

# Remediation

of polluted site

## BREST BALLAST POND

BRITTANY - FRANCE



### Rehabilitation of ballast pond in Brest by active barrier and in situ stabilisation



View of site after completion

The ballast pond behind the Moulin Blanc harbour in Brest was commissioned in the late seventies. It was used to store some of the waste from the Amoco Cadiz wreck, then, repeatedly, by ships cleaning their ballast tanks when berthed at the Port de Commerce quayside.

It was decided in the late nineties to shut down the pond and reclaim the land for development as an industrial building site.

#### Solution adopted

CCI invited tenders for a performance-based contract and finally opted for an active barrier / stabilisation solution.

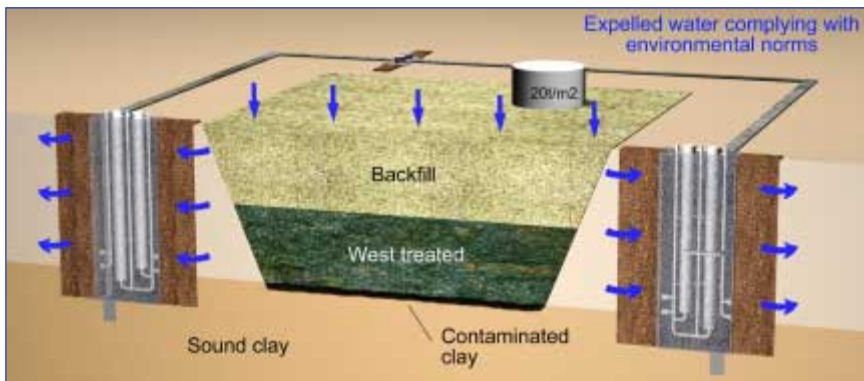
The advantages of this approach are:

- It forms a twin barrier, of material stabilised at microscopic scale and a macro-scale slurry wall around the site. Stabilisation reduces the leaching potential and the filter gates trap any residual leachate.
- If subsequent building work on the site breaks up the stabilised material in places, releasing contaminants, these are also trapped by the filter gates.

OWNER:	CHAMBRE DE COMMERCE ET D'INDUSTRIE DE BREST (CCI)
CONSULTING ENGINEER:	GESTER
MAIN CONTRACTOR:	ATE-GEOCLEAN
PERIOD:	SEPTEMBER - NOVEMBER 2000

#### MAIN WORKS QUANTITIES:

- Slurry wall: 3,200 m<sup>2</sup>
- Filter gates: 4
- In situ stabilisation: 23,500 m<sup>3</sup>



Sketch illustrating active barrier / in situ stabilisation technique

## Description of works

### In situ geotechnical stabilisation (Soletanche Bachy/Inertec)

The consistency of the soil, containing a very high percentage (up to 35%) of pollutants, was spadeable or even semi-liquid, a fact which complicated the treatment work.

The technique adopted was as follows:

- A special tool was developed, consisting of a double paddle mixing and injection system,
- A strip of soil was first treated with the mixer mounted on a long boom,
- Once this consolidated strip had set (quick setting mix), it was used as a working platform to treat the second strip,
- The whole area of the pond was treated in strips in this manner.

A trial strip was performed before commencing the main work, to finalise injection variables and sequencing:

- slurry mix design
  - quantities injected
  - mixing time
  - mixing method (speed and direction of rotation, forward speed, etc.).
- More than 23,000 m<sup>3</sup> of soil was treated by this technique in four months.

### Active barrier (Soletanche Bachy)

An active barrier isolates the enclosed soil from the outside world. When the soil becomes waterlogged with rain, excess water escapes through the filter gates and emerges free of any residual pollutants, i.e. from any minor leachate not fully controlled by the stabilisation work, and from any soil left untreated inside the barrier.



Installing filter gate



In-place mixer

## Conclusion

The combination of processes developed jointly by Inertec and Soletanche Bachy, such as in situ stabilisation of polluted soil and active barrier with filter gates, offers a new, economically attractive approach to the rehabilitation of ballast storage ponds.

The twin - microscopic and macroscopic - barrier provides effective protection to the environment and allows contaminated sites to be developed with new industrial buildings economically and without restriction, other than the need to maintain the active barrier in good condition.

Such maintenance is very simple, consisting of simply changing the filters when they become saturated.

In the case of the Brest reclamation, the gates are designed to last one year.

Monitoring measurements on liquid emerging from the filter gates give entirely satisfactory results, complying with government regulations:

- THC < 1 mg/l
- Phenol < 0.1 mg/l
- Heavy metals (Ba, As, Ni, Co, Cu, Pb) < 0.1 mg/l