

SCS ENGINEERS, PC

File No. 02206371.01

April 3, 2008

Mr. John Murray, PE
North Carolina Department of Environment and Natural Resources
Mooresville Branch
610 E, Center Avenue, Suite 301
Mooresville, North Carolina 28115

NC DEPT. OF ENVIRONMENT
AND NATURAL RESOURCES
RECEIVED

APR 04 2008



Subject: Liner Repair Certification
Geomembrane Liner Penetration – EW-14
Cell 1A, Anson Waste Management Facility

MOORESVILLE REGIONAL OFFICE
DIVISION OF WASTE MANAGEMENT, SWS

Dear Mr. Murray:

On behalf of the Anson Waste Management Facility (AWMF), SCS Engineers, PC (SCS) is submitting this liner repair certification as a follow-up to the Liner Repair Plan dated January 11, 2008 to the North Carolina Department of Environment and Natural Resources (NCDENR). This plan is to repair the bottom liner penetration in Cell 1A at the AWMF. The liner penetration, which occurred on December 12, 2007, was reported verbally to NCDENR on December 13 and a written notification was submitted on December 18, 2007. The liner repair was performed by a qualified liner seamer on February 27, 2008 and under full-time monitoring and observation of a qualified construction quality assurance (CQA) professional engineer. The following presents a summary of events including but not limited to the cause of the damage to the base liner system in Cell 1A, an immediate remediation method using bentonite to seal the liner penetration, a subsequent excavation of waste to expose the damaged liner surface, liner repair activities and certification of the repair.

On December 12, 2007, the geomembrane liner in Cell 1A was penetrated during the installation of landfill gas extraction well EW-14. Figure 1 shows the approximate location of the penetration at EW-14. Drilling was performed using a 3-ft diameter bucket auger drill rig. It appeared the 2-ft thick soil liner directly underneath the geomembrane liner was not penetrated, or drilled through. Approximately 3 hours after the liner penetration, ten 50-pound bags of granular bentonite were placed in the borehole to provide a seal over the existing soil liner.

On December 13, 2007 representatives of AWMF, the landfill gas contractor (B&M Excavating, Inc.), and SCS (the landfill gas engineer/CQA firm) met at the AWMF around 8:15 am to evaluate the situation. At the recommendation of SCS, an additional forty-eight 50-pound bags of bentonite were placed in the borehole. A 6-in diameter pipe was lowered and suspended in the borehole and was used as a tremie pipe. Water was added on four occasions to hydrate the bentonite. Following the bentonite, the borehole was backfilled with soil to the ground surface. Based on field information and measurements, the liner was breached at an elevation of approximately 321 feet mean sea level (MSL). After filling the hole with bentonite, SCS submitted a liner repair plan dated February 11, 2008 to NCDENR, which included a waste



excavation grading plan, a geotechnical slope stability evaluation of various excavated slope angles considered, and a Health and Safety Plan (HASP) to be followed during liner repair work.

Waste excavation began on January 12, 2008 and was completed on February 25, 2008. Waste excavation was conducted by Earnhardt Grading. Excavated waste was properly disposed of at the active cell of the landfill. Posi-shell was used as an alternative daily cover (ADC) on exposed waste side slopes. The use of an ADC greatly reduced the time needed to make the repair and helped with odor control as well.

In order to avoid damage to the base liner system (due to excavating equipment), waste was excavated to a depth of approximately 323 feet MSL surrounding EW-14, or to the top of the operational layer. The excavated slope was maintained a maximum slope of 2 horizontal to 1 vertical (2H:1V). The excavation also maintained a 20-ft wide ramp for access to the liner repair area. The excavation grading plan (Figure 2) includes a 20-ft by 20-ft "flat" spot centered on the location of the penetration. The operational cover was hand-excavated in this area to expose the geomembrane liner and geocomposite drainage layer. The flat area provided adequate space for the liner crew to access the extent of the liner damage and to repair the penetrated liner.

On February 26, 2008, SCS personnel were on-site and conducted a safety meeting to review the HASP for the liner repair effort and to prepare the damaged liner surface ready for patching the hole. An air blower was used at all times to pump air into the liner repair area to ensure safety of the workers in the repair area. The jagged liner and geocomposite drainage net edges, due to the penetration of the auger bucket, were trimmed and the exposed liner surface around the hole was cleaned up. No leachate seeps were observed in the excavated area during liner repair. Bentonite powder was used to level off the soil surface within the hole.

On February 27, 2008, the soil liner surface and the liner repair area were re-inspected and photographed by SCS. The size of the patch hole on liner was about 4 feet in diameter. Based on visual inspection, the integrity of the soil liner remained intact. A photograph of the hole is shown in Figure 3. A patch was cut from surplus textured 60-mil HDPE material remaining from Cell 1E construction. After the extrusion welding gun G-2 was heated up to the temperature of 260 degrees, a trial weld was prepared. A photograph of the trial weld is shown in Figure 4. Based on the project specifications, all specimens achieved passing test results, with peel adhesion seam strength ranging from 125 to 135 pounds per square inch (psi) and exhibiting Film Tear Bond (FTB) break mode. Based on these results, the equipment and seamer were approved to perform extrusion welding. A copy of the trial weld log and test results is included in Attachment 1.

Upon the arrival of NCDENR's regional engineer at 10:00 am and with his approval of the subgrade soil liner condition, SCS heat-bonded the ready-cut patch to the underlying liner in order to perform necessary grinding of the edges for extrusion welding. An edge grinder was used to "scuff" the liner surface of the patch edges and the underlying HDPE liner to provide an acceptable fresh surface for extrusion welding. The extrusion welding of the patch was done by the same equipment and seamer who performed the passing trial seam. All grinded areas were covered by the extrusion bead around the entire patch perimeter. A photograph of the patched area with extrusion welding is shown in Figure 5. After the extrusion welding was completed,

the patch was tested for leaks using a vacuum box, in accordance with the AWMF's CQA Plan. The entire perimeter of the patch with extrusion bead was vacuum box tested to detect any leaks. During the vacuum box testing, no leaks were detected around the entire perimeter of the patch. A photograph of the vacuum box testing is shown in Figure 6. A copy of the repair logs and seamer's daily reports is included in Attachment 1.

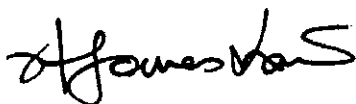
After the completion of the vacuum box test, a piece of approximately 10'x10' geocomposite drainage net taken from the surplus material storage was placed over the repaired area. The newly placed geocomposite overlaps the existing geocomposite a minimum of 2 to 3 feet in each direction. A photograph of the newly placed geocomposite drainage net is shown in Figure 7. The geocomposite was held in place with sand bags and sand placed around the edges until operational cover could be placed. The entire liner repair work was completed by 11:00 am.

Once all the equipment and personnel were cleared out of the repair area, a minimum of 2 feet of clean sand was brought in and placed over the entire repair area as operational cover. A photograph documented placement of the operational cover is shown in Figure 8. Immediately after the operational cover was placed, AWMF began placing waste in the excavation area on the same day of the liner repair. The impact area will eventually be topped off with 18 inches of intermediate soil cover when it reaches the permitted grading height.

SCS was on-site full-time during the liner repair to monitor and document the repair of the base liner system at EW-14 location. We hereby certify that the repair has been performed to meet or exceed the requirements of the AWMF's Technical Specifications and the CQA Plan for the base liner system, the leachate collection system and the operational cover.

If you have any questions or require any additional information, please contact either James Law at 919-662-3015 or Steve Lamb at 704-504-3107.

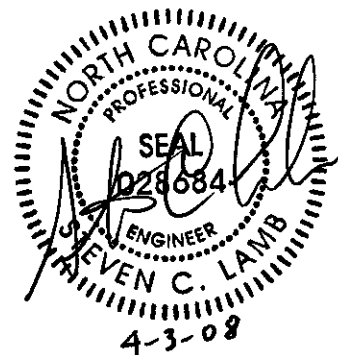
Sincerely,



Hartuan James Law, PE
Project Director
SCS ENGINEERS, PC
NC PE No. 030130



Steven C. Lamb, PE
Vice President
SCS ENGINEERS, PC
NC PE No. 28684



HJL/scl

cc: Mike Gurley, Allied Waste
AWMF – Operating Record

Enclosures - Attachment 1 (Daily Reports, Trial weld test results and Repair logs)

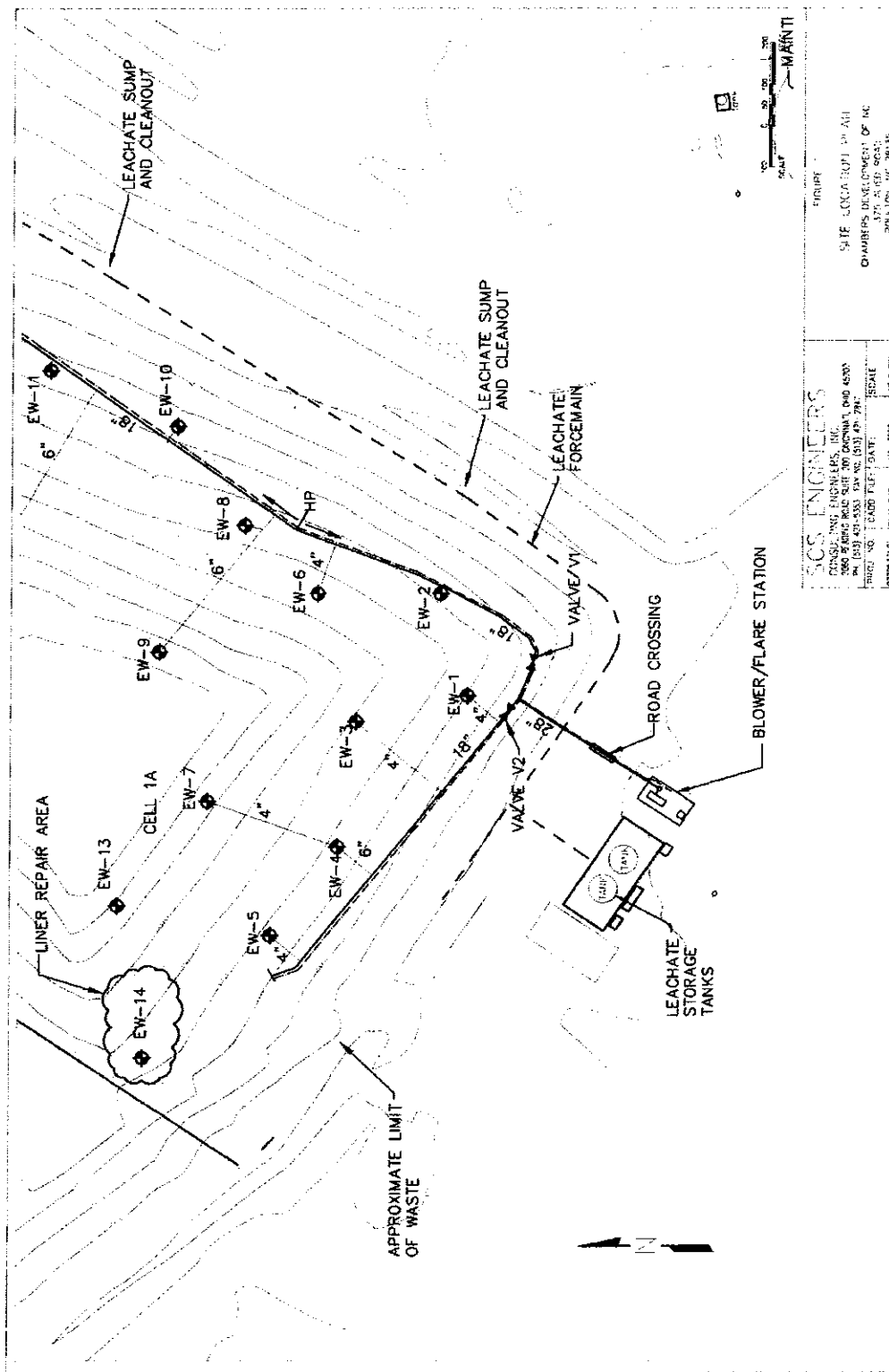


Figure 1. Site Plan Location of Liner Repair Area



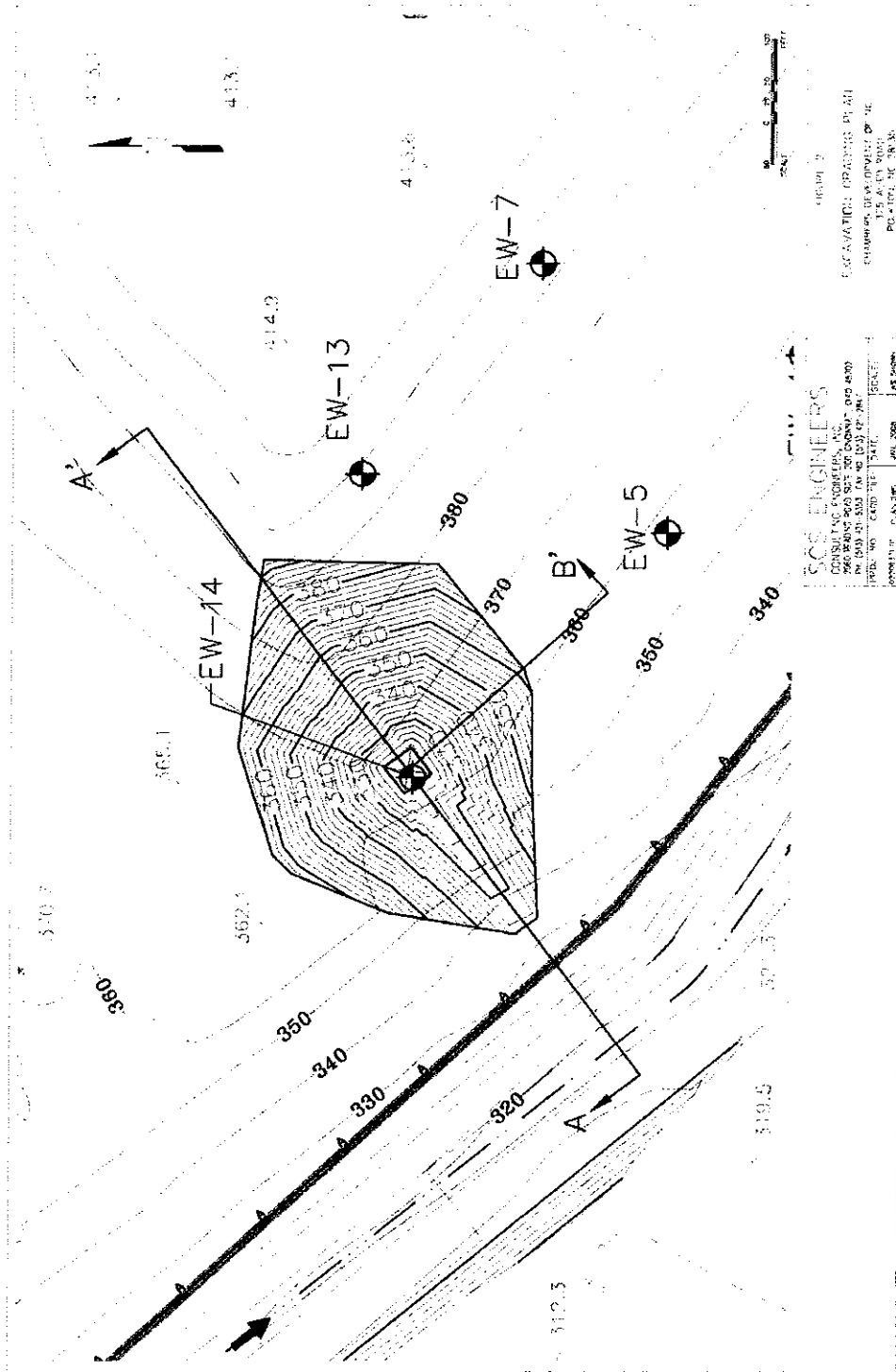


Figure 2. Excavation Grading Plan



Figure 3. Hole on Liner

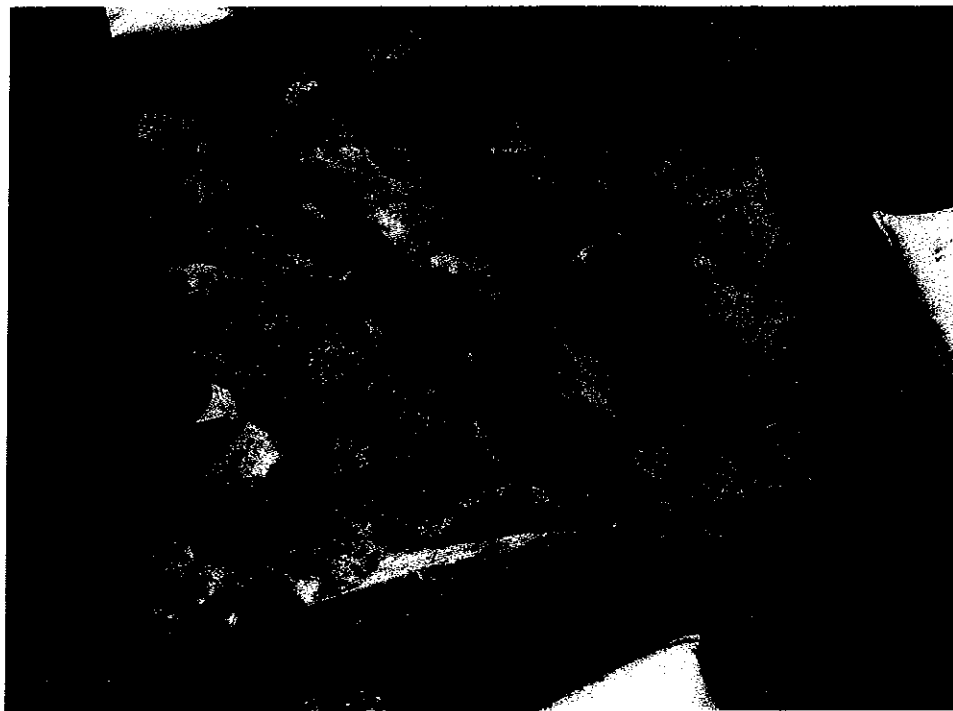


Figure 4. A Trial Weld

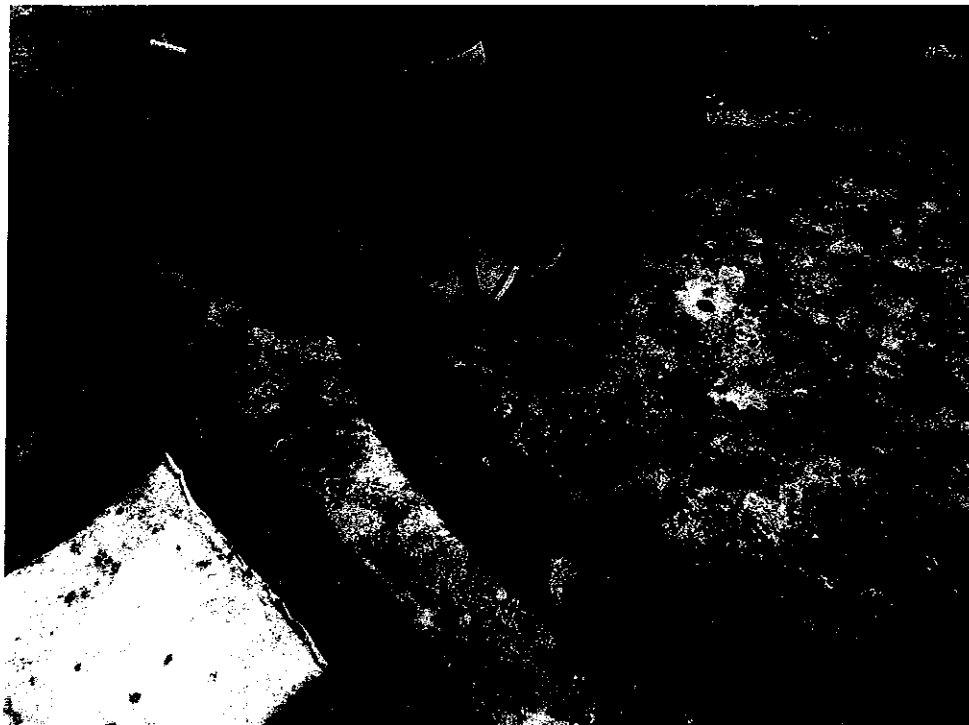


Figure 5. Liner Patched by Extrusion Welding



Figure 6. Vacuum Box Testing



Figure 7. Newly Installed Geocomposite Drainage Net Patch.



Figure 8. Placement of Operational Cover

ATTACHMENT 1

(Daily Reports, Trial Weld Test Result, Geomembrane Repair log)

**SCS ENGINEERS
DAILY FIELD REPORT**

Project No: 02206371.01 **Labor Code: 81000**

Project Name: Anson County Landfill

Contractor:

Date: 02/26/008 **Hours: 8 hrs** **Page: 1**

SCS Personnel: Paul Siriboury **Weather: Rains**

Ground Cond: wets **Wind: calm** **Min 36 Max 55**

Observation:

- Arrived on site.
- Met with Steve Lamb and Adam. Went over Safety plan.
- Shoveled sand off Geocomposite and trimmed around liner damaged area.
- Clean up around damaged area and made preparations for liner repair.

Prepared By:



Date: 2/26/08

**SCS ENGINEERS
DAILY FIELD REPORT**

Project No: 02206371.01 **Labor Code: 81000**

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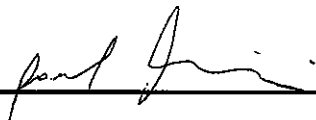
SCS Personnel: Paul Siriboury **Weather: P-cloudy**

Ground Cond: damp **Wind: calm** **Min 36 Max 55**

Observation:

- Arrived on site.
- Cleaned up around the liner-damaged area, made preparations for liner repair.
- Performed trial weld, Extrusion weld patch and vacuum test.
- Prepared documentation for trial weld and repair logs. See trial weld log and repair log.

Prepared By:



Date:

2/27/08

