



**SCREENING TECHNIQUES USED FOR CLEANING UP BEACHES IMPACTED
BY THE ERIKA FUEL OIL : MERITS AND LIMITS**

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ABSTRACT

After coarse clean-up operations on the beaches, which consisted in manual or mechanical collection of the largest deposits, residual oil weathered, binding with sand and sometimes with seaweed. Pellets remained on many beaches and the DDASS (French local Departments of Sanitary and Social services) considered their sanitary condition as unacceptable. Further clean-up was thus necessary. But, considering the number of pellets and their size, manual collection as well as mechanical collection with non-selective equipment were could not be considered. Techniques had to be rapidly selected in order to carry out fine clean-up and deal with small daily arrivals of pellets or oiled waste.

This is the context in which *Cedre* tested a large number of screening techniques. Some of these techniques were approved then widely used on the Atlantic shoreline : ex-situ sandsifting using quarry sifters adapted to the particular job to do or left in their original design; beach sifting using various models of sifters (self-propelled or towed); associated techniques for enhanced effectiveness (raking, tilling, etc.); use of compact, walk-behind sifters for fine clean-up and manual sifting (using inclined sieves, mason sieves, "charlottes"). The mobilization of heavy devices and lighter means on such a large scale required the organization of a network for procurement or lending and allowed the evaluation of many models. Several tens of machines of various designs were used on the Atlantic beaches, which enables us today to precisely define their merits as well as further adaptations to achieve even better result. Particular attention will be paid to certain techniques, such as those regularly used to maintain resort beaches (rakes for collecting large brown algae, sifters). Actually, in conditions beyond their usual scope of use, these machines proved indeed very helpful to meet the sanitary services requirements.



Technical lessons learned from the *Erika* casualty and other oil spills

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Sifting techniques used for cleaning up beaches:
performances and limits

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The objectives

- First step:
 - Collect daily arrivals of weathered oil pellets and oiled waste
- Second step:
 - Once primary cleanup is completed, collect oil pellets of a few centimetres first, then of a few millimetres to reach good health conditions
- Third step:
 - To show the general public that the municipality is acting efficiently



Quarry sieves

Ex-situ sandsifting

- Screening devices inspired by quarry sifters
- Ex-situ tests in Loire-Atlantique and Vendée “Departments” (75t/h and -70% pellets)
- Cleanup sites in Morbihan “Department”(several hundred m³ treated)
- Two or three sieves may be superposed
- Performances depend on sand granulometry and hygrometry



Screening machines



- Regularly used for beach maintenance (waste)
- On 4 to 6 inches-thick sand layers
- Used to collect hydrocarbons in previous spills: *Tanio, Aragon, Amazzone*, pollution from illegal discharges at sea.
- Easily available - Easy to buy
- Various styles - Identical operating principles
- Summer 2000: 80 machines





Performances depend on

- The environment:
 - Beach slope
 - Sand granulometry and hygrometry
 - Sand bearing capacity
- The adjustments:
 - Pick-up rotation speed
 - Belt rotation speed
 - Tractor+sifter forward speed
- The tractor:
 - Sufficient engine power (100-120 HP)
 - Ability to work at reduced speed (300 m/h)
- The operator:
 - Appropriate adjustments

Towed machines





- + Reasonable cost: models most commonly used: 7 models have been tested
- + Performance, selectivity, reliability
- + Meshes of 15 to 40 mm
- + On certain models, the waste tank content can be directly dumped in a bin
- Sand compaction due to tractor weight
- Oil pellets split due to belt vibrations
- Bar with claw on pick-up causes pellets fragmentation
- Pick-up equipped with a plate reduces fragmentation but then a ridge forms which affects screening efficiency

➔ DESIGN OF A PICK-UP DEDICATED TO HYDROCARBONS

Carried by tractor

- + Reduced cost
- + Suitable for small beaches cleanup
- + Require less power from tractor
- + Less sensitive to beach slope
- + Fragmentation by belt is limited
- Sand compaction due to tractor weight
- Waste tank empties directly on the ground (further recovery of waste)
- Pick-up: same problems as on towed machines




Self-propelled




- + Pick-up located at the front of device therefore avoiding sand compaction
- + Pick-up is an endless worm screw reducing pellets fragmentation

Continuous rotation of sand in a trommel:

- + High selectivity: the sand remains on the beach
- High pellets fragmentation rate

- Use limited to large ocean beaches, flat and equipped with access ramps
- Costly equipment

Walk-behind models

- 4 models used to carry out fine sandsifting allowing to meet public health services standards.
- 5 mm meshes
- + For use on small beaches offering no access to heavy machinery
- + Mobile (mobile response teams)
- + Low pellets fragmentation rate
- Reduced performance
- Certain models lack reliability




 **Sifters potential impact**

High and low water marks removal



Damage to beach access



Embryonic dune may suffer uprooting



Beach sediments removal