



NICOLE NEWS

Newsletter of the Network for Industrially Contaminated Land in Europe,
a Concerted Action of the EC Environment and Climate Research and Development Programme

Volume 2 Number 1 August 1997

"Containment" at Compiègne

Jean-Michel Lebeault reports on the meeting of NICOLE Working Group 3

"We were very pleased to host the meeting of Working Group 3, Control Methods (Remediation and Containment), at the Department of Chemical Engineering, Université de Technologie de Compiègne on 17 and 18 April 1997," says Professor Lebeault. The meeting was the first workshop for Working Group 3. Martin Bell started the meeting with a review of the first year of NICOLE and the results of the 2 previous workshops. He also discussed the relationship between NICOLE and CARACAS (see article on page 7). Martin's introduction was followed by three presentations to explain the state-of-the-art in soil processing, containment methods and *in situ* remediation methods.

- Innovative Remediation Technologies: A problem holder's perspective by Ger Beuming from Shell (NL)
- Containment Approaches: a consulting engineer's perspective by Stefan Jeffries from Golder Associates (UK)
- Recent Progress and Limits in Bioremediation Research by Paul Lecomte from CNRSSP (F)

After the 3 presentations the meeting divided into 4 parallel groups to identify research needs. A wide variety of suggestions were considered and delegates asked to make a selection from these of priority subjects.

The selection was drawn up and, following the usual NICOLE workshop procedure, all the participants voted on the topics to choose those that should be given priority. The outcome of the voting was that the following topics were deemed to be most important for further development by NICOLE.

- Comparison of remediation technologies
- Natural attenuation of source contaminants from the perspective of historical sites
- Beneficial applications for contaminated soils
- Demonstration sites for novel clean-up technologies
- Phytoremediation
- On-line monitoring

These project areas, though drawn up from the standpoint of remediation and containment, also reflected dominant themes from previous meetings, in particular, natural attenuation.

Group leaders have agreed to lead the activities for these themes, this is discussed in more detail on page 6, in the context of the latest developments in the NICOLE network overall.

NICOLE members can obtain a summary report of the workshop from Professor Lebeault. His contact details are on page 7.

Half time at NICOLE

Paul Bardos

NICOLE is 18 months into its 3 year contract. NICOLE now has more than 120 members from 17 countries and has met its contract and all its agreed milestones. Each of the 4 working groups has completed a workshop. From these workshops a series of research proposals is being developed. Common themes through all of the research ideas generated by the Working Groups include the issue of bioavailability and the use of natural processes for achieving contaminated land remediation.

The commonality of suggestions has led to the development of a revised structure for NICOLE focusing on topics and specific proposals rather than general research themes. This mid-term review has also combined the functions of the Steering Group with the Scientific Advisory Group and placed a greater emphasis on the exploitation of members' existing knowledge for the benefit of all.

Inside includes

Revised structure of NICOLE (pages 6 and 7);
Building materials (page 8);
RACE (page 9);
Research in Germany (page 11).

NICOLE/NOBIS conference

Johan van Veen

NICOLE is organising a conference on *in situ* bioremediation together with the Dutch Research Programme on In situ Bioremediation (NOBIS). The conference will bring together representatives from NICOLE, NOBIS, CARACAS, VEGAS and the North American Remediation Technologies Development Forum (RTDF).

The conference will be held at the Golden Tulip Barbizon Palace Hotel in Amsterdam, The Netherlands, on 10 October 1997, after an official opening on the evening of Thursday, 9 October, by the Director-General for Economic Structure of the Dutch Ministry of Economic Affairs.

NOBIS is the research programme supported by the Dutch Government and industry. It was reviewed by Ingrid Halbersma in *NICOLE News* (V1 N1 p9). VEGAS is a German research initiative examining *in situ* treatment at large scales and has also been reviewed in *NICOLE News* (V1 N2 pp4-5).

The Remediation Technologies Development Forum is a US Public/Private sector consortium providing field scale evaluation of remedial technologies (*NICOLE News* V1 N2 p10).

The provisional programme for the conference is as follows:

- plenary opening session with introductions on NICOLE, NOBIS and RTDF
- keynote session by USA representative of the RTDF
- 4 parallel sessions on
 - natural attenuation/extensive concepts
 - intensive concepts
 - monitoring
 - decision support tools

Contact details are given in the Calendar of events table opposite.

Editor moves

Paul Bardos, the editor of *NICOLE News*, has moved to R³ Environmental Technology Limited. His contact details for *NICOLE News* are now as follows:

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Jacqui Marsh is continuing as Deputy Editor. Her contact details are now:

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Calendar of events	Date
Brussels	11/12 Sept 1997
Topic Development Workshop Marjan Euser Fax: +31 55 5493 410	
Lisbon	30 Sept to 3 Oct 1997
INETI and DGXII - Workshop on Recycling Technologies, Treatment of Waste, Remediation of Contaminated Sites and Life Cycle Assessment Francisco Rodrigues Fax: +351 1 716 65 68	
Amsterdam	9/10 Oct 1997
2 nd NICOLE conference (organised with NOBIS) Johan van Veen Fax: +31 55 5493 410	
Preliminary announcement of NICOLE/CARACAS meeting	Early 1998
Details to be provided later this year	

WWW sites

NICOLE News can be found on the following web sites

<http://clu-in.com>

<http://groupius.ntu.ac.uk/cbe/nicol.htm>

Innovation Relay Centre Help Forward

<http://www.irc.forth.gr> will be hosting information on

both NICOLE and CARACAS. Information about

CARACAS can also be accessed via CLU-IN

(<http://www.clu-in.com/intup.htm#International>)

as well as the European Commission CORDIS site:

<http://www.cordis.lu>

ISO Draft Standard for Site Investigation

- *views of NICOLE Industry
Subgroup*

*described by Lida Schelwald-van der
Kley for Port of Rotterdam*

The International Standards Organisation (ISO) has for some time been working on a standard for site investigation, and a draft document (ISO 10381-5) was recently passed to the NICOLE Industry Subgroup for their views. Four members made detailed comments on the 60 page document: ICI, Shell International, BP International and Dow Benelux, which were then forwarded to the draft's authors.

All recognised the value of the ISO initiative and the work it summarised. However members were able to offer some constructive suggestions. Their comments were made in five general areas:

- general: conceptual model, sources, pathways, targets;
- objectives of site investigations
- sampling strategy
- preliminary site investigation
- main site investigation.

An overarching concern was that the ISO standard considers site investigation in isolation, and not in the context of risk assessment and corrective action. The approach is therefore driven by the aim of identifying the location and nature of contamination. NICOLE members regarded this as too limited and suggested that from the very beginning site investigation should be driven by a conceptual model of risk assessment considerations. From this perspective the extent of investigation, it was felt, should be limited to that which is practical to support the risk assessment, using an iterative approach. This tiered approach is intended to avoid wasting resources on localising contamination where no risk is evident. Hence at each tier, more in depth investigation is only carried out where a risk based conceptual model indicates that more information is necessary. ISO suggest that for preliminary sampling, the number of samples should be proportional to the area of the site. This is considered both wrong in principal and of limited usefulness. All sampling should be performed with a risk based approach, which also increases the likelihood of localising contamination compared with a simple "scatter gun" approach. The sampling strategy itself was felt to lack detail, in terms of:

- incorporating prior knowledge
- using reconnaissance techniques (e.g. semi-quantitative tests, geophysical assessments)
- taking into account risk considerations.

Members also commented that the requirement to consider short and long term monitoring and maintenance could not be considered in isolation from the risk based approach already mentioned, and the corrective actions dictated from such an approach. In

general ISO has been encouraged to take a more global and integrated outlook on site investigation, considering the full examination and remediation process from identification through risk assessment, corrective action (if deemed necessary) and aftercare.

If you would like to obtain a copy of the ISO draft or pass your own comments forward to ISO, this can be done through the NICOLE Secretariat.

Marjan Euser, TNO, The Netherlands Fax: +31 55 5493 410 e-mail: m.euser@mep.tno.nl
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ISO News flash

At the 6th meeting of ISO/TC on 22 April it was agreed to take forward the proposed ISO standard on 'Environmental Assessment of Sites and Entities' (EASE), for further development. This is work item 14015 and it is under the aegis of Work Group 4. The document first working draft is expected to be ready by September 1997 with a Committee draft for comment by September 1998. The scope is broad, but intrusive investigations are outside its remit. Dr Alan Knight of Canada is the secretary of TC207/WG4.

NICOLE's statement of research needs to EU

by Martin Bell, NICOLE Chairman

This is a summary of the key points made in the NICOLE view of research needs which is currently under preparation.

There are 6 broad areas where research and development should be focused and all of these broad areas are aimed at supporting and filling the gaps for advancing and applying risk based site management for contaminated land.

1 A framework for risk based land management

We need:

- development of a methodological framework which supports and provides a rigorous structure for risk based site management, which accommodates national requirements and which encourages the use of scientific methods for site characterisation, hazard analysis, risk assessment, control, remediation, and monitoring
- a better understanding of the costs and effectiveness of 'extensive' remediation approaches
- improved methods of risk communication and any necessary feedback to the site investigation process.

2 Improved methods for site characterisation

To improve the quality and cost effectiveness of the site characterisation process, we need:

- robust and rapid low cost techniques for on site screening and investigations
- improved methods for estimating and interpreting the accuracy and likely variability of the sampling and analytical process, leading to changes in sampling and analysis strategy if appropriate.

3 Bioavailability of contaminants in soil and groundwater

We need:

- to understand the relationship between bioavailability, speciation, chemical structure, and plant/organism uptake.
- to be able to express bioavailability in terms of existing soil quality and experimental methods.
- practical procedures for determining the bioavailability of compounds as they exist in the environment including for example laboratory validated *in vitro* test protocols.
- a technical basis to support the development and regulatory acceptance of novel analytical methods for quantifying the bioavailable fraction.
- further development of biosensors to enable predication of hazard levels.

4 Natural Attenuation

Further work is needed to:

- assess the soil parameters and hydrogeological properties that will support natural attenuation
- quantify the *in situ* potential of a soil to naturally attenuate contaminants with acceptable risk
- compare decision support systems.

5 Fate and Transport

The following are seen as necessary:

- more information to enable consistent application of factors of safety and interpretation of toxicological data
- updated ecological dose-response data which will overcome the difficulty of linking and extrapolating data from a wide variety of tests using relatively untested assumptions and safety factors
- better understanding of the behaviour of contaminants and improved methods of modelling and measuring the parameters which describe this behaviour.

6 Remediation

- develop a better understanding of the long term behaviour of residual contamination, leading to better predictive tests for long term behaviour, and possibly a review of the treatment of residuals
- increased development in the area of phyto- and/or rhizoremediation techniques
- consider the need for development of demonstration sites for testing of novel remediation techniques.

Network on 'Harmonization of Leaching/Extraction Tests'

The aims of the network, which is funded by the EU's Standards, Measurement & Testing programme, are:

- to harmonize the approaches in existing and future leaching tests
- to exchange information between different fields
- to facilitate the development of a generic approach to leaching
- to form a network of experts in the field of waste treatment and disposal, soil clean-up, soil use, and materials in construction

EIC

by John Waters and Adrian Wilkes

The Environmental Industries Commission (EIC) is the leading association for the UK's environmental technology and services industry. EIC represents over 190 manufacturers, consultants, suppliers, academics, research institutes, law and insurance firms.

EIC works (strategically and specifically) to ensure a prosperous home market for its members by:

- influencing government policy (through lobbying and Public Relations)
- facilitating the exchange of ideas and experience
- providing policy information
- educating mainstream industry about the commercial and environmental benefits of environmental technologies and services
- supporting export initiatives.

The EIC has 10 working groups covering different sectors of the environmental technology industry. The Contaminated Land Working group has over 50 members representing environmental consultants, remediation contractors, academics, insurers, solicitors, chemical laboratories and waste disposal companies. *The Environmental Industries Commission Guide to the UK Environmental Industry* was produced by EIC in 1996.

The Group networks with the Association of Geotechnical and Geoenvironmental Specialists, Soil and Groundwater Technology Association (SAGTA) and the United Kingdom Environmental Law Association (UKELA), through its members and welcomes the recent amalgamation of the Association of Environmental Consultancies into EIC which will expand membership.

The Group will link into Brussels through the recently formed European Committee of Environmental Technology Suppliers Associations. The role of its Working Group on contaminated land will be to lobby on future EC environmental legislation and influence the Commission's R & D programmes and export support plans.

For further information contact:

Adrian Wilkes, EIC Fax: +44 171 328 5910

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- to formulate recommendations for the implementation of more generally applicable approaches in the evaluation of leaching results in different fields and define the research items needed to resolve specific issues.

For further information about the Network on 'Harmonization of Leaching/Extraction Tests' please contact:

Dr H A van der Sloot (Co-ordinator) ECN - The Netherlands Tel: +31 224 564249 Fax: +31 224 563163
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NICOLE - Moving ahead

by Dale Laidler, NICOLE Co-ordinator

NICOLE has reached the half-way point in its 3 year life as a Concerted Action within the Environment and Climate RTD Programme. At the end of May the cycle of 4 workshops addressing site assessment, risk assessment, control methods and measurement and monitoring was completed. The 4 workshops selected a total of 23 topics that the participants identified as requiring further action by members of the NICOLE community. Individual topics are being developed further by volunteers from NICOLE. Table 1 lists these topics and the contact details of those who have taken the lead in their development. All of the topics listed are 'open' for any NICOLE member to join, providing they are willing to contribute some resources towards the proposed activity. If you would like to lead one of the topics where a leader has yet to be arranged, please contact me. (Fax: +44 1928 581 864; e-mail: dale_laidler@ici.com)

Theme	Topic	Topic Leader	Fax number
Bioavailability	1 Development of more relevant toxicological & ecotoxicological data	M J Jauzein (IRH)	+33 3 83 50 36 99
	2 Data on bioavailability & relationship with time	B J Alloway (Univ. of Reading)	+44 118 931 6666
	3 Review on biosensors	<i>To be arranged</i>	
	4 A framework on bioavailability	<i>To be arranged</i>	
Fate and Transport	1 Data collection concerning exposure assessment	M Jauzein (IRH)	+33 3 83 50 36 99
	2 Sensitivity analysis for pathways & contaminants	J Troiano (Ford)	+49 221 901 8743
	3 Fundamental study of fate & transport processes	R Hetterschijt (TNO)	+31 15 256 4800
	4 Leaching tests	P Walker (BG Plc)	+44 1256 308 679
Low-Cost, Rapid, On-Site Measurements	1 A "good survey practice" network	J Okx (Tauf Milieu)	+31 570 699 666
	2 Rapid low-cost techniques for preliminary characterisation	G Shelton (Shell)	+44 151 373 5845
	3 Cheaper alternatives to monitoring wells & the development of monitoring procedures	<i>To be arranged</i>	
	4 Development of on-site field instruments	<i>To be arranged</i>	
Natural Attenuation	1 Validation of natural attenuation models	T Walden (BP)	+32 2 774 32 93
	2 Acceptable protocols for natural attenuation	A Sinke (TNO)	+31 55 5493 252
	3 Natural attenuation of source contaminants from the perspective of historical sites	S Smith (Welsh Development Agency)	+44 1443 845 588
Remediation	1 Beneficial applications for contaminated soils	D Edwards (VHE)	+44 1226 717080
	2 Demonstration sites for novel clean-up technologies	M Jauzein (IRH)	+33 3 83 50 36 99
	3 Phytoremediation	S Andersen (Jordforsk)	+47 64 4 081010
	4 Treatment of residuals	P Bardos	+44 1920 485607
	5 Monitoring of <i>in situ</i> remediation	<i>To be arranged</i>	
Risk Management	1 Comparison of remediation technologies	L Schelwald -van der Kley (Port of Rotterdam)	+31 180 315 654
	2 Uncertainties in characterisation	<i>To be arranged</i>	
	3 Risk communication	T Mitchell (Shell)	+44 151 373 5845

Table 1. Consolidated summary of topics and topic leaders.

Brighton Workshop

The most recent Working Group meeting was that of WG4 (Measurement and Monitoring), which took place in Brighton on 28-30 May. The meeting report for this workshop is still in preparation, but will be available soon from the Working Group leader. However, the main conclusions on research needs reached at this workshop have already been included in Table 1 above. If you have not already received a copy of the summary reports of a workshop, these are available from the Working Group leaders whose contact details are given at the end of this article.

Brussels on 11 and 12 September to which all members of NICOLE are invited. The workshop will present preliminary proposals for many of the 23 topics which, for the purposes of managing the workshop, have been grouped within the 6 themes indicated in Table 1. The aim of the workshop will be to build and consolidate project teams with the commitment to progress specific projects within the 6 themes. These projects may arise from some of the existing 23 topics, or perhaps some new projects may

Next meeting

NICOLE's next meeting will be a Topic Development Workshop to be held at the offices of Solvay SA in

emerge from the workshop based on the convergence of topics or the emergence of new ideas.

Advisory Group

The Scientific Advisory Group has almost completed its work on defining a NICOLE Opinion of Research Gaps and Needs in Contaminated Land. This work is based upon the outcomes of the 4 workshops with additional inputs being made by members of the Industry Subgroup regarding the perceived value of research for problem holders. A final draft of the Opinion is currently being reviewed and it is anticipated that this will be forwarded to DGXII in September where it is expected to be a major contributor in shaping the orientation and content of contaminated land research opportunities in the next Framework Programme due to start in late 1998/early 1999.

NICOLE organisation

With the remit of the 4 current Working Groups and the Scientific Advisory Group essentially completed, the opportunity arises for NICOLE to review its structure and organisation. The main focus of NICOLE activity over the next 18 months will be the development of the research topics, and resources will be concentrated on initiating actions to address the identified needs. The membership and operation of the Steering Group will be reviewed at its next meeting in September. It is likely that the Steering and Scientific Advisory Groups will be combined. The Industry Subgroup is expected to continue its work in providing a forum for problem holding companies to share their experiences, to express views on the prioritisation of research in the further development of NICOLE's scientific programme and to interact with CARACAS. A revised structure of NICOLE is indicated in Figure 1.

Three members of the Industry Subgroup will be attending the presentation of the CARACAS summary report on the *State-of-the-Art on Risk Assessment* to be held in Bilbao. A full joint meeting between NICOLE and CARACAS early in 1998 is being planned.

Finally, NICOLE is working to develop a WWW site in conjunction with CARACAS. News of this initiative will be made available to NICOLE members later in the year.

WG1 Site Assessment and Characterisation

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WG2 Contaminant Behaviour and Risk Assessment

Dr Michel Jauzein, IRH, France
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WG3 Control Methods (Remediation and Containment)

Professor Jean-Michel Lebeault, Université de Technologie de Compiègne, France
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WG4 Measurement and Monitoring

Professor Brian Alloway, University of Reading, UK
Fax: +44 118 931 6666

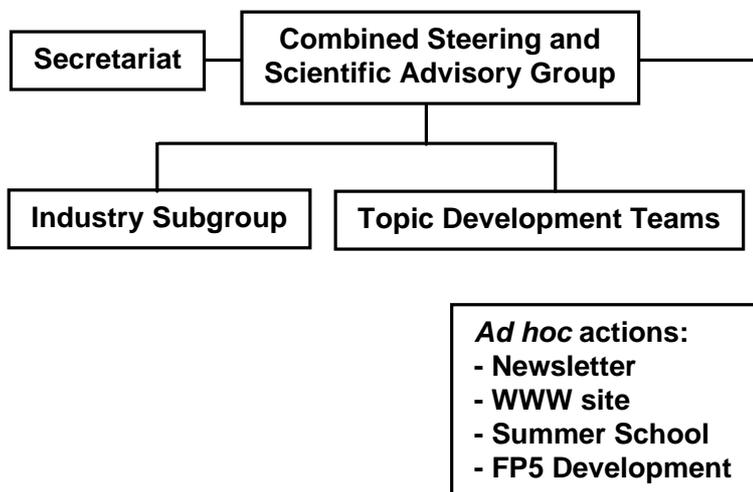


Figure 1. Revised structure of NICOLE

CARACAS update

by Harry Kasamas

The first phase of CARACAS has been completed. Around 1200 scientists world-wide have expressed an interest in CARACAS, and more than 500 R & D projects concerning risk assessment for contaminated land have been identified. This information has been included in a CARACAS database, which is used to help formulate recommendations for research priorities to DGXII. The database information will be published on Internet (CARACAS WWW site) to facilitate scientific co-operation between scientists in Europe. CARACAS scientists are currently finalising the second summary report the *State-of-the-Art Report on Risk Assessment*, which will be launched at the next meeting in Bilbao, Spain on 24-25 September, 1997.

Co-operation with NICOLE

CARACAS and NICOLE have agreed several areas for co-operation. Both CARACAS and NICOLE are developing Internet sites, and ways of linking have been explored. Both sites will be interlinked with other WWW sites of interest on contaminated land issues. A joint NICOLE/CARACAS conference is being considered for early 1998 to discuss consensus views on research needs and priorities. NICOLE will involve CARACAS in the development of a framework for risk management based on the CONCAWE approach (NICOLE News V1 N2 p9). CARACAS invites NICOLE for comments on the next summary report, *State-of-the-Art on Risk Assessment*. As far as possible NICOLE and CARACAS will continue to arrange common venues for meetings to encourage interaction between individual members of their networks.

For further information contact:

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e-mail: caracas@compuserve.com

Building Materials

Stephen Garvin discusses their performance in contaminated land

Construction may take place on contaminated land under a number of different scenarios. In the UK many sites have been reclaimed by removal of the worst contamination and replacement with clean fill. However, a number of sites have been covered or soil remediated prior to construction and buildings erected as part of the reclamation scheme. The Building Research Establishment (BRE) is in the process of determining the effect of contaminants on building materials and providing guidance to permit construction on contaminated sites. In particular the objectives are to:

- minimise the risks associated with building on contaminated sites
- investigate the consequences associated with attack by contaminants on building materials

The Construction Sponsorship Directorate of the UK's Department of Environment, Transport and the Regions (DETR), previously the DoE, has recently granted 50% funding for a field trial to assess the performance and durability of building materials in contaminated land. The other 50% is being contributed by a number of industry partners who have an interest in this area. The industry partners are:

- 1 Roger Bullivant Ltd
- 2 Tarmac Topmix Ltd
- 3 British Steel
- 4 Cementitious Slag Manufacturers Association
- 5 Quality Ash Association
- 6 Concrete Block Association
- 7 Autoclaved Aerated Concrete Products Association
- 8 British Cement Association
- 9 M A Smith Environmental Consultancy
- 10 Golders Associates
- 11 FUGRO

This work is complimentary to research that has been carried out for the then DoE, Contaminated Land and Liabilities Division, since 1990. Already 2 important reports have been published (BRE Report BR255; BRE Report BR286). The field trial is the final part of a 4 part test programme to assess the durability of building materials in contaminated sites. The 4 parts are:

- Mortar Bar Tests: accelerated laboratory tests involving the immersion of small mortar prisms (40 x 40 x 160mm) in solutions of single and combined contaminants (duration of exposure 2 - 4 months)
- Concrete Cube Tests: longer term tests involving the immersion of 100mm concrete cubes in a number of solutions of contaminants (duration of exposure 5 years)
- Concrete Cylinder Tests: exposure of concrete cylinders (150dia x 300mm) in a contaminated soil slurry in the laboratory (minimum duration of exposure 10 years)
- Field Trials: a field trial involving burial of concrete, steel, brickwork and other materials in a

contaminated land site (minimum duration of exposure 10 years)

At present guidance on the use of building materials in aggressive soils is given in documents such as BRE Digest 363. Although this was developed for natural sulphate bearing soils the guidelines are often used for industrially contaminated soils that have sulphate contamination. BRE's work over the past few years has shown that the recommendations given in Digest 363 remain the most appropriate for contaminated sites. However, the interim results of the research based on parts 1 to 3 above suggest that the cocktail of contaminants found on old industrial sites could cause enhanced deterioration of some concrete samples.

The field trial will extend the work already carried out and allow assessment of material-contaminant interaction under real conditions. It also aims to improve the ability to predict durability criteria and service life under these conditions. The field trial will involve burial of building material samples in a contaminated site the construction of elements such as trial foundations or drains. Samples of modern building materials such as concrete, steel, coated steel, brickwork and blockwork are to be buried.

Field trials will extend previous work and allow assessment under real conditions

Funding has been secured for 2 years to allow a site to be found, materials to be built into the site and removal of some samples after a year. Thereafter, samples of materials will be removed at intervals up to 10 years or more. It is important therefore that the site, or part of

it, will be left specifically for the field trial. At the time of writing BRE has negotiated the use of a site with the Welsh Development Agency and Flintshire County Council. This is the site of a former steelworks and includes tipped material from many years of manufacturing. However, further sites are required for comparison and BRE would like to hear from any landowner or agency that could provide access to appropriate sites. Such sites may typically have been gasworks, chemical works, manufacturing or heavy industrial plants. Whilst this research is necessarily long term in nature the laboratory based tests will allow the production of interim guidance on the performance of building materials in contaminated land.

Researchers, landowners and developers throughout Europe who have similar interests in building on contaminated sites and the durability of building materials please contact us to find out about this research and further areas of BRE's research on contaminated soil.

Dr Stephen L Garvin, BRE Scottish Laboratory Fax: +44 1355 241895 or Mr Max Halliwell, BRE Garston Fax: +44 1923 664786

RACE

by **Piotr Poborski**

The Risk Abatement Center for Central and Eastern Europe (RACE) is an international non-profit foundation established in September 1996 by the Institute for Ecology of Industrial Areas in Katowice, Poland. RACE's mission is to advocate the use of risk based methods and emerging technologies as tools for improving environmental quality in Central and Eastern Europe (CEE). A major emphasis will be placed on land reclamation issues. Principal aims of RACE are to:

- promote risk based policy, regulatory reform and application of risk management methods
- facilitate introduction of innovative technologies for environmental restoration and pollution prevention
- contribute to public understanding of environmental risks and public involvement in formulating environmental policy, and
- Characterise environmental risks and trends in the CEE region related to contaminated land

RACE held its official opening ceremony on 6 September, 1996. By its activities RACE plans to demonstrate the benefits of using more effective risk based policy and regulatory tools and build local and regional support for their application. Through close east-west co-operation, RACE will contribute to developing innovative solutions to land contamination and other environmental problems by combining existing CEE environmental expertise and practices with modern risk assessment strategies and technologies being developed in Western Europe and the United States.

Structure and Activities

The organisational structure of RACE is shown in Figure 1. An important activity of RACE in the coming year will be to develop the Risk Abatement Network (RANET) which will provide an important platform to exchange information and experience and conduct co-operative projects. A key element to the success of RACE activities will be the early involvement of a broad range of stakeholders, including problem holders. Key activities of RACE will include:

- providing training for decision makers on the topics of risk assessment, risk management and risk communication and environmental management (including ISO14000)
- organising regional workshops
- conducting demonstration projects
- editing RACE NEWS
- preparing an Internet World-wide Web (WWW) page
- developing a library and databases providing information and linkages between contaminated sites, projects, technologies, professionals and organisations interested in environmental risk management and pollution abatement

This year RACE will conduct training workshops in co-operation with Florida State University and the US EPA, on the topics of site risk assessment, risk management and soil bioremediation technologies.

Demonstration Project

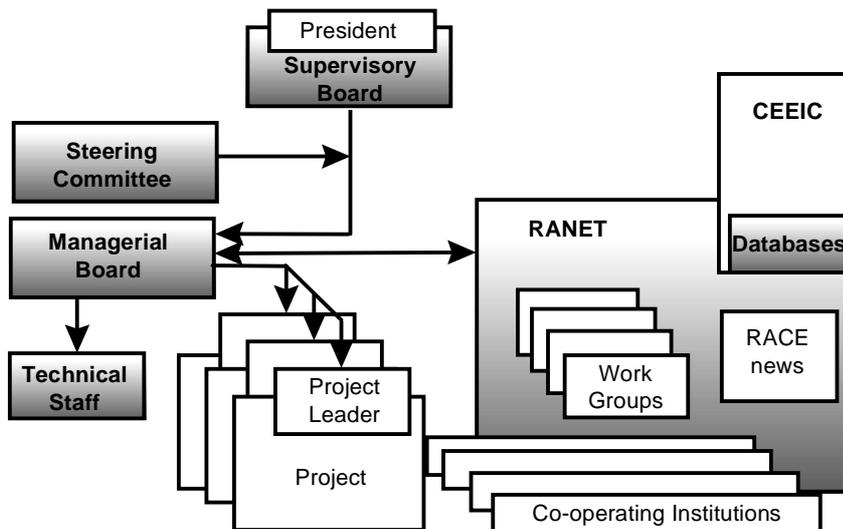


Figure 1. Organisational structure of RACE

The design plans will be completed this year for an innovative technology demonstration project at the Lagisza electric power generating station, Dabrowa Gornicza, Poland. Co-operating partners in the demonstration project will be the Southern Research Institute and Acurex Environmental Corporation, USA. The demonstration project will test the ADVACATE process which uses hydrated calcium silicate sorbents made from coal fly ash and lime $\text{Ca}(\text{OH})_2$ to control SO_2 emissions.

Co-operation

RACE presently co-operates with the:

- Institute for the Ecology of Industrialised Areas (IETU), Katowice, Poland
- Institute for Central and Eastern European Co-operative Environmental Research, Florida State University, Tallahassee, FL., USA
- US EPA, Region III, Philadelphia, USA
- Southeastern Environmental Resources Alliance, Aiken, South Carolina, USA

Financing

The majority of RACE projects and activities will be individually financed through grants and contracts with RACE, or will be jointly financed and implemented in parallel with other institutions.

For further information contact:

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email: race@ietu.katowice.pl

Slovenia

Branko Druzina reports on soil contamination in the country

In Slovenia there is no systematic review of the level of soil contamination. However, measurements and analyses indicate an alarming growth in pollution of ground waters in various parts of the country, and the level of soil contamination is now believed to have reached critical point.

Measurements of soil pollution were recently conducted, particularly on agricultural land, which covers 300,000 ha or 15% of Slovenia's total area, and on forest land. The agricultural land showed large quantities of pesticides. In certain locations, principally near industrial centres, systematic measurements of several pollutants connected with industry have been conducted.

Of the inorganic pollutants found in soil and plants around Ljubljana, Slovenia's capital, lead is found in the most excessive quantities (tests for 11 metals were carried out). Lead levels were particularly high in soil near major transport routes, an indication of the effect of traffic on soil contamination. Cadmium concentrations are also high in these areas, as shown by certain indicator plants (e.g. plantains).

Organic soil pollution is most often encountered in the form of classic insecticides based on chlorohydrocarbons, and their break-down products. Concentrations of simazine and atrazine and their break-down products are close to or beneath the level of detection. The concentrations of PACs, PCBs, volatile phenols and alkanes are also low.

Around Celje, an industrial town about 60km north-east of Ljubljana, both the soil and plants contained high levels of cadmium, zinc and lead. The levels of cadmium in particular were excessive, being measured as five times the maximum permissible level in plants and soil.

Perhaps the most polluted area, is the area around the town of Kranj, which is 20km north of the capital. Many industrial plants were located throughout the entire area, including a major ironworks, and it is not surprising that there are high levels of nickel, cobalt, chromium, iron, manganese, cadmium, zinc and lead. There were also strong indications of chlorohydrocarbon insecticides, herbicides, PAHs, PCBs and volatile phenols.

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ECEPA-Life project

Soil recycling - co-operation between 9 port authorities

In 1994 Environmental Challenges for European Port Authorities (ECEPA) established a collaborative project under *Life*, an EC(DGXI) programme to demonstrate new technologies for a cleaner environment. Nine ports have participated in the project (Figure 1). Pilot projects to develop soil recycling techniques for port-specific pollution have been carried out in the ports of Antwerp, Rotterdam and Amsterdam.

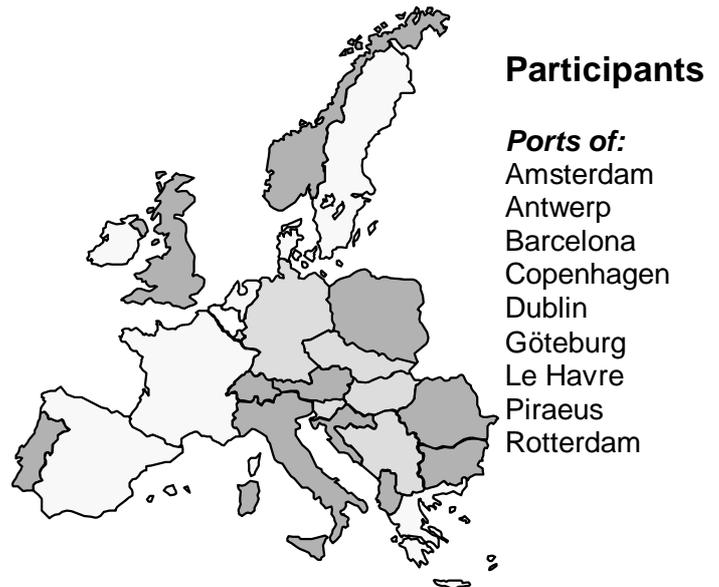


Figure 1. ECEPA participants

Port-specific pollution

- oil pollution
- heavy metals/complex pollution
- volatile pollution

The techniques used included 'horizontal drains', particle separation, landfarming, biodegradation, aeration, and physical/chemical cleaning.

The active co-operation between the 9 European Port Authorities has resulted in a better understanding of the soil pollution problems they face and the publication of an ECEPA-Life guideline 'Soil recycling in European Ports'. The guideline, which is aimed at managers, engineers and planners in port authorities, incorporates 10 checklists on topics ranging from legal aspects to cost reduction and organisation at site level.

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Research in Germany - DFG

summarised by Rainer Stegmann

A research centre for the 'Treatment of Contaminated Soils' has been set up by Deutsche Forschungsgemeinschaft (DFG). Within the framework of this special programme, we are investigating basic methods for the treatment of contaminated soils in several projects (Figure 1) at the Technical University of Hamburg-Harburg and the University of Hamburg.

The first 2 research periods ran from 1 January 1989 to 31 December 1994. The third and current research period will end on 31 December 1997.

availability of contaminants for organisms. In addition, ecological and methodical valuation criteria for decontamination methods must be developed.

For instance, with biological soil decontamination, soil is either directly treated in bioreactors or exposed to biological breakdown processes after chemo-physical pre-treatment. During chemo-physical treatment supercritical water is used to break down substances with a high molecular structure where biological degradation is either impossible or difficult. Rapid and complete degradation is then ensured in subsequent biological treatment. This approach is particularly suitable for highly concentrated contamination so initially soil fractions with high contamination are separated by mechanical processing.

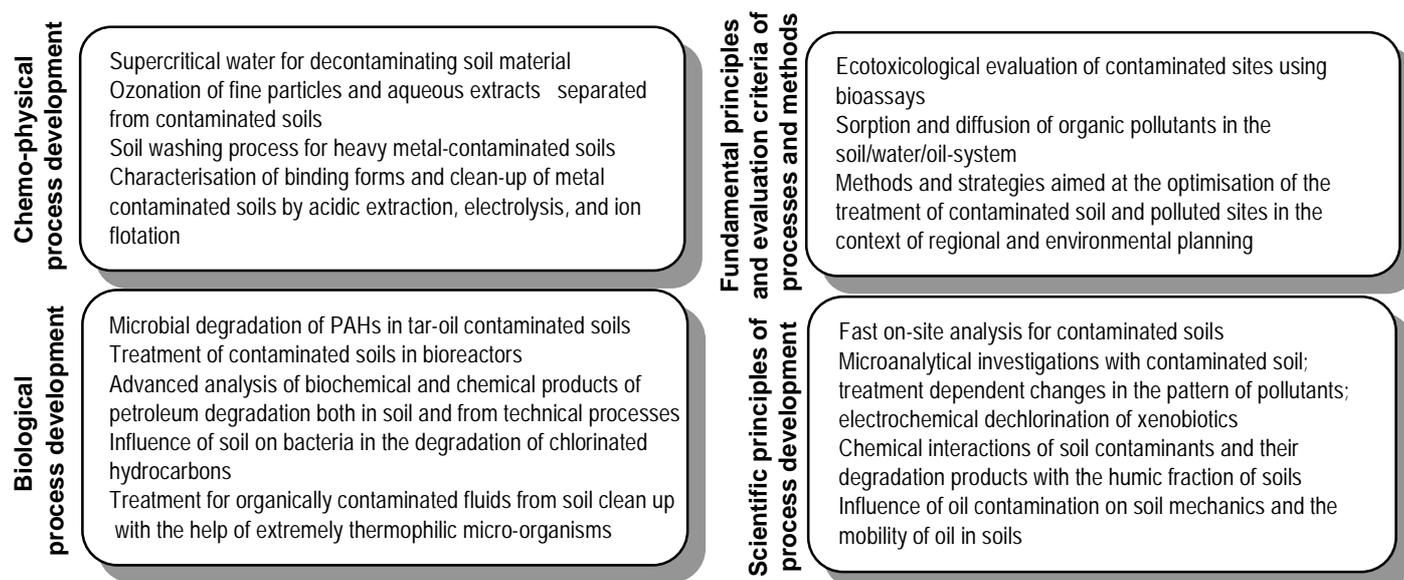


Figure 1. Projects

Our aim at this research centre is to establish the scientific basis of each of the decontamination methods shown in Figure 1. This will allow us to develop a range of procedures, methodological steps and apparatus to treat effectively a variety of contaminants. Our main focus is on biological methods combined with chemo-physical methods.

We believe that technical soil protection has become an independent scientific discipline in which the experience and knowledge from different disciplines should be combined to investigate the problems posed by contamination. Civil engineers, process engineers, chemists, microbiologists, soil scientists, geologists and environmental planners can all co-operate in the development of this new field of work. We intend not only to investigate, develop and optimise decontamination methods but also to perfect both analytical and measuring techniques, thus enabling all processes to be swiftly and comprehensively described. In this context the definition and investigation of decontamination objectives is especially important. To achieve this goal, it is necessary to screen the contaminants, both to calculate ecotoxicological limits and to quantify the

Our view is that the efficiency of biological degradation processes needs to be increased and microbiological screening in conjunction with strain development.

We will also investigate decontamination of heavy metal contaminated soils. In our approach, after soil pre-treatment, heavy metals will be removed and recovered from the soil using a new, ecologically compatible process consisting of extraction with organic acids, electrolysis and foam separation. Our work in these will draw from a strong platform of expertise in the current state of the art. Our main emphasis will be placed on the explanation of structures as well as on the behaviour of non-bioavailable and thus non-degradable substances: the bound residues.

For further information on the Research Centre SFB 188 contact:

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Dear Sir,

I have just read, or tried to read, *NICOLE News* and feel that you could sharpen it up more by providing a clearer framework for presentation. As it stands it seems to be a mixture of information on (a) R & D, (b) practice (or the authors' ideas about good practice), (c) reports on activities rather than information (e.g. Industry Subgroup). To the reader on the periphery of this, there does not seem to be any attempt - either overt or implied - to relate the articles to (a) the basic processes and hence "best scientific understanding", and (b) best practice.

Surely these 2 "platforms" should be seen as the deliverables from the 2 key groupings - the Industry Subgroup and the Scientific Advisory Group. The managers of NICOLE must exert some form of controlling framework on NICOLE to stop it simply becoming an R & D talking shop, and to ensure it delivers within a consistent reference framework. Otherwise it will not contribute to the co-ordinated advancement of environmental management practice, and will provide poor value for money for the taxpayer. As a salutary note, can I suggest that the conclusions of the recent independent assessment of the 4th Framework Programme are published in the next issue. General conclusion - good science, but poor application or effective technology transfer.

Mervyn Bramley,

Head of Environment Agency R & D, UK

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Dear NICOLE members,

I would like to let you know about the publication of our report, *Nordic Guidelines for Chemical Analysis of Contaminated Soil*. Because very few standards on chemical analysis of contaminants in soil are available from the International Standards Organisation (ISO), the Nordic countries (Denmark, Finland, Iceland, Sweden and Norway) have collaborated to develop guidelines for methods to use for site investigations and for the evaluation of remediation. When facing the large cost for remediation, it is evident that we need reproducible, comparable and reliable methods.

Currently sample pre-treatment and chemical analysis are often performed differently at different laboratories and therefore give different results. Organic pollutants are especially difficult to determine precisely, as relatively few certified reference materials are available for routine quality control. Furthermore most countries do not have regular inter-laboratory tests on organic pollutants in soil.

Our report describes methods for the chemical analysis of heavy metals, chlorophenols, creosote, volatile organic compounds, polychlorinated biphenyls, total hydrocarbons and polyaromatic hydrocarbons. It also contains chapters on quality assurance during site investigation, sampling strategy, validation of chemical methods and an appendix on field survey methods.

The proposed methods were tested in an inter-laboratory test for repeatability and reproducibility according to ISO 5725-2. The reproducibility variation, which expresses the combined variation of within- and between-laboratory variability was very high for most organic contaminants, also for liquid control solutions of the compounds. A summary of these results is included in the report, which is available, free of charge, from NORDTEST, P O Box 116, FIN-02151, Espoo, Finland

Fax: +358 9 455 4272; e-mail: nordtest@vtt.fi

Kirsten Jørgenen, Finnish Environment Institute

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Dear Sir,

To improve communication between researchers in the field of risk assessment of soil contamination, the Dutch are now starting a project called NARIP (National Platform on Risk Assessment of Contaminated Land). The aim of the platform is to provide a database with names of people working on the subject of risks of contaminated soils, and to facilitate discussion by organising workshops to inform and discuss new developments. Workshops and contributions to newsletters will be used to disseminate information.

As I am responsible for writing and distributing information I am looking for appropriate places for the news. *NICOLE News* would make a good outlet. Any readers of *NICOLE News* who would like to find out more about this Dutch initiative please contact me.

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NICOLE News (ISSN 1365-3962) is published twice a year by R³ Environmental Technology Ltd., P O Box 58, Ware, Hertfordshire, SG12 9UJ, UK
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Editor: Paul Bardos **Deputy Editor:** Jacqui Marsh Printed by Minta's The Printers Ltd., Nottingham

Submissions *NICOLE News* informs members of NICOLE and those interested in the network about the network's activities and other developments of interest in contaminated land management. All articles are the views of the authors and do not necessarily reflect the views of NICOLE or all NICOLE members. *NICOLE News* is supported by the EU Programme on Environment and Climate and members of NICOLE.

NICOLE News is intended to serve as a platform for debate in the network. Your ideas, articles and letters are very welcome! Please send them to the editor or deputy editor. The deadline for publication is 1 June and 1 December each year.

Subscription details *NICOLE News* is circulated free to members of NICOLE and others nominated by the NICOLE Steering Group. Otherwise its subscription costs per year are: £50 within the EU; £55 elsewhere within Europe; £60 world-wide. *NICOLE News* reprints are available from the editors at a cost of £10 each including post and packing. Please contact the deputy editor for further information.

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