

LEAK LOCATION SERVICES, INC.

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September 29, 2014

Naomi Azulai
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Ignacio, Colorado 81137

Email: naomi@maralexinc.com

Subject: Report for “Geomembrane Leak Location Survey of the Roan Creek Evaporation Pond at the Maralex Facility near DeBeque, Colorado;”
LLSI Proposal 2126

Dear Ms. Azulai:

On September 23, 2014 John Ortiz of Leak Location Services, Inc. (LLSI) performed a leak location survey of the geomembrane of the subject pond. The pond is lined with a 40-mil geomembrane and has an area of approximately 65,000 square feet. Most of the pond contained about 4 inches of water, although some areas of the pond were not covered with any water. Two panels on the south end of the pond were not surveyed due to their lack of water cover. There was also a layer of compact salt covering the floor of the pond and earth sediment around the pond’s edges during the survey. This report documents the results of the survey.

I. RESULTS

A. Survey

Fourteen leaks were found in the geomembrane of the Roan Creek Evaporation Pond. Figure 1 shows the approximate locations of the leaks and Table 1 lists the approximate locations of the leaks found in the pond.

B. Leak Detection Sensitivity Test

The leak location equipment was tested to document the leak detection sensitivity. A simulated leak was constructed by placing a 0.06 inch-diameter hole in a plastic container with a thickness approximating the thickness of the geomembrane. An insulated wire with a stripped end will enter the container through a sealed insulating penetration. The other end of the wire was connected to earth ground. The container was filled with water from the lagoon and submerged in the lagoon. Leak location scans were made to determine the maximum distance that the simulated leak can be reliably detected. The simulated leak could be detected from 3 feet away.



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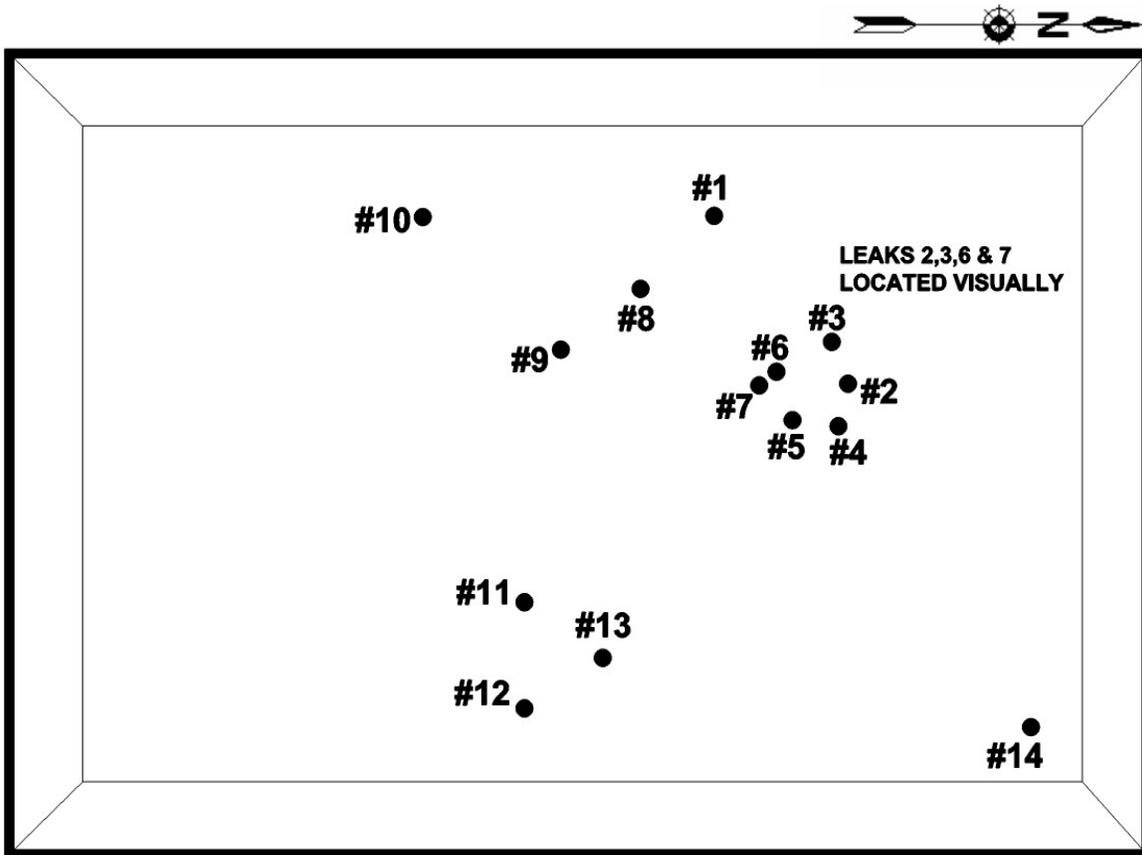


FIGURE 1. APPROXIMATE LOCATIONS OF LEAKS IN THE ROAN CREEK EVAP. POND

Table 1. Locations of Leaks in the Roan Creek Evaporation Pond

LEAK	LOCATION
1	19 feet from mark on west slope on panel 10
2	65 feet from mark on west slope on seam of panels 10 & 11
3	50 feet from mark on west slope on seam of panels 10 & 11
4	80 feet from mark on west slope on seam of panels 10 & 11
5	80 feet from mark on west slope on panel 10
6	70 feet from mark on west slope on panel 10
7	70 feet from mark on west slope on panel 10
8	40 feet from mark on west slope on seam of panels 9 & 10
9	70 feet from mark on west slope 1 foot north of seam for panels 8 and 9
10	25 feet from mark on west slope on panel 7

11	85 feet from mark on east slope on seam of panels 7 & 8
12	50 feet from mark on east slope on seam of panels 7 & 8
13	60 feet from mark on east slope on seam of panels 9 & 10
14	20 feet from mark on east slope on seam of panels 13 & 14

II. TECHNIQUE

A. General

The electrical leak location method detects electrical paths through the liner caused by water or moisture in holes through the liner. A voltage is connected to one electrode in the water covering the liner in the impoundment and an electrode connected to earth ground. Electrical current flowing through the leaks in the liner produces localized anomalous areas of high current density near the leaks. These areas are located by making electrical potential measurement scans in the water on the geomembrane liner. Determining the size of the leaks based on the leak location scans is impractical.

B. Wading Survey

For a wading survey, the operator wades in the water and systematically scans the submerged liner to locate any leaks. The operators scan the floor area with overlapping coverage, moving the probe laterally across an 8-foot span, advancing a distance of about 18 inches, and then moving the probe laterally in the opposite direction. In this manner, the total area of water-covered liner is surveyed with the probe passing within approximately 9 inches from every submerged point on the liner. Any seams are double checked by scanning the probe along the seams. The located leaks are marked with weights connected to floats on a string. The locations of these markers are referenced to marks placed on the side slopes above the water line.

If there are any questions regarding leak location surveys or this report, please contact us at (210) 408-1241. We appreciate this opportunity to have been of service to on this important service requirement.

Very truly yours,



Dale Kemnitz
Client Relations Officer/Project Manager

Approved by:



Matthew Kemnitz
Operations Officer/Project Engineer