Report

WS CityChlor 23 maart 2010

Description	Report of results from WS, to be sent on to participants
Date and time of meeting	23 March 2010
Location of meeting	Jaarbeurs Utrecht
Present	See list of participants

NL Environment and Living Environment

Date
1 April 2010
Aantal bijlage(n)

Introduction

A workshop was held on 23 March in Utrecht as part of the inter-regional IVB NEW CityChlor. CityChlor is a European project in which nine partners from Belgium (OVAM (the Public Waste Agency of Flanders) is the leading partner), France, Germany and the Netherlands are involved.
The aim of the project is to devise an integrated approach for investigating and decontaminating volatile aliphatic chlorinated hydrocarbons. The focus is not only on technical aspects, but also on such matters as policy, communication, socio-economic factors and organisation.
The integrated approach will ultimately lead to an improvement in the quality of the soil and groundwater, more sustainable spatial urban planning and a boost in the quality of the environment. The project runs until April 2013. See also the SDE (stimulation of sustainable energy production) presentation by Jan Frank Mars (AgentschapNL/Bodemplus).

Area around Utrecht station to be the testing ground in the Netherlands

The area around Utrecht station has been selected as the testing ground in the Netherlands. It is here that the following pilot schemes will be carried out in the next few years:

1. determining the financial benefits of an area-based approach;
2. measurements of the effectiveness of cold/heat storage as a decontamination technique (the bio washing machine);
3. communication with the community with regard to their involvement and how risks are perceived;
4. setting up a SMART measuring network for monitoring decontamination and to make any adjustments where necessary.

Background:

The area around Utrecht station has the following characteristics:

1. Several different types of contamination, some of which may be mixed together. It is thought to concern 180 million cubic metres of groundwater, contaminated mostly by volatile aliphatic chlorinated hydrocarbons.

2. The contaminated sections cannot be separated, so an approach based on tackling each individual case of contamination is not possible.
3. The area covers a surface area of around ninety hectares and is heavily built up, including many older houses with wooden floors, etc. (evaporation-related risks).

A decision giving consent to the decontamination plan was taken in accordance with the Soil Protection Act, for the *'Ondergrond van Utrecht'* (Utrecht subsoil), on 20 January 2010.
It is assumed that the topsoil and the subsoil will be dealt with separately. The decontamination plan focuses on the first aquifer, from five to fifty metres below the surface. The contamination in the top five metres (including the parts where the sources are located) will be tackled on a case-by-case basis in accordance with the Soil Protection Act.
The area-based approach (formally known as a phased clustered approach), which is allowed by the Soil Protection Act, includes the option of placing dynamic elements in the subsoil, such as for the construction of several cold/heat storage systems for stimulating biological breakdown (the bio washing machine).

The purpose of the meeting was, together with consultants from the Netherlands, to put the detail on various ideas for pilot schemes for smart monitoring in the area around Utrecht station. See also the presentation by Albert de Vries (Utrecht City Council).

Presentation by Maurice Henssen of Bioclear
The value of the breakdown potential in monitoring, including for area-based management. Water purification installations are dimensioned on the basis of their load (i.e. contamination) and the purification capacity on the basis of each cubic metre of the installation. Is it not possible to use this approach for contaminated soil as well? The message from this presentation was that if you know the biological processes in the ground, you can determine the breakdown potential per cubic metre of soil. With this information and the amount of contamination that exists in an area, it is possible in theory to work out what the parameters of the system are. See also the presentation by Maurice Henssen (Bioclear).

Presentation by Eric van Nieuwkerk of Deltares
Plume behaviour in an area-based context. In the past, the Soil Protection Act 'case-by-case' approach was used: look at individual sources and how they spread (make everything clean!), but this is no solution for a large-scale contaminated area. A risk/area-based approach is needed here.
The objectives of area-based groundwater management:

- (Removal of human and ecological risks);
- Making the ground usable again;
- Protecting current and future users from the soil.

Knowledge of large-scale systems is required here: source-path-receptor. The primary message is this: know the parameters of the system (local and regional). A good knowledge of the local geology, groundwater flows and bio/geochemistry (Na potency) is important too. See also the presentation by Eric van Nieuwkerk (Deltares).

WS 1: SMART monitoring and risk approach

Definition of the problem
To determine the level of risk in the Netherlands, the Sanscrit (*Saneringscriterium Bodem* – soil decontamination criterion) model has to be used. However, this model assumes a case-by-case approach to soil decontamination and is therefore

less suitable, or indeed not usable at all, for the situation in the area around Utrecht station. As is the case with many older city centres, this is a large and heavily built-up area that includes many old houses, a large number of which have wooden floors. We have to take account of the possibility that contamination may spread, and of the fact that people are in close proximity. But how do you determine this for an entire area and how are you going to be able to measure it?

1. risks of spreading: how do you keep this under control, both horizontally (clean site) and vertically (second aquifer with drinking water abstraction)?
2. risks involving people: how do you determine them, and how do you measure them (Sanscrit is not adequate for this), how do you deal with an increase in VC and evaporation risks during an area-based project (including to employees who are working on the site). Evaporation risks are affected by a variation in the level of the water, something that will occur frequently in a dynamic area.

Results from the brainstorming session on risk approach method
Focus on established flow channels and use a good geohydrological groundwater model. It is essential to have an understanding of the dynamics of the groundwater flows. You do not have to measure every spot, only a few local and regional examples. This can serve as a basis for calculating and modelling. Work should be phased, with feedback; a phased approach has three phases: 1. modelling 2. determining 3. feedback.

Use a flexible measuring system and place sensors (adapt the diameter of the water level indicator accordingly). You can also use water level indicators to measure the actual groundwater flow. Often, the data from drilling reports is ignored, even though it contains useful information. The first thing to do is to conduct a smart search for sources that could affect people or which may entail a risk of spreading. Adapt your risk model accordingly.
Where would you like to carry out the costly monitoring:
1. In the cold/heat storage systems.
2. As soon as the deep water level indicators suggest that there is a non-porous layer.
3. Specifically for Utrecht: monitor towards the south-east – a significant proportion is moving towards the distant polder regions.

It is important that risk should be the starting point, not measuring (risk approach), and to derive scenarios and trends from that. Your insight will inevitably be enhanced as time passes. The model has to be continually adjusted and improved. The twenty cold/heat storage systems will not all be built at the same time, for example. Confidence can only be built as familiarity with the system grows.
As well as Sanscrit, the VOLASOIL model can be used to calculate risks where people are involved and to carry out indoor air measurements (source: RIVM (National Institute for Public Health and the Environment)).

Work together with and make good use of other people; create common ground for joint operations underground. Possible examples of this include collaborating with water companies, TNO, water boards, etc.

WS 2: SMART monitoring and purchase processes

Definition of the problem

The aim is to think of proposals for improving monitoring methods when decontaminating volatile aliphatic chlorinated hydrocarbons in area-based projects. How can we monitor more effectively and less expensively?
For example, in the area around Utrecht station, monitoring is financed by the government. It is important that public resources are spent wisely, which is the reason to see if things cannot be carried out at less cost. However, this should not compromise the quality of the work. One of the objectives of an area-based approach is that is should be less costly than the traditional case-by-case approach to decontamination.

Results from the brainstorming session on risk approach method
The first thing is that the monitoring strategy should be established: work out first of all what you want to measure, and why. Working on the basis of a conceptual model may be helpful here, from broad outline to the finest detail. In short, a flexible approach is very much preferred.

All the information that could be needed at a later stage for modifications to the approach should be made available from the very beginning. Sometimes, more initial investment is needed, but in the long term this should be beneficial for the monitoring strategy (through savings in time and money). By conducting extensive measurements at the start, you can become familiar with the local soil system, and the processes that are taking place there. As a result, you may not need as many parameters at a later stage.

A three-dimensional spatial image is needed to be able to determine what has to be measured, and where. For this, make a link between monitoring and the spatial functions in the area (such as cold/heat storage, underground buildings, pre-war buildings with evaporation risks, known contaminations, archaeology, ecology). Then, monitor not just the points on the raster, but take extra measurements at the locations in the topsoil where the most dynamic activity occurs as well.

It is important that there are 'buttons' that can be pushed in order to make modifications to the project. Interventions targeted at specific areas can be highly effective. The contamination is not spread evenly across the area. Some of the sources are still producing contamination, but this does not mean the entire site is affected. By targeting action at those locations where a large amount of contamination is to be found (sources still producing contamination, non-porous layers), it will be possible to attain a rapid improvement in quality.

It sounds controversial, but you can also use monitoring results for modifying your ambitions in the long term. By using monitoring not just for what is required on the basis of the contamination plan, you can achieve results in other areas, too. For example, link the monitoring to the demand for energy.

Optimising the amount of contamination being removed can only be achieved if you are able to steer the process, and that is only possible through cold/heat storage systems. There is currently no coordination between the position of the cold/heat storage systems on the one hand, and the prevention of contamination on the other.

The local authority may want to consider having a greater say regarding the cold/heat storage system. Optimising its dimensions may make the decontamination process more effective: discussions with private parties in the area will be needed for this.

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Perhaps a master plan/list of ambitions for the subsoil can be drawn up, with heat and cold zones. This could then serve as a basis for planning and carrying out monitoring activities.

WS3: SMART monitoring and establishing the system parameters

Definition of the problem
What is a system parameter (definition) and how can this be established. A decision then has to be made on how it should be monitored or rather, what are you going to monitor and how often.

Results from the brainstorming session on risk approach method
A system parameter is location-specific, depending on the space that you need and the amount of space that is available in an area. Demarcate the system parameter on the basis of natural flows. Look at groundwater flows/ decontamination spread over a long period: that is your area demarcation. Account should also be taken – in the case of Utrecht – of where the cold/heat storage systems are located. Look not just at the horizontal demarcation but consider the vertical one as well. Contamination can spread between distinctive layers as a result of differences in pressure, for example, and this adds a third dimension to the system parameter.
In addition, the system parameters depend on what you want to do with the area.
You could describe the system parameter as the maximum impact area within which the contamination is kept. The parameter is dynamic and equates to the management area as stated in the Water Framework Directive. Or is it about setting a boundary for the purpose of protecting drinking water abstraction areas, for example?

More water in the cities/urban groundwater management. It is important to realise the value of groundwater. This could include obtaining grey water for various purposes and also to use it for monitoring decontamination. Using groundwater abstraction at strategic locations for controlling system parameters. Combine this with management of infrastructure. Flexible water extraction around the system parameter: extracting groundwater at different locations which can be easily engaged and disengaged to control decontamination.

The monitoring network will then have to be adapted to the system. For example, no monitoring at the system parameter, only where there is a vulnerable element (drinking water extraction, for example), and then you can start purifying there as well.
There are various techniques for monitoring, but online monitoring using sensors and telemetrics has a future and is innovative. It should also be pointed out that statistical assessments of real-time data can add an extra dimension. You can gain a rapid and overall insight into the decontamination situation, at low cost.
A distinction should be made when monitoring between problem parameters (human, ecological) and process parameters (redox, bio), and possibly a simplification towards guideline parameters (measuring one or two substances that also serve to predict the characteristics of other substances).
And of course do not monitor for the sake of it: it is a means to an end, not an end in itself!

Conclusions, and what to do next

Many good ideas were put forward by the participants, although none of the groups came up with a clear suggestion for detailing any of the pilot schemes. Nobody managed to find the silver bullet either (the bottle of wine remains unopened!). In spite of the different starting points, the discussions in the various workshops were more or less about the same subjects.
The following subjects came up most often, in various forms and with different sensors??:

- insight into the groundwater system underneath Utrecht;
- gaining knowledge of the breakdown potential;
- monitoring at strategic points using innovative sensors (many examples were given);
- setting up a dynamic risk groundwater model;
- using existing monitoring networks.

It can be concluded from this that the pilot schemes should include the above items at least, or certainly a combination of them.

We will be inviting a number of parties (based on their input) to develop their ideas into feasible pilot schemes with us - ideas which can be checked against the monitoring system in accordance with the existing decontamination. The emphasis here will be on working partnerships in order to develop and share knowledge as much as possible. This is expected to take place in the next few weeks. The project will be assigned and start this year, as soon as possible.
If you would like to propose a pilot scheme yourself that addresses any of the above topics, then please contact Jan Frank Mars (AgentschapNL/Bodem+: janfrank.mars@agentschapnl.nl) or Albert de Vries (Utrecht City Council: a.de.vries@utrecht.nl)
Many people have already signed up to the think-tank, and it is still possible to do so. We will refer to the think-tank when deciding how to implement the pilot schemes.

On behalf of CityChlor,

Jan Frank Mars (Bodem+)
Albert de Vries (Utrecht City Council)

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