

EXECUTIVE SUMMARY

The Centre experienced a year of growth in 1999/2000 with the addition of three new posts in response to new duties under the Groundwater Regulations and Part IIA Contaminated Land regulation. In all this brought the complement of staff to nineteen.

The key work areas continued to be;

- Advice and support to Groundwater Regulations
- Guidance for Part IIA of the Environmental Protection Act 1990 (contaminated land regime)
- Redesignation of groundwater nitrate vulnerable zones (NVZs) for the EU Nitrate Directive
- Influencing and preparing for the Water Framework Directive
- Waste Management Licensing for contaminated site remediation

Centre staff have played leading roles in national and international discussions on these and other topics.

Significant efforts have been made in training both Agency and external staff (especially Local Authority staff) in groundwater and land regulatory issues and use of new methods and tools.

The intellectual and technical lead provided by Centre staff has been greatly aided by many Regional and Area colleagues who play an important part in Centre projects. Centre staff have also brought a professional approach to managing work programmes to time, quality and cost and the report which follows provides a small taste of all the work undertaken and the benefits which this brings to the wider Agency.

ENVIRONMENT AGENCY



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KEY OUTPUTS FOR THE YEAR

Source Protection Zone maps	<ul style="list-style-type: none"> ● A nationally consistent set of maps covering almost 2,000 groundwater source protection zones and roll-out to Operational staff. ● A public information booklet. ● Preparation for a public launch of these onto the Agency web-site in summer 2000.
Joint training seminars	<ul style="list-style-type: none"> ● Land contamination technical seminars to over 2,000 Agency and Local Authority staff.
Nitrate vulnerable zone methodology	<ul style="list-style-type: none"> ● Revised methodology for determination of groundwater NVZs on behalf of DETR.
Groundwater sampling	<ul style="list-style-type: none"> ● Draft ISO standard providing guidance on sampling at contaminated sites.
Supporting documentation for Part IIA contaminated land regime	<ul style="list-style-type: none"> ● A number of documents delivered both through the Centre programme and Land Quality R&D Programme including: <ul style="list-style-type: none"> ● Internal standard for remediation. ● Internal standard for information and registers. ● Procedural handbook note 4, Remediation.
Groundwater protection methods	<ul style="list-style-type: none"> ● Methodology for the derivation of remedial targets (see front cover). A key document that can be used across regulatory regimes.
Framework for assessing abstraction sustainability	<ul style="list-style-type: none"> ● A new methodology for looking at sustainability issues for a catchment for all the water therein.
Groundwater monitoring	<ul style="list-style-type: none"> ● A draft monitoring strategy which resulted in additional Grant-in-Aid from DETR.
Strategy for groundwater pollution R&D	<ul style="list-style-type: none"> ● Informing and leading the Agency spend on R&D in groundwater quality.
NATO/CCMS contaminated land initiative	<ul style="list-style-type: none"> ● International seminar and special topic session.
CONSIM and LANDSIM	<ul style="list-style-type: none"> ● Preparation of LANDSIM 2 package. ● Release and roll-out of CONSIM and external sales.
Building on contaminated land	<ul style="list-style-type: none"> ● Guidance for building housing on land affected by contamination.
Groundwater Regulations Process Manual	<ul style="list-style-type: none"> ● To guide and inform staff.
Better understanding of UK hydrogeology - K variation with depth	<ul style="list-style-type: none"> ● Modification of MODFLOW modelling code, technical reports and user manuals to allow more realistic interpretation and simulation of geological conditions at depth.
Impact of cemeteries on groundwater	<ul style="list-style-type: none"> ● Report and continuing work to identify the potential impacts from cemeteries.
Internet pages	<ul style="list-style-type: none"> ● Preparation and update of groundwater and contaminated land pages - now some of the most visited pages on the Agency site.
Underground	<ul style="list-style-type: none"> ● Groundwater and contaminated land circular to 500 Agency staff. 6 editions.
Impacts of groundwater abstractions on river flows	<ul style="list-style-type: none"> ● Technical reports and spreadsheets providing a first methodology to link the worlds of surface and groundwater and highlight the importance of groundwater for base flow in many rivers.
Methodology for detecting and quantifying virus contamination of groundwaters	<ul style="list-style-type: none"> ● Report detailing the proving trials of a new virus trap method.

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1. INTRODUCTION

DURING THE YEAR THE NATIONAL CENTRE REVISED AND RE-AFFIRMED ITS MISSION TO:

“Develop the scientific and technical understanding of the subsurface environment ensuring its translation into clear policy, helpful operational guidance and sound technical support that will contribute to open, effective and consistent regulation.”

The work of the Centre directly addresses five key themes of the Agency's work: Managing water resources, Conserving the land, Managing waste, Delivering integrated river basin management, Regulating major industries whilst influencing to a lesser degree the remaining four themes.

Centre staff have been active in advising Head Office and DETR on new policy issues and individual Regions on operational matters. Much of the detailed advance preparation for the new Groundwater Regulations was carried within the Centre. Similarly, staff have provided substantial technical support to Head Office in the preparation of policy and guidance for Part IIA Contaminated Land Regulations.

Centre staff lead 3 R&D topics and manage a large number of R&D projects. We also provide an expert point of contact for external groups and are involved with numerous collaborations with academic and industrial partners. We produce reports and education materials in both print and electronic formats (e.g. internet) and detailed technical and awareness training for many of our outputs.

2. SUMMARY OF THE YEAR

As in previous years this report categorises our work broadly by environmental theme and based on the major contributor or customer for the work. However, much of our work relates to more than one Agency Function indeed often to more than one Directorate.

Key issues have been:

- Advice and support to Groundwater Regulations and Regulation 15 (WML),
- Guidance for Part IIA of the Environmental Protection Act 1990 (contaminated land regime),
- Redesignation of groundwater nitrate vulnerable zones (NVZs),
- Influencing and preparing for the Water Framework Directive,
- Waste Management Licensing for contaminated site remediation.

Much of our work covers technically complex areas, which are new and unfamiliar topics for many in the Agency and outside. Over the year the Centre has provided a lead for the relatively small pool of groundwater and contaminated land operational staff through technical discussions, liaison events and training initiatives.

The Centre hosted a number of international visitors during the year and met with others at the requests of senior Head Office staff.



MANAGING WATER RESOURCES

We have had an active year working with Regional and Area colleagues. The Water Framework Directive continues to be a source of long term steering for much of our work. The Centre has also played an important role in starting to bring together groundwater and surface water issues. However additional requests from DETR, particularly for NVZ advice, had a major impact on the work-plan this year.

Centre staff have been asked to sit on a number of National functional groups and to input to the work of the Groundwater Resources Group. It is regarded as essential that all Centre projects reflect the needs of the users and that useful, effective deliverables are rolled out together with appropriate advice or training. We have adopted a generic project board practice where we have a Centre Project Manager, Centre staff, regional or area staff as appropriate and external advisors where necessary. We have endeavoured to ensure that whilst battle hardened veterans are in evidence, at least one of the project board should have less experience. This arrangement provides a development opportunity and ensures that new ideas and different expertise are brought to the projects which has added substantially to their worth.

GROUNDWATER NITRATE VULNERABLE ZONES

The Agency was asked by DETR to reconsider the way groundwater NVZs are designated. NVZs are required under the European Nitrate Directive to protect water resources from the effects of leaching from agriculturally derived nitrates.

This project could not have been conducted in the time available without a resource such as the Centre and without the flexibility to reschedule a number of our projects to make way for it. Nevertheless, the Centre has been instrumental in helping avoid the potentially huge fines from infraction proceedings. A paper on this work has been accepted for an international conference in autumn 2000.



The work stemmed from a provisional EU opinion that the current NVZ methodology was insufficient. This potentially left the UK in breach of the Directive with the threat of infraction proceedings and a potential for high fines for the nation.

The NVZs to protect groundwater have been radically reviewed and in the process a new system of evaluating data sets has been developed which will have a much wider application. The problems of accessing dispersed point source information in the interpretation of a three-dimensional environment have always been problematical in groundwater data interpretation. We believe that our work is the first time that an exercise of data fusion has been used to assist in understanding groundwater quality.

We have used a soil leaching model to evaluate the risks of nitrate concentrations exceeding 50 mg/l under differing land use and hydrogeological conditions. This has produced a map showing where groundwater is likely to be high in nitrate. At the same time we have collated the data from our groundwater quality monitoring network and analysed geostatistically both the distribution of monitoring points and the concentrations of nitrate present at each. This gives us an appreciation of where we think the nitrate is high and where the density of monitoring points is sufficient to give us confidence in accepting the data as representative. Combining the layers of information (risk, reality and monitoring confidence) produces a map that shows the areas that should be suitable for NVZ designations. The methodology also has the additional advantage of identifying high-risk areas where the monitoring network needs to be improved in order to give the desired degree of confidence. Recommendations for new NVZ designations have been given to DETR and additional GIA received for 2000/2001, especially for groundwater monitoring, will be focussed on improving the network according to the identified needs.

AVAILABLE RESOURCE METHODOLOGY (ARM)

The previous year's project which produced the Available Resource Methodology (ARM) was accepted by Regions as a valid method for the calculation of the water resources of an area. Accordingly it was suggested by the team looking at producing Abstraction Management Strategies (AMS) as an appropriate method for inclusion in this process. In view of the urgency associated with AMS, the National Centre suggested an extended trial alongside the AMS trialling to determine how it could be applied in real aquifers and under operational conditions. This was accepted by the Function and the Centre programme amended to allow this. The trialling has enabled improvements to the methodology and the final project outputs have been modified to take account of these.

The final ARM methodology has been adopted for future Abstraction Management Strategies. Scientific papers detailing this world-leading work have been accepted for inclusion in 2 international conferences (Geoscience 2000 and International Association of Hydrogeologists 2000).

NEW FRAMEWORK FOR ASSESSING WATER RESOURCES AND ABSTRACTION SUSTAINABILITY

The Environment Agency is seeking to regularise the way in which water resources are assessed throughout England and Wales. A framework methodology was developed in 1999/2000 which considers the interaction of groundwater and surface water and regards these components as a single integrated resource. It draws on other Environment Agency led research, most notably an on-going programme of work on the estimation of impacts of groundwater abstraction on river flows. The framework methodology requires:

- catchment delineation,
- a conceptual understanding of the catchment's hydrology and hydrogeology,
- estimation of artificial impacts,
- calculation of aquifer water balance,
- comparison of existing and target flows

all of which are then used to derive a sustainability status for the catchment. It has been developed for use within the regulatory community in helping achieve a consistent approach to the sustainable management of water resources.

GROUNDWATER MODELLING

The work on the Strategic Review of Groundwater Modelling has progressed and the reports will be delivered during summer 2000. The project will provide "Guidance Notes and Template Project Brief", and "Environment Agency Framework for Water Resources Modelling". The technical working group for the project have met a number of times and this contact is helping to develop an Agency groundwater modelling fraternity which is proving useful to all concerned.

The Centre modeller has spent 40% of his time working with Regions and Areas on project work. This provides a resource in groundwater modelling to Regions. It develops Centre awareness and also provides a conduit through which Regions can gain from each others experience. In addition, the Centre manages Professor Ken Rushton, the Agency's external modelling advisor, who has continued to visit Regions and Areas to help on specific problems and most Regions are taking full advantage of this.

SMALL LICENCE EXEMPT GROUNDWATER SOURCES.

A report has been prepared with BGS on the Small Licence Exempt Sources providing advice on how data on these sources can be acquired with a view to their protection.

IMPACT OF GROUNDWATER ABSTRACTIONS ON RIVER FLOWS.

Last year we produced a report on Impact of Groundwater Abstraction on River Flows (IGARF1). Arrangements were made to have the related software rolled out on the servers and well received training courses were delivered in November and December. The follow up project, (IGARF2) has started and aims to develop the analytical approach of the first project into a more flexible system involving digital modelling and neural networks. This innovative approach will provide a halfway house between the simple analytical approaches of IGARF1 and the more long term field work / modelling approach proposed for IGARF3.

RESEARCH AND DEVELOPMENT

The Groundwater Resource R&D Topic is led from the Centre. A number of projects have been managed by Centre staff. For example one project aimed "to assess existing methods to develop a rigorous and defensible methodology for deriving GPZs in fractured/fissured aquifers". The work undertaken included review of the (international) literature, theoretical considerations, and case studies.

2.2 INTEGRATED RIVER BASIN MANAGEMENT

Our effort is split between policy support to Head Office, Operational support to the Regions and Areas and management of particular projects both in our own workplan and those in the R&D portfolio. In addition, one of the posts added at the start of the year through the allocation of Grant-in-Aid for new duties (Groundwater Regulations) also took on the role of Policy Advisor for Groundwater to the Head of Water Quality.

GROUNDWATER REGULATIONS

Although the Groundwater Regulations were implemented in April 1999, the relatively short lead in time for this legislation had been insufficient to ensure that all the supporting technical guidance was in place by this date. Considerable effort was devoted during the year to the preparation of this material which has now been incorporated in the Process documentation. We have also assisted with awareness raising/training of staff in its use.

The Centre has responded to many routine enquiries from Areas and Regions on technical matters associated with the Regulations, as staff have encountered problems/issues associated with the new regulatory regime. Numerous internal and external presentations have been given during the year by Centre staff regarding the Regulations.

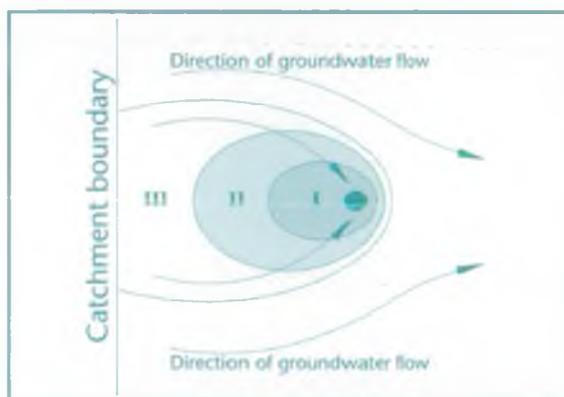
It became apparent that to support the regulatory process, further R&D, particularly on the fate and transport of pesticides in the soil and unsaturated zone and practical technical assessment methodologies, would be needed. The Centre has initiated new research, sought to influence external research and adjusted some of its existing programme to respond to these needs.

There is a continuing need to further develop technical guidance, taking the results of R&D and converting this into practical and cost effective procedures that can be used to assess applications for authorisations.

GROUNDWATER SOURCE PROTECTION ZONES

During 1999/2000 the Agency has, for the first time, developed a nationally consistent map series of Groundwater Protection Zones (see front cover for an example). These build on the "Policy and Practice for the Protection of Groundwater" which sets out:

- a series of policy statements on groundwater;
- a classification of groundwater vulnerability;
- definition of groundwater protection zones.



The zones are designated Areas around public water supply abstractions and other sensitive receptors that signal there are particular risks to the groundwater source they protect. They provide a readily understandable signal that particular land uses or activities within those Areas may be inappropriate and are based on an estimation of the time it would take for a pollutant which enters an aquifer to reach the receptor.

This important new national dataset represents a major triumph for every Region and Area of the Agency in defining the zones. It is the culmination of a ten-year programme of producing a nationally consistent groundwater protection policy and associated toolkit. Staff at the Centre led the collation and preparation of a consistent approach. The maps have implications for how we work in Environmental Protection, Customer Services, Planning Liaison etc.

To define a zone it is necessary to know how the groundwater behaves in that area along with knowledge of well construction, water levels, and groundwater surface water interactions. Once compiled, the information is used to create a conceptual model which is a clear concise statement on the groundwater setting. The results of modelling and zone definition along with the supporting data are held in Regional offices in source evaluation reports. These are available for consultation but, to facilitate ease of use, the Agency has produced a series of maps which display the protection zones (inner, outer and total catchment) for each of the modelled sources.

Later in 2000 the digital data will also be available for download from the Agency's internet web pages for use in geographic information systems (GIS).

GROUNDWATER SAMPLING

The Centre has made a significant contribution to the development of an International Standards Organisation (ISO) standard on groundwater sampling from potentially contaminated sites (ISO 5667-18) by providing the technical expert lead role for this standard. This document has now been adopted as a Final Draft International Standard after all member countries voted in favour.

GROUNDWATER MONITORING

Increasing recognition within government of the pressures on groundwater has led to an increase in the DETR provisions for better monitoring of our groundwater assets. Centre staff were instrumental in leading Agency representations to the Department through the development of a draft groundwater monitoring strategy which identified the costs of the current system and the implicit costs in meeting future EU and UK obligations. This drew attention to Agency assets currently valued at £97M and operating costs of £1.4M p.a. combined with a realisation that future needs will require further funding in the order of £3M p.a. This work led directly to additional grant-in-aid for 2000/01 and 2001/02 from the DETR of £325k p.a. and with likely further substantial increases in subsequent years.

THE FUEL ADDITIVE, MTBE

Methyl tertiary butyl ether, often referred to as MTBE, is one of a class of compounds which have been used as fuel additives in recent years. It has become an extremely high profile pollutant in the United States where the EPA have recently announced they will seek to reduce or remove ether oxygenates from all the fuel in the US.



The environmental benefits from the use of fuel oxygenates include more complete combustion and hence improved air quality. For the fuel producer oxygenates provide a useful method to meet octane requirements under some circumstances and provide a replacement for some of the benzene in petrol that is required by new fuel standards. However, these compounds can also create major problems in contamination of groundwaters. The main sources of ether oxygenates as pollutants of groundwater are likely to be from transfer spills, leaking storage facilities or other spills.

The Agency R&D Programme has recently undertaken a review of known incidents of oxygenate pollution in England and Wales. The work has been carried out in collaboration with the Institute of Petroleum. The work will also provide the most recent estimate of the extent of oxygenate production and use in England and Wales. The National Groundwater and Contaminated Land Centre has published a booklet about MTBE which has proved a major interest on the Agency web-site.

RESEARCH AND DEVELOPMENT

The Groundwater Quality R&D Topic within the Water Quality Programme is led from the Centre. The Topic was successful in establishing the first large "umbrella" R&D project to enable a concerted research effort in a number of related subjects. The project "Fate, transport and natural attenuation of pollutants in the subsurface" is intended to run for three years and has addressed these issues through a variety of "sub-projects". Key examples include:

- A Fellowship in Natural Attenuation - a 3 year Fellowship with an internationally recognised group at the University of Sheffield which provides: buy into a range of external R&D, training for Agency staff, call-off consultancy, Agency direction to the UK research community.
- A site for research in natural attenuation, a UK collaboration with Shell and AEA to demonstrate natural attenuation and provide "best practice" guidance.
- A survey of incidence of fuel oxygenate pollution - MTBE see page 6.

A methodology for the **derivation of remedial targets for soil and groundwater** to protect water resources was a major synthesis of earlier R&D work. Together with CONSIM (a risk based decision support software for remediation design which was developed and rolled-out to Operational staff) this will aid in the assessment of polluted soils impact on groundwater and in the derivation of remedial standards to protect water resources.

CONSERVING THE LAND

CAPITAL FUND PROJECTS

Additional Capital Projects funding was secured (Contaminated Land Pool) from DETR. This amounted to £1958k for 1999/2000, representing works at 12 individual projects. Progress was hindered by the amendment to section 161 (1A) of the Water Resources Act 1991, which restricted remediation works in several instances because of potential legal implications relating to the Agency undertaking such works.

Despite legal issues restricting the progress of several projects, the funding obtained for 99/00 increased overall. In addition, approximately 70 Local Authority applications for funding have been assessed in terms of technical feasibility and value for money already in 2000. Advice provided by the Centre continued throughout 1999 with some notable successes; one site alone led to a saving to the public purse of **£1.7M** through the redirection of a proposed remediation scheme.

PART IIA CONTAMINATED LAND REGIME

The Centre has delivered large bodies of guidance in support of the new regulatory duties associated with Part IIA of EPA 1990 the Contaminated Land Regime. Procedural documentation under the Integrated Management System (IMS) was delivered detailing how Agency staff will operate the regime along with advice and guidance on the underlying technical issues. The Centre has played an important role supplying several sections of guidance and internal standards and advice to the implementation project.

Part IIA is a technically and procedurally complex regime and therefore comprehensive guidance is required to provide a framework for consistent decision-making. It will be used to support the developing skills base within the Agency as experience develops. It fulfils the role of a quality assurance manual and a training tool. The tangible benefits to the Agency are consistent regulatory decision-making within a framework that allows site-specific flexibility, and development of the existing skill base within the Agency to deal with Part IIA matters. This avoids the cost to the Agency of failing to apply the new regime in a consistent, effective, and prioritised manner and also the need to "buy-in" contaminated land expertise from outside. The issue of dealing with land contamination is a high profile issue externally, typically site investigation and remediation costs may reach £100k and £1M respectively. The Agency must be seen to be implementing correctly in line with legislation, policy, and sound science.

JOINT TRAINING WITH LOCAL AUTHORITIES

The new Regime for regulation of Contaminated Land in England and Wales was introduced from the 1st of April 2000 in England and is anticipated in Wales later this year. The new regulatory regime presents major new challenges for the Agency but above all successful implementation requires close co-operation between Agency and Local Authority staff. Whilst the Local Authorities carry the initial duties under the regime, the Agency is required to provide advice and, of course, to regulate Special sites.

The Agency through the national implementation project for groundwater and contaminated land has established a training programme. Within this and in consultation with the Local Government Association and the Chartered Institute of Environmental Health and with support from DETR a Joint Training Initiative was established by the Centre. This delivered a series of one-day seminars on Site Investigation, Risk Assessment and Remediation at locations throughout the country. Presentations from experienced Agency and Local Authority staff were complimented by case studies from industry, consultants and others. In all, over sixty seminars have taken place with audiences typically numbering 30 to 50 at each such that overall almost 2,500 staff have participated mostly from Local Authorities.

First and foremost the seminars provided a common basis for Agency and Local Authority technical staff who must now work closely in implementing the new regime. Beyond this the seminars in many cases provided the first opportunity for staff from different organisations to meet face to face. The low costs enabled large numbers of Local Authority staff to attend and included some from complimentary disciplines to hear about contaminated land e.g. Planning, building control, architects surveyors, engineers and lawyers.

USE OF GEOGRAPHICAL INFORMATION SYSTEMS (GIS) FOR MANAGING LAND CONTAMINATION

The National Centre completed a technical guidance document which aims to encourage the use of digital environmental data and GIS in the management of land quality issues. The guidance document is being provided free of charge to local authorities and other interested parties. The preparation of the guidance, which was done in collaboration with BGS, has generated considerable interest. Three GIS case studies developed as part of the project were well received and positive feedback has been received from the local authorities involved.



RESEARCH AND DEVELOPMENT

Within the Land Quality R&D Programme the Remedial Treatment topic is led from the Centre. Centre staff also manage 11 of the projects including guidance on the verification and validation of remedial techniques, housing for brownfield developments, measuring the wider environmental impact of land remediation, and assessing the cost and benefits of different remedial approaches. The development of the research programme was handicapped during the year because of the priorities given to the development of technical guidance.

2.4 MANAGING WASTE

WASTE MANAGEMENT LICENSING

Centre staff continued to provide a lot of technical advice and support to the implementation of and implications of waste management licencing in respect of land contamination. The Centre co-ordinated revisions to the guidance on the application of Regulation 15 of the Waste Management Licencing Regulations 1994 to landfill, taking into account the interface with other regimes such as the Groundwater Regulations. Centre staff have also provided advice to Regions and Areas on a number of landfill licencing discussions where disputes had arisen between the Agency and waste operators over groundwater protection issues.

LANDFILL LOCATION POLICY

As a direct response to a number of separate but similar operational concerns the National Centre promoted the development of Agency policy on the strategic location of landfills in order to protect water (particularly groundwater) resources. This was intended to strengthen the approach in the existing Groundwater Protection Policy. The Centre delivered a draft policy through the Environmental Protection Group to the Head of Waste Regulation. We were also active in discussions with industry and other interested external parties.

2.5 EDUCATION AND DISSEMINATION

The Centre continued to promote groundwater issues and land contamination issues through key internal and external dissemination events. The Centre outlined a new strategy for publications at the October Client Board which was well received (Paper 99/10/3).

SEMINARS AND CONFERENCES.

The Centre sponsored or contributed to a number of keynote events during the year all of which attracted large and influential audiences. These included:

- **Joint Training Initiative** a series of technical awareness seminars carried out at Regional and Area level and delivered to a total audience of 2,500 Agency and Local Authority staff.
- **MTBE Conference** co-sponsored with Imperial College attracted an international audience of 150 with academics, industry, regulators (including European Environment Agency and the Drinking Water Inspectorate) and press with keynote presentation by Head of Centre.

- **Groundwater Festival** - a week long event opened by the Chairman Lord De Ramsey which provided an introduction to groundwater for over 800 school children and a public open day. It introduced the concept and needs for groundwater management and protection. A satellite link (sponsored by BT) was held with the US Festival organisers and further contacts were made with schools in South Africa to enable schoolchildren to share experiences across continents.
- **"What we can learn from real aquifer pumping data"** series of seminars to over 120 Operational staff.
- **Contaminant transport modelling** workshops in each Region with 15 staff at each.
- **Joint hydrology and hydrogeology conference** 2-day event attended by over 250 staff. This was the very first time that the disciplines had met in such a conference environment and it paves the way for closer working arrangements which will be essential with the coming of the Water Framework Directive.
- **Natural attenuation workshop** bilateral UK-Netherlands workshop for key national experts to foster links and develop collaborative research projects.

PRINT MEDIUM

The Centre continued to produce the bi-monthly, circular "Underground". A range of Agency and external authors have contributed to make the circular a groundwater and contaminated land community document. It has matured into a very well respected publication.

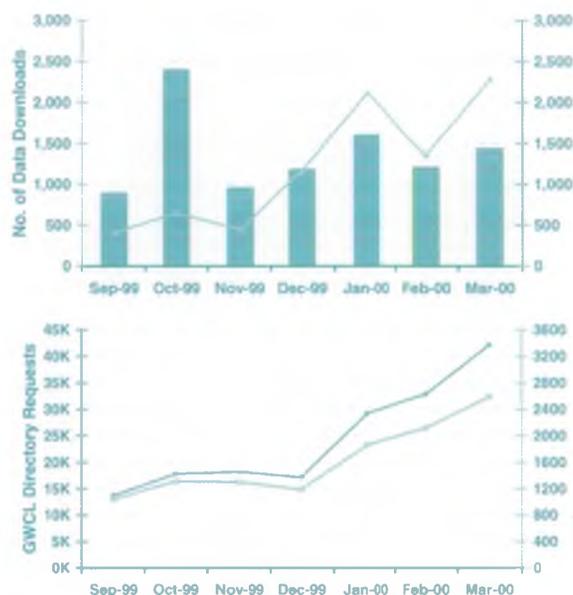
The Centre have produced two new A5 sized booklets to inform staff and customers on key issues:

- Groundwater Source Protection Zones,
- Searching for Groundwater.

In addition, Welsh language versions of all booklets including those from previous years have now been completed and these along with the English versions have all been made available on the Agency internet site.

INTERNET/INTRANET

The National Centre re-launched the 'Groundwater & Contaminated Land Issues' webpages on 9 September 1999. These pages were well visited from the beginning and are now more popular than such Areas as 'Environment Action', R&D, IPPC, the 'Demand Management Bulletin' and 'Focus and Forward Look'. Over the same period, the number of visitors to the pages has almost doubled from the previous module based pages which were very limited in their scope and ability to hold sufficient content. The National Centre is dealing with an increasing number of external email enquiries from people who have first visited the website.



As noted above, the Centre made electronic copies, of its series of information booklets, available through the website. To date nearly four thousand English booklets have been downloaded and over two hundred bilingual copies. Production and distribution of such numbers in paper would have cost over £2k assuming no additional design costs were incurred. Electronic dissemination through the internet offers unlimited copies at negligible ongoing cost.

ConSim is a risk assessment model for land contamination, developed for the Agency by Golder Associates and discussed in the annual report for 1998/9. A demonstration version of this software was this year made available over the internet and over a thousand customers have downloaded it. One of the R&D projects managed by the Centre produced a report entitled, 'Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources', and a complex spreadsheet. The spreadsheet was placed on the Agency's website and has been downloaded by over 1,300 customers.

The Groundwater & Contaminated Land webpages are still relatively young and more exciting, informative and interactive content is being added constantly. As practices within the Centre are reoriented to include the internet as a major dissemination route this area of the Agency's website will become a crucial information resource for our external customers.

The recent roll-out of the Intranet within the organisation has opened up the internal audience to the Centre. Through use of the same data and skills, we helped to pioneer the initial launch and indeed still have more potential content than the site can currently accept. We hope to cultivate this medium as a rapid dissemination route for essential guidance and information.

PRICED PUBLICATIONS

A number of groundwater publications are sold through The Stationery Office (TSO) including groundwater vulnerability maps, Policy and Practice for Protection of Groundwater and supporting documents. Total face value sales amounted to £36k in 1999, a reduction from the previous year due no doubt to the completion of the vulnerability map series and the Groundwater Protection Policy (i.e. there were no new publications from these series). A completely revised Policy will be prepared in 2000/01.

Groundwater vulnerability data is now supplied to a number of value-added-resellers (e.g. Landmark Information Group). This is managed by the Scientific and Technical Information Service (SATIS) who supplied an estimate of revenues at £3k for the last 3 months of the year.

The sophisticated contaminated site risk tool ConSim produced at the end of 1998/9 has sold 55 full price copies with a value of £37,950 to be shared between the Agency and our partners Golders Associates. ConSim is also in use in all Agency Regions.

The technical report mentioned above "Methodology for the derivation of remedial targets for soil and groundwater to protect water resources" is sold through WRC as an R&D output and has already sold over 200 copies since late November 1999.

SUPPORT TO UNIVERSITY COURSES

Centre staff have continued to support relevant M.Sc. courses by giving guest lectures. We have also participated in several short courses which have provided benefit to the Agency either as income to the Centre (see financial reporting below) or more commonly through allocation of free places to Agency staff by the course organisers (e.g. Sheffield University - Natural Attenuation course, Birmingham University - Groundwater Modelling course).



OPERATING IN AN OPEN AND BUSINESS-LIKE WAY

The Centre continues to use a number of management computer systems to promote efficient delivery of work. These include:

- "Enquiries" database (developed in-house) tracks all requests for assistance and helps ensure that responses are delivered in line with the Agency's Customer Charter.
- "Project database" (developed in-house) holds details of all Centre projects.
- "Timesheet Professional" provides detailed cost breakdowns to inform future planning and to report to customers.

The Centre has reported against its Operational Performance Measures both to the Client Board bi-annually and to the Regional Director, Midlands on a quarterly basis.



FURTHERING THE SCIENCE BASE

Centre staff have actively managed relationships with a number of key Universities and studentships relating to Centre work are in progress most notably at Sheffield, Essex, Birmingham, East Anglia and University College London. A number of joint projects have also been developed with industry groups such as the Institute of Petroleum, the Groundwater Forum and the Chartered Institute of Environmental Health.

Staff lead three Agency R&D Topic Areas in Land Remediation, Groundwater Quality and Groundwater Resources. We have continued to explore academic partnerships with a number of University departments and are developing a focussed research strategy based on Agency needs. This strategy is and will be promoted with key external groups to influence their direction.

3. CENTRE MANAGEMENT

The Centre continued to review its methods of working and refined its conceptual model in collaboration with an external management consultant. This adopts a project based approach to manpower and financial planning. The figure below illustrates our approach and the reporting planning and delivery routes for the Centre's work programme.

In addition, all the staff job descriptions were reviewed and re-evaluated by Midlands Region personnel staff in recognition of the changing role for the Centre since start-up and in preparation for the Equal Values exercise.

Centre reporting lines (Client Board and Regional Director)
And Delivery routes (Project teams and Ad Hoc Groups) And
Planning/Support routes (Business Groups)



3.1 CLIENT BOARD REPORT

The Client Board met twice during the year; in May and October. In October the Board were joined for the first time by a representative from DETR (Ian McDonald from DETR Water Quality). It is hoped that representatives from several DETR Divisions may share the duty. The Board also recognised the need to increase representation from the Water Management Directorate and so Giles Phillips (Head of Water Resources) was invited to join. The membership of the Board (at March 2000) is included in the Appendix.

The terms of reference for the Centre Client Board were revised and endorsed at the October meeting. The Client Board for the National Groundwater and Contaminated Land Centre shall:

- provide strategic direction to the work of the National Groundwater and Contaminated Land Centre on behalf of all the Centre's customers, and
- monitor performance at a strategic level.

The Client Board accepted the Centre's annual report for the previous year and commended the Centre for full delivery of the programme during the set-up period.

At the October meeting the Client Board received the first draft of the Centre business plan for the coming financial year (2000/01) and beyond. The Board broadly agreed the plan and a final version was approved by correspondence in January 2000.

In addition to the Client Board meetings there were regular, quarterly reviews of the Centre performance by the Regional Director of Midlands Region (to which the Centre is attached) with the Midlands Environmental Protection Manager and business planning staff.

3.2 CUSTOMER SURVEY

The Client Board received a report on the Centre's first customer survey at the October meeting. The responses were generally very favourable, the most common rating from respondents was "good" service in all categories. In key areas of technical advice and external liaison the response was particularly noteworthy with over 80% rating as "good" or "excellent". The Centre also scores well in these areas in comparison to other National Centres.

The survey did highlight some misconceptions of the role the Centre plays in implementation of new and existing duties. The main area with scope for improvement is the dissemination of Centre work to Operational staff. Several respondents commented on a need to increase access to Centre workplans. Some of these concerns already have been, or are being, addressed. The Centre has been pro-active in the acquisition of OLIB library software linked to the National Library and Information Service (NLIS) system and we funded the cataloguing of the Centre library onto the NLIS system. Librarians in each Region should be able to access our books directly. Our newsletter "Underground" is rated "good" and this echoes feedback received directly. For the future we intend to maximise our new web access through addition of project descriptions (includes R&D); we have already placed as much material as possible on the Agency intranet and will continue to make maximum use of this new medium along with this we will publish library lists through "Underground".

The survey also showed that some respondents are unclear about the role of the Client Board itself and would benefit from a more visible Board if it is to represent and feedback issues from the customer base.

The Centre works on a project by project basis; resources, both staff effort and finance are deployed according to the needs of each project and the agreed budget.

3.3 FINANCE

The Centre budget and end of year out-turn is presented below. Additional monies (£90k) from DETR were provided to enable some of the additional NVZ work which was not originally in our business plan for the year. To improve clarity the large budget item "contract services" was split to better identify the amounts spent on environmental consultancy services in the delivery of the projects.

The final out-turn for the year was a £5k overspend, however this is well within our performance target of 2.5 % of budget.

Item	Initial Budget	Revised Budget	Out turn
MANPOWER COSTS:			
Staff costs	658,408	682,708	684,475
Relocation Costs	13,000	14,130	
TOTAL	658,408	695,708	698,605
OTHER COSTS			
Transport & Plant		5,000	6,013
Equipment & Materials	10,000	25,000	26,324
Consultants	554,000	443,500	393,255
Hire & Contract			
Serv - other	42,042	56,750	98,004
Office Costs	29,550	42,000	49,915
Other Costs	4,000	33,000	33,737
Support Services Costs	100,000	98,000	100,000
TOTAL	739,592	703,250	707,248
GRAND TOTAL	1,398,000	1,398,958	1,405,853
INCOME:	1,000	1,000	2,469
TOTAL	1,397,000	1,397,958	1,403,384
Overspend			5,426

3.4 STAFFING

The Centre complement grew to 19 full time equivalent (FTE) posts at the start of the year. The three new posts were funded through extra grant-in-aid associated with the "new duties" of Groundwater Regulations and Part IIA contaminated land regime.

All three posts took time to fill with the last new staff member joining in January 2000. Nevertheless the Centre is fortunate to have been able to attract extremely able and committed individuals including:

- a scientific support team leader from a Midlands Area office
- a former director of a major UK consultancy
- a doctoral risk assessment scientist specialising on contaminated land and water

In addition, a number of individual contractors were used to support project work in various areas:

- Environmental Simulations Ltd (Laurence Brown) used to support groundwater resources projects
- WS Atkins plc (Frank Westcott and others) used for engineering advice on land contamination sites
- Professor Ken Rushton (University of Birmingham) used for groundwater modelling advice.
- Blue Arrow for temporary support staff.

3.5 EFFORT

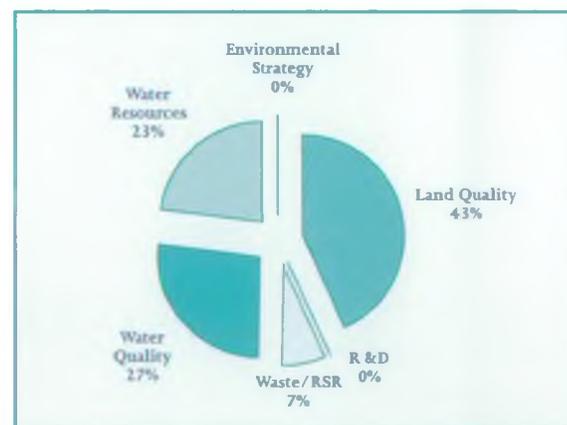
Delivery of the Centre work programme is focussed through a system of projects and a computer-based time recording system allows us to both review the effort expended on each project and then to use this information in future planning. A breakdown of the workload by customer is shown in the attached chart. However, it is important to recognise that this is only a partial reflection of the beneficiaries of Centre projects. For in truth, much of our work is multifunctional, for example advice on Waste Management Licensing to Land Quality and Waste functions.

EFFORT (OFFICER TIME) EXPENDED BY FUNCTION

Actual

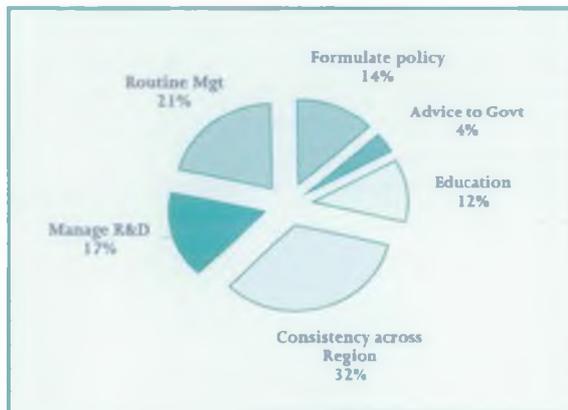


Planned



There are a number of reasons for the differences between the effort distributions as originally planned versus the actual. The bulk of the effect is due to difficulties in attracting additional staff early in the year. As indicated this meant that the two additional posts for Land Quality related new duties did not join the Centre until late 1999 or January 2000. As a result the proportion of time spent on Land Quality is reduced. Nevertheless it is clear that the Water Management Directorate obtain excellent value for money.

The work done within the Centre may be compared with the Environmental Protection Directorate's Priority Planning exercise and the activity categories described therein. Doing so provides the breakdown of activities shown in this section.



3.6 BUDGET FOR 2000/01

The Client Board approved a budget of £1569k for the current financial year (2000/01). This is again an increase over the previous budget and reflects the addition of new grant-in-aid associated with groundwater monitoring and the Groundwater Regulations. It also includes finance specifically for the Capital Projects work carried out for Land Quality Function on behalf of DETR.

ITEM	SUPPORTING DIRECTORATE/FUNCTION (£K)					
	TOTAL	WR	LQ	WQ	WM	RSR
Staff costs	712	186	273	211	21	21
Associated costs	235	61	90	70	7	7
Project direct costs	622	175	223	285	6	7
TOTALS	1,569	422	586	566	34	35

4. HEALTH, SAFETY AND ENVIRONMENT

TRAVEL

The Centre set a car mileage target of less than 103,017 miles for the year, equivalent to a 9% reduction from the previous year. This target was easily met with a final figure of 74,740 miles by car. In addition the Centre also began recording mileage by train which totalled 50,378.

Clearly, the late appointment of some posts made attaining the target perhaps easier than it otherwise would have been. However, even when these effects are taken into consideration, the Centre was on track to meet the target.

The Centre contributes to and joins all Midlands Region HSE initiatives. Other environmental efforts such as paper recycling are already in place and one staff member represents the Centre on the Midlands Green Transport panel.

The Centre has instituted paper use and recycling monitoring and used 106 reams of printer paper.

5. UNSOLICITED ITEMS

Delegation from India... "Thank-you for the time and effort you put into this session. It obviously paid off and presented the Agency in a very good light. Well done."

Ed Gallagher, Environment Agency

"I, along with my colleagues have read and commented on the draft report, we believe it to be an excellent report which holds invaluable information"

Jon Tait, East Riding of Yorkshire Council

"I also wish to formally acknowledge the debt we owe to Dr Baker. His advice has been invaluable in helping to refine the scheme to reduce costs and simplify the works, whilst still retaining the high levels of protection our pupils require."

Parin Bahl, London Borough of Newham

"The vision and hard work of the NGWCLC appears to be paying dividends. I thought you may be encouraged to receive this feedback."

Louise Stelfox, Environment Agency

"We appreciate very much that we can use the translation you have commissioned. Thank you very much on behalf of the Dutch Ministry of Environment. It is indeed a good example of collaboration.

We will write our acknowledgement in the copies we will distribute. In case we can do anything in return, please let us know."

Onno van Sandick,
Ministry of Environment Netherlands

APPENDIX A - CLIENT BOARD (GENERAL)

CLIENT BOARD MEMBERSHIP AS OF MARCH 2000

Paul Leinster	Director, Environmental Protection - Chair
Martin Griffiths	Head, Water Quality
Mark Kibblewhite	Head, Land Quality
Giles Phillips	Head, Water Resources
Alistair Ferguson	Manager, Environmental Monitoring
Simon Read	Regional EP Manager, Thames Region

Andrew Skinner	Regional EP Manager, Midlands
Sue Herbert	Groundwater and Contaminated Land Project Manager
Geoff Bateman	Area Manager, Devon
Jan Gronow	Waste Function Policy Manager
Andy Bell	Chief Accountant, Midlands
Mike Eggboro	Water Resources Manager, NW Region
Paula Woolgar	Policy Advisor (Environmental Risk), SEPA
Stephen Foster	Assistant Director, BGS
Ian McDonald	Water Quality DETR Manager,
Bob Harris	National Centre, NGWCLC
Mary Goldsworthy	Business Support Officer, NGWCLC

APPENDIX B OPMS FOR THE YEAR

OPERATIONAL PERFORMANCE MEASURES FOR THE NATIONAL GROUNDWATER AND CONTAMINATED LAND CENTRE

1. DELIVER THE APPROVED BUSINESS PLAN TO AGREED TIME, WITHIN BUDGET AND TO A HIGH QUALITY

Item: Final expenditure to be within 2 1/2 %

Performance: Overspend of £5k on budget of £1.4M, within target.

Item: 90% of projects completed to time.

Performance: The plan for the year identified 47 deliverable items from National Centre projects. 35 have been delivered or are currently at printing/production stage. The other 12 were from projects which were revised early in the year and either delayed or deleted. Indeed, 4 projects were delayed as a direct result of the addition of new work requested. DETR required urgent advice for nitrate vulnerable zone designation. Land Quality Head Office requested a major shift in effort into Part IIA guidance writing in advance of implementation and in order to supply training material. This also affected some R&D although conversely it has increased work on some LQ R&D to deliver items for Part IIA

2. DELIVER A QUALITY SERVICE TO CUSTOMERS AND MAINTAIN HIGH EXTERNAL REGARD

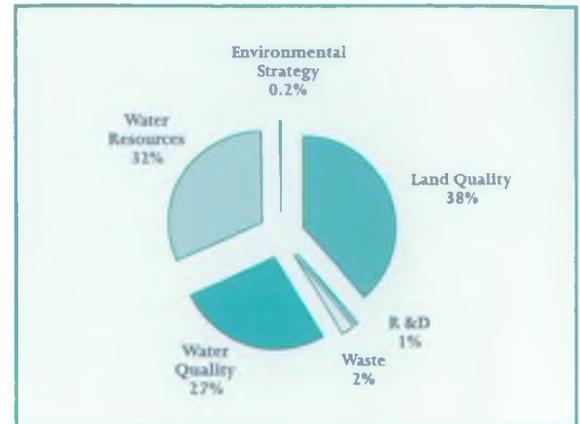
Item: Customer satisfaction survey

Performance: Carried out in summer/autumn 1999. Results reported in Section 3.2.

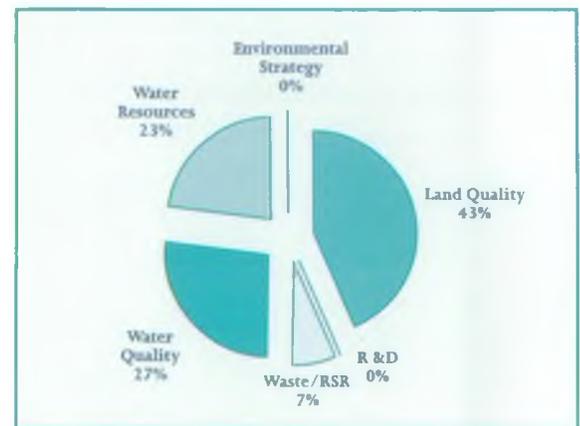
Item: Distribution of work done: national and operational issues

EFFORT (OFFICER TIME) EXPENDED BY FUNCTION

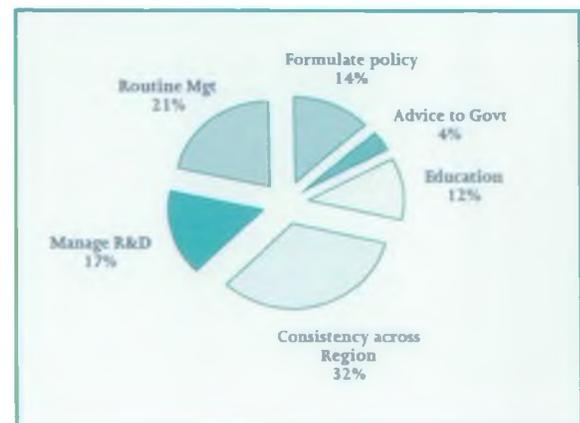
Actual



Planned



There are a number of reasons for the differences between the effort distributions as originally planned versus the actual. The bulk of the effect is due to difficulties in attracting additional staff early in the year. As indicated this meant that the two additional posts for Land Quality related new duties did not join the Centre until late 1999 or January 2000. As a result the proportion of time spent on Land Quality is reduced. Nevertheless it is clear that the Water Management Directorate obtain excellent value for money.



Item: Numbers of Capital Fund and SCA sites reviewed

Performance: 12 Agency Capital Fund sites reviewed with a total cost of £2m.

Over 70 Local Authority SCA bids reviewed - total budget directed by Centre staff was approximately £14M. Plans for more Agency sites were hindered by a re-interpretation of the legal implications of Agency work carried out under Section 161 WRA and any subsequent cost recovery. Nevertheless some substantial benefits were seen including a saving of £1.7M on one site

Item: Business impacts of Centre work, improved cost/benefits due to Centre efforts.

Performance: To be carried out after year 3.

3. PLAY A LEADING ROLE IN INTERNAL AND EXTERNAL EDUCATION AND DISSEMINATION OF AGENCY POLICY AND BEST PRACTICE.

Item: Numbers of guidance and policy papers produced or with significant contribution.

Performance: This is a difficult item to quantify, input ranges from overall control to discrete groundwater items. Approximately 12 items of major importance to the Agency including NVZ designations, Groundwater modelling strategies and integration of groundwater and river flows. Groundwater Regulations policy development. Procedural documentation and supporting Internal Standards for Part IIA contaminated land regime including Guidance note 4, IS for Remediation, Pollution of Controlled Waters Information and Public Registers, guidance to determine the best practicable technique for remediation.

Item: Numbers of internal seminars carried out and uptake by Operational staff

Performance: ● Joint Training Initiative a series of technical awareness seminars carried out at Regional and Area level and delivered to a total audience of over 2,000 Agency and Local Authority staff.

● "What we can learn from real aquifer pumping data" series of seminars to over 120 Operational staff

● Contaminant transport modelling workshops in each Region with 15 staff at each.

● Joint hydrology and hydrogeology conference 2-day event attended by over 250 staff.

● Supplementary Credit Approval and Capital Fund sites seminar for Land Quality Regional staff.

● Use of clay in landfill liners training for Area staff.

● Source Protection Zone maps seminar for Planning Liaison staff.

Item: Numbers of key national events led by Centre.

Performance: ● Joint Training Initiative a series of technical awareness seminars carried out at Regional and Area level and delivered to a total audience of over 2,000 Agency and Local Authority staff.

● MTBE Conference co-sponsored with Imperial College attracted an international audience of 150 with academics, industry, regulators (including European Environment Agency) and press with keynote presentation by Head of Centre.

● Groundwater Festival co-sponsored (with Midlands Region, BT, Severn-Trent, BGS, Chemex)

● Natural attenuation workshop bilateral UK-Netherlands workshop for key national experts.

● Groundwater NVZ methodology seminar for DETR and MAFF.

Item: Numbers of technical enquiries and requests for assistance

Performance: 350

Item: Numbers of publications (leaflets, journal papers, invited lectures, etc)

Performance: ● A5 size booklets (via PENS). "Source protection zones", "Searching for Groundwater"

● Underground bi-monthly circular to Agency staff, 6 editions, circulation approximately 500 copies.

● Groundwater and Contaminated Land web pages -see below

● Methodology for the derivation of remedial targets for soil and groundwater to protect water resources - major R&D output.

Major invited lectures etc

- CIEH Annual conference,

- EU-IMPEL Prague,

- UK-Japan Bioremediation Workshop (presented by Head of R&D)

- CIWEM Soil and Groundwater Conference.

- IAH-GWF seminar Groundwater Protection.

- Urban Mines seminar,

- CIRIA seminar - construction industry and contaminated land,

- CONSOIL,

- IBC Groundwater Pollution and Remediation course (Manchester)
- Presentations at Universities of Southampton, Sheffield, Nottingham, Reading, Aston, Belfast, Birmingham and Imperial College London.

4. EXTERNAL VALUE AND POPULARITY OF CENTRE PRODUCTS.

- Item: Numbers and face value of publications or data distributed through PENS, The Stationery Office.
- Performance: Stationery Office - 1,263 items sold with face value of £36k. This out of total for all TSO/Agency sales. 4,275 items and £202k VARs (Landmark etc) Groundwater vulnerability maps - Value approx £3k. The National Centre launched the 'Groundwater & Contaminated Land Issues' webpages on 9 September 1999. These pages were well visited from the beginning and are now more popular than such areas as 'Environment Action', R&D, IPPC, the 'Demand Management Bulletin' and 'Focus and Forward Look'. The Centre publication on MTBE, which is available for electronic download, is rated as the 5th most popular download document on the Agency site. Collectively the pages receive approximately 4,500 hits per month.

5. DEVELOPMENT OF R&D PROGRAMMES.

- Item: Value of R&D projects compared to total Agency R&D. Target - 5% of total
- Performance: In total there are 30 R&D projects although one of these (P2-169) is an "umbrella" project with currently 7 sub-projects underway and more planned. The total R & D budget for 1999/00 is for £9,983K. Projects managed by Centre staff amount to £904k (including both on-going and new starts, and one project which was originally down as being done by another topic leader) with collaborative funding this rises to £2,200k. This indicates a percentage of total spend as being 9%, significantly above the target of 5%.

- Item: Collaborative funding for Centre managed R&D projects. Target - >50% matching funds.
- Performance: The total Agency funding for Centre managed R&D is £904K compared to collaboration funding of £1,301K.
- Item: Proportion of projects completed to time and on budget. Target - 90%
- Performance: All are on target with 14 completed or awaiting ERSE. Two were delayed early in the year at the request of the relevant Programme Officer (1) or with their agreement (1). Of the other 14, 5 are due to complete within the first quarter of 2000/01.

6. CONTINUOUS IMPROVEMENTS AND CONFORMANCE WITH AGENCY POLICIES.

- Item: Achievement of environmental targets,
- Performance: Car mileage 75,000 against a target of 103,000. Only 75% of the target, no doubt some of this is due to delays in appointing staff.
- Item: External requests shall be dealt with in accordance with the Agency Customer Charter.
- Performance: Enquiries database revised, 1,100 recorded entries detailing requests for assistance, typically 3 per month are recorded as overdue for response an approximate rate of 97% compliance.

7. LINKS WITH OTHER CENTRES, SERVICES AND AGENCIES.

- Item: Number of collaborative projects with Centres, Services and externals. Target - 10% of total.
- Performance: From a total of 50 projects, 6 involve significant collaboration with HEIs, SEPA, BGS etc and other Centres/Services (EDS, EHS, ESD) ie. 12%.
- Item: Number of collaborative projects with Regions/Areas. Target - 20 per annum.
- Performance: From a total of 50 Centre projects identified at the start of the year, 34 involved some Regional or Area input and 8 involved substantial Region or Area collaboration (e.g. SPZ mapping where Regional data was collated by the Centre)

MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

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Fax: 0118 950 0388

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St Mellons
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Fax: 029 2079 8555



ENVIRONMENT AGENCY
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0845 933 3111

ENVIRONMENT AGENCY
FLOODLINE

0845 988 1188

ENVIRONMENT AGENCY
EMERGENCY HOTLINE

0800 80 70 60



ENVIRONMENT
AGENCY



Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources



CONTAMINATED LAND PART IIA EPA 1998

PROCESS DOCUMENTATION

EA2 Publication M



ENVIRONMENT AGENCY Policy and Practice for the Protection of Groundwater SOURCE PROTECTION MAP Sheet 53



- SOURCE INDEX**
- SU0077 Prison
 - SU0079 Birlings Farm
 - SU0080 Church
 - SU0081 Birlings
 - SU0082 Halywell
 - SU0083 Waterworks Road
 - SU0088 Railway

This map must be used with the accompanying procedure notes printed on the reverse.

- Groundwater Sources**
- Zone Protection Zone
 - Zone 1 - Zone Protection Zone
 - Zone 2 - Zone Protection Zone
 - Zone 3 - Zone Protection Zone
 - Zone 4 - Zone Protection Zone
 - Zone 5 - Zone Protection Zone
- Site Classification**
- Major Source
 - Minor Source
 - Not Aquifer and other unclassified sites

National Groundwater and Contaminated Land Centre

Workplan 2000 - 2001 and beyond

Underground

From the National Groundwater and Contaminated Land Centre Environment Agency

Part IIA Comes into Force

Part IIA of the Environmental Protection Act 1990 (EPA) came into force on 1st October 2000. This means that the Environmental Protection Act 1990 (EPA) now covers the protection of groundwater resources. The new provisions of the Act are designed to ensure that groundwater resources are protected from contamination and that any contamination is identified and remedied as soon as possible.

- In This Issue**
1. Introduction
 2. The new provisions of the Act
 3. The new provisions of the Act
 4. The new provisions of the Act

environment information

Groundwater and Contaminated Land Issues

What is the 'Groundwater and Contaminated Land' issue?

Groundwater is a vital part of our life and environment. It is a natural resource that is essential for drinking water, agriculture and industry. It is also a key component of our environment and plays a vital role in maintaining the health of our ecosystems.

Groundwater is a natural resource that is essential for drinking water, agriculture and industry. It is also a key component of our environment and plays a vital role in maintaining the health of our ecosystems.

National Groundwater and Contaminated Land Centre

Groundwater Source Protection Zones

ENVIRONMENT AGENCY

National Groundwater and Contaminated Land Centre

The fuel additive MTBE - a groundwater protection issue?

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