

Achieving more with less. Lessons learned by the Oslo Harbor case study, Norway

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Achieving more with less. Is it really possible?

- Yes it is! If you can harvest freebees from someone
- Splitting the bill and sharing results
- Use of waste materials
- Doubling of the environmental effects
- Local solution
- Fight future treats with a blue-green strategy

Splitting the bill and sharing the results

- Oslo Harbor
- City of Oslo
- Norwegian Public Roads Administration
- Bjørvika Development
- Norwegian Environment Agency



Overview of works

Dredging of contaminated sediments <15m

Disposal in local underwater deposit (CAD)

Capping of CAD with sand

Capping of dredged areas with sand

Capping of contaminated seabed > 15 m with clay

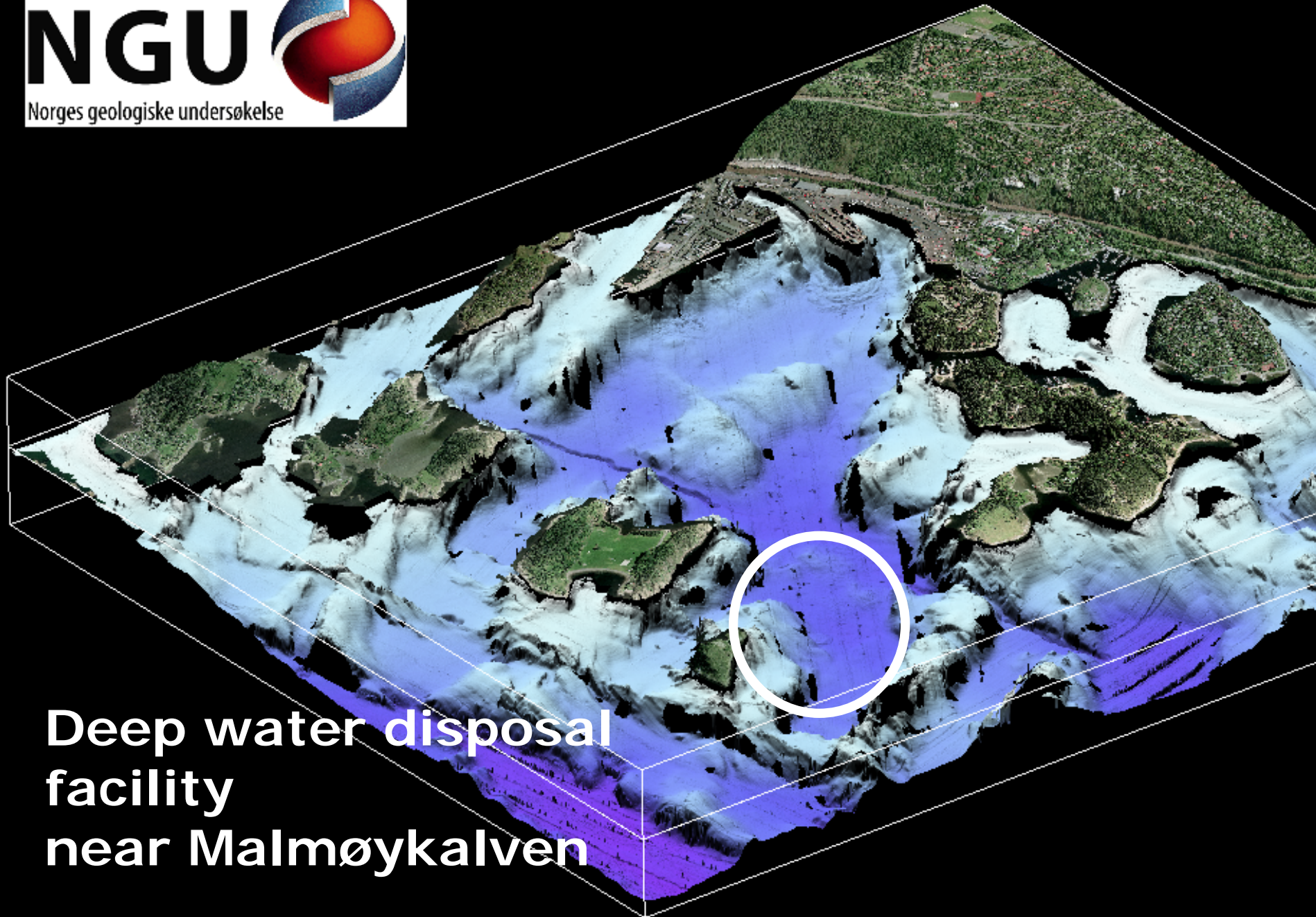
Dredging of contaminated sediments <math>< 15\text{m}</math>



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Disposal in local underwater deposit (CAD) at ~70 m water depth





**Deep water disposal
facility
near Malmøykalven**

photo by Viktor Jæger courtesy www.stopp-giftdumping.org



Capping of the deep water facility



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Capping of dredged areas with sand



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Capping of contaminated seabed > 15 m with clay



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Did you see some more freebees?

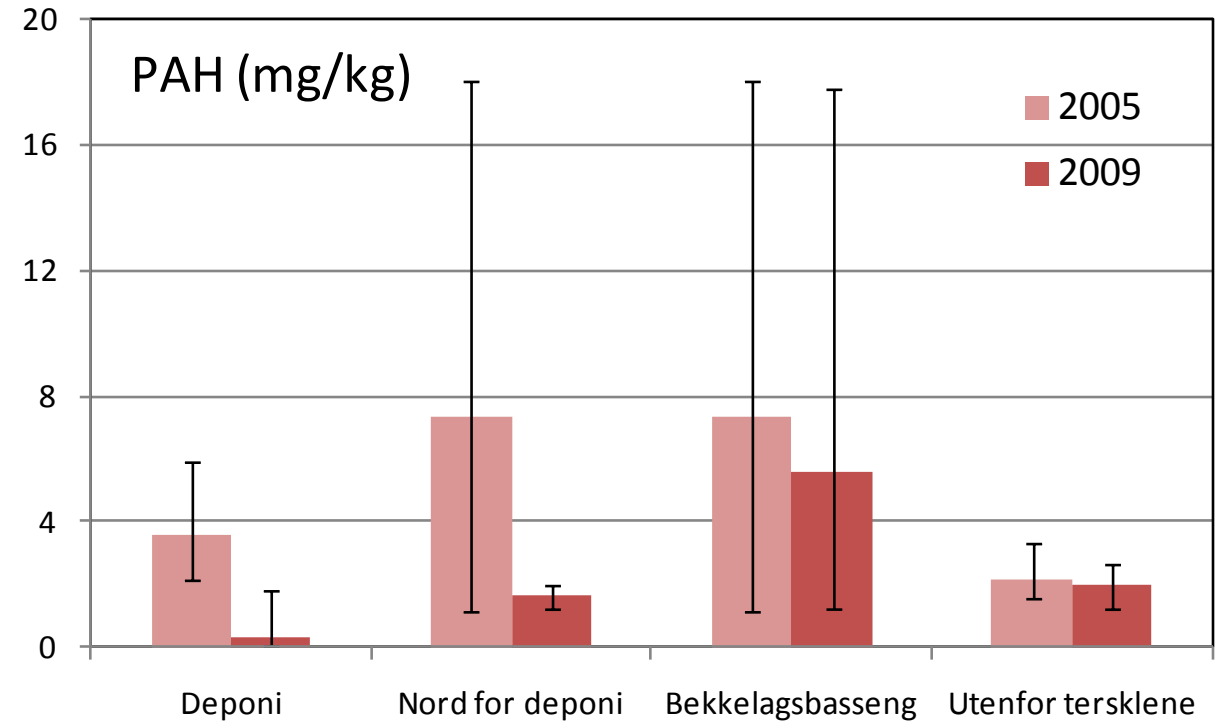
- The Clay, waste material from the excavation of submerged tunnel.
- The sand, waste material. Sandy fraction from local source with little commercial value.



Doubling of the environmental effects



Oslo Havn KF	
Sedimentundersøkelse	Sjettevex 2005/1795-05
Gjennomført 10. Juni 2009	2009-09-25
Målestokk 1 : 10 000	KST
	GBR
	NGI
Dokument: VGS04, Kartprosjekt: UTM, Serie: 32N	



Sediment quality in the CAD area (0-5 cm)						
	Hg	Cd	Pb	PAH-16	PCB-7	TBT
	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	µg/kg
Concentration						
Before establishing the CAD	0,80±0,49	1,39±0,97	94±50	3,58±1,38	28±20	112±92
After capping of CAD	0,03±0,03	0,06±0,06	5,2±2,7	0,30±0,58	< 18	2,4±2,5
Change in sediment quality						
Persent	-96 %	-95 %	-94 %	-92 %	> -47 %	-98 %
Statistical signifikan	Yes	Yes	Yes	Yes	No	Yes

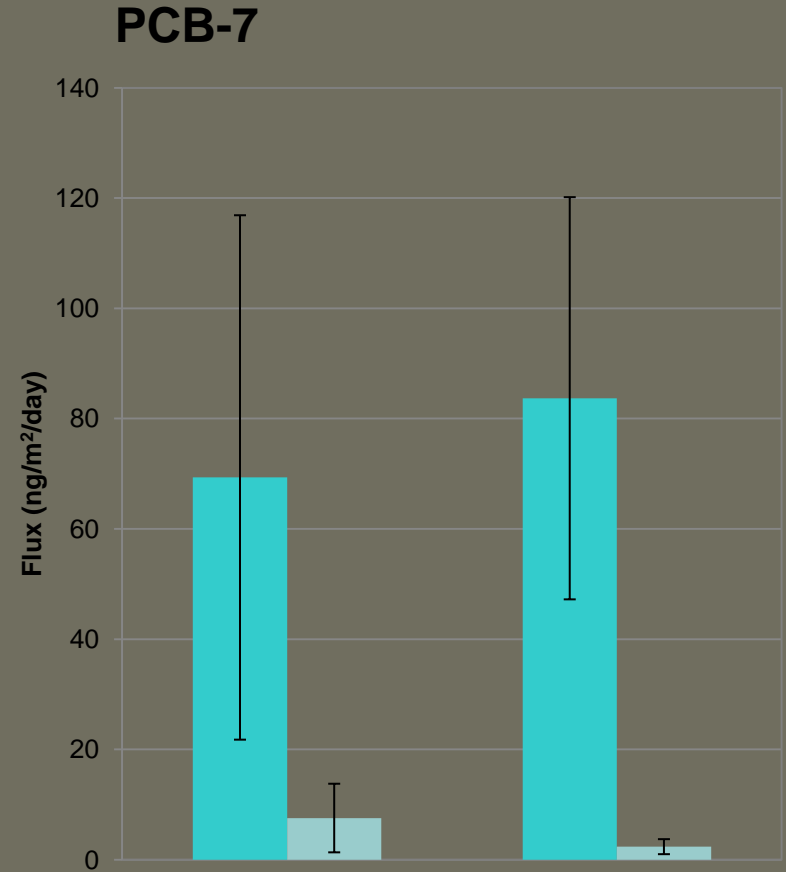
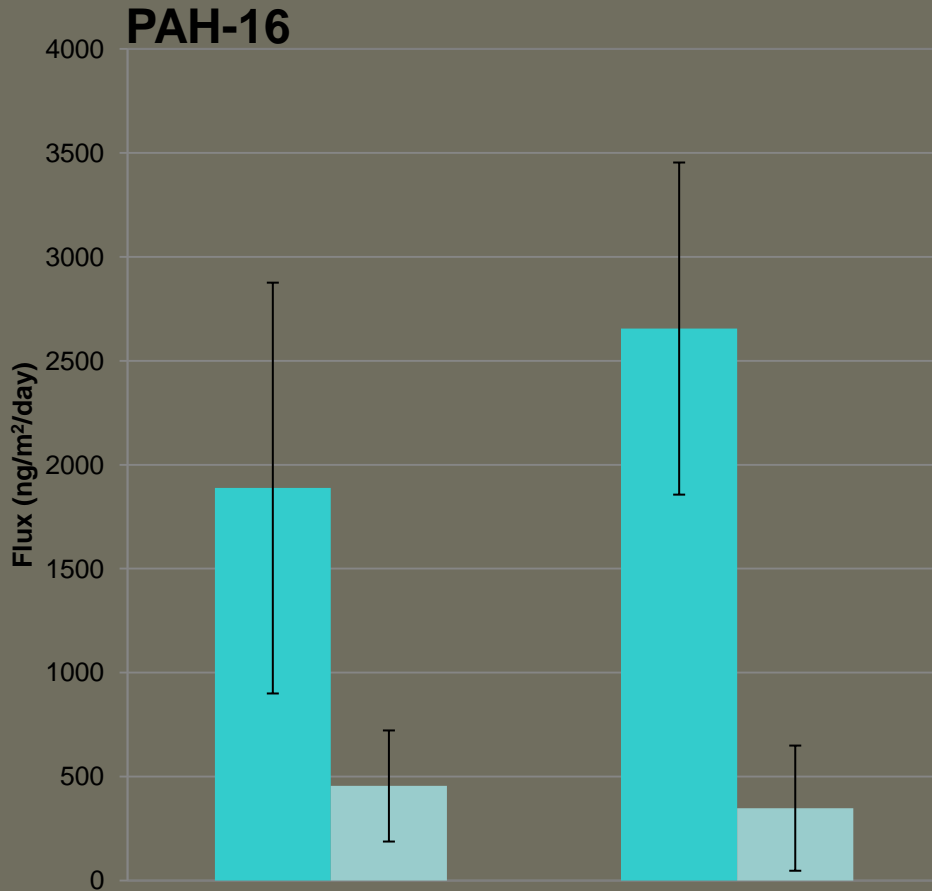


A handy piece of tool

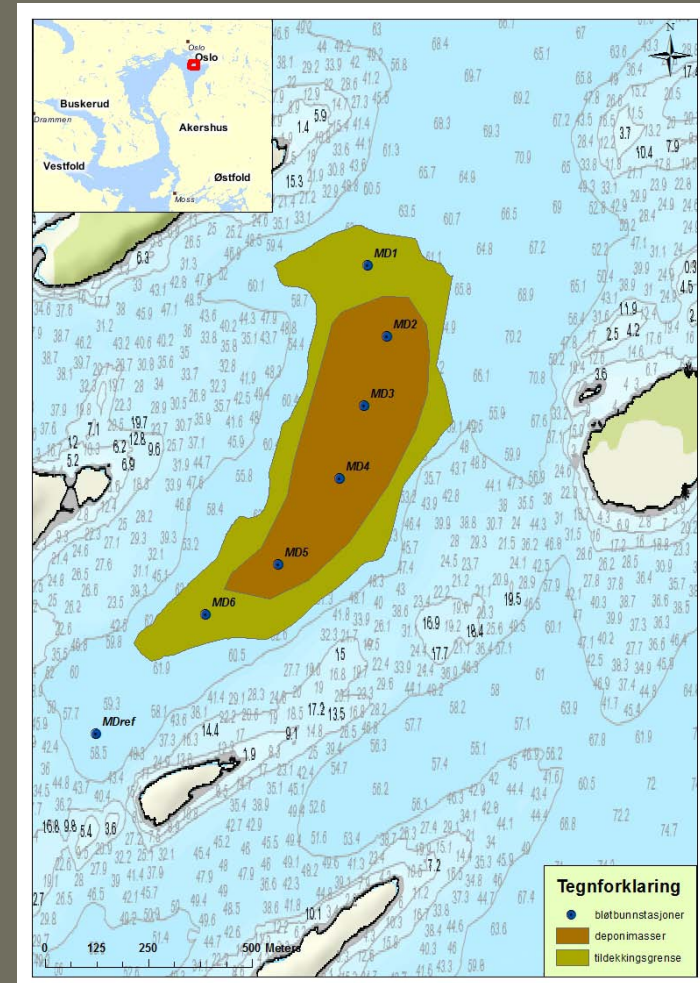


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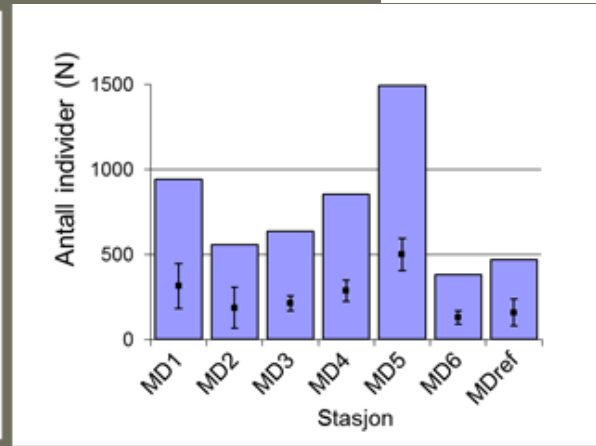
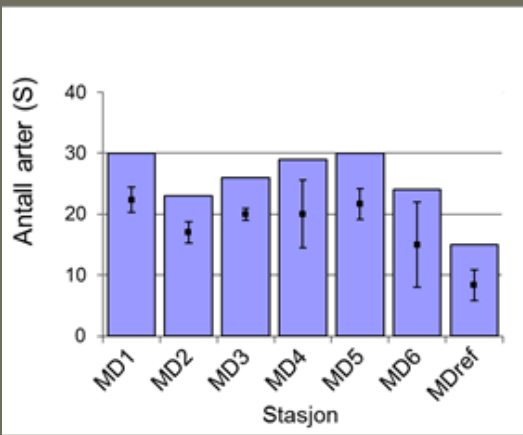
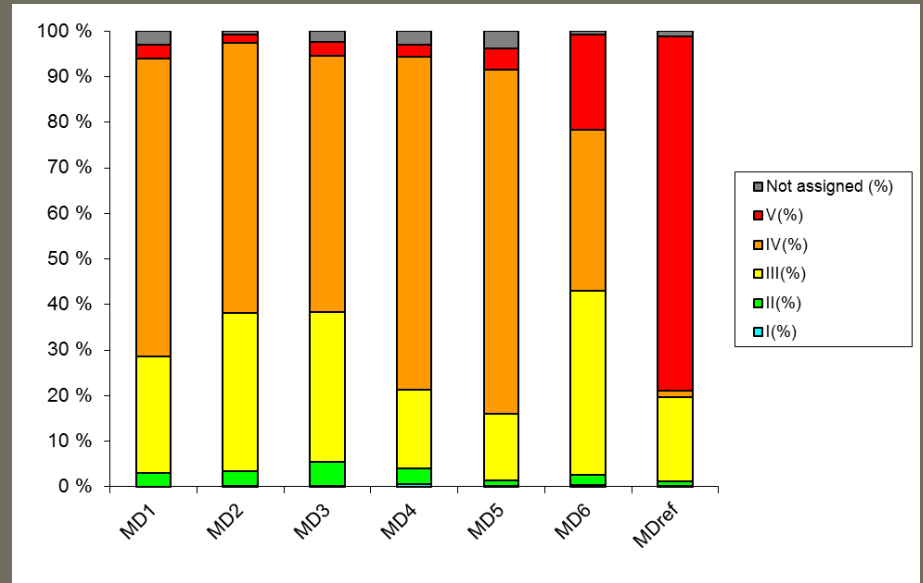
Doubling of the environmental effects



Doubling of the environmental effects



Doubling of the environmental effects



The local solution

- Less fuel consumption, easier logistics
- Less conflicts
 - Only pain and no gain



Some aspects on use of local solutions

- Less fuel consumption, easier logistics
- Conflicts are manageable



The need for a blue-green strategy

- A new building comes with a maintenance plan
- A new remediated area should come with a blue-green strategy



• NORSK:

LANGØYENE ER STENGT!
INGEN BÅT TIL LANGØYENE. PÅ AV GASS - FORURENSING
MER INFORMASJON KOMMER.

• ENGLISH:

LANGØYENE IS CLOSED!
NO BOATS TO LANGØYENE BECAUSE OF POLLUTION (GAS)
MORE INFORMATION WILL BE GIVEN LATER.

• ESPAÑOL:

LANGØYENE ESTA CERRADO!
NINGUN BARCO A LANGØYENE PORQUE HAY POLUCIÓN (GAS)
MAS INFORMACION LLEGARA AL TRANSCURRIR LOS DIAS.



Summary

Deep water disposal facility is environmental efficient, especially when a contaminated area is used.

The use of waste materials is effective since a problem is turned into a solution

A local solution can give more gain than pain

Protect the remedial investment with a blue-green strategy



Thank you for your attention

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