National Audit Office

The Termination of the PFI Contract for the National Physical Laboratory

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL | HC 1044 Session 2005-2006 | 10 May 2006

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A report by the Comptroller and Auditor General

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John Bourn
Comptroller and Auditor General
National Audit Office

5 May 2006

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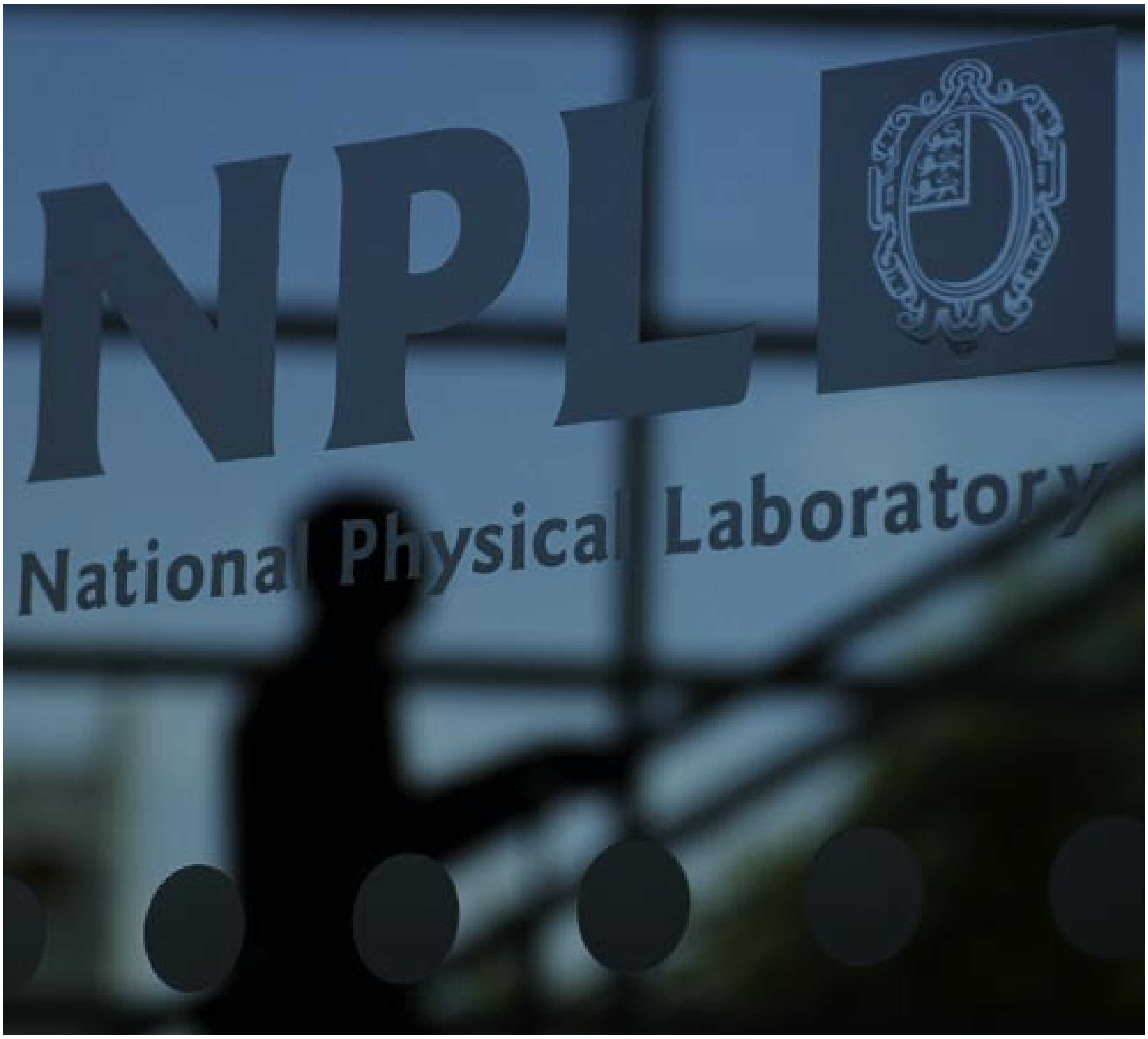
EXECUTIVE SUMMARY



1 The National Physical Laboratory (NPL) is one of the world's leading laboratories working on the measurement of physical properties such as time, length and mass. It sits at the pinnacle of the UK's National Measurement System for which the Department of Trade and Industry (the Department) is responsible.

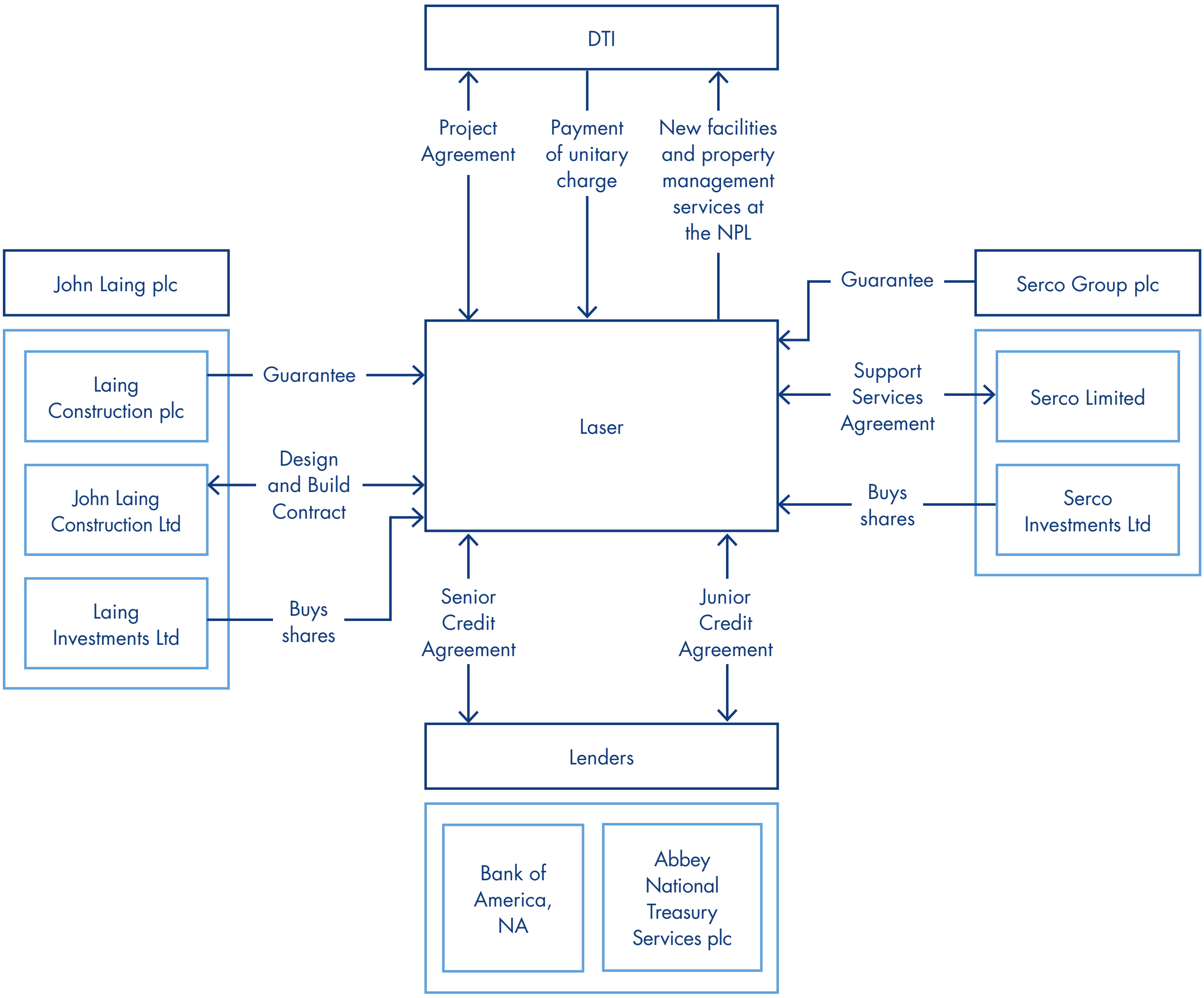
2 On 31 July 1998, the Department and Laser, a special purpose company jointly owned by Serco Group plc and John Laing plc, signed a 25-year long, Private Finance Initiative (PFI) contract. Under the contract Laser would build and manage new facilities for the NPL, comprising 16 linked modules, containing over 400 laboratories, and replacing many existing buildings. The planned cost of the new buildings was approximately £96 million,[1,2] financed mainly by loans from Bank of America, NA; and Abbey National Treasury Services plc (the Lenders) **(Figure 1 overleaf)**. The Department would pay Laser a unitary charge, of £11.5 million (1998 prices) a year once the new buildings were ready. The charge would be increased annually by a factor based on the increase in retail prices. At the end of the contract, the charge would cease and ownership of the buildings would pass to the Department.

3 The project suffered considerable construction delays and difficulties in achieving the specification for some parts of the buildings. These difficulties delayed the realisation of benefits associated with the new buildings, although mitigating action protected the quality of the scientific research conducted in the existing facilities. In December 2004, the Department and Laser agreed to terminate the PFI contract. The Department paid Laser £75 million for its interest in the new buildings, took over responsibility for completing some outstanding building works, and its liability to pay the unitary charge ceased. Laser passed the payment in full to the Lenders and is currently being wound up.

4 This was the first termination of a major PFI contract involving serious non-performance. We examined the Department's handling of the project and the lessons that might apply to other PFI projects. This report examines the problems that led to the termination, why these problems arose, how the Department managed them and the value for money consequences of the termination. Appendix 1 sets out our methodology.

1 All figures quoted in this report are cash except where otherwise stated.
2 The figure includes the fixed price for the design and construction of the new facilities, fees for construction advisers, capital expenditure in preparation for the provision of facilities management services and debt interest payments during the construction period.

1 Principal relationships between the parties



Source: National Audit Office and the Department

The parties agreed to terminate the PFI contract

5 Laser's shareholders divided the main contracts between them. Laser awarded John Laing plc's subsidiary, John Laing Construction Limited (JLC Ltd), a fixed price contract to design and build the new facilities (Figure 1). Serco Limited, a subsidiary of Serco Group plc, entered into a contract with Laser to manage the completed facilities (Figure 1).

6 Laser and JLC Ltd designed the main facilities around 13 construction phases, with completion spread from October 1999 to March 2001.[3] This approach was intended to provide Laser with early cash flow from the Department's payment of the unitary charge for completed phases.

7 Problems in constructing the new facilities delayed completion of all the phases by between seven and 46 months. Problems stemming from JLC Ltd's designs for achieving stringent temperature and/or stringent sub-audible noise controls in 30 key laboratories were particularly intractable. Problems with eight of these laboratories have still to be fully resolved.

8 Initially, the fixed price design and build contract with JLC Ltd protected Laser from increases in construction costs, and compensated it for lost revenue resulting from the delays. However, Laser lost this protection in November 2001, when John Laing plc sold JLC Ltd, took on responsibility for the contract with Laser, and concluded a Supplemental Deed with Laser which replaced JLC Ltd's obligation to construct facilities that met the Department's performance specification with one of completing an agreed list of work. The Department was not party to the deed and registered its objection to it. Laser considers that the Supplemental Deed protected the project from a larger downside that would have materialised if John Laing plc had pulled out of the project.

9 When it signed the Supplemental Deed, John Laing plc was in serious financial difficulties and needed to satisfy its bankers that it had put a limit on its losses on the contract. However, the Supplemental Deed exposed Laser to the full financial impact of any further construction problems and delays. When these materialised, they sapped Laser's financial strength so much that, in July 2004, Laser recognised that it could not complete the project. In Laser's view, the key problem was the financially open ended obligation to solve design issues with the eight laboratories that had to meet the most stringent sub-audible noise requirements. Laser therefore proposed a negotiated, early termination. After negotiations, the Department and Laser signed the termination agreement in December 2004.

The parties could have reduced project risks

10 The fundamental reason for the termination was that the original private sector design of the new buildings was deficient. The Department had concerns with the design at several stages during the project. During the procurement, the Department considered that Laser would overcome the Department's concerns and so did not insist on Laser demonstrating that its design could work. Following the award of the contract, the Department did not seek to resolve its concerns by imposing a design solution on Laser because the Department wished to ensure that responsibility for delivering satisfactory performance remained unambiguously with the private sector. The Department expected Laser and its contractors to recognise that their best interests were served by resolving concerns about the design, and would be able to act accordingly. The Department also aimed to avoid costs to the taxpayer and, initially, keep the value of the buildings off its balance sheet.

3 A fourteenth construction phase covered construction of car parks and other ancillary works, with a planned completion date of September 2001.

11 However, the private sector parties also missed opportunities to reduce project risk. Laser did not prove key features of JLC Ltd's design before construction commenced. JLC Ltd was slow to heed concerns expressed by the Department's expert advisers and the Independent Certifier. Also, although Serco Group plc stood to lose its investment in Laser, it was unable to persuade JLC Ltd to make changes when problems materialised.

12 Notwithstanding the obligation on JLC Ltd under the design and build contract to comply with Laser's obligations under the PFI contract, the payment schedule in the design and build contract reimbursed JLC Ltd mainly for making progress with building work rather than showing that the completed buildings met the specification. As a result, by autumn 2001, Laser had already paid JLC Ltd £76 million of a fixed price of £82 million, although only 9 out of the 16 modules were finished and John Laing plc estimated that completing the facilities would cost at least a further £45 million. John Laing plc told us that it had seriously underestimated the cost of constructing the buildings and lost £67 million on the contract, and at least a further £12 million of losses were borne by its sub-contractors.

The Department protected its position as problems grew

13 Following the signing of the contract in 1998, the Department retained a team to manage its residual responsibilities at the NPL. As a result, when Laser and JLC Ltd found that they were in trouble, the Department already had in place a project team that included staff and advisers with experience of the project. As the problems increased, the Department engaged additional technical and legal advisers to support and direct the team.

14 JLC Ltd's approach to the project became more adversarial as its problems mounted. The Department strove to avoid compromising its contractual position. It was prepared to accept lower performance requirements providing the relaxations did not compromise scientific research. Prudently in the circumstances, the Department refrained from requesting changes to the specification, and so avoided obscuring Laser's design responsibilities. Despite being of the view that some construction phases had been wrongly certified as complete, the Department paid the required unitary charge in full, adhering to legal advice that it was under an obligation to do so, pending overturning of the Independent Certifier's completion certificates by adjudication. Also, the Department's ability to sustain leading scientific research in the pre-contract, existing laboratories effectively avoided supply side pressures in the provision of laboratory space.

15 At least three times from 2001 onwards, the Department considered terminating the contract on the basis of default by Laser. However, each time, the Department was advised that there was a risk that to do so would expose it to a claim for damages. The Department was also concerned that it might not be able to find another contractor to take on the project.

Ultimately, the termination sum should be value for money

16 The Department based its strategy for negotiating the agreed termination sum on its estimate of Laser's contractual entitlement in the event of termination on the grounds of Laser's default. These provisions took account of the projected cost to the Department of completing the facilities. The estimate took the form of a range of likely outcomes, due to uncertainty in some parts of the calculation. The agreed termination sum, £75 million, was near the lower end of the range.

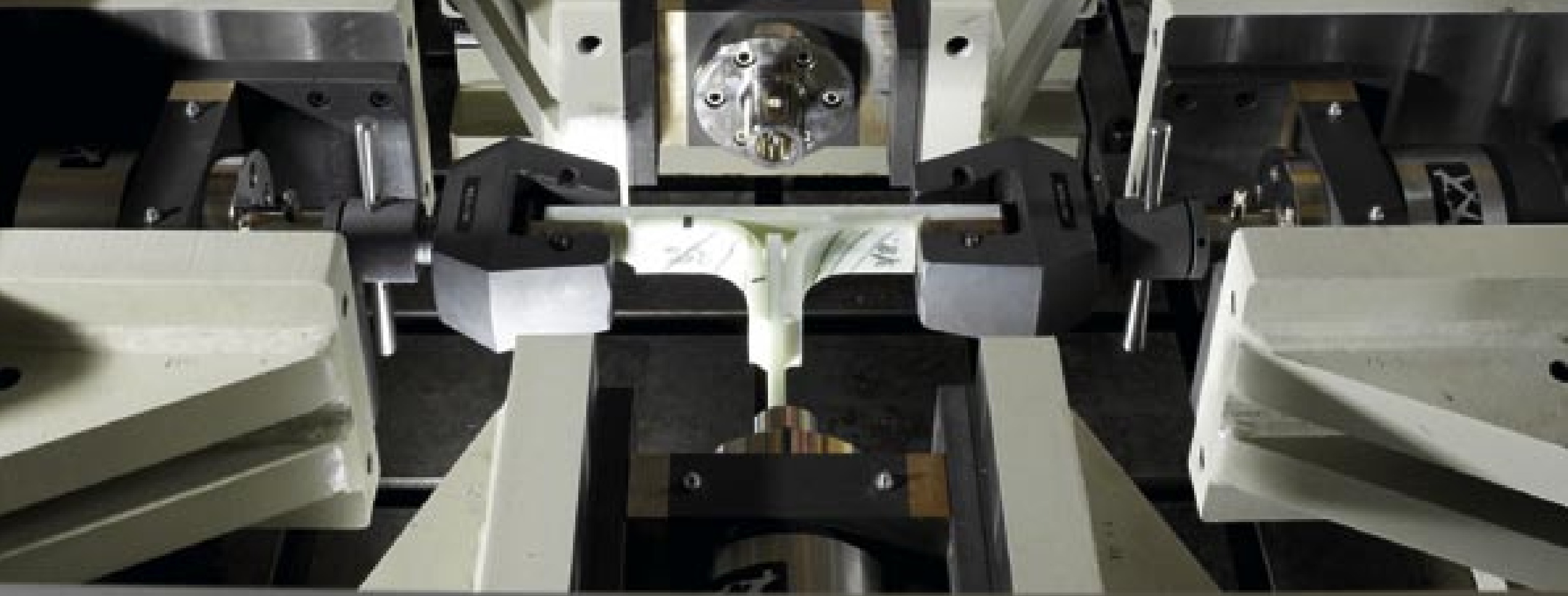
17 The Department expects substantially to complete the facilities in March 2007 and within a budget of £18 million. So far progress with the remedial and outstanding works is on schedule and within budget.

18 Up to and including the termination, the Department's investment in the new facilities was about £122 million (March 2005 prices). In return, the Department secured an asset that, for its 2004-05 accounts, was valued at £85 million and for which all but eight of more than 400 laboratories should be capable of being made to meet its specification in full. The private sector reported a loss of at least £100 million **(Figure 2)**.

2 The private sector reported a loss of at least £100 million

	Investment in the new buildings (£ millions at 2005 prices)	Value of the new buildings (£ millions at 2005 prices)	
The Department	122	Value of the new buildings on a depreciated replacement cost basis	85
The private sector	**Investment in the project (£ millions)**	**Principal outcomes (£ millions)**	
The equity investors	4	Full equity lost. No dividends received	(4)
The Lenders (loans)	85	£67 million left to repay loans from the termination sum (£75 million) after deducting the cost to break agreements that hedged movements in interest rates (£8 million)	(18)
Sub-contractors (JLC Ltd)	not available	£67 million loss on the design and build contract plus £12 million suffered by other parties in the supply chain	(79)
Total private sector investment	**>89**	**Total private sector loss**	**(101)**

Source: National Audit Office



RECOMMENDATIONS

19 The contractor failed to deliver the project to the time and quality required. However, the contract and the way it was managed by the Department were effective in transferring design and construction risk to the private sector. This has meant that, while the public sector has lost some of the benefits from the use of the buildings, it has not borne the full cost of making good deficiencies in them. We conclude that the Department did not achieve full value for money in the short to medium term, but did protect its downside position.

20 The NPL project was an early PFI contract. Some lessons that can be drawn from this project have already been captured in guidance published since the contract was signed in mid-1998. There are, however, new lessons to be learnt, and older ones to be reinforced about awarding and managing a fixed-price contract involving a high degree of technical complexity. We make the following recommendations:

a Technically challenging requirements – To reduce the risk that the Contractor will fail to deliver the required performance, the procurement process for technically challenging requirements should require bidders to demonstrate convincingly that they can satisfy the performance obligations, for example by constructing prototypes.

b Risk management – Before signing the contract, the Authority should assess the main ways in which the project could go wrong and use this assessment (a) to see whether more needs to be done to reduce risks and (b) confirm that the contract provides adequate incentives for all parties to avoid problems, or cure them if they occur.

c Risk management – Following the award of the PFI contract, the Department benefited from retaining staff on the project with detailed knowledge of the NPL and the contract. The Authority should retain access to a core of key personnel during the initial post-contract stage of the contract, until the Contractor has begun to deliver the services successfully.

d Risk management – The concept of partnering can help the public and private sectors to find solutions to issues where they are working together over an extended period. However, the Authority should be prepared to set limits on its partnering role when the Contractor's continued poor performance seriously jeopardises the successful delivery of the project, and, where necessary, re-establish any rights that may have been eroded through its dealings with the Contractor and avoid actions that will inadvertently transfer risk back to the Authority.




e Risk management – Under normal circumstances, issuing variations in good time is sensible, for example to avoid the cost of installing equipment that would otherwise need to be changed at a later date. But this project demonstrates that refraining from issuing variations, which would have changed the nature of the works, helped the Department successfully avoid counter claims that it shared responsibility for the poor performance of the new facilities.

f Risk management – Banks may prove reluctant to step in when projects are in difficulties, especially when the physical asset is technically complex or in some other way novel. The Authority should therefore not assume banks' step-in rights are sufficient to ensure that the private sector will deliver the contracted services.

g Risk management – The Authority should ensure that the payment regimes between the Contractor and its sub-contractors are structured so that the amount left to be earned by a sub-contractor for completing a contract exceeds its cost of doing so.

h Risk management – As part of its risk planning, the Authority should prepare fallbacks/contingency arrangements so that it is not forced to compromise its contractual position in order to maintain services.

i Termination – Terminating a contract for reasons of an alleged default by the Contractor is unlikely to be straightforward. Reliance on the threat of termination alone is therefore not an adequate substitute for effective arrangements that confirm, before the contract is signed, that the Contractor can meet its obligations.

j Termination – If the Authority wants to consider a termination involving default by a Contractor that is a special purpose company, it should consider taking advice on the market value of the Contractor's debt to inform its strategy for negotiating the termination sum.

PART ONE
The parties agreed to terminate the PFI contract

1.1 The National Physical Laboratory (NPL) is one of the world's leading laboratories working on the measurement of physical properties such as time, length and mass. It sits at the pinnacle of the UK's National Measurement System (NMS) for which the Department of Trade and Industry (the Department) is responsible. The NMS comprises the national infrastructure of measurement laboratories and scientific programmes that together establish conditions that produce world-class science and technology in the field of measurement. The NMS provides traceable and increasingly accurate standards of measurement for use in trade, industry, academia and government. In industry, the NMS supports innovation and increases in productivity by: enabling the benefits of new products and processes to be measured; improving processes and quality controls; and stimulating advances in measurement instruments. Measurement underpins a wide range of public goods, including consumer protection, forensic science, environmental controls, safe medical treatments and food safety regulation, as well as the technical standards that foster barrier-free trade.

1.2 On 31 July 1998, the Department and Laser, a special purpose company jointly owned by Serco Group plc and John Laing plc, signed a 25-year long, Private Finance Initiative (PFI) contract, under which Laser would redevelop the NPL facilities and provide property management services. Laser estimated that the capital cost of the project would be approximately £96 million. In exchange for use of the new facilities and the related property and other services, the Department agreed to pay Laser £11.5 million (1998 prices) a year, which would be increased annually by a factor based on the increase in retail prices. At the end of the contract, ownership of the facilities would revert to the Department. Appendix 2 provides background information about the project. Figure 1 shows the main parties involved and **Figure 3 overleaf** shows the key events in the life of the project.

1.3 Construction of the new facilities proved problematic and, as a result, there were long delays to completion. Events culminated in the Department and Laser, with the approval of Laser's lenders (Abbey National Treasury Services plc and Bank of America, NA (the Lenders)), signing a termination agreement on 20 December 2004. The termination was the first termination of a major PFI contract in which there were serious non-performance issues.

1.4 Under the agreement, the Department paid Laser £75 million for its interest in the new buildings and its liability to pay the unitary charge ceased. The Department became responsible for completing the facilities and expects substantially to complete them by March 2007. Laser passed the payment in full to the Lenders and is currently being wound up.

3 Key events affecting the project

Date	Event
1993 – March 1994	Prior Options Review into the future of the Department's research laboratories.
October 1995	The Department awarded Serco Group plc the contract to provide scientific research services at the NPL.
Spring 1996	The Department decided to redevelop the NPL site through the PFI.
August 1996	The Department invited parties to express their interest in the project.
February 1997	The Department issued Invitations to Negotiate to three consortia.
August 1997	The Department selected Laser as preferred bidder.
July 1998	Site preparation began. The project agreement was signed.
Summer 1999	Laser confirmed that difficulties in complying with some specified environmental outputs would delay completion of the first construction phase.
March/April 2000	Adjudication of the dispute about the interpretation of the specification governing the most stringent temperature control requirements.
November 2000	John Laing plc announced that it planned to withdraw from major construction projects.
March 2001	Original contractual completion date for all modules. Only seven out of 16 modules actually completed.
April 2001	The Department signed a "Technical Arrangement" revising the specification for the most stringent temperature control requirements.
July 2001	JLC Ltd withdrew all previously agreed delivery dates due to the extent of mechanical and electrical problems.
October 2001	John Laing plc sold its construction business, including JLC Ltd, to a competitor for £1. John Laing plc took direct responsibility for the conduct of JLC Ltd under the NPL design and build contract.
15 November 2001	Laser and JLC Ltd signed a Supplemental Deed to the design and build contract without the Department's consent. The deed released JLC Ltd from several of its obligations under the original contract. Laser's obligations to satisfy the Department's output specification remained unchanged.
31 August 2002	"Long stop date" – The date specified in the contract when failure to complete construction of the new facilities (including car parks) would constitute a default that entitled the Department to terminate the contract subject to any extension to the date and Laser's failure to remedy the default. Only nine out of 16 modules were actually completed.
April 2003	Serco Group plc paid John Laing plc £800,000 for its interest in Laser.
February 2004	Laser notified the Department that it did not have funding to build out the project or meet long term requirements of the project. To improve its cash flow, Laser did not pay £2.2 million liquidated damages to the Department and became liable for interest charges.
5 July 2004	The Independent Certifier signed off completion of the last of the modules. Contractually, all building modules were complete. Construction of the car parks remained outstanding.
7 July 2004	The Department received proposals from Laser and the Lenders suggesting three ways forward including negotiated termination.
October 2004	The Department referred to adjudication two disputes about the appropriateness of the Independent Certifier's completion certificates for three construction phases.
30 November 2004	The Department, Laser and the Lenders agreed in principle to a termination payment of £75 million.
3 December 2004	The Adjudicator found in favour of the Department on one dispute and overturned two completion certificates. The Department halted proceedings on its other dispute.
20 December 2004	The Department paid the termination sum and the PFI contract was brought to an end.

Laser had scheduled to complete construction of the new laboratories by March 2001

1.5 In 1991, the Department identified that it needed to replace and upgrade the buildings that housed the NPL facilities, in order to provide a long-term working environment that would enable scientists to conduct world class research in support of UK competitiveness. The existing site comprised over fifty buildings, varying in age and quality spread over 28 hectares **(Figure 4 overleaf)**. However, the Department postponed its plan to redevelop the NPL site while it conducted a review into the future of its research establishments, including the NPL. Acting on findings from the review, the Department contracted out the operation of scientific research services at the NPL to Serco Group plc in October 1995. In early 1996, the Department decided to proceed with the redevelopment of the NPL site. In August 1996, it advertised in the Official Journal of the European Communities that it sought a contractor to take responsibility for redevelopment, reorganisation and day to day management of the NPL site.

1.6 Nearly two years later, at the end of July 1998, the Department signed a PFI contract with Laser. The company was to construct 16 linked modules that would house over 400 laboratories, offices for scientists and administrators, workshops, and other administration spaces, such as the main computer room (Figure 4). Most of the existing buildings would become surplus to requirements when the new facilities were complete and so, as part of the deal, the Government sold two plots of surplus land to Laing Homes Ltd for a total of £8.8 million. To reduce Laser's debt requirement and so reduce Laser's unitary charge, the Department transferred the proceeds from the sale to Laser as a prepayment for future services. Under the contract, Laser's unitary charge, after taking into account the prepayment, was £11.5 million (1998 prices) per annum.

1.7 Serco Group plc and John Laing plc each owned 50 per cent of Laser, which they had established for the purpose of bidding for the contract. As is common with PFI deals, the shareholders divided the main contracts between them. Laser awarded John Laing plc's subsidiary, John Laing Construction Ltd (JLC Ltd), the contract to design and construct the new facilities. Serco Limited, a subsidiary of Serco Group plc, entered into a contract with Laser to manage the completed facilities.

1.8 Laser phased construction of the new facilities so that it could generate cash flow as early as possible. Laser therefore planned to complete the first construction phase, modules 1, 2, 11 and 12, in October 1999. The remaining 12 modules, comprising 12 construction phases, were to have been completed over the following 17 months **(Figure 5 on page 13)**.

1.9 The parties agreed that Laser should engage an Independent Certifier to determine completion of each phase and, after a competition, Laser appointed Allott and Lomax, a firm of consulting engineers. The Department, Laser, JLC Ltd and the Independent Certifier together identified, for each construction phase, tests to assess whether JLC Ltd's completed works met the specified environmental conditions. If the Independent Certifier were satisfied with the test results, he would certify completion of the phase at which point the Department's obligation to pay the relevant portion of the unitary charge would arise.

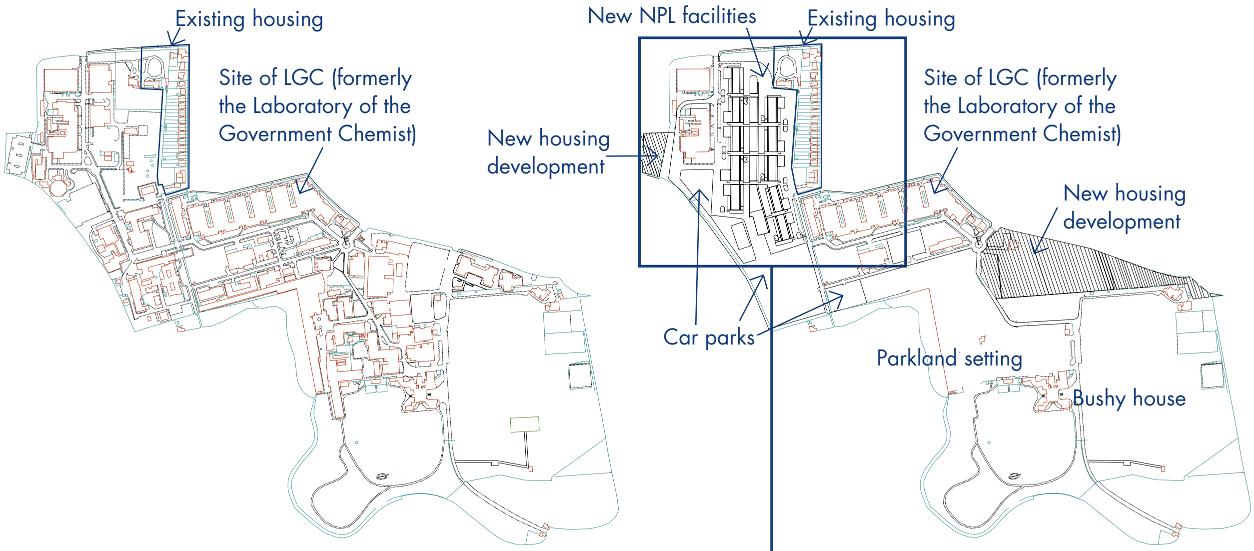
Construction of the new laboratories has taken considerably longer than planned

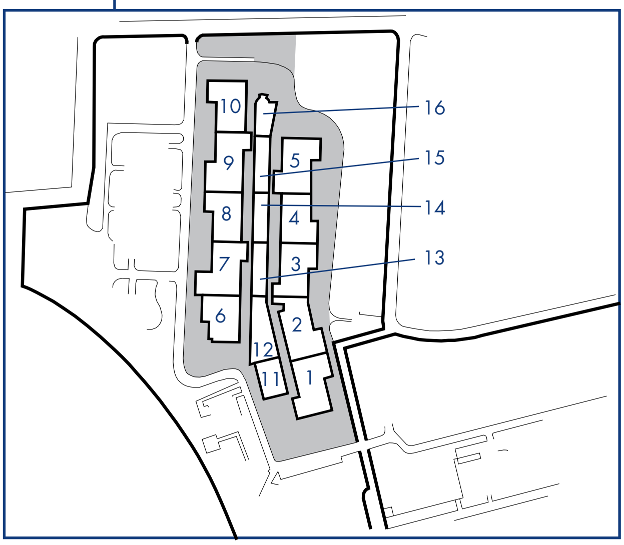
1.10 Initially, construction proceeded as programmed, but, in summer 1999, JLC Ltd confirmed that it was experiencing problems with some of the mechanical and electrical systems in the first phase modules. It stated that completion of the phase would be delayed by a month, but the delay became progressive. As the build continued, problems emerged with construction of the other construction phases. The problems translated into delays to the completion of all of the phases, which for three phases amounted to nearly four years (Figure 5).

4 Laser's proposed redevelopment and reorganisation of the NPL site

The National Physical Laboratory Site at Teddington

Before Development **After Development**





The contents of the new laboratory facilities

Module	Contents
1	Information systems; Electrical measurements; Environment
2	Dimensional metrology; Information systems; Optical metrology; Electrical measurements; Time
3	Dimensional metrology; Information systems; Metre and wavelength standards; Optical metrology; Electrical measurements; Optical radiation; Photonics
4	Metre and wavelength standards; Basic metrology; Optical metrology; Electrical measurements; Time; Optical radiation; Photonics
5	Basic metrology; Temperature; Thermophysics; Optical radiation
6	Ionising radiation
7	Materials; Force and mass; Humidity; Ionising radiation
8	Materials; Pressure; Environment
9	Materials
10	Materials; Acoustics
11	Goods in/out
12	Engineering workshop; IT support
13	Materials; Reprographics; Graphics; Conferencing
14	Senior management; Finance; Marketing; Personnel; Health/safety and quality
15	IT support; Restaurant; Library
16	Meeting rooms; Security; Reception

Source: National Audit Office and the Department

5 Laser planned to complete all 16 modules between October 1999 and March 2001 but it incurred delays which ranged from seven to 46 months

Construction phase	Modules included	Original target completion date	Issue of completion certificate	Delay (months)
Phase 1	Modules 1, 2, 11 and 12	13 October 1999	29 June 2000[1]	8.5
Phase 2	Module 13	21 October 1999	14 June 2000	7.8
Phase 3	Module 14	23 February 2000	07 September 2000	6.5
Phase 4	Module 3	26 February 2000	23 December 2003	45.9
Phase 5	Module 6	04 March 2000	26 April 2001	13.7
Phase 6	Module 7	04 May 2000	14 July 2003	38.3
Phase 7	Module 4	30 June 2000	08 April 2004	45.3
Phase 8	Module 15	06 July 2000	12 March 2001	8.2
Phase 9	Module 8	18 August 2000	06 October 2003	37.6
Phase 10	Module 16	05 October 2000	23 May 2001	7.6
Phase 11	Module 5	20 October 2000	05 July 2004	44.5
Phase 12	Module 10	02 March 2001	02 May 2003	26.0
Phase 13	Module 9	11 March 2001	12 February 2003	23.0
Phase 14	Car parks and gas bottle store	24 September 2001	Never issued[2]	

Source: The Department

NOTES

1 Excluding four laboratories, the completion of which the Department agreed to transfer into Construction Phase 4.

2 The Independent Certifier issued construction completion certificates for three sub-phases of Phase 14, which covered various elements of the phase including the gas bottle store.

1.11 The problems causing the delays were many and various **(Figure 6 overleaf)**. Two were particularly intractable:

- The design of the environmental control systems in 29 laboratories within Construction Phases 1, 4, 7 and 9 that were required to achieve the most stringent temperature control – Recognising that meeting these requirements would take a considerable time, the Department agreed to exclude these types of laboratories from Construction Phase 1 and incorporate them in Construction Phase 4. When the Independent Certifier issued his completion certificates for the three remaining phases, construction delays to the phases ranged between 38 and 46 months (Figure 5).
- The design of eight laboratories governed by stringent sub-audible noise requirements – In 2003, tests revealed that none of these laboratories met these requirements. Seven of the laboratories also had to comply with the most stringent temperature control requirements and, on investigation, Laser concluded that the air-conditioning needed to achieve the temperature control precluded attainment of the most stringent sub-audible noise requirements. After reviewing the issue, the Independent Certifier decided that the non-performance did not constitute a major defect preventing beneficial use of the modules. On this basis, he certified completion of the two affected construction phases: Phase 4 (Module 3) in December 2003; and Phase 7 (Module 4) in April 2004.

6 The Department identified numerous problems with JLC Ltd's design

Module/Area affected	Problem
Modules 1 & 2	The temperature and humidity controls were found to be inadequate.
Modules 2, 3, 4 & 8	Temperature control did not adhere to the most stringent requirements. Temperature control in line with the reduced control space agreed in the Technical Arrangement was eventually achieved after several years delay.
Modules 3 & 4	Stringent requirements governing control of sub-audible noise were not met.
Module 8	The Department considered that, in some of the laboratories, the gas extraction systems were unsafe.
Module 8	A pillar was put into a laboratory space in order to support plant in the roof space above. Contrary to the specification, the pillar was constructed of magnetic material that could potentially interfere with experiments sensitive to magnetic effects. Tests to date have not revealed interference problems although the pillar may become magnetised over time.
Module 9	Fume hoods designed to extract gases were found to be ineffective. Scientists were forced to move out of some module 9 laboratories until Laser fitted temporary corrective measures.
Module 12	The layout of the main workshop conflicted with the Department's interpretation of health and safety regulations.
Module 12	Difficulties were experienced in adhering to environmental control specifications in the main computer room.
Various Modules	There were strict dimensional specifications for access to the laboratories. JLC Ltd fitted large doors that were extremely heavy and impeded disabled access. As a result, it had to fit electronic door openers at extra expense. The Department maintains that there were alternative design solutions that could have avoided this extra cost.
Various Modules	Water dilution tanks were found to be ineffective.
Various Modules	The Department specified that residual current devices had to be fitted in the majority of laboratory spaces. These were not fitted. The devices are designed to prevent electric shocks and are considered best practice in industrial buildings. Laser fitted the required devices approximately two years after the first construction phase had been certified complete.
Various Modules	Humidifiers were installed incorrectly.
Site wide	Pipes used in the process cooling water system were susceptible to corrosion.
	The environmental process cooling water system was not separated from the process cooling water system used to cool scientific equipment, therefore a system failure could result in scientific equipment becoming damaged.
Site wide	Marginal and, in some cases, inadequate capacity of machinery used to chill water for air-conditioning and process cooling water purposes.
Site wide	The electrical circuits servicing the site were arranged as a network of radial branches rather than a loop. Higher than designed electricity demand in a branch would result in electricity supply in the branch shutting down so threatening scientific work in the affected modules.

Source: The Department

1.12 The Department was not satisfied with the Independent Certifier's decision to issue completion certificates for the construction phases that included the eight laboratories that did not meet the most stringent sub-audible noise requirements. In October 2004, the Department referred the matter to adjudication. In December 2004, the adjudicator found in the Department's favour.

1.13 The adjudicator considered that the non-compliance did not constitute a defect as defined by the contract because the evidence before him had not demonstrated that the non-compliance could be directly attributed to a breach of contract by Laser. However, he considered that the non-compliance prevented beneficial use of the laboratories and decided that the Independent Certifier ought not to have issued his completion certificates. Consequently, the two construction phases affected were deemed not complete when the Department and Laser terminated their contract in December 2004.

Laser could not afford to complete the new facilities

In July 1998, Laser had access to funds that it considered sufficient to complete construction

1.14 In the design and build contract between Laser and JLC Ltd, the latter agreed to provide new laboratory facilities that complied with the Department's output specification for a fixed price of about £82 million. At the time, Laser had access to funds totalling nearly £100 million **(Figure 7 overleaf)** to cover its total expected capital expenditure of £96 million.

1.15 In its financial model, Laser estimated that its maximum demand on the available funds would be £94 million, the rest of its cash requirements would be met from revenue received following completion of the early construction phases. Laser, therefore, had a small funding cushion to cover risks and contingencies that it had not passed down the contractual chain.

Initially, JLC Ltd protected Laser against construction cost increases and consequences of delays

1.16 Under the fixed price design and build contract, JLC Ltd could not pass on to Laser increases in the cost of constructing the facilities, including costs attributable to rectifying elements of the design that did not meet specified performance requirements. JLC Ltd was also liable to compensate Laser for construction delays through the payment of liquidated damages.[4] However, JLC Ltd capped its liabilities to Laser at £31 million, which included payment of up to £17 million in liquidated damages. To give the protection more force, Laser secured a covering guarantee from John Laing plc, JLC Ltd's parent company. These provisions initially protected Laser as construction costs rose and delays increased.

1.17 Under the contract, the main source of Laser's income was the Department's payment of the unitary charge (Paragraph 1.6). The Department had agreed to pay just under one-sixteenth of the unitary charge for each completed module,[5] from the date of the Independent Certifier's completion certificate for the relevant phase. The delays detailed in Figure 5 therefore meant that Laser suffered a loss of income. Through to the end of October 2001, Laser lost about £11 million of revenue, but recovered liquidated damages of £10 million from JLC Ltd.

The costs of rectifying the design were greater than John Laing plc was prepared to bear

1.18 After suffering from losses on the NPL contract and other construction projects, notably the Millennium Stadium, Cardiff, in October 2001, John Laing plc sold its construction business, including JLC Ltd, to a competitor for £1. It retained liabilities for thirteen contracts, including the NPL design and build contract.

4 Liquidated damages are included in contracts to allow one party either to deduct from payments due to the other party, or to receive a payment from that other party, an amount that represents a genuine pre-contract estimate of the loss that the first party expects it will suffer as a consequence of a specified breach of the contract by the second party.

5 Five per cent of the unitary charge was dependent on completion of Construction Phase 14, car parks and the gas bottle store.

7 Laser had access to nearly £100 million

Laser's sources of funds		Use of funds	
Prepayment – The Government's proceeds from the sale of land to Laing Homes Ltd	£8.8 million	Fixed price contract for the design and construction of the new facilities	£82.0 million
Senior debt – The majority of the funds Laser needed to construct the new laboratories. Bank of America, NA provided 10 per cent of the senior debt facility and Abbey National Treasury Services plc provided the remainder.	£81.8 million	Fees for construction advisers, capital expenditure in preparation for the provision of facilities management services, debt interest payments, working capital and contingency.	£17.6 million
Junior debt – Provided by Abbey National Treasury Services plc, this form of funding is more secure than equity but less secure than senior debt.	£4.6 million		
Shareholders' equity – Serco Group plc and John Laing plc each held 50 per cent of the stock in Laser.	£4.4 million		
Total	**£99.6 million**		**£99.6 million**

Source: National Audit Office and the Department

1.19 John Laing plc then renegotiated JLC Ltd's contract with Laser. It did so because:

- It had already incurred considerable losses on the contract. John Laing plc singled out the NPL contract as being a major contributory source of the reported £56 million gross loss in JLC Ltd's activities for the year ending December 2000.
- It faced further losses under the design and build contract. In September 2001, John Laing plc estimated that the cost to complete the new facilities would be about £45 million, with the potential to be even more because John Laing plc retained responsibility for ensuring that the design would meet the Department's output specification. JLC Ltd had already been paid £76 million against the agreed fixed price of £82 million, so could earn only a further £6 million.
- Its projected future losses from honouring its obligations, together with the £10 million it had already paid Laser in liquidated damages, would considerably exceed the £31 million contractual limit to its liability to Laser.

1.20 Against this background and under pressure from its bankers to obtain cost certainty by "whatever means", John Laing plc threatened to walk away from the project. Laser and the Lenders advised the Department that the threat was real. The ensuing discussions and negotiations concluded in November 2001 when Laser signed a Supplemental Deed with JLC Ltd. Under the deed, Laser agreed to relax its performance requirements, so that JLC Ltd would complete construction on the basis of specified inputs rather than performance outputs, and so would no longer bear final responsibility for ensuring that the design met the Department's requirements. For those construction phases that did not meet the Department's output specification after JLC Ltd had completed its work under the deed, Laser arranged for Serco Limited to project manage outstanding works.

1.21 The Department refused to accept any relaxation of the performance requirements and did not recognise the Supplemental Deed. However, Laser considered that had it not concluded the deed with JLC Ltd, John Laing plc would have pulled out of the project, an intention that John Laing plc confirmed to us was indeed the case. In Laser's view, the consequences to the project would have been very serious and for the Department could have included:

- A legal dispute with John Laing plc, Laser and the Lenders, with an uncertain outcome.
- A lengthy delay while it assessed and re-tendered the unfinished work.
- The likelihood that no replacement contractor would accept the output specification.

Laser too ran out of funds

1.22 When the Supplemental Deed was signed, Laser had:

- £2 million of cash reserves;
- access to nearly £17 million through its debt facilities;
- a commitment from John Laing plc that, under the Supplemental Deed, JLC Ltd would execute works estimated to cost about £42 million in return for a maximum payment of about £6 million[6]; and
- a revenue stream of £600,000 per month from the Department for nine completed modules.

1.23 In late 2001, however, Laser's operating expenditure and debt interest payments averaged respectively about £170,000 and £450,000 per month. Later, as JLC Ltd finished its work on each phase, as defined in the Supplemental Deed, Laser needed cash both to pay John Laing plc and to fund the additional works needed to complete the phase to the Department's output specification. Laser's monthly capital expenditure therefore grew. In the first six months following the signing of the deed, Laser's cash outflow, net of cash receipts, averaged £180,000 a month **(Figure 8 overleaf)**. By summer 2003, the cash outflow had grown to over £1.2 million a month before falling to a monthly outflow of £310,000 in 2004.

1.24 Altogether, between November 2001 and June 2004, Laser spent nearly £12 million to complete the construction phases after JLC Ltd had completed its work under the Supplemental Deed. During this period, Laser's net cash outflow was just over £18 million. As a result, by July 2004, Laser had exhausted its debt facilities and had under £1 million of cash reserves. However, Laser had still not fully completed the laboratories (Paragraph 1.12).

Given the construction related uncertainties, neither Serco Group plc nor the Lenders were prepared to extend their commitments in support of Laser

1.25 In April 2003, John Laing plc sold its interest in Laser to Serco Group plc for £800,000. From this moment, Laser became a wholly owned subsidiary of Serco Group plc. While Serco Group plc did not expect a return on this investment, it considered that the leadership of Laser had to change in order for the project to stand the best chance of success. However, Serco Group plc was not prepared to shoulder responsibility for construction activities and, while it was prepared to forgo a return on its investment in Laser, it was not prepared to increase its investment or guarantee completion of construction work.

1.26 The over-riding concern for the Lenders was recovery of their loans. At the time of the 2001 deal, they re-modelled the project and concluded that Laser's forecast cash flows would still cover repayment of the projected debt. The Lenders were, therefore, prepared to keep Laser's debt facilities open.

1.27 When Laser encountered construction related difficulties in 2003 and 2004, the Lenders continued to support the company. They agreed that Laser could defer repayments of principal, but they refused to increase the debt in the project. The Lenders told us that they carefully considered the option of stepping-in to replace Laser. They decided that the commercial risk of taking on Laser's obligations, particularly given the uncertain cost of correcting the deficient design, was too large. They also considered that replacing Laser would not be cost effective because another contractor would not possess any knowledge of the problems and complexities associated with the project.

6 John Laing plc told us that honouring its obligations under the Supplemental Deed cost it £39 million for which it received £3.5 million from Laser.

8 By July 2004, Laser had access to less than £1 million

Laser's cash flow from November 2001 to June 2004/£000s

	Nov 2001 to Apr 2002	May 2002 to Oct 2002	Nov 2002 to Apr 2003	May 2003 to Oct 2003	Nov 2003 to Apr 2004	May 2004 to Jun 2004[1]	Totals
Cash Receipts	3,010[3]	4,260	3,810	4,660	5,490	2,060	23,290
Operating Expenditure	(1,020)	(1,650)	(1,380)	(2,180)	(1,890)	(860)	(8,980)
Capital Expenditure (JLC Ltd - Supplemental Deed)	0	(2,460)	0	(1,080)	(10)	0	(3,550)
Capital Expenditure (to complete construction phases, ex JLC Ltd liabilities)	0	(910)	(1,720)	(5,500)	(2,870)	(780)	(11,770)[2]
Capital Expenditure (other)	(390)	(800)	(150)	(450)	90	(270)	(1,970)
Debt payments	(2,680)	(2,790)	(2,790)	(2,870)	(3,340)	(780)	(15,260)[2]
Total cash outflow during period	**(1,090)**[2]	**(4,360)**[2]	**(2,220)**[2]	**(7,430)**[2]	**(2,530)**	**(620)**[2]	**(18,240)**[2]
Funds at start of period	18,610	17,520	13,160	10,940	3,520	990	
Funds at end of period	17,520	13,160	10,940	3,520[2]	990	370	
Average monthly cash outflow during period	(180)	(730)	(370)	(1,240)	(420)	(310)	

Source: National Audit Office and Laser

NOTES

1 All periods are six months except the last which is a two-month period.

2 Minor rounding errors corrected in totals.

3 The unitary charge for April 2002 (£608,000) appears in the column for the period May 2002 to October 2002.

In a precarious financial position, Laser proposed a negotiated termination of the contract

1.28 Notwithstanding the Department's protests about the completion status of a number of modules, including the two that housed the laboratories that did not comply with the most stringent sub-audible noise requirements (Paragraph 1.11), by the end of June 2004, certified completion of the last building module was imminent. Consequently, Laser was now close to receiving 95 per cent of the unitary charge. However, Laser informed the Department that it did not have the financial capacity:

- To fund major remedial works to achieve the most stringent sub-audible noise requirements.
- To fund upgrading the supply of power to the NPL (Figure 6), if these works were the responsibility of Laser.
- To pay the Department £2.2 million of accrued, but unpaid liquidated damages.

Laser told us that the first of these three points was the most serious. Laser was of the view that the commitment to deliver laboratories that complied with the most stringent sub-audible noise requirements was financially open ended because it did not possess a proven design. The non-performance of these laboratories was the key problem preventing completion of the new buildings.

1.29 Given the construction and operational uncertainties that Laser continued to face, the company assessed that there were three ways forward for the project. These were:

- the parties renegotiating Laser's rights, obligations and financing;
- the Department terminating the contract; and
- the parties negotiating a termination of the contract.

In July 2004, Laser put these options to the Department.

The Department considered that a negotiated termination would achieve a better outcome than relying on its termination rights under the contract

1.30 By 2004, the Department was certain that Laser would not be able to complete the buildings to the required specification and therefore termination was ultimately the best way forward. However, the Department had to avoid a counter-claim that it had wrongly terminated the contract, which would have potentially exposed the Department to compensating Laser for its costs and loss of profit. Legal counsel advised the Department not to progress termination until Laser committed a breach that contractually entitled the Department to terminate the contract and that Laser could not remedy.

1.31 When Laser proposed a negotiated termination, the Department accepted that it should try to conclude a deal. The Department considered that to have proceeded with termination because of Laser's defaults would have risked a legal dispute, the outcome of which would have been uncertain and could have taken many years to conclude. When, in December 2004, the Independent Certifier's completion certificates for the Construction Phases 4 and 7 were overturned, the Department's legal advisers suggested that such a breach could have occurred giving the Department a clear right to terminate the contract, because Laser could not afford to remedy the defective modules. However, by this time, the key terms for the negotiated termination had been agreed, and the only practical effect of the decision was to strengthen the Department's bargaining position should issues be reopened.

PART TWO
The parties could have reduced project risks

2.1 The termination of the PFI contract for the NPL can be directly attributed to deficiencies in JLC Ltd's original design for the new buildings. The Department identified concerns about the design. During the procurement, the Department considered that Laser would overcome the Department's concerns and so did not insist on Laser demonstrating that its design could work. Following the award of the contract, the Department did not seek to resolve its concerns by imposing a design solution on Laser because the Department wished to ensure that responsibility for meeting its specification remained unambiguously with the private sector. The Department's aim in doing so was to maximise incentives for the private sector to solve any problems, avoid costs falling on the taxpayer, and, initially, keep the value of the buildings off its balance sheet. However, the private sector failed to respond to these incentives in the manner expected by the Department.

The specification was complex

2.2 In accordance with the principles of the Private Finance Initiative, the Department based the procurement on a specification of outputs that the new facilities should provide (e.g. quantity of space, services provided, environmental conditions maintained), rather than inputs (e.g. materials or design to be used).

2.3 The redevelopment of the NPL involved the construction of over 400 laboratories. Many of the laboratories had to meet exacting environmental conditions, which varied according to the type of research. Consequently, elements of the output specification were more demanding than any other output specification then prepared under the Private Finance Initiative. In addition, the specification for many of the laboratories required that a variety of different output conditions had to be met at the same time.

The Department identified concerns about the design at several stages

During the evaluation of bids

2.4 In its instructions to its bid evaluation team, the Department specified that it wanted the team to gauge whether each bidder had appreciated the complex requirements associated with the laboratories. The Department received two bids for the project: one from Laser and the other from a consortium called Osborne. The team concluded that neither bidder had demonstrated specifically how it would meet the stringent temperature controls required in some of the laboratory spaces. The team suggested that a single laboratory should be selected and the bidders asked to work up their designs. The Department did not follow up the idea.

2.5 The bid evaluation team also considered that Laser had underestimated how tough meeting the most stringent temperature control requirements would be and had not made sufficient space available in its design for the machinery needed to maintain the specified environmental conditions. However, the Department did not demand from Laser detailed plans for addressing these concerns.

At preferred bidder stage

2.6 After the Department had appointed Laser as preferred bidder, reservations about its understanding of the project's requirements remained. In early 1998, the Department was of the view that some of Laser's proposed mechanical and electrical solutions would not deliver the specified performance.

2.7 In April 1998, JLC Ltd stated that it would list areas in the new laboratories that would not meet the output specification. It wanted the Department to amend the specification to suit the proposed design. The Department noted that JLC Ltd's representatives appeared surprised when the Department explained that the outputs were core requirements that should drive the design, rather than the other way round.

2.8 At this late stage in the procurement, the Department was still concerned that JLC Ltd lacked understanding of the nature and purpose of the output specification. However, the Department considered that, in transferring design and construction risk to Laser, the financial and reputational consequences of failure would discipline Laser and JLC Ltd into meeting the required performance. The Department, therefore, was content to permit Laser to commence site clearance and foundation construction in advance of the signing of the contract.

During construction

2.9 From early 1999, the Department's technical adviser, HDR, and the Independent Certifier found deficiencies in JLC Ltd's designs, for example, the design to control temperature to the most stringent requirements. The Department also challenged Laser about the adequacy of JLC Ltd's design for mechanical plant used to chill water, which was essential to the air-conditioning systems and for cooling operational scientific equipment. However, unless the Department could identify a clear breach by Laser, it had, without running the risk of compromising its contractual position, no power to compel Laser and JLC Ltd to give suggestions from HDR consideration.

During the procurement, the Department was of the view that its concerns about the design were surmountable

2.10 Although the Department had concerns about the design, there were several reasons why it did not require Laser to address them.

The procurement competition was weak

2.11 In response to the advert published in the Official Journal of the European Communities, the Department received only 10 expressions of interest **(Figure 9)**. Concerned that some potential bidders had not responded to the advert, the Department commissioned advisers to investigate. The advisers found that some of those that the Department considered as potential bidders were not interested because they considered that the project was too small, or did not suit their abilities. Some had not seen the advert.

2.12 In November 1996, the Department short-listed four parties to bid for the contract (Figure 9). One, Teddington Technology Park, withdrew shortly thereafter. In February 1997, the Beazer Homes & Balfour Beatty consortium did not respond to the Department's invitation to negotiate because it was concerned that its proposals to exploit surplus land would not secure planning consent. Under procurement regulations, the Department could only increase the number of bidders by effectively restarting the whole process. Rather than do so, it decided to continue with only two bidders.

Commercial opportunities to exploit surplus land further reduced the effectiveness of the competition

2.13 One of the Department's objectives for the project was to consolidate the NPL on to a smaller site, with the result that it would release surplus land. The opportunity to exploit this land commercially complemented a driving feature of the PFI philosophy, commercial exploitation of redundancy in the public sector's assets. The Department therefore encouraged bidders to consider opportunities to develop the surplus land, in the expectation that successful development would reduce the charges it would have to pay.

9 Ten parties expressed interest in the NPL PFI project and the Department short-listed four

Consortium Name	Design	Construction	Facilities Management	Commercial Developers	Residential Developers	Project Management	Legal	Financial	Engineers	Surveyors
Short listed bidders										
Teddington Technology Park		Costain	Procord		Berkeley Homes	Ove Arup	Berwin Leighton	Sumitomo Bank		
Osborne	RMJM/ John Thompson	Amec	Building & Property FM	Argent/Trevor Osborne		Hawk Development	Charles Russell	Smith Williamson	Oscar Faber	Davis, Langdon & Everest
Laser	Percy Thomas	John Laing	Serco		John Laing	John Laing	Rowe & Maw		Whitby & Bird Roger Preston	
Beazer Homes & Balfour Beatty		Balfour Beatty			Beazer Homes					
Other parties that expressed their interest in the NPL project										
Shepherd	Sheppard Robson	Shepherd	DSSD					Deutsche Morgan Grenfell		
Laing, London & Regional		John Laing		London & Regional	John Laing	John Laing				
Kyle Stewart		Kyle Stewart	Serco	Kyle Stewart					Thorburn Colquhoun	Kinney & Green
Drake & Scull	Halpern Partnership	Drake & Scull	Drake & Scull		Lawson Price	Arnold Project Services		Northcroft/ Daiwa Bank	DSSR/ Hyder	
Manly	GMW Partnership			Manly		Manly		Manly	Kerr & Tucker	
Symonds									Symonds	

Source: The Department

2.14 The opportunity to develop surplus land encouraged the bidders to look beyond the design and construction of the new laboratories towards maximising development potential. While Laser discussed the technical requirements for the new laboratories with the scientists before submitting its bid, Osborne did not. The Department's evaluation of the resulting bids concluded that Osborne's bid was so poor that Osborne hardly merited being considered as a reserve bidder. Since there were only two bidders left at this stage, the Department therefore had little scope to use competitive tension to encourage Laser to improve the technical quality of its bid.

The Department considered that the specification was attainable

2.15 While the specification was demanding, the Department and Laser were of the view that the specified outputs had been achieved in other laboratories, and/or were already achieved in parts of the existing facilities. What the Department wanted that was extra, was greater reliability of the environmental conditions over increased volumes of controlled space.

2.16 In exchanges with Laser following its appointment as preferred bidder, the Department considered that JLC Ltd's design concept for controlling temperature to meet the most stringent requirements was similar to those adopted in other leading laboratories. The Department considers that JLC Ltd subsequently modified its design and in so doing introduced a non-standard approach. The Department was not aware of the change until late 1998, after it had awarded the contract. The Department, JLC Ltd and Laser did not realise that meeting the stringent temperature requirements would prove to be so difficult, or that leading edge engineering would be needed to meet the sub-audible noise requirements, within the shell of the new buildings.

The Department wished to ensure that the private sector remained unambiguously responsible for delivering satisfactory output

2.17 The principles of the Private Finance Initiative put considerable emphasis on transferring risk to the private sector. There are three main reasons for this:

- To provide strong incentives for the private sector to control risks.
- To pass each risk to the party best able to manage it.
- To encourage innovation and flexibility by giving the service provider discretion to determine how best to provide the service specified by the public sector.

2.18 By procuring the new facilities through an output based specification, the Department sought to transfer design risk to the private sector. Forcing resolution of its concerns over the design would mean that the Department would be taking back some of the risk it was paying the private sector to bear. The Department was also concerned that if it contributed to the design, then it might become responsible for some of the cost of correcting design defects and prejudice its other rights, including its rights of termination. However, the Department did not model a downside scenario in which those elements of the design over which it had concerns did not meet the specification. Such a model could have indicated to the Department the potential problems that it, Laser and JLC Ltd later faced.

Balance sheet treatment was a major influence on the Department's procurement process

2.19 The Department sought an arrangement under which the new and upgraded facilities would not appear on the Department's balance sheet. The Department, therefore, sought to transfer a substantial element of risk to the private sector. Securing the risk transfer prevented the Department from forcing resolution of its concerns over the design because it was of the view that to have done so might have reduced the amount of risk the private sector would bear, and result in the project coming on balance sheet.

The private sector parties missed opportunities to reduce project risk

2.20 The Department expected that even though it had concerns about the design, the transfer of design risk to Laser and its partners meant that they would recognise that it was in their best interests to resolve these concerns, and would act accordingly. Unfortunately, the Department was mistaken in this expectation.

Laser did not prove key features of JLC Ltd's design before construction commenced

2.21 Neither Laser nor JLC Ltd sought to prove to the Department the viability of key elements of the design. Nor did they take up the Department's offer, in spring 1998, to send key personnel responsible for the design of environmental control systems to visit the laboratories of the National Institute of Standards and Technology (NIST), the American equivalent of the NPL. During the visit with Laser, the Department had arranged to meet HDR (at the time, the firm was not advising the Department) which had designed systems at NIST intended to achieve temperature controls more stringent than those specified at the NPL.

2.22 Despite knowing of the Department's design concerns, Serco Group plc looked to JLC Ltd to ensure the viability of key elements of its design. At the time, Serco Group plc had had direct experience of project success in other ventures with John Laing plc and so, in assessing JLC Ltd's ability, relied on its parent company's then good construction record. In spring 1998, Serco Group plc also took comfort from due diligence by the Lenders which did not raise any deal-stopping concerns about the ability of JLC Ltd's design to satisfy the Department's specification.

2.23 None of Laser, its shareholders or its Lenders objected when, in June 1998, and in advance of the award of the contract, JLC Ltd commenced construction of the foundations for the new facilities before detailed designs of the mechanical and electrical systems were available. Consequently, the footprint and, to a large extent, the shell of the new facilities were fixed before machinery requirements were fully understood.

JLC Ltd was slow to heed concerns expressed by others

2.24 Paragraph 2.9 above reports instances where the Department and the Independent Certifier found deficiencies in JLC Ltd's designs. Neither, however, had any power to compel either Laser or JLC Ltd to reconsider their proposals. Most notably, JLC Ltd continued building to its original design for achieving the most stringent temperature control requirements despite being aware of the Department's concerns. Only after failing to meet the output requirements in the otherwise completed laboratories, did JLC Ltd action changes along the lines suggested by the Department.

Private sector parties did not exert sufficient pressure on JLC Ltd to instigate necessary changes when problems first materialised

2.25 Laser was a special purpose company originally staffed by four part time, non-executive directors and a full time general manager. Under the fixed price design and build contract, JLC Ltd agreed to pay Laser liquidated damages for delays, but otherwise (except for enforcement of its contractual rights) Laser had no other means of commercial control over its contractor. Only after the signing of the Supplemental Deed, did Laser take on some project management responsibility, which it exercised by arranging for Serco Limited to project manage construction activities after JLC Ltd had handed over modules completed under the terms of the deed.

2.26 Serco Group plc, as co-owner of Laser, stood to lose its equity investment of £2.2 million if the project failed. The company was clearly aware of the delays and the reasons for them, but it had no direct contract with JLC Ltd. Therefore, Serco Group plc's influence over JLC Ltd was too remote to influence corrective action.

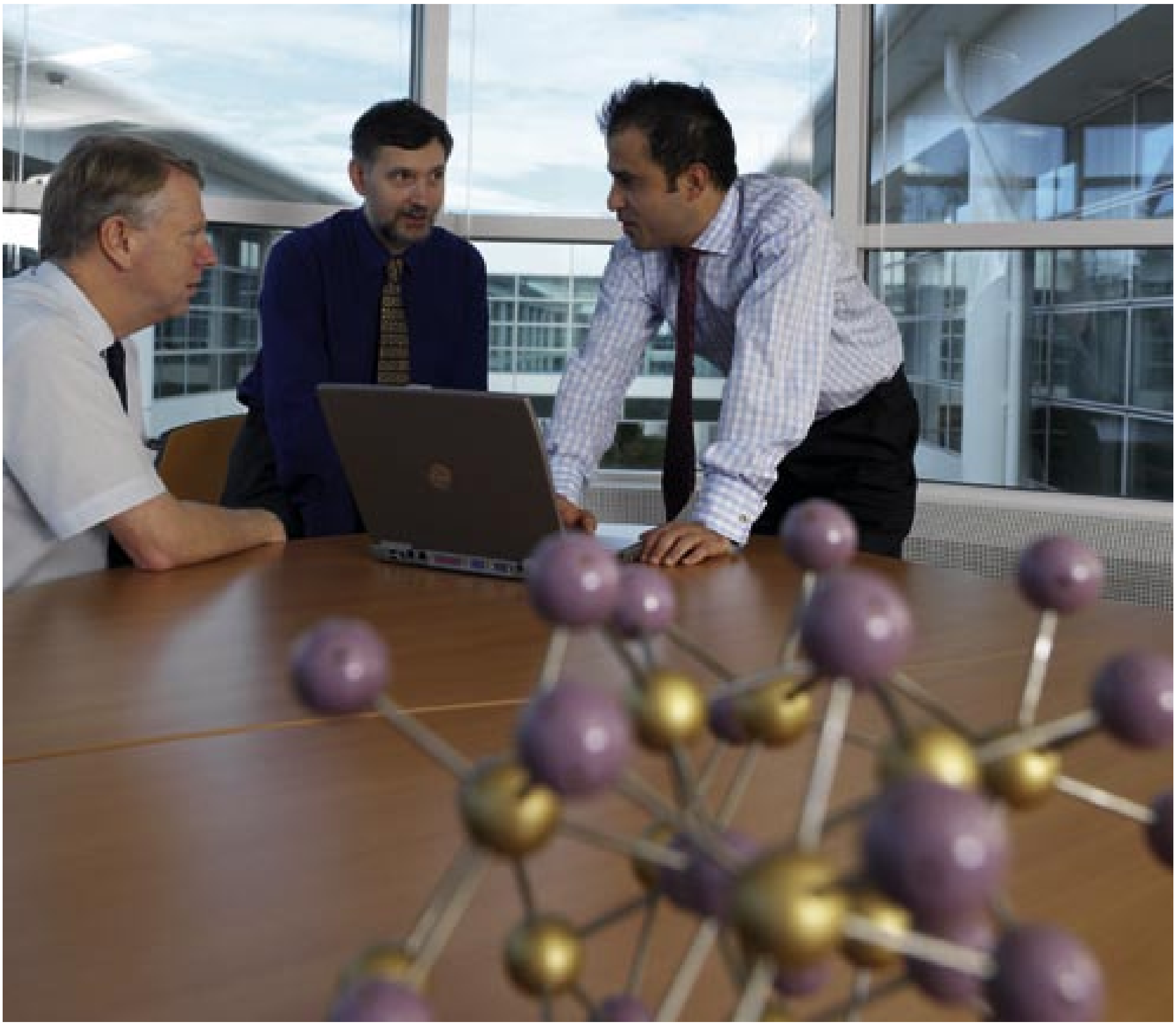
2.27 The Lenders' loans were exposed to project risk. However, the Lenders could not, without breaching their contract with Laser, interfere with Laser's execution of the project. Initially, the Lenders received monthly reports from their technical adviser and Laser. After John Laing plc threatened to leave the project in autumn 2001, the Lenders increased their scrutiny of the project. Being aware of the true complexity of the project, the Lenders decided against stepping-into the contract and replacing Laser. Moreover, through to 2004, their revised models of the project continued to indicate that Laser would repay the debt, albeit later than planned.

The payment regime under the design and build contract was poorly structured

2.28 Laser's contract with JLC Ltd linked payment to the progress of construction work on each phase, rather than to the delivery of the Department's specification. This arrangement meant that, provided construction work was complete, JLC Ltd would be paid most of the contractually set price for a phase, even though it did not meet the specification and required significant remedial work.

2.29 As a result, by September 2001, Laser had already paid JLC Ltd £76 million out of the £82 million fixed price set in the contract, even though at this point only 9 of the 16 modules had been certified complete. Consequently, when John Laing plc was negotiating its exit from the project and estimated that the cost to complete the new facilities would be about £45 million, it knew that the maximum it would receive in return would be only £6 million.

PART THREE
The Department protected its position as problems grew



3.1 Laser and JLC Ltd found that they were in trouble shortly after the contract had been signed. In response, the Department acted to preserve its contractual position and, through continued use of the existing laboratory facilities, avoided supply side pressures to grant concessions.

The Department retained continuity in the project team

3.2 After signing the contract with Laser in July 1998, the Department did not expect much involvement in the project until the first construction phase neared completion. However, it retained responsibility for some parts of the NPL site and needed to plan for post construction fitting out activities. To manage this work, the Department established a small project team, which included two key members of its procurement team. It also retained, on call-off contracts, four of the advisers used during the procurement: Hulley and Kirkwood (services engineering), PricewaterhouseCoopers (financial), Metron (laboratory specifications) and Turner & Townsend (quantity surveyors).

3.3 In late 1998, after construction had started, the Department re-assessed its cost to procure the PFI project, its estimate to manage its obligations during the construction of the new buildings and its estimate of the cost of its residual responsibilities for the NPL site **(Figure 10)**. The Department revised the total upwards from £30 million to £53 million. The Department told us that most of the increase was unrelated to the PFI procurement and would have been necessary whatever procurement route had been used.

10 The Department's estimate of the costs to procure the PFI contract, to manage its obligations during the construction phase and to meet its residual responsibilities increased from £30 million to £53 million

	Sunk and forecast expenditure (£ millions)		
Cost item	July 1998	April 1999	Increase
Site preparation, decontamination, demolition	8.2	16.4	8.2
Move from old to new laboratories	4.3	7.5	3.2
New radiotherapy standards facility	2.8	4.7	1.9
Design costs for new laboratory	2.0	2.5	0.5
PFI advisers	3.3	3.5	0.2
Variations in design	0	4.0	4.0
Use of advisers during construction phase	0	3.0	3.0
Other works required by the Department	4.7	6.5	1.8
Miscellaneous items	4.5	4.9	0.4
Total	**29.8**	**53.0**	**23.2**

Source: National Audit Office

3.4 The Department reworked its cost/benefit analysis and concluded that, despite the increase in the costs of its residual responsibilities, the project was still value for money. Nevertheless, concerned about the increase, the Department established a project steering group to which the project team would report. Apart from members of the project team, the group included individuals associated with the project from the Department's financial and legal centres. The group's function was to monitor the project team's management of the PFI project, the progress of the project and the project team's execution of the Department's residual responsibilities. Fortuitously, the group was established just as Laser's construction related problems began to emerge.

3.5 In 1999, the Department strengthened the project team by engaging HDR, a leading firm in the design of buildings like the new facilities at the NPL. Initially HDR's role was limited to investigating the problems afflicting JLC Ltd's design for controlling temperature to the most stringent requirements. Later, as Laser's problems increased, the Department widened HDR's remit to investigate all the problems with the new facilities.

3.6 In 2000, the Department engaged Leading and Junior Specialist Counsel from Keating Chambers to advise on contractual issues. By autumn 2001, the steering group realised that the team required more legal support, so the Department reappointed Herbert Smith, the solicitors that had advised the Department during the procurement. Altogether, since awarding the contract to Laser in July 1997, the Department has spent nearly £9 million on advisers **(Figure 11)**.

The Department avoided compromising its contractual position

As problems evolved the Department set limits to its partnering role

3.7 When the Department and Laser signed the contract, they were entering into a 25-year long relationship. Given the long duration of the contract, the Department wanted the relationship to be based, informally, on principles of partnering. After the Department appointed Laser as preferred bidder, the two parties established a partnership forum to discuss issues as they arose.

3.8 As early as February 1999, the Department noticed that JLC Ltd's attitude to the project was hardening as the company encountered more and more problems. In response, the Department's project steering group gave the project team guidance on how to react to requests from Laser to loosen interpretations of the output specifications. The steering group recommended that the Department could accept lower output requirements for non-key services, but should hold Laser to the specification in cases where the scientific research would otherwise be compromised. Examples of relaxations that the Department agreed to included:

- In laboratories that had to meet the most stringent temperature control requirements, reducing the absolute volume of space that had to be controlled.
- Allowing planned office space to be converted into equipment rooms, to house additional mechanical plant required to provide adequate air flow to the laboratories that had to meet the most stringent temperature control requirements.

3.9 During 1999, the Department's involvement in the construction phase grew as it started working with Laser and JLC Ltd to help find solutions to the emerging difficulties. However, having engaged HDR to review the designs for controlling temperature to the most stringent requirements, the Department instructed HDR to avoid making comments or statements that the contractors could later allege they relied on in a claim to transfer design risk to the Department.

11 The Department spent nearly £9 million on advisers between July 1998 when it awarded the PFI contract to Laser and the termination of the contract in 2004

Adviser	Area of Expertise	Costs/£000s							
		98/99	99/00	00/01	01/02	02/03	03/04	04/05	Totals
Herbert Smith, Keating Chambers	Legal Advisers	0	10	5	48	180	219	574	**1,036**
PricewaterhouseCoopers	Financial	0	19	111	39	12	31	212	**424**
HDR	Engineering	0	99	466	78	1,267	802	609	**3,321**
Turner & Townsend	Quantity Surveyors	87	261	318	297	297	313	540	**2,113**
Metron	Laboratory Conditions	32	70	80	49	70	69	44	**414**
Llewelyn Davies	Architectural	63	145	113	82	116	88	44	**651**
Hulley & Kirkwood	Services Engineers	26	135	91	61	35	26	12	**386**
Mott McDonald	Structural Engineers	28	56	30	13	23	32	2	**184**
Totals		**236**	**795**	**1,214**	**667**	**2,000**	**1,580**	**2,037**	**8,529**

Source: The Department

By refraining from issuing variations, the Department avoided compromising its contractual position on design responsibility

3.10 With early knowledge that construction problems were occurring, the Department decided that, where it could, it would refrain, during construction of the new facilities, from issuing variations to the specification to accommodate changes in scientific research. By taking this line, the Department intended to avoid giving Laser and/or JLC Ltd opportunities:

- To attribute output failures and project delays to variations, without having to prove that the original designs could have met the original specification requirements.
- To demand payment for plant that would never have met the specification but, because of variations, would never be tested.

3.11 Departments have to be cautious about adopting such an approach. If a department identifies a genuine need to change the specification before the contractor has constructed the relevant element, ordering the change at this time should reduce the cost of the variation because the contractor can pass on savings from avoiding abortive work. The decision to withhold issuing variations to the output specification, however, was, in the circumstances of the NPL PFI contract, a prudent one, because the Department avoided inadvertently taking back risks it had transferred to Laser.

3.12 Acting on legal advice, the Department adopted a more contractual position in its correspondence with Laser. Previously, the Department had included clear statements that information was provided on the basis that it did not prejudice the Department's rights under the contract. The legal advice in June 2003, however, recommended that the Department also needed to emphasise the actual graveness of the contractual situation from the Department's perspective to avoid a possible future judge or adjudicator concluding that the delays were of little commercial consequence.

The Department honoured its part of the bargain

3.13 Over the course of the contract, the Department was careful to honour its obligations, in particular its duty to pay the relevant portions of the unitary charge from the dates when the Independent Certifier issued his certificates of completion. For example, when the Independent Certifier issued his completion certificates for the construction phases containing the laboratories that had failed to meet the most stringent sub-audible noise requirements, the Department was not satisfied that the laboratories were of the required standard. Nonetheless, the Department acted on advice that it should pay the relevant portions of the unitary charge, although it notified Laser that the payments were made under protest. In parallel, the Department put in train a legal process to overturn by adjudication the certificates upon which payment of the unitary charge depended.

The Department kept its options under review

Initially, the Department decided to let Laser resolve its problems

3.14 In mid 1999, the delays to the completion of the early construction phases prompted the Department's project steering group to prepare responses in case of allegations that the specification was impossible to achieve. By autumn 1999, the group also considered whether the Department should:

- pay for remedial engineering work;
- relax compliance requirements; or
- leave the problems with Laser.

3.15 The group concluded that the Department should not do anything that would compromise the science, transfer risk back to the Department, or require a financial contribution from the Department. The group therefore decided that the Department should leave the problems with Laser.

In 2000, the Department agreed to negotiate a supplementary agreement

3.16 While Laser experienced mounting problems in meeting the most stringent requirements for controlling temperature, it also found that the Department disputed Laser's interpretation of the volume of space that had to be controlled. The parties agreed to put two issues fundamental to the specification to adjudication, which took place in March and April 2000 (Appendix 3). The adjudicator awarded in Laser's favour for the first issue. On the second issue, the Department argued that Laser's interpretation was not correct. The Adjudicator found that he was not in a position to say that the interpretation presented by Laser was correct and so concluded that it had not put forward the correct meaning.

3.17 In the light of the adjudicator's award, the Department and Laser agreed to negotiate a supplementary agreement. Negotiations began in spring 2000. The Department and Laser concluded a technical arrangement in April 2001 that went beyond the adjudicator's award by including further reductions in the volume of space that had to meet the most stringent temperature control requirements. However, the parties never concluded their negotiations for a supplementary agreement. As a result, they did not settle other associated outstanding matters, including whether Laser might be entitled to an extension of time to the contract.

Terminating the contract on the basis of Laser's defaults posed considerable risks

3.18 The Department considered terminating its contract with Laser at least three times before 2004.

3.19 By June 2001, the Department's project steering group had concluded that the least expensive solution for the project would be if the contract were terminated for contractor default. However, legal counsel advised the Department that if it terminated the contract on the basis of a default by Laser, the contractor might successfully counter that it was working to remedy the default as it was contractually entitled to do. If Laser's argument were to prevail, the Department would be judged to have wrongly terminated the contract and would be liable for damages. The Department, therefore, decided to await further developments.

3.20 In November 2001, Laser's signing of the Supplemental Deed with JLC Ltd (paragraph 1.20) constituted a default by Laser because it had not obtained the Department's approval, as required by the contract. The Department considered it now had a right to terminate the PFI contract but it decided not to do so because, although it had doubts about Laser's ability to complete the project, Laser was still solvent and willing to honour its obligations. The Department was also concerned that it would not find a contractor willing to take on an output based contract for the new facilities.

3.21 In mid 2003, the Department considered terminating the contract because delays had pushed completion well beyond the contractual long-stop date of 31 August 2002 for completing construction. However, legal counsel advised that such grounds for termination might not be legally sustainable. Laser had a legal argument that, following the spirit of the discussions that had taken place on the proposed supplementary agreement (paragraph 3.17), it was entitled to an extension of time, potentially exposing the Department to the risk of being liable for damages if it terminated the contract. The Department therefore decided again to await further developments.

The Department used existing laboratories as an effective fallback

3.22 The new facilities being built by Laser were located in an area of the NPL site where there had been very little scientific activity. Consequently, as construction delays became progressive, the Department was able to continue to use the existing facilities to provide the conditions needed to conduct leading edge scientific research in accordance with the NPL's science programme, albeit sometimes in less than ideal buildings. This fallback meant that the Department was never placed in a position of needing the new facilities so urgently that Laser could have gained a supply side bargaining position.

PART FOUR

Ultimately, the termination sum should be value for money

4.1 The investment appraisal leading up to the 1998 deal made the case for the new buildings mainly on the grounds that the facilities at Teddington needed radical improvement if the NPL was to retain its leading position in its field. We did not reopen this appraisal but focused our examination on whether the termination sum was reasonable within the terms of the project, how the Department is preparing to complete the project, and the impact that the termination and the problems that led up to it have had on the Department's and the private sector's costs.

The termination sum was reasonable within the terms of the contract

The Department based its calculations of Laser's entitlement on provisions relevant to terminating the contract for default on the part of Laser

4.2 When the parties drafted the contract, they had not contemplated a negotiated termination so no governing provisions existed. The gap had to be filled by creating a new agreement to effect the termination **(Figure 12)**. The termination sum was therefore an outcome of bargaining between the Department, Laser and the Lenders.

12 The main elements of the termination agreement

Payment of the termination sum to Laser and transferring ownership of the assets to the Department. Consequently, the Department was no longer liable for paying the unitary charge of £11.5 million (1998 prices) per annum.

The Department's step-in to Laser's contract with its facilities management contractor, Serco Limited

The transfer of all warranties covering the assets from Laser to the Department

Entitlement for the Department to pursue claims against JLC Ltd in Laser's name

Source: National Audit Office

4.3 To inform its negotiating position, the Department used provisions in the contract governing a termination on the grounds of Laser's default, under which the Department had to pay a termination sum that was the lesser of:

- The Lenders' liabilities.
- Laser's budgeted construction costs[7] in 1998, as amended by the cost of subsequent variations ordered by the Department; less 105 per cent of (a) the Department's costs of completing the outstanding work and (b) any unpaid liquidated damages owed by Laser to the Department.

7 Under the contract, Laser's budgeted construction costs included construction costs, start up costs incurred by Laser's facilities management contractor, capital purchases, insurance, interest, and fees but excluded VAT.

The Department calculated a wide range into which Laser's entitlement was likely to fall

4.4 To estimate the cost of outstanding work, the Department tasked its quantity surveyors, Turner & Townsend to prepare current estimates of the costs of:

- Remedying defects in the new facilities.
- Upgrading the electrical supply and the machinery used to chill water for air-conditioning and for cooling scientific equipment (Figure 6).
- Fees and other costs that the Department would incur as a result of terminating the contract and managing the remedial works.

4.5 The Department asked PricewaterhouseCoopers, its solicitors (Herbert Smith) and specialist legal counsel for advice on the costs it should include in its calculations and the sustainability of each element if challenged by Laser. On the basis of the received advice, the project team concluded that the value of Laser's interest in the contract was subject to several uncertainties, but fell within the range £54 million (on the most favourable interpretation of the Department's position) to £93 million (the least favourable interpretation) **(Figure 13 and Figure 14)**.

The Department agreed a termination sum that was near the lower boundary of its range of likely outcomes

4.6 The project team advised ministers that justification was weak for some of the figures in the Department's opening position because the team had taken the most favourable view wherever there was any doubt. A more realistic settlement range lay between £73 million and £86 million. In September 2004, ministers authorised the team to negotiate termination of the contract providing the termination sum did not exceed £73 million. To keep pressure on Laser and the Lenders, ministers instructed the team to refer two disputes to adjudication: the first sought to overturn the Independent Certifier's completion certificate for the modules housing laboratories that failed to meet the most stringent sub-audible noise requirements (paragraph 1.11); the second sought to overturn the completion certificate for Construction Phase 9 (Module 8), in which the Department considered the gas extract system to be in breach of health and safety requirements.

13 The Department estimated that, at most, the Lenders' liabilities amounted to £93 million

	£ millions
Senior debt	81
Junior debt	4
Cost to break agreements that hedged movements in interest rates	8
Total Lenders' liabilities	**93**

Source: The Department

4.7 Negotiations started in mid October. The Department informed Laser and the Lenders that it was prepared to pay £54 million, the lowest bound of the Department's range. The Lenders declared that they wanted full recovery of their liabilities, £93 million.

4.8 Initially, neither the Department nor the Lenders displayed much willingness to compromise on their opening positions. Also, while the Lenders complied with their contractual obligations to Laser, they were not prepared to release funds so that Laser could meet unsecured creditor demands and insurances. Any release of cash from these accounts to pay unsecured creditors would have reduced the Lenders' recovery on a pound for pound basis. When Laser reported the Lenders' action to the Department, it instructed Laser to demonstrate that it was complying with its obligations and was solvent. As an interim solution, Serco Limited insured the works, but threatened to initiate termination of the Support Services Agreement (Figure 1) because of an outstanding £1.4 million bill for facility management services.

4.9 By mid November, the Lenders were prepared to settle for £80 million, £13 million less than their liabilities. The reduction was based on a mixture of the Lenders accepting some of the Department's arguments (£10 million), and writing off some of the cost of breaking hedging arrangements behind Laser's debt (£3 million). At this stage, the Department decided to concede the weakest areas in its opening position and increased its offer to £67 million.

14 The Department estimated that Laser's costs, less the Department's liabilities, ranged between £54 million and £86 million

	The Department's estimates for the range of Laser's budgeted construction costs, "A" (£ millions)		
	Opening position	Lower bound of likely outcome	Upper bound of likely outcome
Design and build contract	82	82	82
Construction advisers	1	1	1
Capital expenditure for facilities management services	0	1	1
Construction element of set up costs	3	3	3
Debt interest and bank fees	9	9	9
Design costs prior to contract signature	0	0	3
Revenue from the Department for space that it did not occupy because of concerns about non-performance and health and safety	(9)	(1)	0
Variations ordered by the Department	0	4	4
Total Construction Cost, "A"	**86**	**98**[1]	**103**

	The Department's estimates for the range of its recoverable liabilities and entitlements, "B" (£ millions)		
	Opening position	Lower bound of likely outcome	Upper bound of likely outcome
Costs to complete the NPL facilities to meet the Department's output specification	15	13	5
Fees incurred as a result of the termination	<1	<1	<1
Unpaid liquidated damages	3	2	2
Receipts from the property sale to Laing Homes Ltd which was invested into Laser	9	9	9
Costs to re-tender the construction contract and manage contractors	2	0	0
Total "B"	**30**	**24**	**16**

	The Department's range for the termination sum, "A" minus 105% "B" (£ millions)		
	Opening position	Lower bound of likely outcome	Upper bound of likely outcome
Laser's budgeted construction cost less 105 per cent of the Department's liabilities and entitlements	54	73	86

Source: National Audit Office and the Department

NOTE

1 Minor rounding errors corrected in totals.

4.10 With some weaknesses in its arguments still remaining and a desire to conclude the negotiations before positions became entrenched, the Department opted to try and reach a common agreement based, not on arguments of contractual entitlements, but on a figure mutually acceptable to the two parties. It therefore offered £73 million less outstanding obligations to creditors, estimated to be £1.4 million. The Lenders responded by reducing their demanded termination sum to £77 million.

4.11 The project team informed ministers and received authority to negotiate a termination sum up to £76 million. During a further meeting at the end of November 2004, the parties settled on a termination sum of £75 million. The Lenders also relaxed Laser's access to cash reserves which were sufficient to meet all unsecured third party creditor claims against the company. On 20 December 2004, the Department and Laser signed a termination agreement. The Department stepped into the facilities management contract with Serco Limited to ensure that operations would continue at the NPL.

There was another way to calculate the termination sum which the Department did not use to lever a potentially better deal

4.12 During the course of the project, the Lenders, Abbey and Bank of America, restructured their businesses, which included, in both cases, independent decisions to exit the UK's project finance market. Both wanted to dispose of their assets in this business area, which included their loans to Laser. Given the precarious state of Laser and the Department's declared reluctance to change the contract, the Lenders stated that they were considering selling the debt at a discount in the secondary debt market. This statement may have been intended to lever concessions from the Department, by playing on fears about dealing with potentially more aggressive debt holders.

4.13 In assessing the termination sum, the Department might have sought professional advice as to the market value of Laser's impaired debt held by the Lenders. This advice may have provided the Department with a better understanding of the Lenders' negotiating position. The Department might then have had a clearer view as to how far it could push its own negotiating position on the termination sum to the lower end of its range of outcomes.

All parties got less from the project than they had hoped

4.14 Figure 15 summarises what the parties have put into the project, and what they gained in return. For the private sector parties, the project has been a clear failure: the investors in Lasers lost all of their investment, and John Laing plc told us that it lost about £67 million on the construction project, excluding losses of at least £12 million absorbed by its sub-contractors. The Department has also not achieved all it wanted because of delays in completing the buildings and because some work still needs to be completed. However, the Department has much to show from the project, in buildings that are largely complete and which the Department expects substantially to complete over the next few years.

4.15 The £122 million (2005 prices) investment in the new buildings by the Department is less than the amount spent on the buildings by the private sector, which we estimate to have been at least £178 million, made up as follows:

- Laser's investment (£99 million, comprising the Department's £8.8 million prepayment, £81 million of senior debt, £4.5 million of junior debt and £4.4 million of equity);
- Losses by John Laing plc and JLC Ltd on the fixed price design and build contract (£67 million), and by their sub-contractors (£12 million).

The Department's investment is however more than:

- The £85 million valuation placed on the buildings by King Sturge LLP for the purposes of the Department's 2004-05 accounts;
- The value implied by the original project agreement. The original budgeted cost of the project totalled approximately £130 million when adjusted to 2005 prices.[8] The Department's current estimate of the cost of completing the buildings and ancillary works is £18 million, implying a value for the work done to date of around £112 million at 2005 prices.

8 Laser's budgeted construction cost of £113 million in 2005 prices plus the Department's procurement and other budgeted costs of £17 million in 2005 prices.

15 What the parties put into the project and what they got out of it

The Department's investment in the new buildings	(£ millions at March 2005 prices)	Value of the new buildings (£ millions at March 2005 prices)	
Pre-contract cost of advisers	3		
Cost of design assistance from NPL scientists.	2		
Pre-contract design and construction work intended to shorten construction timetable	8		
Proceeds from sale of excess land as pre-payment for future services	10		
Cost of advisers following the award of the contract	9		
Variations ordered by the Department	4		
Unitary charge for space that the Department did not occupy because of concerns about non-performance and health and safety	9		
Payments of liquidated damages to Laing Homes Ltd, net of liquidated damages received from Laser	2		
Termination sum	75		
Total investment:	**122**	**Value of the new buildings on a depreciated replacement cost basis**	**85**[1]
Private sector investment in the project	**(£ millions)**	**Principal outcomes (£ millions)**	
Equity investors (Serco Group plc & John Laing plc)	4	Full equity lost. No dividends received	(4)
The Lenders (Bank of America, NA; and Abbey National Treasury Services plc)	85	£67 million left to repay loans from the termination sum (£75 million) after deducting the cost to break agreements that hedged movements in interest rates (£8 million)	(18)
Sub-contractors (JLC Ltd)	not available	£67 million loss on the design and build contract plus £12 million suffered by other parties in the supply chain	(79)
Total private sector investment	**>89**	**Total private sector loss**	**(101)**

Source: National Audit Office

NOTE

1 The valuation consisted of £102 million for the completed buildings, less an estimated cost of £17 million to complete the buildings, which excluded the cost of achieving the stringent sub-audible noise requirements in existing buildings, if such work becomes necessary. The cost to complete included the cost of fitting out the new buildings to accommodate new scientific research needs, a cost that would not have been part of Laser's obligations.

When the new facilities are completed, the Department expects them to meet its requirements

The Department hopes substantially to complete the facilities by March 2007 within a budget of £18 million

4.16 Following Laser's enquiry in July 2004 about a negotiated termination, the Department instructed HDR and Turner & Townsend to prepare a master list of defects and outstanding work. The advisers considered that all the problems with the new facilities were fixable, except possibly satisfying the most stringent sub-audible noise requirements. Their view was that these requirements might not be compatible with Laser's design for the new facilities, but that it would be worthwhile trialling some relatively low cost solutions before committing to more radical measures. If these trials fail, the Department intends to provide the required facilities by refurbishing some of its existing laboratories.

4.17 The Department's advisers estimated that remedying the defects and completing the outstanding work **(Figure 16)** would cost about £18 million. There is uncertainty about the cost of refurbishing existing laboratories to meet the most stringent sub-audible noise requirements because the Department does not yet have a proven design. The Department also prepared a works schedule. If the Department's project team and contractors adhere to the schedule, the new facilities will be complete by March 2007, unless refurbishment of existing pre-contract laboratories is required to provide facilities that meet the most stringent sub-audible noise requirements.

16 Main cost centres for outstanding work

- Rectification of defects in various modules
- Improve supply of electricity and chilled water
- Construct laboratories that comply with the most stringent sub-audible noise requirements
- Construct car parks and complete landscaping
- Professional fees

Source: The Department

So far progress is on schedule and within budget

4.18 The Department is packaging the work required to remedy defects with the new facilities and to complete outstanding items, such as construction of the car parking facilities, into discrete contracts. Each contract is being tailored to the new facilities, and around the scientific research now being conducted within the modules. Some of the work will be specialised.

4.19 Taking these factors into consideration, the Department decided that appointing another contractor to manage and carry the construction risks would not be cost effective. Knowing that its project team had considerable knowledge of the new facilities and the skills to design solutions to correct the defects, the Department decided it should bear the remaining design and construction risks. However, since its project team lacked project management expertise, the Department appointed Bovis Lend Lease as project manager in June 2005, following a competition. The Department signed the first remedial works contract in August 2005. So far, the costs of the remedial works have been close to the Department's budget for the scheduled work, but the Department has yet to resolve completely the design of laboratories that meet the most stringent sub-audible noise requirements.

APPENDIX ONE

Study scope and methodology

Study Scope

1 The objective of this study was to examine the problems that led to the termination of the PFI contract for the NPL, why these problems arose, how the Department managed them and the value for money consequences of the termination.

2 In 2000, we commenced a study into the value for money of the PFI deal however, as our work progressed we became aware of the project's instability. Rather than continue work that was likely to be immediately out of date, we decided, after discussions with the Department, to await developments. Thereafter, the Department provided us with regular briefings.

3 The termination of the contract was a first for a major PFI contract involving serious non-performance. We decided therefore to concentrate our study on this feature of the project. Using the information we obtained from the Department in 2000, from the Department's briefings and from subsequent reviews of a selection of the Department's files, we identified a wide range of issues that we considered might be pertinent to our study.

4 We analysed the issues and found that they logically fell into two high-level, chronologically ordered sets. To link the two sets, we settled on the overarching question, "Have the Department's actions to achieve its objectives provided good value for money for the taxpayer?" We defined the two sets by the following two questions:

- Did the Department's actions prior to signing the contract lead to the creation of a suitable contractual framework?
- Were the Department's actions subsequent to signing the contract appropriate?

Study methodology

5 Having scoped the study through the issue analysis, we collected the evidence that would answer our audit questions through four principal streams of work activities.

- File review
- Interviews with key parties
- Observations of selected scientific research conducted in the existing buildings
- Desk top studies of selected problems encountered in the new facilities

6 During the file review, we collected the contemporaneous records that informed us about the conduct of the Department throughout the project. There was a considerable volume of material available to us. To break the task down into a manageable activity, we initially restricted our review to:

- Minutes to Ministers
- Minutes of meetings of the Department's project steering group
- Minutes of pre-contract meetings with Laser
- Reports from the Department's advisers
- Project progress reports
- The Contract Documents including the Technical Arrangement and the Sale and Termination Agreement
- The documents prepared for the three adjudications
- Various financial models

7 After sourcing the above, we extended the file review to cover correspondence between Laser and the Department that was relevant to the former's performance under the contract. Laser willingly granted us access to its files from which we secured records that illuminated some aspects of the relationship between Laser and the Lenders.

8 To obtain first hand accounts of the views that various parties held about the project, we conducted semi-structured interviews with key advisers to the Department (Herbert Smith, HDR and Bovis Lend Lease), two former directors from Laser (one appointed by John Laing plc and the other by Serco Group plc), representatives from Bank of America and Abbey, the executive chairman of Serco Group plc and the Independent Certifier.

9 We observed four scientific research projects conducted in the existing facilities. We selected the four research programmes to witness for ourselves the fallback arrangements that the Department had had to adopt and the difficulties of conducting leading edge science in the existing facilities. Each observation involved interviewing and shadowing a selected scientist over a four week period.

10 We conducted detailed desk top studies of six selected problems that affected the new facilities. Included in this list were the three problems that the parties referred to adjudication.

11 We conducted a high level validation of the Department's assessment of the range in which the termination sum might fall. We examined the assumptions made, and the inputs used by the Department. We compared the results against the provisions in the contract.

APPENDIX TWO

Background to the deal

The Department and the National Measurement System

1 The purpose of the National Measurement System (NMS) is to provide the UK with the infrastructure of laboratories, services and expertise that upholds the UK's measurement standards and develops the measurement technology essential to advancing the UK economy and the quality of life of UK citizens. Its mission is to meet the needs of users in industry and the community by driving up measurement standards whilst continuing to work at, and exploit, the leading edge of measurement research. It makes a significant contribution to ensuring the health and safety of UK citizens and to promoting a business environment in the UK in which innovative companies have the confidence to apply new technologies and develop world-class products.

2 The NMS has a wide scope of diverse activities. In conjunction with fundamental research in measurement science, it supports innovation in industry by:

- stimulating the continuing development of better measurement techniques and equipment;
- providing high-accuracy calibration and testing services;
- upholding and improving primary national standards;
- providing traceability in measurements;
- disseminating good measurement practice;
- underpinning measurement regulation; and,
- ensuring international harmonisation of measurement standards.

3 Measurement science also underpins a wider range of public goods, such as consumer protection, forensic science, environmental controls, safe medical treatments and food safety regulation, as well as the technical standards that foster barrier-free trade. In this way, the NMS serves as a cross-governmental resource that helps to fulfil the policy agendas of not only the Department but other Government departments, principally the Department of Health, Ministry of Defence, the Department for Environment, Food and Rural Affairs and the Health & Safety Executive.

The Redevelopment Plans

4 Since its establishment in 1902, the NPL has accumulated a disparate collection of buildings. By the early 1990s, the buildings at the NPL had deteriorated to the point where conditions risked reducing the quality and cost-effectiveness of the scientific work.

5 In 1993, the Department's plan to redevelop the NPL facilities was shelved pending the outcome of a review of all of the Department's laboratories. For the NPL, the conclusions of the review ruled out the option of privatisation but identified potential advantages from contracting out the management of the NPL's operations. Acting on the finding, the Department ran a competition and, in 1995, it contracted out the operation of the science work at the NPL for a 5 year period to NPL Management Ltd, a wholly owned subsidiary of Serco Group plc. Under the contract, NPL Management Ltd was also responsible for the provision of the facilities management services in support of the science delivery. The Department retained ownership of the buildings and NPL Management Ltd rented them for a fixed annual payment of £1.6 million.

6 In 1996, the Department recommenced its project to redevelop the NPL site. The Private Finance Initiative became the Department's preferred option for securing the redevelopment. Other options considered but rejected were:

- Publicly funded redevelopment. This option was rejected on the grounds of affordability.
- Privatisation. This option was rejected in 1993 because of lack of interest from potential buyers, and the need for perceived independence. Privatisation was informally considered again in 1996, but ruled out for a second time based on previous findings and also on consideration of the fact that operations had only recently been contracted out in October 1995 to NPL Management Ltd.
- Inclusion of science provision in the PFI redevelopment deal. The science contract with Serco was due to end in 2000. This left open the option of letting the PFI contract to a consortium interested in taking responsibility for both the redevelopment plans and also management of the science programme from 2000 onwards. However, this plan was rejected on the grounds that it was not practical to specify science requirements over a 25 year period. The Department was unable to offer any long term guarantees about the level of work emanating from the National Measurement System. Consequently, the Department concluded that tendering a consecutive series of medium-term science service contracts and treating these as separate from the PFI contract made better commercial sense.
- Deferment of the PFI deal. The Department recognised the potential problems in seeking approval for a 25 year contract when the National Measurement System itself was subject to periodic review. In-depth reviews of future funding are carried out every 5 to 15 years, and another review of this kind was expected around the time when the PFI deal was going ahead. The option of delaying the redevelopment plans until after the major review was rejected by Department, and so procurement went ahead in advance of the review. This decision was based on a number of smaller interim reviews, which supported the case for continued spending at present levels on the National Measurement System. In addition, the Department was already in advanced negotiations with Laser, the preferred bidder, when the review started and there was concern that the deal would be lost if the PFI project was delayed.

Assessment of value for money of the PFI Deal

7 The Department selected Laser as preferred bidder for the PFI deal in 1997 after a competitive procurement process that included evaluation of detailed bids from both Laser and a second bidder, Osborne. The Department also compared these bids with a public sector comparator to assess the value for money of choosing the PFI route for redeveloping the laboratories. The present value cost of Osborne's bid was lower than either that in Laser's bid or the public sector comparator **Figure 17**. However, the Department chose Laser over Osborne because the Department had concerns about aspects of Osborne's bid, including the acceptability to the planning authorities of Osborne's proposals to develop surplus land.

8 Between the selection of Laser as a preferred bidder in July 1997 and contract signature in July 1998, the predicted cost of Laser's bid increased by £26 million[9] (25 per cent). The Department's transfer to Laser of additional responsibilities to replace exisiting facilities for acoustics and radiation measurements increased the number of building modules from 14 to 16 and accounted for about 40 per cent of the increase. The Department asked Turner and Townsend to review the increase in construction costs. Turner and Townsend advised that the higher costs proposed by Laser were generally reasonable given the design solution and risks borne by Laser. The Department did, however, challenge some of Laser's costs and secured a price reduction of £1.9 million.

17 Present value costs of the bidders' proposed charges and the public sector comparator at the time of the selection of the preferred bidder (July 1997) (£ millions)[1]

Laser	108
Osborne	97
Public sector comparator	118

Source: National Audit Office and the Department

NOTE

1 Values shown are present value costs at 1997 prices, calculated using the then Government discount rate of six per cent a year.

9 Calculated on the same basis as in Figure 17.

APPENDIX THREE

The dispute about the interpretation of the specification for spaces that had to meet the most stringent temperature control requirements

1 After the parties had signed the contract in July 1998, JLC Ltd mocked up, off site, its design for one of the laboratories that had to satisfy the most stringent temperature control requirements. During the latter half of 1998 and the first half of 1999, JLC Ltd tested the performance of its design against various configurations of heat generating sources within the room. The results from about 750 measurement points revealed a pass rate of between 17 per cent and 98 per cent depending on design configuration and heat sources located within the room. JLC Ltd achieved the latter result when all heat generating sources, including lights, were turned off.

2 Under the contract, there was an allowance for non-compliance with the stringent temperature requirements for those areas within the controlled space that were "immediately adjacent" to heat emitting equipment or people. In September 1999, JLC Ltd stated the view that its design complied with the specification, but noted that the Department disagreed because it considered that JLC Ltd's definition of immediately adjacent was too generous.

3 In November 1999, JLC Ltd sought clarification of the contract in regards to the minimum distances between the edges of controlled spaces that had to meet the most stringent temperature requirements and the walls and the floors of the laboratories. JLC Ltd pointed out that specified minimum distances in some space data sheets were smaller than the minimum specified in covering explanatory notes. JLC Ltd was of the view that the minimum distance of 0.5 metres set in the explanatory notes took precedence over the smaller distances stated in the space data sheets. The Department disagreed, taking the position that the lower values in the space data sheets took precedence.

4 A dispute emerged between the Department and Laser regarding Laser's interpretation of these two aspects of the specification. In February 2000, Laser referred the two issues to adjudication.

5 The first issue centred on the definition of the size of the space in the relevant laboratories within which the temperature had to be controlled to the most stringent requirements. The contract stated:

> *Controlled Area – The [relevant] field [on the space data sheet] specifies the amount of the space that requires control of temperature and humidity. The requirements shall be interpreted as follows:*
>
> *i* *The maximum controlled area for ± 0.1°C specified Spaces [spaces requiring the most stringent control of temperature] is a distance of 0.5 [metres] from the walls and 0.5 [metres] up to 2 [metres] from the floor.*
>
> *ii* *For Spaces with temperature control other than ± 0.1°C (where the area of control is not specified as less than 0.5 [metres] from any surface), the maximum controlled area is 0.5 [metres] from all surfaces.*
>
> *iii* *Spaces which specify a requirement for an area of control of less than 0.5 [metres], shall be provided with an area of control of up to 0.1 [metres] from the wall and/or floor.*

6 Some of the space data sheets for laboratories that had to meet the most stringent temperature control requirements stated that the controlled area extended to within 0.1 metres of the walls. Laser interpreted the contract on the basis that requirement (i) took precedence over entries on the space data sheets that specified a larger controlled area. The Department disagreed. The Adjudicator concluded that Laser's interpretation was correct.

7 The second issue was about Laser's interpretation of "immediately adjacent" in so far as this term provided relief from complying with the most stringent temperature control requirements in areas around heat generating sources. The contract stated:

> *For all Spaces, areas immediately adjacent to heat-emitting equipment and people within the room will be outside [the controlled] limits [of ± 0.1°C of the specified temperature].*

8 Laser contended that, if the controlled space met the requirements of the contract when there was neither heat emitting equipment nor people within the space, when such heat sources were introduced, those areas next to the heat sources that do not comply with the specified requirements should be classed as "immediately adjacent" areas. The Adjudicator found that he was not in a position to say that the meaning presented by Laser was correct and so concluded that it had not put forward the correct meaning.