

## CASE STUDY

# GASOLINE BY THE RED SEA

## Background

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**CLIENT:** Saudi Arabian Environmental Consulting Firm, on behalf of a major Oil & Gas Company

**DURATION:** 4 years

**LOCATION:** West Coast of Saudi Arabia

**PROJECT VALUE:** \$550,000 CDN

At an active bulk fuel facility on the west coast of Saudi Arabia, historical spills and leaks had resulted in up to 1.8 metres of gasoline floating on the water table. The site and geographic location required a flexible, low-infrastructure solution that could withstand the extreme climactic conditions without interfering with the facility's operations.

## Approach

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The oil & gas company hired a local environmental consulting firm to characterize the site. On behalf of their client, the firm tendered an initial pilot project to five companies for bid. IRSL earned the pilot project based on their price and innovative approach.

### VACUUM-ENHANCED PNEUMATIC SKIMMING

To meet the challenges associated with this site, IRSL recommended extracting the LNAPL (Light Non-Aqueous Phase Liquid) through vacuum-enhanced extraction wells instrumented with pneumatic skimmers. A full-time engineer remained on-site for the project's 4-year duration to continuously adjust and optimize the system.

This system was flexible enough to fulfill a number of important criteria:

- Little infrastructure, and minimal power, leaving a very small ecological footprint.
- Minimal equipment to be transported to the site also meant minimal maintenance on-site.
- The vacuum system and skimmers could be easily moved and optimized.
- The efficiency of the skimmers negated the need for a treatment system.



## GEOLOGY: Unconfined aquifer, Silty sand

### APPLIED TECHNOLOGIES

Free product removal was completed through vacuum extraction wells instrumented with pneumatic skimmers equipped with hydrophobic filters. The filters allowed only the LNAPL to pass, leaving the water behind, while the vacuums increased the radius of the skimmers.



InSitu Remediation Services Ltd (IRSL) is one of Canada's most experienced remediation companies. Our team has designed, implemented, and maintained soil and groundwater remediation programs in diverse geological environments in North, Central, and South America, Europe and the Middle East.

We confidently implement innovative solutions, based on sound knowledge, using seasoned field staff. Our pragmatic, flexible approach reduces effort, cost to our clients, and environmental risk.

## Challenge

A number of conditions made this project exceptionally challenging:

- Located on the edge of the Red Sea, the site was tidally influenced, with water tables rising and falling up to 0.5 metres throughout the day.
- The project required continuous, proactive optimization with regard to cycle length and numbers, as well as skimmer position.
- The remote location necessitated minimal and low-maintenance equipment as the equipment, and its replacement parts, had to be transported from North America.
- The extreme climatic conditions required equipment designed to withstand very high temperatures, humidity, corrosion, and dust.
- The active bulk fuel facility's rigorous health and safety regulations required all equipment to be explosion-proof and highly secured.

## Results

- Over 30,000 litres of gasoline were removed over the course of the project.
- The extracted liquid was greater than 99.998% gasoline, minimizing the need to treat extraneous water and translating into real cost savings for the client.
- The purity of the gasoline enabled the company to stream it into their production, effectively paying for the project.
- The pilot project was deemed a complete success, initiating plans for several full-scale projects

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