



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 1 Number 1 August 1996

A European Industry Network for Contaminated Land at last

Inaugural meeting of the NICOLE network on May 22nd is a runaway success

NICOLE is a Europe wide initiative by industry and the European Commission to provide a forum for problem holders and researchers to come together to find workable solutions to the problems of contaminated land. It promises to be one of the largest environmental networks in Europe, with an initial budget of over 650,000 ECU, of which around 55% will come from industry. NICOLE is open to all organisations with an interest in contaminated land, both from within and outside the European Union. The first meeting of NICOLE attracted nearly 100 delegates from industry and academe from 17 countries. Ambitious targets for NICOLE were set:

- Eight technical workshops;
- Two scientific conferences reporting progress of EU funded research;
- A directory of research expertise (the NICOLE Information Base);
- "NICOLE inspired" research proposals to the Environment and Climate and Standards Measurement and Testing Programmes;
- Recommendations report of research needs for the 5th Framework Programme.

All of these developments will be reported in *NICOLE News* which will be produced twice yearly, and more detailed information will be available in separate publications available to NICOLE members.

NICOLE will be at the cutting edge of contaminated land management research world wide and will be a major influence on the development of contaminated land management approaches and research in the European Union. It is vital for Public Research enablers to be sure that the work they are supporting addresses the needs of industry to develop solutions which are not only effective, but which are also cost efficient and practical.

NICOLE is your opportunity to have your say. Its founding members are keen to see as many enthusiastic new members to the network as possible. If the network is to achieve the aims and influence it seeks then it needs your help, and help will be gratefully accepted at all levels.

More inside!!! Features inside describe NICOLE (page 6), the Newsletter and membership opportunities (page 2 & 4), the NICOLE Information base (page 3) and the proposed programmes of Working Groups (page 7) Interview with Dr Busing of the Environment and Climate Programme (page 8).

Contaminated Land Programmes

Three EU programmes support work directly relevant to contaminated land management:

- The Environment and Climate Programme;
- The Standards Measurement and Testing (SMT) Programme; and
- The Biotechnology Programme.

The Environment and Climate Programme currently supports research into *in situ* bio-remediation, degradation of pollutants and transport of contaminants. SMT supports the development of harmonised analytical methods and a number of standard reference materials for comparing contaminated land analyses have already been evolved. The Biotechnology Programme includes environmental applications of biotechnology such as monitoring and treatment technologies for soils and wastes. There is a current call, closing 18 October 1996, for proposals in the Biotechnology Programme. Key contacts are: Environment and Climate Programme Manager - Fax +32 2 296 3024; SMT Programme Manager - Fax +32 2 295 8072; Biotechnology Programme Manager - Fax +32 2 295 5365. Biotechnologies for the Environment - Fax + 32 2 299 1860. Training awards are also available, contact DG XII/E - Grants Office - Fax +32 2 296 0540.

EU research

Welcome to your newsletter

Contents	Page
Inaugural meeting of the NICOLE network	1
EU research	1
Calendar of events	2
Welcome to your newsletter	2
CARACAS	3
The NICOLE Directory of Research Capabilities	3
Are you eligible?	4
Soil forming project in the UK	4
WHO Nancy Project Office and NICOLE	5
NICOLE: The Network for industrially contaminated land in Europe	6
Environment and Climate Programme	8
EEA Soil Topic Centre	8
The NOBIS programme	9
Risk assessment - model development	10
ENEL's mobile laboratory	11
Letters	12

Calendar of events	Date
First industry sub-group meeting for "problem holding" organisations. Port of Rotterdam (see below for further details)	24 Sept 1996
WG 2 - Workshop 1 Contaminant Behaviour and Risk Assessment Dr Michel Jauzein, IRH Environnement, Direction de la Recherche, Nancy Fax: + 33 83 50 36 99 e-mail mjauzein@irh.fr	7/8 Nov 1996
WG 2 - Excursion 1 Industrially contaminated sites in the Lorraine region	8 Nov 1996
Steering Group meeting Nancy, France	8 Nov 1996
WG 1 - Workshop 1 Surveying contaminated sites TNO-MEP, Apeldoorn (NL)	22/23 Jan 1997
WG 1 - Excursion 1 Former gasworks, Rotterdam	23 Jan 1997
WG 1 - Workshop 2 Interpreting and managing data	First half 1998
WG 3 - Workshop 1 Remediation technologies	date to be announced
WG 3 - Workshop 2 Containment technologies	date to be announced
WG 4 - Workshop 1	May/June 1997
WG 4 - Workshop 2	May/June 1988

This is your newsletter, please use it

Paul Bardos and Jacqui Marsh

The idea for a network for industrially contaminated land in Europe was first suggested nearly two years ago. After a lot of hard work by the Steering Group and DGXII, we finally have our network.

Networks always seem to give birth to newsletters, so after a suitable period of gestation, here is *NICOLE News*.

The chairman of NICOLE, Martin Bell has a simple message "*NICOLE News is your newsletter, please use it*". We want your news and your views. We want to make sure that this newsletter is of real use to you and reflects your wishes for information from the NICOLE network. We plan to bring to you:

- News on pertinent developments in contaminated land management in Europe (e.g. on policy and project funding);
- Proceedings of NICOLE meetings;
- Short technical articles (for example from the NICOLE Working Groups or about European contaminated land research facilities); and, importantly
- *A forum for the exchange of views and opportunities to find partners for research and other projects.*

Submissions from you in any of these areas, as well as your views on the newsletter structure itself would be welcome. We have a letters page at the back of the newsletter where we invite you to be as controversial as you wish - or as conciliatory. We would be delighted to hear your suggestions for articles that we should write or interviews that we should carry out. Just write, fax or e-mail us and let us know your views or send us your submission.

Photographs from top: Martin Bell, Chairman, NICOLE, Paul Bardos, Jacqui Marsh.

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Late News - After the NICOLE Inaugural Meeting it was decided to form a sub-group within NICOLE for companies and other organisations which are actively addressing contaminated land problems within their **own** land holdings. The sub-group will provide a forum for the exchange of views and experiences of organisations directly affected by contaminated land problems and will work to ensure that NICOLE will remain relevant to their needs. The aims of the first meeting will be to identify topics and issues to be developed through the planned workshops and to review the Netherlands NOBIS Programme. To register an interest in attending please contact D. A. Laidler, NICOLE Co-ordinator by tel + 44 1928 511521 or fax +44 1928 581864.

CARACAS

Harald Kasamas, CARACAS Project Co-ordinator describes our sister network

The partnership

The Concerted Action on Risk Assessment for Contaminated Sites (CARACAS) in the European Union is funded under the EU Environment and Climate programme. It will be carried out by 14 Member States of the European Union:

Austria	Ireland
Belgium	Italy
Denmark	The Netherlands
Finland	Portugal
France	Spain
Germany	Sweden
Greece	United Kingdom

plus Norway and Switzerland. Each of these countries is represented by the national Environment Ministry and two scientific institutions. The United States and New Zealand have expressed their interest to co-operate with the scientific programme of CARACAS.

Objectives

The primary objective of CARACAS is to improve guidelines and recommendations for assessing risk posed by contaminated land based on secure scientific knowledge. The work programme is subdivided in three phases:

- Phase 1: to identify, compile, assess and review all relevant RTD projects and scientific approaches for risk assessment developed in the Member States of the European Union;
- Phase 2: to propose scientific priorities for future programmes and projects of the European Commission and the EU-Member States; to stimulate transnational co-operation between RTD programmes;
- Phase 3: to elaborate guidelines and recommendations for assessing risk of contaminated sites.

Furthermore, CARACAS will exchange information with other international initiatives in the field of contaminated land, like the Concerted Action NICOLE, relevant ISO/CEN Working Groups, the EEA Topic Centre Soil, the Ad Hoc working Group on Contaminated Land and the relevant NATO/CCMS Pilot Studies.

Interim results

The Concerted Action CARACAS started on 1 February, 1996, and will continue for 30 months. The inaugural meeting of the CARACAS Co-ordination Group (40 participants from 17 countries) took place in Brussels on 28 and 29 March, 1996. At this meeting the scientific programme was specified and seven scientific topic groups for specific risk assessment issues were formed.

These issues are:

- TG1: human toxicology
- TG2: ecological risk assessment
- TG3: fate and transport of contaminants
- TG4: site investigation and analysis
- TG5: models
- TG6: screening/guideline values
- TG7: methods for risk assessment

CARACAS Newsletter

To inform all interested parties on the progress of the Concerted Action as well as to provide a platform for scientific links concerning risk assessment, a CARACAS Newsletter will be issued.

Further information

If you are interested in receiving the Newsletter, if you are working on research concerning risk assessment issues and you are interested in collaboration within the project, or if you just have some questions regarding the CARACAS project, please don't hesitate to contact us.

Harald Kasamas at CARACAS-office in Vienna
Fax: +43 1 804 93 194
e-mail: 101355.1520@compuserve.com
or
Fr. Woelke at CARACAS-office in Berlin
Fax: +49 30 8903 2285

The NICOLE Directory of Research Capabilities **Research expertise, NICOLE** **Members and potential collaborative projects**

by Dale Laidler

One of the most important objectives of NICOLE is to be well focused and industrially relevant contaminated land R&D. The directory is one of the tools that NICOLE uses to reach this objective. The Directory is intended to facilitate problem holders interested in collaborative research in finding research partners, and for researchers to find partners with complementary expertise. It will be based on information collected from all research groups participating in NICOLE and will contain details for each group of:

- Research interests and capabilities;
- Specialist facilities and equipment;
- Major publications; and
- Major recent and current projects.

This information will be compiled as a searchable database using *Microsoft ACCESS*TM software. Hard copy and disk based versions of the directory will be available to all NICOLE Members free. The Directory will not be available to organisations which are not members of NICOLE. The first release of the Directory is planned in Autumn 1996, with an update in 1998.

Please contact Mrs Marjan Euser of TNO for further information on the Directory. Fax: +31 55 5493 410

Are you eligible?

NICOLE membership: costs and what you get for your money

NICOLE will be the foremost European forum for problem holders and solution finders to establish links in a non-competitive and co-operative atmosphere. The network will cross both industry sector and discipline boundaries - as well as geographical borders. Its meetings and its information base will be the foundation of a new contaminated land community in Europe. Membership of NICOLE is open to companies and organisations with potential contaminated land problems; technology developers or service providers; and National and European Trade Associations. Membership for the full duration of this phase of NICOLE (till 1999) costs only a single subscription 10,000 ECU. There's a 50% discount for companies from Eastern Europe - they pay a single subscription fee of 5,000 ECU.

Researchers in universities and independent research organisations, and national and EU research funding bodies can participate without payment of a membership fee.

The benefits of membership can be divided into two categories: (1) state-of-the-art documentation and (2) research development and support; influence and networking - both for those carrying out research and those who have research needs.

Tackling the problems of contaminated land in a practical and cost effective way

Written outputs will be:

- 8 Workshop proceedings (the technical coverage of the Working Groups is outlined on page 7);
- Conference proceedings for the two scientific conferences;
- Good practice guidance;
- Directory of Research Capabilities (see page 3)
- Recommendations reports for Environment and Climate and SMT Programmes, Call 2; and for the 5th Framework Programme; and, of course,
- The bi-annual newsletter.

These documents will be open to and available free to NICOLE members. Non-members will have to wait for general publication and pay full publication prices. Some publications may be restricted to NICOLE members only. In addition, any of NICOLE's members will not have to pay registration fees for meetings and conferences although they will be expected to pay their own expenses of participation.

As well as access to the state-of-the-art meetings and documentation, there are other major membership benefits. NICOLE aims to define the contaminated land research agenda for Europe, not just in terms of general recommendations, but with a series of research proposals from its membership intended to secure a major part of the research funding available. These proposals will use NICOLE not only to position studies so

that they meet both industry's needs and EU programme requirements, but also to secure the best research expertise available and firm commitments of industrial backing. These proposals ensure that the best use is made of scarce Public and Private Sector resources in tackling the problems of contaminated land in a practical and cost effective way.

There will be duties and conditions for members, as well as benefits. NICOLE is not intended to be a market place for technology and service vendors. All members must be willing and able to discuss their research and technological development activities and needs in the open forum of NICOLE and undertake not to participate for commercial gain.

Please contact Mrs Marjan Euser of TNO for further information on membership applications
Fax: +31 55 5493 410

Soil forming project in the UK

The UK's Department of the Environment has recently commissioned a two year programme of research to examine the use of soil forming materials in the reclamation of mineral workings and derelict land in circumstances where native soils have been lost in the course of mineral extraction or industrial activity. The University of London, Wye College and Forestry Commission Research Division have been jointly appointed to undertake the project.

The investigation will be divided into two parts: the first phase will involve the collection, collation and review of existing experience and technical knowledge; while the second phase will investigate practical aspects pertaining to use of materials with detailed site studies examining "best practice". A wide range of geological materials will be considered in order to determine their suitability for a range of after uses requiring the establishment of a vegetation cover.

The project will also consider the appropriateness of using waste materials as amendments to assist in restoring the soil-plant system and natural cycles of the soil. These will include sewage sludges, dredgings, wood residues and animal manures.

The objective will be to produce technical, scientific, planning and procedural guidance for the use of soil forming and waste materials for a selection of after uses.

Dr Nigel Bending would welcome information on approaches adopted towards the reclamation of sites elsewhere in Europe where the unavailability of native soils has necessitated the use of alternative materials as surface cover (*contact details page 12*).

WHO Nancy Project Office and NICOLE

An opportunity for mutual collaboration

Since its creation, the World Health Organisation (WHO) has been involved in many aspects of public health protection. Preventing illness from chemically contaminated soil is just one of these areas. The principal interests of WHO are shown in Figure 1. Toxicological assessments are becoming part of the procedure used in many countries to determine the levels of safe exposure.

The WHO European Centre for Environment and Health, Nancy Project Office in France is interested in the engineering approaches to identify and participate in the cleaning up of contaminated land, and sees NICOLE as an ideal opportunity to bring together the many players in this field.

There are numerous occurrences of actual or threatened risks to public health from contaminated land and within the European Region of the WHO, an immeasurable number of sites have become open to wider scrutiny. The number of sites throughout Europe requiring remedial treatment is a task greater than the capability of any single organisation. Therefore, an important way forward to protect health and to return land to economic uses is for people to work together.

The interests of the WHO Nancy Project Office in NICOLE are to share its experiences with those of both the research and private sector members in providing advice and assistance that can be used throughout Europe. In particular, it is hoped that advice from research and field experience will enable the transfer of sustainable techniques for field use in those countries whose economies are in transition. It is also hoped that NICOLE can take a positive role in the promotion of workable standards for measuring land contamination and the identification of realistic approaches to determining when intervention and clean-up are necessary, and how to implement them.

We are currently preparing a briefing paper for non-specialists on the subject of health protection from contaminated land and this will form one contribution to the initial work of the NICOLE network. The WHO also has an extensive source of toxicological,

epidemiological and occupational health advice that can be drawn upon and this can be of benefit to the Working Groups. The WHO Nancy Project Office is working extensively in Eastern Europe and its experience of the situations in these countries should provide an additional dimension to the relevance of the work produced by the Working Groups and possible, subsequent research activities. It is also hoped that industrial participants in the network will consider the possibility of twinning arrangements between industrial operators to share knowledge on land clean-up and as such, the closer relationships fostered between organisations may have complementary benefits. Research teams, too, could explore the possibility of twinning with Eastern European counterparts,

especially since several Eastern European countries are, or may well be in future, able to participate in EU research programmes.

It is acknowledged that many countries are now developing standards and clean-up

techniques which first and foremost are intended to protect public health from conceivable, realistic risks.

The WHO Nancy Project Office is pleased to see this development and wishes, through its collaboration with the NICOLE network, to assist in practical ways to support this trend further, not only in Western Europe, but also beyond.

The principal contact within WHO on matters relating to NICOLE is:

Dr Philip Rushbrook,
Waste Management and Soil Pollution,
WHO European Centre for Environment and Health,
Nancy Project Office
149 rue Gabriel Péri
F-54500 Vandoeuvre-lès-Nancy
France
Fax: +33 83 15 87 73
e-mail ecn@who.dk

This article contains the personal opinions of the author, Dr Philip Rushbrook, and does not necessarily reflect the views of the World Health Organisation.

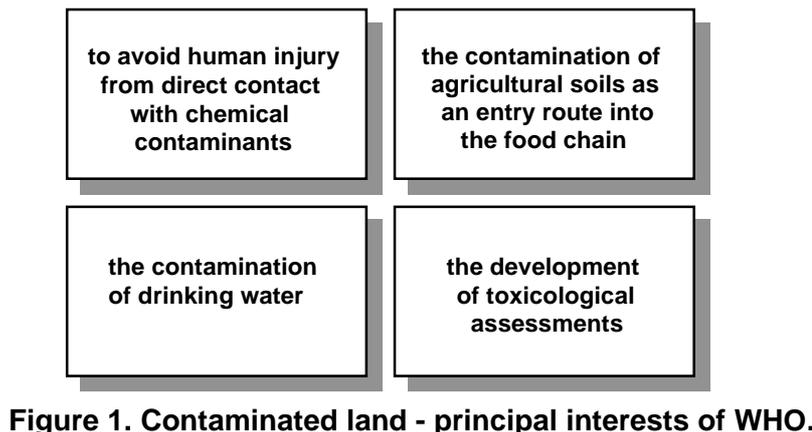


Figure 1. Contaminated land - principal interests of WHO.

**site remediation
in Europe
a task greater than the
capability of any single
organisation**

NICOLE: The Network for Industrially Contaminated Land in Europe

What is NICOLE?

NICOLE has been created to bring together problem holders and researchers throughout Europe who are interested in all aspects of contaminated land.

A new Concerted Action of the Environment and Climate RTD Programme of the European Commission, it began on 1 February 1996. NICOLE is industry-led and will provide a forum for the dissemination and exchange of scientific and technical knowledge and ideas relating to

Measurement and monitoring will be the subjects for the fourth Working Group (WG4). Network participants will be able to choose with which Working Group/s they wish to be affiliated. NICOLE also produces a bi-annual newsletter *NICOLE News*, which is produced by the Centre for Research into the Built Environment, Nottingham Trent University.

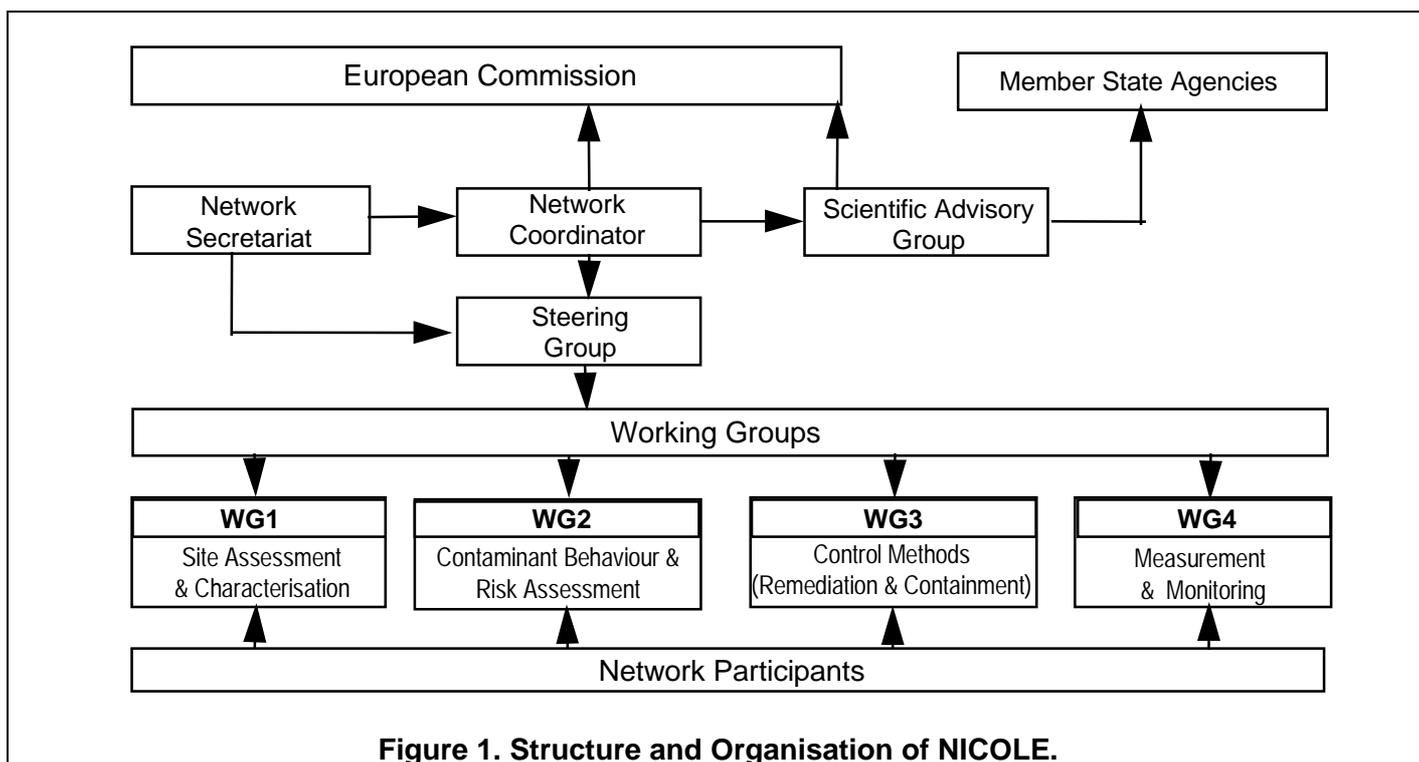


Figure 1. Structure and Organisation of NICOLE.

all aspects of industrially contaminated land. Hitherto research into contaminated land problems has not been fully co-ordinated across industry/academic and national/international boundaries - NICOLE aims to rectify this. Membership will be open to industrial companies that need information; academic and independent research organisations carrying out relevant research; National and European Industrial Trade Associations; representatives of National and EU research programmes who plan and fund research; and vendors of remediation advice and processes.

NICOLE will organise 2 scientific conferences where the progress of EU-funded projects relating to contaminated land will be reported. In addition NICOLE Working Groups will establish a series of workshops on particular aspects of contaminated land. There are currently four working groups. The first, WG1, is concerned with site assessment and characterisation. Contaminant behaviour and risk assessment are the interests of WG 2, and WG 3 will be involved with control methods (remediation and containment).

Who does what in NICOLE

The structure and organisation of NICOLE is shown in Figure 1. To reflect the orientation of NICOLE industrial representatives are in a majority on the Steering Group. The network chairman is Mr Martin J Bell of ICI Chemicals and Polymers Ltd, UK; other industrial representatives are Ing Guiseppe Frego, ENEL SpA; Dr Manuel Bravo, Repsol SA; Dr Francis Klein, Usinor Sacilor (LECES); Ir Cees Buijs, Port of Rotterdam; Mrs Patricia de Bruycker, Solvay SA. The leaders of the 4 Working Groups are drawn from universities and research institutes:

- WG1 Dr Henk Leenaers, TNO-MEP
- WG2 Dr Michel Jauzein, Institut de Recherche Hydrologique
- WG3 Professor Jean-Michel Lebault, Universite de Technologie de Compiègne
- WG4 Professor Brian Alloway, University of Reading.

Mr Johan van Veen and Mrs Marjan Euser of TNO will provide the secretariat to the Steering Group, conferences and network administration.

The Technical Coverage of the Four Nicole Working Groups

Please feel free to contact any of the Working Group Leaders.

WG 1 Site Assessment and Characterisation

Led by Dr Henk Leenaers, TNO-MEP, The Netherlands

Scope

- Initial reconnaissance surveys to establish the presence of contamination and its dispersion
- Methodologies to assess the extent of contamination quantitatively
- Interaction of site assessment and characterisation with contaminant behaviour and risk assessment (WG 2)

Issues

Setting clear goals for site investigations, and survey protocols and procedures; the use of historical investigations; geological and geohydrological conditions; use of statistical and geostatistical techniques; use of soil information systems and GIS; and the reliability of data.

Contact Fax: +31 55 5493 390

WG 3 Control Methods (Remediation and Containment)

Professor Jean-Michel Lebeault, Université de Technologie de Compiègne, France

Scope

- To survey remediation technologies
- To develop methodologies to assess the benefits and limitations of remedial techniques
- Treatment effects on contaminant behaviour and risk assessment (with WG 2)
- The measurement and monitoring of remedial techniques (with WG 4)

Issues

Particular interest in bio-remediation and containment techniques; integration of remedial techniques to produce hybrids with enhanced performance and assist effectiveness; a wider cost-benefit debate for example comparing "extensive" and "intensive" approaches for different types of application.

Contact Fax: +33 44 20 48 13 and +33 44 23 19 80

WG 2 Contaminant Behaviour and Risk Assessment

Led by Dr Michel Jauzein, IRH, France

Scope

- Understanding and prediction of the behaviour and migration of contaminants from sources to exposed populations and ecosystems
- Use of this understanding and predictive knowledge to assess hazards and risks for human health and the environment

Issues

Collation and structuring of an integrated methodology for risk assessment based on a more coherent and rational body of information; development of a more widespread and better understanding of the use of risk assessment techniques; development of enhanced methods for assessing potential impacts on public, occupational and environmental health issues as well as the sustainability of ecosystems.

WG 2 will interact with the CARACAS network (described on page 3). The WG2 work plan is featured in an article on page 10.

Contact Fax: +33 83 50 36 99

WG 4 Measurement and Monitoring

Led by Professor Brian Alloway, University of Reading, UK.

Scope

- State-of-the-art of monitoring and analysis for organic and inorganic contaminants in soil, sediment, water and air
- Collation and dissemination of published information on standard methods and protocols
- Identifying research needs for the enhancement of monitoring and analytical techniques where this is seen to be *necessary*
- Interaction with site assessment and characterisation (WG 1) and contaminant behaviour and risk assessment (WG 2).

Issues

Dealing with a wide range of existing methodologies from different countries and international bodies; optimal use of measurement and monitoring techniques; opportunities for cost reduction; development of measurement and monitoring strategies; direct measurements of environmental impact such as measures of soil function and eco-toxicity.

Contact Fax: +44 1734 316 660 or +44 1734 316 666

Environment and Climate Programme, Second Call

Paul Bardos interviews Dr Busing of DGXII

DGXII is the Directorate General of the European Commission responsible for Science, Research and Development. Its work concerned with contaminated land is mainly dealt with under the *Environment and Climate Programme*. Dr Busing kindly agreed to spend a little time telling *NICOLE News* about the forthcoming second phase of the Environment and Climate Programme.

What is the Environment and Climate programme?

"The EC R&D Programme 'Environment and Climate' is one of the 19 specific programmes organised within the Fourth Framework Programme of the European Commission, covering the period 1994 to 1998."

What type of contaminated land research is already funded by the Environment and Climate programme, and how much does this cost?

"At present two concerted actions [NICOLE and CARACAS] and more than 10 shared-cost research contracts are supported by the programme. The average Community support is in the order of 500,000 ECU per project. The programme includes research topics such as 'measurement and transport of pollutants', 'degradation of pollutants' and 'bio-remediation'".

Will the Environment & Climate programme fund more research related to contaminated land management?

"A second phase of the Programme (1997-98) will continue contaminated land research in the areas already mentioned. A call for proposals will be published mid-September [1996], with a deadline for proposals of 15 January 1997."

What research topics will be funded?

"Detailed information will be given in the work programme and information package that will accompany the call for proposals."

How much will be spent on new contaminated land management research?

"The amount which will be spent strongly depends on the number and on the quality of the proposals submitted to the programme."

How do researchers and industry find out more and get involved?

"Contact details for obtaining further information from the secretariat of the Environment and Climate Programme will be published in the *Official Journal* with the call for proposals. Those interested may also be able to keep abreast of events, and indeed find potential collaborators and partners, through the NICOLE network."

How will NICOLE assist the second call?

"NICOLE can, for example, identify the main research and development needs for contaminated land management from industry's point of view, and can provide a forum to discuss and develop proposals, which, of course, have to be within the scope of the work programme."

What other Commission programmes will fund research relevant to contaminated land management?

"The research and development programme on Standards, Measurement and Testing could also support work in areas related to contaminated land, especially when standardised or harmonised analytical procedures are required." [Editor's note: There will be an article about this programme in the second issue of *NICOLE News*.]

What are DGXII's plans for further contaminated land management research after the end of the Environment and Climate Programme?

"Financial support from the European Commission for future research and development in the field of contaminated land strongly depends on the real needs for this work identified at a European level, which are being considered in the current deliberations on Framework 5, in which NICOLE is participating."

EEA Soil Topic Centre

The Soil Topic Centre of the European Environment Agency has wide ranging interests in the monitoring of soil quality across the European Union. It is led by Spain with contributions from Ireland, Denmark, United Kingdom, Austria, France, Germany and Greece. Its activities have been agreed by the EEA in Copenhagen and the Member States, and each country of the EU has a contact who reports to the Centre. The objective for the Centre in relation to contaminated sites, is to improve the level of reliable information to assist in preparing a Europe-wide assessment of the extent of the contaminated land, the level of contamination and of remediation being achieved.

The possible tasks for the Topic Centre, as proposed in the Scoping Study, were discussed at the Common Forum for Contaminated Land in Europe at Maastricht in 1995. The Common Forum holds regular meetings for those involved in contaminated land in government departments and agencies; specifically covering issues of relevance to Member States of the EU. It pointed out that finding an acceptable common approach will be difficult. The Topic Centre will build on initiatives such as Waste-92 study (carried out for DGXI of the Commission in 1992/93) the Scoping Study, the Vienna questionnaire and results from the Ad Hoc Working Group and the Common Forum.

For further information on the Soil Topic Centre contact: Mr Anton Azkona, EEA, Kongens Nytorv 6, 1050 Copenhagen K, Denmark Fax: +45 33 36 7199 For further information on the WASTE 92 study contact: M A Piavaux, Waste Management, DGXI Fax: +32 2 299 1068

The NOBIS programme

Ingrid Halbersma tells us about industry and government in partnership in the Netherlands tackling the problems of contaminated land

NOBIS is an acronym for "Dutch Research Programme In-situ Bioremediation". The NOBIS mission is twofold: to reduce the cost of soil remediation by applying biotechnological *in-situ* techniques in a large scale, extensive approach, and to strengthen the export position of Dutch trade and industry in knowledge-based products and services. Developing, demonstrating and evaluating innovative remediation strategies, methods and techniques are the ways in which NOBIS aims to achieve its mission. Users and suppliers in the soil remediation market have formed a consortium to work together on projects. We need an optimal input of available top level knowledge in the Netherlands. A market-steered research programme based on co-operation between public and private parties should ensure that this knowledge is used in a problem and results oriented way.

Public-private co-operation

One of the basic principles of the NOBIS programme is the formation of groups to work co-operatively on solutions to actual projects. Universities and technology institutes carry out research, developers and end-users generate solution aimed ideas, authorities and end-users determine the efficiency and relevance with regard to their policy, and finally developers and executing parties mould the ideas into reliable techniques. Groups from these institutions and organisations were given three opportunities to submit project proposals (in 1995 and 1996). This proved to be a success. 48 project proposals were submitted by 48 consortia, which represent 55 companies and institutions.

Programme development

The AD-NOBIS study, the results of which became available in May 1995, identified the most important bottlenecks in the application of *in-situ* bioremediation techniques from an inquiry, market research, a literature study and visits abroad. The study enabled the objectives of the research programme to be clearly defined.

An important aim of the programme is that an initial demonstration of the current feasibility of *in-situ* remediation of easily degradable substances (mineral oil, BTEX, aromatic compounds) develops into research on the degradation of difficult substances (chlorinated hydrocarbons, polyaromatic hydrocarbons) and to apply *in-situ* techniques in heterogeneous, poorly permeable types of soil. The projects accepted

in 1995 and 1996 are equally distributed over the above mentioned contaminants and types of soil.

The bottlenecks in the application of the techniques as identified in the AD-NOBIS study form another major area of investigation. These bottlenecks have been clustered in so-called "lines of research" - that is research subjects for which solutions have to be found in the corresponding research projects. For every selected research project an inventory is made of its contribution to the solution of the bottlenecks. This results in a matrix in which the distribution of the points of research over the identified bottlenecks can be checked and, if required, adjusted. Should identical themes be tackled in different projects, the essential cohesion between the projects and the desired exchange of knowledge and experience can be stimulated.

Before 1995 the programme was steered passively - project proposals were awaited and subsequently a selection made. More active steering of the content of the programme may be required in future. A more detailed understanding of the market may highlight certain types of contaminants or soil characteristics that require investigation. Lines of research that do not get sufficient attention in the proposals submitted will have to be stimulated. For example, tools to characterise and monitor physico-chemical and biological processes are essential to judge the feasibility of *in-situ* techniques, to design processes and to engineer and realise installations. A long-term, extensive approach to controlling and reducing risks can only be successfully implemented when adequate methods and techniques are available to monitor and control processes in the soil.

Finances

The Dutch government supports NOBIS with Dfl. 25 million. Trade and industry have to contribute at least half this amount to the financing of the programme, so that over Dfl. 37.5 million will be available up to the end of 1998. So far 23 projects have been selected from the project proposals that were submitted, together representing nearly Dfl. 20 million. 13 projects have actually started and the remaining projects will start before the end of the third quarter of 1996. Valuable achievements of the NOBIS programme to date are the co-operation patterns developed and the more open exchange of knowledge and experience. As the problem and result oriented research evolves, the NOBIS association, its board, its programme management and especially its numerous participants will be stimulated to continue their work with enthusiasm. The ambitious and socially relevant aims of NOBIS form an inspiring goal.

Dfl. 37.5 million available up to the end of 1998

**23 projects selected...
13 started**

Ingrid Halbersma Fax: +31 182 573 447

Risk assessment - model development

Some thoughts from Michel Jauzein, the chairman of NICOLE Working Group 2

Soil contaminations are diversified due to different historical conditions. These historical conditions include space, time and human factors. Depending on the nature of the pollution sources, the presence of pollutants in soil systems can be local or diffuse (space factors). The potential impact of such contaminations can be acute, chronic or insignificant depending on the levels and the dynamics of pollutant concentrations in the environment (time factors). Lastly the pollution events can be accidental or generated by technical, economic or political limitations (human factors).

The main stages of the management of suspected polluted sites are:

- identification of the polluted sites,
- preliminary assessment for preventative actions,
- monitoring of suspected sites before remediation
- hierarchisation of sites for actions
- risk assessment concerning human health and environment (natural and built)
- site characterisation
- remediation actions,
- control and monitoring of sites after remediation.

We need tools to make the preliminary assessment to evaluate the necessity and urgency of preventative actions. We need qualitative risk assessment methods for the hierarchisation of potentially polluted sites. We need a consensus for the quantitative risk assessment of contaminated land. And we also need quality references for environmental media.

From qualitative risk assessment to integrated technico-economical optimisation of remediation scenarios

Even though the general procedure of risk assessment is easy to describe, the practical application of it is difficult because of the many parameters involved and the extensive data requirements. Using the basic idea of balancing risk factors concerning sources, fates and effects of pollutants, it might be interesting to develop a flexible tool on a step by step analysis of risks; from the preliminary evaluation of contaminated sites to the selection of remediation options.

For preliminary risk assessment, many countries have developed qualitative or semi-quantitative risk assessment methods to support their contaminated land policy. These qualitative methods are mainly based on ranking systems. A limited number of quantitative or qualitative parameters are necessary to rank a set of risk factors including the hazard of pollution sources, the transfer and persistence of the pollution within the environment, and the presence of potential targets. Although a lot of tools are available for the various stages of the risk assessment procedure it is difficult to select individual tools and connect them in a comprehensive and validated way. The development of

fugacity models, the use of complex multi-component multi-phase pollutant transport models, the simulation of dose-response relationships on single targets or on ecosystems, the use of Quantitative Structure Activity Relationships are just some of the many interesting tools that could be utilised in integrated risk assessment.

Innovative numerical tools could be an interesting way to solve integration problems linked to exposure analysis and risk assessment. The use of neural networks for the probabilistic prediction of exposure pathways, risk assessment through fuzzy logic systems and the combined use of geostatistics and Geographical Information Systems (GIS) are potential developments of risk assessment methods. The aim of any models developed in future should be the cost-effective reclamation of contaminated land and the reduction of potential hazards to humans and the environment.

Numerous European research teams are working in fields connected with environmental risk assessment, and European membership governments need information to formulate their policies on contaminated land. Consequently, it is important to promote technical and scientific exchanges between policy makers, scientists and industrialists to discuss and obtain a consensus for environmental risk assessment of contaminated land making the best use of available knowledge on the transport, exposure and effects of pollutants on human health and the environment (natural and built). This is the aim of the Working Group 2 of NICOLE (*see page 7*).

Our first workshop will be organised around the theme "needs and existing tools for the risk assessment of industrially contaminated land". A first set of presentations will be devoted to the contaminated land policy of different countries and the associated risk assessment methods. The approaches and their *in situ* validation will be discussed from the point of view of administrative and industrial representatives. A second set of presentations will be focused on technical and scientific tools available for risk assessment. Innovative methodologies, pollutant behaviour models, exposure and dose-response models will be presented by research organisations. Then, their potential application to risk assessment of contaminated land will be discussed by participants. (*see page 2 for date and contact details*).

We hope that this introduction paper will promote your active participation as a call for papers, posters and contributions. To participate in this first workshop, you can send an abstract indicating the title and the authors (address, telephone and fax) to:

Dr Michel Jauzein IRH Environnement 11 bis rue Gabriel Péri, B.P. 286 54515 VANDOEUVRE-LES-NANCY, FRANCE

ENEL's mobile Laboratory

Described by Ing Guiseppe Frego, ENEL

ENEL SpA. is responsible for the production, transmission and distribution of electricity power throughout Italy. Over the years the company's research centres and its associated companies have developed instrumentation for the control of atmospheric pollution, equipment and laboratories for chemical and geotechnical analyses. Because we often wish to make measurements on-site rather than transport samples to a laboratory we need mobile laboratories. However, their operating effectiveness has to be validated and inter-laboratory (permanent and mobile) comparisons carried out. Collaborative studies with other organisations in Europe have given us interesting results for contaminated sites. In conjunction with our subsidiary companies (CISE, ISMES) we participated in the EUREKA EU 674 - EUROENVIRON - ADVANCED MOBILE ANALYTICAL LABORATORY (AMAL).

The project, which concluded in 1995, developed and evaluated the effectiveness and operation of mobile laboratories. Methods and equipment specially created for the in-field characterisation of contaminated sites ranging from rapid screening methods to more sophisticated analyses such as Inductively Coupled Plasma - Mass Spectrometry (ICP-MS), Gas Chromatography - Mass Spectrometry (GC-MS), X-ray Fluorescence Spectrometry (XRF), SFE, PSA, etc.) were verified. Fitting mobile laboratories with penetrometric units for geotechnical research was of particular interest.

The culmination of the AMAL project was a measurement exercise held in Leipzig, Germany during October 1994. Mobile laboratories from Denmark (Danish Technological Institute and the Force Institute), Finland (Technical Research Centre), the United Kingdom (Fisons plc and AEA Technology) and Italy (ISMES and CISE) took part. CCR of ISPRA co-ordinated the exercise. The participants carried out considerable work to define a complete list (AMAL Technical Procedure List) of sampling and analytical procedures. A total of 53 technical sampling and analysis procedures were defined.

The positive experience we gained at Leipzig encouraged us to develop two mobile laboratories. We always follow clearly defined procedures, with uniform documentation which allows verification at any time.

For further information contact the author at ENEL
Fax: +39 831 517 305

For the sampling and analyses carried out in our mobile laboratories the workflow is:

- definition of the collecting points
- drawing of samples (surface and deep waters, soil, waste, subsoil air, sludges, etc.)
- sampling labelling, recording, storage and distribution to the testing laboratories
- processing of analysis results and preparation of test reports for daily briefings.



We attach particular importance to the role of the Quality Control manager, who works alongside the Co-ordinator, and, in practice, monitors any given aspect of the measurement programme, even for work carried out over an extensive area, through the documentation available (Sampling Master Log).

At present ENEL is developing two mobile laboratories:

Mobile Unit No. 1 - this vehicle is for chemical analysis and is equipped with:

- FIA-Flow Injection Analyser to determine the chemical parameters of liquids
- XRF-X-ray Fluorescence Analyser for the analysis of metals present in environmental matrices
- GC-Gas Chromatography unit to determine the organic compounds in environmental matrix.

Mobile Unit No. 2 - this vehicle is for geotechnical analyses and is equipped with:

- Soil sampler equipped with piston engine for core sampling up to a depth of 5-6m
- trailer mounted and penetrometric soil drill for drawing off gas, solids and liquids
- PID-Photo-Ionisation Detector for analysis of ionised gases extracted from the soil
- PSA-Potentiometric Stripping Anodic to analyse metals present in water
- Portable Gas-Chromatography for examination of the environmental matrices (water and gas).

In conclusion our experience has shown that the acquisition of rapid results is the most efficient way of reducing the management costs relating to the problems linked to contaminated sites. Therefore, developing the potential of mobile laboratories capable of producing results in minimal times may constitute the most financially viable research path.

Letter Box

The Editor **NICOLE NEWS**
Centre for Research into the Built Environment
The Nottingham Trent University
Burton Street
Nottingham
NG1 4BU
United Kingdom

Are you doing too much sampling?

Sir,

I have observed with some concern the number of research projects devoted to improving analytical capability for measurement of contaminants in soils and groundwater. In many cases the aim is to maximise the accuracy of the analysis of the total quantity of contaminant present in a sample. I suggest that the real uncertainties, and therefore research priorities, in the process of assessing the risks from contaminated land lie elsewhere.

In addition to the variability between different laboratories carrying out the same analysis even under the same protocols, there are significant uncertainties in sample design and in the assessment of exposure effects which dwarf those due to analytical accuracy. The use of a high sample density to high standards of accuracy is often quite inappropriate and serves only to lull the unwary into a false sense of security.

Martin J Bell,
ICI Chemicals & Polymers Ltd.

A question of balance.

Sir,

Assessment of the feasibility of (innovative) remediation is largely based on a comparison of the expected end results in terms of concentrations of contaminants in soil and groundwater. These concentrations are specified in all kinds of regulations and laws.

If a risk assessment reveals that remedial action is required, then remediation needs to be optimised. Optimisation can only be done when an objective assessment procedure is available that weighs alternative remediation options on all these criteria. To introduce feed-back in remediation such a procedure should also provide a tool to evaluate on-going and completed remediations. In this way further development of new strategies and concepts will be stimulated. Up to

now a lot of work has been done on these separate criteria, however an integral method is not yet available. The Dutch NOBIS-programme has adopted the development of such an integral procedure to evaluate remediation alternatives.

Cees Buijs,
Rotterdam Municipal Port Management

[Editor's note: see page 9 for a feature on the NOBIS programme. NOBIS contact Fax: +31 55 5493 390]

The rate and extent of biodegradation of contaminants in subsurface zones.

Sir,

Zeneca is currently carrying out a review and evaluation of the state of the science of degradation within the subsurface. This review will try to identify gaps in the knowledge and what research may be necessary to fill those gaps. Our concern is particularly with the saturated zone (including the capillary fringe) and our prime interest is likely to include halogenated pesticides, thiocarbonates and other nitro and halogenated aromatic compounds.

Having identified what research may be needed the long term aim of the project is to develop a methodology to demonstrate and evaluate the rate and extent of biodegradation by indigenous microbial populations. It is anticipated that this will be a three year project and we are seeking academic and industrial collaborators who can demonstrate a good complementary fit to the work. If you would like to find out more please contact me.

Dr. Mike Evans, Zeneca Ltd., Brixham Environmental Laboratory, Freshwater Quarry, Brixham, Devon, TQ5 8BA. Fax: + 44 1 803 882974

[Are there any service providers, or risk assessment specialists who would care to write in and comment?](#)
Paul Bardos, Editor, *NICOLE News*.

Contact details for Soil Forming Project described on page 4.

Dr Nigel Bending,
Wye College, c/o 6 Lyndhurst Court, 33 Avenue Road,
Abergavenny, Gwent, NP7 7DA.
Fax: +44 1873 853162.

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Editor: Paul Bardos **Deputy Editor:** Jacqui Marsh

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