

**SALEM COUNTY IMPROVEMENT AUTHORITY
RESOLUTION 2022-71
AUGUST 11, 2022**

**RESOLUTION OF THE SALEM COUNTY IMPROVEMENT AUTHORITY
AUTHORIZING SCS ENGINEERS CONSULTING SERVICES TO CORRECT
OPERATIONAL ISSUES REGARDING THE LANDFILL GAS COLLECTION
SYSTEM AND THE EXPOSED GEOMEMBRANE COVER (“EGC”)**

WHEREAS, several operational issues have been revealed regarding the landfill gas collection system and the EGC; and

WHEREAS, pursuant to Resolution 2022-33, SCS Engineers (“SCS”) has submitted qualifications and was approved by the Board through a fair and open process to render the type of engineering services identified in this project; and

WHEREAS, pursuant to Resolution 2022-48, authorizing SCS to evaluate and correct several operational issues that were revealed with regard to the landfill gas collection system; and

WHEREAS, SCS Consulting has identified, summarized and outlined the necessary corrective actions required regarding the EGC and the gas collection system, and same are outlined on the Memorandum attached hereto as Exhibit A; and

WHEREAS, the cost of the work outlined in the attached Memorandum will not exceed \$70,000; and

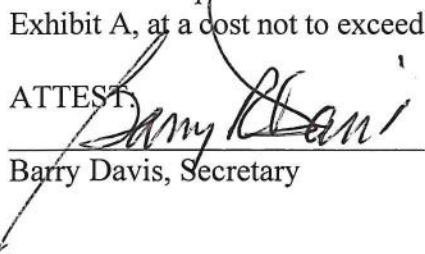
WHEREAS, funds are available in the Methane Gas System accounting line item in the full amount of the cost of the work outlined in the attached Memorandum and same have been certified by the Certifying Officer;

Vendor: SCS Consulting

Account Number	Amount	Department Description
60-16-125-000	\$70,000.00	Methane Gas System

NOW, THEREFORE, BE IT RESOLVED that the SCS Consulting is hereby authorized to perform the necessary work as outlined in the memorandum attached hereto as Exhibit A, at a cost not to exceed \$70,000.

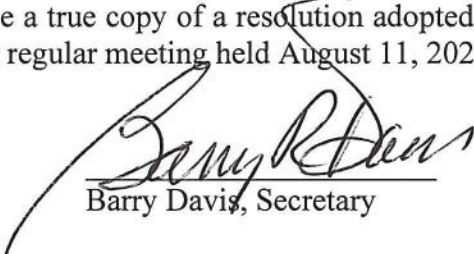
ATTEST


Barry Davis, Secretary


Cordy Taylor, Chairman

CERTIFICATION

I hereby certify the above to be a true copy of a resolution adopted by the Salem County Improvement Authority Board at their regular meeting held August 11, 2022.


Barry Davis, Secretary

August 8, 2022
File No. 02218820.05

MEMORANDUM

TO: Parker Smith and Julie Acton

FROM: Eric Peterson and Christopher Woloszyn

SUBJECT: Gas System and EGC Issues – UPDATE 3 Recommendations and Budgets

As per the scope of services presented in our April 1, 2022, proposal, SCS has evaluated various operational issues involving the gas collection and control system (GCCS) and the exposed membrane cap (EGC). A discussion of our findings and recommendations is presented below.

Loss of Vacuum in a Portion of the GCCS in Cell 7

Following the repair work that was done for the EGC next to the access road to the top of the landfill, a series of wells lost system vacuum. As such, no gas extraction could occur from the six wells that were impacted. A temporary repair made by Earthres allowed for gas extraction through a temporary pipe laid over top of the access road. A permanent solution is needed to restore vacuum at this location plus one other location where vacuum was compromised for a single well (EW-09).

As part of this evaluation, SCS reviewed the gas system operational data and as-built conditions to determine options for connecting to a competent vacuum source within the system. We also visited the site to review the area and locations for the piping connections needed. **Attachment A** includes design drawings depicting the jumper locations for the two areas described above. For EW-09, it appears that the vacuum lateral to this location is compromised as no vacuum is available there. To remedy the situation, a new pipe is to be installed above the EGC to connect EW-09 to the vacuum lateral to EW-04. The two wells will share the same vacuum lateral.

The cluster of wells in Cell 7 that lost vacuum includes EW 27, 32, 34, 35, 36, and 37. We are proposing to connect EW-27 to the vacuum lateral at LFG-E at the top of slope. This should restore vacuum to all six of the interconnected wells. If there is an additional compromise to this well cluster, a second connection could be made between EW-37 and EW-41. Details for the pipe connections and modification needed for the existing wellheads are shown on sheet 2 of the attached drawings.

The estimated cost to install jumpers above grade at two locations is \$13,000. This price includes parts, fusion equipment, and labor for two days. The cost estimate is based on SCS Field Services performing the work and includes an additional laborer to help move piping on the EGC since equipment can't be used.



Ballooning of the EGC Liner

Ballooning of the EGC liner is occurring, particularly with windy conditions. Two areas have been identified that experience ballooning with or without windy conditions indicating that gas collection is an issue. Although shallow gas collectors were installed and tied into the gas system under the liner per the Tetra Tech design, these are installed in limited areas. To remedy this situation, we propose to add shallow gas collectors to draw down the gas bubble and maintain flat conditions. These collectors would consist of perforated piping inserted between the EGC and the underlying soil cover. Proposed locations and details for installation are presented in **Attachment B**.

The vacuum for these installations will be supplied from the nearest existing gas extraction components in the GCCS. These measures also will guard against previously observed tearing of the EGC liner around the gas well boots in areas where ballooning has occurred.

The estimated cost for SCS to install the system modifications needed to pull down the membrane is \$14,700 for budgeting purposes. The estimate assumes that work is accomplished in conjunction with the boot repairs so that the penetration boots are installed by a liner technician.

Well Boot Design

Concerns about the design of boots for gas wells and other penetrations through the EGC arose after installation as surface emissions monitoring (SEM) revealed that methane emissions were occurring at numerous (initially 17) boot locations. Note that the initial SEM was conducted during a time when the new flare controls were being tested and a rental flare was operating. As such, some of the emissions were attributable to reduced gas collection rates. After the flare work was completed, some of the boot leak issues were resolved.

Nonetheless, the boot design provides a pathway for gas to leak out if pressure builds up around the well. In our experience, the boot detail provided in the EGC design drawings is not typical because of this inherent potential pathway for gas emissions. An alternative boot design and/or modification to existing boots may be needed to control emissions and protect against damage. To this end, SCS has developed two options.

The first option is a boot repair that would seal the pathway for emissions. The proposed detail is included in **Attachment C**. Boots around manholes do not have the emissions problem as they are outside the waste mass. Boots around shallow small-diameter pipes, such as air and forcemain penetrations, probably could be sealed with mastic tape if any of these locations are leaking gas. Note that gas well boots that are repaired would need to be observed for settlement during routine monitoring. If the boot appears to be strained, the band clamp at the top would need to be loosened to slide the boot down. The repair approach may be appropriate if all the existing boots are planned to be modified to prevent potential emissions.

An alternate boot detail also is included in **Attachment C**. This detail is a standard detail that SCS uses (and many in the industry) to allow gas well pipes to slide through the boot to accommodate landfill settlement without leaking gas. Based on a recent project (2021) in Burlington County where these details were employed, the cost per boot for installation is approximately \$535. Additional costs for your situation would be involved as the existing boot would first need to be removed. We recommend installing this type of boot to replace the 17 boots that have experienced measurable methane emissions as noted above. Several additional costs would be involved for this project.

Costs would include the mobilization of the liner crew, purchase and delivery of new material, and crew labor expenses to remove the existing boot components. Including these costs and the base price of \$535, an adequate cost estimate would be to double the 2021 Burlington County per-boot price to an approximate cost of \$1,070 per boot. Given the 17 locations, this would equate to approximately \$18,190.

Piezometer Boot Modifications

Recently, SCIA discovered that the membrane boots around the piezometer installations inadvertently covered the access panel needed to retrieve the piezometer instrumentation. This has occurred at four locations. To remedy the situation, the EGC will need to be cut, the piezometer base and access panel exposed, an access extension installed, and a boot added around the extension. A detail of the proposed remedy is included in **Attachment D**. The budget to modify the four piezometer boots is \$8,200. The basis for this budget also is included in **Attachment D**.

Cost Summary

In addition to the construction costs for the various items noted above, field engineering, coordination, and limited construction quality documentation also needs to be budgeted. These costs are estimated to be \$10,000 as we still have \$4,600 of remaining of our initial \$14,000 for engineering related to these issues. The table below summarizes all the costs to remedy the various EGC-related issues described above.

Table 1. Cost Summary

ITEM	AMOUNT
Jumpers to Restore Vacuum	\$13,000
Boot Replacement (17 locations)	\$18,190
Membrane Bubble Collectors	\$14,700
Piezometer Boots	\$8,200
Field Engineering/Documentation	\$10,000
TOTAL	\$64,090