SCS ENGINEERS

Unsolicited Conceptual Proposal

Landfill Gas Collection & Control System Design/ Build/ Operate

Region 2000 Regional Landfill Livestock Road Facility

Presented to:

Region 2000 Services Authority
361 Livestock Road
Rustburg, VA 24588

Presented by:

Robert E. Dick, PE
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October 26, 2015
File No. 02223215

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SCS ENGINEERS

October 26, 2015
File No. 02223215

Mr. Clarke W. Gibson, PE
Solid Waste Director
Region 2000 Services Authority
361 Livestock Road
Rustburg, Virginia 24588

Subject: Proposal for Landfill Gas Management and Monitoring Services
Region 2000 Services Authority

Dear Clarke:

SCS Engineers (SCS) is submitting the enclosed Unsolicited Conceptual Proposal (Proposal) to the Region 2000 Services Authority (Authority) for implementation of a Landfill Gas Collection and Control System Design/Build/Operate (DBO) Project at the Region 2000 Regional Landfill – Livestock Road Facility (Landfill) in Rustburg, Virginia. Our Proposal has been developed in accordance with the Implementation Procedures and Guidelines for the Public-Private Education Facilities and Infrastructure Act (PPEA), adopted by the Authority on 10/26/11.

The proposed Project involves the permitting, design, construction, and operation of a full-scale, active landfill gas (LFG) collection and control system in Phase III at the Landfill for the purpose of recovering LFG from the Phase III waste disposal unit at this Facility (referred to as the D/B/O Project). SCS has over 40 years of engineering and contracting experience involving LFG collection and control systems in Virginia and will serve as a "one-stop shop" for LFG system permitting, design, construction, and operation, thereby reducing the Authority's overall costs associated with administering a capital project.

SCS considers our proposed approach to financing the DBO Project to be confidential proprietary information; therefore, a discussion of the costs and financing strategy is outlined in the Supplemental Confidential Information document that is a component of this Proposal and has been submitted as a separate package. We request that the Authority treat the information contained in the Supplemental Confidential Information document as non-releasable under the Virginia Freedom of Information Act (VFOIA).

SCS understands that the Authority's Procedures and Guidelines adopt a "Two Phase" proposal process. Accordingly, this Conceptual Proposal conforms to the requirements outlined in Section IV of the Procedures and Guidelines. We expect the Authority will conduct an initial review of this Proposal to determine whether the Proposal presents a "Qualifying Project" under the PPEA. As required under Section II.E.2 of the Procedures and Guidelines, SCS has enclosed a check in the amount of $5,000 to serve as payment of the Proposal Review Fee.

SCS understands that following a decision by the Authority to accept and consider this Unsolicited Conceptual Proposal, the Authority and SCS will execute a Confidentiality Agreement designating confidential information within the Proposal that will be excluded from public availability under the VFOIA. At this time, the Authority will publish a notice of its decision and an invitation for the submission of competing proposals. In the event that SCS is selected to proceed to the second phase of the process, SCS is prepared to respond to the Authority's request for a Detailed Proposal and a Draft Agreement.

SCS and the Authority have a history of successfully implementing infrastructure delivery projects and related task assignments at both of the Authority's landfills since 2008, and SCS has a 20-year history with performing engineering, construction, and operations activities for LFG and other environmental control systems for select member jurisdictions (City of Lynchburg and Campbell County), which pre-dates formation of the Authority. Our Project Team includes professional staff engaged in SCS' work efforts at the Authority's facilities since 1995, and all of these individuals are employee-owners at SCS, some for their entire career. We believe this DBO Project at the Landfill represents an excellent opportunity for the Authority and SCS to continue our collaborative work to deliver innovative solutions at solid waste management facilities.

We are excited about this opportunity to engage in a formal public-private partnership with the Authority related to implementation of this DBO Project.

If you have questions or require additional information, please do not hesitate to contact us at the letterhead address.

Sincerely,

Robert E. Dick, PE
Vice President
SCS ENGINEERS

Guy F. Lewis
Vice President
SCS FIELD SERVICES

Enclosures

Table of Contents

Section **Page**

List of Exhibits

EXECUTIVE SUMMARY

A brief description of the project scope and characteristics, the general approach to financing the proposed project and the benefits. The Executive Summary may be used by the Authority in public notices and other short descriptions of the proposal.

SCS Engineers (SCS) is submitting this Unsolicited Conceptual Proposal (Proposal) to the Region 2000 Services Authority (Authority) for implementation of a Landfill Gas Collection and Control System Design/Build/Operate (DBO) Project at the Region 2000 Regional Landfill – Livestock Road Facility (Landfill) in Rustburg, Virginia. Our Proposal has been developed in accordance with the Implementation Procedures and Guidelines for the Public-Private Education Facilities and Infrastructure Act (PPEA), adopted by the Authority on October 26, 2011.

The proposed Project involves the permitting, design, construction, and operation of a full-scale, active landfill gas (LFG) collection and control system in Phase III at the Landfill for the purpose of recovering LFG from the Phase III waste disposal unit at this Facility (referred to as the D/B/O Project). The full-scale active LFG collection and control system will be designed to control emissions, migration, and odors in compliance with State and Federal regulations. The LFG system will accomplish the following objectives:

- Control malodorous emissions associated with fugitive LFG to maintain good relations with the community;
- Recover LFG for beneficial use as fuel for a future landfill gas-to-energy (LFGE) project;
- Control subsurface LFG migration to comply with solid waste permit requirements and provide a safe work environment; and,
- Control emissions to comply with multiple Clean Air Act regulatory program requirements (NSPS, NESHAP, GHG Mandatory Reporting Rule, etc.) that are currently applicable, or may become applicable at some future date.

SCS considers our proposed approach to financing the DBO Project to be confidential proprietary information; therefore, a discussion of the costs and financing strategy is outlined in the Supplemental Confidential Information document that is a component of this Proposal and has been submitted as a separate package. We request that the Authority treat the information contained in the Supplemental Confidential Information document as non-releasable under the Virginia Freedom of Information Act (VFOIA).

SCS' proposed schedule for the permitting, design, construction, and operation of the LFG system under this DBO Project is presented as **Exhibit 2**. We anticipate commencing with installation of the LFG collection system within 8 weeks of SCS and the Authority executing a Comprehensive Agreement.

Numerous benefits for the Authority, customers, and surrounding communities will be accomplished by this DBO Project, including:

- Improved control of malodorous fugitive LFG emissions from the Facility which will reduce odors and maintain good community-relations and quality-of-life issues for surrounding residential neighborhoods and commercial businesses.

- Proactive environmental stewardship by improving localized and regional air quality and implementing climate change response strategies by reducing greenhouse gas (GHG) emissions from the Landfill.

- Proactive resource management and sustainability by initiating the first step toward a future LFGE project that embraces renewable energy policies and reduces the region's dependence on fossil fuel and offsets air quality pollutant emissions associated with energy derived from combustion of fossil fuels.

- Enhanced worker and customer safety by managing LFG at the Facility and thereby reducing the potential for methane accumulation in confined spaces.

- Preemptive installation of a LFG control system in advance of pending air quality regulatory requirements.

- Delivery of infrastructure at the Facility on an accelerated schedule compared to a traditional design/bid/build approach that requires greater administrative resources by Authority personnel.

SCS and the Authority have a history of successfully implementing infrastructure delivery projects and related task assignments at both of the Authority's landfills since 2008, and SCS has a 20-year history with performing engineering, construction, and operations activities for LFG and other environmental control systems for select member jurisdictions (City of Lynchburg and Campbell County), which pre-dates formation of the Authority. Our Project Team includes professional staff engaged in SCS' work efforts at the Authority's facilities since 1995, and all of these individuals are employee-owners at SCS, some for their entire career. We believe this DBO Project at the Landfill represents an excellent opportunity for the Authority and SCS to continue our collaborative work to deliver innovative solutions at solid waste management facilities.

INTRODUCTION

Among other information, the Introduction should address the criteria by which the Authority must evaluate the proposed project to determine if it is a "Qualifying Project" under the Act, identify how the proposed project serves the public purposes of the Act, and whether or not the use of competitive negotiation as a method of procurement can be authorized.

SCS Engineers (SCS) is pleased to submit this Unsolicited Conceptual Proposal (Proposal) for implementation of a Landfill Gas Collection and Control System Design/Build/Operate (DBO) Project at the Region 2000 Regional Landfill – Livestock Road Facility pursuant to the Virginia Public-Private Education Facilities and Infrastructure Act of 2002 (the "PPEA" under Virginia Code §56-575.1 et seq.), as outlined in the Implementation Procedures and Guidelines amended and adopted by the Region 2000 Services Authority (Authority) on October 26, 2011.

The proposed Project involves the permitting, design, construction, and operation of a full-scale, active landfill gas (LFG) collection and control system in Phase III at the Landfill for the purpose of recovering LFG from the Phase III waste disposal unit at this Facility (referred to as the D/B/O Project). A detailed description of the DBO Project characteristics is presented in **Section 2** of this Proposal.

SCS has over 40 years of engineering and contracting experience involving LFG collection and control systems in Virginia and will serve as a "one-stop shop" for LFG system permitting, design, construction, and operation, thereby reducing the Authority's overall costs associated with administering a capital project. A detailed discussion of our qualifications and experience to perform this DBO Project is presented in **Section 1** of this Proposal.

SCS has the resources to provide an innovative and affordably structured financing plan to allow the construction and start-up of the LFG system to be accomplished within the Authority's current fiscal term, which represents a substantially accelerated schedule compared to the traditional design, bid, and build process. A detailed discussion of the costs and financing strategy is outlined in **Section 3** of this Proposal, which references the Supplemental Confidential Information document that is a component of this Proposal and has been submitted as a separate package. Because SCS considers our proposed approach to financing the DBO Project to be confidential proprietary information, and because we believe making such information public would adversely affect the financial interest and negotiating position of both the Authority and SCS, we request that the Authority treat the information contained in the Supplemental Confidential Information document as non-releasable under the Virginia Freedom of Information Act (VFOIA).

SCS' proposed schedule for the permitting, design, construction, and operation of the LFG system under this DBO Project is presented as **Exhibit 2** and milestones for the major tasks are discussed in **Section 2** of this Proposal. The numerous benefits of the DBO Project, as well as public support and compatibility with the Authority's mission, are presented in **Section 4** of this Proposal.

Our Proposal has been developed in accordance with the Implementation Procedures and Guidelines for the Public-Private Education Facilities and Infrastructure Act (PPEA), adopted by

the Authority on October 26, 2011. The DBO Project as outlined in this Proposal is a "Qualifying Project" as the term is defined in the PPEA and the Authority's Procedures and Guidelines. Specifically, the DBO Project satisfies the second, third, and fourth components stipulated under the definition of "Qualifying Project", which states *"…(ii) any building or facility that meets a public purpose and is developed or operated by or for any public entity; (iii) any improvements, together with equipment, necessary to enhance public safety and security of buildings to be principally used by a public entity; (iv) utility and telecommunications and other communications infrastructure…"* in the following manner:

- The LFG collection and control system that SCS proposes to permit, design, construct, and operate at the Landfill is being developed and operated by SCS on behalf of the Authority, which has been designated as a "Responsible Public Entity" and it **serves multiple distinct public purposes** related to:

  - Improved odor control at the Landfill to yield good community-relations and quality-of-life issues for surrounding residential neighborhoods and commercial businesses;

  - Proactive environmental stewardship by improving localized and regional air quality and implementing climate change response strategies by reducing greenhouse gas (GHG) emissions from the Landfill;

  - Proactive resource management and sustainability by initiating the first step toward a future landfill gas-to-energy (LFGE) project that embraces renewable energy policies and reduces the region's dependence on fossil fuel and offsets air quality pollutant emissions associated with energy derived from combustion of fossil fuels; and,

  - Preemptive installation of a LFG control system in advance of pending air quality regulatory requirements.

- The LFG collection and control system being proposed by SCS will **enhance public safety** in and around the Authority's existing buildings (maintenance shop, administrative offices, etc.) by managing LFG at the Facility, thereby reducing the potential for methane accumulation within these buildings and adjacent confined spaces.

- The LFG collection and control system being proposed by SCS is **utility infrastructure** that will be capable of providing the LFG as a fuel for energy recovery and beneficial utilization at some future time, in the event the Authority decides to pursue a LFGE project.

SCS understands that the Authority's Procedures and Guidelines adopt a "Two Phase" proposal process. Accordingly, this Conceptual Proposal conforms to the requirements outlined in Section IV of the Procedures and Guidelines. We expect the Authority will conduct an initial review of this Proposal to determine whether the Proposal presents a "Qualifying Project" under the PPEA. Also, SCS anticipates the criteria that the Authority will use in determining whether this proposed DBO Project meets the "public purpose" requirement, will include the following:

- *There is a public need for or benefit derived from the Qualifying Project;*

  Based on SCS' communication with Authority personnel, Board members, and residents and businesses from the surrounding communities, we believe the public need and benefits derived from installation and operation of an active LFG system at the Landfill are well understood by all parties. Our participation at public meetings related to the Authority's permit actions and ongoing operations at the Landfill during the past six months has confirmed a public need exists.

- *The estimated cost of the Qualifying Project is reasonable in relation to similar facilities; and,*

  The estimated costs to implement the permitting, design, construction, and operational phases of the DBO Project are commensurate with the level of effort necessary to accomplish these activities at similar landfills in Virginia. The Authority can verify that the proposed costs are reasonable utilizing industry benchmark studies and comparative bid prices for LFG system components at other landfills.

- *The private entity's plans will result in the timely acquisition, design, construction, improvement, renovation, expansion, equipping, maintenance, implementation, installation, and/or operation of the Qualifying Project.*

  The Supplemental Confidential Information document that is a component of this Proposal, which has been submitted as a separate package, presents SCS' conceptual design plans and specifications to demonstrate SCS' investment of resources necessary to result in the timely implementation of this DBO Project. Because SCS considers our proposed LFG system design and specifications to be confidential proprietary information, and because we believe making such information public would adversely affect the financial interest and negotiating position of both the Authority and SCS, we request that the Authority treat the information contained in the Supplemental Confidential Information document as non-releasable under the VFOIA.

SCS understands the Authority will determine whether to acquire a Qualifying Project through the use of "competitive sealed bidding" procedures or whether proceeding through "competitive negotiation" procedures will be advantageous to the Authority and the public based on the following:

- *The probable scope, complexity or urgency of the project, or*

  The implementation of a DBO Project structured in a manner that accomplishes the professional engineering services associated with permitting, design, and construction quality assurance (CQA) efforts, along with the technical field expertise required to construct and operate the LFG system warrants competitive negotiation procedures. The nature of changing field conditions at the Landfill due to ongoing waste placement operations, along with the uncertainty of actual LFG production quantities and quality, warrants competitive negotiation procedures. Furthermore, SCS estimates that acquiring the Qualifying Project through competitive negotiations of a DBO Agreement will enable accelerated delivery and start-up of the LFG system by at least six months, which will reduce the timeframe required to yield improved odor control practices and the other project benefits identified herein.

- *Risk sharing, added value, an increase in funding or economic benefit from the project that would not otherwise be available.*

  SCS' financing strategy as outlined in the Supplemental Confidential Information document provides a risk sharing arrangement that would not be available if procured through competitive sealed bidding procedures. Our innovative financing plan to allow the construction and start-up of the LFG system to be accomplished within the Authority's current fiscal term, introduces added value and economic benefit that the Authority will realize only through competitive negotiation procedures.

SCS understands that following a decision by the Authority to accept and consider this Unsolicited Conceptual Proposal, the Authority and SCS will execute a Confidentiality Agreement designating confidential information within the Proposal that will be excluded from public availability under the VFOIA. At this time, the Authority will publish a notice of its decision and an invitation for the submission of competing proposals. In the event that SCS is selected to proceed to the second phase of the process, SCS is prepared to respond to the Authority's request for a Detailed Proposal and a Draft Agreement.

1 QUALIFICATION AND EXPERIENCE

1a Legal/ Organizational Structure

Identify the legal structure of the firm or consortium of firms making the proposal. Identify the organizational structure for the project, the management approach and how each entity and major subcontractor in the structure fits into the overall team.

The proposing entity is Stearns, Conrad and Schmidt, Consulting Engineers, Inc. dba, SCS Engineers. SCS Engineers is a Virginia Corporation having several offices in Virginia, including an address at 15521 Midlothian Turnpike, Suite 305, Midlothian, Virginia 23113, as well as 11260 Roger Bacon Dr., Suite 300, Reston, VA 20190. SCS Engineers' management structure, approach, key responsibilities of its team and major subcontractors are described in this Proposal.

SCS is the Design/Build/Operate contractor proposing to perform this project. SCS is licensed in Virginia to provide engineering services (License No.: 411000175) and construction contracting services (License No.: 2705030576).

The project team will be led by Mr. Bob Dick, PE of SCS Engineers and the Project Organization Chart, **Exhibit 1**, identifies specific team members that are proposed for the project. Major subcontractors include:

- Drilling: B&H Drilling (specialized LFG well drilling)
- Electrical: Armstrong Electric Co. Inc.
- Surveying: to-be-determined

SCS strives to provide professional engineering, consulting, and contracting services of the highest quality and to be responsive to the needs of the Authority in administering the permitting, design, construction, and operations task assignments affiliated with this DBO Project. Our staff adheres to our Quality Assurance Program when performing project assignments and we utilize computerized financial management systems and manpower allocation software. The key personnel identified for this contract attend rigorous technical training, in the form of in-house workshops sponsored by SCS' Solid Waste Division, and project management training sessions. Furthermore, all officers of the company enter into a structured leadership training program in order to fully recognize the responsibilities and acknowledge the commitment of time and resources and motivation necessary to undertake these project assignments.

The workloads of the Task Managers and Program Director, and key technical staff are monitored regularly (at least monthly) to confirm that adequate staff resources are available to deliver and complete task order assignments. You have our commitment that SCS staff assigned to this DBO Projects will be available for the duration of known assignments.

SCS commits to be responsive to the Authority's needs. We will establish and maintain close communication with the Authority and we propose to utilize Central Desktop to streamline our efficiency, increase our cost effectiveness, enhance our overall value, and satisfy project deadlines. We can be available during off hours as well as during normal business hours.

1b Firm and Principals Experience

Describe the experience of the firm or consortium of firms making the proposal and the key principals involved in the proposed project including the length of time in business, business experience, public sector experience, other engagements of the firm or consortium of firms and experience with projects of comparable size and complexity. Include the identity of any firms that will provide performance guarantees and warranties and a description of such guarantees and warranties.

SCS ENGINEERS

Stearns, Conrad and Schmidt, Consulting Engineers, Inc. (dba SCS Engineers\Field Services\ Energy) was founded in 1970. We are an environmental consulting and contracting firm serving public and private clients across the nation and around the world. Our core capabilities are in solid and hazardous waste management, energy, remediation and environmental compliance. SCS Engineers specializes in the assessment, design, permitting, construction, operation and maintenance, and monitoring of sustainable environmental solutions and facilities. Approximately 70 percent of the firm's business consists of LFG, landfill engineering, and other solid waste-related services.

With over 45 years of experience in the field of LFG management, SCS provides full-service capabilities in the area of comprehensive LFG engineering, construction, operations, and consulting. SCS has permitted, designed, and constructed hundreds of LFG collection and control systems. We currently operate/manage over 24,000 extraction wells at LFG management systems in North America, more than any other LFG consulting/contracting firm. SCS has performed LFG engineering, construction, and/or operations work for Region 2000 Services Authority's two landfills as well as nearly every public and private sanitary landfill in Virginia, including MRSWA, NRRA, RSWA, RVRA, SPSA, the counties of Bedford, Campbell, Caroline, Fairfax, Frederick, Montgomery, Page, Prince William, Rockingham, and the Cities of Bristol, Lynchburg, Norfolk, Richmond, and Waynesboro.

We are one of the oldest and most experienced environmental engineering firms in the Commonwealth of Virginia and in the U.S. In the Mid-Atlantic region, SCS has a staff of over 125 people based in four Virginia offices (Reston, Richmond, Norfolk and Winchester), as well as offices in North and South Carolina, Maryland, Pennsylvania and New Jersey. As a national firm, SCS has a total staff of nearly 800 individuals, located in 68 offices across the US and we are employee-owned.

SCS's staff includes experienced environmental, civil, mechanical, electrical, geotechnical, structural, and chemical engineers; geologists, geochemists, hydrogeologists; public health specialists; chemists, biologists, ecologists, and other environmental scientists; architects; planners; systems analysts; computer scientists; statisticians; field technicians; and technical personnel. SCS employs thoroughly trained, experienced, and fully equipped field technicians. Our field personnel have completed 40-hour health and safety training and supervisor training per OSHA 29 CFR 1910.120. In addition, field personnel are trained in Competent Person Awareness for Trench and Excavation Safety, and Confined Space Entry in accordance with OSHA standards.

SCS is one of the largest and most experienced LFG engineering/construction/operations companies in the world and has experience with numerous LFG system DBO projects similar to the one proposed for the Region 2000 Regional Landfill - Livestock Road Facility, as demonstrated by the following:

- Since 1970, SCS has performed over 6,000 LFG collection/protection and recovery facilities designs and engineering-related investigations;
- Since 1985, SCS has constructed over 360 LFG collection/flaring systems;
- SCS currently operates approximately 293 LFG collection and control systems (several with LFG condensate injection systems);
- SCS operates and maintains 53 LFG collection systems with the dual operational goals of environmental compliance and energy recovery; and,
- SCS currently provides surface emissions monitoring (SEM) services at 135 active and inactive landfill sites.

PROJECT STAFF AND ORGANIZATION

The Project Organization Chart, **Exhibit 1**, identifies specific team members that are proposed for the project. The chart depicts how we intend to coordinate and manage activities to accomplish proper communications with the Authority and internally.

Key Project Team Members

SCS has assembled a highly qualified team of key principals to conduct this project for the Authority. Each principal has worked on LFG DBO projects of identical scope, size, and complexity at various MSW landfills in Virginia and throughout the U.S.

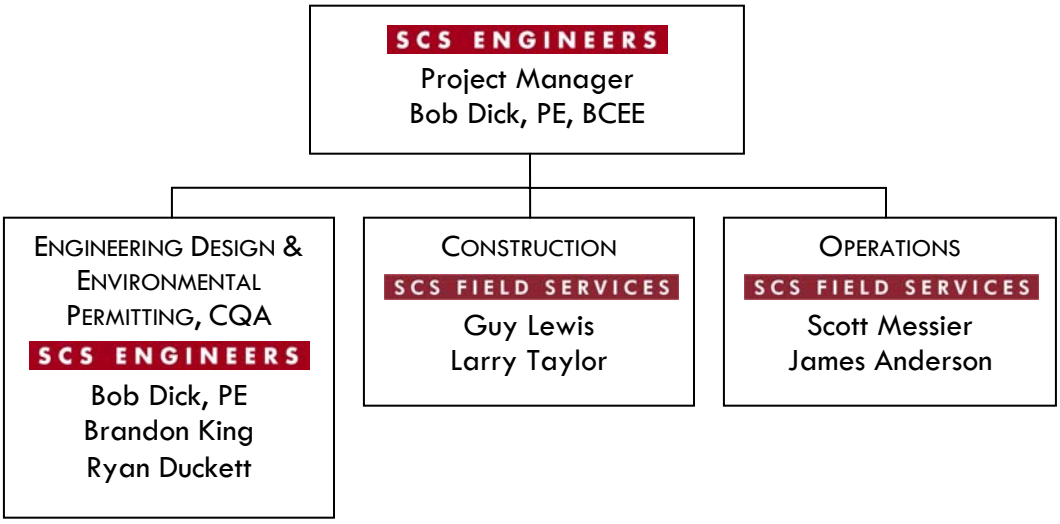
Bob Dick, PE, BCEE: Project Director/Vice President, Engineering Design: Mr. Dick is a licensed Professional Engineer in Virginia and North Carolina. He joined SCS Engineers in 1990 and is a Vice President, responsible for SCS' operations in the Richmond, Virginia office. With over 25 years of experience working on civil and environmental engineering projects related to solid and hazardous waste management, he has performed landfill and LFG engineering projects (design, permitting, and construction) in more than 15 states and several foreign countries. He has worked on over 25 major landfill multi-task assignments involving new landfill cell construction, vertical and lateral expansion, closure, post-closure care, groundwater monitoring, phasing operations, and financial assurance, and has performed over 150 LFG projects involving LFG migration control, odor control, emissions control and Clean Air Act compliance, energy recovery/utilization, and carbon credit monetization.

Guy Lewis: Project Director/Vice President, Field Services Construction: Mr. Lewis is a Vice President and has been with SCS Field Services for over 24 years and has worked on construction, operation, and repair of environmental pollution control facilities and remediation projects. LFG projects under Mr. Lewis' direction have included LFG to energy facilities, compressor stations, off-site LFG pipelines for direct use, gas extraction

well installations, collection header lines, polyethylene (PE) pipe fusion, polyvinyl chloride (PVC) pipe installation, installation of condensate/leachate containment and collection facilities, installation of blower/flare station mechanical equipment (including concrete pads, blowers, flares, compressors, condensate tanks, pumps, flame arrestors, electrical panels, etc.), repair of landfill cover systems, erosion and sediment controls, and landfill revegetation.

Scott Messier: Project Manager, Field Services Operations: Mr. Messier has over 10 years of operation, monitoring and maintenance experience in maintaining LFG recovery and control collection systems, and has worked on numerous LFG migration control and recovery projects. As a Project Manager for ten field technicians, he oversees the operation, monitoring, and maintenance activities on over 35 projects in Virginia and Maryland. Responsibilities include work scope implementation, scheduling and training field technicians, data review and assessment in SCS-FS's DataServices program, report preparation and review, and troubleshooting.

Exhibit 1. Organizational Chart



SCS LFG SYSTEM PROJECT EXPERIENCE

SCS' has performed numerous LFG collection and control system design/build/operations projects over the past several decades throughout the US. **Tables 1 through 4** presented in **Appendix A** highlight SCS' LFG system permitting, design, construction, and operations experience throughout the Mid-Atlantic Region. The projects listed in **bold text** on these tables represent facilities where SCS has provided some combination of design/build/operate services under various contracting arrangements. Detailed project profiles for those projects listed in **bold text** in the tables are presented in **Appendix B**.

1c Firm Contact Information

Provide the names, addresses, email addresses, and telephone numbers of persons within the firm or consortium of firms who may be contacted for further information.

Design	Build	Operate
SCS ENGINEERS Robert E. Dick, PE 15521 Midlothian Turnpike Suite 305 Midlothian, VA 23113 bdick@scsengineers.com (804) 378-7440 Office (804) 400-4179 Mobile (804) 378-7433 Fax	SCS FIELD SERVICES Guy Lewis 11260 Roger Bacon Drive Suite 300 Reston, VA 20190 glewis@scsfieldservices.com (703) 709-0004 Office (703) 517-5594 Mobile (703) 709-0268 Fax	SCS FIELD SERVICES Scott Messier 11260 Roger Bacon Drive Suite 300 Reston, VA 20190 smessier@scsfieldservices.com (703) 709-0004 Office (703) 987-4946 Mobile (703) 709-0268 Fax

1d Reference Contact Information

Provide the address, telephone number, and the name of a specific contact person for an entity, or entities, for which the firm or consortium of firms, or primary members of the consortium, have completed a similar project or projects. These references should include: name and address of project owner/sponsor; name, telephone number, fax number, and email address of the owner's project manager; a summary of the project including budget and final cost; and, project schedule (proposed and actual).

Tables 1 through 4 presented in **Appendix A** highlight SCS' experience related to the permitting, design, construction, and operations of LFG systems throughout the Mid-Atlantic Region. The projects listed in **bold text** on these tables represent facilities where SCS has provided some combination of design/build/operate services under various contracting arrangements. The detailed project profiles for these projects presented in **Appendix B** identify the contact information for client references, a summary of the project, information pertaining to the budgeted and final cost of SCS' services on these projects, and the project schedule.

1e Recent Audited Financial Statement

Provide the most recent audited financial statement of the firm or firms, and each partner with an equity interest of twenty percent or greater. Such financial statements shall be for a period not more than one year before the date of the proposal. Submit the most recent Securities and Exchange Commission 10-K and 10-Q reports, if such reports have been filed.

The most recent audited financial statement for SCS Engineers is included as **Attachment D** of the Supplemental Confidential Information document that accompanies this Proposal. Because SCS is a privately held company, we do not file SEC 10-K or 10-Q reports.

1f Conflict of Interest

Identify any persons known to the proposer who would be disqualified from participation in any transaction arising from or in connection to the project pursuant to The Virginia State and Local Government Conflict of Interest Act (Virginia Code § 2.2-3100 et seq.).

SCS is not aware of any persons that would be disqualified from participating in any transaction arising from or in connection with the DBO Project pursuant to the aforementioned Act.

1g SWaM Participation

Include any planned participation by small, women-owned, or minority-owned businesses during project development and implementation.

SCS has identified the subcontractors we intend to utilize for LFG well drilling and electrician trades. To the best of SCS' knowledge, neither subcontractor qualifies as a small, woman-owned, or minority (SWaM) business. In the event that the DBO Project warrants that SCS select additional subcontractors, we will pursue the opportunity to include local SWaM businesses on the team, to the extent practicable.

2 PROJECT CHARACTERISTICS

2a Project Description/ Conceptual Design

Provide a description of the project, including the conceptual design. Describe the proposed project in sufficient detail so that the type and intent of the project, the location, and the communities that may be affected are clearly identified. Include a description of any components, planned initially or for the future, that are expected to generate revenue for the project or the proposer.

The proposed Project involves the permitting, design, construction, and operation of a full-scale, active LFG collection and control system in Phase III at the Landfill for the purpose of recovering LFG from the Phase III waste disposal unit at this Facility (referred to as the D/B/O Project). The proposed LFG system will include vertical LFG extraction wells, leachate cleanout connections, buried LFG collection piping, isolation valves, condensate management features, and blower/flare station. The blower/flare station is sized to handle the projected LFG recovery quantities from the Landfill through compilation of filling operations in Phases III, IV, and V. The blower/flare station anticipates diverting all or a portion of the LFG to a future LFGE project. The LFG collection system design considers the continued expansion of the system as subsequent cells are developed.

The Supplemental Confidential Information document that is a component of this Proposal, which has been submitted as a separate package, presents SCS' conceptual design plans and specifications to demonstrate SCS' investment of resources necessary to result in the timely implementation of this DBO Project. Because SCS considers our proposed LFG system design and specifications to be confidential proprietary information, and because we believe making such information public would adversely affect the financial interest and negotiating position of both the Authority and SCS, we request that the Authority treat the information contained in the Supplemental Confidential Information document as non-releasable under the VFOIA.

The initial phase of SCS' proposed DBO Project will not include beneficial utilization of the extracted LFG nor energy recovery equipment (engine generators, turbines, boilers, etc.) that would generate revenue for the Authority. However, subsequent phases of the DBO Project may include evaluations, development, and implementation of a LFGE project and associated facilities, depending on the Authority's directives to pursue such efforts.

2b Authority's Responsibilities

Identify and fully describe any work to be performed by the Authority.

The DBO Project involving installation of a full-scale LFG system, as proposed by SCS, does not require extensive work to be performed by the Authority. The Authority's activities will likely be limited to administrative oversight as well as review and coordination with regulatory agencies during the permitting task, review and consultation of engineering documentation during the design task, limited coordination regarding facility operational issues and minor field assistance during the construction task, and limited coordination during the operations task. The Authority and SCS have a long history of successfully collaborating on field work and LFG

system projects and we intend to utilize the Authority's existing resources (manpower, equipment, etc.) on this DBO project to the extent that such resources can be made available to SCS to provide cost savings, improve efficiencies, accelerate schedule, and not disrupt the Authority's primary mission at the Landfill.

2c Statement of Property Owners

Provide a statement setting out the plans for securing all necessary property. The statement must include the names and addresses, if known, of the current owners of the subject property.

The LFG system proposed under this DBO Project will be positioned entirely within the Facility property and will be owned by the Authority. SCS does not anticipate that either SCS or the Authority will need to secure real estate property for this DBO Project.

2d Permitting Requirements and Schedule

Include a list of all federal, state and local permits and approvals required for the project and a schedule for obtaining such permits and approvals. Identify which, if any, permits or approvals are to be obtained by the Authority.

The proposed LFG system will include a utility flare, which SCS believes will require a modification to the Facility's existing Stationary Source Air Permit issued by the Virginia Department of Environmental Quality (VDEQ) Division of Air Quality (DAQ). The Facility's existing Title V Operating Permit may need to be modified to incorporate this additional emissions source. The design of the proposed LFG system will likely need to be incorporated into the Facility's existing Solid Waste Permit issued by the VDEQ Division of Land Protection and Revitalization (DLPR). SCS will develop the technical documentation for submittal to VDEQ as necessary to amend the Facility's existing environmental permits. SCS' proposed schedule for the permitting activities associated with the LFG system under this DBO Project is presented in **Exhibit 2**.

SCS assumes that the installation of the LFG wells, collection piping, and the blower/flare station will not be subject to any local land disturbance or erosion and sediment control permitting. Also, SCS assumes that discharge of the condensate that accumulates in the header piping lowpoints into the leachate management system will not require modification of the Facility's wastewater discharge permit.

2e Anticipated Adverse Impacts

Identify any anticipated adverse social, economic and environmental impacts of the project. Specify the strategies or actions to mitigate known impacts of the project.

SCS has not identified any anticipated adverse social, economic, or environmental impacts of the proposed DBO Project. As stated herein, we believe the LFG system will result in beneficial social, economic, and environmental impacts. We will work with the Authority to mitigate potential odors during the well drilling within the waste mass (estimated to be a short duration of a week or so) and to coordinate construction activities to minimize impacts to on-site operations

and customer vehicle traffic. We do not expect the DBO Project to require additional erosion and sediment controls since the extent of disturbed area outside of the waste disposal unit footprint is limited to the header pipe trench width and the relatively small dimensions of the blower/flare station.

2f Projected Positive Impacts

Identify the projected positive social, economic and environmental impacts of the project.

The full-scale active LFG collection and control system to be installed in Phase III as part of this DBO Project will be designed to control emissions, migration, and odors in compliance with State and Federal regulations. The LFG system will accomplish the following objectives:

- Control malodorous emissions associated with fugitive LFG to maintain good relations with the community;
- Recover LFG for beneficial use as fuel for a future LFGE project;
- Control subsurface LFG migration to comply with solid waste permit requirements and provide a safe work environment; and,
- Control emissions to comply with multiple Clean Air Act regulatory program requirements (NSPS, NESHAP, GHG Mandatory Reporting Rule, etc.) that are currently applicable, or may become applicable at some future date.

Numerous positive social, economic, and environmental impacts for the Authority, customers, and surrounding communities will be accomplished by this DBO Project, including:

- Improved control of malodorous fugitive LFG emissions from the Facility which will reduce odors and maintain good community-relations and quality-of-life issues for surrounding residential neighborhoods and commercial businesses. SCS and the Authority have identified fugitive LFG emissions from the existing Phase III cells (and future Phases IV and V cells) as a potential source of odors at and around the Facility. An active LFG collection and control system that recovers LFG from within the waste mass and combusts the LFG at a flare is a common technique to reducing odors at solid waste disposal facilities.
- Proactive environmental stewardship by improving localized and regional air quality and implementing climate change response strategies by reducing GHG emissions from the Landfill. An active LFG collection and control system that recovers LFG from within the waste mass and combusts the LFG at a flare is considered by VDEQ and USEPA to represent best available control technology (BACT) for controlling fugitive LFG emissions and reducing pollutants that contribute to air quality degradation. As noted in the recent NSPS/EG rulemaking documentation, “The EPA expects that the reduced [LFG] emissions will result in improvements in air quality and lessen health effects associated with exposure to air pollution related emissions, and result in climate benefits due to reductions of the methane component of landfill gas.”

- Proactive resource management and sustainability by initiating the first step toward a future LFGE project that embraces renewable energy policies and reduces the region's dependence on fossil fuel and offsets air quality pollutant emissions associated with energy derived from combustion of fossil fuels.

  The methane component in the LFG generated at the Landfill has the ability to do useful work and is a source of energy. Since the methane concentration in the LFG is approximately 50 percent, the heat value of LFG is approximately 500 Btu/ft^3, which is about one-half the heat value of natural gas. LFGE projects are most often categorized as electrical generation or direct-use. Electrical generation involves using the LFG as a gaseous fuel source for mechanical equipment, such as an internal combustion engine or gas turbine, which are coupled to a generator to produce electrical power. Direct-use projects refer to applications in which the LFG serves as a gaseous fuel source for boilers, kilns, space heaters, or similar equipment and most often displaces natural gas.

  Like wind, solar, and biomass, LFG is a renewable resource. Accordingly, electrical power produced using LFG is considered to be renewable energy and is often termed "green power", which means the electricity produced is "bundled" with an environmental attribute. This environmental attribute is referred to as a "green tag" or a renewable energy credit (REC). In select markets, green power has two distinct commodities that provide revenue, this being the sale of the electrical power and the sale of the REC.

- Enhanced worker and customer safety by managing LFG at the Facility and thereby reducing the potential for methane accumulation in confined spaces.

- Preemptive installation of a LFG control system in advance of pending air quality regulatory requirements. The installation and operation of the proposed LFG system, which will be considered a voluntary system, will likely qualify as progress towards achieving the Environmental Objectives and Targets that are necessary for continued implementation of the environmental management system (EMS) and pollution prevention program under the Virginia Environmental Excellence Program (VEEP).

- Delivery of infrastructure at the Facility on an accelerated schedule compared to a traditional design/bid/build approach that requires greater administrative resources by Authority personnel. In addition to accelerating the schedule, this DBO Project will reduce the engineering costs associated with preparation of formal bid documents and leverage the Authority's in-house resources to yield additional cost savings. Also, this format positions SCS as a single-point of responsibility for delivery of the infrastructure

2g Proposed Project Schedule

Identify the proposed schedule for work on the project, including the estimated time for completion, and any extended or maintenance warranties.

SCS' proposed schedule for the permitting, design, construction, and operation of the LFG system under this DBO Project is presented as **Exhibit 2** and milestones for the major tasks are as follows:

- **Task 1 – Preparation of Phase III LFG Collection and Control System Design Documents:** Submit LFG system Design Documents to Authority within 4 weeks.

- **Task 2 – Preparation of Phase III LFG system Construction Documents:** Submit Construction Documents to Authority within 2 weeks.

- **Task 3 – Air Quality and Solid Waste Permitting:** Submit air quality and solid waste permit amendment applications to the VDEQ within 2 weeks after Authority's review of the Design Documentation.

- **Task 4 – Phase III LFG System Construction & Start-Up:** Achieve temporary blower/flare station start-up within 5 weeks. Achieve permanent blower/flare station start-up within 18 weeks.

- **Task 5 – LFG System Operations, Maintenance, and Monitoring (OM&M):** Provide routine and non-routine OM&M services associated with the LFG system for a term of three years after start-up of the permanent blower/flare station.

2h Risk Allocation

Propose allocation of risk and liability for work completed beyond the agreement's completion date, and assurances for timely completion of the project.

SCS will complete the work in accordance with the final project schedule incorporated in the executed Agreement. SCS has significant bonding capability and, if performance bonds are deemed necessary, they can be separately priced and provided.

2i Assumptions Related to Ownership, etc.

State assumptions related to ownership, legal liability, law enforcement and operation of the project and the existence of any restrictions on the Authority's or the public's use of the project.

The LFG system to be implemented at the Landfill under this DBO Project will be owned by the Authority. SCS proposes to operate the LFG system in accordance with the Authority's directives and instructions. SCS Engineers is not aware of any restrictions regarding the installation and operation of the LFG system other than those that may be introduced in the Facility's environmental permits (upon being modified) and regulatory requirements.

2j Project Phases

Provide information relative to phased or partial openings of the proposed project prior to completion of the entire work.

The scope of services for the DBO Project involving the permitting, design, construction, and operation of a full-scale active LFG collection and control system at the Landfill will involve the following tasks:

- **Task 1 – Preparation of Phase III LFG Collection and Control System Design Documents:** SCS will prepare a LFG Collection System Masterplan that provides phasing plans to reflect the Authority's objectives for installation of the LFG system in conjunction with landfilling activities. SCS will also prepare a LFG Masterplan Design Criteria Memorandum to identify the basis of design of the proposed active LFG collection system expansions. This task addresses the engineering efforts required to prepare design documents. Our design engineering activities will involve the following:

  - Prepare final design drawings for the expansion of the LFG control system;
  - Mechanical drawings showing basic equipment layout and blower/flare station;
  - Electrical drawings showing basic equipment and electrical system components;
  - The design documents will include technical specifications for the LFG system; and,
  - Perform a quantity take-off and develop the final cost.

- **Task 2 – Preparation of Phase III LFG system Construction Documents:** The final design drawings and technical specifications developed under Task 1 will be utilized for preparation of construction documents, suitable for system installation purposes. The construction documents will include the sealed, construction-level drawings and the technical specifications for the LFG collection and control system.

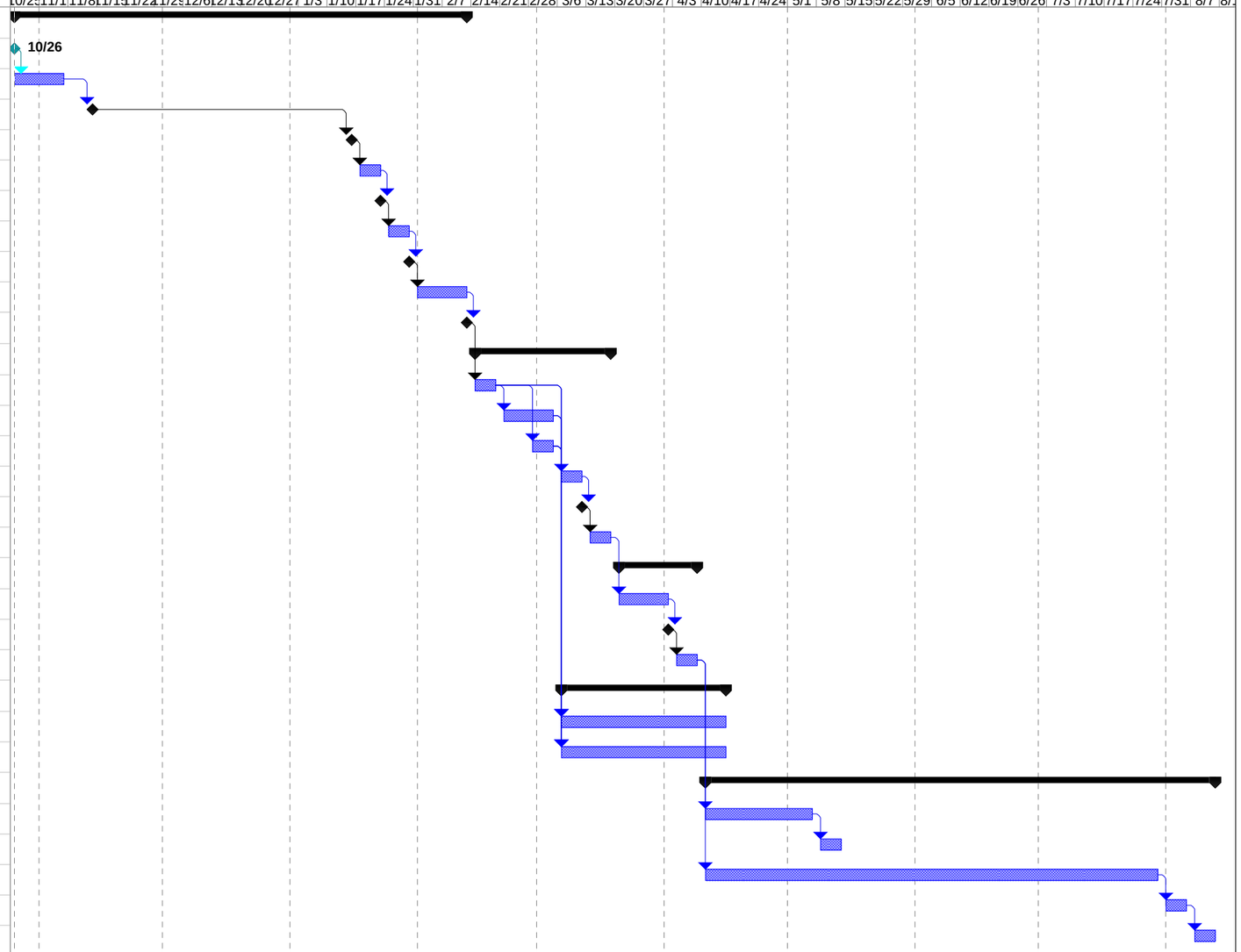
- **Task 3 – Air Quality and Solid Waste Permitting:** This will involve efforts to modify the Facility's existing solid waste and air quality permits to incorporate an active LFG collection and control system.

- **Task 4 – Phase III LFG System Construction & Start-Up:** The initial action item will be to place the order for the blower/flare station since this equipment has a long lead time for fabrication and delivery. SCS will commence installation of the LFG collection system comprised of the vertical LFG extraction wells and leachate cleanout connections, LFG collection piping and valves, condensate management features, and the electrical service for the blower/flare station. Because the anticipated duration for construction of the LFG collection system is significantly less than the time to fabricate and deliver the permanent blower/flare station, SCS will mobilize a temporary skid-mounted blower/flare station to the Facility and commence operation in advance of delivery and connection of the permanent blower/flare station as outlined on the proposed schedule presented in **Exhibit 2**.

- **Task 5 – LFG System Operations, Maintenance, and Monitoring (OM&M):** SCS will initially provide routine OM&M services associated with the LFG system utilizing the temporary blower/flare station for the interim period and then continue providing routine and non-routine OM&M services associated with the LFG system for a term of three years after start-up of the permanent blower/flare station.

Exhibit 2. Region 2000 Regional Landfill LFG System Permitting, Design & Construction Preliminary Schedule - PPEA DBO Project

ID	Task Name	Duration	Start	Finish	Predecessors
1	**PPEA Qualifying Project Proposal Review & Contract Approval**	**80 days**	**Mon 10/26/15**	**Fri 2/12/16**	
2	Submit PPEA Unsolicited Conceptual Proposal	0 wks	Mon 10/26/15	Mon 10/26/15	
3	Authority Review Conceptual Proposal	2 wks	Mon 10/26/15	Fri 11/6/15	2
4	Authority Publishes Invitation for Competing Proposals	0 days	Fri 11/13/15	Fri 11/13/15	3FS+1 wk
5	Authority Receives Competing Proposals	0 days	Fri 1/15/16	Fri 1/15/16	4FS+45 days
6	Authority Reviews Competing Proposals & Requests Detailed Proposals	1 wk	Mon 1/18/16	Fri 1/22/16	5
7	Submit PPEA Unsolicited Detailed Proposal	0 days	Fri 1/22/16	Fri 1/22/16	6
8	Authority Reviews Detailed Proposal	1 wk	Mon 1/25/16	Fri 1/29/16	7
9	Selection of Proposal for Contract Negotiation	0 days	Fri 1/29/16	Fri 1/29/16	8
10	PPEA Contract Negotiation & Approval	2 wks	Mon 2/1/16	Fri 2/12/16	9
11	**Project Kick-Off**	**0 days**	**Fri 2/12/16**	**Fri 2/12/16**	**10**
12	**Preparation of Phase III LFG System Design Documents**	**25 days**	**Mon 2/15/16**	**Fri 3/18/16**	
13	LFG System Masterplan	1 wk	Mon 2/15/16	Fri 2/19/16	11
14	LFG System Design Drawings	2 wks	Mon 2/22/16	Fri 3/4/16	13
15	Technical Specifications	1 wk	Mon 2/29/16	Fri 3/4/16	13FS+1 wk
16	Quantity Take-Off & Final Cost	1 wk	Mon 3/7/16	Fri 3/11/16	15
17	Submit LFG System Design Documents to Authority	0 days	Fri 3/11/16	Fri 3/11/16	16
18	Authority Review LFG System Design Documents	1 wk	Mon 3/14/16	Fri 3/18/16	17
19	**Preparation of Phase III Construction Documents**	**15 days**	**Mon 3/21/16**	**Fri 4/8/16**	
20	Develop Construction Documents (Drawings & Specifications)	2 wks	Mon 3/21/16	Fri 4/1/16	18
21	Submit Construction Bid Documents to Authority	0 wks	Fri 4/1/16	Fri 4/1/16	20
22	Authority Review Construction Bid Documents	1 wk	Mon 4/4/16	Fri 4/8/16	21
23	**Air Quality & Solid Waste Permitting**	**30 days**	**Mon 3/7/16**	**Fri 4/15/16**	
24	Modify Stationary Source Air Permit	6 wks	Mon 3/7/16	Fri 4/15/16	14,15,13
25	Modify Solid Waste Permit	6 wks	Mon 3/7/16	Fri 4/15/16	14,15,13
26	**Phase III LFG System Construction & Start-Up**	**90 days**	**Mon 4/11/16**	**Fri 8/12/16**	
27	Phase III LFG System Wellfield Construction	4 wks	Mon 4/11/16	Fri 5/6/16	22
28	Temporary LFG B/F System Start-Up	1 wk	Mon 5/9/16	Fri 5/13/16	27
29	Permanent LFG B/F System Procurement	16 wks	Mon 4/11/16	Fri 7/29/16	22
30	Phase III Permanent LFG B/F System Install & Connect	1 wk	Mon 8/1/16	Fri 8/5/16	29
31	Phase III Permanent LFG System Start-Up	1 wk	Mon 8/8/16	Fri 8/12/16	30



Project: 02195001.07
Date: Mon 10/26/15

Task	Rolled Up Milestone	Project Summary	Inactive Milestone	Manual Summary Rollup	External Tasks
Milestone	Rolled Up Progress	Group By Summary	Inactive Summary	Manual Summary	External Milestone
Summary	Split	Inactive Task	Manual Task	Start-only	Progress
Rolled Up Task	External Tasks	Inactive Milestone	Duration-only	Finish-only	Deadline

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3 PROJECT FINANCING

3a Preliminary Estimate and Methodology

Provide a preliminary estimate and estimating methodology of the cost of the work by phase and/or segment (e.g. planning, design, construction).

SCS' preliminary cost estimate for the permitting, design, construction, and operations, maintenance, and monitoring (OM&M) of the LFG collection and control system in Phase III at the Landfill, along with a description of the methodology for developing these cost estimates for each phase of the DBO Project, is included in **Section 1a** of the Supplemental Confidential Information document that accompanies this Proposal.

3b Project Financing

Submit a plan for the development, financing and operation of the project showing the anticipated schedule on which funds will be required. Describe the anticipated costs of and proposed sources and uses for such funds.

SCS' plan for implementation of the DBO Project, including the anticipated schedule depicting the timeframes in which funds will be expended, as well as the sources of such funds, is included in **Section 1b** of the Supplemental Confidential Information document that accompanies this Proposal.

3c User Fees, Tolls, Usage Rates

Include a list and discussion of assumptions (user fees, tolls, usage rates) underlying all major elements of the plan.

The technical basis for the LFG system design is presented in the Conceptual Design Specifications included in **Attachment C** of the Supplemental Confidential information document that accompanies this Proposal. Assumptions that impact the financial elements of the DBO Project are outlined in **Section 1c** of the Supplemental Confidential Information document.

3d Risk Factors

Identify the proposed risk factors and methods for dealing with these factors.

SCS has identified the following risk factors that have the potential to affect the SCS/Authority public-private partnership related to this DBO Project:

- Continued deferment of the installation and operation of a full-scale, active LFG collection and control system in Phase III at the Landfill (and subsequent expansion of the system into Phases IV and V) imposes a risk that malodorous conditions attributed to fugitive LFG emissions from the Phase III waste disposal unit may continue to persist, potentially creating nuisance odors and impacting the surrounding communities. The implementation of this DBO Project is anticipated to mitigate off-site odors that are attributed to fugitive LFG emissions.

- Several permit applications must be prepared and submitted to the Virginia Department of Environmental Quality (VDEQ) for review and approval to facilitate implementation of this DBO Project. A potential risk is delay in the construction and start-up of the LFG system due to extended timeframe for review and approval of the permit applications by the VDEQ prior to the start of construction. This potential risk would be incurred regardless of how the project is procured or the structure of the contract. SCS will prepare the permit applications concurrent with final design, and will pro-actively maintain communication with the VDEQ reviewers to answer questions on an on-going basis to reduce the risk of DBO Project delay.

3e Local, State, or Federal Resources

Identify any local, state or federal resources that the proposer contemplates requesting for the project. Describe the total commitment (financial, services, property, etc.), if any, expected from governmental sources and the timing of any anticipated commitment.

The LFG system proposed under this DBO Project will be positioned entirely within the Facility property and by owned by the Authority. SCS does not anticipate that either SCS or the Authority will need to secure real estate property for this DBO Project.

The government services necessary for implementation of this DBO Project are confined to permitting by the VDEQ. We have assumed that the construction of the LFG system will not be subject to any local land disturbance or erosion and sediment control permitting. Also, SCS assumes that discharge of the condensate that accumulates in the header piping lowpoints into the leachate management system will not require modification of the Facility's wastewater discharge permit.

SCS' plan for implementation of the DBO Project, including the anticipated schedule depicting the timeframes in which funds will be expended, as well as the sources of such funds, is included in **Section 1b** of the Supplemental Confidential Information document that accompanies this Proposal.

3f Financial Stability of Proposer

Provide financial information which indicates the proposer's financial stability and ability to finance the project.

SCS Engineers has been in business since 1970. We are a financially stable corporation as demonstrated by the most recent audited financial statement for SCS Engineers, which is included as **Attachment D** of the Supplemental Confidential Information document that accompanies this Proposal.

SCS carries insurance in amounts and types appropriate for the work we perform. Our insurance policy includes coverage for Commercial General Liability, Automobile Liability, Workers Compensation and Employer's Liability, and Professional Liability, which is written specifically for environmental consultants. The policy limits have been acceptable to the Authority in the past and SCS will provide a certificate naming the Region 2000 Services Authority as an additional insured.

3g Financial Feasibility

Include a description and analysis (cost/benefit, tax, etc.) to demonstrate the project's financial feasibility.

The financial feasibility of the proposed DBO Project for a full-scale LFG system at the Landfill is demonstrated by the existing LFG systems that are operational at other landfills in Virginia and throughout the mid-Atlantic region, many of which have been permitted, designed, constructed, and operated by SCS. Because many of the benefits derived from the DBO Project are indirect and challenging to quantify (community relations, improved air quality, enhanced safety, etc.), it is difficult to calculate a cost/benefit impact in financial terms.

The estimated costs to implement the permitting, design, construction, and operational phases of the DBO Project are commensurate with the level of effort necessary to accomplish these activities at similar landfills in Virginia. The Authority can verify that the proposed costs are reasonable utilizing industry benchmark studies and comparative bid prices for LFG system components at other landfills.

Upon commencing operations of the Phase III LFG system, SCS and the Authority will have empirical LFG recovery data to better facilitate conducting a feasibility analysis of a potential LFGE project at the Facility. The economic viability of such an endeavor can be evaluated by SCS at some future time, in the event the Authority decides to pursue a LFGE project.

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4 PUBLIC SUPPORT, PROJECT BENEFIT, AND COMPATIBILITY

4a Project Beneficiaries

Identify who will benefit from the project, how they will benefit and how the project will benefit the overall community, region, or state.

Numerous benefits for the Authority, customers, and surrounding communities will be accomplished by this DBO Project, including:

- Improved control of malodorous fugitive LFG emissions from the Facility which will reduce odors and maintain good community-relations and quality-of-life issues for surrounding residential neighborhoods and commercial businesses.

- Proactive environmental stewardship by improving localized and regional air quality and implementing climate change response strategies by reducing greenhouse gas (GHG) emissions from the Landfill.

- Proactive resource management and sustainability by initiating the first step toward a future LFGE project that embraces renewable energy policies and reduces the region's dependence on fossil fuel and offsets air quality pollutant emissions associated with energy derived from combustion of fossil fuels.

- Enhanced worker and customer safety by managing LFG at the Facility and thereby reducing the potential for methane accumulation in confined spaces.

- Preemptive installation of a LFG control system in advance of pending air quality regulatory requirements.

- Delivery of infrastructure at the Facility on an accelerated schedule compared to a traditional design/bid/build approach that requires greater administrative resources by Authority personnel.

4b Anticipated Public/ Government Support or Opposition

Identify any anticipated public support or opposition, as well as any anticipated government support or opposition for the project.

Based on SCS' communication with Authority personnel, Board members, and residents and businesses from the surrounding communities, we believe the public support for this DBO Project involving installation and operation of an active LFG system at the Landfill will be universal, unanimous, and substantive. Our participation at public meetings related to the Authority's permit actions and ongoing operations at the Landfill during the past six months has indicated that public opposition to the DBO Project will be non-existent. SCS believes the Campbell County leadership, as the host member jurisdiction, will offer complete support and that the Virginia Department of Environmental Quality (VDEQ) will also be supportive of the

Authority's voluntary installation of the LFG system and act accordingly to facilitate the necessary permitting actions for the Landfill. The resulting reduction of fugitive LFG emission rates will be recognized in the Facility's Annual Emissions Inventory submitted to VDEQ; thus, the Facility's Annual Emissions Fee may decrease with respect to improved LFG collection efficiency.

4c Strategies and Communications

Explain the strategy and plans to involve and inform the general public, business community, and governmental agencies in areas affected by the project.

Upon execution of a Comprehensive Agreement with the Authority for this DBO Project, SCS will communicate the specific details to the public at the Authority's Board meeting and contact the Lynchburg News-Advance, which has been assigning a reporter to cover the meetings and has previously interviewed SCS regarding issues at the Landfill. Also, SCS will schedule a pre-application meeting with the regulatory agencies that will be involved in modifying the Facility's existing environmental permits that govern the implementation of the LFG system. SCS will perform other communications related to the DBO Project as directed by the Authority.

4d Economic Benefits

Describe the anticipated significant benefits to the community, region or state, including anticipated benefits to the economic condition of the Authority and whether the project is critical to attracting or maintaining competitive industries and businesses to the Authority or the surrounding region.

The Livestock Road Facility serves as a solid waste management facility for waste generated within the member jurisdictions. The annual waste acceptance quantities at the Landfill currently exceed 200,000 tons per year and are projected to increase commensurate with future increases in the region's population. The continued operation of the Landfill contributes to economic development within the region. Improved odor control at the Landfill that maintains good community-relations and quality-of-life issues for surrounding residential neighborhoods and commercial businesses yields an indirect economic benefit. Other indirect economic benefits resulting from the DBO Project include, but are not limited to, proactive environmental stewardship by improving localized and regional air quality, implementing climate change response strategies by reducing greenhouse gas (GHG) emissions from the Landfill, and preemptive installation of a LFG control system in advance of pending air quality regulatory requirements.

Development of a LFGE project, which would beneficially utilize the LFG recovered from the LFG system implemented under this DBO Project, represents a direct economic benefit that may be realized at some future. The resource management and sustainability efforts that are embodied by initiating the first step toward a future LFGE project facilitate renewable energy policies and reduce the region's dependence on fossil fuel, as well as offset air quality pollutant emissions associated with energy derived from combustion of fossil fuels.

4e Compatibility with Authority's and Local Government Plans

Address project compatibility with the Authority's master plan, local comprehensive plans, local infrastructure development plans, the capital improvements plan or other government spending plan.

As proposed by SCS under this DBO Project, the Phase III LFG system will consider the ongoing waste placement operations and continued development of subsequent landfill cells. The proposed LFG system is compatible with the Authority's master plan and capital improvement plans for Landfill operations, closure, and post-closure care activities at this Facility. The design of the blower/flare station will be compatible with future potential LFGE project equipment in the event the Authority is interested in pursuing beneficial utilization of the recovered LFG. Based on SCS' communication with Authority personnel, Board members, and residents and businesses from the surrounding communities, we believe this DBO Project is compatible with budget plans for development of environmental control system infrastructure at the Facility.

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Table 1. Landfill Gas Migration & Odor Control Project Experience

Project Location	Migration Investigations	Odor Investigations	LFG Management Plan and/or Remediation Plans (Initial or Amendment)	Control System Designs & Expansions	Building Monitoring & Protection Systems	Solid Waste and/or Air Permit Applications (Initial Application or Modifications)	Operation, Maintenance, Monitoring, & Testing	Construction Engineering and/or System Construction	Comprehensive Wellfield Evaluations & System Upgrades & Wellfield Adjustments	Regulatory Inspections, Negotiations & Compliance (EPA, VDEQ, NCDENR)
VIRGINIA										
Accomack County – 2 LFs	✓		✓			✓				✓
Alexandria Old Dump Sites	✓				✓		✓			✓
Bedford County LF	✓			✓			✓	✓	✓	
Bristol ISWMF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Campbell County LF	✓		✓	✓		✓		✓	✓	✓
Caroline County LF	✓	✓	✓	✓		✓	✓	✓	✓	✓
Chesterfield County 3 Closed LFs	✓						✓		✓	
Fairfax County I-66 & I-95 LF	✓		✓	✓	✓	✓	✓	✓	✓	✓
Fort Belvoir Cullum Woods & Theote Road LFs	✓		✓	✓	✓	✓	✓	✓	✓	✓
Franklin LF	✓		✓							✓
Frederick County LF	✓		✓	✓		✓	✓	✓		✓
Henrico County Old LF	✓				✓		✓			
Hilltop Sand & Gravel LF	✓		✓	✓	✓	✓	✓	✓		
Isle of Wight LF	✓		✓							✓
Montgomery County LF	✓		✓	✓	✓	✓	✓	✓		✓
MRSWA Mid-County LF	✓		✓	✓		✓	✓	✓	✓	✓
Norfolk Campostella LF	✓		✓	✓		✓	✓			✓
NRRA Cloyd's Mountain LF	✓		✓	✓		✓	✓	✓		✓
NRRA Ingles Mountain LF	✓		✓	✓		✓	✓	✓	✓	✓
Old Dominion LF		✓					✓	✓	✓	
Page County Battle Creek & Stanley LFs	✓		✓	✓	✓	✓	✓	✓	✓	✓
Portsmouth Greenwood Drive	✓			✓	✓			✓		✓
Prince William County LF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region 2000 Concord Turnpike Regional LF	✓		✓	✓	✓	✓	✓	✓	✓	✓
Region 2000 Livestock Road Regional LF		✓		✓		✓	✓			✓
RVRA Rutrough Road LF	✓	✓		✓		✓	✓	✓		✓
Richmond – 3 Closed LF	✓		✓	✓	✓		✓	✓	✓	
Richmond Gayton Crossing	✓			✓	✓		✓	✓		
Roanoke Statesman Park	✓			✓	✓		✓	✓		
Shenandoah County LF			✓			✓				✓
Shoosmith Sanitary LF		✓	✓	✓		✓	✓	✓	✓	✓
Suffolk SPSA Regional LF		✓		✓		✓	✓	✓		✓
NORTH CAROLINA										
Allied Charlotte Motor Speedway LF		✓		✓		✓	✓	✓	✓	✓
Buncombe County LF	✓			✓		✓		✓	✓	✓
Catawba County Blackburn LF	✓	✓		✓		✓		✓	✓	✓
Henderson County LF	✓			✓		✓		✓	✓	✓
City of Raleigh, Wilders Grove LF				✓			✓	✓	✓	
Uwharrie Regional LF	✓	✓		✓			✓		✓	
Wake County, Feltonsville & North Wake LFs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
City of Winston-Salem, Hanes Mill Road LF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
York Road LF	✓		✓	✓	✓		✓			

Table 2. Landfill Gas Clean Air Act Project Experience

Project Location	Design Capacity Report/ NMOC Rate Report (Initial or Amendment)	Method 25C Sampling (Initial or Retests)	LFG System Design Plan (Initial or Amendment)	Wellfield or Surface Emissions Monitoring	Title V Permit (Initial Application or Mods)	New Source Review Permit (Initial Application or Mods)	Initial Performance Testing & Reporting	Semi-Annual NSPS Reporting	Title V Reporting & Emissions Inventories	Compliance Inspections (EPA, VDEQ, MDE, NCDENR)
NORTH CAROLINA										
Allied Charlotte Motor Speedway LF		✓	✓	✓	✓		✓	✓	✓	
Buncombe County LF		✓								
Catawba County Blackburn LF	✓	✓			✓	✓			✓	
Cumberland County, Ann Street LF							✓			
City of Greensboro, White Street LF		✓	✓		✓		✓	✓	✓	
New Hanover County LF		✓			✓				✓	
City of Raleigh, Wilders Grove LF				✓				✓		
Republic East Carolina LF			✓				✓	✓	✓	
Republic Uwharrie Regional LF		✓	✓		✓		✓	✓	✓	
Wake County, North & South Wake LFs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
City of Winston-Salem, Hanes Mill Road	✓	✓	✓	✓	✓			✓	✓	
VIRGINIA										
Bristol ISWMF				✓	✓	✓	✓	✓	✓	✓
Campbell County LF	✓					✓				
Fairfax County I-95 LF			✓	✓						
Frederick County Regional LF	✓	✓			✓	✓	✓		✓	
New River Resource Authority Regional LF	✓	✓			✓	✓	✓	✓	✓	✓
Page County Battle Creek LF	✓				✓	✓			✓	
Prince William County LF	✓		✓	✓	✓			✓	✓	✓
Region 2000 Concord Turnpike Regional LF	✓	✓				✓			✓	
Region 2000 Livestock Road Regional LF	✓	✓		✓	✓	✓			✓	
Republic Brunswick LF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Republic Cumberland LF	✓					✓				
Republic King & Queen LF				✓				✓	✓	✓
Republic Old Dominion LF		✓		✓					✓	
RVRA Smith Gap LF	✓	✓			✓				✓	
Rockingham County LF	✓	✓	✓		✓	✓				✓
Shenandoah County LF		✓								
Shoosmith Sanitary LF	✓		✓	✓	✓	✓	✓	✓	✓	✓
SPSA Regional LF	✓	✓	✓		✓		✓	✓	✓	
Waste Management AWDI LF						✓	✓			
Waste Management Charles City County LF			✓	✓						
Waste Management King George LF		✓		✓			✓			
MARYLAND										
Anne Arundel County Millersville LF	✓	✓	✓	✓	✓		✓	✓	✓	✓
Baltimore County Eastern LF	✓	✓	✓	✓	✓				✓	
City of Baltimore, Quarantine Road LF	✓	✓	✓	✓	✓				✓	
Frederick County LF		✓								
Howard County Alpha Ridge LF	✓	✓			✓				✓	✓
Montgomery County Oaks LF	✓	✓								
Prince George's County, BS Rd LF				✓	✓			✓	✓	✓

Table 3. Landfill Gas-to-Energy Engineering Project Experience

Project Location	LFG Recovery Projections	LFGE Feasibility Studies & Economic Analyses of Project Scenarios	Due Diligence Efforts for Financing	LFGE RFP Development/ Technical Support	LFGE/ PPA Agreement Negotiations	LFGE Facilities Permitting & Engineering	LFGE Facilities Construction and/or Operational Support
VIRGINIA							
Atlantic Waste Disposal LF	✓		✓				✓
Augusta County Service Authority LF	✓	✓					
Bethel LF	✓					✓	
BFI Richmond LF	✓		✓				
Bristol ISWMF LF	✓					✓	
Brunswick LF	✓		✓		✓		
Charles City County LF	✓		✓				
Danville LF	✓	✓					
Denbeigh LF	✓	✓			✓	✓	✓
Fairfax I-66 LF	✓					✓	✓
Fairfax I-95 LF	✓		✓			✓	✓
Frederick County Regional LF	✓	✓			✓	✓	✓
King & Queen LF	✓		✓				
Maplewood LF	✓		✓				
MRSWA Mid-County LF	✓			✓	✓		
New River Resource Authority Regional LF	✓	✓		✓	✓		
Prince William County LF	✓	✓	✓			✓	✓
Old Dominion LF	✓		✓				
Region 2000 Concord Turnpike Regional LF	✓		✓				
Rockingham County LF	✓					✓	✓
RVRA Rutrough Road LF	✓	✓					
RVRA Smith Gap LF					✓		
Shoosmith Sanitary LF	✓						
SPSA Regional LF	✓		✓				✓
NORTH CAROLINA							
Ann Street LF	✓		✓				
Blackburn LF	✓						
Buncombe County LF	✓		✓				
Caldwell County, Mt. Herman LF	✓	✓				✓	✓
New Hanover County LF	✓	✓					
Republic Charlotte Motor Speedway LF	✓		✓			✓	
Republic Uwharrie LF	✓						
Wake County, North Wake LF	✓		✓				
Wake County, South Wake LF	✓	✓		✓	✓		
Waste Management Piedmont LF						✓	
White Street LF	✓						
Wilders Grove LF	✓	✓					
City of Winston-Salem, Hanes Mill Road LF	✓						

Table 4. GHG Monitoring & Reporting Project Experience

Project Location	MRR Applicability Evaluation	BAMM Documentation	GHG Monitoring Plan (Initial or Amendment)	GHG Monitoring	GHG Data Compilation & Review	Facility Registration/ COR	Designated as e-GGRT Agent	Annual GHG Emissions Report in e-GGRT
VIRGINIA								
Augusta County LF			✓	✓	✓	✓	✓	✓
BFI Richmond LF				✓	✓		✓	✓
Campbell County LF			✓	✓	✓	✓	✓	✓
Fauquier County LF				✓	✓		✓	✓
City of Franklin LF	✓							
Frederick County Regional LF			✓		✓	✓	✓	✓
Loudoun County LF			✓	✓	✓	✓	✓	✓
New River Resource Authority Regional LF		✓	✓		✓	✓	✓	✓
New River Resource Authority Ingles Mountain	✓							
Prince William County LF			✓	✓	✓	✓	✓	✓
Region 2000 Concord Turnpike Regional LF		✓	✓		✓	✓	✓	✓
Region 2000 Livestock Road Regional LF			✓	✓	✓	✓	✓	✓
Republic Brunswick LF				✓	✓		✓	✓
Republic King & Queen LF				✓	✓		✓	✓
Republic Old Dominion LF				✓	✓		✓	✓
Rockingham County LF			✓	✓	✓	✓	✓	✓
Shenandoah County LF	✓		✓		✓	✓	✓	✓
Shoosmith Sanitary LF		✓	✓		✓	✓	✓	✓
Waynesboro LF	✓							
NORTH CAROLINA								
Buncombe County Closed LF			✓			✓	✓	✓
Mecklenburg County, Harrisburg Road LF	✓							
Mecklenburg County, Holbrooks LF	✓							
New Hanover County LF					✓			
Republic Charlotte Motor Speedway LF					✓		✓	✓
Republic East Carolina LF				✓	✓		✓	✓
Republic Foothills Environmental LF				✓	✓		✓	✓
Republic Upper Piedmont LF				✓	✓		✓	✓
Republic Uwharrie LF				✓	✓		✓	✓
Wake County, East Wake LF	✓							
Wake County, Feltonsville LF			✓	✓	✓	✓	✓	✓
Wake County, North Wake LF		✓	✓		✓	✓	✓	✓
Wake County, South Wake LF			✓	✓	✓	✓	✓	✓
City of Winston-Salem, Ebert Road LF	✓							
City of Winston-Salem, Hanes Mill Road LF		✓	✓		✓	✓	✓	✓
City of Winston-Salem, Overdale Road LF	✓							
MARYLAND								
Charles County, Pisgah LF	✓		✓	✓	✓	✓	✓	✓
City of Baltimore, Quarantine Road LF			✓	✓	✓	✓	✓	✓
Montgomery County, Gude LF			✓	✓	✓	✓	✓	✓
Montgomery County, Oaks LF			✓	✓	✓	✓	✓	✓
Prince Georges County, Brown Station Road LF			✓	✓	✓	✓	✓	✓
Prince Georges County, Sandy Hill LF			✓	✓	✓	✓	✓	✓

Landfill Gas Control and Utilization
Concord Turnpike Regional Landfill
Lynchburg, VA

Client Reference

David Owen, Director
Department of Public Works
City of Lynchburg, Virginia
434.455.6078

Clarke Gibson, SW Director
Region 2000 Services Authority
Lynchburg, Virginia
434.455.6079

Contract Amount: >$500,000

Date: 1995 to present

Key Personnel

Bob Dick, PE, Project Director
Scott Mortimer, Technical Advisor
Brandon King, Staff Scientist

Highlights

- ✓ LFG Migration Investigation
- ✓ LFG System Design
- ✓ Permitting
- ✓ Regulatory Compliance
- ✓ LFG System Operations & Monitoring
- ✓ Remediation Plan
- ✓ LFGE Calculations
- ✓ Subsurface Investigations
- ✓ LFG System Construction

SCS Engineers has provided landfill gas (LFG) engineering and construction services for LFG management, migration control and utilization projects at the Concord Turnpike Regional Landfill (former Lynchburg Landfill) since 1995. The project assignments have involved all aspects of LFG investigation, design, permitting, construction, operations, and regulatory compliance for LFG collection and control systems that addressed LFG migration at the closed landfill area and the landfill gas-to-energy (LFGE) project at the site.

LFG Collection System Design. SCS conducted a field investigation, developed design criteria, and prepared construction documentation for the initial active LFG extraction system in 1995. The system was installed to control migration and to protect on and off-site buildings. In 2000, SCS prepared design documents for installation of an expanded LFG collection and control system along with a LFG transmission pipeline to serve the LFGE project. In subsequent years, SCS developed design drawings, technical specifications, and construction bid documents for multiple expansions of the interior LFG collection system serving the LFGE project as well as the active perimeter LFG migration control system, portions of which operate separately from the interior LFG recovery system.

LFG Migration Control and Remediation. SCS performed subsurface investigations using direct-push probes and sampled the soil gas at the compliance boundary for laboratory analysis. SCS developed updates to the LFG Remediation Plan, implemented LFG monitoring network reconfigurations, and prepared design documents for construction of active perimeter control systems.

Solid Waste Permitting and Regulatory Compliance. Since 1995, SCS has developed permitting documentation for solid waste permit amendments and coordinated with VDEQ and the Landfill Owner to implement updated LFG Remediation and Management Plans. Throughout the years, SCS has met with

VDEQ and the Landfill Owner on numerous occasions concerning regulatory issues affecting LFG management, and has developed comprehensive permitting and compliance documentation addressing LFG system installation, operation, and monitoring. SCS provides updates regarding the status of non-compliant probes and coordinates continued remediation activities with the VDEQ.

Air Quality Permitting and Compliance Reporting. SCS prepared Title V Air Permit Applications and conducted Tier 2 NMOC sampling, analysis, and reporting. SCS assisted the Authority with compliance regarding the EPA GHG Mandatory Reporting Rule, including development of a GHG Monitoring Plan, Facility registration in e-GGRT, compilation of GHG monitoring data, serving as an Agent, and preparation of the Annual GHG Emissions Report.

LFG System Construction and CQA Engineering. During December 2006, SCS installed a series of extraction wells connected by a buried LFG collection header as part of a design/build project. In August 2007, this portion of the system was isolated from the active LFG collection system on the Closed Landfill and connected to a dedicated, separate blower. In May 2008, SCS completed another design/build assignment to expand the active LFG perimeter migration control system. SCS prepared Record Documentation for these construction projects for submittal to VDEQ and the Landfill Owner.

LFG System Operations & Monitoring. SCS conducted routine monitoring activities and operations consulting related to the initial active LFG extraction system in 1996. In later years, SCS provided O&M services related to the interior sensors, LFG collection system, and blower/flare station. Currently, SCS performs routine operations, maintenance, and monitoring of the active LFG perimeter migration control system and provides monthly reports to the Landfill Owner.

Landfill Gas-to-Energy Consulting. As early as 1996, SCS performed monitoring activities and compiled data to provide operational information for a proposed LFGE project. Later, SCS calculated LFG recovery estimates to assist the City with contract negotiations on the proposed LFGE developer. Since start-up of the LFGE project, SCS has coordinated with the Landfill Owner and the LFGE developer to address operational challenges, facilitate negotiations, and comply with regulatory requirements.

Landfill Gas Remediation, Groundwater Treatment System Construction and O&M Campbell County, VA

Client

Department of Public Works
P.O. Box 100
Rustburg, VA 24588

Contact

Cliff Tweedy, PE
540.592.9528

Groundwater Treatment System Build/Operate

Treatment Facility – 2005

Key Personnel

Jeff Marshall, PE
Jennifer Robb
Bob Isenberg, PE
Darrin Dillah, PE, PhD

Highlights

- ✓ Process Analysis and Redesign
- ✓ Operational Improvements
- ✓ Procurement & Subcontracting for Maintenance & Repair
- ✓ Regulatory Support
- ✓ Process Quality Control
- ✓ Process Engineering
- ✓ Sampling and Analysis
- ✓ Regulatory Reports
- ✓ VPDES Discharge Permit Management
- ✓ Process Automation and Controls
- ✓ QA/QC

GROUNDWATER

SCS was selected in an emergency procurement by Campbell County to complete the remaining 8-month term of the incumbent operations and maintenance contractor for the 35,000 gallon-per-day groundwater pump and treat remediation system. Brief descriptions of project activities for the closed MSW Landfill groundwater management program are provided below:

Groundwater Treatment System Engineering

- Evaluated the condition and efficiency of the groundwater treatment system and made modifications in the operation to improve reliability.
- SCS is updating the operations and maintenance procedures and the O&M manual.

Groundwater Treatment System Construction

The total cost for this construction assignment was approximately $1.3 million. SCS' total project fees for groundwater treatment-related construction, operations, and monitoring services during the contract were approximately $2 million. The project schedule was 6 months, which included treatment equipment fabrication and delivery, as well as installation and start-up activities.

Groundwater Treatment System O&M

- Prepared operations procedures, checklists and daily logs to properly treat the groundwater to meet discharge permit requirements and prevent process break-down and upsets.
- Evaluated process chemicals and established blanket purchase orders for process chemicals and repair part.
- SCS provides routine system inspections and performs preventive maintenance and repair of pumps, piping, tanks, blowers, valves and instrumentation.

Contract Amount
$135,000

Dates
2008 to Present

Key Personnel
Darrin Dillah, PhD, PE
Roger Moeller, LEED AP, EIT

Highlights

- ✓ Remediation Plan
- ✓ Design and CQA for LFG Perimeter Probe Network
- ✓ Design and CQA for Replacement LFG Collection Wellfield

Groundwater Treatment System Regulatory Compliance

- Treated groundwater discharges directly to the landfill storm water management system, then off-site to a local stream. Under the Virginia VPDES Discharge Permit Program the Virginia Department of Environmental Quality (VDEQ) has issued a VPDES Discharge Permit to Campbell County requiring monthly discharge monitoring and reporting.
- SCS conducts monthly sampling and analysis, reviews analytical data and prepares the monthly Discharge Monitoring Report (DMR) for the County to submit to the VDEQ.
- SCS supports Campbell County during compliance inspections and at regulatory meetings with the VDEQ.

Groundwater Monitoring and Reporting

- Perform semi-annual and quarterly detection, assessment, and corrective action monitoring requirements including sampling, data evaluation, and report preparation.
- Prepare annual groundwater monitoring reports for submission to VDEQ.
- Corrective Action Status Evaluation – evaluation of corrective monitoring results to assess the effectiveness of the groundwater remediation strategies.

LANDFILL GAS

SCS Engineers was retained by Campbell County, Virginia to evaluate the existing landfill gas (LFG) collection and control system (GCCS), and LFG monitoring network (GMN), LFG migration, prepare a LFG Remediation Plan, design and construction quality assurance (CQA) of a replacement GMN and LFG collection system, and compliance monitoring of the GMN. The Landfill includes approximately 159 acres of which approximately 68.6 acres is permitted for municipal solid waste (MSW) disposal.

GMN and GCCS Evaluations

The GMN evaluation found LFG constituents in several existing groundwater wells confirming LFG migration not detectable by the existing shallow probes. Also, the existing GMN probes were not constructed in accordance with

Submission Instructions 13 (SI 13) guidance provided by the VDEQ.

The existing GCCS collection system vertical LFG extraction well spacing and construction did not provide adequate control of LFG.

LFG Remediation Plan

LFG migration detected in the existing GMN required the preparation of a LFG Remediation Plan. The Plan included conceptual designs for a new GMN and new LFG Collection System and was prepared in general accordance with VDEQ Submission Instructions 2.

GMN Design and Construction

The new GMN network design included 37 new probe locations where, consisting of either a single probe or two to three nested probes. New probes were designed in accordance with SI 13 and to intersect groundwater. SCS prepared bid documents, evaluated bids, provided CQA during construction, and prepared as-built records. New GMN monitoring data provided valuable insight into LFG migration which SCS used to tailor the new LFG collection system design.

LFG Collection System Design and Construction

The new collection system design included the abandonment of existing shallow vents and extraction wells. The design included 24 new vertical LFG extraction wells, 11 new vertical soil gas extraction wells, and expanded existing collection piping network. SCS prepared bid documents, evaluated bids, provided CQA during construction, and prepared as-built records.

GMN Compliance Monitoring

SCS provides quarterly GMN monitoring services, documentation, and notifications.

Landfill Gas Power Plant and Carbon Credit Design/Build Projects, Frederick County, VA

Client

Frederick County Public Works Department
Frederick County, Virginia

Contact

Joe Wilder
Deputy Director
(540) 665-5643

Contract Amount

$4,000,000

Key Personnel

Darrin Dillah, PhD, PE
Guy Lewis
Larry Warren
Derek Dyer

Highlights (optional)

- ✓ Design Build
- ✓ Construction Bid Documents
- ✓ Permitting
- ✓ Carbon Credits
- ✓ Regulatory Compliance
- ✓ Construction Quality Assurance

SCS has been providing Frederick County with comprehensive landfill and LFG engineering services for over 10 years. Brief descriptions of two LFG design/build projects are provided below:

Design-Build for 2 MW LFG to Energy Power Plant

- Prepared construction drawings and specifications for a 2 MW LFG-to-Energy project. The plant is designed anticipating expansions to 5 MW in the future.
- Prepared the necessary permit applications including NSR, Title V for the power plant internal combustion engines.
- Constructing the power plant. Major components include a treatment skid to dewater the LFG, compress, and filter; two 1 MW Jenbacher Engines, and switchgear.
- Assisted the County with negotiations related to interconnect and power purchase agreements.

Design-Build for a 70,000 tonnes Carbon Credit Project

- Assisted the County with negotiations for a 70,000 tonnes CO2e per year carbon credit project.
- Expanded the LFG collection system: 40 new extraction wells, 7,250 feet of header pipe, flare station improvements, data acquisition system, condensate handling.

The total cost for these two design/build task assignments, along with LFG system operations, is in excess of $4 million. SCS' total project fees for LFG-related engineering, construction, operations, and monitoring services since 1997 are more than $5 million.

Landfill Gas Investigation and LFG Control System Engineering and Construction
Glen Allen Softball Complex
Henrico County, VA

Client

Department of Public Utilities
Henrico County, Virginia

Contact

Ms. Marchelle Sossong
Mr. Steve Yob
10401 Woodman Road
Glen Allen, VA 23060
(804) 261-8217

LFG System Design/Build

Perimeter LFG Migration Control System – 2011

Total Contract Amount

>$400,000

Highlights - Landfill Gas

- ✓ Landfill Gas Investigation
- ✓ Landfill Gas Pump Test
- ✓ Air Sampling
- ✓ Surfacewater Sampling
- ✓ Landfill Gas System Design
- ✓ GCCS Design/Build
- ✓ Public Meetings

SCS was retained by Henrico County's Department of Public Utilities to perform landfill gas (LFG) investigations beginning in July 2010, which involved multiple rounds of LFG probe installations, surface and subsurface gas monitoring, ambient air and gas probe sampling, test pit excavations, surface water sampling, and a pump test to evaluate potential remediation approaches. The presence of LFG in the vicinity of the Glen Allen Softball Complex was suspected due to the discovery of municipal solid waste (MSW) along the preliminary alignment for a proposed drain pipe for the water tank located on an adjacent parcel. SCS performed field investigations, developed LFG control system design, prepared the Erosion & Sediment Control Plans, prepared the Site Plan Permit applications, and provided construction administration, construction engineering, and construction quality assurance (CQA) inspection.

Landfill Gas Collection and Control System. SCS performed the engineering design to develop construction drawings and specifications, and developed construction cost estimates.

Erosion & Sediment Control Plan, Stormwater, and Site Plan Permitting. SCS developed the E&SC drawings and details, stormwater management drawings and calculations, 50/10 detention exemption, and Engineering Plan Review and the Environmental Plan Review processes. Site plans were approved by the Henrico County DPW.

Construction Administration, Construction Engineering, and Construction Quality Assurance (CQA) Inspection. SCS served as the Owner's representative with respect to administration of the construction contract; provided engineering services during the Construction Phase of the project, and, provided CQA inspection and oversight (often termed resident engineering).

Construction. In 2011, SCS Field Services installed the active LFG migration control system, which was comprised of a horizontal collector trench, condensate sump, blower unit, and extension of electrical service. The construction required compliance with the E&SC plans.

The total cost for this design/build task assignment was approximately $270,000. SCS' total project fees for LFG-related engineering, construction, operations, and monitoring services during the contract were approximately $400,000. The design/build project was implemented on an accelerated schedule of 4 months, which included blower fabrication and delivery, as well as permitting, design, installation, and start-up activities.

Also, in 2010, SCS Field Services installed an expansion of the LFG collection system at the Springfield Road Landfill consisting of 19 gas wells, 2200 feet of 4-inch lateral piping and 775 feet of 8-inch header pipe.

Landfill Gas System Permitting, Engineering, Construction, Operations, and Monitoring
Mid-County Closed Sanitary Landfill
Christiansburg, VA

Client

Montgomery Regional Solid Waste Authority
Christiansburg, Virginia

Contact

Alan Cummins, Executive Director
555 Authority Drive
Christiansburg, VA 24068
540.381.2820 Ext. 302

LFG System Design/Build/Operate

Perimeter LFG Migration Control System – 2005-2009
Blower Station Construction – 2009

Highlights

- ✓ LFG Migration Control
- ✓ LFG System Design
- ✓ LFG System Operations
- ✓ Construction Bid Documents
- ✓ Permitting
- ✓ Regulatory Compliance
- ✓ Construction Quality Assurance
- ✓ Groundwater Sampling & Analysis
- ✓ Stormwater Sampling & Corrective Actions
- ✓ Greenhouse Gas Emission Reductions
- ✓ Landfill Gas-to-Energy Feasibility

SCS Engineers performed landfill gas (LFG) evaluations, regulatory compliance and permitting, design, construction, CQA, testing, control system operations and repairs, monitoring, and greenhouse gas emission reduction (carbon credit) reporting for the Mid-County Landfill.

Beginning in 1998, SCS was contracted by the Montgomery Regional Solid Waste Authority (MRSWA) to address LFG migration control at the Mid-County Landfill in Christiansburg, Virginia. SCS provided the Authority with the engineering and consulting services during the investigation and regulatory phase of the project. SCS provided the Authority with the following engineering services during the design and construction phase of the project:

- Developed conceptual design for the proposed LFG control system, including retrofit of the existing passive vent trench.
- Coordinated with the Authority and other consultants to integrate the LFG system into the final closure design and to accommodate system installation in conjunction with final capping.
- Prepared final design and bid documents consisting of construction drawings, specifications, project manual, and an Engineer's Cost Estimate.
- Provided bid assistance and engineering support to the Authority during the bidding process and recommended award of contract.
- Provided Resident Engineer (RE) and construction quality assurance (CQA) services during system construction. SCS duties included participation at progress meetings, review of shop drawings and substitution requests, observation of performance tests, and development of final certification report.
- Assisted with startup of the full-scale passive flare system and initial wellfield balancing.

- Provided routine operations, maintenance, and monitoring for LFG migration control system and monitoring network, and coordinated submittals to VDEQ.

In 2008 and 2009, SCS performed a design/build project which converted the existing passive LFG control system into an active blower/flare station. The modifications to the existing LFG control systems operating at the site involved converting the existing passive interior LFG collection system into an active LFG extraction system, via the addition of a blower unit upstream of the existing solar-powered utility flare. The total cost for this design/build task assignment was approximately $100,000. SCS' total project fees for LFG-related engineering, construction, operations, and monitoring services during the contract were approximately $420,000. The design/build project was implemented on an accelerated schedule of 6 months, which included blower fabrication and delivery, as well as permitting, design, installation, and start-up activities.

Other LFG-related miscellaneous assignments performed by SCS involved assessment of Greenhouse Gas Credit Potential for Landfill Methane Reduction at the Mid-County Landfill to estimate carbon dioxide equivalent reductions and assisted the Authority with sale of vintage and current carbon credits via the Chicago Climate Exchange (CCX). Also, SCS conducted a LFG pump test in 2006 as part of a LFG-to-energy (LFGE) feasibility study and assisted the Authority with reviewing LFGE proposals and contract negotiations for implementation of a LFGE project.

Landfill Gas System Engineering and Construction, Air Quality & Environmental Consulting
Cloyd's Mountain Landfill
Dublin, VA

Client

New River Resource Authority
Dublin, Virginia

Contact

Joe Levine, Executive Director
7100 Cloyd's Mountain Road
Dublin, VA 24084
540.674.1677

LFG System Design/Build

LFG Collection and Control System (Blower/Flare Station) – 2007
LFG Wellfield Expansion – 2012

Highlights

- ✓ LFG Design & Construction Drawings
- ✓ Construction Oversight
- ✓ Migration Investigation
- ✓ Carbon Offset Project Technical Support
- ✓ Blower/Flare Construction
- ✓ Air Permitting Compliance
- ✓ LFG Emission Calculations
- ✓ Financial Assurance
- ✓ Stormwater Permit Compliance
- ✓ SPCC Plan
- ✓ Environmental Management System Development
- ✓ Groundwater Monitoring & Reporting

SCS has provided the New River Resource Authority (NRRA) with landfill gas (LFG) engineering, air quality permitting and compliance, carbon offset project support, groundwater monitoring, and other related environmental consulting services at the active Cloyd's Mountain Landfill including:

Landfill Gas Management. SCS conducted a LFG migration investigation, developed the LFG Remediation Plan and prepared documentation suitable for amending the solid waste permit. SCS developed the design and construction documents (drawings and specifications) for the initial phase of the active LFG collection and control system in Area A as well as the system expansion into Area B. The LFG system infrastructure projects in 2007 and 2012 were design/build projects with SCS serving as the design engineer, SCS Field Services serving as the LFG system contractor in conjunction with closure and final capping activities for both projects, and SCS providing CQA and construction engineering services. SCS performed routine system monitoring and balancing upon system start-up in January 2008.

The total cost for the initial design/build task assignment in 2007 for the initial LFG collection and control system, including the blower/flare station, was approximately $700,000. The total cost for the subsequent design/build task assignment in 2012 for the LFG collection system expansion was approximately $250,000. SCS' total project fees for LFG-related engineering, construction, operations, and monitoring services during the contract are approximately $1.3 million. The initial design/build project in 2007 was implemented over a 9 month duration, which included blower/flare skid fabrication and delivery, as well as permitting, design, installation, and start-up activities. The subsequent design/build project in 2012 involved two mobilizations separated by 6 months to accommodate the capping project schedule.

Clean Air Act Compliance. SCS has assisted the Facility with multiple permitting and reporting requirements associated with the provisions under Title V, NSPS, and MACT. Specific tasks included:

- Annual emissions inventory for regulated air pollutants
- Annual compliance reports required by the Title V Permit
- Semi-annual NSPS/Title V monitoring reports
- GHG Monitoring Plan
- Annual GHG Emissions Reports
- Updated Tier 2 NMOC sampling, analysis, and emission rate reports
- Coordination with VDEQ Division of Air Quality

Landfill Gas-to-Energy. SCS has assisted the Authority with evaluation of the feasibility of a LFG-to-energy project and assisted during solicitation of proposals from third-party LFGE developers and subsequent contract negotiations. SCS developed a landfill gas-to-energy feasibility study including economic analysis and financing options for multiple scenarios, developed the RFP for LFGE project development and served as the technical point-of-contact, reviewed and evaluated the proposals submitted from LFGE developers, and provided technical support during project development. SCS reviewed construction documentation for the electrical generation facility prepared by the LFGE developer.

Voluntary GHG Emission Reductions (Carbon Offset) Project. SCS reviews field measurements and recordkeeping related to greenhouse gas emission reductions. SCS prepared technical documentation for registering, validating, generating, verifying, and monetizing greenhouse gas emission reduction credits in accordance with The Climate Action Reserve (CAR) Protocol. Specific task assignments involved project registration, development of GHG Monitoring Plan, methane destruction reporting, CAR variance requests, and responses to requests for clarification from the CAR and third-party verifier. SCS participated in subsequent verification efforts and coordinates monetization of the credits with the Authority, emissions broker, and buyer.

Financial Assurance Cost Estimates. SCS assisted the Authority with annual updates to their financial assurance mechanism and prepared the closure/post-closure cost estimates that serve as the basis for the financial assurance amount. SCS coordinated with VDEQ Office of Financial Responsibility and Data Management to adhere to new guidance and address ongoing development and closure of landfill cells.

Landfill Gas System Engineering & Construction Services
Ingles Mountain Landfill
Radford, VA

Client

New River Resource Authority
Dublin, Virginia

Contact

Joe Levine, Executive Director
7100 Cloyd's Mountain Road
Dublin, VA 24084
540.674.1677

LFG System Design/Build

Wellfield Collection Piping - 2004

Highlights

- ✓ LFG Design & Construction Drawings
- ✓ Construction Oversight
- ✓ Migration Investigation
- ✓ Collection and Control System Evaluation
- ✓ Blower/Flare Construction
- ✓ Air Permitting Compliance
- ✓ LFG Emission Calculations
- ✓ Stormwater Permit Compliance
- ✓ Environmental Management System Development
- ✓ Groundwater Monitoring & Reporting

SCS has provided the New River Resource Authority (NRRA) with landfill gas (LFG) engineering and groundwater monitoring services at the closed Ingles Mountain Landfill including:

Migration Investigation. SCS performed an initial investigation to confirm the existence and extent of LFG migration from the closed Ingles Mountain Landfill. Activities included data collection, LFG extraction wells and perimeter components monitoring and evaluation of existing LFG collection and control system. A final report summarizing the field activities, findings, and recommendations was submitted to the Authority.

Temporary Blower/Flare Installation. SCS coordinated the rental, delivery, installation, and start-up of a temporary LFG blower/flare unit for the purpose of supplementing the existing LFG control system and extracting additional quantities of LFG from the closed landfill. Specific activities included connection of the existing collection system to the blower/flare unit, LFG collection and perimeter systems monitoring, data collection, and troubleshooting.

Collection Piping Replacement. SCS performed a design/build project involving a complete replacement of the existing LFG collection piping that was found to have numerous leaks and excessive air infiltration during site investigations and system troubleshooting. SCS provided construction drawings and coordinated with SCS Field Services to construct the replacement system in accordance with the engineering specifications. SCS personnel provided oversight of construction, system start-up, monitoring, wellfield balancing, and as-built information to the Authority. The total cost for this design/build task assignment was approximately $100,000. SCS' total project fees for LFG-related engineering, construction, operations, and monitoring services during the contract were approximately $190,000. The design/build project was implemented on an accelerated schedule of 4 months, which included permitting, design, installation, and start-up activities.

Coordination with VDEQ. On behalf of the NRRA, SCS has coordinated on-going LFG migration remediation efforts with the Virginia Department of Environmental Quality (VDEQ). SCS and the Authority have held meetings with VDEQ to discuss LFG remediation progress, gain regulatory approval of proposed site-specific remediation activities, and to assist with solid waste permit requirements and necessary updates. SCS also prepared and submitted an updated LFG Remediation Plan to VDEQ.

Financial Assurance Cost Estimates. SCS assisted the Authority with annual updates to their financial assurance mechanism and prepared the post-closure cost estimates that serve as the basis for the financial assurance amount. SCS coordinated with VDEQ Office of Financial Responsibility and Data Management to adhere to new guidance and address post-closure of the sanitary and debris landfill cells.

Landfill Gas System Engineering, Construction, Operations, Monitoring, and Reporting
Rockingham County Sanitary Landfill
Rockingham County, VA

Client

Department of Public Works
Rockingham County, Virginia

Contact

Mr. Warren Heidt
Public Works Director
540.564.3021

LFG System Design/Build/Operate

LFGE Treatment Facility and Pipeline – 2008

Total Contract Amount

>$3,000,000 – Landfill Gas

>$120,000 – Groundwater

Highlights – Landfill Gas

- ✓ Landfill Air Permitting
- ✓ Title V Operating Permit
- ✓ NSPS and Tier 2 Consulting
- ✓ Landfill Gas System Design
- ✓ GCCS Design/Build
- ✓ LFGE Pipeline/Compressor Design/Build
- ✓ Other Tasks Include Groundwater and Landfill Engineering Services

Landfill Gas. SCS has been providing landfill gas engineering and air compliance consulting services to Rockingham County since 1999.

Rockingham County engaged SCS Engineers and SCS Field Services (SCSFS) to perform the engineering, design, and construction of a landfill gas (LFG) treatment facility and pipeline for transport of LFG from the Rockingham County landfill three miles to the new Rockingham Hospital. LFG is collected from the existing LFG collection system, which consists of landfill gas wells, a collection piping system, and a utility flare. The treatment system was integrated with the existing blower/flare station and GCCS to supply treated LFG to through the pipeline to meet RMH's energy demand while diverting excess unprocessed LFG to the existing flare for combustion. Landfill gas is treated by removal of moisture through refrigeration and then is compressed to 10 psi for discharge into the pipeline.

To date, other LFG-related specific tasks have included the following:

- Design and construction of a pilot-scale methane gas extraction and combustion system to evaluate its feasibility for subsurface methane migration control.
- Engineering design of a full-scale methane gas extraction and flaring combustion system.
- Evaluation of the technical and economic feasibility of implementing a methane capture, treatment, and pipeline system for delivery of gas to the Rockingham Memorial Hospital (RMH).
- Air permitting and compliance services in accordance with VA Code and the EPA's NSPS and Title V requirements including:
  - Air permitting for the current landfill expansion area.
  - Tier 2 testing and NMOC annual emission rate reporting.
  - Preparation of Title V permit application for the facility.

- Design and construction of expansion of the landfill gas extraction system in 2008.
- Design and construction of treatment and compression system, and 3-mile pipeline to deliver gas to RMH.

In addition to methane and air related services, SCS also provides various other engineering and consulting services to Rockingham County including landfill engineering and operations, and groundwater sampling and compliance.

Furthermore, SCS has provided air compliance consulting services to RMH for many years, including air permitting and emissions reporting for the old hospital campus, and air permitting of the various sources (including the LFG-fired boilers) at the new RMH campus.

Landfill Gas Management and Landfill Engineering
Shoosmith Sanitary Landfill
Chesterfield County, Virginia

Client

Shoosmith Bros., Inc.
11800 Lewis Road
Chester, VA 23831

Contact

Bruce Coble
Manager of Landfill Operations
804.748.3311

LFG System Design/Build/Operate

LFG System Operations – 2011-2015
LFG System Construction – 2013

Contract Amount

> $2,000,000

Highlights

- ✓ Landfill Design
- ✓ Design Documents Third-Party Review
- ✓ Solid Waste Permit Amendments
- ✓ Air Permit Documents
- ✓ LFG Collection System Modifications
- ✓ Polluant Emission Inventories
- ✓ NSPS, Title V, NSR, MACT Compliance
- ✓ Solid Waste Mgmt. Plan Review
- ✓ Control Device Performance Tests
- ✓ Construction Engineering Services
- ✓ Odor Monitoring
- ✓ LFG Sampling and Analysis
- ✓ Traffic Impact Study
- ✓ Noise Management Plan

Shoosmith Sanitary Landfill is a privately owned solid waste management facility consisting of a waste management unit boundary of 374 acres. The permitted waste disposal area is 217 acres.

LFG System Engineering. SCS has assisted the Facility with LFG collection and control system modifications and improvements to accommodate continued filling operations. Various tasks have included:

- Coordination with LFGE project owner regarding controls
- LFG system controls specifications and procurement review
- LFG system field design and installation assistance
- LFG odor management plan implementation
- Maintain and update LFG system as-built drawings

LFG System Operations. Beginning in January 2011, SCS field technicians provided full-time assistance to SBI personnel in support of LFG system operations, monitoring, maintenance, and reporting.

Field activities included wellfield monitoring and balancing, rechecks, fixing oxygen intrusions, wellhead and other minor repairs, well sounding, well pumping, carbon monoxide measurements, ATL rechecks, lateral repairs, and system performance troubleshooting. LFG system construction activities to assist SBI personnel to accomplish expansions, upgrades, and improvements. Field activities included pipe welding, construction and installation of wellheads, connection of new wells, drain line and collection pipe installation and tie-ins.

The cost for the LFG system operations services from January 2011 through May 2015 was approximately $400,000. SCS' total project fees for LFG-related engineering, construction, operations, and monitoring services during the contract were over 2.1 million.

Clean Air Act Compliance. SCS has assisted the Facility with multiple permitting, monitoring, and reporting requirements associated with the provisions under NSPS, Title V, NSR, and MACT as well as participation during EPA and VDEQ compliance inspections.

Solid Waste Permit Amendment. SCS amended the Solid Waste Permit in order to reconfigure the waste disposal limits, make improvements to the landfill design, and facilitate a sequence of construction for developing and operating the landfill. This work included preparation of permit application documents for a major amendment addressing reconfiguration of cell limits, base grades, final grades, alternate liner configuration, leachate system modifications, changes to the groundwater monitoring network, and related redesign efforts. This project also involved wetlands considerations, airspace calculations and life expectancy, and incorporation of technological advances for facility construction, operation, and monitoring, such as updates to the geosynthetic material specifications. SCS assignments also involved development of a traffic impact study, noise management plan, leachate pump station design, tire processing facility, and LFG collection system specifications. SCS works on behalf of the Facility to review the updated solid waste management plan prepared by Chesterfield County. SCS also provides construction engineering support and professional engineer certification during subsequent landfill cell development and landfill closure activities such as final cap construction.

Landfill Gas, Groundwater, and Solid Waste Services
Southeastern Public Service Authority (SPSA)
Suffolk, Virginia

Clients

SPSA
4 Victory Blvd.
Suffolk, VA 23702

US ENERGY Biogas Corp.
1 Bob Foeller Drive
Suffolk, VA 23434

Contacts

SPSA
Amy Hardy
757-398-0832

US ENERGY Biogas Corp.
Dominic Antignano
631-563-6336

Over the years, SCS has provided services to SPSA and to SPSA's landfill gas-to-energy (LFGE) vendor, US Energy Biogas (formerly ZAPCO). Services provided to SPSA are described first, followed by services provided to US Energy

SPSA

- In 1989, SCS compiled a listing of small quantity hazardous waste generators (SQGs) in SPSA's service area, and conducted a survey of the SQGs to estimate the types and quantities of hazardous waste generated.
- During the mid-1990s, SCS constructed an LFG collection system to mitigate odors emitted from leachate manholes; provided a portable blower/flare; and provided routine and non-routine OM&M services for this odor control system.
- Clean Air Act (CAA) consulting services involving the New Source Performance Standards (NSPS), Title V, and National Emission Standards for Hazardous Air Pollutants (NESHAP) have been provided for the Regional Landfill beginning in 1997 and are being provided now. These efforts required negotiations with VDEQ and USEPA as well as detailed coordination with US Energy, resulting in the waiver for stack tests of the on-site and off-site energy recovery control devices.
- In 2000, SCS performed a desktop study to estimate the quantity of commercial waste generated in the SPSA service area. The waste generation estimates were based on similar studies for various jurisdictions in the Washington, DC and New York areas.
- In 2000, SCS conducted a soil evaluation study for the Regional Landfill, including cover soil thickness and hydraulic conductivity on the sideslopes of Cells I-IV.
- From 2001 to the present, SCS has been providing groundwater consulting services at the SPSA

Regional, Isle of Wight, City of Franklin, and Hosier Road Landfills. These services have included QA/QC review; data analysis; statistics and reporting; consulting on corrective action programs; assessment of corrective measures; and nature and extent studies.

- SCS conducted a site investigation and performed a risk assessment at a former industrial facility in Portsmouth and assisted SPSA with negotiations with VDEQ under the Voluntary Remediation Program. The objective of this effort is to develop engineering controls and deed restrictions, which will enable redevelopment into commercial property.

US ENERGY BIOGAS CORP. (Formerly ZAPCO)

A variety of services were provided to SPSA's LFGE vendor at the Regional Landfill. These services involved construction of an LFG collection system for the utilization facility, which houses four engine-gensets. Subsequently, SPSA's transmission pipeline was constructed off-site to the CIBA plant. Both construction and engineering services were provided, as follows:

- Construct the initial LFG collection system. A major element of this project was to provide a system that could be expanded as the landfill cells were filled.
- Prepared permit documents for expanding the LFG collection system in Cells I and II, and for installation of a LFG-fueled leachate evaporator.
- SCS was retained by the loan institutions who financed the LFG utilization project to conduct due diligence engineering studies. These due diligence studies were conducted for Allstate, who financed the original project, and for Lyon Credit as part of a refinancing of 10 ZAPCO projects.
- Constructed the LFG transmission pipeline from the Regional Landfill to CIBA's facility in Wilroy Industrial Park for direct use of the LFG. Provided construction quality assurance (CQA) services and provided interface with inspectors on behalf of LFGE vendor.

Southeast Public Service Authority (SPSA)
Landfill Gas Transmission Pipeline
Suffolk, Virginia

Client

Zapco – US Energy Biogas Corp.
40 Tower Lane
Avon, CT 06001

Dates

April 2000 to October 2000

Key Personnel

Tom Barham
Rich Dart
Robert Mount, Jr.

The project included over 2½ miles of 14-inch high density polyethylene pipe (HDPE) from the SPSA landfill in Suffolk, Virginia, to a boiler facility at the CIBA chemical facility. The project scope of work included the installation of approximately 13,400 linear feet of 14-inch HDPE SDR 21 and SDR 17 piping. The transmission line connects the landfill gas (LFG) utilization at the SPSA Landfill to a boiler facility at the CIBA Chemical facility. The pipeline alignment passes through multiple private and commercial properties in Right-of-Ways and easements obtained by the owner. The pipeline also crosses through environmentally sensitive and protected areas such as the Dismal Swamp.

The project included approximately 2,875 linear feet of directional boring and jacking & boring. The longest directional drill was approximately 1,100 linear feet along a busy Virginia Department of Transportation (VDOT) highway. In addition, the Dismal Swamp crossing was directionally drilled for a length of approximately 600 linear feet. Several railroad crossings were completed by installing 20-inch carbon steel casings for the HDPE pipe. Additionally, several public roads under the control of VDOT were either jacked and bored or directionally drilled.

This transmission line did not include any condensate sumps or traps and was designed as a “piggable” line with pig launching/receiving facilities at both ends of the transmission pipeline.

Landfill Gas Management, Engineering and Regulatory Compliance
Hanes Mill Road Landfill, Winston-Salem, NC

Client

City of Winston-Salem/Forsyth County Utilities Commission

Contact

Ed Gibson, PE
Solid Waste Engineer
336.661.4900

Contract Amount

$500,000

Highlights

- ✓ LFG System Design
- ✓ Specifications
- ✓ LFG Remediation Plan
- ✓ Sampling and Analysis
- ✓ Air Permitting
- ✓ LFG Collection System
- ✓ Emissions Inventories
- ✓ Regulatory Compliance
- ✓ Construction Oversight

Hanes Mill Road Landfill is a municipal solid waste (MSW) management facility located in Winston-Salem, North Carolina. The facility is owned by the City of Winston-Salem.

Since 1997, SCS has provided comprehensive LFG management and consulting services dealing with LFG migration, remediation actions, NSPS compliance, Title V permitting and reporting, SSM Plan development, Gas Lease Agreement, and LFG system design permitting and construction. Descriptions of work are provided below.

LFG System Engineering. SCS has assisted the Facility with LFG collection and control system design, permitting and construction oversight to accommodate continued filling operations. Various tasks performed to-date included:

- LFGE project design criteria
- LFG system specifications and construction drawings
- LFG system field design and installation assistance
- LFG ambient air monitoring and odor assessment
- LFG system construction quality assurance
- Conceptual Masterplan development
- Installation and OM&M of a temporary utility flare
- Technical support during Gas Lease Agreement negotiations
- LFG migration control investigations

Clean Air Act LFG Compliance. SCS has assisted the Facility with multiple permitting, monitoring, and reporting requirements associated with the provisions under NSPS, Title V, NSR, and MACT. Specific tasks included:

- Amendment of the Title V permit application
- Development / amendment of the NSPS Design Plan
- Submittal of the Title V Permit renewal application
- Minor NSR permit documentation for temporary utility flare and landfill cell construction
- Routine surface emission monitoring and review wellhead monitoring performed by others
- SSM Plan development
- Annual emissions inventory for regulated air pollutants
- Annual / semi-annual NSPS/Title V/SSM Plan reports
- Method 25C NMOC sampling, analysis and emissions calculations

Landfill Gas Control System and Odor Mitigation
Caroline County Landfill
Bowling Green, Virginia

Client

Caroline County, Virginia

SCS provided landfill gas (LFG) engineering services for design, permitting, and construction of the LFG control system to mitigate odors and migration at a closed facility that accepted substantial quantities of gypsum drywall waste and, therefore, had high hydrogen sulfide emissions.

COLLECTION AND PILOT-SCALE SYSTEMS

SCS submitted the LFG control system drawings and design criteria memorandum to VDEQ prior to issuance of Temporary Authorization. SCS Field Services (SCS-FS) installed the LFG collection and pilot-scale treatment systems. The pilot-scale treatment system consisted of a utility flare and contact unit (scrubber) containing a triazine solution to remove hydrogen sulfide from the LFG prior to combustion.

ENGINEERING DOCUMENTS

SCS developed permitting documents, construction drawings, and specifications for the final LFG treatment system, which consisted of a skid-mounted blower station to extract the LFG from the landfill and deliver it to an enclosed ground flare. A utility flare served as a back-up control device. SCS-FS also installed this system.

AIR MONITORING

SCS-FS conducted routine ambient air monitoring and LFG system operations, maintenance, and monitoring to measure the concentrations of malodorous compounds leaving the landfill site and to assess the effectiveness of the collection and control system.

LITIGATION SUPPORT

Throughout the project, SCS provided litigation support to the County in the form of expert testimony in a lawsuit filed by citizens impacted by landfill odors. SCS also represented the County in numerous meetings with the public and regulatory agencies.

Landfill Gas to Energy System
Catoosa County Landfill
Catoosa County Landfill, Ringgold, Georgia

Client

Catoosa County
800 LaFayette Street
Ringgold, GA 30736
James Flowers
Solid Waste Director
Phone: 706-965-2500
E-mail:
james.flowers@catoosa.com

Dates

April 2011 to December 2011

Key Personnel

Guy Lewis
Pierce Wu
Larry Warren
Jr. Mount

SCS Field Services provided construction services for Catoosa County, Georgia to design and build a facility that efficiently utilizes the available LFG to produce about 633 kW of electric power. The facility was designed around the GE Jenbacher JGC 312 engine model. This engine is rated 633 kW gross power output, designed to operate specifically on LFG, and has a low NOx emission less than 0.6 g/bhp-hr (NO2). At full load, this engine uses less than about 200 scfm of LFG (assuming 50 percent methane by volume).

A new treatment system was installed to collect LFG from the existing wellfield. The treatment system also filters and compresses the LFG to levels suitable for use by the engine. An aftercooler was installed at the discharge of the blowers/compressors to cool the gas to temperatures just above ambient prior to delivery to the engines. Installation of piping to the treatment system connects the existing blower inlet. The existing blower/flare station will serve as backup to the new facility/power plant.

The treated LFG is piped to the new containerized engine/generator. A concrete pad was built for the genset; the pad is located outside of waste, within 50 feet of the existing blower/flare station. The LFG is used by the engines to turn a direct-coupled alternator that produces 633 kW of gross power. Switchgear that synchronizes the engines to the power grid will be located inside the engine/generator container.

Power from the engine/generator has been wired to a new 480V/25kV transformer. Northern Georgia EMC was responsible for components starting from the high or primary side of the transformer to interconnect the new plant to the utility power grid, including the transformer.

Site preparation included surveying, site grading, gravel application, stone paving, and surface restoration. Power generation compound was constructed for all the components of the system including the existing flare skid and air compressor. Stone paved areas have a 6” stone base with geo-textile fabric below the base.

Concrete foundations included construction surveying, excavation, backfilling, and installation of concrete formwork, reinforcement and concrete foundations the containerized engine/generator, the LFG conditioning skid, the pad mounted transformer, and the two oil storage tanks.

Little Dixie Landfill
Cover System Design Build
Jackson, Mississippi

Client
BFI Alabama-Mississippi Landfill District
(now Republic Services, Inc.)
3950 50th Street
Birmingham, AL 35221

Contact
Eric Mead, PE

Contract Amount
$446,000

Dates
June 2001 to January 2002

Key Personnel still with SCS
Rich Dart, Project Manager
Andy Heffel, Cost Estimator
Bob Dick, Design Engineer
Tom Conrad, Principal

Highlights
- ✓ Construction drawings approved expeditiously by MDEQ
- ✓ Construction work completed per the client's schedule
- ✓ Final project cost was less than contract amount

This design-build project consisted of the (1) design, permitting, and construction of a closure system for 10 acres of the active landfill that were at final grade and (2) an extension of the landfill gas system in the area being closed. The cover system work included erosion and sediment controls, final grading of the intermediate cover, construction of drainage terraces and pipe downchutes, placement of an 18-inch low permeability clay layer and a 6-inch infiltration layer, and revegetation.

The pre-construction engineering work consisted of preparing the construction drawings, performing engineering calculations, providing draft and final submittals for coordination and approval by the regulatory agency, a pre-construction meeting, and providing engineering support and consultation during construction.

Earthwork construction consisted of a pre-construction meeting; mobilization; erosion and sediment controls; construction staking for subgrade (intermediate cover) cut and fill; final grading and compacting of the intermediate cover to conform to the landfill permit grades; excavation of low permeability clay from on-site, hauling it to the area to be covered, and spreading and compacting the clay to achieve the 10^{-7} cm/sec hydraulic conductivity specification; placement of an infiltration layer to support vegetation; and revegetation by means of hydroseeding.

The landfill gas system extension involved construction of six wells and piping to collect gas from the portion of the landfill being closed, connecting it to the existing gas collection system, repairing the condensate sump, and replacing the inlet demister.

The wells and piping were constructed after bringing the intermediate cover system to grade but prior to placement of the clay barrier layer to avoid damaging the final cap and to minimize the depth of the pipe trenches and volume of refuse excavated. Excavated refuse was hauled to the active face for disposal on the day it was excavated. Upon completing the landfill gas construction, the new wellhead valves were adjusted to balance the flow with the rest of the wellfield.

The project was carried out and completed in a timely manner and satisfied the client's schedule.

Landfill Gas Collection and Control System Construction
Berkeley County Landfill, South Carolina

Client

Berkeley County Water and Sanitation Authority
212 Oakley Plantation Drive
Moncks Corner, South Carolina 29461

Dates

March 2009 to January 2010

Key Personnel

Tom Conard, P.E.
Guy Lewis
Johnny Meier

SCS Field Services and SCS Engineers worked together to provide engineering, permitting, and construction services for the Berkeley County Water and Sanitation Authority. SCS Field Services provided modifications and expansion to the landfill gas collection and control system (GCCS) including 45 landfill gas (LFG) extraction wells, collection piping, self-draining condensate traps, and a blower flare station. The project consisted of installing a pre-existing design with modifications made by SCS Engineers, and to evaluate the potential to expand the GCCS into the vertical expansion landfill. Modifications included relocating the blower flare station, modifying the location and depth of several extraction wells due to topography changes caused by waste placement since the design was originally prepared, and redesigning the piping network in order to route the collected landfill gas to the new blower flare location. SCS Field Services' construction services included the following scope of work:

- Mobilization of a drill rig
- Lay-out and survey with as-built measurements
- Drill 1,800-feet (47 LFG wells) of 30-inch diameter bores with 6-inch PVC well casings
- 47 2-inch prefabricated wellheads with orifice plates
- 12 Wellbore seals for the wells less then 30-feet deep
- 180 feet of 18-inch SDR 17 HDPE LFG header pipe
- 2,350 feet of 12-inch SDR 17 HDPE LFG header pipe
- 2,000 feet of 8-inch SDR 17 HDPE LFG header pipe
- 975 feet of 6-inch SDR 17 HDPE LFG lateral pipe
- 3,080 feet of 4-inch SDR 17 HDPE LFG lateral pipe
- Three in-line self draining drip leg sumps
- Eight connections to the existing leachate manholes or cleanouts; each has a 2-inch wellhead
- One 24-inch HDPE condensate sump at the blower flare station with an electric pump
- 40 feet of 18-inch CMP casing in dirt road crossing
- 40 feet of 30-inch CMP casing in dirt road crossing
- Two 12-inch butterfly valves
- Four 8-inch butterfly valves
- Silt fence for erosion control
- Seed and mulch
- One skid-mounted 2,500-scfm candlestick flare and blower