

# **7th meeting of the Ad Hoc international Working Group on Contaminated Land**

Paris, September 29 – 30, 2005

La Maison de la Chimie, 24, rue Saint Dominique, Paris



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## Introduction

Thomas Joindot, France

Mr Joindot welcomed the participants, more or less 30 persons representing 13 – 15 countries. He then presented the program and some practical details.

## Program for the meeting

<b>September 29 – Morning session</b>	
09.00 – 09.15. Registration	
09.15 – 09.30. Introduction	Mr. Thomas Joindot, Prevention of Pollution and Risks, French ministry for Environment.
09.30 – 12.00. Round Table discussions	Presentations from each of the participating countries; 10 – 15 minutes per country. Each of the participating countries gives a short presentation on the state-of-the-art on the national work regarding contaminated soil; The presentation should, for example, contain information about; i) number of contaminated sites in the country that need to be recognised, ii) annual and over all budget for the work on contaminated sites; iii) number of persons at authorities involved in the work, iiiii) national goals in terms of achieved results and amount of time/budget needed. Also the use of national methodologies and guidance that could be of interest for other countries should be mentioned in the short presentation for each country.
<b>September 29 – Afternoon session</b>	
<b>13.00 – 17.00. Thematic discussions</b>	
<b>Theme 1. Responsibility and Financing</b>	Introductions: Thomas Joindot, France. <i>Responsibility in the French regulatory framework, recent developments</i> Adrien Pilon, Canada. <i>Brownfields in Canada</i> Adrien Pilon, Canada. <i>The civil responsibility of the land owner in Canada</i>  Discussions and questions
<b>Theme 2. Specific risk assessment, the setting of riskbased cleanup goals.</b>	Introductions: Michel Beaulieu, Canada. <i>The use of site specific risk assessment and the in situ management of contaminated soil in the redevelopment of contaminated sites.</i> Harald Kasamas, Austria. <i>How is the setting of (riskbased ?) cleanup goals performed in the participating countries?</i> Bruce Means, USA, <i>Risk assessment or decision making programs in the USA</i>  Discussions and questions
<b>Theme 3. Contamination with heavy metals</b>	<i>The countries are invited to share their views on heavy metals contamination, for example extraction with different technologies, mobility of metals, bioavailability, analytical procedures for the characterization, acidic digestion, residual concentrations in soils.</i>  Discussions and questions
<b>September 29 – Evening program</b>	
	18.30-19.30 Visit to the Orsay Museum (subject to confirmation) 19.30 Dinner at La Maison des X
<b>September 30 – Morning session</b>	
<b>09.00 – 12.00 Thematic discussions</b>	
<b>Theme 4. EU and contaminated land, COMMON FORUM and Soil framework directive</b>	Introductions: Claudia Olazábal, eu. <i>Prevention and management of soil contamination in the proposal for a Soil Framework Directive</i> Joop Vegter, The Netherlands. <i>History and future plans of COMMON FORUM</i> Anna Rita Gentile, EEA. <i>Periodical reporting of national/regional inventories of contaminated sites.</i> Francesca Quercia, Italy. <i>Possible monitoring of risk areas of EU concern</i> Victor Dries, Belgium. <i>Belgian experiences with a "Land Status Report" at the moment of transfer of land.</i>  Discussions and questions

<b>Theme 5. Excavated (polluted) soil</b>	Introductions: Michel Beaulieu, Canada. <i>The management of excavated soil (treated or non treated)</i> . Andreas Bieber, Germany. <i>Regulations to deal with the reuse of excavated (polluted) soil in Germany</i>  Discussions and questions
<b>Theme 6. Techniques</b>	Introductions: Bruce Means, USA. <i>Electronic Delivery of Analytical Data for US Superfund Cleanups</i> . Dietmar Müller, Austria, <i>Innovation on Remediation technologies – from Research to markets (a presentation on EURODEMO)</i>  Discussions and questions
<b>September 30 – Afternoon session</b>	
<b>13.00 – 15.30. Thematic discussions</b>	Continuation of morning session
Next meeting	Dates for the next meeting in Sweden Appointment of the country who will serve as secretary for the meeting in Sweden. That is, the country that will be host for the meeting after Sweden.
Conclusion	Mr Trouvé, Director, Prevention of Pollution and Risks, French ministry for Environment.
16.00 Closing of meeting	

## Round table discussion

### Short personal presentations

*Harald Kasamas*, Austrian environment ministry, coordination contaminated land management program for Austria.

*Adrian Pilon*, Canada, national research council in Canada, representing Canada for the fourth time (1 day).

*Claudia Olazábal*, Unit of agriculture and soil in the director general of environment in the European commission. Responsible of the development of the soil thematic strategy.

*Laurent Olive*, French ministry of environment, in charge of contaminated soil.

*Kjell Färnkvist*, Swedish environmental protection agency, working for 4-5 years at Swedish EPA with those questions.

*Håkan Rosqvist*, Swedish Geotechnical Institute. Assisting the Swedish EPA to secretary for this meeting.

*Yvonne Österlund*, Swedish EPA, department of contaminated soil.

*Anna-Rita Gentile*, European environment committee in Copenhagen. In charge of project of soil and contaminated sites.

*Francesca Quercia*, Italian environment agency. Representing Italy in European international for the last 10 years, on contaminated sites.

*Brendan O'Neill*, Irish environment agency. Senior technical adviser in the ministry. Contaminated land is treated in the context of waste management. It is just one of the areas of waste management and hasn't got a huge amount of priority in recent years but that is beginning to change.

*Andreas Bieber* from the federal ministry for the environment in Germany. Responsible there for the item of contaminated sites.

*Michelle Beaulieu*, Quebec ministry of the environment, Canada.

*Joop Vegter* from the Netherlands. Currently the secretary of the "Common forum", CF, which is a European network quite similar to the ICCL.

*Margot Meijer* from the ministry of environment in the Netherlands. Working from January 2005 for the contaminated soil department, before that in the waste department.

*Sietske Veenman*, the Netherlands.

*Anna-Maija Pajukalio* from the Finnish ministry of environment. Senior advisor on the field of contaminated soil, sediments and soil protection.

*Sheena Engineer*, policy engineer for the environment agency of England.

*Bruce Means*, USA

*Rolf Kettler*, Switzerland

*Victor Dries*, Belgium

*Thomas Joindot*, France



*Figure 1. The participants of the meeting.*

## **Presentation of the situation in each country**

*Rolf Kettler, Switzerland (Sw.)*

I give you a little speech of the situation of contaminated land in Switzerland. In Switzerland there are some 50-60 000 polluted sites to register of which some 3-4000 are considered to be in need of remediation and are classified as contaminated sites. Land management has a high priority due to the coincidence of a big number of contaminated sites in immediate neighbourhood of highly vulnerable groundwater and due to high population density in the Swiss central plateau. The main natural resource affected is therefore often the public supply of drinking water. The vulnerable groundwater cause a strong pressure for a fast remediation of polluted sites even when the costs are quite elevated. The fact that Switzerland has a high population density with accordingly high land prices can explain why we remediate in Switzerland to an extent and cost that maybe not makes sense in other countries.

I won't describe the guidelines of the Swiss regulations as I assume that most of, or even all of you have already heard, and discussed this point in earlier meetings of this ad hoc group and I would like to concentrate on some new aspects since the last meeting two years ago and talk about the actual situation in Switzerland now.

First point: We have some new financial regulations. With a revision of the federal law relating to the protection of the environment. In Sw. we have the polluter pays principle which means that the person that has caused the measure to be taken has to bear the costs. Now, the estimated amount of all remediations in Sw. lies somewhere over 3 billion Euro and in cases in which the responsible person can no longer be prosecuted, so called orphan sites, or in cases of landfills with municipal waste the community must bear the costs of remediation. In such cases the federal authority take over 40% of the remediation cost. To finance this contribution the federal government established a fund which is raised by means of a charge on disposal of waste in landfills. About 50 million Euro per year are in this way put aside for remediation actions.

There are now three important changes in financing the treatment of polluted and contaminated sites. The Swiss state will in the future not only pay for the remediation itself but also for the measures taken during investigation and monitoring. This should lead to a facilitated remediation of "orphan" sites. In addition also the establishment of the register of polluted sites will be financially supported. Federal authorities pay 320 Euro per site to the canton but only under the condition that the registration is finished before the end of this year. This financial support will probably speed up some government employees in the cantons, at least this year.

The third new financial regulation concerns the elimination of excavated materials from polluted sites. In many cases an existing site may be polluted but not in need of remediation which means it is not a contaminated but at polluted site. Whoever excavates material from such a site, for example in the context of a construction project, is not only responsible of its legally correct disposal but also for the cost arising from it. The modification under way in the Swiss parliament demands that at least two thirds of the cost for analyses and elimination of the excavated material is paid by the polluter or the former landowner, of course under some conditions for example that he did not get the compensation, for example a price reduction when he bought the land. Splitting of the financial charge prevents on one side that the construction party does excavate and remediate in a quite luxury way, charging all the costs to

the former landowner and it prevents that the new owner of the site must take all the risk and uncertainty of the eventually polluted material.

Second point is the register of polluted sites. As you know we only enter sites that are polluted with waste or very strong probable cause to accept that they are polluted. The register does not contain dubious sites. And it only contains essential data, no technical investigations are necessary for an entry. This makes the relative cost effective registration. The owner of the site always receives the opportunity to state his position on the entry of the register. He can make additional clarifications and thanks to this opportunity the general acceptance of this register is enormously increased. It is also publicly accessible and therefore contributes to a general transparency and clear relationships. Of course the register is a dynamic working instrument which is being adapted to new information on an ongoing basis. As mentioned before the cantons, the parts in Sw. are financially regarded for every entry in the register that is finished before the end of 2005. Therefore half of the cantons will be on schedule and will complete their register this year but due to manpower cuts in the public administration we have assumed that the last canton will finish this work around 2012.

After completion there will be an estimated number of 60 000 sites in the Swiss register. 2/3 are company sites, 1/3 are waste disposal sites and less than 1 % are accident sites. Under the assumption that the registration cost is about 1000 Euro the total amount for establishing this Swiss register will be about 60 million euro.

Information about the numbers of contaminated sites in Sw.; Of this 60 000 entries in the register of polluted sites we estimate that about 1/4, 15 000 sites need investigation and about 1/4 of these cases will have to undergo detailed analyses. The final number of contaminated sites will be some 3-4000. Which, never the less is less than 7 % of the sites in the register. The total investigation cost will settle somewhere around 600 million euro and the remediation itself, that's the main part, will cost approximately 2,5 billion euro. Sw has many small contaminated sites and only a few bigger, expensive sites. In almost over 90 % of all cases the overall cost will be less than 1 million euro. 30-40 sites will provoke a remediation cost of over 30 million euro.

Up till now about 200 sites have been remediated and there are 2 very big remediation projects under way, both of which are ancient landfills for hazardous waste and municipal waste. One is a landfill where now an agreement between the financing parts was achieved this year. Some figures up till now: The securing measures produces costs over 100 million euro and the annual maintenance cost is about 5 million euros. We make a full-scale remediation which is now started. This will cost us about 280 million euro. The same amount would be necessary if we had another 40 years of surveillance. So in the end we would not have solved the problem. The potential for groundwater pollution would still remain for many decades. So it is probably better if we remediate on full-scale. As 90-95 % of the waste in this landfill is municipal waste, mainly slag, the community will have to pay most of it. In the other big site, all the waste is of private industrial origin so the cost, around 200 million euros for remediation will be charged to private companies, chemical industry near Basel.

Some aspects to Brownfield: The Swiss agency of environment and the Swiss agency for special development, they published last year an extensive, expensive study on Brownfield in Sw. There are about 17 million m<sup>2</sup> of Brownfield in Sw. which is nearly as big as the city of Geneva and its suburbs with a population of at least 190 000 people and 140 000 jobs. It is quite big for a small country like Sw. and we estimate that due to this underutilization of

industrial areas the municipalities lose an annual tax income of somewhere between 100 and 300 million euro per year so authorities and taxpayers therefore should have a big interest in revitalizing these brown fields. The advancing land use at the rate of almost 1 m<sup>2</sup> per second is another reason why revitalization of brown fields becomes an increasingly important issue on the political agenda in Sw.

Due to long and therefore, expensive planning periods it is in more than 50 % of all the cases the lack of potential interested investor. 1/3 of the landowners complain about difficulties on the level of special planning they have to change the planning zones. And the third reason seems to be the lack of financial support to overcome a financial bottleneck at the beginning of these revitalising projects. In most cases the landowner also complains about the missing support of authorities and the lack of coordination between the involved administrations with sometimes multiple and even contradictory permissions or conditions. This is probably the main reason for a long planning period.

The remediation of the contaminated site itself does not seem to be the main reason for difficulties in rehabilitation of brown fields but of course our study also shows that remediation may be expensive. Revitalizing is possible as soon as there is a financial profit in reusing Brownfield sites. The net profit of a revitalized site must be bigger than the remediation cost and the so called transformation costs. Transformation costs are infrastructure cost and development costs. As land prices are high in economic centers a profit can often be realized in these districts and the profit gets more difficult to gain in industrial centers and is poorly achievable in rural regions.

Finally, this brown fields problem is becoming more and more important in Sw. so therefore we are planning to start up another project to reinforce these remediations.

#### *Bruce Means, United States (US)*

We have a number of programs in the US to clean up contaminated land. The program most familiar is the superfund program which is administrated on an national level and it is intended to deal with abandoned sites or "orphan sites". Although there is also a law, a research recovery and conservation act, which deals with operating facilities and the contaminated land generated and residing on those operating facilities. We have another program that deals with leaking underground storage tanks.

There are a number of federal agencies that have there own programs as well for detecting contaminates soils and for remediating those. They tend to fall into the programs above. Some of the federal sites are superfund sites and some are being cleaned up under our corrective action program. A whole variety of programs out there at the state level. There is a national Brownfield program that provides funding and grants to state and local organizations that are intended to help. To better understand the character of the contamination on sites under question of whether or not they are contaminated.

You tend to rely on numbers as hard and fast but they are very soft. The numbers don't reflect the fact that there is a good deal of work that goes on before; ex. determine that sites require cleanup. And just to give you an example: For superfund represents about 45 000 sites assessments from which 12 000 assessments are currently still active or the sites have been identified as superfund sites. Of the 12 000, 1500 have been identified as national priorities



*Figure 2. The lecture hall*

list-sites in various stages of cleanup. The cleanup may be going on some of these sites that don't make it to the national priorities list but those tend to be addressed under some of the state or local programs or programs associated with private companies or regional governments. Of the 1500 sites, about 960 are at a stage where all the construction associated with remedy is completed so we have made some progress for all the time and money that has been put into this.

The construction complete category does not mean that the cleanup is done, only that all engineering type construction is done. For sites that have contaminated groundwater, some of those plumes will require pump and treat or some kind of security many years into the future but no more construction other than perhaps some optimizing of the remedies, arrangement at the wells and plume will be required. We were asked to talk about how we measure progress and early in our program people would simply ask; When will you be done cleaning up your 1200 or 1500 sites? As you all know it is very difficult to say. We like to say: Well we are making headway but more recently we have been asked to define progress in these categories:

- Construction complete (explained earlier)
- Completed final site assessment decision
- Counting sites that we are confident that human exposure have been controlled
- Counting number of sites where groundwater migration has been controlled
- Sites where we have selected remedies but may not have constructed all of the requirement of the remediator.

In this table you see what our targets are for the year 2008. In order to get to the targets of 2008 we have been asked to track, year by year what our annual targets are and then whether or not we achieve them. We have translated something that is very difficult to predict, into some fairly visible numerical targets that have the benefit of forcing people to move forward and to give a sense of urgency to this program and when we don't achieve this targets managers are held accountable and maybe their budget is cut. So for better or not it is a tool that we use to measure our progress and performance.

3400 people across the US are in the superfund program. Largest wedge is in the Washington DC- area but also a number of national laboratories are included. There are generally between 200 and 300 people at the regional offices.

Over half of our budget goes to cleanup of about 9 sites, a small share of all number of sites at the NPL (National Priorities List). The fact that we have bitten off large complex sites that require a lot of money to study and then clean them up is actually taking away resources makes it difficult to address the large number of much smaller sites that may present easier targets for cleanup but still take money.

We're actually not in this business alone. I've mentioned our reinforcement program has a mission of identifying the responsible parties and encouraging/requiring them to pay for or manage the cleanups. For every dollar that the reinforcement program spends we recover about 8 dollars in response money. A good investment which made 22,8 billion dollars in 2004.

Department of defense and department of energy have committed this year to spend 9 billion dollars a year in the future as well for these sites that are on the NPL.

Reuses with other countries is become very important, not only in the way we think about the risks posed to people that use a site but also when thinking about how we can select a remedy that can be maintained and people and communities and the environment will be protected over time. A to help facilitate that we have made efforts to try to turn over the sites as quickly as we can.

Now we don't wait till the whole site is clean to release it for use. We have some certificates that designate areas that are ready for reuse. We are encouraging third parties to get involved early on so that as we select remedies, those who gain from the reuse can also be advocates for moving sites to cleanup quickly.

Last thing I want to mention is the Brownfield site. Apparently they've posted a study that surveys all of the states on their progress in establishing and running Brownfield program, voluntary cleanup programs. In it they list for all of the states the financial tools that have been developed to support those programs in the states as well as guidance for defining what a protective cleanup might be under those programs. I think as a recourse that may be a good place for many of you that are interested in Brownfield to look.

*Harald Kasamas, Austria (A)*

I want to make a little review of the Ad Hoc group. I was involved to organize the first one in November 12 years ago and I will give a brief review of why we initiated the ad hoc group in 1993. The initiative came out of the very successful pilot study of remediation techniques led by the US EPA. And in these days, 1993, we thought it should be beyond technical information exchange on the international level the ministries worldwide should cooperate in the exchange of experiences. All the issues that we have covered that is on the program, liability funding and so on.

We decided for this international information exchange on policy matters, how to manage programs, what issues are involved and Judith Denner (Law) was the initiator. She started to plan the program of United Kingdom which took ten years to get because all of the innovative things. The real trigger, the motivation of this group was related to two reports. One was a TCP (Technical Cooperation Partnership)-report. It was the first review of international comparison of contaminated land policy in ten industrialized countries. The initiator of the report was Joop Vegter. He gave one of the impulses of the Ad Hoc information. And the second thing was a development of the European commission.

The DG environment publication of the waste -92 report reviewed for the first time contaminated land policies in Europe. One of the first tasks of the meeting in Vienna was the initiation of the so called Vienna questionnaire which we continued at later meetings to keep the information that was initiated by the DG11 reports in 1992 updated by the member states. This was one of the major aims to initiate this ad hoc group, now no longer called ad hoc-group, initial committee changed the name last time. So this two reports influenced the work of these groups and we have now the seventh meeting here in Paris. And we have always this arrangement that 2 countries are responsible. One is responsible for the agenda.

Together with the Danish EPA we had 1999 in Copenhagen the fourth meeting which was very innovative because the Danish and the Swiss people worked together and they wanted to establish a network not only for western European, but a paranetwork for European countries on contaminated land issues. In Copenhagen we had representatives from 20 ministries of

eastern European countries in a special meeting together with the ad hoc group which was very interesting but the problem with eastern European countries was that the fluctuation of position was very high and of course these countries in these days of transition had a little different perspective. We had a meeting in Bern in 2001 together with Canada. The highlight was the initiation of the Website. 2003 we had a meeting in Montreal. Now we have France and Sweden together here organizing this Paris-meeting and I'm very grateful that Sweden will organize the next meeting in Stockholm.

Now I come to the less interesting things related to the Austrian program. The team here is 2 Austrians, me and Dietmar Müller from the environmental agency of Austria (not present today). When you are speaking of the national program you should be very much aware of the specific national meaning, what you are covering with the national program. This is a very big point in the discussion of the EU soil policy, because the national programs vary considerably between each other. All programs came up to be established in the late 80's, early 90's very urgently because - which also leads to this international information exchange - the pressure was very high from the public. You had all this terrible sites in the new papers and the people in the ministries had also to make these programs effective and connected with different laws in different countries so when I give you an update of Austria I have to make a very brief introduction what the Austrian contaminated sites program means.

We have established a federal law in 1989 and this is mainly organizing the program. It is, most important, collecting the money for remediating actions so it is a financing law. It regulates how you get the money for funding remediation. This is collected in Austria by taxes on waste treatment, land filling and now also on incineration. On the second part it is also defining how the sites are registered, assessed and prioritized to get a guidance what are the most important sites. This is a very important thing. This legislation is just covering the peak of the mountain. The most dangerous sites should be dealt with in this contaminated sites program so it is an environmental legislation, not a land use related legislation. So this program in Austria only solves the most urgent problems to get money and organize a countrywide program. I will focus on the problems, why this is problematic connected with environmental protection laws later this afternoon when I speak about the remediation targets.

And now, the news of Austria: we are planning to solve this problem with a major amendment to the legislation. We will get a specific contaminated land regime which is not any more connected with the environmental protection laws, which allows flexibility in decision-making and integrated solutions and from a technical point of view this amendment will also allow risk based decision-making when it comes to rest contamination and remediation goals. Now I will be very short, I come to the data. You have to be aware of what it means for the specific country, it is not easily comparable to any other country. We all know this but we stress this to get the message also to people who are not in the contaminated land field but in EU soil policy and more general and so on.

We have 2 federal registers in Austria. First one is potentially contaminated sites, 2265. So if we have an amendment in 2006/2007 and we are changing our level of what is a contaminated sites immediately the number will be quite different. And we have 196 registered contaminated sites, proven after risk assessments. These sites are subject for funding from this law. So the remediation figures are: we have 137 remediated in the past 15 years. It costs – our major aim is to support voluntary actions – we spent on a federal level 370 million euro in total over the 15 years. 85 % of the budget is allocated to the funding of remediation actions and the rest is for the federal register, the federal investigation and federal assessment.

We have a budget for this law of 46 million euro per year on average. So we are planning for a major revision of this law. We are carrying out in the preparation of this amendment a study how to set risk based remediation goals. We stimulate with this risk based goals in situ-technology which leaves rest contaminations. We are now also going in the Brownfields redevelopment things which are not so urgent. We initiated a multi stakeholder association with insurance companies, banks, technicians, everybody. We want to attract people and come forward on an voluntary basis with the national contaminates land association and of course we spend a lot of energy to get a good framework coming from the European commission which I suiting all the existing things on oil and groundwater. We are hoping very much to add benefit.

As a third point I found that if you are looking for legislation for eastern European countries, there was a workshop in 2003. All the legislation for contaminated land management is collected on CD and on a web-site available.

*Adrian Pilon, Canada (C)*

We have different categories of contaminates sites in Canada. We have industrial sites, those are owned and operated by private companies, mining, petrol, metal transformation. And those are covered by legislation in each province. We have government sites that are owned and operated by government departments and those are legislated by federal legislations and have to report to different provincial regulation depending on where the operation is.

We have federal sites. This is a new program and it is about former sites that were used for military, mining etc and they were returned to the federal government as a legacy of the past and there is a specific program for that. We have orphan sites as well in different parts of the country. We have Brownfield that could include some of the above but with specific character that they are allocated in the municipality where we can find services. I will give a presentation on this specific category this afternoon.

Especially in the federal sites we have a recommendation to the federal government to put its own house in order. We have mining sites and all kinds of big pollution in northwest territory, in different regions of the country. Just for the mining sites we estimate 0,5 billion dollar just for cleanup but those are very preliminary assessments and it will probably cost more. The private sector was operating those sites and they were transferred to the government for different reasons. Those are contaminated by toxic chemicals and they are classified by the Canadian council ministry of environment guidelines in order to establish a priority set of actions to act on those sites and of the eight thousand sites that have been part of the inventory

Almost 3000 sites are representing A-priority for the governmental act. A special budget at 3,5 billion dollars has been put in place by the Canadian government to clean up those sites. In northern Canada we have several of those sites. It is a heritage of second world war and we have many of them in the north. One very well known site is one of the first iron and smelter transformation plants in Canada and the federal government as part of the decision to clean up federal sites has allocated 0,5 billion dollars just to clean that site. This is a very huge site and 700 000 tonnes of heavily contaminated sediments and soil.

As a lesson we learned from that site that putting the different stakeholders and the different governmental departments together to act was probably one of the worst sites where communication has taken place. This is not highly complex contamination. The highest complexity

came from the communication point of view. I think that as part of the policies – and that's what I will talk about later on today – is that you have a good communication before implementing any policy. Because in that specific case, the population of that site never wanted to have a risk based cleanup. If you look at the numbers they are extremely reluctant to human health risk assessments because over the last 10 years they have been told many stories about the potential risk and they found out arsenic contamination at this site.

We have probably 250 000 industrial sites contaminated in Canada. This is not an inventory in the book of the government but we had, some years ago, a work with the Canadian ministry of environment.

The petroleum industry represents probably 70 % of the contaminated land in C. Mining is also an important contribution and several other operations. But industrial sites, they have to report their toxic substances (according to CEPA-Canadian environmental protection act). There are several acts dealing with surplus water, great lakes, fisheries, oceans and so on. So those operations have to be reported but they also have to report on specific regulations that exist in the province where they are located. We have a very long history of regulation that have developed in C. The leading province has been Quebec. In the other provinces (10 provinces and territories in C.) each one have set up their own regulation or policy. Ontario is the largest province. They have established new policy for Brownfield. It's taken place in each province now. The harmonization on national level is an issue. Responsibility, liability, methods, solutions etc. We have an estimation of 30-50 000 brown fields in C. cities (not a strict inventory, just an estimate).

Because of the importance of municipalities and the development of municipal land and the impacts on municipal spread and so on and the government asked the national roundtable of economy and environment to come up with a strategy. Different provinces have already programs in place. Now in Canada we see since 2003 and implementation of a national strategy for brown fields. The most important issues are related to finance liability and there are also issues with respect to technologies and risk assessment but the point is that the national round table on economy has reported to the government that this activity does represent a big economic impact: for each dollar spent, 3.8 dollar is returned on investment which is considered as good return on investment.

Major issues on contaminated sites in C: legal aspects – the liability and long term responsibility, the cost of remediation is an important issue, risk assessment acceptance among stake holders, even implemented in different regulation in different regulation and law in provinces. Some stakeholders and bankers have difficulties to support the risk based decision processes. There are still issues about technology and sustainability. Since we have been quite proactive in developing solutions I think we try now to address sustainability in urban development and contaminated site as well. So digging in landfill of contaminated soil and treated soil is still an operation that is permitted but there are actions to look at different options

We think the development can't be done without considering the big picture. Even if C. is a large country we don't want to put the contaminated land in landfill with no control. We have complex other contamination issues. I would say that the chlorinated solvents in recent years have been really the big issue. We have large aquifers impacted with chlorinated solvents and other contaminants as well but chlorinated solvents are driving everybody crazy at the moment. Small municipalities with abandoned operations by industry left behind big

contamination problems. So those are issues with soil contamination. We still have heavy metal contamination.

Last but not least. Communication and education: in 2001 we initiated meetings with stakeholders. We regroup 80 stakeholders under a center for Brownfield restoration of which I'm also the vice president. It's a nonprofit corporation, a public organization. We put all the people together to discuss the different issues. This is a continuing process. We make sure that we communicate with the developers, the bankers, decision makers and public organizations to have actions done, especially in the Brownfield area. There are solutions – the federal gov. decided that- because this was looking like a negative value in the budget, to but in the budget of 2004, a specific program for addressing federal sites and then dedicated 3.5 billion dollars so this program is really just started.

There are other programs, for example Revisoil that is in place for more than five years. We have tax reduction and new program for developing sustainable technology, assistance for technology development. We have created the center for Brownfield restoration in 1998 and this is still doing good work and recently the federation of C. municipalities have got mandate from federal government to develop a program to assist municipalities in cleaning Brown fields. Recently we created the C. Brownfield network. This are 20 people from across the country that are discussing different issues on Brown fields.

*Victor Dries, Flanders, Belgium (B)*

Contaminated land management in Flanders. The rest of Belgium will follow in a few minutes with Henri. Together we have 90 % of Belgium at least talking about contaminated land. A few things I will focus on: What triggered contaminated land policy in Flanders? What triggers soil remediation? Where are we today? What is the status of the proceeding? We have a few bottlenecks we try to solve via evolutions in our policy. And just a few conclusions. Flanders is the northern part of Belgium. Belgium consists of 3 regions: Flanders, Vallonia and Brussels capital region. Each of them has complete autonomous decision right for environmental policymaking. That means that we have 3 different environmental policies - keeping life exciting for companies that are working in Belgium.

Ovam is a public waste agency. We deal with contaminated land as well as waste management. We have a soil remediation decree. It was established in 1995. Before that contaminated land was dealt with under waste legislation which was rather difficult and offered us quite a few problems. What may be different for a few people around the table, soil with us includes groundwater. So when we talk about contaminated land we talk about contaminated soil and groundwater.

Something very specific for Belgium is that we work with accredited experts. We have very little personnel that we can dedicate to this issue. That means that we want to be extremely sure that a report coming to us is a good report. So we put effort in accrediting consultants to know that they can do the job. We also accredit laboratories but I think that is more common. It is giving us a baseline in quality.

What triggers in our policy? There are two very important triggers. The main is not there and it is money. We don't have money. Belgium is a rich country but the problems that Belgium has a huge country debt for quite a few years. That meant that 15 years ago there was a hard political decision that said that governmental budget has to be cut down where ever possible.

Our budget for environmental issues/contaminated land is very low. We did need other triggers. We did not have money to put in contaminated land issue.

We had to make the companies pay and how can we do that? For instance by saying that whenever somebody wants to transfer a piece of land he has to carry out an investigation, at least when it is a risk land which means that there has been or is a risk activity. Companies did not like that but when you can't sell a piece of land without an investigation you will carry out the investigation. Also when such an activity is stopped you have to carry out an investigation and on the other hand you have to carry out an investigation on a periodical basis especially when you have a high risk activity. Which means for quite a few big companies that a complete soil investigation is necessary every 5 or 10 years and the report has to be sent to us. All the data we get is in a register of polluted land. That register is completely public. All the reports are public. You can come and copy them. But that is a big issue because big companies are really aware of their image. They know that any reporter can come to us and read. The companies don't want negative publicity – it works, makes people do something.

Triggers - in our policy and legislation we make a huge difference between new contamination and historical contamination. New is contamination after the legislation was enforced and there we say: no fussing. If you want to do something, if you have a risk activity, do it in a clean way. If not- start remediation immediately as soon as soil remediation criteria is exceeded. No discussion. We don't even have to send a paper. As soon as a company finds out that there is a new contamination there is a legal obligation on them to clean it up.

For historical contamination we say: Remediation is necessary if it poses a serious risk. Risk assessment is very important for us. If there is no risk we don't discuss about it any more. If there is a risk remediation has to be carried out after priorities. We have many sites and can't clean all of them in a few years. Take the most important first, unless you want to transfer your land. The remediation duty is also linked to transfer. For us it is good because in the moment of transfer money is on the table. The buyer wants to buy a piece of land, puts money on the table to buy the land and we say: Take part of the money for remediation. Nobody likes it but they'll do it.

The cleanup criteria we have is based on difficulty which means that if it is an easy problem. OK, take it out completely, to background values. If the problem is larger, more complex, the remediation is done in a risk based way. Take away human risks, take away risk for environment, for groundwater quality.

Where are we today? We estimate that we have 76 000 potentially contaminated sites in Flanders. Why do we estimate that? Just because the responsibility top hand out permits to start a new activity has been with the local authority since Napoleon was with us and the local authorities has only very seldom sent the data to us which means that we don't have the data and sometimes the local authorities don't have the data anymore because they moved, lost it etc. Lots of data are not available. So this is a guess. Because of investigation duty at transfer a lot of sites has been investigated by now, more than 22 000. Almost none of those investigations has been paid by us.

Of these 22 000 sites for more than 8400 a descriptive site investigation is necessary. That means that the first signals of investigation shows that there might be a serious risk. Descriptive site investigation is necessary to prove whether there is a serious risk or not. From those 8400 sites more than 4500 such investigations have been carried out. And about half of them,

2700, have shown that soil remediation is necessary. Out of those 2700 more that 2000 soil remediation projects have been carried out and got an OK means that we agree with the remediation concept and the remediation project also works as a permit. So the companies can carry out the remediation – they have all the permits they need. From those 2000 more that 1200 remediation works have been started on site. More than 300 remediations have been finished by now, after 10 years, with almost no governmental money.

There are a few bottlenecks, though. One, probably the same problem as other countries; There are complex contaminations. At quite a few Brownfield sites, contamination is not really the problem. It is hard to have legislation that work specifically for these very complex sites. Sometimes the remediation duty we put on the present controller of the land may be too hard. For quite a few SMI-sectors (small and middle big sectors) the financing is a huge problem. For example chlorinated solvents at dry-cleaning facilities– the companies can not bear the cost.

Sometimes the remediation cost is higher than the full capital of the company. So either you find some way to help them with the remediation cost or most of the sector will go bankrupt on soil remediation. Our legislation is very descriptive talking of procedures. That was good in 1995 because we had fairly little history in procedures but today it proves to be too strict for those companies that want to go ahead. So we see evolutions in policies, which has got an ok from our government so we are translating that today in a draft legislation. We want to shorten the procedures whenever possible and we want to make them more flexible where possible.

Giving an opportunity to a company that want to go ahead to do that and even sometimes say: OK I put aside part of the procedure; I want to go as fast as possible. We also work on a system to agree on partial investigations and partial remediations where a company can say: I can't afford to do all in a short term, I just want to focus on one problem that is the major problem. The next I will do in a few years. We also want to have fast procedures for small problems. Remediation duty may be ruff for a few owners. One of the big issues for complex sites is that remediation, especially short term remediation often is not possible unless you tear down the entire installation. So you want to give the choice to a company/the owner whether he want to remediate the land or make a management plan that has to be agreed with us and has to be renewed every ten years. There he can say for example “I evaluate when there is a building opportunity, when I tear down a building, I can remediate that part of the site”. That will give more flexibility.

We have a procedure today in our legislation to deal with excavated soils because there are waste, but that procedure is very ruff so we want to make that procedure clearer but also safer and more flexible in our new legislation. We want to limit the definition of transfer. It is our trigger but today it is more that a trigger, a huge cannon. In fact, we don't always think that is necessary and we want to work out funds for problem sectors, we already have a fund going on gasoline stations, now we are working on fund for dry-cleaning facilities, also working on a fund for private UST-underground storage tanks. Conclusions: a lot has been done since the decree, the last 10 years. Most of our system is market driven. There is very little government money spent but the legislation need optimization and we are working at it.

*Henri Halen, Vallonia, Belgium (B)*

A few words about the Vallonian region. It's a wonderful land but it is also characterized by a lot of industries. These industrial basins was also, at the beginning of the century, occupied by

heavy industries. This was due to the presence of coal and the rivers among other things that lead to famous inventions like the vapor machine, the dynamo and so on. Most of these activities have ceased today and as a consequence we have a lot of unemployment in some regions, 30 % of active population and another consequence, of course, is brown fields and contaminated soils.

The estimated number of contaminated sites in the Vallonian region is 6000. This is the official number. Include only the relict sites and waste deposits. There is also another number, sites that have been used by industrial activities but are nowadays used by common activities. And this inventory has not been made yet. Vallonia is facing the challenge to deal with its industrial past and up to recently there was no specific tool to deal with soil contamination problems, legal tools, technical tools or specific rehabilitation program. But there has been since 2000 a raising awareness process about the consequences of this. If we compare the number of brown fields in 1994 and 2004, the number is the same. That is; some have disappeared and some have appeared. This work has led to, in April 2004, a law of contaminated land plus 2 enforcement decrees. I will not go into details of this. This decree integrate both corrective and preventive aspects. Preventive aspects are based on the concept, already in use in Flanders, of new pollution with a duty to clean up when a pollution exit some definite level and it is, for active industries, based on soil investigation, on the hand of exploitation and probably also at some date fixed by the government and possibly also at some repeated interval for risk activities. And it is also based on general prevention principle.

It integrates corrective aspect based on historic pollution and we try to apply the risk based land management principle as a general framework. That include step wise intervention strategy, public intervention strategy on orphan sites and also step by step order by authorities that will be addressed either to the polluter either to the owner. Risk based land management, risk evaluation and risk management. This legislation refers to a soil database that is conceived as a central tool for planning action, the same as in Flanders. Also as a special feature it intends to promote a voluntary soil cleaning among other system of guaranties given to the owners. Another aspect is public private partnership agreements for some active industries and a system of subsidy program that is very few money but somewhat to begin with. Other feature concerning the issue is quality assessment and decision to remediate. In that one we have taken a 3 value system with a trigger value above witch you have to do an action, systematically if it is a new pollution and you have to an action above trigger value in case of historical contamination if there is a substantial risk. This system integrate 3 kinds of risks.

For the revision of trigger values we have integrated a value specifically protecting human health, a value specifically protecting ecosystems and a value specifically protecting the groundwater. This is the reason why some of our proposals are somewhat stringent than in Flanders. That causes some political debate. This decree is not yet in force. There are some provisions to revise, some functioning tools under development, among others, the list of risk activities and also the technical guidelines and so on. There are some points under discussion. Among others the relict sites. Do they all have to be considered as potentially polluted? How do you manage this problem in your country? We are very interested to know that. How to apply the prevention principle. We all admit that it should be some addition of polluted substances that are permitted but how do you manage that? This addition is it the same for all kinds of use or do you differentiate it according the kind of use?

Some problems. Now there is a very recent decision on the political level. It is a response to some report made by the economist that showed that Vallonia was one of the poorest regions

of Europe. There has been a very rapid political reaction. In a plan we found 343 million Euro for making Vallonia more attractive. With a budget of 150 million euro for contaminated sites and brownfields. This could be good news but the question is: will this money be used in an efficient way? There are a lot of people that say; How will you manage that?

What is the money that you could keep for private ideas, private investments. Will public authorities clean the most commercially viable land? The propose is to divide brownfields into 3 categories; A, B and C. A being private driven projects and C the public driven projects. This is the question currently under discussion.

Conclusion: the state of ideas on sustainable management of contaminated sites are in progress. We think that there will be appropriate juridical and technical tools taking advantage of the international experience. These ideas should be put in function. Risk based land management ideas from the network CLARINET have been put forward and taken as a general strategic framework. Now the real challenge will be the development of synergies between stakeholders. Also the civic participation of this program is important and for Vallonia it is also very important to participate in the international efforts and develop collaboration at the international level. These are, to my opinion, 3 key issues for Vallonia for ensuring success to the implementation of this new regulation.

In the ministry of Vallonia we are 4 persons and we develop a lot of thing. It is not an easy task and we try to combine the best of the tools and things we judge as appropriate for Vallonia. It's important for us to have a return from the international community.

*Thomas Joindot, France (F)*

I will make a short presentation of facts and figures of contaminated soil in France. In the afternoon I will speak more about the regulation framework and juridical aspects. First; inventories of contaminated sites. We mainly have two inventories in France. The first one, BASOL, is the national inventory of contaminated sites which request an action from the administration so to speak from the contaminated sites recognized as contaminated by the administration. The administration could be asking for a diagnosis, imposing studies of simply monitoring.

The second inventory, BASIAS, is not an inventory of contaminated sites, it is the inventory of former industrial activity all over the country. It was launched in 1995 and should be completed in 2007. It is a public tool. For ex. if a piece of land is sold we expect all actors to have a look in BASIAS register if there was any industrial activity in this site. Those people can make a more accurate diagnosis of the site. Both inventories are available on the internet. BASIAS is filled by the administration, by national inspectorate of classified sites and if the amount of 300 euro would be given to the inspector to maintain the site up to date it would be a great help because having the site maintained up to date is the fight of each day for us. The number of sites: we have roughly 3800 sites. In BASIAS we expect 300 000-400 000 sites in the inventory. The main regions correspond to the industrial regions of France. First of all the Northern region that has quite the same characteristics as Vallonia. The region near Lyon and also the eastern region are the main regions concerned by the inventories.

In the BASOL inventory you can see where the site is located, the chemical situation, what the administration did etc. In BASIAS you get an extract of a citycenter with factory symbols where former industrial activities or industrial related activities have bees situated.

The BASEL sites – in which state are they? We have roughly 5 types of sites - It means sites that are fit for use without anything to do. We have sites with remediation work in progress, or sites with no problem identified yet, not immediate risk for the population identified but the administration diagnosis has to be done so 84 sites in this situation. Diagnosis or further investigation in progress in more than 1000 sites and also we have sites that are fitted for the actual use but with use-restriction or necessity of maintaining brown water-monitoring of the site – 1876 sites.

Fitted with its actual use but nothing special to do we put the site into BASIAS and it goes out of BASOL.

Somewhat about the budget: According to professional organization the total budget for cleaning contaminated sites in France is near 850 million euro a year so I think it could be a little higher than that, perhaps 10-20 % higher so it's the budget used to clean up sites. It's not the budget coming from the state. The main expense, the main problem now, what drives to expenses is to enable a change of use. A change of use is the trigger of action in the cleaning up sites in French society. Public funding is used when we have to prevent risks on sites where the responsible is failing. We don't use the word orphan – I will explain this afternoon. We roughly have 10 million euro for working on those sites a year.

There is no difference between the ministry of defense having a site or an industrial A or B having a site and cleaning it up. How many persons are involved not in the word but in the work? In the authorities we have roughly, very, very rough figure because people in the inspectorate for classified installations don't deal only with contaminated sites, they deal also with pollution prevention and risks in general. Roughly I think we have the equivalent of between 60 and 70 persons dealing with contaminated sites in the regional inspectorates and in the ministry we are 4 dealing with this subject. Besides we also have public institutions working, at the environmental agency 10 people, mostly dealing with those public interventions on contaminated sites. And in conclusion, our national goals. Our national policy is based on a fit for use of contaminated sites. We could say; no use – no treatment but monitoring in order to assure that the site remain fit for its actual use so no systematically complete remediation. A huge focus on monitoring. There is a difference for us between a contaminated site and a contaminating site. Monitoring is to ensure that a contaminated site remains contaminated but is not contaminating especially groundwater. We have the necessity of this position regarding biased information, limit of use to ensure that use fits with the state of the site and monitoring.

These two last dispositions leads to administrative actions and we try to motivate the inspectorate towards those two actions. Nowadays we have 214 juridical restrictions of use on contaminated sites. It is sufficient but it is good to have that today if we look at juridical problems. And we have roughly 2500 sites having groundwater monitoring today and it was a huge effort of the administration is satisfied with this figure now. National goal for now and the future – continue prevent policy. Most people think contaminated sites management begin when the activity ceases. People say; this industrial site is ceasing its activity, a contaminated site will appear. No the site was contaminated before and we would like to focus on prevention, preventions policy, emissions monitoring and so on. Another goal is completing the inventory of BASIAS. Nowadays, use restrictions are seen as a tool to fix a use of a state. We would like to put that into a more dynamic restriction. The restriction would not say; This is the use of the site and nothing else but; The site is fitted for this use. If you want to change use, be careful, you have to make investigations and so on. And also, the last goal; continue

monitoring with development of data bases. We have a project to put the results of the groundwater monitoring into the national database of groundwater management so that the inspectorate could have a more accurate vision of the evolution of those groundwater-monitoring and we could react if we see for example ground water measure values going up and we have to do something else on the site than only monitoring groundwater.

*Kjell Färnkvist, Sweden (S)*

The Swedish government has set up an environmental quality objective for nontoxic environment. The environment must be free from manmade organic compounds and metals that represent a threat to human health or biological diversity. We hope to reach that goal in one generation. There are 7 interim targets and two of those are connected with contaminated areas. The first one is that all polluted areas that are considered an acute risk has to be investigated and if needed remediated by the end of 2001. The next one is that remediation measures will be undertaken to such an extent under this period that the main environmental problems can be solved at the latest in 2050. That means that we will not reach the goal in one generation. It will take some longer.

The organization in Sweden. We have no person working with this in the ministry but in the Swedish EPA we are 3 or 4 persons working with these matters and we are dealing with guidelines, international work, management of state found for remediation, distribution, follow ups and reports. In addition we have 21 regional councils, county administrations and they are responsible of controlling, management permits, investigations, prioritizations and reinforcement and there are about 80-90 persons working at regional councils with this.

Then we have added this year and next year another 30 persons with control to enforce the matters where we have responsibility from companies. Our aim is that companies have to remediate as much at least as the government money.

Then we have 289 municipalities. They are responsible for controlling. They are participating in inventories. When there will be a remediation by state funding the municipality will take the main responsibility for doing that. We also have some help from our friends; public institutions. The Swedish Geotechnical Institute is one of those. There are about 10 persons a year from public institutions that help us. From now on, for 30 years forward we hope that the state funding is 60 millions a year where there is no other responsibility.

Where there is limited liability or limited responsibility it will be a combination - state funding and negotiation with the one responsible and maybe a judgment from the court. And where there is a liable and responsible party it's the environmental code or voluntary agreements. When we are talking about assessment or reasonability we have these things to deal with; the time since the contamination occurred – the responsibility decreases with time. Where the responsibility is accomplished at that time - are several operators involved?

We have a Swedish method for inventory which we call MIFO. Here we regard hazardous assessment, contamination level, potential of migration, sensitivity and protection value. In class 1 we have about 1500 sites. In class 2 about 1200. Class 1 is the highest priority and we think we will have to fix class 1 till 2050 and maybe a lot of class 2 also. That is our aim.

Here are the key figures. We have about 50-60 000 estimated areas. 40 000 of those are identified. We have MIFO classifying for about 10 000 of those areas. During the last 10 years

there are about 20 sites which are remediated from state funding, 18 is ongoing now and the cost for each site will be, mostly, between 5 and 12 million euro.

Here are the common contaminants. We have a lot of heavy metals. Mines for example and wood treatment plants. For example we have 500 sawmills where we are looking for dioxins because they have treated the wood. They sent a lot of tests to laboratories to Europe from Sweden now so I heard the times to get an analyses in Europe are much longer now just because we are dealing with that problem. We are specifying metals. Arsenic both from mines an wood impregnating and lead, mercury are important contaminants.

*Francisca Quercia Italy (I)*

First of all; in 1997 the waste act was forced at national level, including national framework for contaminated land management. Then this management was implemented by technical regulation, a decree enforced in 1999. This decree established a strategy for the management and very strict role of limit values for soil and groundwater quality. The role of this values is threshold between contaminated and clean site and remediation objective at the same time. Space for risk based solution within this regulation is very limited. Risk based solution can be applied only when it is demonstrated that, by applying the best available technologies, this limit values cannot be reached as remediation goals. This is the present registration enforced in 1999.

What has happened in these 6 years? Much experience has been gained on assessment and remediation of contaminated sites even though, because of the strategy enforced most of the soil is going to landfill. Actually little experience of different, more sustainable, technologies. I hope also these landfills are legal because we have a huge management of waste that are disposed illegally. The need for a change has grown in these years and also much experience of the use is very limited by law.

Risk assessment approaches has grown. An example; the agency has developed a risk assessment tool, software. I have some figures, just one year from now has been downloaded from the agency (free access) site by 500 users and we have 200 registered users and we advice on the use of that tool but again the use of risk based approaches is limited by law.

Some figures on the size of the problem; 40 000 potentially contaminated sites have been identified so far. There is an estimate that this sites can be 100 000. The regions have not completed yet the inventory of potentially contaminated sites. Investigation and remediation is in progress. Figures from 2004; roughly 1000 sites have investigation and remediation in progress. So far 2500 sites are remediated. The ministry for the environment has established by law so far (last 3-4 years) 50 sites of national interest which are taken care directly by the ministry of environment. These sites are large areas, former industrial halls, vulnerable areas. The ministry issues a decree with the limitation of each individual area for investigation. It does not mean that it is all contaminated.

The ministry has supported for this activity, by more than 100 people, and also roughly 10 people from the agency support this investigation and planning activities on these sites. The ministry is mainly authorizing the characterization and remediation projects which are presented by the responsible parties. Also another task is to investigate and remediate public areas a very vulnerable area which covers more that 2000 hectares and there are some areas in Sardinia, former mining areas with 100 000 hectares, sites of national interest. The funds

invested so far at governmental level are 500 million euros. They cover characterization and safety of emergency actions.

What happens in 2005? The agency has prepared some draft technical report on risk assessment methods which is not a strategy, unfortunately. This is just a draft, analysis of different tools available included the one developed by the agency but there are other tools for risk assessment, mainly human, that are used in the country, also commercial. There was a need to analyze what these tools are doing. This report includes also some criteria for data selection like important parameters and so on. This happened in June 2005.

More recently the government presented, in September 21 a proposal for new scheme on waste and contaminated land management. This is aimed at reforming the former registration towards risk based approach but I have to say that this was an initiative from the government and so far the agency is not being to much involved. Hopefully we will be involved in the future. Somehow they have taken into account the work done so far also on the international level. There are several references international approaches and also some merging with the new liability directive and hopefully there will be some merging also with the soil policy development. It depends on time and what happens in the next months. Hopefully this proposal will become new legislation. This government last until April next year and then I don't know what will happen. In this proposal risk based approach is suggested. Also some distinction between historical and new sites and active sites.

*Brendan O'Neill, Ireland (Ir)*

I can see from this morning that Ireland wouldn't be as far advanced as other countries. As I said earlier the contaminated land falls within the workload of the waste management section. So I will just mention contaminated land in the context of waste management and talk about the work that is undertaken on contaminated land. And then in relation to resources, staff, some budget and number of sites and then finish up talking about some publications we feel are very important in this area.

Going back to 1995 waste management was in a very bad state in Ireland. We had few regulated controls, little strategic planning, poor design and operational standards for facilities. 92,2 % of municipal solid waste went to landfill. Low technology was used to conserve costs and there was a minimal expenditure. Most of the MSW (Municipal Solid Waste) went to land fill and the cost was about 6 euro per ton so that's where we were back in 1995.

Now we have turned around to a certain degree. We have done a lot of hard work over the last 10 years and some of the success is that the amount of recycling has increased over 28,7 %. The costs has increased accordingly. Maybe a 150 euro per ton of waste handle so it has absolutely rocketed. That's what we have done the last years. In relation to contaminated land Ireland arrived late to the industrial age and the contaminated sites that we have would be larger due to improper handling, spillages and leakages. All gasworks sites, all waste disposal sites, all mining sites and underground leakage storage tanks. So contaminated land, as you saw from the situation in 1995 was not a huge priority in waste management terms.

What work has been done? Traditionally we had plenty of Greenfield sites available. Land was fairly low cost and contaminated land remediation that was done was largely related to infrastructure developments. If you wanted to build a road or a sewage treatment works or even a landfill site you would have to deal with removal of contamination, isolation in some

cases, putting in barrier walls, interrupting pathways. And if you do in situ treatment it should be under a waste license.

Things have changed in recent times. There has been an enormous rise in property prices in Ireland. Also, the spending rations has hugely increased for planning development. A site where former you normally get 5 houses at say 50 000 euro. Now you might get 100 houses at maybe 250 000 euro. So it is now becoming economically viable to remediate some sites and this type of remediation will be carried out under waste license.

On the waste management scene there would be an increased focus on contaminated land in the context of waste management. Recently the minister issued a section 60 ministerial policy direction to local authorities in terms of the preparation of waste management plans and section 60 direction to inventory of sites where waste-related activities has been carried on. They told them to undertake a risk assessment and to take the necessary measures to prevent and limit environmental pollution. So the essential requirement of this ministerial direction was to identify sites with genuine environmental pollution protection.

The nation has its waste management plan including procedures of risk assessment. First step – to conduct a desktop study on bases of contaminant uses on potential sites. The second step was to evaluate the particulars of these sites on the base of any information that could be obtained from documents and talking to people that might know something about it. The third step was to evaluate the information compiled in step 1 and 2 to see which are the most likely sites for hazardous waste disposal. And also to look at things as maps and other records which are available. Step four is the preparation of the section 26 register of sites known or suspect to have been used for disposal of hazardous waste. The difficulty is that if there is no information available they remain suspect so a large number of sites could be there on the basis of suspicion alone. Secondly, you would not have looked or visited the sites so it is preferable that steps 5 and 6 that are the preliminary risk assessment and the intermediate risk assessment are carried out before the register is formalized. There should be some procedure for removal of sites from the register, following the completion of investigations.

Step five is a desk study on the information assembled and to prioritize the site categories. Basically 3 categories. Category A sites – high priority. Category B sites – medium priority and category C sites – low priority. The intermediate risk assessment will be a little more detailed. From a literature review of site specific information to physically visit the site do some visual site monitoring. To review monitoring results adjacent sites and look at water pollution records. And to look at the historical geological characteristics of the site. This prioritize sites for detailed risk assessments.

The final step, a detailed risk assessment of the high priority sites thru intrusive site investigations, environmental monitoring. Therefore verify the absence or presence of contaminants and generate information to generate a proper remediation strategy. From listening this morning to different presentations I can see already a couple of additions that could be made. First the idea of having just one list of sites is difficult because the site can be there on suspicion alone. I think the system in France where they have 2 parallel registers is a very good idea. The second point is; most of the talk this morning has been on costs. That particular risk assessment procedure doesn't look at costs at all. That is something that has to be worked in to it. The point is that a lot of talk has been about communication campaigns to try to get by under the risk assessment process. I think some sort of decision support system would be needed to try and engage the other stakeholders.

In terms of resources; first there is no specific national survey on the number of contaminated sites. The national hazardous waste management plan estimates that there could be 2000 potentially contaminated sites. Of them it is estimated that 487 are contaminated due to hazardous and non-hazardous waste-disposal activities. In terms of budget; there is no dedicated budget whatsoever. Its part of the overall waste management budget. But encouragingly I see in another area that the minister of the marine communications and natural resources has allocated 10,6 million euro for rehabilitation of a former mine site, silver mines. So maybe that is the shape of things to come.

Because of the increased cost of waste management, say 150 euro/ton, the idea of putting a tax to generate a substantial fund for remediation will be quite difficult. Further serious decisions need to be made in the near future. In terms of staff resources; there is no official contaminated land officials who are dealing exclusively with contaminated land. Officials become involved purely as the need arises. If there is an application of redevelopment of a contaminated site they will become involved. If there is a pollution incident they will become involved or if there is evidence of something illegal or activities that require enforcement.

And there is some work going on trying to develop risk assessment methodology so that there will be a system in place. In terms of the actual resources being allocated it's estimated that in the EPA you probably would have 4-5 person every year in terms of activities related to contaminated land. And the local authorities, there is probably 10 persons. In the ministry, probably only about 1 person year per annum. It's quite a low level of activity on contaminated land. There is a new momentum gathering, looking at the inventory of sites, risk assessment and remediation program. That's going to take additional resources. And just looking at the type of resources we are talking about. The EPA could be talking about maybe 10 per year. There is 34 local authorities and an average of maybe 1 per local authority, 35 person years per annum. And the ministry will have to step up its input considerably. Maybe 3-4 person years per annum.

In terms of publications relevant to Ireland. I've given you an extract of the hazardous waste management plan. Also an extract from Harold and Carol Ferguson's report from CARACAS and the Ireland-chapter there. In terms of monitoring and general management we will follow very closely the practices established by the EPA landfill design manuals. We have a landfill registration, manual, investigations for landfill manual and landfill monitoring manual. The actual application may change but the principles will stay very much the same.

*Andreas Bieber, Germany (G)*

Some words about the situation in Germany with contaminated sites. Our regulation used is mainly the federal environmental protection act which is from 1998 and the federal environmental protection and contaminated sites ordinance from 1999 which is now in course of renovation. We then have regulations of the different states in addition and a lot of papers that come from the federal ministry and the land working groups. For example we have some toxicological data and proposals for levels which are not laid down in our soil protection ordinance. We have a manual about the reuse of polluted soil and we have edited a manual about natural attenuation.

We have about 270 000 sites which are suspected of contamination. These are numbers from May 2005. Of those 270 000 sites 85 000 are landfill sites and the other industrial sites. Risk assessment was finished at 45 000 sites. We have definitely sites which are contaminated

where something has to be done 13 000. We have under remediation 8000 sites and 17 500 where the remediation has been finished. Monitored are 4500 sites. Expense, the money that we spend 500 million euro per year.

Research projects that are very interesting. We have running projects with active barriers and leakage – the risk that comes from contaminated sites related to ground water. Both projects have amounts of 7 million euro. Then we have 2 other big issues; natural attenuation and land consumption and recycling. Which are covered both with 20 million Euro. We don't have goals in term of time or cost limits on the federal level. The goal is mainly to reduce risk for humans and the environment. For some regions they had goals in time where they said they want to get rid of the problem until 2010. They reduced this goal to the risk of public sites until 2010 and now I don't hear anything about it so I think they gave up. It is very difficult to set items in time or cost.

*Michelle Beaulieu, Quebec, Canada (C)*

Talk about the situation in Quebec. The surface of the province is 1.5 million m<sup>2</sup>. The density is very low. Most of the 8 million people are living in the southern part of the country, around Montreal and this area. There you find the same problem and the same pressure to reduce the land as in Europe. If you go north you find the mining areas, the gold mines have a huge impact on the environment but it is a different kind of problem.

We also have the northern region. It is impossible to reach this area by road. You have to go flying or by boat. There are a lot of villages scattered all along the coast. Indian and eskimo villages. It is polluted there because there are heating and electricity through generators so they have petroleum hydro carbons and there is spills. So we are doing cleanup work even where no trees are growing and where there is frozen ground all year round. This is the kind of problems we may find there.

As for the known contaminated sites there are two public inventories, accessible on the internet which register all contaminated sites and waste deposits known by the ministry. On those registers there is 6400 sites and 326 sites which are more hazardous waste landfill sites often quite big sites. When we started that in the 1980-ies we did first the hazardous landfill sites register so we looked actively for those sites and came back in 1984 with 311 sites. At that time we thought; this is it, this is the problem, in 10 years it will be solved. Of course we have now a different vision. Many more came, due to industrial spills and this is the second inventory. Even if there are that much sites in the inventory many of them have been cleaned up already. Still, even if the site is clean it stays in the inventory as a memory.

There is also another inventory by the federal government. In the budget of 2004 the federal government decided to spend 3.5 billion dollars on it's own sites. Before that they asked all the ministries to do an inventory of the sites that they own. In Quebec there are 481 sites which are owned by the federal government. If you take those 2 registries there are 7253 known sites in Quebec and some of them were cleaned. Of course there is much more sites in the province. Each day new are discovered as part of legislation.

Legislation; we have a list of industrial and commercial activities where you are almost sure that the soil was polluted. When they are ceasing activities they have 6 months to do an assessment and if contamination is found it will be put on the inventory and they will have to clean up the site. Also in legislation there is something like, a person that will change land use

on a site where one of those activities has operated need to do site assessment before doing that land change. So again this is a source of information.

There is a program on active industries. About 300 of them are targeted. They have to do an inventory as they are still in activity. Then cities are doing different kind of public work and often they discover contamination. There are some sites where you notice an impact of the environment, like presence of hydrocarbons on surface water and so on. So you discover other sites and sometimes the minister give order to someone to assess its site.

Through all that we are getting more and more information on the number of contaminated sites. How much is there in reality? I would say between 30 000 and 50 000. Sometime in the future we will probably reach that level. In Quebec when we started in 1984 there was no treatment centers. It took about 7 years before we started to implement treatments. From first policy in 1998 it was clear that we didn't want to create new problems somewhere else if soil is excavated. We always had in mind that we had to build up a treatment facilities network and try to do what is needed so it is not dig and dump but dig and treat. We succeeded quite well. Today it is 21 treatment centers. Most of them are biological. Probably because 70 % of our problem is related to hydrocarbons so biodegradation is working quite well. Then we have 2 thermal plants. We have physical/chemical plants too and 4 secure sites for contaminated soil. Those sites are getting only contaminated soil, there is no mixing with other kind of waste.

I don't know how many sites were treated last year 2004. What we are gathering as data is all of these sites must report the amount of soil that they got for treatment. 2004 we treated 432 000 tonnes and land filled about 100 000 tons so it is 82 % where soil was treated and 20 % where land filled which is not bad. We are able to follow that from 1991 year after year and we are shifting more and more towards treatment. So far totally in 2004 about half a billion ton of excavated contaminated soil show us there is a lot of activity. It is not coming from government because we do not have so much money and we are not ourselves paying that much for having sites rehabilitated so this is mostly a private sector.

How many people are involved? First the budget. The central office has about 1 million dollars a year to pay for expenses in the personal. In regional offices, 17 of them, there are 2.4 million dollars. We are putting 1.4 million dollars a year on orphan sites. A total of 5 million dollars. We have a program that is called REVISOIL. It worked out from 1991 to 2005. In that program the government was putting 15 million dollars a year to finance the assessment sites. If you look at these 7 years we put in fact 20 millions a year on contaminated sites but it is back to 5 millions next year if no other program is replacing the one we had. The number of people involved; 14 in central office, 36 in regional offices, that's 50 people. Then we have also external experts, authorized by the ministry. They have to have the right formation. They need 10 years of experience, have to go through exams. It's not firms that are acknowledged, it is individuals. Those people are certifying that the assessment done is respecting the ministry guidelines and they have experience in the whole process. Just to make sure things are done the way they should be done. There are 79 of those people in Quebec.

There are also people working at municipal level especially in towns like Montreal. I did not count them. There is a hidden force, the banks which are also working quite lot because there is very difficult to get a loan to develop anything on a possibly contaminated site without doing some kind of assessment and showing to the bankers that the site is clean or was cleaned to the level asked by government so the bank is really active area.

A word on REVISOIL incentive program: It started in 1998 and was targeted on brown fields. The government would give up to 50-70 % of the total assessment and clean up cost but it has to be a concrete project, not only a vague idea that maybe something will happen. You will have to show, as a promoter, that you have a project and you are able to pay for it. This was for anyone, private party. For municipalities we had to show that if they redevelop the site, for example cleaning up a river bank, it will be nice and people would come and build things around.

Through that program in seven years we have 9 projects done so not only the site was clean but things were built on it. For 3 million m<sup>2</sup>, clean or rehabilitated. What is interesting on those projects we were involved with financing part of the projects so we got all the data and what was done, how much contamination and so on. What was built on those sites afterwards? It was buildings, houses or industries for 3 billion dollars. We realized that for example in Montreal the government loans over 7 years were 75 millions but yearly all that was built on those sites generated 46.5 million municipal taxes a year. It means that in 2 years you are getting back the investment. We saw also that back in 1998 it is the finance ministry that had the idea. It was really finance-oriented from the start. It worked out quite well.

*Margot Meijer, Netherlands (N)*

Briefly about the new developments on contaminated soil. At the end of this year the new soil protection act will be enforced. New in the act are the obligation of soil remediation for industrial owners combined with financial arrangements.

The obligation of soil remediation and the right of subsidy: Owner of manufacture sites will have to clean up their premises if there are in-acceptable risks, human risk, ecological risk or dispersion risk. The owner of the sites can link the remediation to their own investment plans. That means they can start remediation together with reconstruction activities. In the meantime risk of pollution measures are required. The policy is that manufacturers shall start to clean up locations with serious risks before 2015. The risks will be assessed with means of a tier approach based on functionality. Companies have an obligation to remediate but will also be subsidized by government money.

Subsidization ranges from 50-70 %. The overall goal is to create clean soil and healthy environment. Several inventories of contaminated sites has been made. Most recent estimate is that 600 000 sites are serious contaminated. Over 60 000 need remediation measures.

In December 2003 a policy letter was sent to parliament with a number of updates. The various aspects of soil protection and management linked together including biological and physical aspects, targets, sustainable soil use, harmonizing soil capacity, human use functions, holistic approach, integrating spatial planning including underground space, water management, urban development, nature and eco-culture.

How to deal with contaminated, excavated soil is under review. New elements are that reuse of soil and sludge will no longer be part of building material decree. Nationwide soil management plans will be made.

*Anna Maija Pajukalio, Finland (F)*

We have 2 inventories, one in early 1990's and one in the end of 1990's and now we are revising our inventory again because of a new database which is going to be public. This

means that we have to send 20 000 letters to real estate owners telling them that their real estate is possibly contaminated soil. Very challenging task for risk communication.

Amount of possible contaminated sites is 20 000. 1/3 service stations, more than 1000 shooting ranges, more than 1000 sawmills and wood impregnation sites. Typical contaminants: Sawmills – 250 impregnation sites where we have used chlorophenols contaminated by dioxins and furans. Location of suspected areas: about half of the 20 000 are very near groundwater area or water supply. We think that about 3500 should be remediated in 5 years.

Our regulation of contaminated soil is within the environmental protection act which is a legislation for pollution. There is a soil pollution and groundwater pollution prohibition etc. All the liabilities are in this act. This means that because we are now implementing the act on environmental liability we have to make some revisions or maybe even new legislation.

What is contaminated soil? I think that is very important. We have no exact definition. Soil pollution prohibits says that waste or other substances are not to be left in the soil or on the ground so as to result of soil quality as may endanger health or harm the environment. We have used generic guideline values that are rather old, from 1980 and risk based land management is not used very often. We are trying to change things.

We have been preparing a new governmental decree on assessment of soil contamination and remediation needs and risk analyses is emphasized. Also there is going to be risk based soil quality guidelines for about 60 substances. They are presenting a procedure how to use this in a guidebook, about 250 pages.

Organization: In the ministry of environmental policy legislation and funding there is one person or 2/3 of a person, me. We have 13 regional environmental centers. Their task is to promote remediation and permit and supervise projects. So far we have remediated 2000 sites. In next 20 years we need maybe 1 or 1,2 billion euros. The amount of excavated contaminated soil is about 500 000 tons per year.

Why do we remediate? The most common reason is a change in land use or real estate transactions, closing down of activity - revealing harmful effects. The liability to remediate is based on polluter pays principle but if the polluter cannot, second liability is property owner, third one is local municipalities or state. In cases where polluter cannot be assigned cleanup costs are in practice shared between government and local authorities. About 1/3 of remediation is funded like that. State finance is not much compared for instance to Sweden. State budget money for orphan sites is about 3 million euro per year. We have some money for oil pollution compensation fund. That is about 2 million Euro/year. I'm sorry to say that we still do very much land filling, 44 % but we have many other techniques but as Finland is big and sparsely inhabited land filling is still common and we are thinking about maybe renewing our tax policy, for instance the landfill tax does not include contaminated soil at the moment.

*Sheena Engineer, United Kingdom (UK)*

I represent UK but work for England. Legislation changes slightly between the four governments. We have 400 local authorities and for contaminated land the local authority is generally the leading force. There are nationally 3 environmental agencies and 1 gov. department who look at a more national basis on environmental concerns. Local authority probably lead on human health aspects. Environmental agency have more interest in water and waste issues. England, Wales and Scotland have virtually the same legislation on contaminates land. It

changes slightly between the countries but the same broad principles. Northern Ireland does not have such a regulation but is working to get it quickly.

In UK the primary way to deal with contamination is on a voluntary basis, looking at the liability where they try to reduce the risk of having enforcement action taken against them. Which in the UK severely limits their chance to get other permits in the future. That's a proportion of land cleaned up.

By far the greatest proportion is through re development and planning controls. That is a very positive way of dealing with sites mainly because the cost is born by the private sector. We introduced legislation in Nov 2004 with additional guidance how to deal with contamination through the planning system. A key for that is that the redeveloper has the responsibility to ensure the development is safe. Even if the authority set a level it comes down to the redeveloper to see to that the people that are going to be occupying that land are protected.

It is suitable for use criteria so lesser standard for industrial use than housing and in that process the environmental agency provide advice, particularly on ground water protection. Final way of dealing with land contamination in UK is regulatory action. We deal with it through the water resources act where there is a risk to controlled waters or service waters and in those cases we'd expect the sites to be cleaned up to the initial state. We ensure that the site is cleaned up to the state it was in when the permit was granted. The regime which effectively is used for those sites where action is not taken, so it is not likely to come up through planning control or the site is already used for housing, it has historically had a problem. We don't have a widespread register of contaminated sites although the regimes do develop into registers. Registers only apply to sites where have proven contamination rather than suspected. On those sites are usually about to or have carried out some remedial action.

Funding. We try to avoid funding from a government perspective cause we have very little money. For UK as a whole probably 30 million euro per year cover investigation and remediation of sites. Other funding estimated to 1 billion euro a year spent on investigation and remediation through commercial activities, either planning or company liability. There is no requirement in UK to provide any information on a national basis of how much you spent. It is commercial investment and tend to get very separate from negotiations with local authority or environment agency. As a lead regulator in excess of 400 local authorities equally information on the number of sites on a national basis is very limited. They may locally have good information but nationally we don't have one single register.

Update on more recent work in UK. We issued a document - model procedures for management of land contamination and it provides a framework for looking at sites and the risk assessments, in particular the company liability and planning process. We have also been working to try and improve the standard of analyses in our labs in terms of precision and bias. We have a national standard that we're trying to get labs to comply with. We're about to release a new version of our human health risk assessment model. An Excel spread sheet will come early next month. Helps look at exposure from contaminated soils at a variety of sites. There are key scenarios but it is not a risk assessment tool that should be used by somebody without some knowledge.

We have been working on ecological risk assessments. This is a challenge. Particularly as many of the screening values that are being developed appear to be quite low. Significantly

lower than values for human health or water. Certainly welcome a discussion on that between countries.

On a practical basis we have issued some frameworks on monitoring natural attenuation and reactive barriers, both of which are started to be used more in the UK. The UK have a thriving landfill disposal of contaminated soils relatively cheap, about 10 pounds a ton before July last year and probably 100 pounds a ton currently. Another item, there is actually a new version of the risk assessment tool for looking at medium targets for groundwater known as P20 which is near in completion and will hopefully be published in Nov or Dec 2005. All documents you can find on the environment agency England and Wales –website under land quality.

Other current work; bioaccessability; to use it quantitatively is a bit of a challenge at the moment. Part of that challenge is to ensure that we can even get consistence results from labs and the agency has been looking at a ring-test. Another topic we need to sport each other on, Europe-wide.

Number of sites? I don't have figures for the UK but we published a report last month on England and Wales. These numbers are estimates. They are based on extrapolation of sample-sites reflecting England and Wales commercial land areas. They are not exact but the closest we got at the moment. We estimate 325 000 sites where some former contaminating activity has been carried out. They might be very small sites. In England we have many backyards, tiny little scrap yards etc. Or there could be large sites such as ministry of defence sites. We had a look at the number of sites that maybe have been used for radiological activities. This might include hospitals. This number is only an indication. We think there is probably 53 000 sites where some form of radioactive material has been used. Again: this is no suggestion that these are definitively contaminated. It reflects the type of activities that have occurred. We have also had a look and have now identified probably 43 000 sites where some form of chemical pollution has been identified. Of those on 21 000 there has been some form of remediation carried out. This is very big estimates. Probably there has been about 750 new sites with some form of contamination. I suspect mostly things like petrol station where we still identify problems with leakage to road accident.

Finally a couple of other issues. Our landfill ability, especially for hazardous waste, is decreasing. Northern Ireland has not got a hazardous waste facility at all. Wales and Scotland has about 1 each and England probably 10-12. That is driving at greater pressure to look at authentic technologies. The makeup and the way in which sites are dealt with in the UK is already starting to change significantly in the last 18 months.

About treatment sites. The issue has been raised in the UK. I'm not aware that we have had firm proposals where soils are taken away to one site and treated. Interesting to see if that becomes more of an issue. Ongoing problems with ensuring monitoring and ensuring that we get verification of clean up within those regions. Therefore we can say that the sites that were contaminated have now been removed from that category.

## First thematic discussion – Responsibility and financing

### **Responsibility in the French regulatory framework**

*Thomas Joindot, France*

A presentation of liability in the French system. Four parts; first an overview of our regulatory system. It will be very short but it is necessary to understand these things. I will stress a point on some recent juridical evolutions we had in last months which have very important consequences at our liability system and have huge number of questions about that. This will lead to somewhat about orphan sites and I'll terminate with actual developments of the policy.

Principles we are trying to implement in our policy now. Brief overview of the system; The policy for soil contamination has been tackled through the regulation for classified installations. This regulation is a system of permitting for roughly 60 000 industrial facilities in the French territory and of declaration of 600 000 facilities. It is controlled by the national administration through the ministry of environment and its regional bodies that are under the responsibility of the prefect of each department. What does the law for classified installations say? Two aspects; The polluter, often a classified activity, has the obligation to clean the site so it can be fitted for a determined use. I speak later about how this use is determined. Second aspect; the prefect can impose the responsible to take all necessary measures even after the end of an activity process. Those are the two dispositions on which the policy for contaminated sites rely. Of course we have the normal disposition of this regulatory framework to impose prevention measures on activity that are still working. In this framework, who is responsible? First of all the owner of the permit - if the activity ceased the last owner of the permit. Of course there are dispositions that say that the responsible is not only the last owner but the polluter. If it can be proven that the pollution is not generated by the last owner but someone else it will be this other industry that will have the responsibility for remediation. If he disappeared the responsibility will go to the last owner. If he disappeared that is a big question for us.

All our policy rely on a regulatory framework that was done towards industrial installations and not toward the property owner. We arrive at the end of what this framework enables us and also we tried to go towards the responsibility of the land owner. Saying; he is so to speak linked with the facility on the site. We did not manage to have that and today we don't have any tool that enables us to imply, to have the responsibility of the owner taken in those situations. In 2000 the ministry of environment gave instruction to the prefects to go towards the landowner responsibility. If there is no other, if everybody disappeared on the site and there is something to do, please and ask the land owner to do the remediation work. It leads to lots of decisions at administrative codes and the first decisions were in favor of landowners liability but as time went on all decisions began to be against this liability and now it is clear that the landowners responsibility is something we can't assume from our regulation. If we can prove that landowner is linked with the activity, perhaps we can try to have something but we quite lost this juridical battle. It shows also that our system is not based on very detailed regulation but the regulation establishes principles and after it is a case by case procedure so on each site. It explains why there are so many juridical decisions.

We are quite on a common law system on our contaminated sites policy. It could be rather astonishing for people who know how France works. Owners liability was not introduced in the 2003 law that had some dispositions about contaminated sites management. I don't think there is political aim to implement owners responsibility in our juridical system.

A few words about recent decisions; We had a very interesting decision that was very complicated to understand. This decision says that the administrative constraints don't have a limit in time. A prefect can impose something to the last owner of the permit 100 years after the activity. No time limit. But this decision also says that according to civil right principles the financial consequences of those administrative decisions should – the 30 year regulation should apply to those financial consequences. Also the financial consequences should not be applied to the owner. So our legislation is more or less inoperative towards the property owner and 30 years after the activity ceased if the administration did not do anything.

Explanations about those decisions; The main problem is that we have huge confusion between remediation obligation at the site closures that says; you have a permit, you should remediate it when the site closes, and the obligation of maintaining sites in a state of safety, a duty of care that should apply to the permit owner but also to the landowner. When we say to the prefect to go towards landowners responsibility they applied the same thing to the land owner the same thing that they would have applied to the last owner of the permit. Our juridical codes don't make the difference between the obligation when activity ceases and the duty of care of a site. The actual situation; once the responsible disappeared we have no juridical means to go towards the responsibility of somebody and we have an important risk; Some people can make juridical action to force the state to depollute their own piece of land. The man who prepares the decision of the court, wrote in his report that the state has money so when there is no responsible it is up to the state to clean up the site. As it has money there is no problem. It is totally against the French philosophy of contaminated sites management. How do we fund orphan sites? First, since 1999 we don't speak about orphan sites. We now speak of sites with the person in charge failing because there should always be someone responsible for a site. We don't want people to think that a site is an orphan and the state should do the work. There is always someone responsible but there are cases where the responsible can't do its work and the state will have to do the work. But afterwards if he sells the property or gets money the state will come and take its money back.

Public intervention: the state does only clean sites when there is a risk for the population or sensible environment. The mechanism of public intervention is limited when there are safety-problems. There is no question to give value to the site through this mechanism. You will see the majority of our intervention is waste- evacuation and waste treatment because the first problem we have when an activity ceases without a responsible to care about it we have safety-problem with dangerous waste remaining on these sites. You will also see 33 % of the intervention is dealing with monitoring. You will find another time our focus on monitoring because in most cases it is putting the site in a state of safety means waste evacuation, monitoring and that's all.

Actual development of the policy; We had published on Sept 16 a new decree dealing with the conditions of classified activities. It does not change the practices but it puts at the level of regulation things that were in the practice but not written in the formal regulation and it is also an important step towards clarification of responsibilities. The main thing that the use of the piece of land for which the owner of the permit will have to remediate the site is determined.

When the activity ceases, after a discussion involving the polluter, the landowner and the mayor, the prefect will take its decision, saying; We have this use to take into account or this types of use and the polluter can after that make proposals and the final decision will take in account the cost of remediation, the social-economic advantages/disadvantages of such type

of use. The fact that the site is in a totally urbanized area or an industrial area and also the ecological advantages to take on a cleanup process compared to no cleanup. There is a discussion when activity ceases, for new activities. The final use of the site will be written in the permit and this discussion will take place before the permit is written. It enables the decisions to be clear. One of the problems we have now is that we have remediation of formal industrial sites and the mayor asks the polluter to ask for sensible use and the polluter don't want to do anything and when you go to see what were the conditions of the activities 5 or 10 years ago you are unable to find what the decision was - what the polluter was asked to do an so on.

We hope this (new decree) will enable a clear decision-process when an activity ceases. In this decree there is also a limitation of liability for the industrial. First; the site should be fit for the determined use but 20 years later it can't be asked the polluter to pay for a use that will be a more expensive than the use determined when the activity ceased. For old sites, sites where the activity ceased before 1 Oct 2005, the liability of the industrial is limited to the industrial use, use of site compatible with last function of facility, which does not mean that it is forbidden for industrial local authorities to make agreements in order to remediate sites for more sensible uses.

Evolution of the concepts: We are rewriting our methodological guides and in all our policy, and it is also an aspect of the new decree, to have a clear difference between 2 concepts; putting the site in safety and rehabilitation, in other words putting fit for a determined use and it also enables us to differentiate the obligation. We could put towards the owner of the permit or the landowner. Also it leads to differences in approach.

There is clearly a different approach to historical pollutions or for new pollution, for example evacuation of dangerous waste. We think that historical pollution is not the responsibility of the last owner of the permit. He will not have to clean up all the historical pollution. It is subject to agreements between the polluter, the landowner, the mayor, the man who builds new houses whereas recent pollution is clearly the responsibility of the polluter.

Dealing with historical contamination. We try to implement in our methodology and policy different philosophies. Remind you of the cabinet model where the trigger is the project. In the new guides we will have at the end of this year we will try to have tools that enable us to remediate sites. The fact that a site is contaminated should not lead to a situation where project won't take place on this site but take place on another green piece of land that will be used instead and the brown field is left without any use.

So we have 3 categories of sites: The site where there is no value and no project – the treatment is limited to monitoring. We should assure this is a contaminated but not a contaminating site. To use financial and natural resources to treat this site would not be good from a sustainable point of view. The Second category: The site that have high value and a reuse project. The funding of remediation should clearly rely on an agreement between parts (as mentioned above) with no state money. And the value added to this site should in most cases enable the clean up that is necessary because there is a change of use. Third category: We have to think about subsidy mechanisms. We have some now but they are no sufficient. It is sites with reuse projects but low value so the value added through the project is not sufficient to cover remediation costs and the fact that the site is contaminated could lead to the project to go to another site. Public funding should be useful at this type of sites in order to avoid use of clean land. It is the only category of sites where public funding could be used.

### Questions and discussion

*Harald Kasamas;* About clarification between historic and recent pollution. It is not existing in the French law but you are reacting differently with the liability. How do you define recent and historical pollution?

*Tomas Joindot;* We have very few things in the law and all is in the methodology and the case by case approach. It is now difficult to have property-owners liability but we are thinking about entering into the law property owners liability and establish a clear difference so that it could not be understood that property owners liability also apply to historical pollutions if they do not create a safety problem. Towards liability of industrials/the polluter: when the activity ceases there is a discussion for the use to be chosen and there is a discussion once the use is chosen about the work to do to enable this use. It enables also the mayor etc to have agreements for funding the clean up. When there is a discussion between the administrator and the polluter having in head the concepts of historical pollution, new pollution and so on we can avoid situation when the polluter says: It is historical pollution, it is too expensive. I will not do anything. And the mayor says: I will not give money because it is up to the polluter to do all. We say; Think about that when there is historical pollution it is reasonable to have a co-funding. I think it enables smoother procedures when activity ceases.

### **Brownfields in Canada.**

*Adrian Pilon, Canada*

I will talk about the different issues that we have experienced in Canada dealing with Brownfield. Before I talk about specific cases: We have a new law for contaminated sites that is very specific about diligent action by the owner. It was adopted 2 years ago. There is a difference between the operator of a site or the industrial activity and the owner of a site that is developing the site and then redeveloping or selling the property and acting diligently and remediating the site. I will talk about issues that were raised by developers and some stakeholders about the limited liability with time. This is important.

In Canada we have 2 definitions of Brownfield. The very recent definition by the Canadian municipalities; sites where commercial or industrial property where past action has resulted in actual or perceived contamination and are a threat to public health and safety. This is the definition so far and they added to the last part of the sentence; and where there is an active potential for redevelopment. So in Canada there is a link between redeveloping sites and commercial activity but on the other hand there are some categories of sites with limited value but those sites may need redevelopment. This will be part of the discussion today.

In 2003 the financial minister of Canada mr Paul Martin who is now the prime minister, gave the mandate to the national roundtable of economy and environment to develop a strategy and that strategy was published in 2003. Since then we have been working on some of the recommendations that were a result of an action group with 20 people from different organizations, private organizations, lawyers, municipal and government representatives. With respect to the different issues that were mentioned in this strategy. It was a big issue with 30-50 000 sites, with no survey – this is an estimated number – but the key issues was finance, legal, environment and technical issues, social issues and sustainable issues related to urban development.

The first one is liability and long term responsibility. What happened in the past 3-4 years in Canada is that 2 major petroleum companies have been forced by the court to clean up sites or address contamination outside their property even if they have cleaned to the standards

because of civil prosecution by the new owners. This kind of decisions changed the strategy with respect to the liability issues. We believe with the disposition in some laws that it was sufficient to address those issues since, for instance, in the Quebec regulation, if you submit the remediation plan and the ministry is satisfied there is no longer a danger for reopening the remediation contract.

In this case Esso was owning property 25 years ago. They dismantled the equipment and cleaned up to the standards of the time. Over the time the property changed ownership and very recently the developer wanted to reuse the site and the company had to go back and clean the site. There are 3 or 4 cases in Canada in the recent years. In the case of Shell they had also completed the contamination and had civil action by their neighbour and the decision if the court was to have the company restore the site even though they had cleaned to the standard. The citizen in this case was complaining on different impacts on his quality of life. Those cases have initiated a lot of action by the lawyers. As a result a lot of lobbying is being done in order to set some limitations to liability in case of brownfield redevelopment by a new owner that is not the polluter. It is totally different.

There is a kind of confusion that is taking place between specific industrial activity or past ownership by a company that you can identify and historical contamination where you cannot identify the owner. Those cases are creating some changes in the policies. Those are the recommendations that was in the national round table report; The first was to permit binding contractual allocation of liability upon the sale of a brownfield. This refers to the jurisdiction, province or territory. The second bullet is the most important: Termination of on and off site regulatory liability subject to specific re-openers and fraud upon issue and regulatory remediation approval and amended by the federal environment protection legislation to provide for federal acceptance of provincial territorial approvals. The second and third bullets are very important since those are key issues for the redeveloper, especially for brownfield sites with historical contamination, that was put in place by someone else. Then that specific recommendation was to avoid this kind of re-opener situation and then to force a cleanup after that the that the operator has completed the remediation based on the criteria. This was to prevent the owner/redeveloper to remediate a second time even if the regulation is changed. The other point was the determination of civil liability after the expire of an appropriate limitation period.

We have different regimes of civil law in Canada, we have two regimes, the common law and the civil code in Quebec. It makes the harmonization quite difficult. In Quebec there is some limited liability with respect to civil liability in the civil code which is not the case in the common law. This is why this recommendation was there. Actually it has not been implemented. Those are recommendations and there are working groups developing mechanisms. The third bullet was to create an insurance fund for post-liability determination claims. It was to support any reopening of an agreement or remediation plan, to support the developer or the site owner.

In this case I think that something that was forgotten was, even though the recommendations are interesting from an owner/developers point of view, there is nothing in this document that covers aspects related to historical contamination. If there is a re-opener and there is no insurance fund this historical contamination will be addressed – this is not covered in any policy at the moment. The Canadian council of ministry of environment did produce 13 principles for addressing contaminated site liability 10 years ago. In Canada the polluter pays principle does apply and there is a joint liability that is applicable.

CCME has now decided to revisit them and in particular to look at the possibility of legitimizing the transfer of liability on the sale of brownfield as well as possibility of regulatory and civil liability. This is an issue that is being raised more and more by the developers and this is the kind of policy that will be addressed.

To summarize this aspect on the legal issues; There are several laws and regulations covering the remediation and there are regulation for standards for the cleanup but the most important issue is the limitation over the time of this liability when an owner is not the responsible for the origin of the contamination. The second point I wanted to cover was the financial issues. This was raised by many countries today. This is only for redeveloping brownfields. There is no public funding for helping industrial sites. This is very important. The national roundtable estimated that the annual public benefit is between 4,6 and 7 billion dollars. They have also done an assessment on the return on the investment – the multiplying effect is 3,8 which is the highest of any sector in Canada which is quite surprising. For every dollar spent on brownfield redevelopment the gov. is estimated to benefit 22 cents. The average value of brownfield redevelopment in Canada is probably in the range of hundred millions to hundred fifty millions per year. The return to federal gov. in terms of tax revenues would be 20-30 million dollars/year just in tax. The return on municipal tax is also quite important. If you want the source of this study it is a professor from the University of Toronto that did this calculation. This is only associated with the remediation and does not include the redevelopment, the value after redevelopment. We have experience in Canada where this multiplying factor is up to 18. We have a big site in Montreal redeveloped for residential and small and medium size companies for new technology. So far the return of investment is a factor of 18.

Financial systems for supporting brownfields in Canada – what was recommended? It was recommended to establish revolving loans, fund programs to give low interest loans for public and private parties, establishing quality criteria to target loans and provide comprehensive ground funding program for nonprofit organizations brownfield projects. This is taking place now. The Revisol program was the first in Canada for supporting brownfield redevelopment. The reason why the other programs that are being implemented are not grants - the government for instance will be provided low interest loans and just initiated this fall. Starting Oct. this year they have committed 150 million dollar for 5 years which is very little and they are testing the system in order to see how this will be taking place. The municipality have looked at the higher risk sites and have created that low interest loan for remediation. But in the province of Ontario, the initiative by several municipalities was to create a tax and financing system which is basically an exemption system of municipal tax. If you have a property, a brownfield which is polluted. You buy it and pay 10 000 dollars/year in taxation. If it is redeveloped it is probably 10 times that amount so there is an exemption of this taxation up to maybe the 10:th year of redevelopment. This is an incentive for the redeveloper. So this exemption is reinvested in the remediation project. This is a system that will be implemented but to do that requires an authorization by the provincial government and it is being discussed.

The federal money I talked about this morning, 5 billion dollars, is only for federal sites, not municipal sites or brownfield sites. It is very likely that in the next years, only high value sites will be redeveloped by municipalities. This is very summarized of the very interesting Revisol program. Maybe the numbers are not totally accurate. They are from December 2004. This program is no longer in place.

To summarize the point of the different mechanisms for funding; When we are looking at the redeveloping the brownfields it is very interesting to see that the prime sites or the high value sites are attractive to redevelopers and investors but in most small municipalities those sites are not available or do not exist so municipal administrations have to support those sites. They do represent a threat to the population because of old buildings, because of contamination that can contaminate other properties or ground water and they cannot access those sites because of different issues like.

So the programs that are being developed at the moment in Canada are good for high value sites except Revisol that was excellent for all categories of sites. Revisol was also supportive of historic contamination which those programs will have difficulties to address. There is little support to low commercial value land and it's not very supportive of a sustainable approach of urban development, especially in small and rural environments. We are involved in, for example southwest of Montreal, where one million m<sup>2</sup> of land are available, low value land and it is a low employment area and it is extremely difficult to redevelop those land. It will require new criteria for supporting this category of sites.

Risk assessment; There is a session on that but I want to tell you what is being done on brownfields specifically. When you go from Atlantic Canada to western Canada human health risk assessment is allowed, either in regulation or guidelines. For example the Atlantic region is using the Rebecca – risk based corrective action for hydrocarbon contaminated sites. They have, however, limitations with groundwater use and do not support RBCA in those cases. In all provinces the developers and regulators will agree on the limited acceptance by lenders for brownfields redevelopment. So this is probably an area that need to be improved. In BC for instance, they have created a new expert committee to address the gaps in risk analyses to make sure the lenders have a better information system for risk based decisions. Ecological risk assessment was mentioned as well but this is not of much use in the decision process. It is part of regulation in some regions but not very broadly used.

To finish – some aspects that are important in brown field redeveloping process: Communication and education – at Montreal center of excellence we have created specific activity, started in 2001, and we have an annual exhibition for schools, developers etc. to know better about the brown field redevelopment and contamination issue. Montreal center of excellence is in partnership with 3 levels of government , the industry including the developers. The developers are learning very fast about the issues, limitation of liability technical issues etc. The brown field do also represent technical issues and solutions are being developed.

We have found that heavy metals do represent the most important barrier at the moment for a good management of excavated and treated soil and treatment. We have tested several technologies and at the moment this is a limitation if we want to address heavy metals in brown fields. This suggest that we have to spend much money in remediation in sites compacted with heavy metals if we want to reach the levels in the regulation. The other aspect is that the basis of risk assessment in this case is being revisited and discussed.

The groundwater issue is also a key issue. We are now dealing with PCB and heavy metals in groundwater at a large site in Montreal. We have used the partnership (Montreal centre of ex.) to address brown field issues with different stakeholders since 1997. One of the key thing is that we are promoting sustainable solutions and working with different organizations. We believe that the lifecycle of land development is not yet implemented fully. We are reaching

this level because of the treatment centers but in the rest of Canada there is a lack of remediation solutions and landfill is still in large use. So if we are looking for public and financial assistance for public funds it is recommended that the global solutions is part of the lifecycle land development. Our experience show that since we have implemented redevelopment and cleanup centers the cost of cleanup is being reduced by half over the last 10 year which is interesting.

We believe that the driving force now is the sustainable communities. We have participated with municipalities in designing their sustainable development plan and brown fields are now part of the urban planning. We see also a driving force coming from communities and we involved in local groups for redeveloping abandoned land at the moment.

An example from Southwest Montreal at beginning of the century. Historical contamination is an issue that we have to deal with. Montreal has been a settlement in 19<sup>th</sup> and early 20<sup>th</sup> century so there has been founderies, metal processing, gas plants etc. We need to address different issues in an integrated way for redevelopment to take place. In this small area of Montreal there is one million m<sup>2</sup> of land that is contaminated and available to development but because it is low income area it is difficult.

In conclusion: There are needs for development of contaminated sites management. Decision process is crucial and requires a good understanding by stakeholders which is taken place but there is still work to do. Financial assistance program. Regulatory issues related to long term responsibility need to be addressed. This is slowing down the process and sustainable remediation is applicable to brown fields redevelopment.

### Discussion

*Adrien Pilon;* The Brownfield is a specific program for supporting municipalities to redevelop abandoned land but it is different strategy compared to contaminated land from industrial activity. There are two different programs.

*Victor Dries;* There is something I would like to tell on liability issue of contaminated land. We try to avoid the liability issue. In our legislation we almost do not talk about liable parties. We introduced a kind of environmental liability but just for new contamination. We wanted to say for the future: don't fuss, be clean. If you are not clean you will be liable for anything that will happen, any investigation cost, whatever. That is the only place where we use the word liable party. There is plenty of liability in the civil code. If someone has made a mistake, if that fault has lead to a damage, you are liable for any cost following the damage. If you are a guardian of a piece of land and if that land causes harm to a third party, you are liable. Not because of the contamination but because of the harm and you are controlling the land that is contaminated.

But when we talk about remediation we do not talk about liability. We talk about duty. You have a duty to remediate within certain circumstances and whether you are liable or not we don't mind. There are a number of parameters, you are under duty to those parameters, no discussion. For us this was the only way to get out of all these legal issues. Until 1995 we have spent millions of Euros on lawyer cost and only seldom have we seen Euros back. The liability issues blocked us for years. At one major case we were blocked for 8 or 9 years before we could just enter a piece of land because of the liability issue. For us cutting liability and duty apart form each other was a huge solution that reduced our cost for legal issues and lawyers by more that 90 %.

*Adrien Pilon;* What I brought in my presentation were cases where the responsible parties were the polluters which is not the same as in the brownfield situation, but they are using this as an argument to force a specific plan for a limited liability. For those who would do the remediation. There is a confusion between the developers and the site owners because of those new cases but I agree with you and I think it is very clear in legislation that the owner has the obligation to do it.

*Claudia Olazábal;* Is there a chance in the French system to review the use because to do it at the issue of the permit you don't know how long the installation will be operating, things may change in 20 years. Is there a mechanism to review and change the use that was issued at the permit? Second question: What about existing installations that already have a permit? Are they stuck with whatever use was decided in the past?

*Thomas Joindot;* No, because the fact that the use is in the permit is new. In the existing legislation, normally the permit will contain the conditions of what will be done when the activity ceases but in reality there is no use specified so it is quite void apart from landfills or some specific installations. The use in the permit is only for new installations after February 2006. All existing installations will be in regime of discussion when the activity ceases. Regarding the review of use; It can be reviewed like other functioning conditions of the permit. After contradictory process the prefect will decide.

## Second thematic discussion – Specific risk assessment, the setting of risk based cleanup goals

### **The use of site specific risk assessment and the in situ management of contaminated soil in the redevelopment of contaminated sites**

*Michel Beaulieu, Canada*

Specifically over the years we worked on about 60 cases and now we see where this is leading us. There are a lot of questions and I hope afterwards you can tell me if you are facing the same problems. Management of contaminated sites can be done either using generic criteria – you have the generic risk and clean up to the criteria, the second is having a specific risk assessment and either trying to reach a specific criteria for the site and situation or having some in situ-control through engineered measures of the contamination so it will stay in place.

There are a lot of positive aspects of used-based generic criteria; conservative, easy to use, easy to sell, limited follow up and everybody is asked to clean up the site to the same level and there is no conflict of somebody having to do more or less than his neighbor. Negative aspects; may be overprotective for specific cases, too expensive, some cases unsustainable intervention.

Looking at the site-specific risk assessment, positive aspects; the cleanup is to site specific conditions, “scientifically” based, cost are reduced and projects can be done that would otherwise maybe not take place, especially big ones that could not be done otherwise. Negative aspects: many assumptions during risk assessment have an impact on the final result and it is a little bit of a black box operation. Not only black box but you can influence the result. It is more fussy for the public, the buyers and the bankers. In Quebec bankers are really involved in those transactions, so they don’t like specific risk assessment very much because they are expensive and there is the “eternal” follow up if the contamination is staying in place.

In most countries the government prefer the generic criteria approach if it is possible because it is more definitive but will accept a two-tiered approach where it is possible to chose the specific risk assessment if you are not satisfied with the generic approach.

In Quebec we opened up in 1995 to specific risk assessment. Before that everything has to be cleaned down to generic criteria. In 1995 it was restricted, there were some conditions to obey for specific risk assessment. In 2003 this possibility was brought into the environmental quality law so since then it is a bigger option. If you saw the cases done at the ministry much more was done on a private level - many assessments that we never saw – but the ones that came to us is steadily growing from 1995. Now there are 58, if we take the data of 2005, that we have carefully looked at. 57 projects were received and analyzed at the ministry, 28 of them since 2003 when it became integrated into the law.

Then we get a good idea of where this is all leading. The project that took place, it could be residential, green space, institutional, industrial all types of reuse. When we first opened up we had some concerns. First, we new that this was a new way for polluters to leave contamination in place, transfer liability and escape obligations. Then we had a concern that the risk assessment itself should become a black box from which questionable risk evaluation was produced at will of site-owner’s consultants. We had a lot of experts debate with the first risk assessment back in the 80’s. There could be months of discussions with experts of formulas to consider and so on. We wanted to avoid that.

For answering those concerns when we put it in legislation we put in a set of rules to guarantee that it would be scientifically sound and transparent risk assessment. Then there would be publicity so this would only be done if the public is informed and has the chance to comment on what the developers wish to do and make sure that there is a long term memory. Three – that there would be some governmental overview of the whole process. Now, the scientific risk assessment must take into account toxicological risk, eco-toxicological risk and impact on the groundwater. These aspects are compulsory. The toxicological assessment must follow an extensive ministry guideline. If the consultant deviates from the guideline he has to highlight it and justify it. The assessment is looked at by the health-ministry and the environmental risk assessment is looked at by the environmental ministry so it makes a difference. The health ministry does not want to take a chance. For eco-toxicological risk assessment there is the same idea with a guideline and deviations must be highlighted and justified.

As for the groundwater we have, in the soil protection and contaminated sites rehabilitation policy we have ways for treating the groundwater, partially based on the use of the water. There are different considerations depending on how the groundwater is used, if it can contaminate surface-water etc. In most of the cases this risk assessment is not done to see if a site is polluting the surroundings. It is when somebody want to use a site and leave contamination in place, he has to do a risk assessment to assure us that it could be done without cleaning to the generic criteria.

For the groundwater these reuse projects are often located in urban settings where the groundwater is not used. Sometimes groundwater is not much protected because there are many other impact-sources. So if you clean at one place there is a lot of other places that pollutes the groundwater. Thirdly, we have a lot of clay and quite a basic soil so for example heavy metals groundwater is often not contaminated, so the groundwater do not play the role that it may play in other places.

Anyone that want to reuse a site and leave pollution in place must publicize what he wants to do so he has to put it in the newspaper and all studies must be available for the public at the town hall. There must be at least one public meeting where the project is presented and potential concerns can be presented and then there has to be a summary of all concerns and how the proponent want to answer to that and this summary must be public too.

Long term memory; Any project going through that process must be registered on the. Then any associated land use restrictions or obligations must be registered. This is all quite clear for anyone that wants to by this site later on.

Governmental overview; All those risk assessment studies, public consultation reports and so on, must be submitted and approved by the governmental technical assessment group, GTI, before it can be enforced on the field. On GTI there are local and governmental health and environmental representatives. There are some exclusions. Specific risk assessment is no option for petroleum hydrocarbons. For them there is no other option than to clean to generic criteria because petroleum hydrocarbons is a mixture of hundreds of different substances and it changes so the health ministry says that you can't make risk assessment for each of those compounds and we have no confidence with the integrated assessment so we do not allow that.

Then the ministry of environment put something different for residential redevelopment, where owners have access to private lot. In this case you will have to clean to generic criteria for the first 2 meters cause there is no way to control if people have their own small lot. They will dig a garden or a pool etc. About hydrocarbons; here is a lot of pressure from the petroleum industry to change that, they say we are the only ones in the world that do not allow risk assessments but since 1995 we just hold it.

If we look at how it is working. We have all the tools so that it should work out. So what happens – what is working? The protocols has been developed by consultants so there is no discussion on the scientific process. There is very little experts confrontation. The tools are accepted. The 57 risk assessments done show that risk management measures are necessary in all cases. The process that estimates the risk tells us that there is a risk if you do nothing. The publicity is also working. Some people thought it would create panic and some developers thought competitors will come and have people come and oppose our project. But it worked out very well. There is no panic and no unjustified opposition. Sometimes there is only some people at the meeting. Contamination and land use restrictions are dutifully registered.

Problems: For some contaminants the health risk assessment shows that the background concentration (through what you eat, breath etc) is already beyond the acceptable daily intake, not related to the contaminant present. Arsenic is one of them. It is difficult – every site has to be cleaned to no contamination. The solution is to ponder the relative contribution to the background concentration. From a pure scientific point of view you exceed it. You have an acceptable risk but still you accept it. It is a little bit difficult.

Then there is some problem with the eco-toxicological part. As you know, the numbers are quite low and there is some people, especially industry say; Why should we apply that on industrial lots? Another problem; often those projects are quite small and sometimes like bikeways for example. What is the meaning of having that cleanup on strips of land? A little bit difficult to answer.

The biggest problem; We thought that we would have people suggesting specific cleanup criteria for example this site is 5000 ppm but because the kind of project, the groundwater etc, we should be able to clean to 700 or 800 ppm and still be able to protect the users. But this is not what we find. Instead, in all cases is proposed in situ management of contamination and some kind of confinement so that it is capped, the expositions is cut. So this is where this is leading to in Quebec, except when the contaminants are such that the ministry do not accept such solution, for example volatile compounds. But for all heavier stuff like heavy metals, PCB etc, it is a solution.

This leads us to the question; You do a very sophisticated risk assessment which is very costly and the you come with a very simple solution, risk management. Just add a meter of clean soil and the proponents say look this isolates low mobility contaminants from humans, even when you have high contamination levels (%). The new clean soil layer provide a safe substratum for plants and animals so that is how you deal with the ecological risk assessment. But if the solution is already known from the beginning (after 58 cases or more) what is the point of doing a risk assessment in the first place? It this the end of elaborated risk assessment? Can you go straight to the management? When we talked about that in 1995 and later on the sophisticated risk assessment was also a kind of barrier, you need money, consultants and it will stop many to do this easy solutions. Many will say, for the price it is better to do a cleanup to generic criteria. If you remove the risk assessment it will be easy for many people

to leave everything in place and then maybe we are slowly moving towards the past when contamination was simply left in place and passed over to the next generation. If risk assessment says no problem, you can leave that and you could even use risk assessment to say you can bring more as long as we put one meter of soil on top. Then we hear some consultants and site-owners concern; the process is too complex, we know it can be simpler so simplify it please. Restrictions for petroleum hydrocarbons; We are under constant pressure from the petroleum industry but if we lift the restrictions a lot of sites will not be cleaned anymore. It is a cost, but not a real problem to clean those sites to generic criteria. It should be possible to reuse excavated soil. That is also what is asked to on the original site with no regards to the contamination level. If you excavate a soil let us bring it back there and put some layer on and manage the risk.

We are building some guidelines from experience and some people say we are getting stricter. Some say there is more risk assessment but the consultants say there are less and less risk assessments because there is now many things that you do not allow. We are trying to impact by working on a new regulation to influence and change a little the way it is going. We want to introduce a couple of obligations. First; anyone wishing to propose an in situ management without treating anything, have to submit a detailed evaluation of other treatment options, of treatment off site if there is some technology. Then he will have to evaluate excavation and off-site land filling, its cost, protection of humans and environment, technical performance, etc, everything. Why are we doing that? Risk assessment seems to be the easiest way but if look you at other things there is a lot of different technologies. We want to have all the aspects and try to foster people to get data and better understand how much it cost and maybe to get an impulse to something else than risk assessment.

We want to keep our restrictions because we know they are what makes cleanup happening on the sites. We want to add a restriction. We have a kind of A-B-C-D-system for the soil, for determining how polluted they are. Above the D-value all excavated soil will have to be treated or leaved in a secure landfill so at least for some levels of contamination there is no way you could put that back on the site. Excavated soil between A and D could be reused if it is part of risk management plan following risk assessment showing there is no risk.

For soil placed on above-ground structure like sound wall, river banks it will only be allowed if there is an incapsulation of the contaminated soil and a follow up of the site, if all is registered in the land register and if the structure stays the property of an accountable entity like a city or a huge entity that will not die out shortly to make sure there is some continuity.

To conclude; The changes are under discussion. Could be adopted this year if it is working well. If we go towards simplification of the process it may bring us back to where we were 20 years ago: simple transfer of contamination from polluters to a third party, except that there is publicity and registration on land register. On other hand we know that interdiction of and specific risk assessment contaminant management may jeopardize redevelopment of major sites and impact cities. There are cases when it is impossible to clean to generic criteria and there should be other ways. A balance has to be found.

## **How is the setting of (riskbased?) cleanup goals performed in the participating countries?**

*Harald Kasamas, Austria*

Many of the things of interest has been issued by Michaels presentation. I will briefly highlight a recent study of the Austrian environment ministry on the definition of remediation targets and preach the risk based land management developed by the Clarinet network which is a vision of more integrated decision-making.

You know risk based land management recommends more integrated decision making and includes special planning regional concept. Legislative background in Austria; The focus is on the site whereas in the Clarinet risk based management it is based on the regional aspects. There is a difference. In contaminated sites legislation in Austria, the remediation targets are mainly related with groundwater contamination in the water protection law on a federal level and is following a precautionary principle. For contaminated soil the waste management law is often used also on law on a federal level and is following a precautionary principle. This is the legal basis but we have also technical guidelines for risk assessment for soil which includes land-use related aspects for risk assessment.

Now, the recent development is a planned amendment with own regime for contaminated land management. This provide a legal basis for risk based solutions and more integrated decision making. It will allow from the legal side rest-contamination after remediation and longer time solution. We hope that the decision makers, the local authority, that are responsible and always goes to the maximal solution - maybe this will provide real world cases and more flexible solution findings and give them more banking to innovative solutions.

The major goal for the Austrian study is to develop scientific criteria for the derivation of site specific and land use related remediation targets. The solution should be targeted on the real case in hand and provide the local decision-maker to make sound decisions and find competent solutions. There is usually time pressure in the projects. You have to redevelop the site. You can also accompany things that are not immediately used for the construction work to have some remediation aspects with soft in situ technology. It should facilitate soft technologies and not just dig and dump away to a landfill site.

And the last point is to come towards Clarinet with regional management concept. This should be a step towards this wish and also to enable management concepts on a regional scale and in the long term provide perfect integration of environmental protection and land use planning.

To give an idea what the risk based land management report is about. The simplicity of risk assessment at certain sites and how much makes it sense to just look at the particular site to make it clean. This more integrated solution introduces a regional concept, risk area manager can take care not only of the contaminated sites but also the protection site and people get responsibility and knowledge and training to manage their area and it is not just numbers you have to deal with but guidance and support to make local decisions. It is based on these components of integrated solutions so the site should be fit for use and also protect the soil and groundwater in the surrounding area and make sure that when you have soft technologies where the remediation success is over 10, 50, 100 years you take care in relation to land use planning.

What is the idea behind this? When you have risk based management you go from this problems definition towards solution orientation. We should focus more on how to use the soil in the condition available. Generic solution versus site specific design; Generic solution is easiest to apply, especially for small sites. More site specific design are for big areas. To highlight the scenarios you can reach on a regional space. On one side – the problem area and the protection targets related also to the groundwater directive. On a regional scale you have more sites to deal with many owners and it is not for a regional solution to make all the remediation. Even when the sites contribute to the impact on the environment the regional risk manager should take care to see this in a coherent solution on a regional scale rather than to clean up just his specific spots and to define his remediation targets. The groundwater directive already implemented such a more innovative level of decision makers with their river basin management. So if you can also integrate contaminated soil and remediation in this special concept, you make a risk assessment and when you set remediation goals it is also risk based.

My question is also; when you link this with the risk based land management vision is it more that just chemical parameters or is there an additional component on qualitative targets when you are defining the solutions?

For the discussion I just summarize a few questions:

How are the remediation goal set in Your country? Is this remediation goal just another type of risk assessment concept or is this going beyond this chemical parameters? Can we have other parameters than chemical to define solutions with regard to land use planning. When you go to land use remediation targets you have to decide what is an acceptable risk for your local community? Do politicians take this responsibility in other countries to decide on what is the acceptable risk for their population?

We move towards more local decision-makers with the guidance from us. Some supervision but local decision makers should as much as possible make competent decision in his area of responsibility.

### **Risk assessment or decision making programs in the USA**

*Bruce Means, USA*

There are very many similarities in the issues that have been raised. In the US, risk assessment support our different programs. These are the programs you saw yesterday and risk assessment support them in different ways. It depends not so much on how the programs like to see the technical calculation happen but more about the laws that establish these programs and what values they have built in to these laws. It tends to reflect the scope of the problem that the laws intended to address. Superfund is intended to address a relatively small number of sites but those that are rather complex and extraordinary types of environmental problems.

We saw yesterday that they require lots of money so this usually translates to more careful over site at the national level. Superfund then give provide specific guidance on what it considers a safe outcome in our cleanups. It also provides very specific guidelines on calculating risks and on making decisions on these sites. When you move from one site to the next you would expect assessment process to be very similar. For our corrective action programs they have delegated the enforcement and operation of the program to the states in 48 of 50 states. In this 48 states the oversight is very limited. In fact the national program only provides that we use risk based decision making.

The national program did do a round of training using The REBECCA program for risk based clean up but they do not provide national standards for conducting that. It really gets into the business of the state to define their own programs. There is even a step removed here. There are 10 000 of sites. The national program essentially works to provide monetarian technical assistance to local authorities that investigate brown field properties. There are requirements that the proposed cleanups are protective of the health and the environment but there are no specific guidelines at the national level. Some of the states have defined what they expect to achieve in their cleanups and those can be found at the website. There are other programs I will not say more about and other than that risk assessment is a tool and it is used as a supplement a very specific kind of decision. Depending on the programs, in the US, and in different countries we apply it slightly differently.

In the US there is this common framework for assessing risks, very similar to those we have seen here. We collect data about contaminations in soil, water, air and you consider the human or environmental exposure that occur. You characterize the risk, put that information together so it helps in a very specific risk management context is laid out and usually some regulatory program. Data collection is very site specific. Decision specific also cause you may decide to use certain kinds of instruments if you are in a screening mode verses to whether you are ready to define the extent of contamination.

Toxic information is provided in our integrated risk information system. It is not usually developed on a site specific bases. If the contaminants are not addressed in IRIS there is a hierarchy of places where we look to find information. Exposure assessment is always conducted site specifically. We try to characterize a conservative exposure case that might actually occur in real life. We try not to be over conservative. However, because the science of exposure assessment is, for some reason, does not seem to evolve very quickly we tend to rely on national default exposure assumptions unless there is good site specific information. When we put it all together it is important to emphasize that for any particular set of decision, if we are looking for several options, we may do assessments with different outcomes. Perhaps a residential use of property versus an industrial use verses some controlled residential use. The assessment may be provided with different numbers connected with different actions which give you different costs and thus fit into that risk management paradigm.

Thinking specifically about risk based cleanup goals; In superfund program this is very similar to Quebec and others. We usually find the lowest number that protects health and given current and potential future use of the site, environmental consequences. And we must also achieve state and regulatory requirements that might already exist such as drinking water standards. We must reach those fixed numbers.

The risk based goals; this set of information is not the last word on cleanup goals. We are talking about preliminary remediation goals, other risk management factors come into play later. Depending on the risk management program or the law different values are embedded in the decision making framework. For superfund we value remedies that are achieved longer effectiveness and permanent over those that may be reliable only in the short term. Some of the remediation alternatives may create their own environmental impacts. Trucking things in small neighborhood or establishing repository in a riverbank you will create problem with that alternative does not eliminate it but you must consider what they might be.

Some of our sediment cleanups generate so much waste that we cannot find places to put all of it. You have look at options that actually have the ability to be carried out. Stakeholder acceptance, other environmental laws, cost is the big thing for everyone. Looking at the outcome from our cleanups. You would not ordinarily expect to see numbers so differently but depending on use of the site your cleanup levels may vary widely.

#### Questions and discussion

*Andreas Bieber;* One question to Michel Beaulieu. He said that the health ministry said that they are not able to do a detailed risk assessment in relation to hydrocarbons because of the complexity of the substances. The question arises how to create generic levels then for this kind of substances.

*Michel Beaulieu;* It is clear this is an administrative decision. When we looked at toxicity of hydrocarbons we looked at individual compounds. We have numbers and did a generic risk assessment for individual substances. But when you take it as a whole the total petroleum hydrocarbons, this value is an administrative decision. It is based on when you look at the soil, what it smells like and so on. This is what is enforced. It was set up years ago. Something I did not mention yesterday: In Quebec there is 27 bio treatment centers for petroleum hydrocarbons. It is such a competition so that it does not cost very much to excavate and treat it.

*Victor Dries;* One of the points I would like to make is that when you talk about risk assessment in the evaluation phase, that is one point and there we have had both approaches that some generic values might be quite handy to give a first idea about what you are talking about and to discuss on small sites because there a detailed risk assessment is often too costly. On the other hand, when you set up remediation goals, I think many allow that you use site specific risk assessment but we also add to that the BATNEC-principle. That if you can find an affordable technology that will reduce contamination to a level below generic criteria you have to use it. Only if you can not find a reasonable technology at reasonable cost you are allowed to use site specific risk assessment. That reduces the discussion – should we go for risk reduction in all cases? No, try to find out whether there is a smart way to deal with contamination first. If you talk about risk reduction and management you have to manage the risk for the next decades or even centuries. That will cost an awful lot of money. Most consultants will not take that into account in making up the figure of remediation cost. When you say they have to take it into account, quite often you will go for a fast and clean remediation action. But you have to urge then to put it in the calculation. Very few site-owners would be lucky to pay that money year after year to a consultant.

*Michel Beaulieu;* The BATNEC-principle. It works quite well with groundwater because groundwater it is very difficult to treat and there is a limit to technologies but with soil you can excavate it. It is BATNEC, you can take it out, very huge sites but you can take it out and if dig and dump is a possibility but the real limitation is cost and cost depends on who is paying, more than technology.

*Victor Dries;* But then, we have made land filling extremely expensive. Land filling soil is more than 150 Euro per ton so quite often land filling is an expensive option unless you are talking about really small sites and even then quite often cleaning of soil will be more cost-effective. If the site is a little bit larger, quite often in situ will be more cost-effective than dig and dump but in situ will be more cost effective than just risk management on the long term cause risk management on a site of just a few acres will cost too much on monitoring year after year. And it is not increasing the land value. Then they will chose remedial action and

only for larger sites you will quite often go for a risk management option and long term management.

*Michel Beaulieu;* Just a reaction on the monitoring. In a situation where someone want to build houses, apartments and say they did a risk assessment and it can all stay there under the houses. You can say: OK you have to do a follow up. But what will happen if the follow up shows that there is a problem? You will dismantle the buildings? It is not possible. For the groundwater I understand, it is working well but building on it and leaving the contamination in place is a little bit difficult.

*Victor Dries;* Yes, but that is a risk they have to put on paper and when a consultant put that risk on paper that there may to be a risk within 10 years, when the building is there, most promoters will chose a remediation. They will not like to take that kind of liability. It is endangering the land-value of there project. Or they will make very sure that there will be no risk in the long run or they will go and take it away. Normally in that kind of case the land value will rise extremely high when they can succeed and have a good project, so the options are there. So especially in residential areas they do not like to leave it there. But we must put that kind of price on paper to make it visible.

*Sheena Engineer;* In The UK we use generic and site specific values especially at the evaluation stage and particularly on the generic side for human health, less for controlled water, so we tend to use site specific values and derive cleanup goals on site specific basis. We have a lot of consultants who say: We want generic values. They do not want to accept that if we have generic values based on land use, they will be more conservative than site specific assessment. So people are arguing for it but do not like the consequences. Our site specific goal values are based on existing land use. We do not look at what might occur in 5 years time. Generally we derive a site specific goal that take into account all the receptors.

*Joop Vegter;* I had a reaction on the interesting discussion between Victor and Michel. It was between the risk reduction and leaving something in the soil and the aftercare. The more you leave in the more you have aftercare. If you calculate on that the solution shift into more cleanups. Another question about risk assessment. A lot of European countries use risk assessment to study the problem, not relates to the solution in the first place. They use complicated models and sometimes trigger values. Then if there is a problem you enter next phase, the solution and come up with the discussion about generic criteria etc. If you have generic criteria for the solutions those have nothing to do with whether there is a problem or not. Whereas I think in Canada you have the very simple system. You have just the criteria and when something is above the criteria you should do something. There the description of the solution is also the description of the problem. That leads to a different discussion. That is why we in Europe do very complicated risk assessment because people want to avoid a problem in the first place.

*Michel Beulieu;* I think there are two kinds of situations. The one like for example when I look at Austria's sites. You have a lot of sites and then you have an impact on the surrounding and then you do a risk assessment to try to understand what is going on, on the groundwater and the buildings so this is a situation where we will also make a kind of impact assessment. We have that but the situation I talked about is that you have a land where somebody wants to reuse it and if we say that we allow the contamination to stay in place. This is a simplification that we use in this kind of situation. Still our risk assessment for the reuse is complex. You will see that if you look at the guidelines and maybe after 60 cases you can simplify it but if

you do that there is a question: When, in this type of reuse, you are doing risk assessment in your countries do you get site-specific clean up criteria or is it as we always have it, capped and left?

*Sheena Engineer;* That does depend a little bit on what is acceptable risk. Perhaps there is a difference in the way each of us thinks at what is an acceptable risk, especially at human health, what we struggle with at the moment. That might be why many of ours actually come up with measures and don't just leave it there and cap it.

*Michel Beaulieu;* What is acceptable risk when you just cap and cut the exposure? Then there is no risk anymore. The contaminant is not coming to the users.

*Henri Halen;* Except the spreading...

*Michel Beulieu;* Yes, but that is something different. If the contaminants are spreading to groundwater and so on but if we look at; We have a site and it is polluted, it may spread and we have to look at it if also if no one reuse the site. But if somebody reuse it, it is above ground. It does not use the groundwater if he put something on it or not it does not have any impact on the groundwater. So if you tell them; there is a pollution and you have to do something before the reuse they may say, Ok I go to another site. But you change nothing cause if he does that it is still polluting the groundwater.

*Henri Halen;* I do not share your vision. But you have this key orientation but in the urban areas groundwater is not a target to protect. That is a key orientation. I do not know in other countries. For instance in France, do you do that?

*Thomas Joindot;* It depends on the use of the groundwater located on the site. There is a very big difference between pollution that can spread out from the site. There will be monitoring cost and you have to make a balance between the solution and the monitoring cost in the future and the ability of the responsible to continue monitoring. For pollution that can't spread, well the problem is avoiding people to dig in to make wholes and so on. What we are doing now in France is putting in front of the scene is the solution to the problem and not the evaluation of risk cause as you said people make risk assessments and after say: cap the land with fresh soil but there is no discussion of the efficiency of the measure, how many cm of soil, but there has been a huge and I think not so efficient discussion about the toxicity value and assessment of the source pathway model and we know the uncertainties around that there is a bigger discussion on that and a small discussion on solution.

In the new decree there is something that says that the remediation plan on a site should be based on a cost and advantages basis. The responsible have to show the administration a balance between the cost, the effectiveness, the advantages or disadvantages of the solution. A last reaction on the debate of letting pollution in site or not and what Victor was saying about BATNEC cause I do not share the approach when there is a pollution you should go and take BATNEC and de-pollute the site. There is also a question if there is an environmental effectiveness to clean up a site where there is no problem of risk or pollution spreading. It will be use of natural resources, financial resources and so on. It has to be taken into account.

*Victor Dries;* Our first decision is "Do you have to do anything at all?" For historical contamination there is risk evaluation. If there is no risk you do not touch it. But if you have to do something we go for BATNEC and if you can have a fast way to clean up with it, do it.

On what Michel said: If you deal with risk assessment and calculate remediation options do you leave contaminants behind or do you go for some kind of action? Especially when we talk about heavy metal problems we often come up with much higher concentrations than you would with the generic condition cause availability and stuff like that is extremely important and the generic values usually start from a worst case scenario where the heavy metal is present in its most soluble form and when you go on site the heavy metals are often not there in their most soluble form so the availability is lower so you may end up with 5, 10 times the generic value and can easily show there is not risk even in the long term. I think we come up with that kind of solution quite often.

On the groundwater-issue; groundwater spreading as such has been regarded by us as a problem up to now even in urban areas but we are changing now cause quite often you end up with quite expensive remediation schemes while you do not look at the background contamination – I mean especially if you look at older, bigger cities with industrial past the groundwater underneath that city is contaminated and does not have anything to do with a specific contaminated site but with centuries of leaking sewages and diffuse contamination. So now, if you have a contaminated site within an urban area with groundwater problem first see if that contamination poses a problem to the use you want to make of that site. If not go and see if it poses a problem within the big contaminated groundwater zone. If it is not a problem leave it there but try to find a solution for that big contaminated area and put your money there because that makes more sense. This is for us a new way of thinking and it is not that evident because you have to try to get away from your single site and start thinking at a level of an entire city or region, square km quite often so it is a different scale of management.

*Francesca Quercia;* I heard about groundwater uses and different quality levels depending on uses. In my view European water framework directive there is no such addressing of such different groundwater uses. I heard just about an ecological target quality objectives and for instance in my country this is identified with drinking water standards. These are quality objectives and cleanup levels that have to be met at least at receptor point. Whatever the use of groundwater is. This seems to be in conflict with risk based soil management. I wish this to be clarified. I think taking into account the different groundwater uses is in conflict with European current directives.

Second comment. This is something psychological. The generic verses site specific criteria. Generic criteria is sometimes administrative or political. I have long experience in this. I do not understand why we are so confident in them. I think we should look at this with a more rational attitude.

*Michel Beaulieu;* We have generic criteria but we ask the health ministry to review all of them. So they just reviewed everything and did exposure scenarios and gave us an answer to that. Again – it is science, it looks very scientific and you may play on that. The number generated through risk assessment are also numbers which also depend on the assumptions you are making. This is uncertainty and you have to deal with it. When you apply the cleanup criteria, maybe not always so good, but there is an action done, some contamination is taken out, there is less impact on the groundwater this is all true. You can achieve something. You may have the polluter at hand and after he may walk away. If you let him walk and leave that in place he will be gone so the society will take it afterwards. Also if you have some kind of treatment network, it exists but if you let everyone leave contamination in place you will dismantle it and they will all go bankrupt and afterwards. Those are considerations you have to take into account.

A last intervention: About groundwater, what you said Henri, that groundwater has to play a major role. If I want to protect the groundwater I should go on and look to all those contaminated sites and not considering any person that wants to reuse one I would have to come to the owner and say: You have to do an assessment and see if you pollute the groundwater and if you pollute it do something about it not considering the reuse. If I do nothing about all those site I just let them go but each time someone wants to reuse one I say: If the groundwater is contaminated you have to clean before reuse of the site. I think I am not quite fair. If my goal is to protect groundwater I should not wait until someone wants to reuse the site.

*Dietmar Müller;* A small remark on the water directive and water framework directive. There is a big misunderstanding. Up till now there is a lot of national approaches that refer to drinking water standards but if you read the water framework directive itself the environmental directives are primarily connected to ecological receptors. What is ongoing with negotiation on groundwater-directive. It will refer to ecological receptors and they now had the first agreement on the Counsel to have some additional drinking water protection. The problem is still to have a flexible approach and we have to keep in mind that the groundwater directive is aiming at a rather large management units with its objectives. The real problems is how to make a sound connection of regional groundwater management to local problems. It is not to apply this environmental objectives to every single point source. There is a lot of confusion about this. The water framework directive, itself, on European level would not primarily ask for drinking water standards.

## Third thematic discussion - Contaminations with heavy metals

### Views on heavy metals contamination

*Adrian Pilon, Canada*

Points that I want to make: We have experienced problems with heavy metals in soils, not to much in groundwater cause we have quite high pH-soils. Most of the problems are due to the presence of historic fill or to site characteristics.

Basically heavy metals, especially at brown field sites, is an extreme problem over the last 10-15 years in cleaning up those sites. The technical issues were about site characterization. Soil is not comparable to historic fill like slag or several other materials. The ground on which the construction will be made is considered the soil. What we define as contamination when we do the site characterization in ours standards represents some problems when it comes to remediation.

There are two issues. First: To clean up the site using cleanup technologies. Either phyto remediation for very long time or you can use extraction methods like in the mining industry. We have mobile extraction systems. We have seen problems when it comes to analyzing the results verses site characterization. We have seen that using acidic digestion we come up with total concentrations verses mobile bio-available metal forms. Then it creates a lot of problems in handling the soils and assessing the performance of the remediation. For instance we have built in some of the regulation a requirement that if we can remove 90 % of the contaminants. If we cannot we should dispose the soil to a secure landfill. In the case of heavy metals we have not yet succeeded with any technology, including very aggressive methods, to reach those levels. This comes to the issue of mobile and bio-available forms.

Questions: What are the procedures being used and what are the solutions in your contaminated soils where you have historic fill materials or other metal contamination? As I said the residual value remain high using acidic digestion compared to use leaching test or bioavailability. By that reason we have not been able to implement any treatment technology. We have performed several tests on different technologies. An experiment was done on an historic field. It is a phyto remediation. It goes after only the bio available fraction. The results: Look at the total concentrations that we achieve from acidic digestion - different levels of extraction after the treatment was performed. We had similar results using other techniques. So depending on the fill material, the soil, the metal that can be in a mineral form or a new mineral form can be formed even. We see very often that situation.

So I want to see what characterization methods have been developed or improved, especially at the level of analytical procedures for assessing the contamination which, by the way is an extremely important issue in risk assessment. If risk assessments are based on total concentration versus bio available forms, the model cannot perform very well.

### Questions and discussion

*Victor Dries;* If you look at site characterization it depends a little. If it is fill material, real metal ores or waste residues that have been dumped it is fill, not soil. Then, legally, we don't speak about soil. Of course the material that is there can have risks so we are fully into risk evaluation. Then, for us it depends - of course you can have diffuse contamination because of old metal smelter of stuff like that.

When it is evident it is soil, not fill, you do a site characterization of that soil contamination. But even then, in most cases, it is historical contamination so it is evident for us we talk about risks. When we talk about risks it depends a little bit on how far the owner wants to go with risk evaluation. If he don't want to spend money on risk evaluation it is simple: If there are high levels and you are not interested in risk evaluation, just go for remediation and see how far you get. Then, quite often he will spend a bit more money in risk evaluation.

The next step is: where can the risks be? The analyses depend on how the contaminants can spread to humans, to groundwater etc. For groundwater we use leachability tests. If you have heavy metals at the surface quite often one of the more important exposure routes will be dust. It is pretty obvious that then you talk about total conc. because the dust is something you inhale. If you look at plant uptake either you say I want to do bioavailability test that gives me an estimation but we say go and test the plants them self. In fact we try to see where the contamination is and where it can form a risk. We work out the analytical scheme to see as well as possible if there is a risk or not. When there is a risk you have a problem. For a small contamination you go for a dig and probably a dump, maybe soil washing.

If the problem is big the only thing you can say is that the heavy metals are there to stay. Then you go to risk management schemes. Then we are doing work on phyto remediation but we do not talk about phyto remediation anymore but about phyto management because often the extraction rates are too low. So we say: Try to use plants so that the dust do not blow up etc and if possible try to see if you can do something with phyto extraction but at least use plants that also have another use for instance energy crops so that you get at least a bit money out.

For groundwater contaminated with heavy metals we are looking at if someone in the neighborhood can be interested in that slightly contaminated water and use it in it's process without effects to for ex. the people working in the plant, the products. Then you have someone that is interested in extracting that contaminated water in the long term. This is not remediation but a management scheme for the next 50-100 years if you have a big problem.

If you look at one area we have been working for 10 years on possible immobilization. The problem is so big. We try to find soil-additives to make sure that the metals present would be bound better to the soil. Then we were talking about 1000s of ppm of metals in that soil. If we could find good additive that could bind the contaminants to the soil matrix and we run quite a few availability tests that showed that the metals were there to stay. For us it was ok to leave it to monitoring. We were working with the idea what was the most sensible pathways that the contamination could use to enter the receptor ecosystems. We tried to go measuring for those pathways. For example; Plant a plant that is sensitive to the contamination on the field and measure on the plant. If the plant does not show any uptake we would know that it is still safe. If we would find metals in the plant we know that we have to look further. Then there might be a remobilisation of the metals. For us that was an option.

*Bruce Means;* We do things a little differently. When we look at laboratory risk assessment management in using an integrated exposure uptake by a kinetic model, which does try to reflect different exposure pathways, we try to recognize if the bioavailability of the original material itself is a little different. I think the carbonates are a little more bioavailable than some of the others. Are others here looking at lead differently and the way they assess risks, especially in urban environments? This model associates various uptake and exposure pathways with the blood lead level and look at 6 months to 7 year-old children.

*Thomas Joindot*; I share what Victor said about acting not only on risk assessment but on pathway. Then you can solve the problem without going further than necessary on the risk assessment. As regard lead problems we experience interesting cases now in France. First: A metallurgical factory closed in 2003 with a very big lead problem, very high levels. Around this factory there was a program of measuring lead in blood of people living around the installations. Even though it was considered a very big problem of contaminated soil we saw, after the activity ceased there was a dramatic decrease of levels of lead in blood. Now we do not have so elevated figures around the factory. We conclude that the problem was the lead emissions of the factory. The problem of the dust seems not to be a problem. The problem is moving to a problem of land management. We are working at changing land use near the site. Farmers have subsidies to cease ore change cultures. Also the state bought a number of land pieces to put wooden areas around the site and prevent dust.

Other programs we are making now: We began 2004 a program of formal industrial sites that could have lead to lead contamination. We discovered 6 months ago a case, an old mining factory where there were people living. They were living on waste. Local crisis. We had company pay for studies and part of remediation and safety measures. The health authorities made a campaign. The results were not so high as expected. We have also one near Nantes, an old foundry. The results was not as high as expected here either. It seems that old lead pollution do not lead to very high problems. There is something here with accessibility that we did not tackle in the past when risk assessors took the total contamination and that is the risk. Now we have lots of elements that make us think that a heavy lead contaminations does not have to be such a big problem as expected. It is quite a revolution.

*Victor Dries*; There are two things I would like to say; A concentration can be a first factor that you take into account but it can also be a wrong factor. We talk about high concentrations. If you look at Campen area there were a few places where we were at low concentrations, below any soil remediation standard we have but it was completely phyto toxic. The soil was, from nature, very acid there, below any extrapolation we could make on normal data curves. You are below any standard but you have a problem. If we could find anything better to check our eco-systems than chemical standards – go for it! But today we know less about eco toxicity in soil than in water.

Second; we also have a very nice lead site. There is still a company active there so they are paying. They have been active there since 100 years. Since 1960s the population has been measured for lead in blood. They have been following a lot of children and discovered 3 different populations; 1, children living there and going to local school, 2, children living there and going to school 3 km away and 3, children living 3 km away going to school in the neighborhood. Especially in the 70s the children in the neighborhood was the problem holders. The company reduces their emissions, invested a lot. Today group 1 and 3 has as high levels of lead in blood. Children in group 2 are much lower, close control levels. Still there is a very high contamination in the soil itself and the living zone is very close to the site.

The company want to buy the entire site, 200-300 houses. There was a huge fuss and they would not buy the houses. We proposed to shut down the school and it was not done. There was a huge fuss and even though we could prove that the children had too much lead in their blood the politicians blocked the closing. Today we think that there is still a basic lead intake because of the emissions even though they have been pulled down dramatically. On the other hand we have also that the concentration in the soil are so high that they do cause a secondary emission because of dust that blow outdoors and the children going to school from outside get

in quite a lot of the dust that is on the playground etc. Now we are working on a complete decontamination of the site. Next year a complete de-dustification is planned of the entire neighborhood. Decontamination of the surface soil and then try to take away all the dust present in buildings today. Hope to get the lead levels to acceptable levels once the “historical” dust is gone.

*Adrian Pilon;* I think most countries have experienced this kind of situation close to smelters. Examples in Canada. But most of the problems we see is related to historical fill materials. In some areas in Canada they are testing in situ stabilization at the moment. But it is still a question as efficiency. We have not been successful in using mobile treatment plants. We are doing quite a lot of work on bioavailability testing, different ecological receptors.

*Victor Dries;* We have quite a few soil washing plants in Holland and in Germany as well. It depends on in what fraction the heavy metals are. If you can find 1 or 2 fractions where you can say most of my metals are or bio available metals are. For instance in small fraction it is pretty easy to wash them out. Even cost effective. We had a pilot plant for bio extraction where a bio available fraction was extracted using bacteria. Worked pretty well but then you definitely leave behind a rest concentration. We could prove that the availability of the rest contaminant was low but in the end nobody was interested in building a full scale plant. We have a few physical-chemical plants. Sometimes they work, sometimes not.

*New speaker;* The issue is that the material treated still have a high concentration. Do you consider that a problem or do you consider that as a material that can be used as a fill material? Can we, do you, leave contamination, fill, at historic sites? We can come to the conclusion that there is no risk but are you actually implementing those actions and are you satisfied with the risk assessment to be comfortable to say that you leave the material after it has been extracted?

*Victor Dries;* We accept it but if somebody says that there are such high concentrations there are always uncertainties. We have a discussion and at a certain point we have to say what uncertainty we accept. For example we accept to build a noise wall of fill material with high lead concentrations.

*Thomas Joindot;* We have risk assessors that make very big calculations and say for a concentration in vegetables if there is a risk or not. We see that there is no relationship between the concentration in vegetable and concentration in soil. After all those risk assessors I was quite surprised when I spoke with specialists in agronomics who said we don't know anything about the exact concentration in vegetables.

*Adrian Pilon;* Many of the phyto remediation companies went bankrupt because of those issues. It is so long term but it could be faster if the phyto management and bio available forms are clearly determined. Another point of naturally occurring concentration of metals. We have experience in well known arsenic problems in Bangladesh for example. Is there a specific approach to this - for setting cleanup criteria in such cases?

*Victor Dries;* We also have one or two such problem areas. The only option you have is to say: the arsenic is there, it is not a contamination because it is caused by nature. Don't use it if the arsenic is a problem. There is no decent way you can use a remediation concept. The overall environmental effect would most of the time be negative. If you have to use the water, make sure you use a purification step in your extraction phase.

*Sheena Engineer;* In the UK the regulation that were introduced in 2000 - although identified as contaminated land, when you look at the remediation it does not distinguish between anthropogenic or natural so we do have this problem across Cornwall - or the middle of the country. Which what we struggle with – how can we quantitatively resolve what we see as arsenic-lead in the ground and what we see with the people. This is one of the reasons why we tried to start this ring-test to see whether or not there are ways to more quantitatively look at risk assessment to try and reuse it.

In general, on a site specific basis, there might be some tests but in the UK we don't tend to do a lot of urine-testing or anything else. We don't distinguish and it is a challenge. These sites do come up and that's why we need to find a better way of assessing the risk in a way that the general public can understand. The benefit of having a report is that people see that the risk has been assessed and to certain extent a quantitative assessment has been carried out. One of our problems is that it is very qualitative, our discussion, yes we know that some has been taken up from natural resources and some will be anthropogenic but we can't distinguish the quantitative levels and the communication is very difficult.

*Victor Dries;* It is the advantage of such high natural concentrations that normally the region where you find that elevation the concentration is high enough to do a reasonable toxicological research and investigation. Normally you will have a few thousand of inhabitants so that you really can make a distinction between effects that you could measure that could be caused by the natural contamination and the distinction between the rest. In the Campen area we did something the same. You go investigate 3000-4000 people and then you can see whether or not you can find some correlations but it will cost you an awful lot of money.

*Sheena Engineer;* One other way that we are dealing with the problem to a certain extent is that in some cases is managing it. If you know that you go high levels you manage the pathway to the receptor. You can't cover the whole middle-England with concrete but depending on what your situation is managing it rather than remediating it may be the only answer you got.

*Bruce Means;* This reminds me of our naturally occurring asbestos questions. I don't know if you find a lot of naturally occurring asbestos. There is a lot of uncertainty, the health effects associated with the fiber, the mineral and there is the stuff you pull out of the mines and the stuff that's lying there on the surface and you talk to the people about it. "There might be a problem here in your yards" you have automatically blacklisted, you created brown fields now they're black fields and you don't have any confidence that you're assessment is right.

***End of first day.***

## Fourth thematic discussion – EU and contaminated land, COMMON FORUM and soil framework directive

### **Prevention and management of soil contamination in the proposal for a Soil Framework Directive**

*Claudia Olazábal (EU)*

Many of you have already heard this presentation. Just a bit of background for our colleagues from US and Canada; basically at EU level there is no specific legislation on soil. You will find provisions on soil protection scattered in waste, chemical and water legislation but there is not a specific instrument protecting soil. The community decided in the environmental action program to develop a soil thematic strategy to tackle the soil protection for its own sake. Now the commission is thinking about proposing 3 documents that within this strategy. It would be a communication, a framework directive on soil and an impact assessment, which is an assessment of the economical, social and environmental impacts of the measures that we propose so this package of 3 documents - we are planning to adopt them by the end of the year.

Basically if we now focus on the legislative proposal there will be, - in previous documents we have tackled 8 threats to soil, which are erosion, salination, organic matter by diversity loss, compaction, landslides and flooding, sealing and contamination. We will tackle most of these in the legislative proposal. There will be a common set of articles setting the objectives, the definitions, the competent authorities that should be defined by the member states, the working unit for the different threats, the obligation to integrate soil protection aspects in other policies. There will be, for landowners, an article on the duty of care for landowners. There will be an article on awareness raising because that is a problem that through the very extensive consultation we have done, it has always been a problem with the lack of awareness from the policymakers, from local authorities and from the general public on the need to protect soil.

The objective of this framework directive as the name conveys is to create a common framework with the same principles, tackling the same threats, on the basis on preventing the occurrence of the threats as much as possible. We know that some of the threats are already occurring but to prevent an unacceptable occurrence. To preserve soil function and to ensure basically a sustainable use of soil. Threats such as erosion and organic matter decline etc. we will take an approach on identifying risk areas. We know that erosion does not occur in all member states so for member states we identify a) if they have the problem. If so, where do they have the problem, to be able to tackle and target measures in the areas for risk. Whereas for contamination that are occurring everywhere (in all member states) a more national or regional approach should be taken.

Now I focus on contamination. What are the basic elements that could be in a directive? I say “Could be” because what I mean, and I want to highlight this for the record, that these would be things that DG-environment, the director in general of the environment would propose, notwithstanding what would be the commission proposal at the end. Basically a common definition of what would be a contaminated site would be risk based on human health and the environment, taking into account the current and intended use of the soil.

The obligation of member states to make an inventory of contaminated sites in their national territory. A national remediation plan to be established by the member states containing targets means and prioritization done on their own grounds of the sites. A status report upon a land transaction where soil pollution activity is taken or has taken place, the seller would have to provide the potential buyer and the public authority with a land status report. Another idea we have is to have member states setting up a mechanism or mechanisms to fund the remediation of orphan sites. It would be left to member states which mechanism they would put in place. The idea of this is to secure – the underpinning principle of this is that it is a long term strategy – to secure the funding of this long term strategy and that we do not have to depend on fluctuations in budgets depending on political priorities, accidents driven etc. because then we would not make it for the next 50 years.

There is the idea of setting up a platform to discuss the suitability of harmonization of risk assessment methodologies. Then the classical reporting obligations and what will not be in the directive itself but in the strategy; future modifications of the IPPC-directive . It would be revised in a couple of years, also for other points, with the idea of harmonizing what is interpreted as leaving the site in a satisfactory state, and the establishment of soil monitoring, not only at the end of activity but during the activity of installations.

I bring something new to this meeting; You know that we have been doing an internet. That is one of the requirements of new policymaking and also because we really wanted to have the feedback not only of experts because we had a lot experts advising us, but also of citizens view on this. So we did an internet consultation for 8 weeks which was composed of 2 questionnaires, one questionnaire for citizens and one for experts and organizations. It was translated into 7 languages so we were linguistically speaking covering 80-90 % of the population. I will present here some of the results. it ended up on Monday. I will only present the contamination part. There were many other questions but hopefully we will post the whole statistical analysis of the replies in the internet next week. In others you had a possibility of putting free text. We have received a lot of free text in 7 languages. A lot of comments on many things but this will not be digested and translated for next week. What you will see next week is the statistical analysis of the checked ones.

So this is just a schematic way how we see this framework for tackling contamination. This is mainly for historical contamination. we are thinking about the possibility to of adding a prevention clause of prevention contamination. This is rather a kind of management framework. From citizens we had 1200 replies. One of the first questions we ask is: How do you rank the importance of preventing soil degradation. For citizens if you count people saying it is very important or important you have an overwhelming 90 % which is indeed a very supportive view. I have to say we do not claim that this is a statistically representative sample of the population in the EU but as much as we can get by doing an internet consultation. A statistically representative survey in the EU would cost several million Euros. From the people that replied that come from whoever background we had a very positive reply.

On the level of intervention we said: What do you think should be the level of intervention for soil policy. You have almost 75 % of the people that reply that a framework should be at EU-level and measures should be taken at a national or local level. Surprisingly 60 % thought that all measures should be taken at EU level and less than 5 % said that no measures should be taken at EU-level. You will see that the experts and organizations have a little bit different view on this. On the contamination we asked: Do you think a potential buyer of land is entitled to know if a soil polluting activity has taken place. 90 % say they fully agree and if you

take the people that say “fully agree” or “rather agree” you have almost 99 %. It is obvious that they put themselves in the buying position. You can see an overwhelming support that they want transparency in land transactions.

On the question: There has been a soil polluting activity. Do you think that the potential buyer should provide a land status report? Again you have a very high “fully agree” and “rather agree” have 96-97% of the people also wanting more transparency, more clear information on the purchases they do.

On the: Do you think there should be an inventory of contaminated sites? 70 % say they fully agree and if you take also “rather agree” you get to almost 98 %. Very few say “I rather disagree” or “I disagree completely”.

The inventory should be made public? Again the citizen is in favor of having public access to the inventory of contaminated sites.

On the basis of inventory. Do you think that member states should make a plan for the remediation? There it goes a little bit down but still if you take the fully agree and rather agree you are above 90 %. So basically the endorsement of citizens on what we were exploring in contamination is almost in all cases above 90 %.

I have to say something on the distribution. I did not get it here but almost half of the people were French. So you see a very significant participation of French people. Maybe it is because when we do this kind of questionnaires we do a press release which goes to all the national papers. Some pick it up, some do not pick it up. Maybe some French newspapers picked it up and that is why more French people know about this. First one was French, second one Spain, and third one Germany. Also I think the fact that it was available in Spanish, French, German, does make a difference in terms of participation. If it is only in English you see basically UK and Ireland replying.

We go now to experts and organizations. We had 664 replies basically 60 % organizations and 40 % experts and by experts we clearly say that you have to be professionally working on soil.

How important do you think? We get 68 very important and including important again almost 90 %. On the level of intervention, here it is more people saying a framework at EU level, measures to be taken at national or local level and less people saying that all should be done at EU-level. But on option no at the EU level it is about the same as for citizens, a little bit less than 5 % saying EU should not be doing anything.

We ask on the definition of contaminated sites: Should it be risk based or purely based on concentration of contaminants? We got 74 / 25 %, so  $\frac{3}{4}$  in favor of a risk based definition.

On the potential buyer knowing that there has been a soil polluting activity, again a very strong endorsement of this concept. On the land status report it is still very strong – if you take the agree and fully agree – endorsement of this. On the “member states should do an inventory” you see a little bit less than the citizens. Then you can see some organizations are less inclined to have a national inventory and it goes a bit down but still if you count the agree and fully agree you have a very heavy endorsement. On “the inventory being publicly available” we see that things are going a bit down on the fully agree but all in all with fully agree

and rather agree we are still on a little bit less than 90 %. People completely disagreeing is really a minority. On the national remediation plan it is again a bit less. You see organizations are getting more and more scared as the questions go by. You have a little bit less on the fully agree but still all in all between the 2 first you have a big endorsement of the concept, as I see the figures. Hopefully in next week you will have the full statistical analyses also for the other questions in the DG-environments website.

### **History and future plans of Common Forum**

*Joop Vegter, The Netherlands*

This talk will be about the Common Forum (now CF in this text), a little bit about the history and future plans and will try to speed up. We started a bit as an informal network and you see a logo there that is French design that was introduced in the same building a few years ago. Because after this initiative we saw that we as Europeans should talk to each other because we are all neighbors and this contaminated land it could be useful to look a little bit across the borders to learn interesting things. We also expected that people would become really important that EU has to do something with soil. Unfortunately it remained in the waste department for too long.

When the CF started in 1994 we needed to find some survival mechanisms and found that in organizing with subsidies of the DG research so called the first one was Caracas publishing a book. It was really focused on the scientific issues of risk assessment, the blue book, and we also thought it would be very handy to have some update of the old report concerning the policy frameworks in different European countries, that is the green book.

As you know risk assessment is studying the problems and in the real world we have to solve them. Sometimes approaching the problems under perspective of the solution can lead to new insight and we were lucky to get a second action, the CLARINET which became famous with the risk based land management concept. We did also a lot of work in brown field. CLARINET had a spin off with risk EU projects and we had also important discussion on protection of water resources and I think those discussions really concluded with the discussion we have now in the EU in the groundwater directive and the relation with contaminated land and groundwater management. At that point I think these networks have been very useful.

After that you cannot apply 3 times in a row for conservative action because they are not really crazy in the DG research. We have to find a mechanism to survive on our own and we spent some meetings discussing that. Already in meetings in Antwerpen and Paris we saw well, "What are we?". We are a network of contaminant and policy expert advisers since 1994 and we agreed on a mission statement like a platform for knowledge and experience exchange also following international projects and offering some expertise for European commission. Like Claudia has a few colleagues that are dealing with soils, 3 or 4 people dealing with all soils in Europe, you need some kind of central focal points where you can address certain group of people and the CF is willing to offer this opportunity. It is nice of course to have this network, to have this mission statement. We decided there should be a secretary and after some years we finally got some construction to get a funded secretary.

We are now a multinational project. During all this development the environment, the context we operate in, contaminated land problems – I know the UK and the Netherlands and maybe Germany has something like 25 year of contaminated sites remediation experiences and there

was no EU issued at that moment so there were only national policies and there were the networks that was holding important debates like - is this really an environment policy or is it a special planning issue, like value of land, and it should be fit for a use and we only clean up when there is an incentive from special planning to do so when there is a change of land use or should you address it from the environmental point of view?

The discussion of polluters pay. They do not pay always and sometimes you have the idea they never pay. And you have to apply for public funding but if you apply for public funding you run into the EU, so you can have very interesting debates about that. Something we have even today – soil numbers with the site specific risk assessment. Numbers are very convenient but not so flexible. Site specific risk assessment is very complex, maybe too flexible, and people do not feel really confident about it. Things like manage the risks as they are there like addressing land use restrictions or other things or risk control mechanism like pollution digging away or encapsulate everything. With this discussion we ended up with the CLARINET risk based land management which is really a sort of game with all these ingredients in it. You can play with different issues. If you leave pollution behind then you need more after-care. You can make choices and the perfect solution is not always there but you can find some sort of optimum.

After that contaminated land became part of the EU soil strategy. We had a lot of interesting discussions and as a CF we had the future already from CLARINET that we should move into a sort of a integrated system oriented resource management for soil and I think this is really important because contaminated land and also part of the soil protection become part of environmental policies you have to look at how other policies are framed. Sometimes they are framed in the classical way; you have scientist raising awareness. Then you come up with some numerical standard, you monitor, then you prove that the problem is serious, you make some law and a policy to implement and enforce this and you come up with some solution with business as usual but you add something and end up with additional cost.

I made a little bit of a cartoon of this but it is just to make a clean message. Whereas sustainable resource management is of course again science raising awareness and so but you start with a strategic policy. What do you want to achieve? Next step is to put local management in place and local management means that they are able to make the decisions so you make management systems to support standards so you see that things like soil numbers play a different role in the management system as compared to the classical system. You monitor the performing of this system. What problems are addressed? What solutions comes out? And you also have to consider eco-efficiency approaches which may actually save money. If you can use the capacity of the soil in bio-degradation, in natural attenuation, you save money and that is what I would label an eco-efficient approach. It is very important that we try to keep the EU development in the resource management block. I am quite confident but with all this discussions you have to be aware that things may change.

We had in that soil strategy 8 threats. The most relevant threats for CF are soil sealing and contamination and we already had some discussion about this on  $m^2$  per second a day? I will not say that the CF is the light in the dark but we have to address this issue. Also if you look at the data that are not quite good about contamination in Europe, it is, like the light, concentrated around Brussels and it may convey some sense of urgency for you. You see very much that it is not related to erosion and organic matter like something you can see on the real soil map. This is related to land use and infrastructure and has to be dealt with on different administrative levels. Personally I like the approach of having this risk area for the other ones

and for sealing and contamination having this administration hierarchy. Soil policy is not there yet. We heard about private ownership duty care and so on. We also saw the different ingredients of the framework directive, definitions and so on.

Land status report is obviously a mechanism to inform the buyers and owner is that really a strict construction or is it only a label for something where you can have different means to establish the same goal? Those are important discussion elements also for the CF cause you can agree on the general mechanism but how far do you go in being very strict on the ingredients and harmonizing everything? For us CF is the main issues are indeed on this: what does it mean, contaminated sites? If you look only at contaminated land for instance, you can say it can be a risk based approach but if it is a definition of contamination you have also to look at prevention and you have to address what is actually a site? Is that the border of the ownership or is it the border of the pollution, the border of the development plan? You have all kind of conceptual things you have to address with pros and cons and we could play a very goof role in assessing some of this. We will try to have a special session in the CF where we plan to discuss some of these definitions.

A lot of things can be discussed. It is also important to look over the boundaries of the soil and address the groundwater because as soon as we are going to solve things in groundwater we need the groundwater-directive. We also like the liability directive to really help us to promote remediations and when you leave something in the soil behind immediately you run into the waste directive. It is not only the soil directive we have to discuss also our boundaries. Apart from policy we also have to address the research needs. Some CF members have participated in these activities like European research agenda which came out of the end of the working group research of the soil strategy discussion and of another project, more on contaminated areas in urban environments, a project of the joint.

We hope that many EU-funded projects will come out of this and that we can act as a sort of panel to consult about the results of participating in these projects. A concluding remark. I like to have some things at European level and we should do our best to harmonize when we can but I say: do not harmonize too much. In contaminated land there is a different problem that water pollution prevention. We are dealing with programs, in principle, and with legacies from the past. We also have different member states. Those who started in, those who started 25 years ago and those who start now which are in different phases of completing a certain program and we always revise policies. As soon as the problem looks different or is appreciated in a different way you have to adopt a policy. That type of evolution is of course different in member states. So it is just imposing just one definition of something in this complete diverse system will create a mess. We have to be aware of that.

We must also avoid the pitfall of having the very scientific idea of having a complete inventory of the problem and then you have it on the table, then you have nice priorities and then you go to action. This has to be simultaneous activities. Inventories are needed but they are never complete. It has shown during this network as well. We have to do our best but we must not wait with action until the inventory is completed. When you say: The inventory should be from the environmental perspective, you should not forget that actually the spatial planners, in my country at least, are driving forces in most of the clean ups now.

## **Periodical reporting of national/regional inventories of contaminated sites**

*Anna Rita Gentile, EEA*

The scope of my presentation is to show how we use data from national and regional inventories of contaminated sites to produce environmental assessment at the European level. Also to show the results of the latest assessment that we produced. Before that I think it will be worth while to give some background on the EEA. The mission and work of EEA may be very different from the national EPA's so it will be useful to provide this information. The EEA is specialized and decentralized body of the European union, which is young. It was established with a council regulation in 1990. It started working in Copenhagen only in 1994 and it is a small organization compared to other national EPA's. We are 150 people working in Copenhagen. We have a 1 person office in Brussels.

The mission of the EEA is to provide relevant, reliable targeted and timely information to policymakers and the general public on Europe environment in order to enable the community and member states to take the necessary measures. Another important task is to maintain and coordinate the European environmental information observation network based on sharing of information. The EEA is an assess or analyst independent provider of information but it is not a policymaker or regulator. It does not have the task to enforce environmental legislation and it is not a research body. This task may partly be taken by national EPA's. The EEA has always its - even if it is a body of the EU - it has always been open to countries outside the union. We now count 31 countries and in few months we will be 32 when Switzerland will join and we also work with other countries for example the Balkan countries and with other neighboring countries for specific tasks. For example in the process of the "environment for Europe" which has been established within the UN convention, European economic commission. We are working with Russia and countries in central Asia and we work on the certification with African countries.

We have very variable geography but. We are 150 people dealing with all environmental issues. The idea of the legislator was to have very small organization to build up capacities in the member states so he also coordinated this environmental information and observation network, which is composed by more than 300 organizations in the member countries. Specifically we have organization that are data holders or provide specific expertise in specific environmental issues and actors, contact point with the national networks and we work with European centers which are consortia of organizations in the member states that help us to develop our work program. So mainly we coordinate the work but more and more we are doing assessment work ourselves.

In relation to contaminated land: What is the background of our work? The state of soil is one of the priority areas for the EEA which has been identified in the EEA regulation. State of soil also includes contaminated land. We have been working there almost 10 years. We do also other work on soil but on contaminated land we have currently 2 activities. One is related to the development of specific indicators of contaminated sites and the second is on identification and assessment of potential problem areas for soil contamination in Europe. Francesca will present this specific line of work. I focus on the development of specific indicator on contaminated land. A little bit of background on indicators; Since the beginning of its work the EEA has been focusing on specific tools to provide the information we need to support policy development and one of these tools was the indicators and we thought that the indicators was very useful because they enable us to summarize very complex information using very simple text and nor very many data. Specifically we use them to policy making in the

public and the state on the changes of the environment and it is linked to the economic development.

Claudia mentioned the integration between soil protection and the economic development. It is very relevant to provide information in this area. Also another important thing is to provide information on the effectiveness and how much of the objectives is being achieved. We started to use different more complex tools such as the scenarios and perspective analyses and some tools that we mutated from the economical analyses. In the case of soil we are very far from using these tools because so far there has not been an EU-wide soil policy. In the future, not a short term future, this may develop further.

The first reason for us why we need information on contaminated sites on the European level is that this is an important input to European environmental assessment which are focused on the soil medium. It is a status and if it is contaminated we will have impacts on other media and environment as a whole, so it is very important that we provide information on these aspects even if it seems to be very localized. This is as I said a building block of the overall assessment of the state and trends in the environment which is one of the main tasks of the EU.

Also this information will be useful to support policy making. Since soil policy is at the beginning this information has been useful for raising awareness and make a point of the fact that soil protection was an issue that should be tackled at the European level. Also this information has been used in framing the preparation of the EU policy measures, in particular the soil thematic strategy.

What do I mean by environmental assessment? What is focus of this assessment? First of all we try to provide an over view of all impacts for soil contamination on environment and human health and what I mean – it is important to know what is happening, where it is happening and what are the consequences? I would disagree with Joop that we only need information – if I understood him right - aggregated at the administrative level because we will never be able to evaluate what are the impacts on environmental and human receptors if you do not know the problem is occurring so I agree we need some sort of aggregation at the administrative level and I think the indicator provide this type of aggregation but we also need to know where the things are happening. It is only in this way, in my opinion, that we can also link what is happening in the soil on the consequences on the environmental as whole.

We also try to identify the causes of soil contamination. Which are due to specific economic activity in order to provide some information to this process of integration of soil protection to economic development and also we try to give some information on what does the progress mean on the measure of intake to reduce the impact and prevent further contamination but this has so far only been at the country level. Also ideally you should provide indication on what else should be done. Although I think this will be more left to future development.

We are developing an indicator of contaminated sites and this is one of the 39 core set indicators so that there are priorities that the EEA has defined for its work. The countries have committed them selves to provide information to fill in these 39 indicators. We start from a number of policy questions that we would like to answer with the indicator and the assessment that we make and the general question is: How is the problem of contaminated land being addressed at EU level? Specifically we try to answer questions like: What are the sectors that contribute? How much is being spent? How much progress is being achieved in

the management and control of soil contamination on the county level and what are the main contaminants?

There is more to be done. Specific impacts and the information on brown fields. So far this is not feasible because this information does not exist at the moment but we will develop something more in the future. We consider the management of contaminated sites as a tired process and we have defined 5 steps and we ask the countries to provide information on number of sites according to these steps. What I would like to say is that we have a periodical update of these indicator which we also use electronic tools to enable the countries to post their data and track back the data information and we will publish the results on the website that is public accessible.

We also have the data on methodologies and the plans for future development and indicators on the website. There are some general trends that can be seen, for example in the sources, but the situation in a particular country can be very different. One of the problems is also that we are dealing with different methodologies, different definitions - it is a problem on data comparability. We have made an analyses on main polluting industrial branches contributing to local contamination and the information is given in terms of % of sites where this branch is responsible for the problem.

We also have information on major pollutants. We do not have information on volumes so the definition we provide is always related to the % of sites with respect to the total number of identified contaminated sites where this contaminant is present. Heavy metals is the most spread contaminants, second is mineral oil and hydrocarbons but then again this is the general picture. In some countries the situation can be different. We have information on the extent of the problem, number of potentially contaminated sites, progress in the management – how many sites are being remediated or investigated? The overall trend here is that there is a lot of progress in the first stages of the management process, preliminary site investigation and less progress in the later stages which require huge resources and time. Again here we cannot compare one country with another. This only gives a general overview and to see country by country what they are doing. We also have information on cleanup expenditure. There is only a small amount of expenditure. The total expected cost spent. There is still a lot to do in coming decades. We have also other information.

Finally I would like to conclude with some comments on the quality assessment that we make of the data we have. One major problem is that so far there is no EU-wide data on contamination because there is no legal basis for this. The only activity is the data flows that are based on voluntary contribution. There is no legal instrument requiring countries to provide countries to provide this data except the regulation and commitment they make, participate in the work. Another problem is that the data we use come from national regional inventories which have been set up for different reasons, specifically to support programs in the country and so on. So information we can find there is more information on management and less on environment. That is also why our assessment provide more information in terms of management than impacts.

A crucial point is data comparability and quality control which is demanded to the countries. For data comparability one of the major problems is the lack of definitions across Europe. Some member states do not have a centralized register so we have to use data from regional registers that might not be comparable on a national level. There is very few real data so there is a lot of expert estimations that we use to fill gaps. Countries have reached different stages

in management of sites so if a country have very small number of contaminated sites it does not mean that this is the real situation. Maybe there is still a lot of work to do to find out the extent of the problem. Then we have different legal backgrounds and legal requirements, for example former military sites are not always included in all inventories so we cannot say something of military sites over Europe.

Also there is a different level of interest or resources in the countries for providing information. For some countries the issue of confidentiality is important and the issue of political sensitiveness so one country are not always willing to be compared to another country. But according to my experience there has been, during the last 10 years, increasingly more information of higher quality available. The countries we are working with are very willing to provide data and did it basically with there own resources. But lately there has been an increased level of political sensitiveness which would be expected because now you have EU policies so you also see the potential consequences of providing information that are not really giving the real situation. But we hope that now with the adoption of the soil thematic strategy with the common list of contaminated sites we can get rid of many of the problems we were facing in relation to comparability.

### **Possible monitoring of risk areas of EU concern**

*Francesca Quercia, Italy*

I will present briefly this project of the European topic center of terrestrial environment of the European EPA started in beginning of last year. The project was to develop an effective tool to identify assess on map the areas the risk of potential problem areas for soil contamination in Europe in order to provide input to the EAA activity for policy development. The expected outcome and EEA propose for identification and preliminary assessment of these areas and map-related assessment focusing on special problem areas of soil contamination.

Definition is being adopted at the beginning of the project on the following areas: Where soil contamination is considered to pose significant risk to human health and impacts beyond the local environment and assessment reporting of pressures.

State remediation activities is relevant on the European level. This is the definition.

2004 – project development. We started in order to build an assessment methodology to look at all available preliminary risk assessment methods used in Europe and over seas, used in order do identify and prioritize potentially contaminated sites. We looked particularly at the indicators, the parameters that were used in these methodologies and we try to see common features and try a choose harmonize parameters. Then upon this analyses we developed one method including a number of indicators, or parameters, and an assessment procedure of these potential risks. Then we formulated a methodology and we applied it last year to, selected available data on contaminated sites or potentially contaminated sites available at the European level. This was the background of the methodology which was a preliminary risk assessment model for identification of those areas and all the details are available in the technical reports which can be downloaded from the topic center website.

The review of methods as a background and the application and the database used are available in the reports. The approach adopted or proposed is a tired approach. That means that data of different quality can be analysed. The approach is risk based and we could use low quality and better quality data. This approach was pretty much tailored to the kind of data we

had readily available. The methodology developed to 2 sets of data that were available at the European level. Some mining sites data available from an European project some years ago. The database was available on mining sites and we applied this approach to 236 mining sites where we had site specific data in the database. Then tier 1 assessment of low quality data was performed. We looked at the data available in the register and this was applied to several 1000 of sites for a very preliminary assessment. This is one kind of outcome we got from the analyses of mining sites.

At the end of last year we had a meeting and invited experts. Some are here today. We got some input for improving this approach for changing some elements. We were asked to add the level and take care of really relevant areas in Europe that means what are called “Mega sites” or areas of EU concern so we had to take care of multiple sources giving integrated impacts and focus on classification of sites rather than on prioritisation of sites over Europe. Nobody liked that but some sort of classification will be accepted. We had several inputs from experts and tried to accept them to the method. We have been asked to select according to a prescreening exercise a number of sites at European level at which we would apply the assessment and identification process. We have agreed with the experts of prescreening step also called the tier 0 of the new 2005 assessment. Then sites passing the prescreening level chosen by the memberstate contact would supply site specific or problem area data in an online questionnaire which have been made available to memberstates contacts and on the topic center website.

From July to September 20 with 1-2 months holiday in between we got some response from some contacts. This is a summary. It is clear that this is a voluntary contribute from our contacts and might be quite time consuming. I take the opportunity to thank those who provided the data. So this is the concept and this is the aggregated data that we are asking over problem areas. So also the multiple site option. Either scattered or aggregated in this mega site concept is available. There are guidelines in order to provide aggregated data in the questionnaire of this kind of sites. We are interested also in receptors within the problem area. An example of some data and numeric information that has been loaded on the database. This is a megasite, a site of national interest in Italy, where you may recognise some features of the previous catch with source and landuses and the accent of the problem area as a whole. Next step: the model we developed last year, in 2004 with the risk prioritisation methods is being used in a pilot project in, contaminated mine site. Then we shall see in the following months is there any problems with the questionnaire or the time-consuming activities from the contacts and in order to improve to questionnaire. Any country can contribute voluntarily with relevant data. Just give us a call and we will give you a password to access the questionnaire. Then we are much in contact with the JRC who has very similar objectives in their assessment works so we will benefit from their results as well. Again we are not looking for prioritisation of sites, just classification of problem areas. The main aim of this project is to follow and satisfy spatial assessment objectives of EAA programs.

### **Belgian experiences with a “Land status report” at the moment of transfer of land**

*Victor Dries, Flanders, Belgium*

About Belgian experiences with a “land status report” at the moment of transfer of land. I wanted to give this presentation because the European committee is thinking of introducing a land status report at transfer of land where risk activities have taken place and also as soon as Claudia opened her mouth to say something like that you saw a lot of people round the table gasp – land status report we do not like that. Well, we have got a land status report for

10 years by now so I wanted to present what our experience has been and also what the experience has been from industry cause from the beginning of this year we started quite a big impact study on our own policy so we have done a questionnaire with 2000 companies that are in our database. 2000 companies that had to carry out remediation so it is not the once that are happy with our policy but we asked them what they think about it. Do you think it is more or less OK or do you think it is rubbish? I wanted to present our experiences.

Why did we ever introduced a land-status report? Mainly because most of the transfers before the soil remediation decree took place without a land-status report. No problem unless that, if that land would be contaminated, and if that contamination would have been that bad that it cost damage to 3:rd parties, neighbours, groundwater etc., the new owner, being the new guardian of that land, would have a liability. That liability would be on him just because he would be the new guardian of land. He would guard a land that cost harm to a third party so he would be liable. We had a huge lot of problems like that causing costs for that party. They did not like it so they went to the politicians. A few of those cases got into press. Then we got a feeling that we should have something to guard those nice guys, new investors against that kind of problem. So, you were focusing on optimal protection of a new owner.

Second reason for us (but of course we did not tell the politicians) is that we wanted to guard our selves towards fraud transfer by a contaminated party. A company may cause a contamination, sooner or later they would find out that the land was contaminated and they would just sell the land to a daughter company where they would not put any money in. After a while, when the government finds out there was a problem, the company owning the land would go bankrupt. "Nobody" is owning the land and the government would have to come in and solve the problem. We wanted to protect ourselves. So our legislation says: At any transfer of land, a soil certificate is necessary. That soil certificate is just an extract from our soil quality database. If we don't know anything about it we tell them and if they want to do an investigation they can but it is not obligatory. What we see is that when we say don't know anything at all quite a lot of parties are interested in finding out because they are aware and they don't want to take a risk they don't know anything about.

For any transfer of land with a risk activity, present or in the past, we demand a soil investigation before the transfer can take place. If that preliminary investigation shows there is a problem we demand a descriptive soil investigation, showing whether or not there is a risk and if a remediation is necessary. If remediation is necessary we demand a soil remediation plan and an engagement and an financial guarantee, either from the party selling the land or from the party acquiring the land. Somebody has to put on paper: I will take care of this problem and say here is the money. They don't have to pay the money to us but they have to guarantee the money is there. That has to happen prior to the transfer. If not they risk that we cancel the transfer. We can go to court and say; stop it, turn the clock back five years. So most people follow this legislation.

We have a register of polluted land. All the data we get we put in that register that is completely public. Anybody can enter that register. Nobody, well, minds. Most people are rather interested in finding out what we know. In 1995, what were the reactions? Quite often for investors and big companies said; No problem! We don't mind. Why? Because they were aware of their liabilities so they did carry out land status reports, environmental impact reports, and because they wanted to be sure that is was covered by somebody they would send the reports to us and ask for some guarantee, some letter of that we agree. So they were

following our legislation even before it was there. So they did not mind and like them also the competitors would have to pay those costs.

With small and medium size firms it was clear that they were absolutely afraid. “What is happening to us? We can’t sell our land anymore. This is impossible. There will be no more transfers of industrial land.” So from that part of the market it was a huge resistance. We were lucky to have a few of those public cases that went into the press because the politicians said; “No matter what you think, we need it to protect the new owners.” So that was good. What we thought was also good was that the policy was completely discussed with all experts from all parties before the decree was written. Everybody could have an impact. Everybody could say his thoughts, what his worries were before the decree was written. We got a lot of good feedback.

What are the experience now after 10 years? One very clear positive fact for us is that transfer is a very important trigger for soil investigation and soil remediation. More than 70 % of the sites where remediation has started so far, remediation has started because of the transfer. We have not had to send any letter all, worry anybody at all. People would make themselves start a remediation. That is making the market work. Second very positive thing, we think, is that the cost of a soil remediation becomes part of a transfer. It is relatively easy money. People are not really willing to pay the money but they integrate the cost in the cost of the transfer so the money is being put at the table by either of the two parties. It does not have to be some extra thing out of the budget.

Then we had a questionnaire with 2000 companies from our register. 43 % of them – and that is companies that had to do remediation – finds the transfer as a trigger for remediation, the right moment. Only 15 % of them finds the transfer not the right moment and the rest are somewhere in between. For us that was a very positive signal. Even those parties that have to pay you will find more people say: OK. One positive thing for us is that the register on polluted land has definitely raised public awareness, for instance of the problem of very small storage tanks for gasoline or heating oil. We have got about 600 000 underground storage tanks. It is something you can try to write in the legislation that you have to deal with but if you don’t have public awareness there is now way to tackle the problem. By introducing this legislation, this information duty, people got aware of a possible contamination.

Another positive thing for us is that the duty to have a soil certificate, it is 25 euro, pays for our register. We have not got the money to invest in a whole software system so there is where the money is coming from. 25 euro times 180 000 certificates a year, that’s quite a bit of working money. You can have quite a bit of database for that money. Almost everything is automated so 90 % of the certificates we deliver are delivered in an automatic way. The entries are putting in by the notaries during the night. It is being worked on by our server. Next day 9 o’clock in the morning it goes away by mail. The notaries are happy too because within 2 working days they have their soil certificate. The procedures are fast and it is flexible enough to work with it.

We also have negative experiences. Our legislation is very descriptive also in defining “what is transfer” and there is too much so we have tear that down. We have to put more responsibility on the parties but we think we can do now because most parties involved have become more aware of that soil quality item and the related costs. The stigma of being in a register of polluted land today is too strong. Mainly because in Dutch we do not have different words for polluted and contaminated. For us the word is the same so for many people that read that

word polluted they are afraid and think “we are going to get cancer if we buy this land”. So we are going to change the naming of our register and it is going to be a database on soil quality, stating that with some soils there are no problems and with other there might be some problem with another use and even for some soils; they need remediation.

The procedures are pretty good but must become even faster and more flexible. Today we say that remediation of the site must be guaranteed but for complex sites there is no way you can write a decent remediation plan. So in the near future we want to move ahead to the step where a company can say they guarantee the safe management of the risks and put the money on the table to make sure that they have the means to guarantee the management. One big problem is negative value sites. Sites where the land value is lower than the estimated remediation cost or management cost. For those sites there are no solutions today. The only solution is that we come in and take away at least part of the risks so that the land can be sold again at relatively decent circumstances.

Conclusions: definitely most people agree and information on soil quality is very important at land transfer. It is the only way that a landowner can say what he can do in a safe and sustainable way after he has bought the land. It is also the only way for him to know whether or not he is buying some liabilities he does not know. Parties were afraid before but they accept the legislation now if, and that is definitely it, if process time is limited. Our soil certificates take us 2 days. Our decisions on remediation duties take us 60 days. If a company comes to us and says that “This is really too long for me. I really have an important decision and I need the decision.” we are able to carry out the complete procedure within 7 working days. If we guarantee that it is OK with big companies if the quality of the decision is OK. That is also a problem. If you want to do something like that you have to make very sure that within the organization there is people that can make the decision and can put on paper that this is our decision. If it is wrong we are taking liability for that. That is a political decision you also have to take. I think an advantage is also that money is more or less readily spent at the moment of transfer because a huge lot of money, quite often, is being put on the table by either party. We say: Reserve a part of that money for remediation.

#### Questions and discussion

*Sheena Engineer;* Claudia, I wonder what happens in the situation when you have land fitting into these historical potentially polluting activities. They have been occupied in a number of occasions by a home owner. A family owns the land and wants to sell it to another family. How will that fit in with this transfer and sale. Would you be expecting individual homeowners to be addressing this sort of information or are we actually saying: This is looking at the commercial side of land transactions and the private ownership side is not within that.

*Victor Dries;* Private ownership is in the system. Even a private owner has to carry out a soil investigation. But they can apply for something that means that if that investigation proves that there is a contamination, we take over the remediation duty.

*Sheena Engineer;* In the UK the owner has the liability whether they be a home owner or private owner.

*Victor Dries;* We try to, especially for private parties, make very sure that they can escape quite easily from their duties. When we take over you get certainty to a new owner that he can buy it. He has not to deal with any future duties because we have taken over the duty. We also

try to put money aside once in a while to investigate a number of those potentially contaminated.

*Claudia Olazábal;* The way we see it there will be in the directive an annex with what we call potentially polluting activities which is the one that is going to be the obligation of the land status report. It is true that if you are a residential home owner but you are unlucky. There was in the past one of these installations you will have to do it even if you are a residential. Then comes the decision of which installations you put in the annex, which would be the trigger. That is what we are looking at. Would we look only at the big ones or do we include smaller ones? That's where we play with how many people do we want to catch into this obligation. In the past some homeowners in urban areas might have soil polluting activity.

*Sheena Engineer;* One concern I have is that, yes, you can control it by size and the type of site but having a house on that might not give a risk to those individuals. Their house may not be on part of that site where there are the exposure pathways to put anyone at risk. I can see how you talk about that but it is just how it will be practically implemented.

*Claudia Olazábal;* That goes both ways, because if there has not been a risk it is good for the homeowner to say to the people that might perceive that risk that there is no such risk. It can actually have a beneficial information if you were in case where you say: "I was in a site but it was a pretty clean one and mine is not as risky", or actually proving to the other person there is no risk. But in any case we are not thinking about fully doing converting this landstatus report into a full risk assessment because that would be too expensive. We are not thinking now to say; "If you want to sell your land you have to do a full risk assessment."

*Victor Dries;* Also because you tackled the point of liability, or possible liability of a private owner, it a problem you have to tackle any way. The first serious problem you get – you for instance have a public water extraction that is contaminated by a contamination coming from such a large old industrial site where you have private housing now, I want to see the first politician that says; "OK, those 100 private owners are liable for that contamination and for the damage to the drinking water facilities." At that moment you are going to tackle the liability issues because otherwise you put the 100 people on the street. Sooner or later you are going to have to deal with that problem.

*Sheena Engineer;* I think that when you can prove there is a problem, then you will make that decision. It is the possible consequences of having a shadow over your site until you can prove one way or an other that I think will become more of an issue.

*Michel Beaulieu;* When you say Victor that you will provide a quality decision in 7 days, does that mean that for many cases you will review the preliminary investigation, descriptive soil remediation plan and engagement and financial guarantee in 7 days?

*Victor Dries;* What we do in 7 days is see what information they have available and try to estimate what the insurance is on the quality of the data. If they already have a descriptive site investigation they have to deliver to us also a potential remediation cost and we estimate what the uncertainty may be and if the quality of the data is pretty poor we put an uncertainty on the table of say 200 %. We even have an acquisition operation of 2 big insurance companies, on Belgian and on French. They had a 100 potentially contaminated sites in their real estate portfolio and only half of them was investigated by a preliminary site investigation. For the rest they did not have anything. We do not mind but will have to put 12 million Euros on the

table as a financial guarantee and we said; “Take it or leave it.” They said: “We only have 10 days.” We said: “Ok, that is your problem but within 10 days you will give us either better data or 12.5 millions.” They came up with the 12.5 million and within 2 months we had preliminary site investigations on all sites. Then we said; “Now we will talk about the 12.5 millions.” We could reduce the 12.5 million. That is the kind of decisions you have to take. You do not have to decide on all in detail. Even if do not have the data you have to discuss open with the company what the uncertainties are and how are we going to cover them. That is a language they understand and they are willing to take it.

*Joop Vegter*; Victor said that a lot of people was looking afraid of the land status report. It depends on what it means. Will it be in the directive as a mandatory way of achieving this or will member states be allowed to achieve to goal of the land status report in their own way? We do not have a land status report in the Netherlands but you get the same result by this civil negotiation mechanism. Of course that will make a large difference for the Dutch position. We like the goal but if you enforce the complete mechanism which – we tried to have this land status report in parliament but we did not succeed and will probably not succeed again so it will cause some trouble.

*Claudia Olazábal*; I know you all want to change as little as possible of your own national legislation. We have understood that but you will have to change some things. There is no way around that and we will try to accommodate to the existing mechanisms whereby the same result can be existing but if there are things which are that we are proposing and are non existing in your member state you might have to change.

*Joop Vegter*; I was not talking about that. If you have nothing, but if you have an equivalent mechanism in place and you can show it is equivalent you are allowed to continue its use. This is really a big political difference.

*Victor Dries*; If I may have one more remark. The system we have now goes much further than the ideas of a land status report. As long as I have understood this report is merely a first information step and has nothing to do with remediation duty, financial guarantees or anything.

*Michel Beaulieu*; One more comment. Looking at the figure saying that 70 % of the assessment and cleanup is triggered by transfer. If I look at Quebec where we do not have that probably 70 % of our cleanups is coming where there is a transfer where the buyer ask it from the sellers. The seller would like to know what is there. The bankers will ask something. In a way, informally, it is probably working the same way.

*Tomas Joindot*; I still have a problem when I see the different presentations we have this afternoon and this concept of remediation plan. I think we say remediation plans and we all have different definitions of that concept. I see 2 very different philosophies. The first one is “work in progress” philosophy. There is an inventory of all contaminated sites and if it is contaminated is has to be cleaned up and there is a work in progress and we have indicators showing that this is a percentage of sites that are being cleaned up and the objective is to go to 100 %. Another philosophy, I think more reflected by the position of Common Forum, would be “we have an inventory of sites, we manage those sites” and the objective is having all those sites managed. And therefore we can’t assume that on one of these sites with its current use that creates risk but we have a trigger for cleanup which is reuse of land. Can we have a very short discussion? What are your opinions of these things? I think it is a very important point

in the future debate we will have in the directive and I think there are very different philosophies behind the 2 words.

*Joop Vegter;* I think a lot of things has to do with what they call semantic problems. If I look at the word remediation plan I read it as you should have a contaminated land program or something like that. You should have a policy program addressing the issue because in everyday life a remediation plan is something that states what day you start to dig up something, that is a remediation plan. It is obviously not meant I think in this directive. I really like to have, also from the CF perspective, this broader view on managing land and what is contaminated or not. Reusing land, and within this reusing land and special planning dynamics, one of the things you have to consider whether you have to remediate because it is not fit for the intended use. So it is one small part of the bigger picture. I understand quite well the second position you formulated.

*Tomas Joindot;* Yes, but it is not fit for the intended use. But you can't say "I wait until 10 years in order to put the site fit with its actual use." If you say a contaminated site is a site that causes risk you can't say I'll make a plan in order to remediate this site in 10 years if it causes risk with its actual use. And when you think about "intended use" it is not in your actual inventory.

*Joop Vegter;* It is again a problem with words. It was intended, you can also say that this site was supposed to be used as a residential area, its actual use is a residential area, there are actual risks so I have to intervene. We have to have a long talk about what do these words mean?

*Claudia Olazábal;* The definitions are going to be a key negotiation in counsel and it would be for 2 years going through word by word, that is for sure. The one of contaminated site, the one of remediation, but what you have to have in mind is -What as a community we would accept as remediation- and you have to lift up a bit from your national concept. There are 25 countries. There are trans boundary effects - what would we accept as EU 25 or what would be a remediation. You have to have a kind of helicopter view on what we would, as a community, we would for all member states knowing that there are enormous differences on progress in tackling the problem between the EU 25, how and what we would accept as a definition of contaminated sites. What we should accept politically for all together what is remediation. Knowing that enforcement laws, etc are different between member states, the financial costs and funding costs are different. I do not want to have the counsel discussion, we have 2 years of that to come. I just want to make a kind of a claim or call now - please have in mind that what we will negotiate now is not coherent with what you are doing at home. It is a complete different discussion, it is EU 25 and completely different scenarios to what you have at home.

*Joop Vegter;* This is great for a grant vision. Which what I like to have and I think you also like to have. It is not only the narrow minded thing whether you have to clean up something here. You have to look at how we are going to deal with soils.

*Claudia Olazábal;* Just a very specific example: let's accept natural attenuation as part of a remediation plan. Ok, but you know that some member states might take a more flexible approach to what they call natural attenuation and what you have is that economic operators which are settled in those countries have much more flexible obligations whereby you have a

distortion of competition. This is the type of thing that I mean when I say that you have to see a wider picture.

*Joop Vegter;* Yes, when I see the wider picture I also see that the fact that the land is contaminated is only a marginal aspect in decision to move and put your factory in a certain country. If you want to be in Rotterdam you have to pay for very expensive Dutch clean up and you will pay cause you want to be in Rotterdam. Level playing field is very nice but we should not level the playing field with environmental rules because the playing field is not leveled in the first place. There is distortion of competition but this is very blown up arguments.

*Sheena Engineer;* I was just going to comment on the intended use. As I accept is an opportunity where, there is money available for us to get clean up to be achieved or monitoring or in some cases management. Hand in hand with that is having some kind of strategic approach to the contamination where it is not going through sales. Whether that translates strictly into a list of identified sites that may be or are definitely contaminated on what that definition is, is perhaps a little bit difficult. I think, what we are trying to achieve across the state is we have an approach, a strategy for how we are going to look on these sites that can't be dealt with by redevelopment. We do not push it too far into spending. What would be quite considerable amounts of money, just seeking to come up with a paper list of sites, without actually saying: How can we best address looking at our country and identifying those key risks? And then progressing those, having the strategic approach to how we look at the sites.

## Fifth thematic discussion – Excavated (polluted) soil

### **The management of excavated soil (treated or non treated)**

*Michael Beaulieu, Canada*

This will be another set of questions. The management of excavated contaminated soil, treated or non treated will be a little bit schizophrenic presentation. There is a Quebec philosophy regarding this disposal. There are two antagonistic principles that are colliding. First a protection principle saying soil quality must be preserved where the soil is clean and restored where it is impacted. It means no soil of lower quality can be put on a cleaner soil. That is the idea. Then there is another principle, also good, the waste value principle. Instead of being wasted or transformed at high cost (destruction etc) to be used for beneficial use replacing material in road etc, reducing thus the impact on the environment. So 1, we bring no contaminants, 2, we could use that which means you will bring contamination

We got a couple of policy and regulation touching to that soil and waste management. First we have in 1998 a soil protection act and contaminated soil policy in which there is a grid saying when you have excavated soil, what can you do with it.

Then we had to adopt in 2001 regulation on land filling contaminated soil. 1998 EPA introduced new regulation regarding the land filling of contamination soil in the US and asked that, if soil was contamination beyond a certain conc. land filling was impossible without treatment. That has had an impact on us so the import of US soil for land filling skyrocketed. Public opinion and politics was chocked that we received 100 and 100s of tons of contaminated soil from the US to be land filled. We had a lot of pressure to adopt regulation to stop that. We adopted a kind of mirror-regulation with some differences in 2001. Because of the NAFTA – North American Trade – we could not just say; We do not take any American soil for land filling in Quebec. We had to impose on our self the same rules because this is how this treaty is going. So now if you excavate soil and it is above the criteria you must treat it before land filling if there is a treatment technology.

If you look at the impact of this regulation you can say that until 1998 that the quantity of soil land filled was 120 000 metric tons, American soil coming in, 200 000 tons. Look at the ration before treatment and land filling. In 1998 we land filled 40 % of the soil treated 60 % but then in 1999 we just switched, and it stayed like that in 2000, 2001, even increasing because it was the last chance before the regulation. Then in 2002 regulation was passed and it was just killed. Back to level of 1998 for land filling and treated raised. In 2003 land filling 20 % treating 80 %. Then there is a solid waste regulation which will soon be adopted. In the new regulation for final covering only the first layer 30 cm, it is less than it was and for the covering the hydraulic conductivity must be more than  $10^{-4}$  cm/s, less than 20 % weight in particles a diameter above 8 mm and is not accepted if there are volatile contaminants. Why they did that is because they noticed that before they would accept any soil and some of it was like barrier. It was clay and just stopped the composition of the waste. Now they think there should not be such a barrier. A permeable soil let the water move in and you will degrade much better. 100 years later you will have a lot of degradation in the site. Therefore the quantity of soil accepted in municipal landfill will drop.

Treatment plant operators, we have 31 and 27 do biodegradation, are producing a lot of soil treated, they tell us is 80 % of the treated soil will not pass the new criteria. We will not be able to put these soils in the municipal landfills. So treatment plant operators are concerned

with mountains of treated soils in their backyards. Then there is a pressure to put treated, still contamination soil on cleaner land. Amount of treated soil in 2004 was 400 000 tons biologically treated was 334 000 tons.

There is a bottleneck, there will be more illegal land filling if there are no economical option. Most of the biologically treated excavated soil will be between the criterion and have no solution. We try to solve the potential deadlock. there is the following option. We are caught between those 2 principles. What we will propose is: all the “ab” soils and heavy metals also in “bc”, non leachable, could be disposed in open air quarry on mining sites. They needed geological characteristics. We have some sites that could be used as open air quarry which are giant hole that we could fill up. Ad can be reused for the covering of mine tailings. We have mountains of mine tailings. As long as the material is similar and do not created new problems it can be used that way. Contaminated soil a-c can be used as filling matter on road sidewalks bicycle paths etc.

We have a problem with that. How do you manage that? Do you ask to register it? This is running strongly against protection principle. You will bring more contaminated soil on “clean” soil. On other hand there is regulation allowing the use of granulates made from recycled materials on the road so there is a colliding principle. Then ac soils can be reused in any short-term rehabilitation project if the receiving land is contamination below the imported soil. All the options are by the new regulation I talked about. If the soil have the right density it could be brought in the municipal landfill. We also have that ad soil can be reused on site of origin if you have a risk management plan. d-soil must be excavated and treated. The soil placed in aboveground structure, noise wall etc, must be in capsulated and followed up. It must be registered in the land register and stay the property of an accountable entity. How do you deal with those antagonistic principles? When you put soil on the road – do you put in the land register, who is keeping liability?

### **Regulations to deal with the reuse of excavated (polluted) soil in Germany**

*Andreas Bieber, Germany*

What happens in Germany is not very different from what Michel presented in Quebec. First, what is in our regulation for excavated soil and we are taking the definition for soil is taken from our soil protection act: the upper layer of earth crust as long as it fulfills soil functions. It should contain less than 10 % mineral construction waste. We also include in the regulation soil from soil treatment plant and drenched material from rivers and lakes but it should not contain more than 10 % clay. We have classes for the reuse, not by letters but numbers, from 0 to 5 and the first 3 classes are classes when the soil can be reused and the last 3 classes has to be land filled and in some cases has to be treated before it is possible to landfill. How does it work? If you have soil material and want to create an upper soil layer that is reachable for the roots of plants, the first 2 meters, we have a special regulation in accordance with our soil protection ordinance. If you want to create new soil you have to fulfill 0 requirements and if you want to have a technical soil function the 1 and 2 levels are relevant. For set 1 there are some restrictions but you can reuse it openly and if you only fulfill 2 requirement then you have to take technical precaution measures. What do you have to do if you want to dig out soil? The first thing is you have to look at the material before excavation. If you see or smell contamination you have to check registers if it is a contaminated site and an investigation is not necessary if there is no hints about contamination or if you have a low quantity of soil, less that 500 m<sup>3</sup> and there are no hints of specific contamination or if you do not have a

specific contamination and you want to reuse the soil at the same place or at similar places in the same region.

An investigation is necessary if the soil is from an industrial or commercial area, if you know that there is a cont site, you put out the soil there or if you have soils from naturally contaminated areas for example flood areas or when waste water was irrigated there. Soil from soil treatment plants has to be investigated. Drenched materials also have to be investigated if there is suspicion of contamination and if you have soils where you know there is hits for specific contaminations.

If you know what the problem might be you have an investigation about this specific contamination. In cases you do not exactly know what you are heading for. Then you have to fulfill a minimum investigation program. It means that first you have to look at the solid matter, the levels, the contaminants and if you don't meet those set 0-levels in the solid matter you have to look for the leachate. If you are lower than the set 0 levels you don't have to look at the eluate. The reuse classes set 0 for solid matter are specifically for different types of soil, for sand, loam, clay and there is a fourth category for mixtures of soils. If you are below these set 0 levels you can use the soil for almost every use. If you don't fulfill the solid matter levels, you have to look at the eluate. We also have levels for solid matters for set 1 and set 2. We have also levels for the eluate for those substances. What can we do with the soils from set 0 to set 2 ? If you are below the set 0 levels you can use the soil without restrictions but because it is thought that these levels are characteristic for natural soil.

If the background levels are higher than the set 0 levels then the background levels are used instead. So you can use those soils for every purpose without restriction but you are advised not to use it for very sensible purposes, for example put it on children's playground, when it comes from a contaminated site. If you only fulfill requirements for set 1 it can also be used but restricted, for example for re cultivation of mining areas, road construction, industry areas, parks with dense vegetation cover and rural areas with the exemption that if you have drinking water extraction areas or spring areas, areas with frequent floods and nature conservation areas. Then at set 2 levels you have to take additionally technical precautionary measures if you use the soil. For example if you use it for anti-noise wall you need a mineral soil of more than 0,5 meters and with a very low permeability and you have to re cultivate those anti-noise wall. You can use it for road construction with almost the same requirements and for construction measures on waste disposal sites.

In detail it is a little more complicated but those are the general requirements.

### Questions and discussion

*Tomas Joindot;* First question especially to Michel, how do you manage the possible discrepancy between risk assessment approach regarding cleanup objectives and generic criteria cause it cant be done in another way in reuse of soil. We are thinking of implementing such regulation or guidance to contaminated or treated soil and I fear that if we have generic values saying this is a clean soil people use these values to determine cleanup objectives and therefor the risk assessment approach would not have any sense.

*Michel Beulieu;* I can understand that you fear that people say that this is a generic value for one use so I can pollute the soil up to that value and we had that problem from the beginning and we always explained that we are here in a situation where the site is polluted and we want to do reduce the risk, the best would be to clean to the background, but we go into a inter-

mediate solution, reducing the risk, not saying there is no risk at all. We explain: you have to understand that we are going from the worse to the better, but if you want to apply it reverse; you got clean soil and want to pollute it, it is no right to pollute. We just discard it that way.

*Victor Dries;* We also have a regulation on dealing with excavated soil which is quite like the regulations that have been explained, having certain standards where you can use the soil everywhere, standards where you can use the soil in pits, mining sites etc. One thing we have noticed is that values for soil-reuse have become a trigger to do a more extensive soil remediation, going further than just risk-reduction because the value of the land is impacted by rest concentrations. If you want to sell your land and there is a soil-contamination still there every  $m^3$  of soil that is dug out has to go to a cleaning or a landfill. It does to affect land value quite effectively. If a new promoter is coming there and says: I want to build an apartment block or an office block, and have to excavate 5000  $m^3$  of soil, for him it makes a huge difference whether he can reuse the soil anywhere or send it to soil-cleaning.

*Joop Vegter;* Maybe a suggestion for your problem: I should make a distinction what you are doing on a site during cleanup operation when you move soil around a site and things that leave the site. If things leave the site it is either a waste or a product. In normal life products have to have quality criteria and then you come up with different categories of soil for different uses but the approach is a product, you can even sell it. That is not the case when you do your cleanup operations on the site. This is just displacement of things. If the cleanup yields a product that you can sell on the market like building material it is a value. It may have impact on the cleanup decisions you make.

If I may add another question it seems that Canada says you are not allowed to bring contaminated soil to a landfill before it is treated. In Netherlands it is just the other way around: If the soil is cleanable or there is some treatment for it you are not allowed to landfill it. There are reasons for the differences in philosophy. Obviously, in America, you do not trust the landfills to much. Where in the Netherlands we say we do not want to landfill everything. If it is cleanable you should clean it and only in impossible cases are you allowed to landfill it.

*Victor Dries;* When you say “It is cleanable”, you mean to which level?

*Joop Vegter;* To some level where you can put it on the market.

*Victor Dries;* And then again you are talking about product quality so you get an economic incentive for the soil washers or cleaners to go further because if they can clean to a level where the product can be used where ever they like the product itself becomes attractive. If they can only clean it to a level where it can be used in a limited amount of construction work the value is less because there they have to compete with other slightly contaminated building materials. Again you get an economic incentive and that is nice.

*Michel Beaulieu;* Maybe there is a difference between Flanders, Netherlands and Canada. The clean soil is probably very cheap, we have a lot of it. So the market value is much lower, there are other sources. Then, back to the landfills. In the 80's and 90's it is true our landfill where not as good but now it is double liner and everything. The preoccupation is that there is very difficult to open up a municipal landfill so you do not want to fill it with contaminated soil. So the accept is only with the layering when you need soil and when I say that soil is land-filled after treatment this landfill is special site only for soil.

*Joop Vegter;* But why treat it? You treat it and then throw it away.

*Michel Beaulieu;* That is an argument. Why treat it? It will be put in the landfill if it is beyond the c-value. If you can't go beyond that value it is assumed you can't use it. If it is below c-value there are some uses so there are different levels. But if you are above D you must treat and I told you why we came to that but in a way it is not a bad thing. Before that any soil could be land filled and there was less treatment.

*Joop Vegter;* I know, but obviously there is a category of soil that you treat and then throw it away to a landfill. The obligation to treat would be ok but then it's only worth while if you turn it into a product. If you landfill, why clean it?

*Michel Beaulieu;* If we did not have that legislation we would landfill a lot of things.

*Henri Halen;* I think one answer could be that soils are different. In Quebec you have loamy soils as in Vallon region and I think in situ biological treatment is more easy to realize in the Netherlands, but instead you use biological treatment in treatment plant for instance. That could be one explication.

*Michel Beulieu;* There is something I wanted to ask you. Are you putting anything on land register if you use contaminated soil on roads or parks etc?

*Andreas Bieber;* It has not been foreseen until now.

*Michel Beulieu;* Then you can't reach to this prevention principle. You are putting contamination on clean soil?

*Andreas Bieber;* The point is for example - If you use contaminated soils for the under construction of a road. Usually the road and the under construction are recycled in Germany so it is not likely that this soil is used for other purposes. If you change the road or repair the road it will be recycled.

*Victor Dries;* If we allow slightly contaminated soil to be reused on other soil you can only use it there if that land is already slightly contaminated. That means that that land is already in our register. More soil means only that we have some more data on that piece of land. If anybody would and put some slightly contaminated land on clean land and there is a site investigation on one moment or another it is in the register. For owners that is a reason to follow the legislation strictly because they do not want to enter the register if they are not in there yet.

*Joop Vegter;* In the Netherlands we have the obligation, if you apply polluted soil under road, as part of the construction, there must be some party that is assuring that when the construction has ended it's normal functional life, it should be taken away again, not only the top of the road but also the material under the road. The other problem with the distribution of slightly polluted soil on clean soil. The cities in the Netherlands have made maps of the soil quality of there city. They have zones where you can move soil around, based on the principle of similar quality of the soil you apply and the soil that receives the soil application. It is a form of registration so you can control all these soil-streams. if you want to repair your phonecable and some soil has to go out you don't ask for a waste-license but just for that kind of activity.

*Michel Beaulieu;* So they have a space where the soil will be stored?

*Joop Vegter;* In this area you know the quality of the soil and if you do some excavation you know if the quality is uniform in this area you can take some soil from that street and put it there.

*Tomas Joindot;* We also see if we can use our land use restriction system to deal with the problem. The reality is now we have treatment plants for contaminated soil but when the soil is treated there is no other solution than put it in landfills so we are trying to change the situation. Now we say that those people that have treatments that they can make plants to reuse the soil if it is in a particular piece of land with risk assessment and so on and after that we can use restriction but there is no use of this disposition because people want strict guidance and not to go now in this process. The only thing is: I wonder if we can have a register for every little piece of contaminated or treated soil? We have an experience regarding reuse of municipal waste treatment bottom ash. We have a regulation that say it has to be used on larger scale projects and not on little scale projects on particular ground. After some years of this regulation that this character has been quite forgotten and it is used not only large projects. So we think now that we can have very strict criteria to say this is a clean soil, a product that everybody can use as he wants but no criteria saying this is a product you can use in this or this conditions because it would be difficult to manage.

*Victor Dries;* We also have the system that you can use risk-analyses to prove that you can use soil but what we see is that people do not use that kind of risk assessment studies on small sites because it is too expensive. One exemption is in quarries. We have quite a huge lot of pits, sandpits, clay pits etc. They are relatively clean. We have a legal duty to fill up those pits but the problem is we have to few clean material to fill up those pits so we allow that slightly contaminated soil is used to fill those pits but under the same conditions as you said that it must be relatively clean. The pit must be under good hydro geological conditions. The leachability has to be within certain limits. When you fill the pit with such material the pit is coming in our register to make sure the memory stays there on the long term.

So far as I see it, it is a sector that is very hard to control because it is big money. It is a very sensitive sector, big money and the contractors are not used to think in ppm. If anybody is working on a piece of legislation to reuse soil think about manageability, controllability and traceability. It is extremely hard and no one will like the regulation.

## Sixth thematic discussion – Techniques

### **Electronic delivery of analytical data for US Superfund cleanups**

*Bruce Means, USA*

This presentation will be a little bit different in that it gets to a fairly fine detail that I think is important for all of us but we tend in the US not to think too much about it. In the many years we have been in this business, we certainly have gotten ourselves into a little bit of a fix because we do not think much about the topic of this discussion and I will explain more.

In the superfund process, similar to many programs in your countries, there are a number of steps. Once it is screened and it looks like it will require cleanup, the screening-data is important because you get back to try and understand what kinds of risk the contaminants pose to human health, the kinds of technologies for treatment or containment that would address the contaminants, you will select remedy among many alternatives and there are questions about designing a technology that require contaminant levels kinds of information.

After you are through with your action you want to make sure you reach the cleanup levels. So the analytical data, the information that actually tells you how much contaminant there is is important to many places in our “cleanup-pipeline”. Probably most important at this point is that the information is critical to the people that want to use the property and escape liability for contamination that may have been missed or miss-characterized. This is important information but historically we have not spent a lot of time thinking about how to collect and store it over time even though our sites take a lot of time to get through the process. It may be 10 years from now someone is thinking about how to reuse a cleaned up site.

What I am talking about is the need to capture this in an electronic format that would permit us to manage the large amounts of information that we have collected. We have all used computers and got frustrated by the fact that they change from year to year and you have to buy new ones. For us as the technology changes we have problems to use different kinds of formats. Historically we collected information on paper and stored it in boxes, for example for 20 samples worth of information in superfund we have over a 1000 paper-pages with records that we are required to keep for ever. This is a tremendous burden on us. To look for an electronic way to capture and archive this information is critical for us. After the paper era we entered the spreadsheets with formats that once the manufacturer of that software decides to no longer take care of its customers, they do not have to, and you are stuck with either format your information to a current format or you lose the ability to access this information.

This whole problem is that the current business model is to encourage the purchase products that can be phased out in a planned way is that when you buy the next version. In that way we keep our business very profitable. The appropriate way to manage electronic data is thinking about the value of open data standards. These are standards that are decided in public form and made available to all those that might benefit from using these formats. An open data standard essentially permits that party use these to exchange information. It would not permit for instance Microsoft to set up a way to package and move information that prevents others from accessing or using that same information. In every event every one recognizes these formats for information that are widely used and if you put your information in these formats, they have very good chance of being shared among any people that would like to use or look at that information. XML, essentially, is the finally recommended standard of the www-consortium for electronic data exchange. It permits particular piece of information to be tagged so

that you can find it and access it by software programs that are designed to look for that information.

I know this sounds complicated but is – in our lab-programs, in my particular area, we spend 20 million dollars a year to deliver analytical services to those that are working on superfund sites. The lab-industry in the US have probably over 300 kinds of electronic data deliveries right now, most of the designed for a particular customer, so that if you are a different customer or a downstream user and want to use that information and your programs are no longer operative because technology has moved on you are in a difficult position.

For us to have to work with an industry, like the lab industry, that have 300 different kinds of electronic products has been extremely difficult and expensive. We have spent the last few years developing something called the stage electronic data deliverable. It is a format that essentially sets up a standard way of presenting information about analytical data in electronic format that permits access to this information by a multitude of downstream users. The stage aspect of this permits the customers, depending on what they want to use the information for, to specify how much information about a particular analyses is actually recorded and presented in this format.

If you are only interested in the results you get simple results only in what is called the stage 1. Stage 2 provides quality control information on analytical method used or the instrument itself. That is provided in stage 2. You don't need to look at that information if you don't want it. Stage 3 permits you to recalculate the reported results for those people doing quality control you can do that in electronic matter. Stage 4 we have not developed yet but this will admit us to capture raw data from certain instruments.

We deliver in XML so it is not proprietary. It makes it very easy to put into various databases and then perhaps upload it in some visualization program that allow you to generate maps with the ability to go back and look for the quality information associated with specific points on the map. I guess downstream use options increased dramatically because we are not locked into the appointed time when the data was collected and stored in some electronic file rather than having to pay your contractor a second time to convert old files into new files and then able to take advantage of the new programs. The goal here is simply to make sure that the information you deliver is captured in a format that has the ability to be used over time by multiple commercial vendors, that are supporting us in the cleanup business. It looks like we are saving at least 30-50 % of where we were before. Not shown here is that the people associated with data quality may get a limited amount of time to look at it and currently they may do things as simple as look all the pages are there in a stack of 1000 pages for example. Or all sections of information are there. But there are 1000's of checks that typically go into data quality reviews that with this new format will be done within a couple of minutes time.

Instead of doing these checks about pages and so we have all of the charts and format the correct way. All that is done in the first couple of minutes and they can actually go back for their flags would be automatically checked. You can have the data quality reviewer go back and try to understand what the data are telling you. Did the laboratory do something wrong in the analyzes – believe me if you had a laboratory do the wrong thing and you have gone public with the findings and you have scared half the city to death, you want to avoid that kind of mistake and this can help you do that. Alternatively you might find that the laboratories have been cheating one way or the other. That does not happen often. It only takes once

or twice to blow the credibility of your agency and certainly all your previous cleanup decisions and that kind of things.

Core of engineers and Department of defence working with us on this for years. I mentioned our contracts laboratory program is putting this in place now and some of our other contracts will have this in fall and winter so the department of energy is working with us. Navy and states and private industries are very interested as well. There is a lot of laboratory industry management system groups that I see this as a way to escape the private software vendor and a way to expand our ability to develop innovative software tools that visualize what is going on at our sites and to review the information that is supporting our decision.

Questions and discussion

*Claudia Olazábal*; Would the this be used by the other programs? Or do the other programs have an equivalent? If I have understood correctly superfund is a much more centralized program and the other programs are much more left to the states. I wanted to see if this kind of data sharing works for much more centralized data systems.

*Bruce Means*; It would work if people would use the same format and there is flexibility in how the format can be expanded for particular programs use. We have set this up as the first of remediation land programs as to requiring it in our contracts. We have tried the route where you discuss and try to agree across the programs about how we should present information and that has not worked very well so rather than try to fight that battle that has gone on for many years, we decided to – there is such a flexibility with this – to implement in our contracts. The contractors then are required to deliver the information in the formats that will at least be consistent within our program.

*Victor Dries*; I would like to add to that, that also in Flanders we have implemented an obligatory reporting format for all consultants because all reports have to be sent to us and it has been a great help. In the beginning they found it a pain in the as because they had to put all the analytical data in it an stuff like that. Now they have demanded from the lab that the lab use part of our reporting system so now the lab use part of our reporting system and all is just done in an electronic way apart from the maps. Great because you have only one reporting scheme and one reporting standard and it makes life much easier and today we need much less personnel to deal with administrative part of having reports in our system. You really need something like this if you are dealing with a huge lot of reports.

*Bruce Means*; What is yours based on? Is it an XML-system?

*Victor Dries*; I don't know, I'm afraid.

*Henry Halen*; Yes it is.

*Bruce Means*; We have multinational consistency here. Blind but effective non the less. We will all be sharing our information in a few years.

*Sheena Engineer*; Does it also include the interpretive information or is it pure data?

*Bruce Means*; The data elements in our program will have a large list of elements that are required by the contract and there will be quality review checks as well so it is not just the numbers and the units. We will ask for it to be delivered within a certain amount of time

because you are worried about whether the samples are going to keep after a period of time. It talks about whether the numbers fall within specified limits of detection. If something does not it will flag that and you can go back and ask what happened here and pursue those questions.

*Sheena Engineer;* So in your process you try to do the analytical part and then the interpretation, risk assessment will become the next step and would not be included in this data format.

*Bruce Means;* There will be a very extensive and probably 1000's of data will be checked automatically and then you have people looking at the flags and data-validation. It may, depending on the use, rely heavily on the automated reviews or it may take more time because it is more enforcement sensitive and we might anticipate court battles going into much greater detail.

*Tomas Joindot;* So there is a lab working for the EPA and the lab give the data to the EPA but they work for you?

*Bruce Means;* Usually, depending on the particular part of our program, our site managers will order analyses of the soil and we have several different kinds of contracts that access contractors to deliver that information. There are some EPA-labs that do the work themselves but they are generally very small and they generally can not handle large numbers of samples.

*Tomas Joindot;* You don't have the problem that we have in some cases when we try to implement databases that you have the responsible doing the work, the lab who has a contract with the responsible of this site and the administration and when you ask the lab to deliver data in the information way to the administration there is a question on liability of the lab towards the responsible, towards the administration?

*Bruce Means;* I'm not sure I understand. The responsible party is ...

*Tomas Joindot;* I meant the polluter, the one that has liability to clean up the site.

*Bruce Means;* Our site manager will take small amount of duplicate samples. We will provide oversight. When the responsible party is doing the clean up they will by their own contract support but we will send our contractors in to take samples to verify that their work is – you know spot check.

*Tomas Joindot;* So in this case your database will collect the data from your contractors and not from those of the responsible party?

*Bruce Means;* Actually not from the responsible parties.

### **Innovation on Remediation technologies – from research to markets (a presentation on EURODEMO)**

*Dietmar Müller, Austria*

An information of recently started European projects, it is called EuroDemo. It is a coordination action funded by the European commission for demonstration for efficient soil and groundwater remediation technologies. The idea behind EuroDemo: In preparing the project or the idea of the project we had a lot of effort to develop innovative remediation technologies

during the last 10 years but looking to the countries we saw that still prevailing for remediation is dig and dump and containments or rather old technologies. The second is during the last 10 year we can all observe that the budget for soil and groundwater remediation are rather decreasing. It creates a growing need of cost efficient soil and groundwater-remediation technologies.

The development of new technologies starting from lab scale to pilot scale to full scale demonstration and then it should be ready to market but what is difficult is that you can find a lot of literature on pilot scale and lab scale but the technology do not enter the market. There are several deficits. Lack of information is one of the big issues and also there is a little acceptance and confidence in new technologies. We need more information on successful field scale implementation. The focus of EuroDemo is to skip this gap to demonstration projects and bring new technologies more to the market and to raise market acceptance. The way we want to do it is coordination action so we will not run demonstration projects by our selves but we will try to give you comprehensive information of demonstration projects in Europe, to gather the information of what has been done during the last 10 years and by giving this information coming more from some level of “Trust me, I have a new technology that solves your problems” to “Show me that your technology is ready to solve my problem.”

We are currently in the stage to look for the individual information on demonstration projects and on the funding systems and to provide them through databases so there will be 2 databases with public access, one for demonstration projects and one for funding opportunities. That is what has been going on so far and EuroDemo is aiming at giving some kind of recommendation for prioritization plan for technology demonstration plans in the future. The databases are linked with a portal and both databases are life since summer this year. Life means for the funding database we can take in any information on from regional to European funding programs which address soil and groundwater management projects. The demonstration database was built by inputs from different sources. We also referred a lot to the US for the lechate and the chlorine and at the moment we are looking at the project entries.

And the database is not live for search. We will bring it on air for searching when we reach a critical mass of demonstrations. We are also looking for to get further inputs and suggestions how to improve it. The database will contain demonstrations as well as pilots. The only thing we exclude is containment and dig and dump and there is a focus towards in situ technologies. It is a rather wide and open database just some compulsory information which have to be given so it is also to be aware that we do not bring all the information to the database but everyone is invited so I would like to ask you to distribute the information within your countries if there has been demonstration projects during the last year, please bring it to the database. You can get access and bring all your information.

Examples of the demonstration database. So you get information of who was in the project, finance, technologies, lessons learned and project outputs. Then there is a specific set of how we subdivide in different remediation types. They have different field for if you report on a demonstration or if you search for demonstrations and the same exist if you go for the contaminants. We are looking for improvement so feedback is highly appreciated so we need some more features, maybe on how data have been approved so it is not only a technology vendor who should only introduce his view on technology but there should be some additional information; there was an approval by an authority etc.

So far we have tentative 160 projects which are likely to be introduced by autumn this year so if we got about 100 we will go on air. A chart shows you a brief overview for 4 countries and the distribution of demonstration for different fields from bioremediation up to chemical oxidation or stabilization. Besides the databases we also have to produce some general guidance documents. They will aim at making documentation of demonstration projects in future better comparable and also give guidance how to assess the technical liability of new technologies and also how to evaluate environmental efficiency which will be a big argument in future time. We will try to briefly go into the last one for the first.

Usually in the selection for the remediation projects there are some like you have money in their costs and you think about technical feasibility and then all of us start arguing about other further considerations. We want sustainable remediation, take care about the environmental effects. Still this arguments are at the current stage to our thinking, we do not have a common thinking on so what we need is to create some framework for environmental efficiency criteria. This framework could also support the competitiveness of new technologies, just giving a clear idea of what are the advantages of using a new technology by using common principles by providing analytical tools and protocols. So eco-efficiency it is to compare what is the economy behind, what is the environmental impacts. For eco-efficiency we need a kind of system description. At one hand to think about all the inputs like energy, materials resources and on the other hand to look what are the outputs, the emissions and the waste.

So how to measure it? We hope to deliver first report by the end of the year just to think about the inputs and outputs (greenhouse gas emissions, waste and so on). The difficult thing is to have a selection of the parameters which are the right ones, which are the flows and pressures for the environment which are most relevant and there will be many different relations possible and we will try to identify some common we would refer to like a pollutant mass destruction and also we need some indicators where we can easy and effectively control and aggregate for different levels so for the project level as well as for a country or even within Europe.

An example of the thinking or what we need for indicators on environmental impacts. Well the specific energy consumption for a soil vapor extraction, for in situ technology and it is obvious that the longer the activity runs you need more energy to decontaminate the same amount of contaminant and the question that we will have to learn in the future more is where is the break even. When is it not any longer efficient to waste a lot of energy to get out the last kg of a contaminant. For soil vapor extraction for example in Austria we are in the beginning, we have used this very simplified remediation target by a concentration whereas nowadays we use as an indicator the specific energy consumption and we have some kind of benchmarks for where we start to think about, is it really sustainable to go on with remediation? Now we can stop the remediations even when we fail the initial remediation target but we learned on site that we do not have a further spreading therefore we say it is no use to come down to a very low number which does not effect the environment. This was an example what the guidance documents will go for.

Results: I already mentioned a prioritization plan for technology demonstration. This should be something to support future demonstrations and funding within European programs. We have also been involved to create some proposal for European technology verification system. It is something coming also from the US. They had similar problems. They had a lot of discussion on new technologies and if you can have confidence in how to work out that you sell a solution, not just a technology or kit. They established this technology verification programs in a kind of where you start a demonstration and have an independent 3:d party

verification on it and you have really strong quality assurance procedure along the demonstration itself and by this making it more transparent to help the innovation commercial process.

Strong quality assurance system, transparency, the test plans are published and the results on a voluntary basis for the vendors or demonstrators to take part in such a system. By such a system you could enhance credibility and you provide visibility easy access to information. The European commission is just preparing this action so there have been different activities, discussing with colleagues from northern America. There is at the moment 3 or 2 projects promote and test net. 2 projects really aiming at technology verification and by, lets say, autumn next year there should be a first preparatory action within the program for putting up technology verification program in Europe.

There are large markets that are still growing whereas for soil and groundwater remediation we have to face the situation that it is smaller market and it was also shrinking during the last years. You may need different technology verification systems for the different technology sectors because if you really want to speed up that new technologies get into the field you cannot introduce a very costly and lengthy process and therefore, especially for shrinking markets, you need to have simple systems. So EuroDemo – please remember the databases and try to bring in new inputs and reports on demonstration projects. Hopefully next year or 2 years from now I can tell more on the guidance documents and in the prioritization plan and the technology verification system.

#### Questions and discussion

*Sheena Engineer;* Not really a question, more of a problem we find in the UK. I don't know the EuroDemo can help us. Quite often people look at new technologies but when we look at the documentation of how successful they have been some of the very early information about the characterization etc. is not as robust as we would hope. It is one of the blockages of some of these technologies moving forward. Is there an opportunity to perhaps concentrate on making sure there is a good background to the site and then move on to the technology? We would find that very useful in terms of saying: - Is there something that might be an option or not?

*Dietmar Müller;* Yes I'm with you. We can't handle it for demonstrations that have already been done. The only ways to try and put together the information by the database is then to look also to have a reporting by the different parties involved, not only the technology vendor who of course will say the technology works out quite well but you should have other sectors by the authority or the site owner to give his site. That is all we can do for past demonstrations. For future demonstrations hopefully the guidance documents should create a common basis to make it better comparable and to have more quality assurance that they have done a good characterization and also within running the demonstration - most of them should be for the innovate. Under discussion is always the in situ technologies and there you meet the problem of heterogeneity of the underground. This is just something you can only address when you refer to common protocols and then again you have both sides. You have the vendor and you have the authority on reporting and if both sides agree it was well done then you can maybe create confidence in new technology. Also to clearly indicate the limitations of technologies – that is the other one. To give the operating window. It may work at this conditions.

*Victor Dries;* In fact I agree to quite large extent in what you say. We are also in EuroDemo so we like the project but I think what we also need is knowledge and information on what has not worked and the problem is today that often you see that people will accept that a certain technology is approved technology while for quite a lot of contaminations it has proven that it does not work like for example pump and treat. Everybody will accept a pump and treat even though in a huge lot of cases it has proven to be just a containment concept, not a remediation concept. While almost nobody put any question on whether it is proven or not. That kind of information is lacking and it is a little bit of pain that with EuroDemo we will not get there it is not in the focus. You really need something on an European scale, not only what is successful but as well what does not work, what are the limitations of existing technology?

*Dietmar Müller;* We had also a lot of discussion on this. It is not only to have a documentation on success stories. It would be equally important to look at the failures. But who is willing to report on his failure? Even when you think about the verification system. That is a limitation on the verification system. In a verification system you volunteer for it and hardly any vendor will volunteer for reporting on failures.

*Victor Dries;* Yes, but if you take pump and treat, for instance, there is a lot of publications that have been written on the boundary conditions of pump and treat. We know that but the guys dealing with the project every day, the guys of local authorities, they do not have the slightest idea about that so there is a huge need for information on that part too. You can get it out of the books easily but you just have to spread the news.

*Dietmar Müller;* Yes, but again I think it is hardly possible by the documentation of projects. What we would like to do is to have some technical guidance documents on different technologies, just indicating where are the limitations for a certain technology to make this information transparent, not for single projects but bringing information together in guidance documents.

*Harald Kasamas;* I just want to add that this system is pilot study that has already each year since 20 years demonstration and pilot remediation technologies evaluated. I just want to point out that this focus on remediation technology and industry was, particularly in the beginning of 90s, when we had a lot of soil washing and all these things and to my knowledge or experience the solutions moved away for the past years from the technology issues more to management issues. I think it does not mean that this is not a valuable project but two things: we have a lot of information available and that we are going more to management solutions and soft technologies and a last comment on environmental side effects: The EuroDemo project is going to evaluate the environmental merits of certain technologies. I am sure that this is in the scope of EuroDemo. Maybe this is depending on the priority of the person that has the problem to give certain factors.

*Dietmar Müller;* We will not categorize technologies as efficient or not but we want to build up a system where we can commonly refer to how to do this assessment. It is up to the specific project to think about it but just to have the same indicators behind to assess and to have some more comparable data for the different technologies. Which are the reliable indicators you can put forward that you can compare. We won't do it to say this is good or not, it depends on the circumstances. What we need is a common framework to refer to. Something similar to giving the weight of money.

*Victor Dries*; I would also like to react a little bit on what you said that the shift is changing from remediation technologies to management concepts. I'm fully with you if we are talking about research. There is a whole lot of very complex, very big problems that we will not solve today with remediation technology. On the other hand I fully agree with Dietmar that we need that kind of demonstration projects because there is a whole lot of knowledge present, especially in the states, where what we call new technology has been demonstrated on 50, 100 sites and we do not apply them yet in Europe. And for quite a lot of relatively small sites they are an affordable solution in a relatively short term and if the problem is solved you do not have to manage the site in the long run. There is really a need to show to the public and local authorities, decision makers that there may be solutions available. I think both of them are valuable.

*Harald Kasamas*; I agree. This was the aim of the system on pilot study for 20 years to get all this innovative technology to a practical application.

## Conclusions

*Mr Trouvé, France*

First I would like to thank you for coming to this meeting in Paris and also thank Sweden for the contribution to the organization as secretary of the group. I hope you had interesting discussions during these 2 days and a pleasant stay in Paris. I do not know if it is the same for you, probably, but in France political actors of the sector, citizens, but also people in the administration often wants us to highlight the similarities and differences between the French approach and what is done in other countries.

Indeed I think it is essential to know how contaminated sites are managed in other countries. First it is an element of justification of what we do. Even if the decisions we take in policy matters can not be explicitly linked with what is done in other countries it is sure that having people from my services having a bath, like today, in the wide diversity of other practices will influence us to take decisions with awareness of what works and also what could not work. In this perspective it is important to have such informal groups. Not only for you to present what works in your country but also to share experiences of what did not work or questioning.

It is essential for a modern administration to do what is called benchmarking and it is very fun to see that benchmarking is now also a French word. I would like to review two different things you dealt with in this meeting. Thomas said me a few words about the roundtable you had at the beginning of the meeting. I have the feeling that if we have very different way to present the way we act by in fact, finally, on a practical level, we do very, very close things. Of course there are differences between all countries with liable, national values or case by case approach. This may vary. But risk assessment, having different actions according to the use of the site seems to be quite same concepts. I wonder if there is not simply a financial factor which, even if it cannot be measured, drives our actions.

The second item is about brown fields. It is certainly a subject that have been considered a couple of years ago as a subject of the past but is likely to come in front of the scene, at least in France. Indeed we experience that mainly in the 90's, a policy of systematic brown field regeneration with huge amounts of money sometimes spent to regenerate former industry sectors. I am rather doubting, in fact, whether this type of policies clean up the sites and projects will come has real effects if it is really efficient from the view of contaminated sites managements. However, when my minister speaks about contaminated sites, she says "There is something to do". Because there is a real political awareness.

New projects creating new activities and so on and either it could be realized or they would go to another place just because the place proposed is a brown field. So there is a huge stake in having methodologies to enable cost effective remediation in order to make new projects possible for contaminated sites. It is important for three reasons. First is social economical matters. It is not only the question of enabling some regions to redevelop it is also a question of enabling big cities of solving the problems of housing they could have. The second reason is sustainable development. Farmers for example are arguing about the fact that more and more green land is used for real estate projects. So we have to ensure old used land is used before. It is also important to promote densification of urban areas and avoid strain. The third is public health. All methodologies must prevent risk for health for people who live on a former or around a contaminated site.

Thomas maybe told you we are writing on a methodology in order that they are better used. We also have to work in order that they are effective to help solve part of the problem. This involves good communication towards a series of actors. We are not really involved for the moment in our contaminated sites policy, mayors, real estate professionals for example. Never the less and as you surely understood during the debates, the position we have in France is not towards a systematical remediation planning but considering the new project, the new use of a site, as a trigger of cleanup. Of course this does not apply to new pollution. It means that the main thing for us is having the sites registered, monitored and managed. A site is not contaminated but contaminating until there is necessity to change the use. So to conclude I want to thank you for your presence here in Paris.

The meeting is officially closed.

## List of participants

	<b>Country</b>	<b>Name</b>
1	Austria	Harald KASAMAS
2	Austria	Dietmar MÜLLER
3	Belgium	Victor DRIES
4	Belgium	Henri HALEN
5	Canada	Michel BEAULIEU
6	Canada	Adrien PILON
7	EU	Claudia OLAZABAL
8	EEA	Anna-Rita GENTILE
9	Finland	Anna-Maija PAJUKALIO
10	France	Maton DANIEL
11	France	Dominique GILBERT
12	France	Thomas JOINDOT
13	France	Pierre MENGER
14	France	Laurent OLIVE
15	Germany	Andreas BIEBER
16	Germany	Volker FRANZIUS
17	Ireland	Brendan O'NEILL
18	Italy	Francisca QUERCIA
19	Netherlands	Margot MEIJER
20	Netherlands	Sietske VEENMAN
21	Netherlands	Joop VEGTER
22	Sweden	Kjell FÄRNKVIST
23	Sweden	Håkan ROSQVIST
24	Sweden	Yvonne ÖSTERLUND
25	Switzerland	Rolf KETTLER
26	UK	Sheena ENGINEER
27	USA	Bruce MEANS