Experiences of Applied Remediation Technologies and Solutions in Sweden - 1994-2005

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Technics available and technics used

- Describes available technics in Sweden
- Is a survey of more than 200 remediation projects between 1994-2005
- Discuss the concept of LCA and eco-effectivity in the ”remediation industry”
- And more…

Presentation today:

Case study of 17 remediations. Technics used were:

In situ:

- Biological remediation
- Vacuumextraction/air sparging
- Chemical oxidation
- Immobilization

On site:

- Land filling on site, covering the polluted medium

Ex situ:

- Excavating polluted soil

TYRÉNS 4

Key factors for success or failure:

Biological remediation

- **Nutrient conditions well known and appropriate, Also a permeable soil**

Chemical oxidation

- The polluted soil were exposed before spreading the oxidant substrate

TYRÉNS 5

Key factors for success or failure:

Vacuumextraction/air sparging successful case:

- **Combination with biological remediation**

Vacuumextraction/air sparging failing case:

- **Lack of knowledge about the pollutant´s true extension - treatment done in wrong extent. Also hydrological conductivity to low.**

Immobilization success

- Stable conditions in the soil important when immobilizing pollutants. This project was immobilization of nickel with lime

TYRÉNS 6

Key factors for success or failure:

Dredging, by sucking the sediment to land

- **Minimizing turbidity is very important when dredging: with work behind a shield the process was a success**

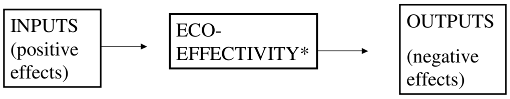
Dredging by freezing sediment to plates and lifting them to land

- Turbidity is minimized

Key factors for success or failure:

Land filling on site
- **Only top covering and not in the bottom.**
- **No leakage treatment**
- **When remediation failed there was no solution to the problem**

Environmental effects of remediation projects



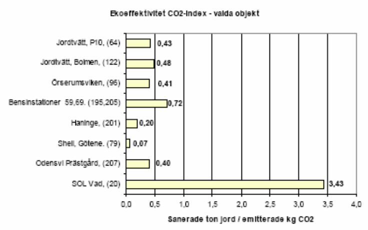
*Reference: Müller, D. et al, 2005. Eurodemo. Deliverable reference number: D 5-1.Title: *Interim results for the 'Framework for Sustainable Land Remediation and Management'.* Project no. (GOCE) 003985. EU FP6.

Easy calculation of eco-effectivity

Negative factor: Energy consumption from remediation technics on place and transport to waste treatment management
- **Energy consumption recalculated to kg discharged carbondioxide**

Positive factor: Tonnes of remediated soil

Index for eco-effectivity = tonnes/kg CO2



Figur 5-2. Diagram över eko-effektivitet avseende CO_2 emissioner för några valda objekt.

Calculation example showed that:
- **Compost on site gave 10-times higher eco-effectivity than the other cases**
- **Excavating of SPIMFABs petrolstations gave also a good gain, this because the distance to waste treatment facilities were short**

Conclusions from this part of the project:

- Think about the importance of eco-effectivity in decision process in future remediation projects!

- Use simple calculations to compare different remediation solutions!

Take with you:

- Development of technics and a more effective remediation is very important! One way to achive this is by continuous feed-back from the projects.

- Legimacy of remediation demands a clear account of disadvantages and advantages and the net gain for the environment in every project! We should furthermore be able to show progress and an increasing net gain over time!