 Leachate Monitoring

Leachate sampling point is a manhole on the east side of Phase 1, located near the northwest corner of the closed Craven County landfill. The sampling location is shown on Drawing OP-01. The chemical composition of untreated leachate generated will be analyzed, at a minimum, semi-annually, concurrent with water quality sampling. The leachate will be analyzed for the Detection Monitoring constituents (EPA Appendix I list from Subtitle D) as well as pH, specific conductance, BOD, COD, phosphate, nitrate and sulfate. Test results will be submitted to the Solid Waste Section.

9.4 Leachate Disposal

Leachate will continue to be collected on site and stored in the existing on-site leachate storage lagoons. At this time, the lagoons' leachate levels are lowered periodically for transport by tanker truck to the City of New Bern Wastewater Treatment Facility. An agreement to pump leachate through a sewer pipe to the City of New Bern Wastewater Treatment Facility will be in effect by summer 2016. As the sewer line is completed, record drawings will be provided to the Solid Waste Section as they come available at the completion of the project. This newest agreement was put in place for the force-main project. Under this agreement, the lagoons' leachate levels will be controlled by pumping it through the constructed sewer pipe to the City of New Bern Wastewater Treatment Facility. A copy of the new leachate agreement is provided in Appendix VI-2 of the Operations Plan. Appendix VI-2 also includes copies of the current and past approval documentation from the receiving plant.

9.5 Contingency Plan for Extreme Conditions

If required, due to extreme conditions, additional hauling capacity will be obtained from subcontract haulers or by the rental of additional tanker trucks. If for some reason the receiving facility no longer accepts the leachate, it will be pre-treated to facilitate acceptance, or hauled to another POTW or commercial pretreatment facility.

10.0 CONTINGENCY PLAN

This section details the Contingency Plan for the CRSWMA Landfill. This plan has been developed to protect human health and the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste to the air, soil, or surface water.

The Landfill Manager and serves as the Primary Emergency Coordinator (PEC). He can be reached at the following numbers:

PHONE: (252) 633-1564
FAX: (252) 633-6515

Depending on the type of emergency, all or some of the following agencies will be notified as soon as possible:

Emergency Preparedness Agency	911
Fire Department	911
Emergency Medical Services (EMS)	911

10.1 Implementation

If an emergency situation develops at the facility, the person discovering the emergency should contact the emergency coordinator immediately. The decision to implement the Contingency Plan depends upon whether or not a situation exists which presents a threat to human health or the environment. The Contingency Plan should be implemented due to any of the following situations:

- Personnel Injury
- Fire
- Explosion
- Spills
- Potential Hazardous Waste

10.2 Inoperable Periods

In the event of equipment breakdown, adequate backup equipment will be available onsite to maintain operations, or replacement equipment will be brought onsite within 24 hours. Routine preventative maintenance will be performed on equipment, including: routine inspections, following manufacturer's recommendations, and keeping accurate maintenance records.

The landfill will maintain a soil stockpile onsite to be used to repair and maintain roads to ensure that all-weather access is maintained.

10.3 Emergency Response Procedures

Landfill personnel will be properly trained to respond to emergencies, as described in this section. In the event of an imminent or actual emergency situation, the following responses will be implemented, as applicable.

Accident/Injury Response

In the event of an accident or injury, the following procedure will be observed:

- 1) Notify the PEC immediately;
- 2) Take action to prevent further injury/damage to personnel or property;
- 3) Provide emergency first aid;

- 4) If the injury is deemed serious, obtain additional medical assistance by notifying EMS. If medical attention is required but ambulance service is not needed, the injured party should be transported to a nearby medical facility; and
- 5) The PEC will investigate the accident to gather the facts and determines the causes of the accident.

Fire in the Waste

In the event of fire in the waste, the following procedure will be observed:

- 1) Notify the PEC immediately;
- 2) If the fire is deemed manageable, the fire will be extinguished by covering the burning waste with soil;
- 3) If the fire is deemed unmanageable, the area will be evacuated and the fire department notified; and
- 4) Incoming solid waste haulers will not be allowed entrance to the landfill until the fire is extinguished.

Fire in the Tire Storage Area

In the event of fire in the tire storage area, the following procedure will be observed:

- 1) Notify the PEC immediately;
- 2) If the fire is deemed manageable, the fire will be extinguished by covering the burning waste with soil;
- 3) Liquid runoff from fire shall be captured within property boundaries;
- 4) If the fire is deemed unmanageable, the area will be evacuated and the fire department notified; and
- 5) Incoming solid waste haulers will not be allowed entrance to the landfill until the fire is extinguished.

Equipment Fire

In the event of an equipment fire, the following procedure will be observed:

- 1) The equipment will be evacuated as quickly and safely as possible;
- 2) Notify the PEC immediately;
- 3) If there are injured personnel, implement the procedures discussed in the Accident/Injury Response section;
- 4) If the fire is deemed manageable, the fire will be extinguished;
- 5) If the fire is deemed unmanageable, the area will be evacuated and the fire department notified;
- 6) Incoming solid waste haulers will not be allowed entrance to the landfill until the fire is extinguished; and

- 7) The PEC will investigate the incident to gather the facts and determine suspected causes of the fire.

Explosions

In the event of an explosion, the following procedure will be observed:

- 1) Evacuate the area;
- 2) Notify the PEC immediately;
- 3) If there are injured personnel, implement the procedures discussed the Accident/Injury Response section;
- 4) If there is a resulting fire, implementation of the procedures discussed in the Fire in the Waste or Equipment Fire sections;
- 5) The PEC will investigate the incident to gather the facts and determine suspected causes of the explosion.

Hazardous and Infectious Waste in Landfill

No hazardous or infectious wastes will be accepted at the site. Vehicles are inspected as stated in Section 4 – Waste Screening Program.

Explosive Gas Detection

In the event that methane gas levels exceed the limits described in section 6.2 – Landfill Gas, the following procedure will be observed:

- 1) Evacuation of the area
- 2) Notification to the local Fire Marshal
- 3) Notification to the PEC immediately
- 4) Venting the structure
- 5) Intercepting the gas before it reaches the building
- 6) Notify the County Emergency Preparedness Agency
- 7) Prepare and implement a remediation plan for methane gas exceedances within 60 days

Spills or Release

In the event of a spill or release, the following procedure will be observed:

- 1) Notify the PEC immediately;
- 2) Immediate action will be taken to control/limit the spread of the spill or release;
- 3) County Emergency Preparedness Agency will be notified;
- 4) Perform appropriate cleanup procedures; and
- 5) The PEC will investigate the incident to gather the facts and causes of the spill or release.

Evacuation Plan

The PEC is responsible for determining whether or not an emergency situation warrants evacuation of the facility. If conditions warrant, the following actions will be taken:

- 1) The PEC gives the evacuation alarm;
- 2) All personnel (visitors, contractors, and employees) will be assembled at the main gate;
- 3) Only qualified personnel may reenter the affected area after approval by the emergency coordinator;
- 4) The PEC will make a tally of all facility employees, visitors, and contractors;
- 5) The PEC or a designated representative will notify County Emergency Preparedness Agency; and
- 6) Reentry to the affected area will be allowed only after the clear signal is given by the PEC.

Report Requirements

The PEC will notify the Division immediately in the event of a fire or other emergency if that emergency has potential off-site effects.

Within two weeks of any emergency involving a potential off-site impact, the PEC shall submit to the Division a written report describing the cause(s) of the emergency, actions taken, results of actions taken, and an analysis of the success or failure of those actions. A copy of the report shall be placed in the landfill operating record.

10.4 Severe Weather Conditions

Ice Storms

An ice storm can make access to the landfill dangerous, prevent movement or placement of periodic cover, and thus, may require closure of the landfill until the ice is removed or melted.

Heavy Rains

Exposed soil surfaces can create a muddy situation in some portions of the landfill during rainy periods. The control of drainage and use of crushed stone on unpaved roads should provide all-weather access for the site and promote drainage away from critical areas. In areas where the aggregate surface is washed away or otherwise damaged, new aggregate should be used for repair.

Intense rains can affect newly constructed drainage structures such as swales, diversions, cover soils, and vegetation. After such a rain event, inspection by landfill personnel will be initiated and corrective measures taken to repair any damage found before the next rainfall.

Electrical Storms

The open area of a landfill is susceptible to the hazards of an electrical storm. If necessary, landfilling activities will be temporarily suspended during such an event. To guarantee the safety of all field personnel, refuge will be taken in the on-site buildings or in rubber-tired vehicles.

Windy Conditions

The proposed operational sequence minimizes the occurrence of unsheltered operations relative to prevailing winds. If this is not adequate during a particularly windy period, work will be temporarily shifted to a more sheltered area. When this is done, the previously exposed face will be immediately covered with daily cover.

Violent Storms

In the event of hurricane, tornado, or severe winter storm warning issued by the National Weather Service, landfill operations may be temporarily suspended until the warning is lifted. Daily cover will be placed on exposed waste and buildings and equipment will be properly secured.

(End)

APPENDIX VI – 4
TYPE 1 YARD WASTE COMPOSTING – OPERATIONS MANUAL

PREPARED FOR:



COASTAL REGIONAL SOLID WASTE AUTHORITY
TUSCARORA LONG-TERM REGIONAL LANDFILL
7400 OLD HIGHWAY 70 WEST
TUSCARORA, NC 28523

PERMIT No. 25-11

**OPERATIONS MANUAL
COMPOSTING FACILITY**

TYPE 1 – YARD WASTE COMPOSTING

DECEMBER 2005
REV. JUNE 2010
REV. DECEMBER 2015
REV. APRIL 2016

PREPARED BY:



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Composting Facility Operational Manual
Coastal Regional Solid Waste Management Authority Tuscarora Landfills
Craven County, North Carolina

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Craven County, North Carolina

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1.0 INTRODUCTION

1.1 Purpose

The purpose of the following document is to provide the information necessary for the operations of Permit Number 25-11, Yard Waste Composting Facility. The facility is currently operated by the Coastal Regional Solid Waste Management Authority (CRSWMA). The facility was last permitted on June 2010 and must be re-permitted every 5 years. The permit number was changed in 2000 from its original number, No. 25-04, to allow the facility to be regulated separately from the landfill. The facility is currently permitted compost yard waste (Type 1).

1.2 Location

The facility is located within the property boundaries of the CRSWMA's Tuscarora site, immediately adjacent to the now closed Craven County Landfill to the east and to the Tuscarora Long-Term Regional Landfill to the north. The facility is accessed off of Route 1005, approximately 2 miles from Tuscarora. A Location Map is included in Appendix 1.

1.3 Contact Person

For actions relative to this permit, the following individual is responsible:

Title:	Executive Director
	Coastal Regional Solid Waste Management Authority
Address for notification:	PO Box 128 or 7400 Old Hwy. 70W
	Cove City, NC 28523 New Bern, NC 28560
Phone:	(252) 633-1564
Fax:	(252) 633-6515

For contacts with the state for permit changes the following individual should be contacted:

Title:	Compost & Land Application Branch Supervisor
Agency:	NC DEQ - Division of Waste Management
	Composting & Land Application Branch
Mailing Address:	1646 Mail Service Center, Raleigh NC 27699-1646
Physical Address:	217 West Jones Street, Raleigh NC 27603
Phone:	(919) 919 -707-8200

1.4 Personnel

The facility will be staffed by a compost facility supervisor and one heavy equipment operators. The facility supervisor will direct traffic, maintain records, and oversee operations. The heavy equipment operators will operate all equipment and maintain good housekeeping practices. A scale clerk assists both the landfill and composting operations by maintaining the weight and billing records.

1.5 Hours of Operation

The compost facility will operate on the same schedule as the landfill. It will be open Monday - Friday from 7:30AM - 4:30PM and Saturday 7:30AM - 2:00PM.

2.0 TYPE 1 – YARD WASTE COMPOSTING FACILITY

2.1 Waste Quantities

CRSWMA receives yard waste from the following localities: Craven County, Carteret County, and Pamlico County and this waste consists of brush, leaves, and other land clearing debris up to 24" in diameter, small stumps are accepted. Appendix 2 summarizes waste data available for the facility from July 2005 through October 2015. Based on the data reported, the facility receives on average 652 tons of brush per month with the lowest tonnage (179 tons) received in April 2012 and the highest tonnage (9,306 tons) received in October 2011. This spike in tonnage in 2011 was the result of receiving hurricane Irene debris from Craven County. Winter months tend to be somewhat lower in tonnage as would be expected.

Accurate records of incoming waste should be kept at the scale house. These records should differentiate between loads of brush (including all land clearing debris), clean wood and loads of leaves or grass clippings.

2.2 Design Consideration

2.2.1 Design Capacities and Product Data

For evaluating the facility's design, 652 tons per month or 7,824 tons per year were used. This material is stockpiled until sufficient material is available to produce a windrow. The material is ground and passed through a 5/8" screen prior to composting. Material that is greater than 5/8" becomes woodchips and mulch; material that is smaller than 5/8" is windrowed for compost. The Appendix 2 summarizes all available tonnage data for the facility. Based on this data, approximately 99% of the yard waste material is turned into compost and mulch products, and a negligible amount is sold for wood chips.

The following table summarizes the current utilization at the facility for the composting operation. As a factor of safety, it was assumed that the density of the product remains the same as the incoming waste stream.

Total waste stream (by weight)	7,824 tons (annual)
Total waste stream for composting (100%)	7,824 tons
Density (assumed average)	500 lb/cy
Composting waste stream (by volume)	31,296 cubic yards
Cross-section windrow 2' (top) x 18'(base) x 7'(ht)	70 square feet
Total length windrow utilized (maximum)	5,000 feet
Windrow: At half in spring and half in fall	2,500 feet

At 225' length
With 18' base and 10' aisle, total acreage utilized

10 windrows used
1.45 acres

The facility was originally designed with a working area for the Type 1 facility of 2.6 acres as illustrated in the Site Plan included in Appendix 3. Sufficient room is available for the operations. Based on the assumed values above, if the Receiving, Grinding, & Screening Area were relocated it would enable CRSMWA to reach their maximum design capacity for the composting facility. Currently over half of the work space is utilized. Doubling the current acreage used, 1.45 acres, would utilize the designed working area of 2.9 acres. By doing so, the facility can receive a total waste stream (weight) of 12,494 tons annually, a total waste stream for composting (100%) and use 20 windrows at the current size of each.

Yard waste generation is cyclical with the seasons; however the data collected to date indicates that the least amount of material provided in one month was 179 tons. Sufficient materials will be available to continue the process throughout the year. Materials will be stockpiled as necessary. High nitrogen content wastes such as grass will not be stockpiled and will be incorporated into the process within 48 hours of receipt or as soon as possible.

The facility does not use any bulking agent and compost is not recycled through the process. If the County determines that either of these processes is beneficial, DEQ will be notified prior to implementation.

Appendix 6 contains a table summarizing product quality. The facility currently has the North Carolina Division of Agriculture analyze the compost on a periodic basis for various metals, nutrients, pH, soluble salts, C:N ratio and % solids.

2.2.2 Site Plan

A site plan at 1" = 40' is provided in Appendix 3. A complete set of the Record Drawings for the facility as original designed and constructed is attached to this narrative. The attached drawing was developed from the Record Drawing provided to CRSMWA by Joyce Engineering, Inc. (JEI). The original designer of the facility was Malcolm Pirnie, Inc.

2.2.3 Process Flow Diagram

Appendix 4 contains the updated process flow diagram, which illustrates the complete operation including the type and size of equipment, feedstock flow streams, recommended operational parameters, monitoring requirements, and final product requirements. The facility records all data on the incoming and outgoing materials in tonnage. To provide the volumetric information, as required by DEQ, the operator should determine a bulk density for brush, leaves, grass, and final product periodically.

2.3 Operations

2.3.1 General Description

The Type 1 facility has been in operation since 1997. The following discussion on operations was taken from the original permit with additional detail added as necessary.

Incoming yard waste is weighed and directed to the operational area. The yard waste is stockpiled until a sufficient quantity is accumulated to form a windrow. On average approximately 1 windrow could be formed per month. It should be noted that this is a theoretical maximum as during the operations to date no more than 10 windrows have ever been curing at one time. The material is run through a Maxi Grinder which can process materials up to 24" or larger in diameter at a rate of 60 tons/hour. Grinding creates a product with a particle size of approximately 5/8" for composting after screening. Once ground, the material is formed into windrows using a front end loader. The windrows are spaced approximately 10 feet apart and each has a north/south orientation and the following geometry: 7 - 7 1/2 feet high x 18 feet wide at base x 2 feet wide at top.

Once the windrow is formed, it will be turned several times using a Scarab 18 windrow turner to mix the materials. The Scarab turner is capable of handling 2,000 tons per hour and is more than adequate for the facility. If necessary, water will be added as the windrow is constructed and then periodically during the stabilization process. CRSWMA uses an irrigation system from the adjacent sediment basins located north of the facility. The pile will be sprayed as it is turned by the windrow turner on an as needed basis. For optimum composting the moisture should be maintained between 45% and 60%. Drier than 45% and the microbial action is slowed; higher than 60% and the material becomes difficult to handle and difficult to aerate. Operation records indicate a moisture range of 50% - 65%. A copy of the recommended moisture log is contained in Appendix 5.

The temperatures are taken at in each quarter of the windrow (4 separate places) or a minimum of each third (3 separate places). It is suggested that the temperature be controlled by turning (aerating) to assure that the compostable material is maintained at an optimum range for decomposition (between 104°F and 113°F) and then allowed to elevate to 131°F where it must be maintained for a period of 3 consecutive days as required by Rule .1406(10). When the temperature within the windrow falls below 120 – 130°F during the final stages of composting, the windrow is turned. Windrow construction and turning frequency will be sufficient to maintain aerobic conditions to produce a compost product in the desired time frame. Separate records are kept for each windrow. Once a windrow is constructed, it is assigned an I.D. Number and folder which are used over the lifespan of the windrow. Every time windrow data is taken, it is documented and logged in the folder. A log will be kept of all temperature readings, which includes the location of the probes. A copy of the temperature log is contained in Appendix 5.

Tables have been provided in Appendix 6, to assist in the operations. These tables were developed by the Compost Council to assist operators with various calculations and parameter adjustments. The Compost Council's operation manual is incorporated by reference into this operations manual.

A nitrogen source is sometimes added to the yard waste if needed to promote the compost process. CRSWMA uses calcium nitrate when necessary. The calcium nitrate is spread by hand and mechanically mixed. To date, operations have shown that a 225 foot windrow requires approximately 25 fifty pound bags.

The process from grinding through stabilization was expected to take 24 weeks, however, existing operations compost in less than 10 weeks. The final time frame is a function of material density, material type, moisture and operational controls.

Once the windrow begins to cool indicating stabilization, CRSMWA screens the material and the larger particles are reused in the process or used as woodchips or mulch. By keeping the coarser materials in the compost, it enables more oxygen to get into the windrows and produces more compost in the finished product. The compost is now stockpiled. Depending on the end use requirements, the compost may be screened again prior to stockpiling if a finer screen is available. The larger particles would be either reused in the process or used as a coarser product.

If the material is free of sharp particles, has no offensive odor, and has minimal pathogens, it may be used in an unrestricted way. Prior to marketing the material to the public, the following testing is recommended by the Compost Council but not required by the State:

- Maximum particle size
- pH
- C:N ratio
- Total Nitrogen Soluble salts
- Metals as suggested by the Department of Agriculture

Once the compost meets the regulatory requirements for distribution to the public, it can be released for use. As the public obtains the material they must be given the information indicated in Section 2.3.9 (c).

2.3.2 Waste Acceptance Rule .1406 (6)

The Type 1 compost facility will accept only grass, leaves, brush, yard waste, and land clearing debris. No municipal solid waste (MSW), hazardous waste, asbestos containing waste or medical waste shall be accepted at the facility. CRSWMA accepts yard waste in a non-bagged state or in approved biodegradable bags. Deliveries are monitored at all sites. CRSWMA anticipates little contamination of the material.

2.3.3 Safety Requirements Rule .1406 (7)

Open burning of solid waste is prohibited. All equipment will be provided with fire extinguishers. The windrow turner will have a fire suppression system. Periodic safety meetings will be held to review safety issues at the site. Personal protective equipment should include steel toe boots, eye and ear protection and dust masks when appropriate. Site personnel will be trained in facility specific safety issues as well as general safety issues. The local fire department would be called should a major fire break out. A minimum of 25 foot distance is required between composting windrows and other structures to allow adequate access of firefighting equipment in accordance with Rule .1404 (8).

2.3.4 Nuisance Control

Rule .1405(10)(B)

Sources of noise will be on-site traffic and the facility equipment such as the front-end loader, Maxi grinder, trommel screen, and windrow turner. Noise can be controlled by appropriately operating and maintaining equipment. In addition, the facility is located next to a landfill operation and is buffered from other properties by distance and trees. Employees should wear hearing protection.

Vectors are animals, insects or other organisms that carry pathogens from one host to another like rats, flies, birds and mosquitoes. Vectors will be minimized by good housekeeping practices. The receiving area will be kept clean, water will not be allowed to accumulate and the drainage areas will be cleaned periodically. Material will be stored based on a "first in/first out" basis to prevent long term storage. Turning the windrows will also control vector flies and their larvae. If necessary, a commercial pest control service will be employed.

Dust will be controlled by good housekeeping practices and by dampening loads on the tipping floor as necessary. Moisture is necessary to enhance the composting process and will be monitored. Employees should wear dust masks.

Odors will be minimized by maintaining adequate aeration through turning the windrows.

2.3.5 Monitoring Requirements

Rule .1406 (9)

Once the windrow is constructed, the pH, temperature and moisture content should be measured. It is also suggested that the C:N ratio be determined to evaluate the need for the addition of a nitrogen source. During the composting process pH, O₂ (if equipment available), moisture, and temperature will be monitored periodically. pH should be kept in the range of 5.5 - 8.5. Outside of this range, the biological process is impeded.

Moisture should be kept in the range of 45% - 60%. Water should be added as required to stay within this range. Moisture, pH, and O₂ should be monitored at a minimum weekly. Temperature will be monitored daily. To monitor temperature, the probe should be inserted 12"-24" every 50' along the windrow at a 45° - 90° angle.

At the end of the process and prior to marketing the materials to the public, it is recommended that the following tests be run:

- pH;
- C:N;
- Total Nitrogen;
- Metals (as suggested by the Department of Agriculture);
- Soluble Salts; and
- Moisture.

These tests are recommended by the Compost Council but not required by the State. CRSWMA also utilizes the "Hand Test" Method. The test is performed by taking a hand-full of compost material representative of the windrow and squeezing it. After you open your hand, if

the material quickly breaks up, then the windrow is too dry. If you can squeeze the material and water is extracted, then the material is too wet. If squeezed and the material remains cohesive, then it is good; otherwise, the proper measures should be taken.

To date the NC Department of Agriculture has been running most of these tests for CRSWMA.

2.3.6 Temperature Parameters Rule .1406 (10)

For Type I facilities, the compost process must be maintained at or above 55°C (131°F) for 3 consecutive days and aerated to maintain elevated temperatures. Temperature will be monitored at least twice a week.

2.3.7 Addition of Nitrogen Bearing Materials Rule .1406 (13)

Nitrogen compounds may be added as necessary to adjust the nutrient balance for optimum product. Only approved waste materials (i.e. grass clippings, leaves) or chemical compounds may be added. Nitrogen compounds increase odors and if using grass clippings, the material should be incorporated into the process immediately upon receipt.

To determine if nitrogen is necessary, the carbon to nitrogen ratio should be calculated. For proper composting, this ratio should be greater than 25:1, but less than 40:1 at the start of composting. Incoming materials have the following estimated ratios:

Grass clippings	12 - 15:1
Dry leaves	40:1
Paper and wood	200:1
Sawdust	200 - 500:1

Thus, adjustment may be necessary after grinding, screening and blending the feed stock materials.

2.3.8 Contingency Plans Rule .1405 (c) (1)

- A. **Equipment:** The four major pieces of equipment that are required for operations includes the grinder, windrow turner, trommel screen, and the front-end loader. These shall be maintained in accordance with the manufacturers' recommendations. If the grinder or screen breaks down, waste shall be stockpiled until the grinder is repaired. If there is a need for a grinder, one can be rented. If the windrow turner breaks down, the windrows can be turned with the front-end loader. If the front-end loader breaks down, one will be rented from a local contractor.

- B. **Air Pollution:** Dust and odor are the two primary air pollutants. Dust will be controlled through proper moisture control and odor will be controlled through proper aeration.

- C. Nonconforming Waste: Nonconforming waste shall be taken to the landfill assuming no hazardous materials or asbestos-bearing materials are present.
- D. Spills: Spills are not expected. Potential spills would include maintenance fluids for equipment, and fuel. Appropriate precautions will be taken to assure that equipment is serviced correctly to minimize spills or discharges. Should oil or gas spill onto the area, it shall be absorbed immediately and the absorbent disposed of appropriately. Major equipment maintenance and repairs are handled in the on-site maintenance garage. Off-spec product, incomplete compost, or compost which might spill off the curing pad will be collected and returned to the appropriate location.
- E. Fires, noise, vectors, odors are discussed under Section 2.3.4. Unusual traffic conditions shall be controlled by on-site personnel and the Craven County Sheriff's Department if necessary.
- F. Adverse weather conditions: The primary adverse weather conditions facing the CRSWMA facility include wind and rain. During periods of heavy wind, grinding and windrow turning will not be conducted and the top of the windrow will be kept moist to prevent blowing material. During periods of heavy rain, compost grinding and screening operations are not carried out in the rain. The operator monitors the site frequently to assure that stormwater controls are adequate and maintains the site as possible. During mild rainfalls, the operator may want to turn the windrow to incorporate moisture into the materials.

2.3.9 Classification/Distribution of MSW Compost Products Rule .1407

A. Requirements

For unrestricted use, the finished Type I compost must meet the following criteria:

- Minimal pathogenic organisms
- Free from offensive odors
- Containing no sharp particles

If these criteria are met then the finished compost material will be marketed to local landscape firms and to residents of CRSWMA's member counties. CRSWMA transports some of the finished product to the transfer stations in Carteret and Pamlico Counties where it is convenient for residents and businesses located there to access.

B. Sampling

Prior to marketing the material to the public, a composite sample of the material should be obtained and the tested for the parameters outlined under Section 2.3.5. It is recommended

that a copy of the test results and recommendations from the Department of Agriculture, Agronomic Division be provided to each individual using the material.

A composite sample is obtained by taking 3 evenly distributed samples along the windrow and compositing them into an airtight container or bag. Each sample should be approximately 1-2 cups each and taken from a hole dug into the windrow starting approximately 4' up and angling at 45° into the pile. More samples may be warranted per windrow if there is evidence of an inconsistent product (based on temperature or pH readings.)

A sketch indicating the location of each sample and a description of the sampling technique should be kept on each composite. Accurate record keeping is critical. Label each composite sample with the following information:

- Date sampled
- Time sampled
- Windrow identification
- Source of Sample
- Name of person taking sample
- Sample Preservation Technique
- Temperature of Sample
- pH of Sample

All information should be recorded in a sample logbook along with the following:

- Sample preparation
- Shipment record
- Tests to be conducted
- Laboratory to conduct tests

C. Labeling

When the Type 1 compost material is to be marketed to the public, sufficient information should be provided to the public to:

- Inform users of the benefits of using compost
- Advise users on suggested uses of product
- Inform users of cautions in using product
- Inform users of composition of the material including nutrients and contaminants
- Inform users of source of feedstock.

Appendix 7 includes a copy of the information provided to the end users by the CRSWMA. It is also recommended that a copy of the test results (if available) be provided to the end user.

2.4 Recordkeeping

2.4.1 Record Keeping Requirements

Separate records will be maintained for each section of the facility as described below. Records shall be made and maintained for a minimum of five (5) years. Records shall be kept on a monthly basis.

2.4.2 Operating Records

Weekly operating records shall include the following information (at a minimum).

- The quantity, type and source of waste received. It is important to track the type of material closely.
- The quantity and type of waste processed.
- The quantity and type of compost produced by product classification.
- The quantity and type of compost removed for use or disposal, by product classification and the market or permitted disposal facility.
- All operational information including date and number of times windrow(s) turned; date, type, quantity and method of addition of any amendments.
- Temperature data. Temperature data shall indicate the location of readings in the windrow and the length of the composting period. (A sample log is contained in Appendix 5.)
- Moisture testing including data, location of test and weather conditions at time of sampling. (A sample log is contained in Appendix 5.)
- All analytical results from compost testing described above.

2.4.3 Annual Reporting Requirement Rule .1408 (c)

An annual report shall be submitted to the Solid Waste Division of DEQ. The fiscal year shall be July 1 - June 30. The annual report will include the following:

- Facility name, address, and permit number
- Year covered
- Total quantity and type of waste in tons received at the facility during the year covered including tons of waste received by local government of origin.
- Total quantity and type of waste in tons, processed into compost during the year covered.

- Total quantity in tons and type of compost produced at the facility, by product classification, during the year covered.
- Total quantity in tons and type of compost removed for use or disposal from the facility, by product classification, along with a general description of the market for use during the year covered.
- Total quantity in tons, and the type of waste removed from the facility and disposed of.
- Monthly temperature monitoring to support Rule .1406 (9).
- Summary of all testing completed on the compost as required by the Division.
- Condensed yearly totals of solid waste received and composted shall be reported back to the local government of origin for respective annual recycling reporting.

2.5 All Required Permits

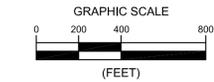
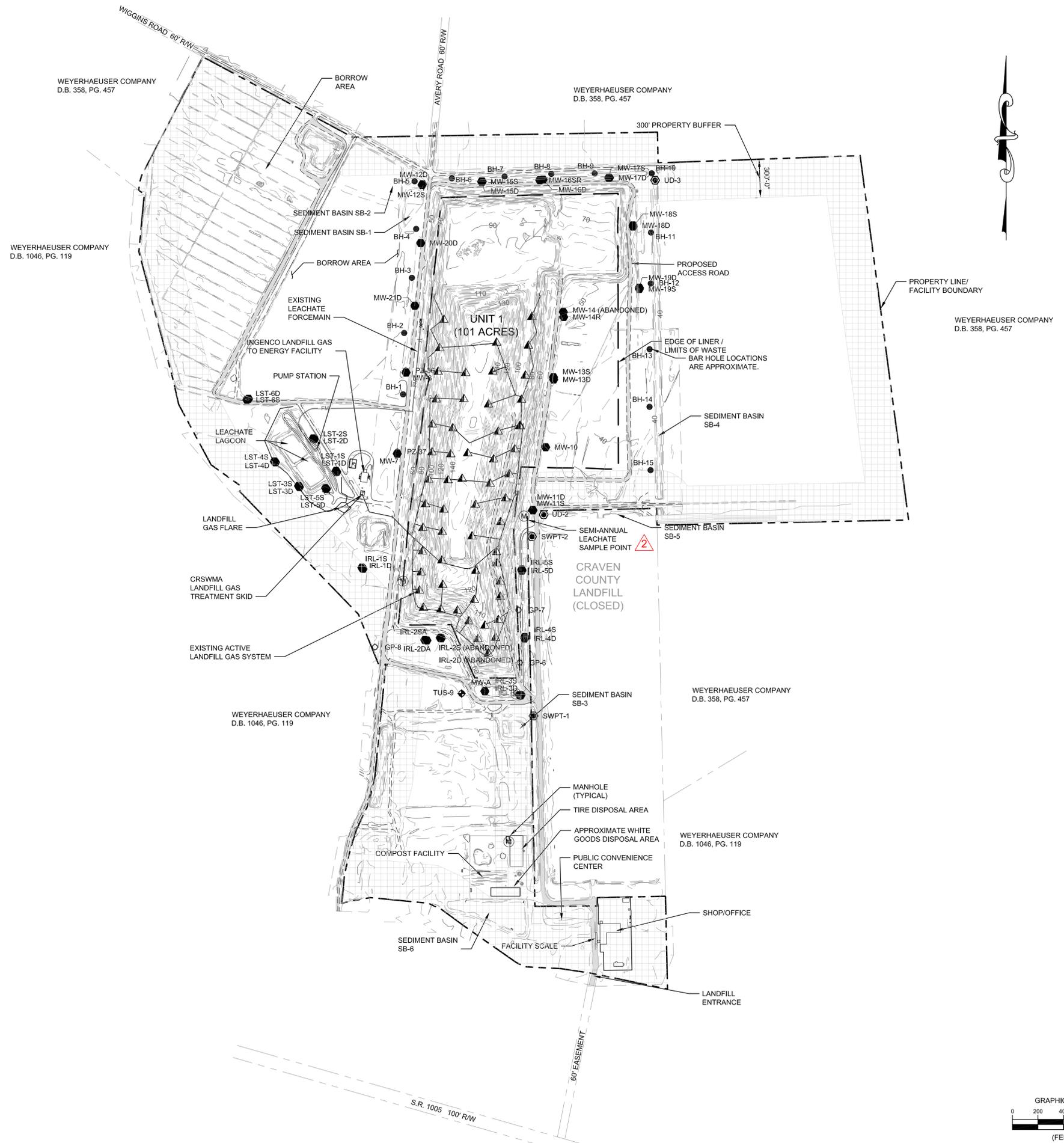
A copy of all required local, state and federal permits/approvals are included in the permit application. The permit application should be kept on site at all times.

2.6 Equipment Specifications

The four major pieces of equipment in use at the composting facility are a Maxi Grinder, Trommel Screen, Scarab Windrow Turner, and a Front-end Loader. Equipment specifications are enclosed in Appendix 8.

[End]

DRAWINGS



DESIGNED		MM	
DRAWN		RWH	
CHECKED		LBB	
APPROVED		MM	
DATE		11/17/15	
 973-14 SOUTHERN PINE BLVD CHARLOTTE, NC 28273 PHONE: (704) 917-2657 NC CORP. LIC. C-0782			
CRSWMA- TUSCARORA LANDFILL TUSCARORA, NORTH CAROLINA		EXISTING CONDITIONS	
PROJECT NO.		618.1601.11	
SCALE		AS SHOWN	
DRAWING NO.		OP-01	
RESPONSE TO DEO COMMENTS RESPONSE TO DEO COMMENTS PERMIT RENEWAL SUBMITTED TO DENR REVISIONS AND RECORD OF ISSUE	04/01/16 11/23/15 11/17/15	RH RH RH RH	LB LB LB LB
DATE	NO	BY	CK APP

PREPARED FOR:



COASTAL REGIONAL SOLID WASTE AUTHORITY
TUSCARORA LONG-TERM REGIONAL LANDFILL
7400 OLD HIGHWAY 70 WEST
TUSCARORA, NC 28523

PERMIT No. 25-09

TUSCARORA LANDFILL PHASE 3 EXPANSION

VOLUME 2, SECTION VII CLOSURE & POST CLOSURE PLAN

NOVEMBER 2009
REVISED APRIL 2016

PREPARED BY:



9731-F SOUTHERN PINE BLVD
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**VOLUME 2, SECTION VII
CLOSURE AND POST CLOSURE PLAN**

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1.0 CLOSURE ACTIVITIES

Pursuant to the North Carolina Solid Waste Management Rules (15A NCAC 13B .1617), this Closure and Post-Closure Plan is submitted as part of the Permit to Operate (PTO) renewal the Tuscarora Landfill.

Within this Closure and Post-Closure Plan, references are made to information and drawings found in the Facility, Operations, and Engineering Plans to reduce redundancy in this report. Grading plans, cap sections, and other aspects related to closure, including phased development, stormwater management, and erosion and sediment control, are discussed in the Engineering and Operation Plans of this report, and are illustrated on the drawings. The Construction Quality Assurance (CQA) Plan provided in this application describes methods and procedures to be used in monitoring construction of the closure cap. Detailed drawings, specifications, and other documents will be prepared prior to closure for bidding and construction purposes.

The facility will be closed in accordance with the requirements of EPA's Subtitle D regulations (40 CFR 258.60) and Rule .1627 of the North Carolina Solid Waste Management Rules (15A NCAC 13 B). Given the proposed development plan for the facility, the waste disposal areas will be capped and closed in phases as described in the following paragraphs.

1.1 Closure of Disposal Units

1.1.1 Cap Design

Proposed final/intermediate grading contours for the facility are provided on Drawing No. FP-04 of the Facility Plan. Final contours have been designed with post-settlement surface slopes of at least five percent on top of the cell. Cross-sectional details of the proposed closure cap design, are provided on Drawing No. EP-10. The following components (bottom to top) are proposed as shown on the details:

- a. Intermediate Cover and Leveling Course - Local soil will be placed over the daily cover soil to provide at least 12 inches of intermediate cover and a uniform base for construction of the cap.
- b. Gas Migration Layer – A geonet composite will be installed between the intermediate cover and the overlying infiltration layer. The geonet composite will provide a pathway for accumulated gas to move laterally to the vents.
- c. Composite Cap: GCL Component - The infiltration layer is proposed to consist of a geosynthetic clay liner. This layer will be constructed over the geonet composite that will serve as the gas migration layer. Installation and testing requirements for the cap are provided in the Specifications (Appendix IV-6) and the CQA Plan.
- d. Composite Cap: Geomembrane Component - The geomembrane component of the infiltration layer will consist of a textured 40 mil flexible geomembrane. The

membrane will be in direct contact with the underlying layer. The testing program and quality assurance requirements for the geomembrane are described in the CQA Plan.

- e. Drainage Layer - A drainage layer consisting of a geonet and geotextile composite will be placed over the geomembrane to promote drainage.
- f. Protective Layer - A layer consisting of at least 18 inches of local soil will be placed above the drainage layer to provide a protective cover for the underlying cap components.
- g. Vegetative Layer - A layer of topsoil material or organically amended local soil will be placed above the protective layer. This soil layer will be at least 6 inches in thickness. The material will be lightly compacted so that a good stand of vegetation can be established. Soil tests will be conducted prior to seeding to determine if soil additives are needed to establish and maintain the vegetation.

1.1.2 Area to Be Capped

The IRL (20.2 acres), Phase 1 (20.5 acres) and west slope of Phase 2 (7.3 acres) have been capped. Phase 2 permitted waste footprint of 17.2 acres has approximately 9.9 acres subject to closure. All of Phase 3 permitted waste footprint of 19.7 acres remains to be closed. Therefore, the largest area of the landfill subject for closure during the permit cycle should be 29.6 acres. A cost estimate for closure of this area is provided as Appendix VII-2.

1.1.3 Cap Settlement and Stability

Non-uniform settlement can be expected over the entire area that will receive a closure cap. The primary mechanism of settlement is waste consolidation due to decomposition of the landfilled material. According to Daniel, et al, long-term settlement is typically 5 to 15 percent over 20 to 30 years; however, settlement of about 5 percent can be expected in the first few months following waste placement. A significant amount of waste consolidation will likely have occurred by the time each portion of the landfill is closed.

The stability of the proposed cap design under static conditions has been evaluated and is included in the Engineering Plan. The proposed design was found to be stable at a slope of 3H:1V.

After capped portions are completed, monthly inspections of the final cover will be conducted to look for areas of the cap that might have experienced displacement. Should these inspections indicate problem areas, (ponding, exposure of the geomembrane, deep cracks, etc.), repairs will be initiated as soon as practical.

1.1.4 Drainage and Erosion

A combination of drainage ditches, diversion berms, vegetative cover, and sediment traps and basins will control drainage and erosion. Construction and design of sediment and erosion control features will be in accordance with applicable sections of the "North Carolina Erosion and Sediment Control Planning and Design Manual." Drainage will be directed to proposed ditches along the perimeter. These ditches will receive runoff from the cap, conveying the flow to on-site sediment basins. For a detailed discussion regarding stormwater management and erosion and sediment control, please refer to the Erosion and Sediment Control Plan submitted under separate cover.

1.1.5 Freeze/Thaw Effects

Based on a published map of frost depths throughout the United States (EPA, November 1993: A530-R-93-017), the anticipated maximum depth of freeze/thaw effects on the site is less than or equal to 18 inches. Since the upper 18 inches of final cover soil is not the low-permeability component of the cap, the effects of freeze/thaw cycles on the closure cap should not be detrimental to its function.

1.2 Waste Volume

A summary of the total airspace available by phase was made in the Facility Plan and has been included in Appendix VII-1. The available airspace was calculated based on a comparison of the base grade and final grade surfaces.

1.3 Closure Plan Schedule

The landfill is designed so that it can be closed incrementally as final contours are reached in various areas. Prior to beginning closure of any portion of the facility, CRSWMA will notify the Division that a notice of intent to close the facility has been placed in the operating record. An itemized list of closure milestones and a proposed schedule follow. Closure activities are proposed to begin within 30 days of final receipt of waste in the area to be closed. Construction of the closure cap is to be completed within 180 days following the initiation of closure activities. The total length of the proposed closure period is 210 days following the final receipt of waste.

The approximate closure milestones shown in Table 1 below are proposed for use in tracking the progress of closure activities. A detailed schedule will be established prior to construction.

Table 1
Proposed Closure Milestones and Schedule

Milestone	Proposed Schedule from the Date of Final Receipt of Waste
Testing of borrow sources	Within 6 months prior to closure
Grading of intermediate cover	Within 30 to 60 days
Placement of soil cap	30 to 150 days
Final inspection of cap by P.E.	150 to 180 days
Construction of stormwater controls	90 to 180 days
Seeding and mulching	150 to 180 days
Preparation of survey plat	180 to 210 days
Submittal of closure certification	180 to 210 days

1.4 Posting and Baiting

At least one sign will remain posted at the entrance to the facility notifying persons of the facility closing. Also, a notice prohibiting further receipt of waste materials will remain posted at the entrance. The site will be secured through the use of gates equipped with locks, fencing, and/or natural barriers. The site will be baited for rodent and vector control before final closure is initiated.

1.5 Notification

Once closure is complete, a survey plat will be prepared by a registered land surveyor showing the locations and dimensions of the landfill disposal areas, the locations of groundwater monitoring wells and gas probes, and the restrictions on future disturbance of the site. A notation will be recorded on the property deed stating that the land has been used to dispose solid waste and that its use is restricted under the Closure Plan as required by Rule .1627(c)(8). Copies of the deed notations as recorded will be placed in the Operating Record and forwarded to the Division.

1.6 Certification

Upon completion of closure, a licensed professional engineer acting on behalf of the owner will submit a Certification of Closure to the Division. This Certification will state that the site was closed in accordance with the Closure Plan and applicable solid waste regulations and laws as required by Rule .1627(c)(7).

The owner must record a notation on the deed to the landfill facility property at the Craven County Registrar of Deeds office, or some other instrument that is normally examined during title search, and notify the Division that the notation has been recorded and a copy has been placed in the operating record. The notation shall in perpetuity notify any potential purchaser of the property that the land has been used as a MSW facility and its use is restricted under the closure plan approved by the Division.

1.7 Closure Cost Estimate

An estimate of closure costs is provided in Appendix VII-2. All costs are given in 2015 dollars.

2.0 POST-CLOSURE ACTIVITIES

Post-closure activities will be conducted at the landfill in accordance with Rule .1627 for a period of 30 years following closure of the landfill. The length of the period can be increased or decreased in accordance with Division directives.

2.1 Contact

All correspondence and questions concerning the post-closure care of the unit should be directed to:

Mr. Bobby Darden
Executive Director
Coastal Regional Solid Waste Management Authority
PO Box 128
Cove City, North Carolina, 28523
252-633-1564

2.2 Security

Access to the site will be controlled by the use of barriers and gates at roadway entrances. These control devices will be maintained throughout the post-closure care period, and inspected as part of the monthly inspection program. All barriers and gates will be clearly marked with signs stating the name and nature of the facility and the person to contact in case of emergency or breach of security.

2.3 Post-Closure Maintenance

Post-closure maintenance and monitoring will be conducted at the Tuscarora Landfill for a period of 30 years after final closure. The Division may decrease the length of the post-closure period if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment, and the Division approves this demonstration. The period might be increased by the Division if the Division determines that the lengthened period is necessary to protect human health and the environment.

Monitoring will include semiannual sampling of groundwater and surface water, quarterly gas monitoring and monthly inspection of the final cover and monitoring and control systems.

Routine maintenance and repairs may include upkeep of fencing, gates, & signage, access roads toward monitoring locations, stormwater, erosion, and sedimentation control facilities, potential leachate seeps, and the integrity of the final cap system.

Maintenance needs identified through the monitoring program will be initiated no later than 60 days after the discovery, and within 24 hours if a danger or eminent threat to human health or the environment is indicated. Minor cap maintenance may be deferred until there is a sufficient amount of work to justify the mobilization of equipment and personnel. Unusual or extreme maintenance needs due to calamities or vandalism might require the implementation of emergency contract service procedures established by CRSWMA.

2.4 Inspection Plan

Routine inspections will be conducted throughout the post-closure care period. These inspections will be carried out monthly unless problems are detected which indicate more frequent visits. Potential impacts to the public and environment will be considered in determining the inspection frequency. Items to be included in the monthly inspection will be as follows:

- Access and security control
- Leachate management and storage systems
- Stormwater management
- Erosion and sediment control
- Gas management
- Groundwater and landfill gas monitoring systems
- Integrity of site benchmarks
- Vector control.

Inspection forms have been prepared for use during each inspection (see Appendix VII-3). Completed copies of the inspection forms will be kept by the owner, and copies will be forwarded to the Division for its records.

2.5 Monitoring Plan

2.5.1 Groundwater Monitoring

Groundwater monitoring will occur semiannually throughout the post-closure care period. The monitoring schedule will continue as established during the active life of the facility. The applicable procedures outlined in Rules .1633 through .1637 will be followed through post-closure as required by site findings. Refer to the Water Quality Monitoring Plan in the Design Hydrogeologic Report, Volume III of this submittal.

The post-closure care period for the site is 30 years unless modified by the Division. If the statistical analysis of the groundwater monitoring data does not indicate degradation to the

quality of the groundwater after the 30-year post-closure care period, a request will be made to terminate the groundwater monitoring program. All groundwater-monitoring wells will be maintained so that future monitoring can be resumed if desired. A blank groundwater monitoring well maintenance record form is provided in Appendix VII-4.

2.5.2 Surface Water Monitoring

Surface water will be monitored according to the Water Quality Monitoring Plan.

2.5.3 Landfill Gas Monitoring

Monitoring of explosive gas hazards will be performed as described in the Operations Plan.

The active landfill gas collection and control system will continue to operate according to the Title V Air Permit (Appendix VI-3).

At the end of the useful life of the gas collection and control system, and after operation is no longer required according to the Title V Air Permit, the gas extraction wellheads will be removed to allow any remaining gas to vent to the atmosphere. All buried gas system components will be left in place. The blower/flare and processing equipment will be decommissioned and may be removed from the facility. The facility will continue explosive gasses monitoring beyond the decommissioning of the active gas collection period in accordance with the Post-Closure criteria by Rule .1627 (d).

2.5.4 Stormwater, Erosion, and Sedimentation Control Facilities

Stormwater management features proposed in the Erosion and Sediment Control Plan are designed to function throughout the post-closure care period. Drainage ditches and sediment ponds will be inspected and maintained as needed to control surface water runoff and erosion.

2.5.5 Leachate Management

Leachate management will continue at the facility during the post-closure period as long as leachate continues to be generated. The leachate collection system will be evaluated periodically and maintained to prevent clogging. Leachate will be pumped as needed from the pond to tanker trucks, and hauled to the wastewater treatment plant for disposal.

When leachate collection ceases, the following closure activities will be completed within 180 days. Leachate removal pipes will be securely plugged, and liquid and solid waste will be removed from the storage facilities and associated piping. Contaminated subsoils, structures, and equipment will also be removed. Material that is removed will be disposed in accordance with applicable requirements.

2.6 Training

Personnel responsible for conducting monitoring activities, site inspections and maintenance will be competent individuals trained in the skills needed for their job. Personnel will continue to receive training as new programs become available.

Groundwater and surface water monitoring will be performed by a qualified firm, and laboratory analysis will be conducted by a certified environmental laboratory.

2.7 Post-Closure Land Use

The primary land use for the site after closure of the landfill will be open dormant green space. Limited passive recreational uses may be proposed at a later time.

2.8 Post-Closure Cost Estimate

An estimate of post-closure care costs is provided in Appendix VII-6. All costs are given in 2015 dollars.

(End)

APPENDIX VII – 2
CLOSURE COST ESTIMATES

Opinion of Cost for Closure (Phases 3; 19.7 acres)

Facility Name: Tuscarora Landfill
 Permit No.: 25-09
 Facility Address: PO Box 128
 Cove City, NC 28523
 Facility Owner: Coastal Regional Solid Waste Management Authority

Date: 09/11/15 04/05/16
 Calculated By: MM HMAK
 Reviewed By: LB
 Revision No.: 2
 Project No.: 618.1601.11
 Task No.: 05



9731-F Southern Pine Blvd.
 Charlotte, North Carolina 28273
 phone - 704.817.2037
 fax - 704.837.2010
 www.joyceengineering.com

CLOSURE COSTS:

Native Soil for Slope and Fill-Intermediate Cover (Site Preparation)		Notes & Guidance Values	
a.	Area to be capped	29.6 acres x 4840 yd ² /acre =	143,264 yd ²
b.	Depth of native soil for slope and fill	12 inches x 1yd/ 36 inches =	0.33 yd
c.	Quantity of native soil needed	(a x b)	47,755 yd ³
d.	Percentage of soil from off-site	100	100%
e.	Excavation unit cost (on-site material)	\$1.74	\$1.74 /yd ³
f.	Purchase unit cost (off-site material)	\$3.48	\$3.48 /yd ³
g.	Delivery Cost (off-site material)	\$8.80/yd ³ for 5 mil RT	\$8.80 /yd ³
h.	Placement/Spreading unit cost	\$1.61	\$1.61 /yd ³
i.	Compaction unit cost	\$0.40	\$0.40 /yd ³
j.	Total on-site native soil unit cost	(e + h + i)	\$3.75 /yd ³
k.	Total off-site native soil unit cost	(f + g + h + i)	\$14.28 /yd ³
l.	Total on-site native soil cost	[j x (1-d) x c]	\$0
m.	Total off-site native soil cost	(c x d x k)	\$681,860
n.	Percent compaction	20	20%
o.	Total native soil cost	(l + m) * (1 + n)	\$818,232

Geonet Composite (Drainage and Gas Migration)		Notes & Guidance Values	
a.	Quantity of Geonet Composite needed	29.6 acres x 43560 ft ² /acre =	1,289,376 ft ²
b.	Purchase unit cost	\$0.37	\$0.37 /ft ²
c.	Delivery unit cost	\$0.00	\$0.00 /ft ²
d.	Installation unit cost	\$0.06	\$0.06 /ft ²
e.	Total geocomposite unit cost	(b + c + d)	\$0.44 /ft ²
f.	Total geocomposite cost	(a x e)	\$565,649

Geosynthetic Clay Liner		Notes & Guidance Values	
a.	Quantity of GCL needed	29.6 acres x 43560 ft ² /acre =	1,289,376 ft ²
b.	Purchase unit cost	\$0.33	\$0.33 /ft ²
c.	Delivery unit cost	\$0.00	\$0.00 /ft ²
d.	Installation unit cost	\$0.10	\$0.10 /ft ²
e.	Total GCL unit cost	(b + c + d)	\$0.43 /ft ²
f.	Total GCL cost	(a x e)	\$551,853

Topsoil (Vegetative Layer)		Notes & Guidance Values	
a.	Area to be capped	29.6 acres x 4840 yd ² /acre =	143,264 yd ²
b.	Depth of topsoil needed	6 inches x 1yd/ 36 inches =	0.17 yd
c.	Quantity of topsoil needed	(a x b)	23,877 yd ³
d.	Percentage of soil from off-site	100	100%
e.	Excavation unit cost (on-site material)	\$1.74	\$1.74 /yd ³
f.	Purchase unit cost (off-site material)	\$5.35	\$5.35 /yd ³
g.	Delivery Cost (off-site material)	\$8.80/yd ³ for 5 mil RT	\$8.80 /yd ³
h.	Placement/Spreading unit cost	\$1.61	\$1.61 /yd ³
i.	Compaction unit cost	\$0.40	\$0.40 /yd ³
j.	Total on-site topsoil unit cost	(e + h + i)	\$3.75 /yd ³
k.	Total off-site topsoil unit cost	(f + g + h + i)	\$16.15 /yd ³
l.	Total on-site topsoil cost	[j x (1-d) x c]	\$0
m.	Total off-site topsoil cost	(c x d x k)	\$385,640
n.	Percent compaction	10	10%
o.	Total topsoil cost	(l + m) * (1 + n)	\$424,204

Protective Soil Cover		Notes & Guidance Values	
a.	Area to be capped	29.6 acres x 4840 yd ² /acre =	143,264 yd ²
b.	Depth of soil needed	18 inches x 1yd/ 36 inches =	0.50 yd
c.	Quantity of soil needed	(a x b)	71,632 yd ³
d.	Percentage of soil from off-site	25	25%
e.	Excavation unit cost (on-site material)	\$1.74	\$1.74 /yd ³
f.	Purchase unit cost (off-site material)	\$3.48	\$3.48 /yd ³
g.	Delivery Cost (off-site material)	\$8.80/yd ³ for 5 mil RT	\$8.80 /yd ³
h.	Placement/Spreading unit cost	\$1.61	\$1.61 /yd ³
i.	Compaction unit cost	\$0.40	\$0.40 /yd ³
j.	Total on-site soil unit cost	(e + h + i)	\$3.75 /yd ³
k.	Total off-site soil unit cost	(f + g + h + i)	\$14.28 /yd ³
l.	Total on-site soil cost	[j x (1-d) x c]	\$201,196
m.	Total off-site soil cost	(c x d x k)	\$255,698
n.	Percent compaction	20	20%
o.	Total protective soil cover cost	(l + m) * (1 + n)	\$548,273

Soil Testing		Notes & Guidance Values	
a.	Number of acres to be capped	29.6	29.6 acres
b.	Testing unit cost (Includes density & permeability tests and technician)	\$2,440	\$2,440 /acre
c.	Total Soil Testing Cost	(a x b)	\$72,212.16

Seeding		Notes & Guidance Values	
a.	Number of acres to be vegetated	29.6	29.6 acres
b.	Unit cost for prep, seed, and fert.	\$1,873	\$1,873 /acre
c.	Total Seeding Cost	(a x b)	\$55,426

Landfill Gas (LFG) Management System		Notes & Guidance Values	
a.	Number of acres of landfill to be closed	29.6	
c.	Number of LFG wells	19	
e.	Average cost per LFG well	\$3,745	
g.	Total cost for LFG wells	(c x e)	\$71,155 total
Landfill Gas Appurtenances			
h.	Header Pipe (12")	ft.	2500
i.	12" Pipe Unit Cost (including installation)	\$37	\$93,625.00 total
j.	Header Pipe (10")	ft.	200
k.	10" Pipe Unit Cost (including installation)	\$32	\$6,420.00 total
l.	Lateral Pipe (8")	ft.	1830
m.	6" Pipe Unit Cost (including installation)	\$21	\$39,162.00 total
n.	Isolation Valve		0
o.	Isolation Valve Cost (including installation)	\$1,284	\$0.00 total
p.	Condensate Traps		2
q.	Condensate Trap Unit Cost (including installation)	\$2,675	\$5,350.00 total
w.	Total gas management system cost		\$215,712

Drainage Pipe		Notes & Guidance Values	
a.	Length of pipe needed (15")	775	775 LF
b.	Pipe unit cost (15")	\$21.13	\$21.13 /LF
c.	Length of pipe needed (12")	950	950 LF
d.	Pipe unit cost (12")	\$16.05	\$16.05 /LF
e.	Trenching and backfilling cost	\$12.84	\$12.84 /LF
f.	Total drainage pipe unit cost (15")	(b + e)	\$33.97 /LF
g.	Total drainage pipe unit cost (12")	(d + e)	\$28.89 /LF
h.	Total drainage pipe cost	[(a x f) + (c x g)]	\$53,774

Synthetic Membrane		Notes & Guidance Values	
a.	Area to be capped with FML	29.6 acres x 43560 ft ² /acre =	1,289,376 ft ²
b.	Purchase unit cost	\$0.28	\$0.28 /ft ²
c.	Delivery unit cost	\$0.00	\$0.00 /ft ²
d.	Installation unit cost	\$0.11	\$0.11 /ft ²
e.	Total synthetic membrane unit cost	(b + c + d)	\$0.39 /ft ²
f.	Total synthetic membrane cost	(a x e)	\$496,668

Mobilization/demobilization	\$27,500
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Survey and deed notation	\$13,200
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Closure Certification	\$27,500
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Erosion and Stormwater Control	\$110,000
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Total Construction Closure Costs

Total Unadjusted Closure Costs **\$3,980,204**

Contingency (10%) \$398,020

Engineering Fees
 Construction Documents \$80,250
 Construction Quality Assurance \$321,000

Total Closure Cost (Phase 3) **\$4,779,474**

Total Area to be capped 29.6 acres
 Approximate closure cost per acre **\$161,469 /acre**

Notes:

Cumulative inflation factor 1.07 was applied to the 2012-2015 Financial Assurance unit costs. In the 2015 Financial Assurance, guidance values were attained from recently completed JOYCE projects, and suppliers' price quotes. Material Costs for Geosynthetics include Delivery.

Material Cost List

	2011 Prices		2015 Prices	
	Material (per ft ²)	Installation (per ft ²)	Material (per ft ²)	Installation (per ft ²)
Synthetic Membrane				
60 mil HDPE	\$0.38	\$0.10	\$0.41	\$0.11
40 mil LLDPE	\$0.26	\$0.10	\$0.28	\$0.11
40 mil PVC	\$0.28	\$0.10	\$0.30	\$0.11
Geonet Composite				
6 oz	\$0.35	\$0.06	\$0.37	\$0.06
8 oz	\$0.39	\$0.06	\$0.42	\$0.06
Triplanar	\$0.60	\$0.08	\$0.64	\$0.09
Geosynthetic Clay Liner				
Type I (Regular)	\$0.27	\$0.09	\$0.29	\$0.10
Type II (Reinforced)	\$0.31	\$0.09	\$0.33	\$0.10

APPENDIX VII – 6
POST-CLOSURE COST ESTIMATES

Opinion of Cost for Post Closure Care

Facility Name: Tuscarora Long-Term Regional Landfill
 Permit No.: 25-09
 Facility Address: PO Box 128
Cove City, NC 28523
 Facility Owner: Coastal Regional Solid Waste Management Authori

Date: 09/11/15 4/5/2016
 Calculated By: MM HMAK
 Reviewed By: LB
 Revision No.: 2
 Project No.: 618.1601.11
 Task No.: 05

JOYCE
ENGINEERING
 9731-F Southern Pine Blvd.
 Charlotte, North Carolina 28273
 phone - 704.817.2037
 fax - 704.837.2010
 www.joyceengineering.com

POST CLOSURE COSTS:

Ground & Surface Water Monitoring		Notes & Guidance Values	
a.	Total number of monitoring wells	42	42 wells
b.	Number of sampling events per year	2 sampling events per year	2 events
c.	Monitoring costs per sample	\$1,605	\$1,605 /sample
d.	Miscellaneous Engineering Fees	\$11,000 or as required	\$10,700 /year
e.	Total annual monitoring costs	[(a x b x c) + d]	\$145,520 /year
f.	Total number of surface water monitoring points	4	4
g.	Number of sampling events per year	2 sampling events per year	2 events
h.	Monitoring costs per sample	\$150	\$150 /sample
i.	Total annual monitoring costs	(f x g x h)	\$1,200 /year
j.	Post-closure period	30	30 years
k.	Total cost for post-closure period	(e + i x j)	\$4,401,600.00

Landfill Gas Monitoring System Maintenance		Notes & Guidance Values	
a.	Monthly wellfield monitoring	(12 events per year)	12 events/year
b.	Unit cost for 'a'	\$1,605.00	\$1,605 /event
c.	Quarterly Surface Emissions & Explosive Gases	(4 events per year)	4 events/year
d.	Unit cost for 'c'	\$1,605.00	\$1,605 /event
e.	Annual Reporting (Title V Permit Compliance)	\$11,000 per year	\$10,700
f.	Maintenance and Response to Shutdowns	\$11,000 per year	\$10,700
g.	Post-closure period	20	20 years
h.	Total annual cost for post-closure period	[(a x b) + (c x d) + e + f]	\$47,080
i.	Total cost for post-closure period	(g x h)	\$941,600

Decommissioning of Landfill Gas Collection and Control System		Notes & Guidance Values	
a.	Total number of wellheads	59	59 wells
b.	Estimated cost per wellhead	100	\$100 /well
c.	Estimated cost of wellhead removal	(a x b)	\$5,900
d.	Decommissioning of blower/flare	\$1,000.00	\$1,000
e.	Decommissioning of processing equipment	\$25,000.00	\$25,000
f.	Total cost for decommissioning LFGCC system	(c + d + e)	\$31,900

Explosive Gas Monitoring Period 20 to 30 Years		Notes & Guidance Values	
a.	Quarterly Surface Emissions & Explosive Gases	(4 events per year)	4 events/year
b.	Unit cost for 'a'	\$1,605.00	\$1,605 /event
c.	Post-closure period (years 20 to 30)	10	10 years
d.	Total annual cost for post-closure period		\$64,200

Leachate Management		Notes & Guidance Values	
a.	Private disposal unit cost	\$0.00	\$0.00 /gal
b.	POTW disposal unit cost	\$0.00	\$0.00 /gal
c.	Direct discharge to a POTW unit cost (2015 rate)	\$0.009	\$0.009 /gal
d.	Amount of leachate generated (HELP Model)	0.3 gal/acre/day	8,497 gal/yr
e.	Load/unload unit cost	\$0	\$0.00 /truck
f.	Capacity of truck	0	0 gallons
g.	Number of trucks required per year	(d ÷ f)	0 trucks/year
h.	Distance over 5 miles of hauling (one way)	0	0 miles
i.	Cost of hauling per mile	\$0.00	\$0.00 /mile
j.	Total cost for loading / unloading and hauling	[(e x g) + (h x i)]	\$0.00 /year
k.	Total annual cost for Private Disposal	(a x d)	\$0.00 /year
l.	Total annual cost for POTW Disposal (delivered)	[(b x d) + j]	\$0.00 /year
m.	Total annual cost for POTW Disposal (direct)	(c x d)	\$78 /year
n.	Number of sampling events per year	2 sampling events per year	2 events
o.	Monitoring costs per sample	\$150	\$300 /sample
p.	Total annual monitoring costs	(n x o)	\$300 /year
q.	Total leachate management cost	(m + p)	\$378 /year
r.	Post-closure period	30	30 years
s.	Total cost for post-closure period	(n x o)	\$11,353

Routine Maintenance and Repairs		Notes & Guidance Values	
a.	Mowing frequency	2	2 visits/year
b.	Area to be maintained (acres)	77.6	77.6 acres
c.	Mowing unit cost per visit	\$85	\$85 /acre/visit
d.	Total mowing cost per year	(a x b x c)	\$13,119.06 /year
e.	Fertilizer unit cost	\$309	\$309 /acre
f.	Total fertilizer cost per year	(b x e)	\$23,996.25 /year
g.	Number of years to reseed (max 3 years)	3	3 years
h.	Area to reseed (acres)	77.6	77.6 acres
i.	Reseeding unit cost	\$1,926	\$1,926 /acre
j.	Total reseeding cost	(g x h x i)	\$448,373
k.	Mobilization/demobilization cost per year	\$112	\$112 /year
l.	Total maintenance and repairs cost per year	(d + f + k)	\$37,228 /year
m.	Post-closure period	30	30 years
n.	Total cost for post-closure period	[(m x l) + j]	\$1,565,202.42

Vector and Rodent Control		Notes & Guidance Values	
a.	Total vector and rodent control costs per year	\$2,200 or as required	\$2,140 /year
b.	Post-closure period	30	30 years
c.	Total cost for post-closure period	(a x b)	\$64,200

Total Post-Closure Costs

Total Unadjusted Post-Closure Costs	\$7,080,055
Contingency (10%)	\$708,006
Total Post-Closure Cost-Estimate	\$7,788,061

Overall Total Costs	
Total Post-Closure Cost-Estimate 2015	\$7,788,061
Total Closure Cost-Estimate (From previous page)	\$4,779,474

TOTAL CLOSURE & POST-CLOSURE COST ESTIMATE = \$12,567,535

Potential Assessment and Corrective Action (PACA), NCGS 130A-295.2(h) \$2,000,000