# Buncombe County Leachate Recirculation/Gas Recovery Landfill XL Project Proposal

## I. Introduction

Buncombe County is interested in working with the USEPA on an innovative project that we believe will provide enhanced environmental protection while at the same time saving our citizens over two million dollars in reduced landfill construction costs over the life of our new Subtitle D landfill. We believe that this project will generate results that will easily be transferable to other facilities and provide a sound scientific basis for modifying existing EPA regulations to allow and promote this alternative method of operating municipal solid waste landfills.

### A. Description of the Facility/Community/Geographic Area

The new Buncombe County Solid Waste Management Facility was opened in September 1997. The 550-acre Buncombe County Solid Waste Management Facility (BCSWMF) is located in the western part of North Carolina. It is owned and operated by the Buncombe County General Services Department. The facility serves only Buncombe County and its six municipalities: Asheville, Biltmore Forest, Black Mountain, Montreat, Woodfin, and Weaverville. This facility is among the ten largest publicly-owned Municipal Solid Waste landfills in the state, accepting approximately 100,000 tons per year from the area's 200,000 residents. The current population of Buncombe County is growing at about 2% per year. The landfill currently receives about 150,000 tons per year of municipal solid waste and construction and demolition wastes.

Cells 1 and 2 of the Subtitle D landfill portion of the site were constructed as part of the initial phase of construction of the 10 cell site. Cells 1 and 2, which cover approximately 13 acres, were constructed with the standard Subtitle D composite liner system. North Carolina did not implement alternative liner rules until 1998, thus the standard composite liner had to be used. In 1999, the County completed the construction of Cell 3, and 8-acre cell designed with an alternative liner system consisting of 18 inches of $10^{-5}$cm/sec soil overlain by a geosynthetic clay liner (GCL) and a 60-mil HDPE synthetic liner. Groundwater modeling results showed that the leakage rate through the standard composite liner is 1.59 gal/day while through the alternative liner it is 1.08 gal/day. Thus, the alternative liner affords almost 50 percent more protection to the underlying aquifer than the standard composite liner.

In the past three years, Buncombe County has been recognized four times for its award-winning solid waste program:

- 2000 North Carolina Association of County Commissioners (ACC) Award for Hazardous Waste Program
- 1999 North Carolina SWANA Gold Award for Outstanding Integrated Solid Waste Program
- 1999 SWANA Bronze Award in North American Landfill Competition

– 1998 North Carolina Consulting Engineers Council Design Excellence Award

### B. Contact Information

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## II. Project Description

### A. Summary or overview of project

Over the past two years, Buncombe County has been researching a new method for operating sanitary landfills – the bioreactor method. The bioreactor method involves the recirculation of leachate during the operational phase of the landfill to enhance and accelerate waste decomposition and landfill gas generation. The goals of a bioreactor project are threefold:

1. Decompose the municipal solid waste more rapidly in order to transfer it to a more benign state before the lining system, which presumably has a finite useful life, begins to be compromised. This should maximize the protection benefits afforded by the lining system.

2. Decompose the municipal solid waste more rapidly in order to compress the time that landfill gas is generated and raise peak production levels. This will make the gas recovery system more efficient and less costly, reduce the time over which gas will have to be recovered, and hopefully allow for the majority of gas to be generated and recovered during the active life of the landfill when operators will be on-site to operate it and monitor its performance.

3. Decompose the municipal solid waste more rapidly in order to achieve maximum settlement of the waste mass during operations. This will provide additional capacity at the site, thus prolonging the time when another site must be located and the resultant environmental impacts created (e.g., clearing of vegetation).

### B. Specific project elements

Buncombe County describes five components in their XL proposal: 1) combined leachate recirculation and gas collection; 2) horizontal trenches; 3) pressure injection system; 4) active gas collection; and, 5) alternative liner system.

## III. Project XL Criteria

### A. Superior Environmental Performance

Buncombe County believes that if implemented this project will provide superior environmental performance in a number of ways:

- Acceleration of waste decomposition which should enhance groundwater protection;
- Early compliance with Clean Air Act requirements for municipal solid waste landfills through installation of a gas collection and control system;
- Reduction in emissions as a result of producing a more efficient landfill gas;
- Reduction of potential risk to workers and the community from transport of collected leachate to the POTW via tanker trucks;
- Improved leachate quality and, ultimately, discharge water quality to the receiving stream;
- Reinvestment of cost savings in pilot projects to enhance integrated solid waste management practices in Buncombe County;
- Leachate recirculation/gas recovery process allows for additional waste capacity and longer life of existing landfill cells, reducing the need for new landfill sites;
- Evaluation of the horizontal trench design for leachate recirculation/gas recovery landfills by providing valuable large-scale operational data; and,
- Identification and quantification of performance advantages or limitations of the process.

The County believes that leachate recirculation/gas recovery landfill approach would enable superior performance. When selected, Buncombe County would be willing to provide more detailed information to substantiate this claim.

In order to document how landfill wastes are currently managed without this leachate recirculation/gas recovery system, and to effectively measure the superior environmental performance achieved by this project, Buncombe County will provide a baseline estimate utilizing existing representative conventional

sanitory landfill information, including: information on current liner, cap, and post-closure requirements; source, type, frequency, and volume of water for leachate recirculation; and current gas collection and control requirements. Additional information may include types of wastes received in landfill, quantities of wastes received in the landfill per month or year, amounts of leachate discharges/emissions per month or year, costs for constructing, operating, and maintaining a conventional sanitary landfill, and costs for shipping wastes off-site for treatment (if applicable). This information should be site specific since landfill characteristics can be highly variable. If the information is not site specific, the source of the information will be clearly stated as well as the rationale for not using site specific data.

Superior Environmental Performance will be measured by attempting to quantify the benefits against the baseline for this project. The Final Project Agreement will contain key measurements to be evaluated and will identify when and how these should be reported for purposes of project evaluation.

**B. Flexibility and other benefits**

In the bidding for construction of Cell 3, the County bid the two liner systems as alternates and found that the alternative liner system cost about $30,000 per acre less that the standard composite system. Over the remaining 73.6 acres of the site, this represents a potential cost savings (in 1999 $) of slightly more than $2.2 million.

Buncombe County's current plan is to construct the next phase of the landfill, Cells 4 and 5, with the standard composite system because the benefits of the leachate recirculation/gas recovery method far outweigh the potential cost savings and other benefits afforded by the alternative liner system. If this project is approved as an XL project and the requested regulatory flexibility is granted, the County will be able to install the more protective liner system and still achieve the other benefits of the leachate recirculation/gas recovery method.

**C. Stakeholder involvement**

With regards to stakeholder involvement, the County proposes involving the State of North Carolina Department of Environment and Natural Resources, who will be responsible for permitting the project, the County's Environmental Affairs Board which is comprised of County citizens, and a group of citizens that reside in the neighborhood of the landfill.

**D. Innovation or pollution prevention**

In discussions with EPA staff, Buncombe County discovered that EPA will be seeking comments on leachate recirculation/gas recovery systems and other aspects of the Resource Conservation and Recovery Act (RCRA) Subtitle D regulations during the first half of 2000. These comments would be considered as EPA evaluates whether or not changes in Subtitle D should be made. EPA will be looking to determine whether alternative liners are equally as protective and will be looking for supporting data before supporting a rule change. If such data can be collected, a rule change would be several years off. As part of this XL project, Buncombe County commits to gathering data that would

address this issue. The landfill is presently designed to facilitate such research. Due to concerns from the State of North Carolina, each cell is designed with a lined, leak detection zone beneath the sump area. Buncombe County proposes recording leachate recirculation rates and any flow in the leak detection systems beneath both the cells with the standard composite liner and the cells with the alternative liner. This data should be directly applicable to the data that EPA is looking for.

If successful, this XL pilot is expected to result in more efficient use of landfill space, more effective long-term operation, and an enhanced recovery of landfill gas for use as a renewable energy source.

**E. Transferability**

Following an evaluation of this XL project by EPA, and the first progress report by the County, and assuming the overall success of the project, the leachate recirculation/gas recovery landfill technology used in this project could be transferred to landfills where conditions are favorable for actively managing the decomposition process and where groundwater protection and gas control are ensured. EPA will be soliciting data from similar projects to determine whether or not regulations pertaining to the use of leachate recirculation require adjustments based on new data and/or science.

**F. Feasibility**

The project sponsor, co-sponsors, and regulatory agencies, as designated in the Final Project Agreement, agree to support the project, subject to any review procedures necessary to implement the legal mechanism for this project.

The leachate recirculation/gas recovery landfill would be feasible after State regulatory approval. The proposed project can be installed by onsite County staff.

The proposed pilot will be self-funded. Costs of construction, operations and maintenance are expected to be offset by the benefits.

Each XL Participant has the financial capability, personnel, and senior management commitment necessary to implement the elements of this leachate recirculation/gas recovery landfill XL Project.

**G. Evaluation, monitoring, and accountability**

The operation of a landfill as an enhanced leachate recirculation/gas recovery system can have potential benefits both to the industry and in the protection of human health and the environment (HHE). Research in Europe and in the U.S. seems to suggest that there may be advantages to this approach. When this proposal goes forward, the agreed-upon monitoring and reporting could provide data and information that could help EPA to evaluate this approach and to potentially establish it as a viable, cost-effective alternative to standard approaches for landfill operation and system design.

The XL agreement would contain both legally enforceable and voluntary requirements and would establish certain limits and goals for project performance. The County would be required to ensure compliance with legal requirements and ensure implementation of processes to meet voluntary goals. The project sponsor would be required to establish a record keeping system to ensure compliance as well as accurate reporting of environmental performance. While the nature and extent of such reporting will be subject to negotiation, Buncombe County would be expected to make any reports available publicly and would be expected to specifically discuss their performance with the necessary federal, state, regional, and local regulatory agencies and local stakeholder group. These records will be kept in addition to any monitoring, reporting, and record keeping requirements under the air regulations for municipal solid waste landfills.

More specific information and design specifications would be included in the Final Project Agreement. This additional information may include a survey of settlement plates, projected estimate of the volume of leachate recirculation that would be needed to reach field capacity, and an outline of the measurement and monitoring plan for this aspect of the proposal.

**H. Shifting of risk burden**

This proposal would not result in the shifting of risk.

Buncombe County believes that they can work with the regulatory agencies and stakeholders during the FPA negotiations to ensure that every precaution is taken to prevent adverse impacts to air quality and groundwater quality.

The XL pilot is not expected to result in any environmental justice issues within the local community, or result in any health and safety problems for Buncombe County employees or citizens.

**IV. Requested Flexibility**

EPA's RCRA Subtitle D regulations (40 CFR Part 258) currently allow for leachate derived from an municipal solid waste landfill (MSWLF) unit to be placed back into the landfill if the MSWLF unit is designed with the standard composite liner (i.e., 2 feet of $10^{-7}$ cm/sec permeability soil and a 60-mil HDPE synthetic liner) and leachate collection system specified in the regulations. Though the Subtitle D regulations provide a mechanism whereby alternative liner systems may be accepted by approved State programs (provided that they can be demonstrated at least as protective as the standard composite liner), EPA Office of Solid Waste staff in Washington DC have stated in a policy memorandum sent to the States that it is their interpretation of the regulations that leachate can only be recirculated over landfill units constructed with the standard composite liner design.

The regulatory flexibility sought under this proposal would be to allow Buncombe County to recirculate leachate over MSWLF units constructed with an alternative liner system.

**V. Compliance and Enforcement Profile**

Buncombe County recognizes that all XL Projects must include legally enforceable mechanisms in order to ensure accountability.

The project sponsor further understands that a violation of a condition of the XL Project or a clear pattern of non-conformance on the part of the County may result in termination of the XL Project and the re-institution of the regulations from which flexibility has been granted.

North Carolina State regulatory agencies reserve their rights of inspection and enforcement with respect to the Leachate recirculation/gas recovery landfill in accordance with applicable laws.

**VI. Schedule Information**

This pilot will be developed and implemented over the time period necessary to complete its desired major objectives. The duration will begin from the date that the legal mechanism becomes effective, unless it is terminated earlier or extended by agreement of all Project Signatories.