



Case Study: Advanced Leak Detection for Tailings Management with eLagoon™ Technology

1. Executive Summary

The eLagoon™, a fully autonomous floating drone, was utilized to conduct a precise leak detection survey in a 120,000 square meter (1,291,669 square feet) evaporation pond. This case study demonstrates the successful identification and repair of a leaks in a double-liner (HDPE 1.5mm/60Mil) facility without the need for full drainage, ensuring operational efficiency and environmental safety.

2. Introduction

This case study examines the application of a high-precision, fully autonomous floating drone, the eLagoon™, for leak detection in challenging environments, specifically evaporation ponds containing toxic liquids. The survey was conducted in an evaporation pond featuring a double-liner system (HDPE 1.5mm/60Mil) with an interstitial drainage layer. The pond covered 120,000 square meters (1,291,669 square feet) and contained 2 meters (6.56 feet) of toxic liquid with an additional 30-50 cm (11.8-19.7 inches) of sludge. Notably, the double-liner facility lacks a conductive layer between the liners, making it virtually impossible to survey with traditional arc testing methods when empty.



Picture of the surveyed facility.



Picture of the eLagoon™ drone.



Typical sludge layers observed in the facility after complete liquid evaporation, taken during the subsequent summer.

3. Project Overview

The 120,000 square meter (1,291,669 square feet) pond was divided into four sections, each with its individual drainage system. Two of the sections' drainage systems indicated leaks. The primary objective was to survey these two specific sections, each covering 30,000 square meters (322,917 square feet), where a leak of approximately 1 liter of water per 60 seconds was detected. The mission was to precisely locate this leak using advanced technology.

4. Methodology

Setup and Equipment

The survey began early in the morning with the setup of a base camp completed within just one hour. The setup included:

- **RTK GPS Base Station:** Provided precise positioning and mapping.
- **Connectivity Systems:** Ensured seamless communication between the eLagoon drone and the computer with data analysis software.
- **High voltage generator – eSource 360:** A robust power source to supply uninterrupted operation of the artificial electric field, necessary for the survey.



Base camp.

5. Deployment of eLagoon™ Technology

The eLagoon™ drone, designed for operation in toxic environments with its durable fiberglass construction, was deployed. It utilizes an advanced dipole leak detection system, refined through years of research, and integrated with proprietary software for real-time data collection and rapid analysis.

6. Survey Execution

Over three days, the perimeter and the two designated sections of the pond were meticulously scanned. The eLagoon™ technology allows for surveying up to 20,000 square meters (215,278 square feet) in just 8 hours, ensuring thorough coverage within the allocated timeframe. Each of the two sections surveyed revealed a leak near the liquid surface, which allowed for repairs without the need for extensive pumping.

7. Results

During the survey, significant anomalies were identified in both surveyed sections. The exact locations of the leaks were pinpointed using precise GPS coordinates and marked on a detailed map. Additionally, buoys were deployed at the sites for easy identification. Interestingly, one of the leaks was caused by a torn geomembrane weld, which was documented with a photograph.



A torn weld hole with a liquid vortex as it flows through the hole.

8. Repairs and Outcome

Thanks to the eLagoon™'s precise survey capabilities, the facility operator was able to only evacuate the excessive liquid covering the damage and to repair the damaged areas without the need for full drainage. Post-repair assessments confirmed that the leakage had ceased, demonstrating the effectiveness of the detection and the swift response enabled by the eLagoon™ technology.

9. Advantages of eLagoon™ Technology

- **High Precision:** Provides real-time data and accurate GPS coordinates for pinpoint leak locations.
- **Durability:** Constructed from fiberglass, allowing efficient operation in toxic environments.
- **Efficiency:** Capable of surveying large areas (20,000 square meters / 215,278 square feet in just 8 hours) with rapid setup and deployment times.
- **Advanced Software:** Enhanced data collection and evaluation, offering immediate insights and comprehensive voltage maps indicating anomalies.

10. Conclusions

The successful leak location and its verification through the subsequent repairs underscore the huge potential of the eLagoon™ technology for the tailings and water management stakeholders. By delivering accurate and timely results, the technology helps maintain the integrity of liquid storage facilities, ensuring environmental safety and operational efficiency. The unique ability to survey double-liner facilities without a conductive layer while the pond is still in operation highlights the groundbreaking nature of this technology.



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As Seen In:

