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**ENVIRONMENTAL MONITORING STRATEGIES:
A COST-BENEFIT ANALYSIS**

Peter Pearce (Group F)

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ENVIRONMENT AGENCY



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Summary

The purpose of this project is to review the existing environmental sampling and monitoring commitments of the Environment Agency and to compare the relative costs and benefits of outsourcing this work versus the alternative option of conducting the work in-house. It specifically addresses the argument for putting environmental monitoring, which is essentially routine work, out to contract versus the alternative of retaining it in-house. It considers in particular, the arrangements that have been put in place for the waste regulation function in Thames Region.

The main findings from the study are that there is a considerable range of environmental monitoring work being undertaken by the various Environment Agency functions. There is a wide range of practices, even within functions, that need to be standardised. There is also overlap between functions which in certain instances results in monitoring objectives being duplicated despite the efforts of senior management to bring about the integration of the waste, water and industry process regulatory teams. There also appears to be no consistent national policy controlling the use of external consultants to undertake sampling and analytical work. The benefits of conducting such work in-house considerably outweigh the disbenefits whilst there are also significant cost savings to be made.

Some generic recommendations can be made. Most important, that the policy of utilising external contractors for conducting routine environmental sampling and analysis work should be reviewed and brought into line with a

policy which is nationally consistent throughout the Environment Agency. External contractors should only be sought if there is a need to obtain independent advice, whilst priority should be given to such work being conducted by Agency staff. Similarly, more emphasis should be placed upon the utilisation of the EA's own National Laboratory Service for the purpose of carrying out sample analysis. Staff assigned to the Area Monitoring (Scientific Investigations) teams should be tasked with the responsibility of sample collection. The Agency should conduct a comprehensive survey of all the environmental monitoring programmes currently being undertaken by the various functions in each Region and seek to rationalise the scope of work to avoid duplication of effort and to reduce costs.

Terms of Reference:

1. Review the current environmental sampling and monitoring requirements and obligations of the Environment Agency with particular reference to water quality, waste regulation and industrial process monitoring.
2. Assess the relative advantages and disadvantages of utilising the services of external specialist contractors for routine environmental sampling and monitoring versus the alternative option of undertaking this work utilising the Environment Agencies own staff and in-house resources.
3. Evaluate and compare the costs of outsourcing routine environmental sampling and monitoring work against the costs of undertaking the work internally.

1.0 Introduction

The Environment Agency has a duty, as set out in the Environment Act 1995, to protect and enhance the environment in order to achieve the principle of sustainable development. There are numerous processes that discharge potentially polluting substances whose impact must be prevented, reduced or minimised wherever possible. Industry has a duty to monitor these discharges and provide the Agency with the relevant data to allow discharge authorisations to be assessed from the point of view of compliance. Similarly, the Agency needs to undertake independent audit monitoring in order to validate the environmental data submitted by industry and also to determine charging obligations.

Environmental sampling is undertaken by the Agency for a variety of different purposes. A recent survey (Reference 1) undertaken by QuantiSci Ltd. on behalf of the EA Head Office at Bristol confirmed the huge range of processes monitored, parameters measured and equipment used. The principal areas of monitoring work include the following:

- **Waste Regulation:** Auditory monitoring, principally of groundwater, surface water and landfill gas in order to verify the results of routine sampling undertaken by licensees and to investigate any incidental pollution associated with the operation of licensed waste facilities. The scope of sampling may also extend to the measurement of noise and dust emissions, counting of ambient asbestos fibres and characterisation of hazardous wastes.

- **Industrial Process Regulation:** Auditory sampling is also undertaken at those industrial establishments for which prescribed process (IPC) authorisations have been issued. The scope of monitoring principally concerns emissions to air, especially particulates, sulphur dioxide, nitrous oxides, carbon dioxide and dioxins, in combination with local meteorological conditions. Noise and dust emissions are also routinely measured, as are the quality of effluent discharges to watercourses. Monitoring of discharges to air via stacks frequently involves the use of fixed auto-sampling and telemetric systems.
- **Radioactive Substances Regulation:** The Agency is responsible for assessing and issuing registrations for the storage, keeping and disposal of radioactive substances in accordance with the Radioactive Substances Act 1993. A national programme of environmental monitoring is carried out in order to verify that the quality of surface water in the near vicinity of registered facilities is unaffected by radioactive discharges and to ensure that any radiation is in accordance with environmentally safe and publically acceptable levels.
- **River Water Quality Monitoring:** A nationwide programme is conducted each year in order to monitor the chemical and biological quality of rivers and important watercourses. The information is maintained as a public archive and is the basis for establishing and verifying river water quality objectives.
- **Effluent Discharge Monitoring:** Those facilities such as sewage treatment works and factories which hold effluent discharge consents are checked to ensure that the quality of the discharges remains within

authorised limits. A considerable number of samples are taken from each consented discharge location throughout the course of the year. The parameters most frequently checked are chloride, ammonia, pH, dissolved oxygen, biochemical oxygen demand and suspended solids. Such measurements are often obtained through the use of fixed monitoring installations.

- **Groundwater Quality Monitoring:** The groundwater protection function carries out an annual programme of monitoring in conjunction with the hydrometry team order to audit groundwater abstraction license holders, to monitor the quality of groundwater at known pollution incident locations and to monitor the quality of major aquifers used for potable drinking water supply. Monitoring is principally undertaken in boreholes installed at strategic locations around e.g. industrial installations and landfill sites.
- **Surface Water Monitoring:** The Agency administers a regional operational surface water monitoring (ROM) programme. The objective of this programme is to ensure that any specific water quality problems and the need to conduct any investigative work, or research and development projects can be addressed. The scope of the programme and budgetary requirements are established at the start of each financial year. The bulk of these monitoring commitments are dealt with in-house utilising the existing staff resources to undertake field measurements and collect field samples. The National Laboratory Service undertakes to carry out any analytical work. Most offices operate a sample courier service to their nearest National Laboratory facility and the results of analysis are usually

returned to the sample originator within a few weeks via the computer network.

2.0 Regulatory Requirements and Procedures

The Agency has inherited from its predecessor bodies (NRA, HMIP, WRA's) numerous environmental monitoring and surveillance programmes which relate to a broad range of statutory requirements and environmental management needs. From a higher level perspective, the following are relevant:

- Global - contributions to international conventions such as long-range transport of pollutants, climate change
- International - North Sea Conferences and Oslo and Paris conventions
- European – EC Directives
- National – surveillance programmes such as the Harmonised Monitoring Scheme
- England and Wales – GQA surveys of river quality
- Regional and Local – regional surveys and local environmental management issues, e.g. LEAPs.

Environmental monitoring is required in support of EC Directives, International commitments and National standards and targets. European policy and legislation has had an increasing impact on UK environmental practice in recent years and this has led to many new or amended Regulations.

These concern:

- The regulation of emissions from different processes

- The management and disposal of certain types of waste
- The achievement of specific environmental quality standards and targets

A significant number of EC Directives are directed at water or wastewater quality. These relate primarily to:

- Pollution control of individual substances (e.g. Dangerous Substances Directive, Nitrate from Agricultural Sources Directive)
- Protection of different uses of the environment (e.g. Surface Water Abstraction Directive, Bathing Water Directive)
- Setting of minimum requirements for processes (e.g. Urban Wastewater Treatment Directive).

At the National level, the UK has maintained a stance over the use of environmental quality standards and objectives as the basis for pollution control, but generally most legislative requirements have arisen from EC Directives. Objectives for leachate and groundwater quality at landfill sites are specified in Waste Management Papers 4 and 27 (References 2 & 3). One other set of standards that may eventually be derived nationally is the water classification scheme for river ecosystems under the Water Resources Act 1991. A non-statutory scheme also exists for air quality (Expert Panel on Air Quality Standards).

There are some new directives and guidance documents that are currently being considered. The additional requirements that these may place on operators and the Agency in a monitoring context should be taken into account in any subsequent work. Specific examples include:

- Landfill Directive
- Groundwater Regulations (due Jan 1999)
- Contaminated Land Regulations (due sometime in 1999)
- Water Framework Directive
- Regulation 15 of the Waste Management Regulations
- Waste Management Paper 26D

3.0 Analysing the Problem

Currently, there are various different approaches being adopted by the Environment Agency towards the way in which environmental sampling and testing is carried out by its various functions. Most sampling, however, is of a routine nature and in such instances, the collection of field samples, in-situ measurements and laboratory analysis may be contracted out (outsourced). Examples include the national radiological monitoring programme, some elements of the industrial process auditory monitoring work and waste regulation auditory work. Thames Region, appears to be the only Region which has developed an extensive waste regulation auditory monitoring programme and which has elected to pass the obligation for undertaking this work almost entirely to third party contractors. There appears to be no consistent national policy as to which strategy should be adopted.

There are also many instances where different functions are essentially performing the same exercise in pursuit of slightly different objectives. Part of this duplication of effort stems from the environmental monitoring programmes of the Agencies predecessor bodies having been continued as

they were prior to the creation of the Agency. Examples include the water quality and landfill monitoring programmes, where there is duplication particularly with respect to groundwater and surface water quality; the IPC and waste site monitoring programmes where there is overlap with respect to radiological monitoring work; and between the hydrometric and waste regulation teams, whose staff undertake measurements of groundwater levels independently of each other, often at the same boreholes! Clearly, there is scope to take the “next steps” integration exercise one step further, to encourage data exchange between functions and thereby enable the overall scope of environmental monitoring to be rationalised.

3.1 Thames Region Waste Regulation Contract

The Thames Region Environment Protection Manager presented a business case (Appendix A) to the Regional Management Team on 4th June 1996 detailing existing provisions for the regulatory environmental monitoring of licensed waste facilities within the Thames Region. It was recommended and approved that appropriate new contracts be secured to replace those expiring on 31st March 1997. These contracts included those held with the Babbie Group covering Berkshire, by Mott MacDonald for Greater London and three contracts held by WRC plc, Argus Landfill Monitoring and AEA Technology covering Oxfordshire.

The existing contractual arrangements were described and the justification for the Agency needing to renew the contracts in order to continue the regulatory audit monitoring was also addressed. *What the business case did not do is*

justify the reasoning for this work being outsourced. It simply argued that the contracts were due shortly to expire, that the work had been conducted on an external basis previously and that there was an urgent need for similar arrangements to be put in place.

Five options for replacing the existing arrangements were put forward. It was recommended that a Region-wide contract should be sought to provide an integrated and coordinated approach covering all of the waste regulation monitoring commitments for the whole of Thames Region. The contract was to be secured initially for a two-year period with an option to extend for a third year at an estimated total annual expenditure of £466,000 (index-linked).

As a result of a delay in the business case being approved by the Director of Operations, the first components (i.e. covering waste characterisation, landfill gas and water quality) of the new contract were not put out to tender until after 31st March 1997. Arrangements were made to extend the existing contracts temporarily until the new contracts had been secured. Following a pre-tender evaluation exercise which involved 25 different prospective tenderers, three were invited to submit bids for the gas monitoring contract and four were invited to submit bids for the water monitoring work. The waste characterisation, gas and water contracts were eventually won by a consortium of consulting engineers, led by the London-based Mott Macdonald group (Appendix B). The consortium included AEA Technology, Monitor plc, and Southern Science. The work programme commenced in July 1997.

It should be noted that AEA Technology, whose headquarters are based at Culham in Oxfordshire, has vested interests in a number of the Thames West Area sites and special arrangements had to be made for other members of the consortium to carry out the monitoring there. It should also be noted that the Environment Agencies own NAMAS accredited National Laboratory Service expressed an interest at the contract pre-tender stage in undertaking the work, but they were not invited to bid because it was considered that the laboratory had an insufficient number of staff who had received the appropriate training to take groundwater, landfill gas and leachate samples.

Throughout the tendering and contract procurement period, regular progress meetings were held between Regional and Area staff to ensure that the interests of all those staff who were likely to require work to be undertaken through the new contracts, would be adequately addressed and to ensure that the contract documents were written appropriately. An inception seminar was held in July 1997 to explain to all operational staff, team leaders and managers how the new services would work in practice.

3.1.1 Disbenefits

Contracting out environmental monitoring obligations to third party consultants and laboratories has numerous disbenefits. These are listed below in an approximate order of significance. Apart from the obvious implications arising from the increase in costs, the main implication is that work is being externalised in preference to the Agency making use of and strengthening its own in-house scientific and technical capabilities which it needs to do in

order to reinforce its credibility as an important national regulatory body. It is less likely that the EA will achieve that if it has to rely upon the services of third party consultants and contractors who often prove to be unreliable. Meanwhile, the EA's own very reputable National Laboratory Service is facing increasing competition from other NAMAS accredited laboratories and is struggling to justify its existence.

1. Greater expense

Utilising the services of external consulting organisations and laboratories inevitably results in an increase of costs. Such organisations will obviously seek to make a profit, typically of the order of 20 percent over their actual costs, whereas they often also have higher overheads, higher staff costs and may seek to recharge the cost of vehicle and equipment procurement. The case presented in this report, which compares the costs of landfill gas and water monitoring currently being conducted in Thames Region by Mott MacDonald against the costs of the same services assuming they were to be conducted utilising the Environment Agency's own staff, indicates that the costs of outsourcing this work are up to 85% higher.

2. Divestiture of public accountability

As a part government-funded regulatory body charged with enforcing environmental legislation, the Environment Agency is directly accountable to licence holders, the public and local planning authorities. If any part of the service for which the Agency is responsible is passed to the private sector, the duties, as perceived by others, will become confused. It is far better from the public relations point of view, for officers employed directly by the

Environment Agency to be seen to be assuming the responsibility for undertaking field work, for taking its own samples and using the services of its own laboratory. Also, if the need to undertake litigative action should ever arise, it will be easier for the Agency to compile case files and it is more likely that an eventual prosecution will be successful.

3. Loss of credibility

This follows on from item 2. above. The Agency needs to be seen as a strong and capable organisation with the reputation for providing a good service to its customers and for achieving results. Contracting out, what is essentially fairly routine work to third parties, could be viewed as an indication that the Agency has insufficient staff resources to do the work itself. This also applies to those licence holders who are obliged to grant access to the Agency for the purpose of obtaining samples and to conduct environmental monitoring. The credibility of the Agency will inevitably be eroded as soon as it is realised by licencees, that they are being asked to cooperate with its contractors or indeed, sub-contractors.

4. Less direct control

Having to rely upon the integrity of a third-party organisations charged with an arms-length duty to conduct a range of services, effectively constitutes a delegation of responsibility by the client (EA) to a service provider. The risk is that the client will have less direct control over the services provided unless he is to supervise them on an intensive day-to-day basis. In practice this rarely occurs and the contractors' project manager will often be faced with the

prospect of having to make decisions without prior consultation with the client.

5. Less flexibility

In order to fulfil the terms of the environmental monitoring contract, the contractor is required to work in accordance with a predetermined annual work programme. Although the contract includes a provision for emergency response, the opportunity to alter the programme at short notice is minimal. Any variations to the annual programme normally need to be arranged one month in advance. However, last minute changes do often need to be made in response to day-to-day developments. Clearly, if it is difficult to address these, the usefulness of the monitoring service will be significantly compromised.

6. Confused lines of communication

The more reporting links that there are in the project management chain, the more likely it is that communication between the client and its sub-contractors will become confused and that mistakes will be made as a result. This applies both with respect to the working inter-relationship between the Agency and the contractor, and also between the Agency and the various licensees.

7. More administration

Putting work out to contract inevitably leads to an increase of the administrative burden, in particular with respect to preparing tender documents, placing orders, placing/reviewing contracts, checking invoices, chasing payments etc.

8. Duplication of effort

Utilising the services of contractors for site sampling does not necessarily reduce the Agency's workload. The focus of work will shift more towards providing the contractor with the information he needs in order to do the work safely and efficiently. In utilising the services of contractors, the Agency retains an obligation under the Health and Safety Act 1974 to provide a safe working environment. Additionally, there will be a need to provide maps, keys, arrange consultant/client meetings, authorise access, obtain and communicate information about utility services, inform landowners etc.

9. Reliance upon inexperienced staff

Consultants will traditionally attempt to reduce their costs and maximise profits, for example by employing relatively young inexperienced staff, particularly for field sample collection. Potentially this may result in errors being made and an additional burden being placed upon the EA to provide assistance.

10. Software/ hardware compatibility problems

Difficulties have already been experienced as a result of certain contractors using software for data transfer which is not compatible with the software adopted for standard use by the Environment Agency. Also, the availability of an external E-Mail link to the EA is at present fairly limited which makes communication with contractors more difficult than it could be and means that data can only be exchanged on floppy disks or as hard copy.

11. Demotivation of staff

In Thames Region there has been a noticeable demotivation of staff charged with the responsibility for implementing the new contracts, a change from what is essentially a consultant role to a client role. This reflects the situation which occurred in Oxfordshire, when waste regulation staff who were technically qualified and had previously been directly involved with the field sampling programme, suddenly found themselves confined to the office doing administrative work.

3.1.2 Benefits

There are many situations however, where the employment of consultants does serve a useful purpose, in particular where an independent opinion or independent representation is sought, for specialised projects where in-house staff are insufficiently qualified, or to provide temporary staff cover in response to sudden or extreme staff resource demands. It is more likely however, that such services will be of a specialist nature. The argument for calling upon contractors to do routine work that can easily be done by graduates after basic training remains tenuous. Benefits of contracting out include:

1. Assurance that work will be done - outsourcing is an effective means of ensuring that the work will be done.
2. More time available to do other work - divesting routine tasks to third party contractors frees up in-house staff and generates more time for them to do other work.

3. **Supplementary advice** - alternative views based upon sound knowledge and experience can prove to be invaluable.
4. **Independent representation** - useful in situations where the EA needs to be supported by an unbiased third party with technical expertise, for example in court, at local authority meetings and where there may be regulator versus operator disputes.
5. **Supplementary labour force** - helps to smooth out irregular demands upon the in-house labour force e.g. as a result of having to deploy staff at short notice to respond to a spate of emergency incidents.
6. **Enhanced field surveillance** - provided that the contractor has no vested interests in the licensed operation, information concerning e.g. access problems, condition of monitoring points, incidental evidence of pollution etc. should be fed back to the regulatory authority. It is a requirement for example, of the Thames waste regulation monitoring contract, that the contractor should provide this information by way of site visit reports.
7. **Predetermined budget** – the total cost of undertaking the work is known at start of the financial year, a considerable benefit in terms of cost-centre management.
8. **Predetermined budget expenditure profile** – the monthly rate of expenditure is known for the whole of the financial year, also a cost-centre management benefit.

The advantages and disadvantages of using contractors are summarised in Table 1.

4.0 Evaluating the Costs

For the purpose of this project, the costs of undertaking the Thames Region waste regulation environmental monitoring programme, utilising the services of the Environment Agency's own staff, are compared against those being incurred as a result of contracting out the work to the Mott MacDonald consortium of consulting engineers and their appointed laboratory analysts. A breakdown of costs on a site-specific basis for the landfill gas and water monitoring component of this programme is presented in Tables 2A, 2B, 2C, and 2D and graphically summarised in Figures 1 and 2.

Mott MacDonalds costs are as per those specified in the contract documents (Reference 4) whereas those incurred by the Agency are calculated on the assumption that two technical staff are deployed for each site visit with appropriate allowances made for fuel, travel time, subsistence payments, material and equipment costs. Two staff would be the minimum number required in order to be able to be reasonably confident of complying with Health & Safety obligations. Laboratory costs incurred by the Agency are in accordance with those quoted to the author by the National Laboratory in a fax quotation dated 1/12/1997 (Appendix C). A nominal cost of £25.00 per hour is taken to be representative for an EA Technical Officer, whereas travel costs are calculated on the basis of £0.40 pence per mile and subsistence at £6.00 per day.

For the purpose of the comparison, a selection of sites located in Thames West Area has been taken for which Mott MacDonalds costs for gas (Table 2A) and water monitoring (Table 2B) were available. It should be reiterated however,

that this does not constitute the whole of the Thames waste regulation programme. A selection of sites has been taken simply in order to provide a representative sample. The equivalent costs, assuming the Environment Agency would undertake this work, have been determined for the same selection of sites (Tables 2C and 2D) taking into account the number of sampling points, the scope of analysis required (Suites 1, 2 and occasionally 3), consumption of materials, equipment procurement, the predicted time spent at each site (varies from a couple of hours to two days), and the distance of each site from the Wallingford office. The contract requires that in order to comply with the recommended scope of analysis as prescribed in Waste Management Paper No. 4, Suites 1 and 2 (Appendix D) should be determined for all the samples collected from each site. In addition, there is a need at some sites (e.g. Oakley Wood, Ewelme), to undertake analysis for halogenated solvents (Suite 3), where the presence of these contaminants have been previously identified.

No allowance is made for the cost of vehicle procurement, bearing in mind that these costs will be partly offset through the use by the EA of vehicles from a central pool and no allowance is made for transporting samples to the laboratory at Reading, and that there is a daily courier service which is already in operation which would run regardless of whether any additional samples were being generated through the landfill monitoring programme.

Figures 1 and 2 illustrate graphically, the difference in total costs at each site between Mott MacDonald and the EA for water and landfill gas respectively.

The cost per measurement for gas monitoring equates to £27.79 under the

Mott MacDonald contract which compares with £15.03 if Agency staff were to do the work. As a matter of interest, AEA Technology were charging Oxfordshire County Council a very competitive £9.50 per measurement, immediately prior to the start of the Mott MacDonald contract during 1997.

The costs for water quality suites 1,2 and 3 compare as follows:

	<u>Mott MacDonald</u>	<u>Environment Agency</u>
Suite 1	113.36	68.74
Suite 2	19.20	12.43
Suite 3	27.43	17.43

A summary of the total costs for water quality and gas monitoring is provided in Table 3. *It shows that the costs incurred by the Agency as a result of contracting this work out are almost exactly 85% higher in the case of the landfill gas monitoring programme and approximately 35% higher for water monitoring.*

5.0 Conclusions

1. The principal conclusion to be drawn from this project is that the costs to the Environment Agency in financial terms of utilising external staff resources for the purpose of undertaking routine environmental monitoring, sampling and laboratory analysis are considerably higher than if the same services were to be provided by staff employed directly by the Agency.

2. It is acknowledged that outsourcing this work has a number of benefits which are difficult to evaluate from the point of view of cost. However, the number of benefits are significantly outweighed (Table 1) by the number of disbenefits.
3. The business case (Appendix A) for this work being conducted externally, was incomplete in that it did not address the technical, political or economic justifications for the need to recruit contractors. It simply described the manner in which the work had previously been conducted in a few of the waste regulatory authorities in Thames Region prior to the investiture of the Environment Agency in April 1996 and stated that there was a need for similar such arrangements to be continued following the expiry of the existing contracts on 31st March 1997.
4. The Environment Agency has it's own nationally accredited laboratory service which is capable of undertaking the entire range of chemical analysis required to fulfil the waste regulatory water monitoring requirements. Steps are currently being undertaken to develop the capability further to undertake analysis of high strength leachates and gaseous samples. Notwithstanding the fact that the laboratory has limited staff resources available for the collection of field samples, there is little justification at the present time, for the laboratory service not being utilised.
5. As a result of the "next steps" internal restructuring exercise, the EA has created Environment Protection teams deployed within the Areas to undertake a range of frontline services which includes environmental monitoring. Consequently, there are now sufficient staff available in the

Areas who are receiving appropriate training to be able to collect the various different types of field samples required.

6. There is currently no consistent national policy controlling the manner in which environmental monitoring and sampling is carried out. Some functions routinely utilise the services of external consultants and contractors, whilst others are committed to undertaking the work themselves.
7. There is currently a duplication of effort between different functions undertaking the same regime or similar environmental monitoring work for different objectives. This is due in part to the predecessor bodies of the Agency continuing to fulfill their monitoring obligations in the same way that they were prior to the creation of the Environment Agency.

6.0 Recommendations

- I. The Regional Environment Protection Team should conduct further market testing to determine whether it is feasible for the waste regulatory environmental monitoring services to be conducted more cost-effectively by external consulting and laboratory organisations than by using the Environment Agencies own staff resources and laboratory facilities.
- II. The policy of utilising external contractors for conducting routine environmental sampling and analysis work should be closely scrutinised and brought into line with a policy which is nationally consistent throughout the Environment Agency.
- III. Environmental monitoring conducted for the regulatory audit purposes should be conducted in the first instance by Environment Agency staff. External

contractors should only be sought if there is a need to obtain independent advice.

- IV. The option to extend the existing Thames Region waste regulation contract for a further year upon expiry in July 1999 should be declined.
- V. The National Laboratory Service should be utilised for sample analysis in preference to external laboratories.
- VI. Staff assigned to the Area Monitoring (Scientific Investigations) teams should be tasked with the responsibility of sample collection. Training should be provided as appropriate to ensure that Area monitoring staff are fully conversant with sampling protocols.
- VII. Arrangements for temporary storage and subsequent transport of samples to the National Laboratory Service at Reading should be maintained and, if necessary, improved at each of the three Thames Region, Area offices.
- VIII. The Environment Agency should conduct a more comprehensive survey of all the environmental monitoring programmes currently being undertaken in each Region and seek to rationalise the scope of work to avoid duplication of effort and to reduce costs.
- IX. Communication between functions should be improved further and exchange of monitoring data encouraged.

References

Reference 1 - D J Waters, P Marsh, J Humm and T Marshland, "Data Transmission Requirements for Self-Monitoring Data", R & D Technical Project EIC (96)2, draft report produced by QuantiSci Ltd. on behalf of the Environment Agency, February 1998

Reference 2 – Waste Management Paper 4, "Licensing of Waste Management Facilities", Department of the Environment, 1994

Reference 3 - Waste Management Paper 27, "Landfill Gas", Department of the Environment, 1991

Reference 4 - Contract Document No. Con 100 "Environmental Monitoring Services in Thames Region: Landfill Gas, Landfill Leachate, Waste Monitoring and Analysis", July 1997

Tables

- 1. Benefits and Disbenefits of Using Contractors**
- 2A. Mott MacDonald (Gas Sampling)**
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- 2C. Environment Agency (Gas Sampling)**
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1. Water Monitoring Costs
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Appendices

APPENDIX A - PPC Regulatory Environmental Monitoring. Short/Medium Term Provision. Contract Procurement Business Case

APPENDIX B - Mott MacDonald Consortium. Arrangements for Gas and Water Quality Monitoring

APPENDIX C - Fax Quotation. National Laboratory Service to Peter Pearce dated 1.12.97

APPENDIX D - Water Monitoring Suites 1,2 and 3. Gas Monitoring, Field and Laboratory Measurements

Table 1

Benefits and Disbenefits of Using Contractors

Benefits	Disbenefits
1. Assurance that work will be done	1. Greater expense
2. More time available to do other work	2. Divestiture of public accountability
3. Supplementary advice	3. Loss of credibility
4. Independent representation	4. Less direct control
5. Supplementary labour force	5. Less flexibility
6. Enhanced field surveillance	6. Confused lines of communication
7. Predetermined total budget	7. More administration
8. Predetermined budget expenditure	8. Duplication of effort
	9. Reliance upon inexperienced staff
	10. IT compatibility problems
	11. Demotivation of staff

TABLE 2A					
Mott MacDonald (Gas Sampling)					
Site Name	No. Boreholes	Total Site Cost (£)			
Alkerton	30	527.25			
Ardley Fields	31	1054.50			
Bledlow Ridge	9	527.25			
Calvert	58	1054.50			
Childrey	9	527.25			
Chilton	14	527.25			
Controlled Rec.	27	527.25			
Cotstone Quarry	5	527.25			
Dean Pit	38	1054.50			
Dix Pit	24	527.25			
Drayton GC	44	1054.50			
Enstone	13	527.25			
Ewelme	30	527.25			
Finmere	10	527.25			
Gill Mill	8	527.25			
High Heavens	24	527.25			
Macaroni Down Farm	6	527.25			
Manor Farm	4	527.25			
New Wintles Farm	6	527.25			
Oakley Wood	80	1581.75			
Rhymes Barn	12	527.25			
Slope Hill	17	527.25			
Spade Oak	4	527.25			
Sutton Courtenay	148	1581.75			
Sutton Wick	40	1054.50			
Tubney Wood	6	527.25			
Waterbridge Farm	9	527.25			
Weston Park Farm	5	527.25			
Wheatley	10	527.25			
Totals	721	20035.50			
Notes:					
1. Site visit costs derived in accordance with contract document (Bands G1 to G6).					
Costs cover transport, in-situ gas measurements and sampling.					
Total site visit costs checked and verified by Thames Region Environment Protection Team 11/03/98.					
NB. Costs exclude contract provision for 10% of samples to be checked at £21.95 per sample by laboratory GC analysis.					

TABLE 2B				
Mott MacDonald (Water Sampling & Laboratory Analysis)				
Site Name	No. Samples	Sampling Cost (1)	Laboratory Cost (2)	Total Site Cost (3)
AEA Harwell *	13	1054.50	1830.27	2884.77
Alkerton	19	1054.50	2153.84	3208.34
Ardley Fields	21	1316.70	2380.56	3697.26
Childrey	4	527.25	453.44	980.69
Chilton *	8	527.25	1126.32	1653.57
Controlled Rec.	17	1054.50	1927.12	2981.62
Dean Pit	25	1316.70	2834.00	4150.70
Dix Pit	14	1054.50	1587.04	2641.54
Drayton GC	16	1054.50	1813.76	2868.26
Enstone	6	527.25	680.16	1207.41
Ewelme *	17	1054.50	2393.43	3447.93
Finnere	4	527.25	453.44	980.69
Gill Mill	4	527.25	453.44	980.69
Manor Farm	6	527.25	680.16	1207.41
New Wintles Farm	6	527.25	680.16	1207.41
Oakley Wood *	22	1316.70	3097.38	4414.08
Radley	9	527.25	1020.24	1547.49
Slope Hill	10	527.25	1133.6	1660.85
Sutton Courtenay	28	1316.70	3174.08	4490.78
Sutton Wick	9	527.25	1020.24	1547.49
Tubney Wood	6	527.25	680.16	1207.41
Weston Park Farm	8	527.25	966.88	1494.13
Wheatley	3	527.25	340.08	867.33
Totals	275	18448.05	32879.80	51327.85
Notes:				
(1) Derived in accordance with bands L1 to L6 as per Contract Document				
(2) Suite 1 plus Suite 2. Sites marked with an asterisk also include Suite 3.				
(3) Costs validated by Thames Regional Environment Protection Team, March '98				

TABLE 2C									
Environment Agency (Gas Sampling)									
Site Name	No. Boreholes	Hours On Site	Mileage	Staff Cost (1)	Fuel Cost (2)	Travel Time Cost	Equipment &		
							Subsistence (3)	Materials	Total Site Sampling Cost
Alkerton	30	4.5	190	225.00	76.00	271.42	6.75	75.00	878.67
Ardley Fields	31	5	70	250.00	28.00	100.00	7.50	77.50	463.00
Bledlow Ridge	9	2	80	100.00	32.00	114.29	3.00	22.50	271.79
Calvert	58	8	78	400.00	31.20	111.43	12.00	145.00	699.63
Childrey	9	2	46	100.00	18.40	65.71	3.00	22.50	209.61
Chilton	14	3	44	150.00	17.60	62.86	4.50	35.00	269.96
Controlled Rec.	27	3.5	59	175.00	23.60	84.29	5.25	72.50	360.64
Cotstone Quarry	5	1.5	94	75.00	37.60	134.29	2.25	12.50	261.64
Dean Pit	38	4	144	200.00	57.60	205.72	6.00	95.00	564.32
Dix Pit	24	4.5	60	225.00	24.00	85.71	6.75	60.00	401.46
Drayton GC	44	6	70	300.00	28.00	100.00	9.00	110.00	547.00
Enstone	13	2.5	68	125.00	27.20	97.14	3.75	32.50	285.59
Ewelme	30	5	24	250.00	9.60	38.26	7.50	75.00	380.38
Flnmere	10	2.5	71	125.00	26.40	101.43	3.75	25.00	283.58
Gill Mill	8	2	58	100.00	23.20	82.86	3.00	20.00	229.06
High Heavens	24	4.5	35	225.00	14.00	50.00	6.75	60.00	355.75
Macaroni Down Farm	6	1.5	70	75.00	28.00	100.00	2.25	15.00	220.25
Manor Farm	4	1.5	41	75.00	16.40	57.14	2.25	10.00	160.79
New Wintles Farm	6	2	47	100.00	18.80	67.14	3.00	15.00	203.94
Oakley Wood	80	8	22	400.00	8.80	31.42	12.00	200.00	652.22
Rhymes Barn	12	2.5	78	125.00	31.20	111.43	3.75	30.00	301.38
Slope Hill	17	3	58	150.00	23.20	82.86	4.50	42.50	303.06
Spade Oak	4	1.5	42	75.00	16.80	60.00	2.25	10.00	164.05
Sutton Courtenay	148	16	66	800.00	26.40	94.28	24.00	370.00	1314.68
Sutton Wick	40	6	37	300.00	14.80	52.86	9.00	100.00	476.66
Tubney Wood	6	1.5	42	75.00	16.80	60.00	2.25	15.00	169.05
Waterbridge Farm	9	2	64	100.00	25.60	91.43	3.00	22.50	242.53
Weston Park Farm	5	1.5	41	75.00	16.40	57.14	2.25	12.50	163.29
Wheatley	10	2.5	42	125.00	16.80	60.00	3.75	25.00	230.55
Totals	721	110	1841	5500.00	738.40	2631.13	165.00	1807.50	10840.03
Notes:									
1. Assumes two technical officers @ £25.00 per hour									
2. Fuel cost @ £0.40 per mile									
3. Subsistence @ £6.00 per day									
NB. Costs exclude contract provision for 10% of samples to be checked by laboratory GC analysis.									

TABLE 2D										
Environment Agency (Water Sampling & Laboratory Analysis)										
Equipment &										
Site Name	Hours On Site	Mileage	Staff Cost (1)	Fuel Cost (2)	Travel Cost (1)	Subsistence (3)	Materials	Tot. Sampling Cost (4)	Lab. Costs (5)	Total Site Cost
AEA Harwell *	13.5	94	675.00	37.60	134.28	20.20	100.00	967.08	1281.8	2248.88
Alkerton	18	190	900.00	76.00	271.42	27.00	80.00	1354.42	1542.23	2896.65
Ardley Fields	10	70	500.00	28.00	100.00	15.00	60.00	703.00	1704.57	2407.57
Childrey	2	46	100.00	18.40	65.71	3.00	30.00	217.11	324.68	541.79
Chilton *	6	44	300.00	17.60	62.86	9.00	30.00	419.46	788.8	1208.26
Controlled Rec.	8	59	400.00	23.60	84.29	12.00	60.00	579.89	1379.89	1959.78
Dean Pit	18	144	900.00	57.60	205.72	27.00	80.00	1270.32	2029.25	3299.57
Dix Pit	6	60	300.00	24.00	85.71	9.00	60.00	478.71	1136.38	1615.09
Drayton GC	12	70	610.00	28.00	100.00	18.00	50.00	806.00	1298.72	2104.72
Enstone	5	68	250.00	27.20	97.14	7.50	40.00	421.84	487.02	908.86
Ewelme *	21	24	1050.00	9.60	38.28	31.50	80.00	1209.38	1676.2	2885.58
Finnere	8	71	400.00	28.40	101.43	12.00	30.00	571.83	324.68	896.51
Gill Mill	2	58	100.00	23.20	82.86	3.00	30.00	239.06	324.68	563.74
Manor Farm	4	41	200.00	16.40	57.14	6.00	30.00	309.54	487.02	796.56
New Wintles Farm	3.5	47	175.00	18.80	67.14	5.25	40.00	306.19	487.02	793.21
Oakley Wood *	18	22	900.00	8.80	31.42	27.00	80.00	1047.22	2169.2	3216.42
Radley	8	38	400.00	15.20	54.29	12.00	40.00	521.49	730.53	1252.02
Slope Hill	7	58	350.00	23.20	82.86	10.50	40.00	506.56	811.7	1318.26
Sutton Courtenay	21	66	1050.00	26.40	94.28	31.50	100.00	1302.18	2272.76	3574.94
Sutton Wick	7	37	350.00	14.80	52.86	10.50	60.00	488.16	730.53	1218.69
Tubney Wood	6	42	300.00	16.80	60.00	9.00	30.00	415.80	487.02	902.82
Weston Park Farm	4	41	200.00	16.40	57.14	6.00	30.00	309.54	649.36	958.90
Wheatley	2.5	42	125.00	16.80	60.00	3.75	30.00	235.55	243.51	479.06
Totals	210.5	1432	10535.00	572.80	2046.83	315.70	1210.00	14680.33	23367.55	38047.88
Notes:										
1. Assumes two technical officers @ £25.00 per hour										
2. Fuel cost @ £0.40 per mile										
3. Subsistence @ £6.00 per day										
4. Total transport, staff and equipment costs										
5. Suite 1 plus Suite 2 costs derived from EA National Laboratory Service fax quotation dated 1/12/97.										
Sites marked with asterisk also include Suite 3.										

Table 3

Summary of Environmental Monitoring Costs

Contractor versus Environment Agency

	Mott MacDonald Consortium	Environment Agency
--	--------------------------------------	-------------------------------

Gas	£20,035.50	£10,840.03
Water	£51,327.85	£38,047.88

Fig 1 Water Monitoring Costs

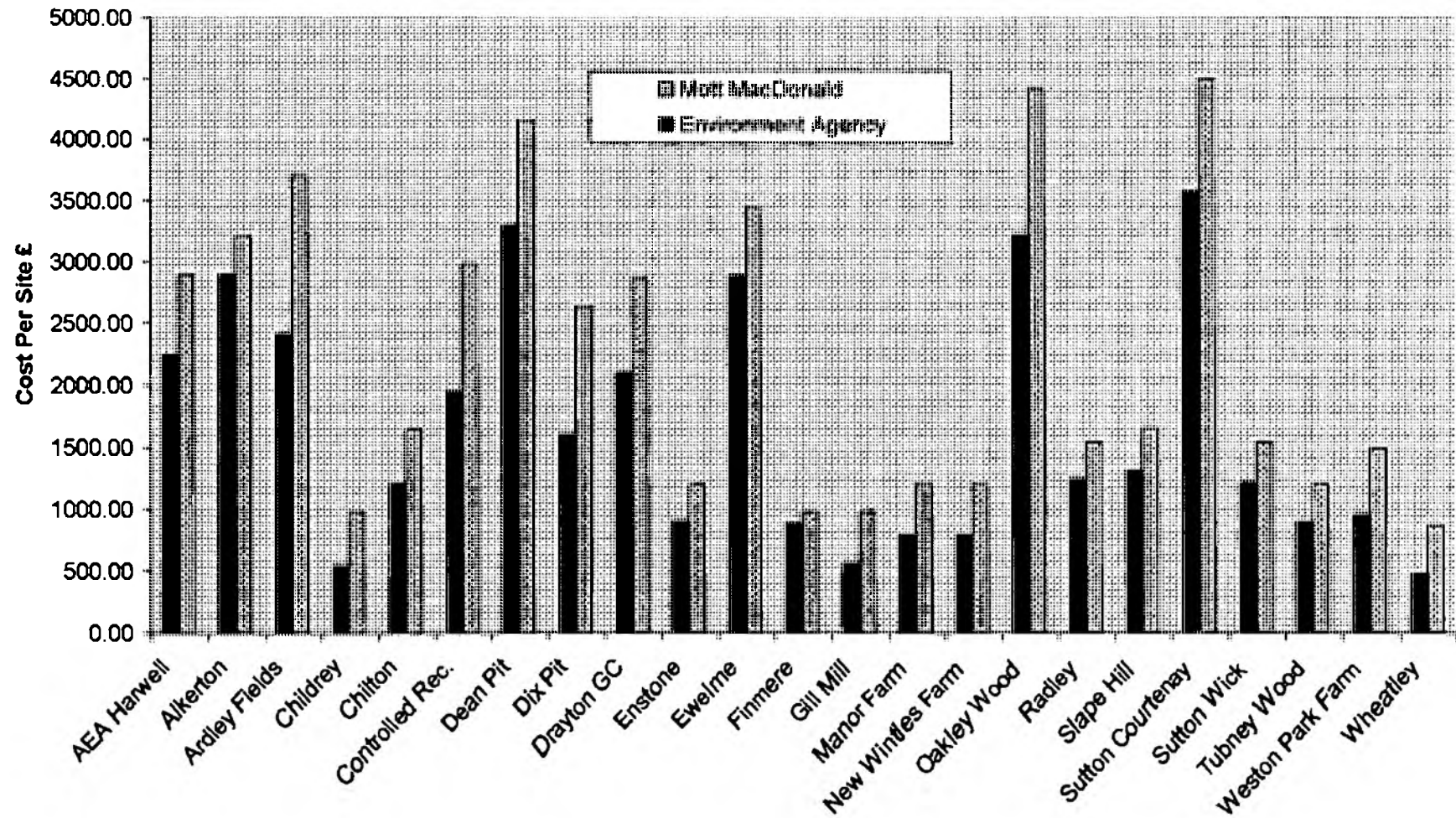
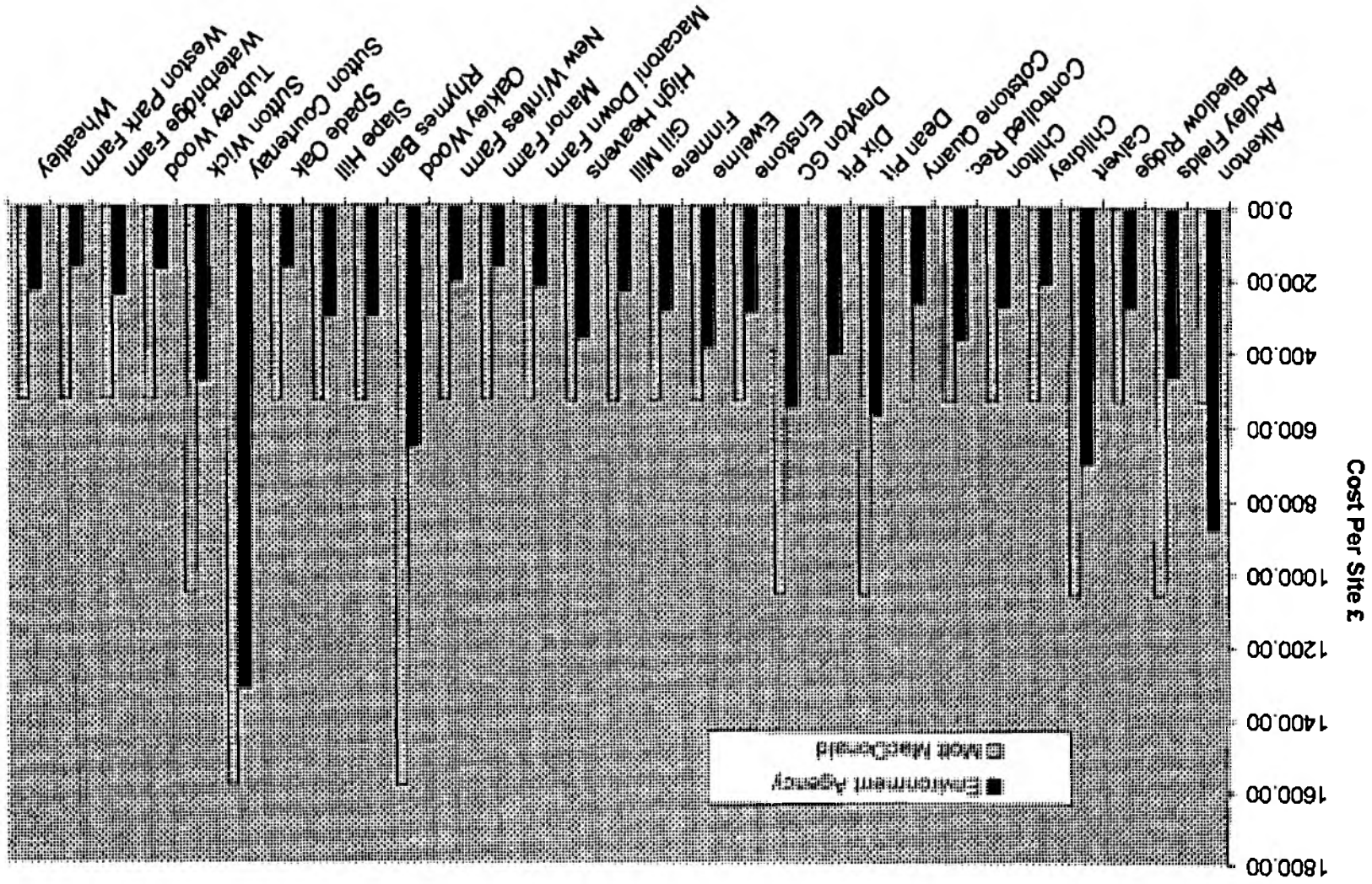


Fig 2 Gas Monitoring Costs



APPENDIX A

PPC Regulatory Environmental Monitoring

Short/Medium Term Provision

Contract Procurement Business Case

Environment Agency
Thames Region
Hampton House
20 Albert Embankment
London
SE1 7TJ
Tel 0171 587 3067



**ENVIRONMENT
AGENCY**

**PPC REGULATORY ENVIRONMENTAL MONITORING
SHORT/MEDIUM TERM PROVISION
CONTRACT PROCUREMENT BUSINESS CASE**

EXECUTIVE SUMMARY

Following approval by the Regional Management Team to secure contractual provisions for regulatory environmental monitoring (REM) Scheme of Delegation Authorisation is sought for annual non project revenue expenditure of £466,000. Contractual provisions are required for two years with the option to extend for a third year at the sole discretion of the Environment Agency.

This document has been prepared in accordance with Treasury requirements for a Business Case for all discrete items of expenditure exceeding £100,000. It summarises the current position with regard to contracts providing REM to the region and outlines the options for contract renewal. It identifies the preferred option for which financial approval is sought.

The preferred option is to tender for a regional wide contract/contracts selected by technical discipline, mainly servicing Berkshire, Greater London and Oxfordshire.

INTRODUCTION

Objectives

The Regional PPC Manager reported to the Regional Management Team on 4 June 1996 detailing current provisions for regulatory environmental monitoring of waste within the Thames region.

It was recommended and approved that appropriate contracts be secured to replace those expiring on 31 March 1997 to maintain the current level of monitoring provision within the region for the medium term.

Authorisation for non project expenditure exceeding £100,000 is sought to secure contracts as approved by the RMT. In accordance with Treasury requirements this business case examines the options, and makes appropriate recommendations, for securing these contracts.

Justification for Monitoring

The purpose of regulatory environmental monitoring is to identify and quantify the effect of waste management operations on the environment.

The WML Regulations 1994 (Schedule 4) includes the duty to carry out appropriate periodic inspections by the competent authorities. In certain cases this can only be accomplished by specific regulatory environmental monitoring exercises.

WMP 4 (4.34) states that a licensee must monitor the effect of the operation on the environment and that the Agency must have the capability to verify operators own monitoring data and to establish baseline environmental conditions.

The range of, and justifications for, regulatory environmental monitoring carried out under existing contracts are detailed in appendix II.

EXISTING PROVISIONS AND FUTURE REQUIREMENTS

Current Position

Regulatory environmental monitoring in the Thames region is currently undertaken by a combination of Agency staff and external contracts.

Contracts in the Thames region include the Babbie Group waste regulation contract in Berkshire, the Mori MacDonald contract for Greater London and three contracts for landfill gas and water quality held by WRC plc, Argus Landfill Monitoring and AEA Technology plc covering Oxfordshire.

The contract for waste regulation in Berkshire expires on the 31 March 1997 and includes environmental monitoring. The Scientific Services contract for Greater London consists predominately of environmental monitoring will also terminate on the 31 March 1997, subject

to a six month extension from 31 September 1996. The three contracts for Oxfordshire also expire on 31 March 1997.

The level of provision and technical procedures / methodologies employed across the region are inconsistent, integration of practices across ex WRA's is required.

The process of contract procurement is complicated and the timetable to secure these contracts by 31 March 1997 is extremely tight (as detailed in appendix I). In order to ensure adequate provision of services on 1 April 1997 there is insufficient time to fully appraise the regions requirements, develop new contracts and specifications or mobilise existing agency staff to extend monitoring cover to new areas.

In view of this the RMT approved that a working group be set up comprising of regional and area PPC functions to review regulatory monitoring in Thames region in the longer term. This review is expected to take place over the next two years with implementation following expiry of these contracts being sought.

Fixed contracts

The services and the financial provisions made under existing contractual arrangements are summarised below. Contract costs are not comparable as specifications, reporting requirements and management systems differ significantly between contracts.

Greater London

The Greater London contract has the widest scope and includes provision for a wide range of monitoring as detailed in appendix II. Mott MacDonald sub-contract various aspects of the work where expertise is not held by themselves. The management of sub contractors is the responsibility of the main contractor.

Technical provision under this contract specifically addresses the needs of London with its high proportion of transfer stations and incinerators located in urban areas and the positioning of landfills along the terrace river gravels of the Thames.

A summary of the services provided for the year October 1994 - September 1995 is listed below.

Landfill Gas - 37	Leachate - 24	Noise - 18
Waste Input - 43	Legal Sampling 12,	Other - 31 (incinerator ash, oil, microbiological loadings etc).

In addition it provides a consultancy service for specialist technical advice where in house expertise is not available eg. database and data handling development, expert witness, risk assessments, noise and microbial guidance and groundwater modelling.

The budget provision for the Greater London contract for 1996/1997 is £350,000. Estimated expenditure for 1995/1996 (index linked) for monitoring services was £302,000 and for consultancy was £48,000.

Berkshire

The Babbie contract provides all waste regulation duties within Berkshire, within this there is provision for gas and leachate monitoring.

For 1996 this was estimated at 44 gas monitoring and 17 water quality surveys. There is no provision within this contract for other types of monitoring.

Financial provision within the Berkshire contract allocated to environmental monitoring is estimated to be approximately £76,000.

Oxfordshire

The three contracts within Oxfordshire provide gas and leachate monitoring at 35 sites. The combined value of the three Oxfordshire contracts for 1996/1997 is estimated to be £79,000.¹

There is no provision within these contracts for other types of monitoring to be undertaken at licensed sites. Some waste sampling and asbestos monitoring is contracted out under ad hoc arrangements, estimated at £9,000¹ for 1996/1997.

Specialist Services and Consultancy

In addition to the contracts detailed above WRA's contracted out various ad hoc and specialist consultancy services. These were employed where in house capabilities were not available or third party opinions were required :- including expert witness, groundwater modelling, database development and assessment of geotechnical data.

The requirements for such services within the Agency are likely to vary from the above and will be reviewed as necessary. The capabilities for this work, in part, are held within the Regional Waste Team. New duties within the regional team may require external consultancy and specialist input such as audit monitoring, site assessments risk assessments etc.

The 1996/1997 provisions for consultancy and contracted out services as identified by area managers are detailed below. No significant variation for the financial provisions of these services is anticipated in the short to medium term. Fixed contracts are not required for consultancy services, authorisation will be sought on a job by job basis, therefore the budget provisions detailed below are not included in the SoD authorisation.

West Area -	£ 20,000	(Oxfordshire) ¹
North East -	£ 40,000	(Hertfordshire) ²
South East -	£ 30,000	(Surrey) ³
London -	£ 48,000	(Within Mott MacDonald contract)
Total	£138,000	

FUTURE OPTIONS

Five possible options for provision of regulatory environmental monitoring for the short to medium term, pending the development of a regional regulatory environmental monitoring strategy are listed below.

- Option 1: "Do Nothing" and allow the contracts to fall on 31 March 1997 (subject to 6 month extension).
- Option 2: Continue with existing arrangements extending Mott MacDonald Contract for 12 Months rather than six months; renegotiate the Babbie Contract excluding non "regulatory environmental monitoring" work and extend the Oxfordshire contracts.
- Option 3: Tender for new contracts to cover existing work using existing contracts and management systems.
- Option 4: Tender for a two year regional wide contract/contracts for regulatory monitoring to include Berkshire, Greater London and Oxfordshire. New contracts based on a revised version of the current specifications for Greater London, accounting for variations in the current provision and requirements of Berkshire and Oxfordshire. No revision of regional capability and requirements or application for additional funds to address shortfalls to be made.
- Option 5: Tender for a single contract/multiple contracts for the region revising contracts, specifications, costings and provision levels. This would involve extensive consultation with Area staff including assessment of requirements outside areas currently covered by existing contracts. Additional financial provision to address shortfalls would be required.

OVERVIEW APPRAISAL

This section seeks to identify the key consequences and outline the major advantages/disadvantages of each option in line with EA objectives and strategy and EA environmental policy.

- Option 1: "Do Nothing" and allow the contracts to fall on 31 March 1997 (subject to 6 month extension).

This approach is neither appropriate nor practical. It would result in the Thames region having no capability for independent monitoring. Furthermore, it is unlikely that Environment Agency in-house teams could be mobilised at such short notice to cover the extent and range of monitoring required. An in-house monitoring strategy would need to be developed including provisions for recruitment, procurement of monitoring equipment and training programmes.

Option 2 : Continue with existing arrangements extending the Mott MacDonald Contract for 12 months rather than six months, renegotiate the Babbie Contract (excluding non "regulatory environmental monitoring" work) and extend the Oxfordshire contracts.

In particular renegotiation of the Babbie contract to separate out technical monitoring is not considered a practical proposition. The extension of the Greater London contract would be viewed unfavourably as the current contract initially set up for a two year period has already been extended twice and is pending a further six month extension. Furthermore continuing with existing contract specifications is considered inappropriate as it would perpetuate the variations in technical procedures that currently exist across the region. Existing contracts do not provide the necessary flexibility to apply resources outside geographical areas covered by those contracts.

Option 3: New contractors to cover existing work using existing contracts and management systems.

As with Option 2, continuing with existing contract specifications is considered inappropriate as it would a) perpetuate the variations in technical procedures that exist across the region and b) requires duplication of contract management within technical disciplines. In addition this option would not provide Area managers with the flexibility to target resources to problem sites located outside the county boundaries these contracts cover.

Option 4: A regional wide contract/contracts for regulatory monitoring to include Berkshire, Greater London and Oxfordshire. New contracts to be based on a revised version of the current specifications for Greater London, accounting for variations in the current provision and requirements of Berkshire and Oxfordshire. This would not include a revision of regional capability and requirements, nor seek additional funds to address shortfalls.

This option would provide an integrated and coordinated approach to contracted out regulatory environmental monitoring within the region. The contract(s) could be written to provide flexibility both between disciplines and in appropriate targeting of resources geographically and over time. It would allow flexibility to provide a limited monitoring service where insufficient provisions have been inherited from WRA's. The Greater London contract could be used as the basis for new contracts as it provides the broadest scope, however the contract would need to be revised to take into account specific provision from the Oxfordshire contract and to incorporate key conditions in line with the Agencies external contracts' policies.

Option 5: Tender for a single contract/multiple contracts for the region revising contracts, specifications, costings and provision levels. This would involve extensive consultation with Area staff including assessment of requirements outside areas currently covered by existing contracts. Additional financial provision to address shortfalls would be required.

This option would provide an integrated and coordinated approach to contracted out regulatory environmental monitoring within the region. The contract/s could be written to provide flexibility both between disciplines and in appropriate targeting of resources over time. It would also provide a degree of flexibility to provide a limited monitoring service where insufficient provisions have been inherited from WRA's. A full review of regulatory environmental monitoring including extensive consultation, applications for additional funding, contract development and/or recruiting and mobilising Agency staff, will take at least two years to complete, leaving the region with no monitoring provision in the interim. This is considered unacceptable and therefore Option 5 is not considered viable for short/medium term provision. The regional working party proposed by the Regional PPC Manager and agreed by the Regional Management Team will review the long term provisions for regulatory environmental monitoring within the region.

SUMMARY

Options 1-3 are considered inappropriate and unacceptable. Whilst option 5 would provide the most thorough review of provisions within the region in view of the time constraints to effect the procurement of services it is not considered viable. Option 4 combines flexibility and regional integration with minimum resources required to secure contract procurement. It is not expected that this option would result in significant changes to the levels of contract management support required. A review of contract management provision will be required. The options for the structure and management of contracts are currently being assessed and will be submitted to the Regional PPC Manager for approval prior to commencement of the procurement process.

RECOMMENDATIONS

That the procurement of contracts be secured for a two year period, with option to extend for a third year, as outlined in Option 4 above.

That financial authorisation be approved for continued provision of the annual environmental regulatory monitoring budget of £466,000 (index linked). This sum being the total estimated expenditure for regulatory environmental monitoring, excluding specialist services, within the Thames region for the financial year April 1996-March 1997.

Notes

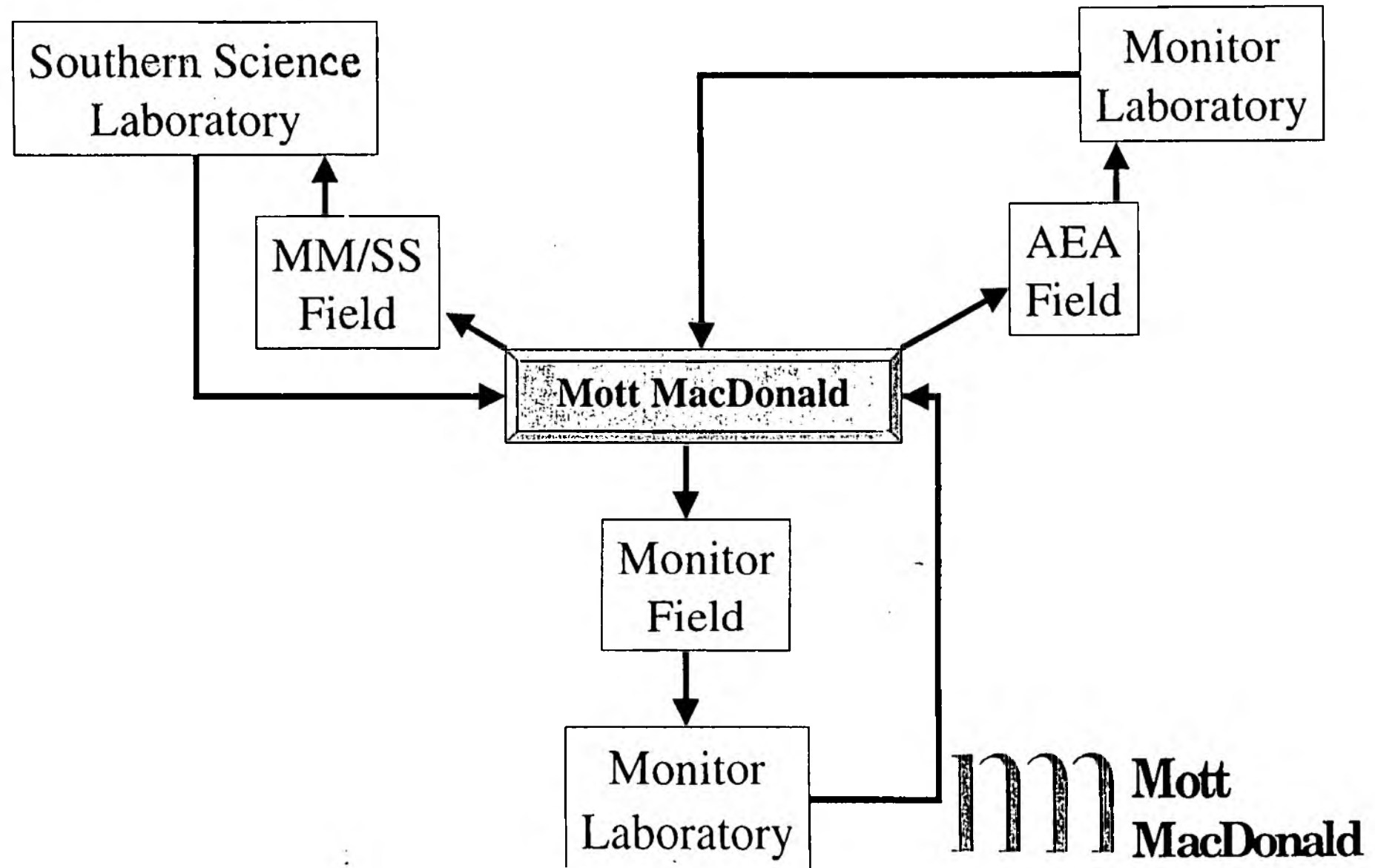
- 1 Memo P Pearce to C Peters ref W03313 dated 16 July 1996
- 2 Memo/ fac J Newton 24 July 1996
- 3 Memo/ fax C Manson to C Sandels dated 19/7/96

APPENDIX B

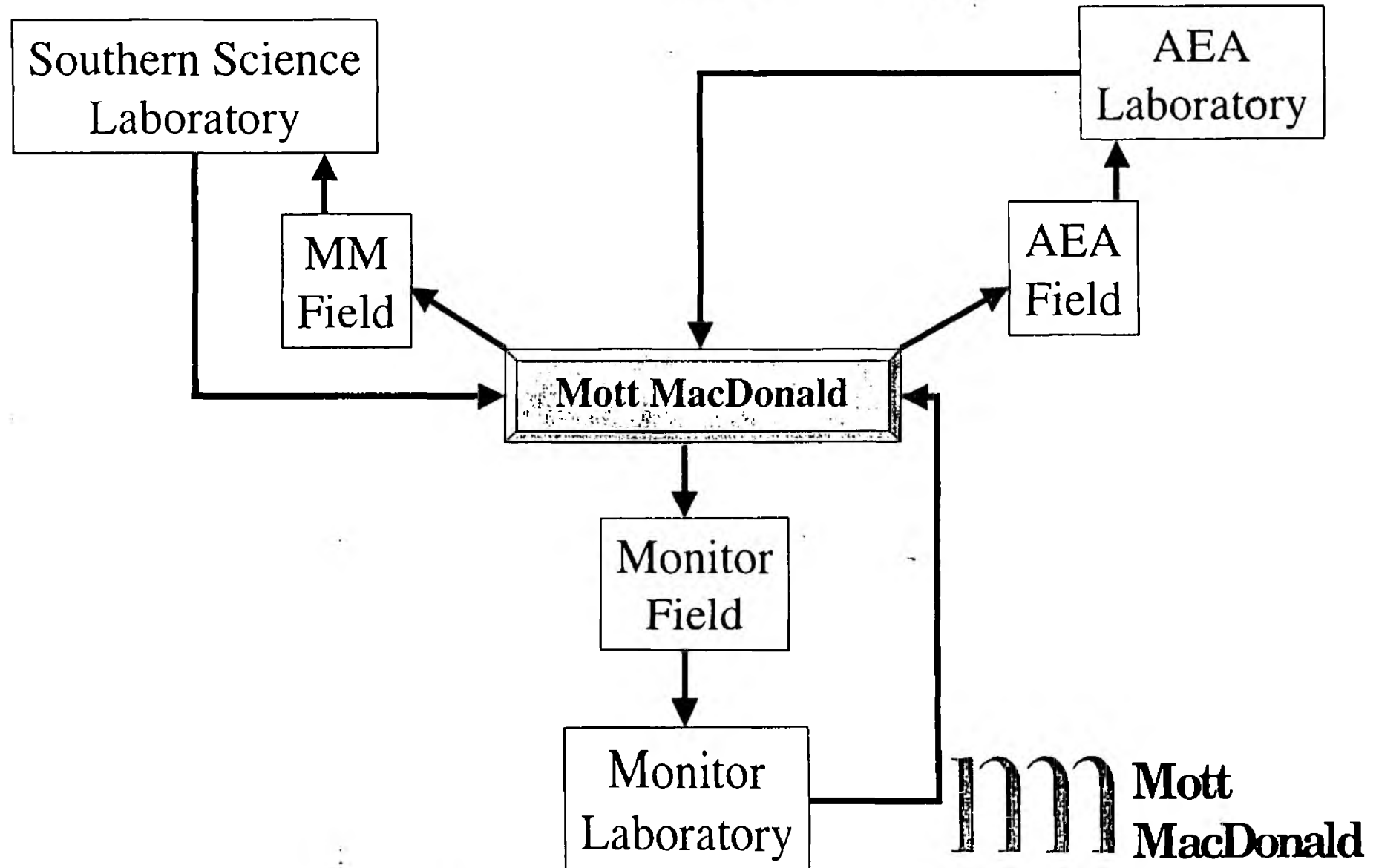
Mott MacDonald Consortium

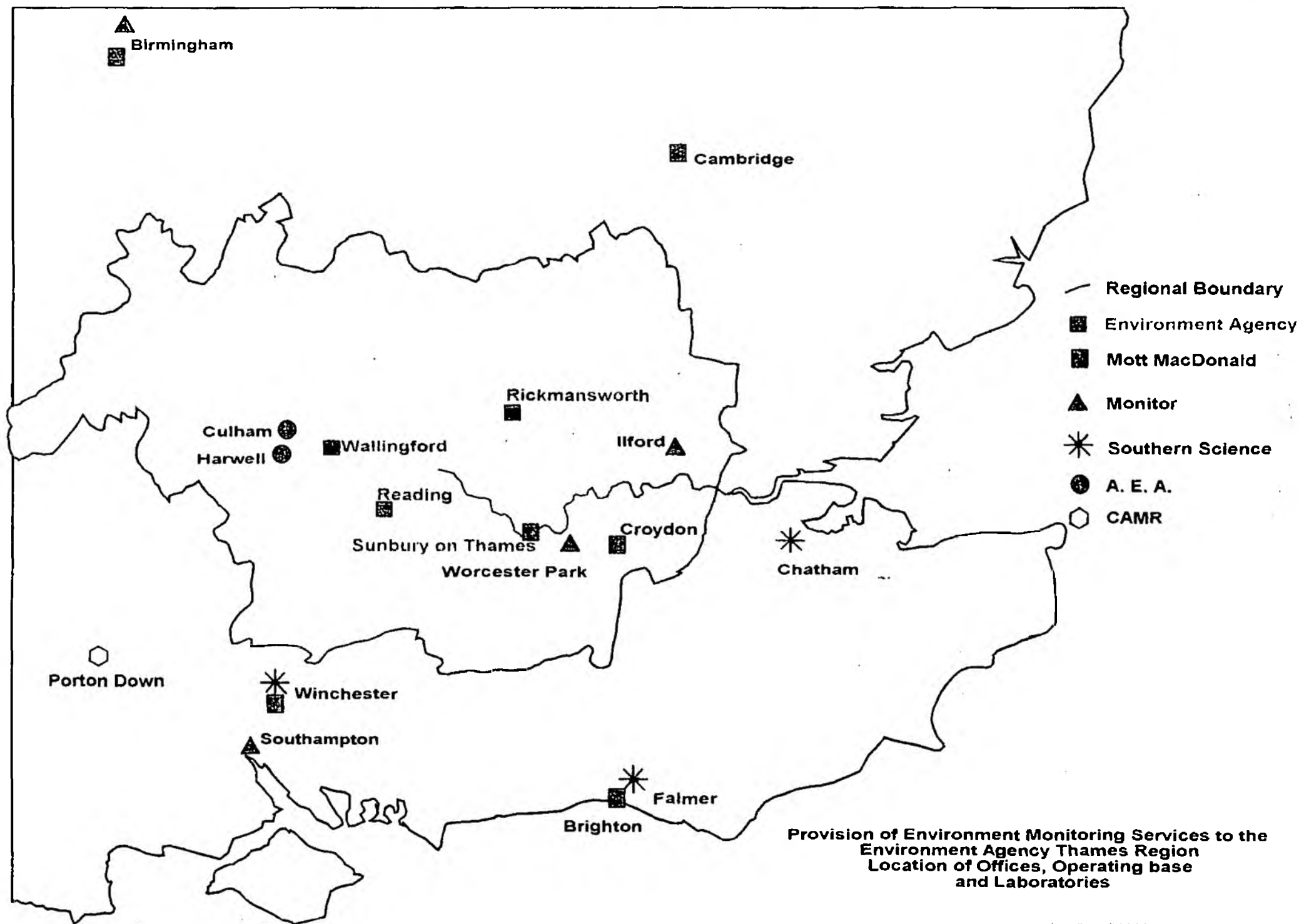
Arrangements for Gas and Water Quality Monitoring

Gas



Water Quality





APPENDIX C

Fax Quotation

National Laboratory Service to Peter Pearce dated 1.12.97

The Environment Agency
National Laboratory Service
Reading Laboratory, Fobney Mead
Rose Kiln Lane, Reading
Berks RG2 0SF
Tel: 01189 535966
Fax: 01189 535950
GTN 7-25-X



ENVIRONMENT
AGENCY

fax

To: Peter Parker

From: Deborah Wapshott

Company:

Date: 1.12.92

Fax No:

Please find below costs as requested :-

Suite 1 = £08.74 per sample. Please note
this is a fixed fee and instead of reporting
total volatile Acid we would report the individual

acids :-
n- Butyric
n- caproic
Ethanoic (Acetic)
Isobutyric
Iso caproic
Iso valeric
propionic
Valeric

and you can calculate the total.

Suite 2 = £12.43 per sample Suite 3 = £17.42

Please let me know if you wish to send
samples in so we are prepared. Standard
turnaround is 20 days, although many tests will
be reported in <10 days. If you require a
faster response it is possible by prior arrangement.

APPENDIX D

Water Monitoring Suites 1,2 and 3

Gas Monitoring, Field and Laboratory Measurements

Water

Laboratory Measurements

Suite 1

- | | | |
|---------------------------|------------------------|----------------------------|
| • pH | • Total Organic Carbon | • Nickel |
| • Electrical conductivity | • Sodium | • Lead |
| • Temperature | • Pottasium | • Zinc |
| • Ammoniacal Nitrogen | • CalciumMagnesium | • Biological Oxygen Demand |
| • Chloride | • Iron | • Chemical Oxygen Demand |
| • Sulphate | • Manganese | • Total Volatile Acid |
| • Alkalinity | • Cadmium | • Phosphate |
| • Total Oxidised Nitrogen | • Chromium | |
| • Nitrate and Nitrite | • Copper | |

**M M Mott
MacDonald**

Water

Laboratory Measurements

Suite 2

- pH
- Temp.
- Elec. Cond.
- Ammoniacal Nitrogen
- Chloride
- Chemical Oxygen Demand

Suite 3

- Chloroform
- Bromoform
- Bromodichlor Methane
- Dibromochlor Methane
- Trichloro Ethene
- Carbon Tetra Chloride
- Tetrachlor Ethene
- Trichlor Ethene

 Mott
MacDonald

Gas

Field Measurements

Standard

- Methane (peak + steady)
- Carbon dioxide (peak + steady)
- Oxygen
- Gas pressure and flow velocity
- Gas temperature
- Atmospheric pressure

Optional

- Carbon monoxide
- Hydrogen sulphide
- Flammable gas
- Water level

Laboratory Measurements

Standard

- Methane
- Carbon dioxide
- Oxygen
- Nitrogen

Optional

- Carbon monoxide
- Ethane
- Propane
- Hydrogen
- Hydrogen sulphide
- Trace Hydrocarbons
- CFC's

 **Mott
MacDonald**