

# C A R A C A S

**CONCERTED ACTION ON RISK ASSESSMENT FOR  
CONTAMINATED SITES IN THE EUROPEAN UNION**



*Network for Industrially  
Contaminated Land in Europe*

*Concerted Actions of the EC Environment and Climate  
Research and Development Programme*

*Joint Statement - October 1997*

Past and present human activities which introduce contaminants to the soil and groundwater have resulted in some 750,000 sites across Europe with suspected contamination. Some of these sites may endanger water resources, ecosystems, and/or human health.

Better methods are needed for assessing the likely impacts on humans and the environment:

- to confirm that sites are fit for their current or intended uses
- to guide the remedial actions needed to ensure fitness for use and a reduced burden of aftercare for future generations.

## **Towards a Better Future:**

### ***Establishing Fitness for Use and Sustainable Development of Contaminated Land in Europe***

Land is "fit for use" when it can be used for a particular purpose without posing unacceptable risk to human health or the environment. Uncertainties about the nature and significance of chemical contamination can be a major stumbling block hindering sustainable development, and increasing pressures on greenfield sites. Without more cost-effective methods for assessing fitness for use, large sums of government and industry money may be spent on sites that cause little environmental impact, while other sites which are in greater need of attention may not receive it.

There are many areas where significant improvements in the science base would greatly reduce the cost and increase the certainty of fitness-for-use assessments. Both Concerted Actions, CARACAS (authority led) and NICOLE (industry led), identified very similar areas which would benefit from further Research and Development initiatives as described in this joint statement.

Together the two programmes are working to provide a vision, and identify the means, by which risk assessment and management can be applied effectively to ensure the safe use of these lands to protect the environment.

#### **Effective solutions require:**

- the close collaboration of scientists and engineers, industry problem holders, policy makers, technology developers, academics, and research programme planners
- focused and transparent approaches that are economically viable.

#### **The results will be important to us all for:**

- a safe and attractive environment
- sustainable reuse of former industrial areas for homes, businesses and leisure areas etc.
- effective and timely solutions at a viable cost to society.

**Inside**  
Research Needs

**Back page**  
CARACAS and NICOLE

# Research Needs

Research should provide a variety of decision-making tools for managing and solving contaminated land problems. Decision-making tools can take various forms such as sampling protocols, transport models, tiered risk assessment frameworks and soil screening values. A focused research effort with international co-ordination is needed:

- to provide a high quality base for peer review
- to stimulate co-operation and harmonisation to avoid duplication of research at the national level.

“Fitness for use” focuses on the relationship between soil and groundwater quality and human land use and natural ecosystems. This provides two starting points for research:

- 1) The nature of contaminated land: the fate, transport, biodegradation and long term behaviour of soil pollutants.
- 2) Fitness for use: understanding the demands on soil quality and risk acceptability for various form of land use.

The first theme focuses on the soil environment and the second on human health and ecological risks, and the perception of these risks. Risk communication and the economic consequences of soil pollution are also central to the implementation of policies.

A third theme is remedial actions. This will lead to a range of feasible short term and long term solutions, these are discussed in a recent opinion on research needs from NICOLE, available from Marjan Euser (see back page). A new Concerted Action CLARINET will consider remedial actions in conjunction with decision-making frameworks.

## Why We Need to Act Now

In recent years we have made great strides in Europe in forging a common understanding of the problems left by our industrial heritage. It is now recognised that the emerging disciplines of environmental risk assessment and management are vital in helping us tackle the contaminated land problem.

Without these tools, and the decision-making framework in which they can be used, the costs of regenerating former industrial sites will continue to impose a severe burden on industry and the public purse. Some of the consequences of this are likely to be:

- continued dereliction which reduces quality of life and stigmatises affected communities
- a distorted and inefficient market in land which may have been contaminated
- increased pressure to develop greenfield sites
- lack of confidence on the part of investors, both in the technical solutions to deal with contamination and the potential regulatory obligations that developers or owners might subsequently face
- negative perceptions among affected communities which can lead to fears about health risks and environmental damage, and reduction in property values.

The CARACAS and NICOLE programmes have identified closely similar research needs. We know what needs to be done.

Now we must ensure that the research funding can be found to do it so that the benefits of a cleaner and safer environment can be achieved for future generations.

# Research Needs

## 1 The Nature of Contaminated Land

### A) Site characterisation: extent, intensity and environmental transport and fate of pollution

- robust and rapid low-cost techniques for investigation of potentially contaminated sites
- improved methods for estimating the accuracy and variability of the whole sampling and analytical process
- methods that yield information at spatial scales relevant for exposure assessment
- characterisation by biosensors and bioassays
- methods to assess migration of groundwater contamination
- methods to assess the natural potential of soil to reduce contaminants to acceptable risk levels and to monitor the process
- the interaction and general fate of contaminant mixtures
- detection of non-aqueous phase liquids and the prediction of their fate.

### B) Bioavailability of contaminants in soil and groundwater

- to study the interaction between organisms (soil fauna, bacteria, plants) and their chemical environment
- time dependence (ageing) of bioavailability
- cost effective procedures for estimating bioavailable fractions in the environment.

## 2 Fitness for Use

### A) Human health risks

- validation of human exposure pathways
- availability of contaminants within the human body
- availability of contaminants in the soil as compared to the availability in the animal experiments underlying most toxicological reference values.

### B) Ecological risk assessment

- impact of a site on its environment
- ecological recovery at the site
- changes in community structure caused by pollution-induced tolerance *versus* classical ecotoxicological endpoints
- biomagnification and adverse effects on food chains
- ecological soil quality requirements related to human land use.

### C) Risk perception and communication

- Risk perception of contaminated land
- Development of communication strategies: how to communicate the results of risk assessments and the choice of solutions to those potentially at risk and to other interested parties.

### D) Remediation Technologies

- Processes of natural attenuation
- Low-energy approaches
- cost-effective remedial technologies
- Monitoring of remediation

# CARACAS

**CONCERTED ACTION ON RISK ASSESSMENT FOR  
CONTAMINATED SITES IN THE EUROPEAN UNION**



*Network for Industrially  
Contaminated Land in Europe*

The Concerted Action programmes, CARACAS and NICOLE, were established in 1996 as part of the Environment and Climate RTD Programme of the European Commission to tackle the problem of contaminated land. They bring together the combined knowledge of academics, government experts, consultants, industrial land owners and technology developers. The two Concerted Actions approached the problem from different perspectives. NICOLE's focus is primarily on industrial sites still in use or owned by industry. CARACAS has the broader perspective of governments who have to make rational decisions within a national contaminated land policy and planning framework.

C A R A C A S	N I C O L E																
<p align="center"><b>Scientific Topic Group Leaders</b></p>	<p align="center"><b>Steering and Scientific Advisory Groups</b></p>																
<p><b>Dr D Darmendrail</b> BRGM, France  <b>Professor C C Ferguson</b>            The Nottingham Trent University, UK  <b>Dr K Freier</b> Umweltbundesamt, Germany  <b>Dr B K Jensen</b> VKI-Water Quality Institut, Denmark  <b>Dr J Jensen</b>            National Environmental Research Institut, Denmark  <b>Dr A Urzelai</b> IHOBE S.A., Spain  <b>Dr J J Vegter</b>            Technical Committee on Soil Protection, The Netherlands</p>	<p><b>Professor B J Alloway</b> University of Reading, UK  <b>Mr P Andreucetti</b> ENEL, Italy  <b>Mrs P de Bruycker</b> Solvay SA Technique, Belgium  <b>Dr R P Bardos</b> <sup>r3</sup> Environmental Technology Ltd, UK  <b>Mr M J Bell</b> ICI Chemicals &amp; Polymers Ltd, Runcorn, UK  <b>Dr M Bravo</b> Repsol Petroleo, Spain  <b>Dr Jürgen Büsing</b> Commission of the EC DGXII, Belgium  <b>Mr P van Eijk</b>            Rotterdam Municipal Port Management, The Netherlands  <b>Dr J Gutafson</b> Shell Research &amp; Technology Centre, UK  <b>Professor Dr F A M de Haan</b>            Wageningen Agricultural University, The Netherlands  <b>Mr W R Hafker</b> Esso Engineering (Europe), UK  <b>Dr M Jauzein</b> Institut Recherche de Hydrologie, France  <b>Professor Dr V Komppa</b>            VTT Chemical Technology, Finland  <b>Professor A Kontopoulos</b>            National Technical University of Athens, Greece  <b>Dr-Ing H-P Koschitzky</b>            VEGAS, Institut für Wasserbau, Germany  <b>Dr D A Laidler (NICOLE Co-ordinator)</b>            ICI Research &amp; Technology Centre, Runcorn, UK  <b>Professor J M Lebeault</b>            Universite de Technologie de Compiègne, France  <b>Dr H Leenaers</b> TNO-MEP, The Netherlands  <b>Professor D N Lerner</b> University of Bradford, UK  <b>Mr J-H le Marrec</b> Rhone-Poulenc, France  <b>Mr J P Okx</b> Tauw Milieu bv, The Netherlands  <b>Dr Phillippe Quevauviller</b>            Commission of the EC DGXII, Belgium  <b>Dr H J van Veen</b> TNO-MEP, The Netherlands</p>																
<p align="center"><b>32 European Research Organisations</b></p> <p>ADEME (F), ANPA (I), AQUATEAM (N), BRGM (F), EAWAG (CH), EMGRISA (E), Environment Institut (SF), Environment Agency (UK), Environm. Agency (IE), EPFL (CH), IFA Tulln (A), IHOBE (E), IGME (GR), Karolinska Institutet (S), Instituto dos Residuos (P), ITGME (E), Laboratório National LNEC (P), National Environm. Research Institute (DK), National Public Health Institute (SF), OVAM (B), R.I.V.M. (NL), SFT (N), TBV Science (UK), The Nottingham Trent University (UK), TCB (NL), Umweltbundesamt (A), Umweltbundesamt (D), Universidade de Aveiro (P), Università degli Studi di Bologna (I), University of Stockholm (S), VITO (B), VKI (DK)</p>																	
<p align="center"><b>16 European Environment Ministries/Agencies</b></p> <table border="0"> <tr> <td><b>Austria</b></td> <td><b>Belgium</b></td> <td><b>Denmark</b></td> <td><b>Finland</b></td> </tr> <tr> <td><b>France</b></td> <td><b>Germany</b></td> <td><b>Greece</b></td> <td><b>Ireland</b></td> </tr> <tr> <td><b>Italy</b></td> <td><b>Netherlands</b></td> <td><b>Norway</b></td> <td><b>Portugal</b></td> </tr> <tr> <td><b>Spain</b></td> <td><b>Sweden</b></td> <td><b>Switzerland</b></td> <td><b>United Kingdom</b></td> </tr> </table> <p><b>CARACAS Co-ordination:</b>  <b>Dr.-Ing. Volker Franzius</b> German Umweltbundesamt</p>	<b>Austria</b>	<b>Belgium</b>	<b>Denmark</b>	<b>Finland</b>	<b>France</b>	<b>Germany</b>	<b>Greece</b>	<b>Ireland</b>	<b>Italy</b>	<b>Netherlands</b>	<b>Norway</b>	<b>Portugal</b>	<b>Spain</b>	<b>Sweden</b>	<b>Switzerland</b>	<b>United Kingdom</b>	
<b>Austria</b>	<b>Belgium</b>	<b>Denmark</b>	<b>Finland</b>														
<b>France</b>	<b>Germany</b>	<b>Greece</b>	<b>Ireland</b>														
<b>Italy</b>	<b>Netherlands</b>	<b>Norway</b>	<b>Portugal</b>														
<b>Spain</b>	<b>Sweden</b>	<b>Switzerland</b>	<b>United Kingdom</b>														
<p><b>For further information about the contents of this statement and information on CARACAS and CLARINET please contact:</b>  <b>Dipl.-Ing. Harald Kasamas, CARACAS Office, Vienna</b></p>	<p><b>For copies of the NICOLE Opinion on Research Needs and for further information about NICOLE please contact:</b>  <b>Marjan Euser, NICOLE Secretariat, TNO-MEP</b>  <b>Fax: +31 55 5493 410</b></p>																

Fax: +43 1 804 93 194  
e-mail: caracas@compuserve.com

e-mail: m.euser@mep.tno.nl