NorthPestClean - Demonstration of alkaline hydrolysis as a new technology for remediation of pesticide contaminated soil and groundwater

LIFE09 ENV/DK/000368

Project description
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Project description:

Background

In 2006, the European Commission adopted the Soil Thematic Strategy (COM (2006) 231) and a proposal for a Soil Framework Directive (COM (2006) 232). In the Soil Framework Directive it was proposed that Member States should establish an inventory of contaminated sites in Europe and, over time, ensure remediation of these sites, which may pose a risk to human health or the environment.

‘Groyne 42’ is an example of a contaminated site in Denmark that poses a risk to human health and the environment. Between 1950 and 1960 this site was used to dispose of waste chemicals. It remained heavily contaminated with approximately 260 tonnes of mainly organophosphorus pesticides. Since 2006, the Midtjylland region and the Danish Environmental Protection Agency had conducted research into a novel treatment consisting of enclosure, in-situ alkaline hydrolysis, and pump-and-treat. Laboratory and small-scale field studies showed that alkaline hydrolysis could be used to successfully degrade and remove the toxic chemicals from the soil.

Objectives

The objectives of the NorthPestClean project were to: 1) Demonstrate, using large-scale pilot studies, that a novel remediation method based on in-situ alkaline hydrolysis is an effective technology for cleaning pesticide contaminated
soil and groundwater; 2) Establish a basis for decision-making on full-scale site remediation. 3) Use the pilot studies to test the effectiveness of different 'enhancement' technologies and to estimate the cost-effectiveness of scaling-up each technology to allow for full-scale site remediation; 4) Create awareness among authorities and environmental scientists in EU Member States about this novel remediation technology and its effectiveness in large-scale pilot studies; and 5) Compare the remediation potential of this new method with risk assessment-based stop-criteria for the clean-up.

By establishing measurable stop-criteria and demonstrating the effectiveness of the new method, the project aimed to provide decision makers with crucial information that could allow them to make a science-based decision on how to progress with site remediation.

Expected results covered: 1) The removal of 70-90% of the pesticides at the project site using in-situ alkaline hydrolysis; 2) Measurement of the effect of enhancement methods on mass removal of contaminants; and 3) The preparation of a decision-basis report which will show that full-scale remediation using in-situ alkaline hydrolysis is cost-effective (remediation using traditional technologies was estimated to cost EUR 15-53 million, whereas remediation by in-situ alkaline hydrolysis had an estimated cost of EUR 6-9 million).

Results

The NorthPestClean LIFE project demonstrated that in-situ alkaline hydrolysis is a new cost-effective remediation technology that can be used in cleaning-up organo-phosphorous pesticides that contaminate soil and groundwater. The method has been proven to be a valid and useful one as in-situ alkaline hydrolysis provided a solution that could be applied to remediate the entire large area of contamination used for the tests.

The derived environmental effects of in-situ alkaline hydrolysis scored better that traditional excavation in the areas of acidification, ozone formation and global warming (CO2 emissions). It was also cost effective compared to other traditional remediation techniques -such as excavation and thermal remediation- but the enhancement methods varied in efficiency and recirculation - adding a surfactant being the most helpful.

This new technology holds a high transferability potential and is ready to be applied by Member States. Its implementation may facilitate a decrease in the cost of soil restoration whilst contributing to the implementation of the Commission’s Soil Thematic Strategy, and at the same time improve soil restoration and environmental protection.

Project results confirmed that the new technology, as a new low-cost method, could encourage more remediation of pesticide-contaminated sites that would otherwise have been left unattended.

Further information on the project can be found in the project's layman report and After-LIFE Communication Plan (see "Read more" section).
Environmental issues addressed:

Themes

Waste - Hazardous waste
Industry-Production - Chemicals
Land-use & Planning - Soil and landscape protection
Risk management - Pollutants reduction
Risk management - Site rehabilitation - Decontamination

Keywords

pest control, contaminated soil, chemical industry, pollutant elimination, groundwater, hazardous substance

Natura 2000 sites

Not applicable

Beneficiaries:

Coordinator Region Midtjylland
Type of organisation Regional authority
Description The Department of Soil and Natural Resources in the Region of Midtjylland (Central Denmark Region) is responsible for administering national legislation on soil contamination in the region.

Partners None

Administrative data:

Project reference LIFE09 ENV/DK/000368
Duration 01-SEP-2010 to 30-JUN -2014
Total budget 1,596,870.00 €
EU contribution 798,000.00 €
Project location Midtjylland(Danmark)
Read more:

- Project website: [Project's website](#)
- Project website - 2: [Facebook page of the project](#)
- Publication: After-LIFE Communication Plan:
  - Title: After-LIFE Communication Plan
  - Year: 2014
  - No of pages: 4
- Publication: Layman report:
  - Title: Layman report (Danish version)
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