A GUIDE TO

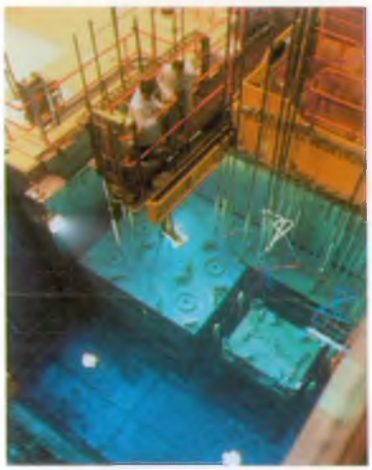
RISK ANALYSIS

AT THE NATIONAL CENTRE FOR RISK ANALYSIS AND OPTIONS APPRAISAL

ENVIRONMENT AGENCY

1 RISK ANALYSIS

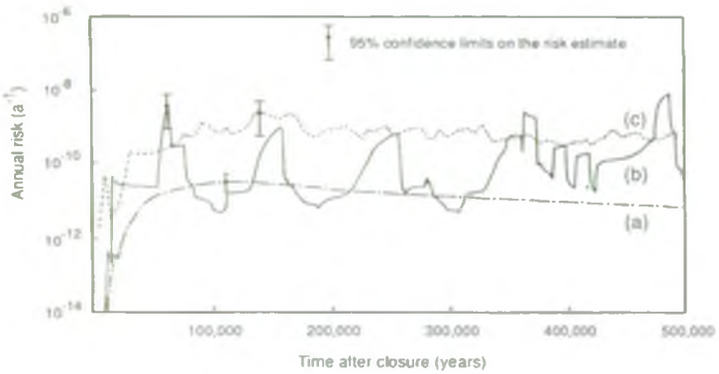
The National Centre for Risk Analysis and Options Appraisal was established to assess risks to the environment and provide guidance on their avoidance or reduction so that society and industry bear a justifiable cost. Understanding the risks that certain pressures pose to the health of the environment is an important role of the Environment Agency.



The statutory guidance issued in respect of the Agency's principal aim makes reference to the use of risk assessment in delivering sustainable development, and the UK's Sustainable Development Strategy commits the Government to basing its decisions on an understanding of the risks facing the environment.

An appreciation of the risks of future environmental damage enables the Agency to take a more proactive position rather than reacting to damage that has already occurred. This is especially the case with respect to the impacts of climate change, for example.

2 THE ROLE OF THE NATIONAL CENTRE



Risk estimates for three different climate scenarios at a hypothetical repository for radioactive waste

The National Centre provides a framework, and the tools and techniques, with which the Agency can determine the significance of various pressures to and from the environment. Such techniques focus on the more obvious pressures created by society, such as the impacts of major industry and the generation and disposal of waste. Equally they apply to 'natural' pressures such as flooding and climate change.

The National Centre also applies risk techniques to strategic issues such as road transport, nationally important issues such as the disposal of radioactive waste and corporate issues such as the prioritisation of resources according to risk.

3 MAIN TECHNIQUES

The Agency has access to a wide range of risk-based tools and techniques. In authorising the activities of dischargers, developers, operators and abstractors, the Agency generally acts as an assessor of the risk assessments of others, but retains the right to undertake its own assessments, independent of the application.

Proportionality of approach is a key concept in the application of risk analysis. At the heart of the framework being implemented by the National Centre is use of the most appropriate techniques given the priority and the complexity of the issue under study.

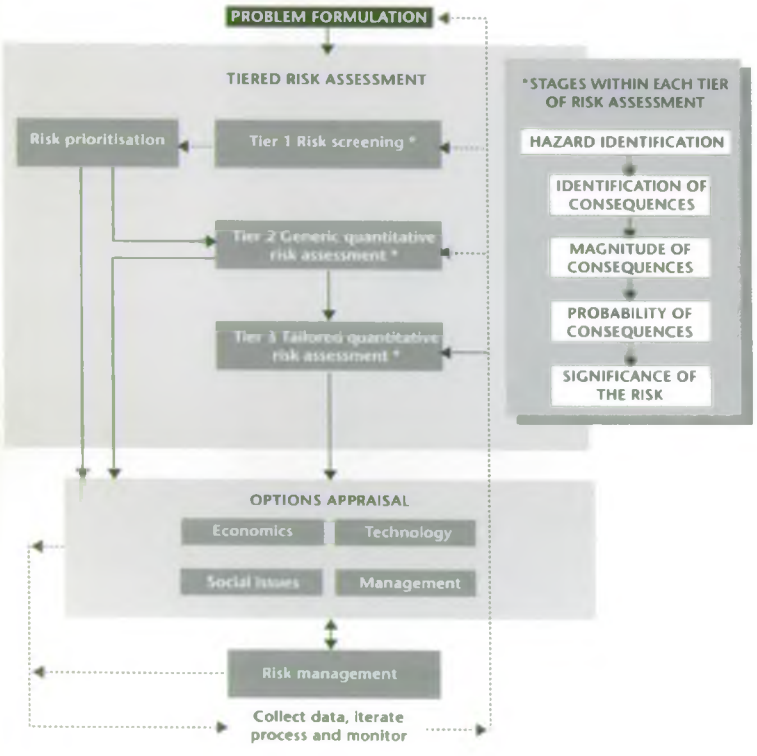
Risk screening – The Centre uses screening techniques, such as the source-pathway-receptor approach, to examine the range of risks and the factors that determine whether they are likely to result in environmental harm.

Risk prioritisation – Having identified all the risks, "ranking" or prioritisation tools can be used to ensure that future work is targeted at higher priority risks. The emphasis is on identification of the key risk drivers using assessment criteria and clearly defined qualitative or numerical scales.

Generic quantitative risk assessment – Generic risk models which illustrate the key drivers of risk are used by the Agency to inform decisions of a common nature and target control measures accordingly. Event and fault trees are applied to map out the key processes where appropriate, and Monte Carlo "add-ins" such as Crystal Ball® and @Risk® can be used to calculate sensitivity analyses.

Tailored quantitative risk assessment – Clearly, some risks are of sufficient priority and complexity that they require a more detailed investigation. In these cases, such as with the assessment of proposals for the disposal of radioactive waste, specific tailored models are used.

A tiered framework for environmental risk assessment and management



4 FUTURE DEVELOPMENTS

There are a number of conceptual challenges for risk analysis that the National Centre is addressing. The first relates to the comparison of risks across the Agency's regulatory and supervisory roles. This is important for targeting resources on the highest priority risks, will contribute to the Agency's work on the state of the environment and assist with the prioritisation of Local Environment Agency plans (LEAPs). Comparing, for example, a one in a hundred year flood event with the local exceedance of an air quality standard for nitrogen dioxide represents the type of issue with which the Centre is concerned.

Equally, the consistent communication of risk to staff, to the public and to government is an important task. Existing methods include the well-known colour coding of flood warnings and numerical risk estimates for the likelihood of harm from exposures to radiation. The Centre is producing guidance on the presentation of risks and consulting those not directly involved in risk analysis to inform this debate.

The Centre is also preparing a 'portfolio' of risk assessment activities across all Agency functions and will be addressing how these activities can be converged. This is a challenging task given the breadth of the Agency's activities and the range of tools and techniques in use.

5 CHECKLIST

The Agency is required to use risk assessment across the full range of its activities, and therefore the role of the National Centre is considerable. The checklist below sets out those areas in which the National Centre is active.

	CENTRE ACTIVITY	CENTRE ADVISES
Development of risk analysis techniques	✓	
Participation in, and communication of, risk assessments	✓	
Training on the use of risk models	✓	
Routine application of risk analysis techniques		✓
Use of risk models for authorisation and licensing		✓
Risk assessment of radioactive waste disposal	✓	
Assessment of risks posed by single activities		✓
Risk analysis of policy options	✓	
Techniques for risk-based resource allocation	✓	

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