



Cerema

Centre d'études et d'expertise sur les risques,
l'environnement, la mobilité et l'aménagement

Evolution of the monitoring network of seaports to a consideration of European priority substances



Julie Droit, Jocelyn Hiliou,
Marion Messenger, Mohamed El Fadili
Cerema Eau, Mer et Fleuves



- *The REPOM*

- *Initial sediment program*

- *Evolution of the REPOM*

- *New Sediment Program*

- *Review of the transitional phase*

- *First results*

- *First conclusions*






Cerema

Centre d'études et d'expertise sur les risques,
l'environnement, la mobilité et l'aménagement

The REPOM

In french : **RÉ**seau national de surveillance de la qualité de l'eau et des sédiments dans les **PO**rts **M**aritimes.

The REPOM is a network for national monitoring of ports water and sediments quality implemented by the services in charge of the littoral waters control.

-  Since 1997
-  192 seaports
-  4 activities and 4 classes
(Marinas, fishing, commercial and military ports)



Objective :

Monitoring of water and sediment contamination in seaports.



Cerema

Centre d'études et d'expertise sur les risques,
l'environnement, la mobilité et l'aménagement

Initial Sediment Program

Parameters measured in 1997 :

- Description of the sediment :

- Grain size distribution,
- Total organic carbon ,
- Aluminium

- Micropollutants :

- Heavy metals : As, Cd, Cu, Sn, Hg, Pb, Zn, Cr, Ni
- PCB,
- PAH,
- TBT





Evolution of the REPOM



2010 : Beginning of the transitional phase :

- Suspension of the water program
- Development of sediment program :
 - Proposition of new substances : WFD, OSPAR

2014 : Integration to the MSFD monitoring network :

- New substances : MSFD
- New protocol : monitoring of the recent contamination
- Reduction in the number of ports monitored (186 ports)
- Reduction in sampling frequency (every 3 years)

2017 : Review of the transitional phase and identification of relevant substances



New sediment program

Contaminants regulated for dredging activities	Heavy metals, HAP, PCB, TBT
Organostanics	TBT, DBT, MBT Triphenyltin cation
Organochlorines	HCH, Aldrin, dieldrin, endrin, isodrin, HCB, DDT, endosulfan
Organophosphates	Trifluralin
Phenols and derivatives	Nonylphenol, octylphenol, pentachlorophenol, TBBP-A (bisphenol-A)
Brominated compounds	PBDE, HBCD (<i>since 2014</i>)
Phtalates	DEHP
Perfluorinated compounds	PFOS (<i>since 2014</i>)
Dioxins	2,3,7,8-T4CDD... (<i>since 2014</i>)
Furans	2,3,7,8-T4CDF... (<i>since 2014</i>)



Cerema

Centre d'études et d'expertise sur les risques,
l'environnement, la mobilité et l'aménagement

Review of the transitional phase (2010-2015)

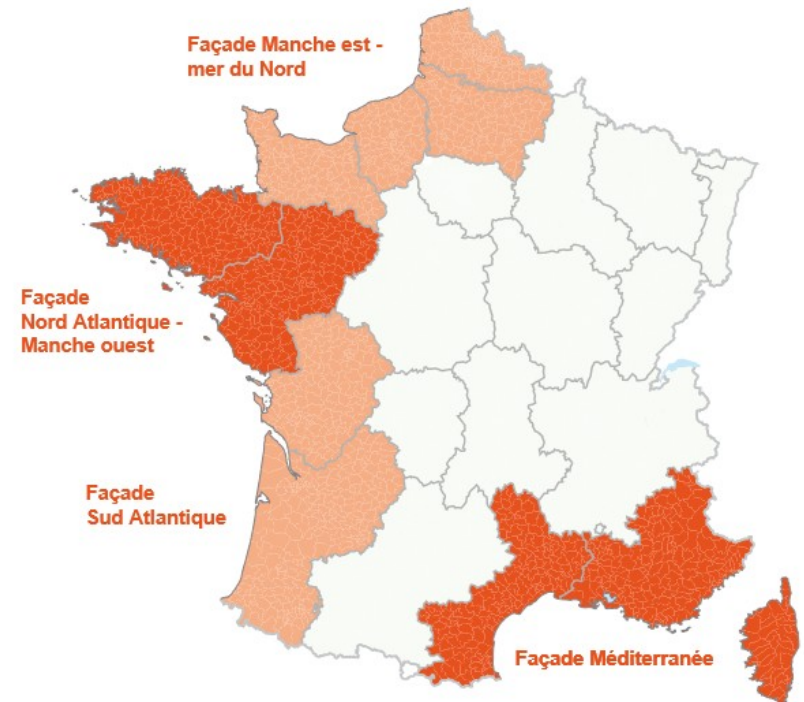
- The analysis excludes contaminants regulated for dredging activities :

Heavy metals, PCB, PAH, TBT

- Sediment threshold values for priority contaminants were defined considering existing data.

- The results were analysed at the level of the metropolitan France and of each coastline :

- Eastern Channel - North Sea,
- North Atlantic - Western Channel,
- South Atlantic,
- Mediterranean.





Review of the transitional phase : first results

- **Some substances were not monitored on all the coastlines :**

Substances	Eastern Channel - North Sea	North Atlantic – Western Channel	South Atlantic	Mediterranean
BDE-206		√		√
BDE-207		√		√
BDE 209		√	√	√
HBCD	√	√		√
Alpha-HBCD				
Beta-HBCD		√		
Gamma-HBCD		√		
Bisphenol-A				√
PFOS		√		√

- These substances are only monitored under the REPOM since 2014 ;
- For some substances there is no standardised method of analysis ;
- Some analyses are very expensive.

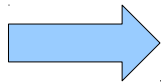


Cerema

Centre d'études et d'expertise sur les risques,
l'environnement, la mobilité et l'aménagement

Review of the transitional phase : first results

- **The recommended quantification limits (QL) are not always met :**
 - The majority of measures are below these quantification limits (QL) ;
 - *But the quantification limits are variable and often too high.*



Only 20% of the priority contaminants were quantified (>QL)



Identification of sediment thresholds

- **Threshold values in sediments relative to priority contaminants have been established considering the existing ecotoxicological data :**
 - Quality standard for sediment (**Qsed**) derived from the Quality standards of the WFD ;
 - Predicted No Effect Concentration (**PNEC**) ;
 - Ecological Assessment Criteria (**EAC**) established under the OSPAR Convention.

Group	Substance	Threshold value (µg/kg)
Organophosphates	Trifluralin	3140
Brominated compounds	PBDE 209	310
	OBDE	5930
	PBDE (28, 47, 99, 100, 153, 154)	6
	HBCD	860
	Nonylphenols	39
Phenols and derivatives	Para-ter t-octylphenol ramifiés	24
	Pentachlorophenol	170
	Tétrabromobisphénol-A (TBBP-A)	410
	Octylphenol	24
	HCB (hexachlorobenzén)	85
Organochlorines	DDT and derivatives	83,6
	Dieldrin	3
	Aldrin	10
	Isodrin	11
	Phtalates	DEHP
Perfluorinated compounds	PFOS	67



Identification of sediment thresholds

- **No threshold value has been established for the following substances :**
 - **due to a lack of data :**

Group	Substances
Organostanics	Triphenyltin
Organochlorines	Delta-HCH
Brominated compounds	PBDE (183, 206, 207)
	Alpha, beta, gamma HBCDD
Dioxins and furans	all the substances

- **or because the threshold value is lower than the limit of quantification :**

Group	Substances
Organophosphates	Fenitrothion
Organostanics	DBT
	MBT
Organochlorines	Gamma and alpha HCH
	Endrine
	endosulfan (beta, alpha, sulfate)



Review of the transitional phase : first results

- The frequencies of quantification of contaminants and exceeding threshold were determined for the ports of each maritime zone and for the entire metropolitan coastline :

- The following table presents the most frequently quantified substances for all the metropolitan ports monitored by the REPOM :

Substances	Quantification frequency	Threshold exceedance frequency
Diéthylhexylphtalate	79,3 %	2,3 %
Dibutyltin	66,8 %	-
Monobutyltin	60,6 %	-
Dioxins and furans ¹	60 %	-
Hexabromocyclododecan ¹	33,3%	-
Polybromodiphenylether 209 ¹	31,2%	-
Nonylphenol	25,7 %	24,8 %
DDT and derivatives	20,60%	2,50%

1. Not monitored in all maritime areas and throughout the transitional period



Review of the transitional phase : first results

The following table presents the **less frequently quantified substances for all the metropolitan ports monitored by the REPOM :**

Unquantified substances	Gamma and beta-HBCD
	PFOS
	Sulfate endosulfan
Quantified substances below the threshold values	Aldrin
	Isodrin
Substances that require additional data	Trifluralin
	PBDE (28,99,100,153,154,183,197)
	Bisphenol A

Substances that have not been monitored on all seafronts, which have not been monitored throughout the transitional period, or whose quantification limits are too high, require additional data.



First conclusions

Review of the REPOM transitional phase allowed to identify a number of recommendations for the monitoring of WFD and MSFD priority substances in port sediments :

- **Substances that have never been quantified for the entire coastline or for one or more maritime zone may no longer be monitored in the concerned areas :** gamma and beta HBCD, PFOS, sulfate endosulfan ;
- **Substances that never exceed threshold values during all the transitional phase** and with respect of the recommended quantification limits may no longer be monitored : aldrin and isodrin.
- **The monitoring of quantified substances on more than 20% of the samples and whose concentrations may exceed threshold values have to be maintained :** DEHP, PBDE 209, DDT and derivatives, and nonylphenol.



Cerema

Centre d'études et d'expertise sur les risques,
l'environnement, la mobilité et l'aménagement

Thanks for your attention !

**Julie DROIT
CEREMA/DtecEMF/ER/IEA**

julie.droit@cerema.fr