

**REVIEW OF
RESEARCH & DEVELOPMENT
NATIONAL REPORT**



Report issued by:

Steve Egan
Head of Internal Audit

28 May 1993

ENVIRONMENT AGENCY



124690

REPORT TITLE: Review of Research & Development

REPORT NO: NAT / 084

TO: Jan Pentreath, Chief Scientist and Director of Water Quality

FROM: Steve Egan
Head of Internal Audit

DATE OF AUDIT: December 1992 - April 1993

REPORT DATE: 28 May 1993

AUDITOR: Kevin Woodrow (Principal Auditor)

AUDIT MANAGER: Miles Jordan Audit Manager
(Projects & Computing)

CIRCULATION: Ed Gallagher, Chief Executive
Kevin Bond, Director of Operations
Peter Humphreys, Director of Personnel
Nigel Reader, Director of Finance
Clive Swinnerton, Director of Water Management
Mervyn Bramley, Head of Research & Development
Mark Yeomans, Head of Procurement
Grainger Davies, RGM Anglian
Roger Hyde, RGM Northumbria & Yorkshire
Chris Harpley, RGM North West
Doug Rainbow, RGM Severn Trent
Katharine Bryan, RGM South West & Wessex
Kevin Whiteman, RGM Southern
Les Jones, RGM Thames
John Stoner, RGM Welsh

CONTENTS

1. INTRODUCTION
 2. OBJECTIVE AND SCOPE
 3. CONCLUSION AND SUMMARY
 4. FINDINGS & RECOMMENDATIONS
 - 4.1 Organisation and Management
 - 4.2 Prioritisation of Projects
 - 4.3 Project Planning, Management and Post Project Appraisal
 - 4.4 Achievement of Project Cost and Benefit Targets
 - 4.5 Uptake of R&D Project Outputs
 - 4.6 Compliance with the Financial Memorandum and Scheme of Delegation
-
- APPENDIX A NATIONAL RECOMMENDATIONS
- APPENDIX B ANALYSIS OF THE PROCUREMENT STRATEGY FOR
R&D PROJECTS LET IN 1991/92 AND 1992/93

1.0 INTRODUCTION

- 1.1 The National Rivers Authority has a statutory duty to carry out research relating to the functions of the Authority.
- 1.2 The Authority spends a significant part of its budget on Research & Development (R&D) - approximately 2% in 1992/93. The 1992/93 Corporate Plan forecast 131 projects to be underway at the end of 1991/92 with 83 new projects budgeted to start in 1992/93. 1991/92 expenditure for R&D projects and support services was forecast as £8.3m, and 1992/93 budgeted expenditure was reported as £8.7m. This was reduced to £7.4m in October 1992, and has been managed at this level since then.
- 1.3 The primary purposes of R&D were approved by the Board in the Chief Scientists position paper NRA(93)5. They are:
 - to improve its ability to carry out statutory duties;
 - to improve its efficiency and effectiveness in carrying out its business;
 - to support its policy development;
 - to increase its general knowledge and understanding, particularly of the aquatic environment.
- 1.4 This review of Research & Development was outlined in the 1992/93 Operational Internal Audit Plan, which was approved by the NRA Board.
- 1.5 The review included an examination of three projects in detail. These projects were managed by Project Leaders in the South West, Wessex and Yorkshire regions.
- 1.6 National recommendations are summarised in Appendix A. Recommendations which have an incremental cost of more than £500 or two man days have been costed.

2.0 OBJECTIVE AND SCOPE

2.1 Objective

To ensure that Research & Development projects are being effectively managed, that they support the NRA's objectives and achieve value for money.

2.2 Scope

The audit reviewed the management and control of R&D projects and expenditure. The aims of the audit were to:

- Review the organisation and management of R&D
- Review the prioritisation of the projects undertaken
- Review the effectiveness of project planning, management and post project appraisal
- Review the achievement of project cost and benefit targets
- Review the process of uptake of R&D project outputs
- Review compliance with the Financial Memorandum and Scheme of Delegation
- Throughout, review the value for money obtained

Projects managed in three regions were reviewed in detail.

MEMORANDUM

To: Ed Gallagher, Chief Executive
 Kevin Bond, Director of Operations
 Peter Humphreys, Director of Personnel
 Nigel Reader, Director of Finance
 Clive Swinnerton, Director of Water Management
 Mervyn Bramley, Head of R&D
 Mark Yeomans, Head of Procurement
 All Regional General Managers

From: Steve Egan
 Head of Internal Audit
 7-10-4417

Our Ref: KW_2705b.MEM

Date: 27 May 1993

G. Davies

G. Brighty

rec 2/6/93

Interesting report.

- any comments

NRA

MP

2/6/93

NATIONAL RIVERS AUTHORITY (ANGLIAN REGION)			
REGIONAL GENERAL MANAGER			
1 - JUN 1993			
ORIG	<i>GD</i>	FOR INFO	<i>MP</i>
COPY			

for Geoff Brighty

REVIEW OF RESEARCH & DEVELOPMENT - NATIONAL REPORT

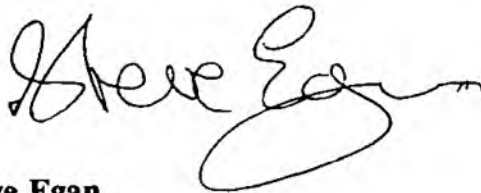
I enclose a copy of our national report - Review of Research & Development for your information.

This report has been cleared with appropriate Directors and Heads of Function. You need take no additional action on receipt of this memo. RGMs may wish to distribute the report to their R&D Contact Points.

I would like to thank Directors, Heads of Function and staff who contributed to this audit. In particular I would like to thank R&D staff in South West, Wessex and Yorkshire regions (as they were at the time of the audit fieldwork).

The report concludes that R&D in the NRA is well managed. Planning of R&D projects effectively supports the Authority's business objectives. Current procedures are adequate to manage projects and control expenditure; improved draft procedures await completion of the NRA Project Management Methodology. Tender and contract specifications should be more detailed. Value for money is difficult to assess as project benefits are usually not quantified. Value for money may be restricted by the limited number of specialist contractors; more than half of contracts are let by Single Tender Action.

If you have any questions on the report please do not hesitate to contact me.

A handwritten signature in black ink, appearing to read "Steve Egan". The signature is fluid and cursive, with a large loop at the end of the last name.

Steve Egan
Head of Internal Audit

Encs: Review of Research & Development - National Report

3.0 CONCLUSION AND SUMMARY

3.1 Conclusion

Research & Development in the NRA is well managed. Planning of R&D projects effectively supports the Authority's business objectives.

Current procedures are adequate to manage projects and control expenditure; improved draft procedures await completion of the NRA Project Management Methodology. Tender and contract specifications should be more detailed.

Value for money is difficult to assess as project benefits are usually not quantified. Value for money may be restricted by the limited number of specialist contractors; more than half of contracts are let by Single Tender Action.

3.2 Summary

Numbers in brackets refer to paragraphs in section 4 - Findings and Recommendations.

3.2.1 Organisation and Management

We found the organisation of R&D in the Authority to be complex. It incorporates project identification and management by functions, and management of the overall programme, including budgetary control, by the Head Office R&D function for the Chief Scientist [4.1.2]. We believe that this structure has significant benefits and is well suited to the needs of the Authority.

The Authority's R&D programme addresses national rather than regional issues. We found a category of expenditure on research related matters within regions which is outside of the controlling framework of national R&D projects - Operational Investigations [4.1.3]. Expenditure on OIs in 1993/94 is planned to be £3 million. We believe that there is a lack of central coordination of these regional projects which may lead to duplication and reduce value for money. We recommend a central register of OIs in Head Office with a review of planned OIs to identify potential duplication.

3.2.2 Prioritisation of Projects

We found the initiation of R&D projects to be business led, with good liaison between national and R&D projects [4.2]. The close ties between business needs and R&D projects forms a sound basis for achieving value for money.

3.2.3 Project Planning, Management and Post Project Appraisal

We believe the current project management procedures used by R&D to be adequate and effective [4.3.1].

R&D have commissioned a Project Management Manual which is in draft form awaiting any necessary changes after the NRA Project Management Methodology has been finalised. We believe that this manual makes some improvements to the existing procedures and we recommend that it be adopted as soon as practicable [4.3.1].

R&D Support currently undertake no Post Project Appraisals (PPAs) [4.3.2]. We recommend that PPAs are undertaken in the future in line with the NRA's Project Management Methodology.

In our review we found no cases where benefits were quantified during the assessment of projects. This makes it difficult to ensure that the Authority achieves value for money [4.3.3]. We recommend that where possible benefits are quantified; where it is deemed not to be possible Project Leaders should include a justification for not quantifying benefits in the Project Investment Appraisal.

The Cabinet Office guide "R&D Assessment" recognises that benefits may not always be quantified in monetary terms and suggests alternative assessment techniques. Further guidance in this area is expected from the Economic Appraisal PIN which is currently being drafted.

Project Investment Appraisal (PIA) documents are used for a number of purposes. This leads to a risk of unnecessary, or insufficiently detailed, information being provided to users [4.3.4]. We recommend that different documents are used. In particular we recommend that more detail is included in specifications, and that these are revised between the tender and contract stages.

We noted during our audit a document granting approval subject to conditions which we do not believe the authorizer could then assess had been met [4.3.5]. We recommend that conditional approvals are not made.

We have made recommendations for improving the control and filing of documents [4.3.6].

3.2.4 Achievement of Project Cost and Benefit Targets

A significant number of projects incur some supplementary expenditure, for a variety of reasons, although this is generally low [4.4.2].

We found that all payments we examined on contracts were appropriately authorised prior to payment being made [4.4.3].

3.2.5 Uptake of R&D Project Outputs

From the projects which we reviewed we found the uptake of outputs to be good. The Head of R&D has concentrated on effective uptake [4.5].

3.2.6 Compliance with the FM and SoD

63% of projects were let by Single Tender Action in 1992/93 (60% by value of contracts) [4.6.2]. We found that the projects we examined in detail were justified in being let by Single Tender Action. The Head of R&D has classified many of the projects let by Single Tender Action as one of the following:

- determined by joint consultation with other funding bodies
- where the NRA wishes the contractor to build up and maintain expertise on its behalf
- where the contractor holds a unique national position as a research institution

We recommend that the Chief Scientist obtain the Board's approval of the extent of the procurement of R&D contracts through Single Tender Action with national research institutions and in collaborative ventures. The Board may consider that the view of the Department of the Environment should be sought.

We found all tender processes for the projects we reviewed in detail to have complied with the FM and SoD [4.6.1].

The NRA Procurement Manual permits the R&D contracts to be let under the two envelope tendering system [4.6.3]. We agree that this is appropriate in some circumstances. We recommend that R&D services should not be procured on the basis of obtaining value for money within a specified price band. Where it is necessary to indicate the scale of the work required this should be done through the specification of the output, or of the number of man-days.

4.0 FINDINGS AND RECOMMENDATIONS

We detail audit findings below in normal type *with their implications highlighted in italics* and our recommendations in bold text.

4.1 Organisation and Management

4.1.1 Statutory Duties and Board Delegation

The Authority has a duty:

"to make arrangements for the carrying out of research and related activities (whether by the Authority or others) in respect of matters to which the functions of the Authority relate" (Water Resources Act 1991).

Since vesting the Chief Scientist has reported his proposals for management of R&D to the Board in position papers in February 1990 and recently in February 1993. The papers were comprehensive descriptions of the organisation and management of R&D in the Authority. The Board approved both papers.

4.1.2 R&D Management Structure

R&D management is structured to give functions responsibility for the identification of R&D objectives, project management and the implementation of outputs. The R&D Support function is responsible for the quality control of R&D projects, progress monitoring, project management support and control of the overall R&D budget.

The structure is complex, involving two reporting lines from Project Leaders up to the Executive Group - one for R&D programme management; the other for project/commission management. This structure is shown on the following page.

The structure is consistent with the Cabinet Office publication: 'R&D Assessment - a guide for customers and managers of research and development, HMSO, 1989. We understand that the DoE recommend that this guide is followed by Non-Departmental Public Bodies in their R&D management. It is dissimilar to the private sector companies examined in a publication by the Institute of Cost and Management Accountants (Lothian 'How companies manage R&D - a survey of major UK companies', ICMA, 1984).

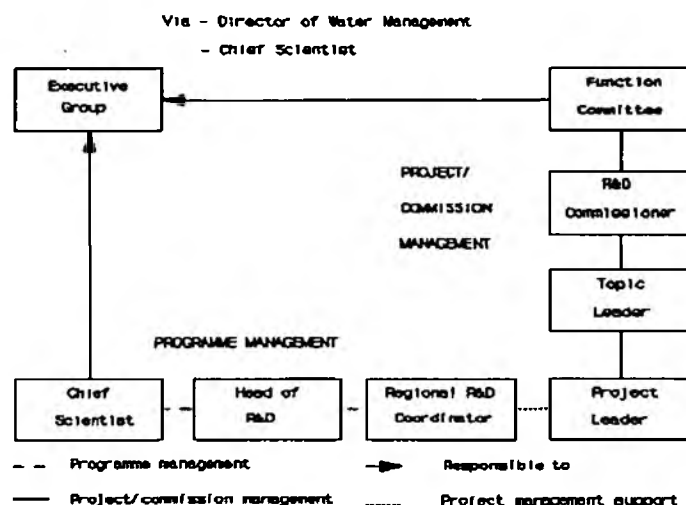


Figure 1 - Lines of R&D programme and project/commission management

The structure has the following advantages:

- project management is conducted by staff who are aware of the Authority's needs and are motivated to produce project outputs
- the R&D programme is managed by Head Office R&D Support which has no functional or regional bias
- central coordination will prevent duplication of effort in projects managed in the regions
- individual projects are quality controlled by Head Office R&D Support
- Head Office R&D Support also has overall budgetary control, providing good segregation of duties

Regional R&D Coordinators may feel some conflict of interest between their regional duties and national R&D duties. This is being addressed in some regions by the inclusion of R&D duties in performance objectives and appraisals.

We recommend that the Director of Personnel issue guidance to Regional Personnel Managers to ensure that the duties of regional R&D Coordinators are included in the performance objectives and appraisals of those staff.

In our view the management structure is well suited to the needs of the Authority.

4.1.3 Operational Investigations

Operational Investigations (OIs) are projects, conducted and funded by regions, whose primary purpose is to address a regional or site specific need.

The Directors of Finance and Operations and the Head of R&D agreed a position paper on OIs with the Operations Team in May 1992 (OPS(92)12). This note includes a description of types of OI. These categories are drawn according to potential interest in the OI outside the Region eg "Regional OI", "OI reported nationally", "Part R&D/Part OI". In our discussions with Head Office and Regional Operations and Corporate Planning staff we found that these designations were not universally known or applied.

We attempted to ascertain the extent of OIs conducted in regions. We obtained information through the Operations Directorate and through the Corporate Planning function. The type of information collected by these functions meant that we were unable to reconcile them together to ensure that either or both included all OIs. The information from the Corporate Planning function included a breakdown of planned regional expenditure on OIs by function. In summary, for 1993/94, this was:

	<u>£'000</u>
Base budget	2,113
Further bid	981
	<hr/>
	3,094
	<hr/>

At the time of our review there was no register of OIs in Head Office. A register is now being compiled by the Operations Directorate.

Because of the lack of information on OIs in each region at Head Office, and the lack of a formal central approval or coordination function for OIs, there is a risk that there will be a duplication of effort if OIs in two regions perform similar work. Also there may be some overlap with an R&D project.

We support the decision of the Director of Operations to produce a central database of OIs at Head Office. We recommend that this be maintained and regularly reconciled to Corporate Planning information and regional financial reporting information to ensure that all OIs are included.

We also recommend that a central OI Coordinator be designated at Head Office to monitor OIs and help to identify potential duplication between OIs. Regions should report OIs to Head Office in the form agreed by OT and in sufficient detail that the Coordinator can identify duplication between OIs, and any overlap with R&D projects and other national activities. This will involve close liaison with the R&D section in Head Office.

4.2 Prioritisation of Projects

- 4.2.1** The identification, justification and initial prioritisation of the R&D programme for each function rests with the relevant Function Committee. Committees may receive inputs to the process from functional staff, external funding agencies and Flood Defence Chairmen. From 1993/94 proposed R&D programmes are presented as part of Functional Business Plans, supporting the business needs of the function and development initiatives identified by the Executive Group.
- 4.2.2** The Water Quality function has the largest R&D programme. The function has recently reduced the number of R&D Topic Areas to eight, in line with the initiatives set out in the function business plan. The smaller R&D programmes for the other functions did not require further rationalisation.
- 4.2.3** We are satisfied that this approach leads to the effective prioritisation of projects.

4.3 Project Planning, Management and Post Project Appraisal

4.3.1 Overall Procedures

Early in 1992 R&D Support sought to review and improve its project management procedures. The function commissioned the writing of a project management manual by PA Consulting Group. The draft manual was completed and delivered in July 1992. At this time the Authority had commissioned a project to produce a Project Management Methodology and Manual for the organisation as a whole. Implementation of a final R&D Manual was delayed to allow PA Consulting and R&D to make any changes to it required by the NRA Project Management Methodology. The NRA methodology has yet to be finalised and the R&D manual remains in final draft form.

We have assessed the current R&D project management procedures used in the function, and documented in various R&D papers. We consider that these procedures are adequate for use in the interim period before the manual is fully implemented. The new draft manual includes some improvements from current procedures. In particular we noted improvements in the areas of:

- feasibility studies
- refining the purpose of the Project Plan and Project Investment Appraisal (PIA)
- including all uptake costs within projects and improving the identification of costs in the PIA
- clarifying the handover of an R&D output to the user
- requiring authorization and approval forms
- managing the risk that the NRA's objectives will not be met

We understand that the first, third and fourth items have been implemented in interim procedures.

We recommend that the R&D project management manual be adopted as soon as the national manual has been completed and necessary changes to the R&D manual made.

4.3.2 Post Project Appraisal

R&D Support performs very little Post Project Appraisal (PPA). A number of workshops have been held, including external people, to assess the performance of R&D Support. No formal PPA of individual projects is performed.

The Post Project Appraisal section of the draft R&D Project Management Manual remains to be completed.

Where formal post project appraisal is not performed there is a risk that lessons from managing projects will not be learned and implemented to benefit the management of future projects. In particular issues may not be identified, and if they are this experience may not be spread to other staff who could also gain from it.

We recommend that R&D section develop and perform post project appraisals of R&D projects in line with recommended procedures in the NRA Project Management Manual. These procedures should include reviews of:

- how well the project requirements were specified, and how well the project was managed
- how well the project was targeted; the quality of the research and its cost-effectiveness
- the success of the project's uptake and the value for money achieved.

4.3.3 Quantification of Benefits

Benefits stated in the PIAs of the projects reviewed in detail were not quantified. We also examined a number of other PIAs. None of them contained quantified benefits.

The Head of R&D has issued a guidance note on completing this aspect of Project Investment Appraisals. This note states that:

"Wherever possible, the benefits deriving from the project should be described and quantified in terms of the likely net savings made . . . The benefits will usually be more readily quantified for projects where the Primary Purpose addresses operational effectiveness, than those which bring about an improvement in the environment or deal with providing information for policy development, complying with a statutory duty, or underpinning knowledge. With the latter, it is often difficult to quantify the benefits and, where necessary, benefit will need to be described in qualitative terms".

Where benefits are not quantified a comparison of the costs and benefits of a project may not be directly made. Value for money may not be achieved. Also monitoring benefits and measuring the success of the project may be more difficult.

We recommend that the Head of R&D ensures that, wherever possible, project justifications include a quantification of benefits. This should certainly include projects addressing operational effectiveness.

This may be done by:

- requiring Project Leaders to include a justification in PIAs for not quantifying benefits
- requiring the Head of R&D to explicitly accept this justification when authorising the PIA.

We recognise that for some R&D projects benefits may not be quantifiable in monetary terms. In these circumstances the Cabinet Office Publication "R&D Assessment" suggests alternative assessment techniques e.g. peer review. These techniques "provide a basis for informed decision making, at all levels of management, in the initiation, selection, direction and termination of R&D"; allowing the value, in non-monetary terms, for a given expenditure on a project to be assessed. An Economic Appraisal PIN is currently being drafted.

4.3.4 The Use of Project Investment Appraisals

Project Investment Appraisals are forms which are used for a number of purposes. PIAs are used as Project Plans, the basis for authorization by R&D section, terms of reference for tendering and final contracts, and sometimes as supporting information for tender boards justifying single tender actions.

The use of the same document for a number of purposes may lead to either insufficiently detailed information or unnecessary information being provided to the user.

We recommend that the purposes currently served by the PIA are in future fulfilled by separate documents. Each may be based on predecessor documents but should be tailored to suit the purpose.

The R&D Manual separates the Initial Appraisal, Project Plan, Terms of Reference for an Invitation to Tender and Project Investment Appraisal. We understand that the Project Plan has now been separated from the Project Investment Appraisal. It is authorised prior to the Invitation To Tender by the Head of R&D.

We believe the use of sections of the PIA as Terms of Reference, or specification, to be a particularly significant problem. We found some specifications included in contracts to be inadequate to avoid misunderstandings with suppliers.

We recommend that the Head of R&D ensure that specifications are as detailed as possible at the tendering stage of the project.

We further recommend that, following the tendering process, these specifications are revised before inclusion in the contract.

4.3.5 Conditional Approval of Documents

We examined three PIAs in detail. We found copies of PIAs authorised by the Head of R&D, or his deputy, in all cases. In one case authorization was given "subject to confirmation from the Project Leader/Topic Leader that the contract is cost-effective". We found no evidence on file of this confirmation having been received.

We also found a Certificate of Tender Board Approval for Supplementary Expenditure to have been signed by one member of the Tender Board with the caveat "on the assumption that the requirements of para 13 of 'R&D Expenditure on National Projects' M. Dalton 28.9.92 have been complied with". We found no evidence on file that this assumption had been tested.

Where conditional authorization is granted for an action the approver loses control of the authorization. Where the condition is not tested authorization may be granted where it is not appropriate.

We recommend that the Head of R&D remind all R&D Support staff with delegated authority of the need to grant authorization clearly and unconditionally. Any reminders of matters to be actioned following authorization should be treated separately.

We further recommend that the Head of Procurement remind all Tender Boards of the requirement that officers submitting papers must confirm their compliance with procedures, and that the Tender Board must satisfy itself that this is the case. The Tender Board should avoid conditional approvals.

4.3.6 Document Control

We reviewed in detail the documentation of a sample of projects.

We found that documentation is held in various locations making it difficult to obtain a complete picture of the history of a project quickly. In particular, we found some documents in Head Office in Bristol; other documents are held in the region in which the project was managed. In regions, documents may be held by the R&D Coordinator, the Project Leader or the Regional SoD Coordinator.

The lack of a consistent filing system for project documentation may result in a loss of documents, may hinder effective project control, and makes Post Project Appraisal difficult.

We recommend that the Head of R&D issue guidance to R&D Coordinators and Project Managers on standard master project documentation files. Guidance should include who should hold each document.

4.3.7 Contracts

The form and standard conditions for R&D contracts were developed in conjunction with the Authority's Legal department and the Department of the Environment. They have standard conditions with supplementary schedules which vary from contract to contract. Where conditions in these schedules conflict with the main contract the supplementary conditions override those of the main contract.

The Scheme of Delegation requires different treatment of standard contracts and non-standard contracts.

The Director of Legal Services has given his opinion that the schedules to the standard R&D contracts vary those contracts but do not make the contracts non-standard.

In all cases where we examined the authorization of contracts, the treatment was in accordance with that required by the Scheme of Delegation for standard contracts.

The commercial rigour of R&D, and other standard contracts, is currently under review by the Head of Procurement.

We found that one contract had been signed some time after the work on the contract had commenced. The contractor was authorised to begin the work under a Letter of Intent. A Letter of Intent is described in the NRA Procurement Manual as:

"A statement made, usually in writing, by one or other of the parties to a prospective contract which confirms an intention to enter the contract in due course. . . It is not the normal policy of the Authority to issue Letters of Intent, but where this is operationally necessary, should be carefully worded to limit, or avoid, the Authority liability in the event that the proposed contract does not proceed."

In this case the signing of contracts was delayed by the contractor's administration. The project needed to commence to take advantage of the season. The Authority sent a Letter of Intent to the contractor's operations to ensure that the project timetable could be met.

We believe that this was a suitable purpose for a Letter of Intent.

4.4 Achievement of Project Cost and Benefit Targets

4.4.1 Costs and Benefits

We have commented on the value of quantifying benefits in section 4.3.3.

4.4.2 Supplementary Expenditure on Projects

R&D Support has analyzed expenditure on projects which were let in 1991/92 and in 1992/93 by original budget and level of supplementary expenditure. This analysis is given in Appendix B.

As expected, the level of supplementary expenditure to date on projects which were let during 1992/93 is very low - £6k on a budget of £4,729k (0.1%).

The level of supplementary expenditure on projects which were let during 1991/92 is £185k on a budget of £5,422k (3.4%). This expenditure related to 22 out of 106 projects (21%).

The figures quoted above do not include inflationary increases to contracted fees. Such increases are included in R&D contracts of more than two years.

All three of the projects which we reviewed in detail had supplementary expenditure. The reason in two of the cases was a change in circumstances in the late stages of the projects which enabled further valuable work to be done. In one case this was due to the unexpected availability of equipment similar to other equipment which the project was established to test. In the second project, set up to assess disinfection techniques, the supplementary expenditure was due to an invitation from a water plc to assess a technique on site at one of its plants.

In the third project the supplementary expenditure was necessary to compensate for unexpected difficulty in performing fieldwork, including poor weather conditions.

We believe that the supplementary expenditure was appropriate in these cases and that the overall level of supplementary expenditure is acceptable.

4.4.3 Authorization of Payments

We reviewed the authorization of payments to contractors under the selected project contracts.

We found that all payments had been correctly authorised before payment was made.

4.5 Uptake of R&D Project Outputs

The R&D section has documented procedures to ensure that project outputs are produced in the most appropriate form, and that uptake plans are developed. An R&D output status report is produced periodically.

The uptake of outputs for the selected projects was good. One project provided data for a mathematical model, as planned. The output of a second project has enabled the Authority to develop a policy and PIN, and will contribute to the UK being able to comply with an EC Directive. The output of the third project was an operational technique which will enable the Authority to perform a statutory duty which it had previously been unable to do without prohibitive cost.

We have referred, in section 4.4.2, to the emphasis placed by the Head of R&D on the uptake of project outputs.

The R&D Project Management Manual includes planning of the uptake stage of an R&D project, in outline as part of the Project Plan and in detail as part of the Undertake Research Stage. The End of Research Stage Assessment (ERSA) incorporates a review of the plans for the following uptake stage. The Manual describes a range of uptake types from simple (despatch of reports to named people) to complex (incorporating publicity, training, development of facilities and staff changes). We understand that the ERSA procedure will soon be implemented, prior to implementation of the Manual as a whole, following the Board's approval of the Chief Scientist's paper on the management of R&D.

4.6 Compliance with the Financial Memorandum and Scheme of Delegation

4.6.1 The Tender Process

The Head of R&D has issued guidance to R&D Support staff on compliance with the Financial Memorandum (FM) and Scheme of Delegation (SoD). He has updated this for the new FM and SoD effective from 1 Oct 1992.

We reviewed the records of the tender process for the selected projects.

Two projects were let by Single Tender Action. The third was principally let by Competitive Tender, although a significant part of the project was the hire of specialised equipment by Single Tender Action.

We found that the procedures followed for the tendering process of all three projects complied with the FM and SoD.

4.6.2 Extent of Single Tender Actions

The latest position paper presented to the Board by the Chief Scientist describes the use of Competitive Tendering and Single Tender Actions in the NRA:

"The majority of the NRA's R&D will be undertaken by external contractors supervised by NRA Project Leaders. Research contractor services will always be procured through Competitive Tender, provided that appropriately qualified tenderers can be identified. R&D contracts may occasionally have to be awarded by Single Tender Action in the following circumstances:

- where only one organisation is found to be qualified to provide the services following pre-tender vetting of possible tenderers against strict selection criteria; or
- where one or more of the other funders, in a collaboratively-funded project, has a binding agreement with a specific research contractor which is acceptable technically to the NRA - this is presently the case for collaboration with Scottish and Northern Ireland regulatory agencies (SNIFFER) and with the Foundation for Water Research."

We requested R&D Support to analyze expenditure on projects let by Competitive Tender and Single Tender Action, as well as by original budget and supplementary expenditure. R&D Support presented the figures for projects let in 1991/92 and let in 1992/93.

In summary, the percentage of projects let by Single Tender Action is:

Financial Year	Percentage of projects let by Single Tender Action	
	Based on number of projects	Based on value of projects
1991/92	64%	70%
1992/93	63%	60%

The full analysis is shown in Appendix B.

The Head of R&D has analyzed the contractors let to by Single Tender Action according to the following categories:

- Collaborative - where the contractor was determined by joint consultation with other funding bodies
- Centre of expertise - where the NRA wishes the contractor to build up and maintain expertise on its behalf
- National - where the contractor has a unique national position as a research institution within the water environment sector
- Other

Projects may belong to more than one category.

The analysis of project types is shown below:

Project Type	1991/92	1992/93
Collaborative	29	25
Centre of Expertise	18	17
National	39	35
Other	18	5
Total projects	67	43

The Head of R&D has quantified the contributions to the funding of collaborative projects by external bodies as £1.49 million in 1991/92 (NRA contribution £1.70 million, 45% of the value of projects let by Single Tender Action) and £13.75 million in 1992/93 (NRA contribution £2.13 million, 76% of the value of projects let by Single Tender Action). Contributions to three projects accounted for approximately £12 million of this £13.75 million. These figures do not include any amounts for non-cash contributions e.g. data supplied free of charge by the collaborating body.

For the three projects which we reviewed in detail we found that:

- One project was inherited at vesting by the Authority. It was reviewed and allowed to proceed with the, already selected, contractor.

We agree that this Single Tender Action was reasonable given the circumstances at vesting.

- A second project was let by Single Tender Action on the basis that the contractor had worked on earlier related projects, and therefore had unique experience, and that the contractor was an identified primary contractor for the R&D programme in this area.

The PIA and Form C, for authorization of a Single Tender Action, also included as a justification:

"other contractors would have to do substantially more work to attain the position already held by WRc, with considerable cost implication."

We accept that the Single Tender Action could be justified due to the unique knowledge and experience of the contractor. However, we do not consider the justification quoted above to be valid. Rather, this statement pre-judges one possible result of a competitive tendering exercise.

We recommend that the Director of Finance issue guidance to regional Tender Boards on reasonable justifications for Single Tender Actions.

- The third project was in two main components. The first of these was a contract, let by Competitive Tender, for data analysis and interpretation. The second was for the hire of specialist equipment. A Single Tender Action was required as there was only one source for the equipment in Europe.

For these projects we consider the Single Tender Actions to have been justified. However, the overall percentage of projects which have been let by Single Tender Action is high. This high percentage appears to contradict the strong presumption against Single Tender Actions of the Financial Memorandum. In contrast, we understand that it is government policy to encourage collaborative projects and to support national research centres e.g. the Research Councils. Unless this conflict is resolved we believe that the Authority may act against government policy.

We recommend that the Chief Scientist obtain the Board's approval of the extent of the procurement of R&D contracts through Single Tender Action with national research institutions and in collaborative ventures. The Board may consider that the views of the Department of the Environment should be sought, in particular on joint audits and technical reviews.

4.6.3 Two Envelope Tendering System

The two envelopes, specified in the Invitation to Tender, hold separately the contractor's Technical Proposal and the Financial Proposal. The NRA Procurement Manual allows this system to be used for the procurement of R&D services. The Manual states:

"A Tender Assessment Team would examine the Technical Proposals first making an objective assessment (scoring) against pre-determined criteria to produce a rating in terms of quality and identifying those which do not satisfy the terms of reference. The Tender Assessment Team would then assess the Financial Proposals. The lowest tender satisfying the terms of reference forms the base-line. The Tender Assessment Team should then consider whether the quality (eg original or desirable attributes; benefits to future phases of the project) of the proposed work warrants the NRA paying more than the base-line tender price (ie more than the lowest technically acceptable tender). If the Tender Assessment Team considers that a higher tender should be accepted, approvals should be sought in line with FM and SoD. A full record of the Tender Assessment Panel's deliberations must be retained on file and a copy supplied to the officer responsible for tender receipt/opening for retention."

Board minute NRA(93)MIN1 (6/93) states that:

"Dr Pentreath advised that for some projects, it was not always possible to select the lowest tender option, as in some cases it did not give value for money. He stressed the need for reliance on professional judgement in such instances. The Board supported Dr Pentreath on this issue."

We accept that the two envelope system of tendering may be appropriate in some circumstances for R&D. In particular, where the objectives of a project, or phase of a project, are to gain new knowledge rather than to produce a clearly specified output.

The NRA Procurement Manual also states:

"In extreme circumstances, R&D services may be procured on the basis of obtaining the best value for money within a specified price band. Approval for such an approach being first obtained through the Tender Board."

We have found no examples of this approach having been adopted in practice.

If the Project Leader cannot specify at least the required attributes of the output this suggests that the project is not being driven by business need. We consider that this approach gives an unacceptable degree of control of the specification to the contractor, and leads to a risk that the Authority will not obtain value for money.

We recommend that the Head of R&D issues guidance to Project Leaders through R&D Coordinators that R&D services should not be procured on the basis of obtaining value for money within a specified price band. Where it is necessary to indicate the scale of the work required this should be done through the specification of the output, or of the number of man-days.

We further recommend that the Head of Procurement remove the quoted paragraph from the NRA Procurement Manual.

Audit Report No: NAT/084 National Recommendations

APPENDIX A

Rec No	Report Para No	Recommendations	Est Cost Implement'n	Management Comments and Action	Officer Responsible	Implementation Target Date
1.	4.1.2	We recommend that the Director of Personnel issue guidance to Regional Personnel Managers to ensure that the duties of regional R&D Coordinators are included in the performance objectives and appraisals of those staff.		Agreed	Director of Personnel	Oct 1993
2.	4.1.3	We support the decision of the Director of Operations to produce a central database of OIs at Head Office. We recommend that this be maintained and regularly reconciled to Corporate Planning information and regional financial reporting information to ensure that all OIs are included.		Agreed. The central database of OIs is now operating.	Director of Operations	Already actioned
3.	4.1.3	We also recommend that a central OI Coordinator be designated at Head Office to monitor OIs and help to identify potential duplication between OIs. Regions should report OIs to Head Office in the form agreed by OT and in sufficient detail that the Coordinator can identify duplication between OIs, and any overlap with R&D projects and other national activities. This will involve close liaison with the R&D section in Head Office.		Agreed.	Director of Operations	June 1993

Rec No	Report Para No	Recommendations	Est. Cost Implement'n	Management Comments and Action	Officer Responsible	Implement'n Target Date
4.	4.3.1	We recommend that the R&D project management manual be adopted as soon as the national manual has been completed and necessary changes to the R&D manual made.	Depends on the format and content of the NRA manual.	<p>The Head of R&D will confirm the extent of any changes required to the draft R&D manual, and the target date for implementation, within one month of the implementation of the NRA Project Management Manual.</p> <p>Uncertainties as to the implementation date of the NRA manual, and its format and content, make it impossible to provide an implementation date for the R&D manual.</p>	Head of R&D	To be determined within one month of implementation of the NRA manual

Rec No	Report Para No	Recommendations	Est Cost Implement'n	Management Comments and Action	Officer Responsible	Implement'n Target Date
5.	4.3.2	<p>We recommend that R&D section develop and perform post project appraisals of R&D projects in line with recommended procedures in the NRA Project Management Manual. These procedures should include reviews of:</p> <ul style="list-style-type: none"> • how well the project requirements were specified, and how well the project was managed • how well the project was targeted; the quality of the research and its cost-effectiveness • the success of the project's uptake and the value for money achieved. 	<p>2 man days</p> <p>Depends on the format and content of the NRA manual.</p>	<p>The Head of R&D will institute interim arrangements for projects which were completed at the end of 1992/93.</p> <p>He will confirm the necessary actions and set a target implementation date within one month of the NRA Project Management Manual.</p>	Head of R&D	May 1993
6.	4.3.4	We recommend that the purposes currently served by the PIA are in future fulfilled by separate documents. Each may be based on predecessor documents but should be tailored to suit the purpose.	3 man days	<p>The Head of R&D will institute interim arrangements for 1993/94 projects.</p> <p>He will confirm the necessary actions and set a target implementation date within one month of the NRA Project Management Manual.</p>	Head of R&D	<p>June 1993</p> <p>To be determined within one month of implementation of the NRA manual</p>

Rec No	Report Para No	Recommendations	Est Cost Implement'n	Management Comments and Action	Officer Responsible	Implement'n Target Date
7.	4.3.3	We recommend that the Head of R&D ensure that, wherever possible, project justifications include a quantification of benefits. This should certainly include projects addressing operational effectiveness.	1 man day	The Head of R&D will issue instructions to R&D officers. The quantification of benefits in some areas will depend on guidance issued in the Economic and Investment Appraisal Manuals.	Head of R&D	To be determined within one month of implementation of the appraisal manuals
8.	4.3.4	We recommend that the Head of R&D ensure that specifications are as detailed as possible at the tendering stage of the project.	20 man days + £2k time & seminar costs	This is an existing area for improvement. The Head of R&D will issue guidance after consultation with the Head of Procurement. Procurement training is planned for R&D staff.	Head of R&D	June 1993
9.	4.3.4	We further recommend that, following the tendering process, these specifications are revised before inclusion in the contract.		The Head of R&D will issue guidance after consultation with the Head of Procurement. Procurement training is planned for R&D staff.	Head of R&D	June 1993
10.	4.3.5	We recommend that the Head of R&D remind all R&D Support staff with delegated authority of the need to grant authorization clearly and unconditionally. Any reminders of matters to be actioned following authorization should be treated separately.		Agreed	Head of R&D	June 1993

Rec No	Report Para No	Recommendations	Est. Cost Implement'n	Management Comments and Action	Office Responsible	Implement'n Target Date
11.	4.3.5	We further recommend that the Head of Procurement remind all Tender Boards of the requirement that officers submitting papers must confirm their compliance with procedures, and that the Tender Board must satisfy itself that this is the case. The Tender Board should avoid conditional approvals.		Agreed.	Head of Procurement	July 1993
12.	4.3.6	We recommend that the Head of R&D issue guidance to R&D Coordinators and Project Managers on standard master project documentation files. Guidance should include who should hold each document.	25 man days overall	The Head of R&D will action this in conjunction with each region, which must assess its present situation.	Head of R&D	Sept 1993
13.	4.6.2	We recommend that the Director of Finance issue guidance to regional Tender Boards on reasonable justifications for Single Tender Actions.		Already actioned. Section 2.4.2 of the Policy Guidance Note on the application of the FM and SoD sets out the conditions under which Single Tender Actions are justified.	Head of Procurement	Already actioned

6b100:2P

Rec No	Report Para No	Recommendations	Est Cost - Implement'n	Management Comments and Action	Officer Responsible	Implement'n Target Date
14.	4.6.2	We recommend that the Chief Scientist obtain the Board's approval of the extent of the procurement of R&D contracts through Single Tender Action with national research institutions and in collaborative ventures. The Board may consider that the views of the Department of the Environment should be sought, in particular on joint audits and technical reviews.		The Chief Scientist is already having discussions on this issue with Board Members and the DoE. He will confirm the actions he will take and target dates following these meetings.	Chief Scientist	June 1993
15.	4.6.3	We recommend that the Head of R&D issues guidance to Project Leaders through R&D Coordinators that R&D services should not be procured on the basis of obtaining value for money within a specified price band. Where it is necessary to indicate the scale of the work required this should be done through the specification of the output, or of the number of man-days.		This is an existing area for improvement. The Head of R&D will issue guidance after consultation with the Head of Procurement	Head of R&D	June 1993
16.	4.6.3	We further recommend that the Head of Procurement remove the quoted paragraph from the NRA Procurement Manual.		Agreed. This will be done in the next revision of the Procurement Manual.	Head of Procurement	Jan 1994

APPENDIX B

Analysis of the Procurement Strategy for R&D Projects let in 1991/92 and 1992/93

PROJECTS LET IN 1991/92	Original				Supplementary				Total	
	Budget		No. of projects		Expenditure		No. of projects			
	£k	%	#	%	£k	%	#	%	£k	%
Competitive Tender	1,619	30	38	36	57	31	10	45	1,676	30
Single Tender Action	3,803	70	68	64	128	69	12	55	3,931	70
TOTAL	5,422	100	106	100	185	100	22	100	5,607	100

PROJECTS LET IN 1992/93	Original				Supplementary				Total	
	Budget		No. of projects		Expenditure		No. of projects			
	£k	%	#	%	£k	%	#	%	£k	%
Competitive Tender	1,914	40	25	37	4	67	1	50	1,918	41
Single Tender Action	2,815	60	42	63	2	33	1	50	2,817	59
TOTAL	4,729	100	67	100	6	100	2	100	4,735	100



W O R K I N G W I T H Y O U

Design: Laura Jane Valentine-Slack