

# NORMANDY REFINERY (France) - 2002 Rehabilitation using *in situ* stabilisation of an industrial lagoon polluted with hydrocarbons

Owner .....	TOTALFINAELF
Work carried out by .....	INERTEC
Volume treated .....	15 000 m <sup>3</sup>
Total duration of work .....	6 months

## Introduction

In the 1970's, wastes from the Normandy refinery of TotalFinaElf group were disposed of in a lagoon. Thirty years later, the lagoon contained a mixture of bituminous waste, water lenses and assorted debris.

The lagoon being located in a marsh area, a risk of pollution of the ground waters was identified, and TotalFinaElf together with the DRIRE (french administration) decided to undertake the rehabilitation works.



**View of the lagoon  
at the beginning of the operation**

## Rehabilitation key issues

The rehabilitation process of the lagoon had to address the following issues :

1. treat surface water and water lenses separately from bituminous waste,
2. avoid dissemination of hydrocarbon outside the lagoon (problems in terms of health and safety, cleaning of equipment, odour and dispersion of materials),
3. take into account the existence of excess groundwater pressure which would make excavation of the waste hazardous.



**Treatment plant**

## Rehabilitation process proposed by INERTEC

Considering the rehabilitation key issues and the site technical constraints, INERTEC proposed an innovative solution, based on *in situ* treatment of the bitumen in two stages.

**Stage 1** : pumping the water lenses and surface water to a treatment plant : more than 3 000 m<sup>3</sup> of water were extracted and treated.

**Stage 2** : stabilization and solidification of the bitumen by *in situ* mixing with reagents in a pumpable form.

The objectives of the treatment were :

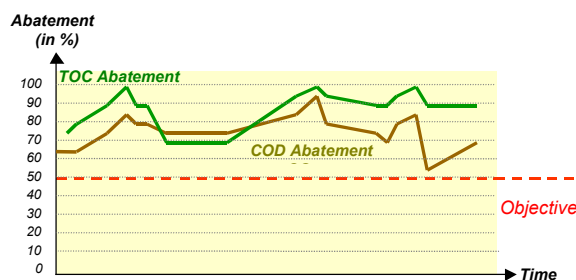
1. **Mechanical** : to achieve a strength suitable for circulation of heavy vehicles,
2. **Chemical** : to reduce the concentration of hydrocarbons and metals (Pb, Zn) after leaching according to NF X31-210 & 211 standards.

## Results after treatment

The effectiveness of the treatment was carefully monitored with an appropriate quality control plan :

Compression tests demonstrated that the 28 day mechanical strength of the treated material exceeded the required value of 0.3MPa.

Leaching tests demonstrated an abatement of the COD and TOC parameters significantly beyond the objective.



All the analyses carried out on leachate from the treated waste gave lead and zinc concentrations below the limit value of 3 mg/kg.

## Conclusion

The innovative method of *in situ* treatment of polluted lagoons proposed by INERTEC is particularly cost effective and environmentally friendly since the treatment is carried out with neither excavation nor transportation.

The success of the operation, which required both precise chemical knowledge and works management expertise, has shown the ability of INERTEC to control all the parameters of the process.



**Lagoon after treatment**