

7 Management Systems

7.1. We review here a number of BC's management information and control systems, notably those determining and reporting on colliery costs and profitability, and those for reporting on and controlling capital projects. These are: the system for allocating sales proceeds to business units, including the price structure; the accounting system for reporting colliery and higher formations' results against budgets; the organization and control of capital projects, and monitoring of the costs of the capital programme; and Annual Reviews and Completion Reports. We then consider BC's project control performance, the monitoring of the Heavy Duty Programme, and indicators of capital performance.

Attribution of sales proceeds to production units for the purpose of investment and business decisions

7.2. BC told us that its accounting system sought to accommodate the following facts:

- (a) The key figure for BC on revenue is what the customer actually pays.
- (b) In the highly competitive environment in which BC is now operating, most customer prices are negotiated individually according to the degree of competition in each particular case.
- (c) Within individual contracts there are provisions for prices to vary according to external factors, so price levels to individual customers can fluctuate throughout the year.
- (d) Coal is a natural product with a wide range of chemical and physical properties, some of which are valued more by some buyers than by others. No two coals are exactly the same and their differences have to be reflected in the price which customers pay, in a way which is meaningful to them.
- (e) The quality of individual named coals can also vary according to method of mining, preparation, seam proportions, and variations in inherent quality within different parts of the same seam. Larger customers monitor quality very carefully and expect the variations to be reflected in the price they pay.
- (f) Despite this wide diversity of quality between and within individual coals, BC can usually offer a choice of suitable coals to individual customers. Many customers take a variety of coals and many coals are supplied to a number of different customers. The pattern of coal flows is constantly altering, and it is only exceptionally that individual coals are linked necessarily to individual customers with one or both of the parties having no realistic alternative available to it.
- (g) Many price arrangements with individual buyers are not specific to named qualities or collieries, eg the CEGB 'tranching' system and quantity discounts.

7.3. BC believes it to be necessary to rationalize this complexity within the management accounting system in such a way as to enable true comparisons to be made between the performance of individual production units. This it sees as an essential prerequisite for sound management decision-making on matters such as investment and closure.

7.4. In the profit and loss account the same value is assigned to all coal of the same quality standard (with one or two minor exceptions). This value equates to the true income BC actually obtains for that quality of coal on average over the year as a whole.

7.5. In BC's view this system:

- (a) avoids individual colliery profit and loss accounts showing wide month-to-month income variances which would obscure underlying trends and distort comparisons between units;
- (b) enables local managements to concentrate on reducing costs, over which they have a substantial degree of direct control;
- (c) avoids situations in which high-cost collieries could be shown to be more profitable than low-cost collieries producing similar types of coal which are fully interchangeable in the market place; and
- (d) thereby facilitates sound management decisions on investment and closure.

7.6. The system depends on two principal mechanisms:

- (a) *price structures*—which assign appropriate relative values to coals of different quality standards; and
- (b) *Market Adjustment Fund (MAF)*—a suspense account which has the effect of collecting income from customers and allocating it in an equitable way to individual units according to the tonnage and quality of coal that they produce.

Price structure

7.7. About 95 per cent of the volume of BC coal is priced according to its price list for industrial coals; the remaining 5 per cent is domestic bituminous and naturally smokeless fuels for which a separate price list applies. In this context 'domestic' means coal sold for use in household appliances. Small tonnages of low grade fuel such as slurry are sold at prices unrelated to the two main pricing systems, ie by commercial negotiation.

7.8. BC's normal quotation is for prices ex-pithead or opencast disposal point, but coal despatched by sea is quoted f.o.b. Occasionally coal is sold on a delivered price basis by agreement with the customer.

7.9. Under European Coal and Steel Community (ECSC) rules, every coal producer within the European Community is obliged to publish price lists setting out certain information and to lodge copies with the European Commission in Brussels.

Industrial coals

7.10. The list price of individual industrial coals is determined according to the Industrial Coal Price Structure, as set out in the price list. This price structure recognizes that the most important feature of a coal is its heat content. The primary price component is therefore calorific value expressed in terms of kilojoules per kilogram (kJ/kg); a secondary adjustment is made in respect of ash; and final adjustments are made in respect of sulphur content and degree of preparation (washing and sorting by size).

7.11. The Industrial Coal Price Structure ensures that within a given coalfield, coals of comparable quality carry the same price; and that coals of different quality bear a commercially meaningful price relationship to each other. However, between coalfields the price of comparable coals differs, and these price relationships have varied through time.

Domestic fuels

7.12. Bituminous house coals are not priced on the same basis as industrial coals, but are assigned to a particular group according to their commercial value in practical use, taking account of such factors as free-burning propensity, amount and nature of ash, size, friability, and general appearance. Assignments are made by a Regional Quality Monitoring Committee consisting of experienced representatives of the wholesale and distributive coal trade. These representatives individually test the coal in their own appliances and submit formal reports to the

Committee, which then decides a group assignment on a consensus basis. Efforts have been made from time to time by BC and others to find a workable scientific formula for use in pricing house coals, but although most coals can be made to fit sensibly within any given formula, there are always exceptional cases which simply do not conform in practical tests with the scientific prediction.

7.13. The number of house coal groups has varied through time and currently there are four. As with industrial coals, prices for a given house coal group vary according to coalfield.

7.14. Naturally smokeless domestic fuels (anthracite and dry steam coal) are produced only in the South Wales coalfield, in the western and central parts respectively. These are highly specialized fuels. Qualities are classified by size range, and there are two groups in the larger size range. Significant tonnages of domestic grade anthracite are also sold on the industrial or quasi-industrial (commercial, local authority establishments etc) markets, but there is a common price list.

7.15. For all domestic fuels, supplementary charges may be raised in respect of special services rendered, eg use of mechanical baggers.

Manufactured fuels

7.16. BC's wholly-owned subsidiary National Smokeless Fuels Ltd is responsible for producing and selling coke and manufactured fuels.

Purpose of the price structures

7.17. The price structures seek to achieve the following objectives:

- (a) enabling the list price to be calculated for individual coals;
- (b) determining price relationships between coals of differing quality specification which are meaningful to the customer;
- (c) providing a methodology for retrospective price adjustment should the quality of a coal as actually supplied vary from the standard specification upon which the invoice price is based;
- (d) providing a base from which to determine revenue for collieries and opencast disposal points; and
- (e) providing a base against which to judge any price negotiations with individual customers.

Allocation of net revenue to collieries

7.18. Up to 1979, the total value of rebate was relatively small. The accounting practice was to credit individual collieries with list price, and (with minor exceptions) to allocate rebates to the coalfield in which they arose. These coalfield rebates were debited back to individual Areas/opencast regions within the coalfield, but they remained on Area account and were not allocated to collieries.

7.19. When in 1979 rebates had to be extended for the first time to the coking market, and it became evident that steam coal rebates would also have to be offered on a wide scale in 1980 (including to power stations, again for the first time), BC decided that the time had come to debit individual collieries with the rebates. This change was made at the start of the 1980-81 financial year. In BC's view, continuation of the previous system would have unduly exaggerated the profitability of production units and given wrong messages for investment.

7.20. In deciding the method of allocation, BC concluded that it was impractical simply to allocate rebates to the unit at which they arose. An alternative system was devised which attributes the same value to all coals of equivalent quality standard; this works by means of a suspense account known as the Market Adjustment Fund (MAF). Before the start of each financial year, the monetary value of rebates expected during the year ahead is estimated and expressed as a percentage of the value of sales at full list price. Subsequently, when coal is sold (or used internally), the profit and loss account of the unit concerned

is credited with list price for the coal less this percentage amount; this credit is known as *saleable proceeds*. Within the accounts, the term 'saleable proceeds' applies to total output, irrespective of whether or not the coal is sold immediately. The difference between saleable proceeds and list price (ie the predetermined percentage amount, known as the 'contribution rate'), is credited to MAF. Any rebates arising from the sale (or any other rebates which are not specific to individual sales transactions) become a debit to MAF; such rebates are the difference between the list price and the actual customer price. If the forecasts at the start of the year were to be precisely accurate, the MAF suspense account would be in balance at the year end (though not necessarily at any point during the year, since some rebates are seasonal). In practice, there are inevitable variations from forecast in tonnages sold and rebates given, and often there is a list price change during the course of the year. If it becomes evident during the course of the year that the MAF account will be out of balance (either credit or debit) at the end of the year, a revised MAF contribution rate is introduced during the course of the year to correct the imbalance.

7.21. The detailed working of the MAF system has been modified in various ways since its inception in 1980. Current arrangements are that there are four separate MAF suspense accounts which reflect the main coal types and markets served, viz:

<i>Bituminous coals:</i>	Graded coals
	Non-graded coals
<i>Anthracite:</i>	Graded coals
	Non-graded coals

The two anthracite accounts are specific to South Wales, and were introduced at the start of the 1985–86 fiscal year, on the recommendation of external consultants, to reflect the largely discrete nature of this coal. (Nevertheless, there is, in fact, considerable interface with bituminous coal, in that the greater part of small anthracite is blended with higher volatile bituminous coals for use in power stations. For this reason such sales are deemed to be bituminous coal for accounting purposes.)

7.22. The division of each main coal type into 'graded' and 'non-graded' reflects the fact that the net price paid by most customers for graded coals (irrespective of market) is much higher both in terms of £ per tonne and £ per GJ. BC told us that the division helps to underline the true value to BC of preparing coals to a high standard, and enables investment decisions on coal preparation to be taken against an accurate yardstick.

Stock coal and sundry items

7.23. Saleable proceeds are not the final determinant of revenue attributed to collieries for the purpose of compiling the profit and loss account. They need to be further adjusted for:

- (a) stocking provisions; and
- (b) income from sundry sales and services (eg sales of colliery methane, payments for special services such as mechanical bagging etc).

These items are shown as separate line entries on the profit and loss statement. The bottom line proceeds figure (ie saleable proceeds adjusted for the creation or release of stocking provisions and sundry items) is known as *net proceeds*. Net proceeds are set against operating costs to determine operating profit/loss.

7.24. When coal is put to stock, it is valued in the accounts at the lower of 'net realizable value' or 'cost of production', within the following broad meaning of these terms:

Net Realizable Value (NRV)

- saleable proceeds less such stocking provisions as are judged to be needed to cover costs incurred while the coal remains in stock, plus the expected future costs of lifting and marketing; and

Cost of Production (COP)

—the annually calculated average cost, excluding Area and Headquarters overheads, of producing a tonne of coal in that coalfield (rather than at the individual colliery which produced the coal).

This credit is to a revenue account known as 'Changes in Stock'.

7.25. Where NRV exceeds COP at the time of stocking, a further provision (known as the general provision) is raised to reduce the book value to COP. The book value of the stock is adjusted whenever list prices and MAF rates are changed, but not so as to increase it above COP.

7.26. No credit to the MAF account is made at the time coal is stocked; this credit only arises when the coal is actually lifted and sold (or used internally). At the time of sale, the colliery is credited with the value of the coal as if it were current output (ie list price ruling at the time of sale less the contribution into the MAF suspense account). At the same time, the book value of the stock, ie NRV or COP (as the case may be), is debited to the 'Changes in Stock' account referred to in paragraph 7.24. The difference between these two amounts represents BC's gross profit on the particular sale. The arrangements described in this and the preceding paragraph satisfy the accounting requirement that profits are not brought to account ahead of sales, but losses are.

7.27. There are detailed mandatory standing instructions governing the accounting treatment for stocks and for the MAF system, issued by the Finance and Marketing Departments after agreement with the Audit Department.

BC's accounting and related systems for reporting operating and 'bottom line' results against budgets

7.28. BC operates an integrated accounting system which, in addition to keeping the books of account, provides the management accounting information. All the management information used for reporting financial performance originates from this system, or from one of the linked sub-systems. The integrated system has facilities for detailed breakdowns of costs by function, by location within a colliery and by spending officer. Such analyses support the standard performance documents.

7.29. At production unit level, a great deal of management information for day-to-day control and monitoring is derived from locally developed manual or partly computerized systems.

Basis of the profit and loss accounts for production units

7.30. Profit and loss accounts are prepared on a 'full cost' basis. Overheads at Area and Headquarters level are apportioned to units on equitable bases. Saleable proceeds are established in accordance with the arrangements described in paragraphs 7.20 to 7.22.

7.31. Since 1985, results have been calculated at the operating level and on a 'bottom line' basis after capital charges. Capital charges are calculated on a percentage (currently 11 per cent) of the written down value of the fixed assets employed at the colliery, or in support of the colliery.

Profit and loss accounts

7.32. Profit and loss accounts are produced each month on a 4.4.5-weekly basis. The format is standard for all collieries. For opencast disposal points a slightly different standard form is used. A disposal point is a washery/coal treatment plant, serving up to four opencast sites. It is the lowest level at which opencast profit is calculated.

7.33. These reports compare the current month and cumulative result with budget and the cumulative result with that for the same period in the previous year.

7.34. In addition to the profit and loss accounts, trend statements are produced each month for all deep mines, with aggregations to Area level. Trend statements give summary information, both statistical and financial, and relate to profit and loss performance over a period of five completed years, together with budget, forward projections and actual results for the current year.

Organization of capital investment projects

7.35. Every capital investment project is the responsibility of the appropriate Area (or other formation as appropriate). Under the control of the Area Deputy Director (Mining) (DDM), who is responsible to the Area Director for capital investment, are the Area's Planning Department, mechanical, electrical and civil engineers, and the collieries, which report through a Production Manager or Managers. In the small Areas (SCT, NEA, WES, SWL)¹ the DDM's role in Investment is the responsibility of the Head of Technical Services. The Planning Department is generally responsible for co-ordinating the preparation of all capital projects, which includes liaison with other departments (notably Finance, IR, Marketing, Staff) to ensure all relevant documentation and comments are completed and included in the Stage I, Stage II (see paragraph 5.6), Annual Reviews and Completion Reports (see paragraphs 7.50 to 7.54). Once Stage II approval has been given progressing of capital projects is again co-ordinated by the Planning Department, although, once nominated, the Project Manager takes specific responsibility for the project.

7.36. On major projects it is now customary for the Project Manager to be nominated by the time the Stage II prospectus is submitted. The level of the appointment is required to be stated in the submission. Staffing proposals by number, grade, discipline and calibre for each stage, the basis for control of the duration and cost, and the system for monitoring and control of the project are all agreed at Stage II.

7.37. The Project Manager may be full- or part-time, and his level of seniority is determined by the complexity and cost of the project or projects for which he is responsible. Ideally, he should be involved in the development of the project from its conception through to commissioning.

7.38. The Project Manager is responsible for the overall monitoring and control of the project. He is responsible for ensuring that:

- (a) there is a forward looking, responsive project control system capable of producing out-turn forecasts (physical/financial: time/cost) against plan;
- (b) specific facilities are provided for planning and controlling the issue and approval of drawings and specifications;
- (c) specific facilities are provided for the planning of material and services procurement and letting of contracts;
- (d) project contracts are controlled;
- (e) BC labour is adequately controlled; and
- (f) there is a means of evaluating rapidly the effects on the project programme of any decisions or actual events affecting the project.

If the achievement of the prospectus' goals is at risk, these arrangements should enable the Project Manager to be aware of the effect of the shortfall/overrun and enable remedial action to be taken.

7.39. Each individual contract within the project is supervised by a BC staff member, reporting to the Project Manager, nominated as engineer, architect, or supervising officer to the contract. The duties of supervising officers and a schedule of meetings typically found in large project organization is laid out in our previous report (paragraphs 10.10 to 10.17). In addition to the monitoring arrangements shown there, capital projects are the subject of regular meetings (usually monthly) held by Area Directors with their staff.

¹ See glossary.

Monitoring and control arrangements

7.40. The Stage II document is expected to incorporate estimates of costs and time sufficient to allow effective control of physical progress and expenditure. Estimates are built up with regard to the nature and order in which the work is to be done, how it is to be contracted out and how services are to be provisioned, grouping the project into sections, sub-sections and items. Planned rates of progress for the important aspects of the project, eg shaft sinking, drivage of drifts and underground roadways, are provided, and a schedule showing the planned physical programme of construction on sections and sub-sections is prepared.

7.41. A contract plan, covering all items which will be contracted out, is also provided. Time-critical contract works are identified and an assessment of the consequences a delay in any of these critical items would have on the completion time of the project is required. Where appropriate, a Critical Path Analysis is prepared for inclusion in the submission.

7.42. Because the most usual reason for cost overruns is delay in physical progress, the arrangements stress physical control of the project, although there are the normal arrangements for confirming contractors' claims for payment and controlling variation orders.

Control of project costs

7.43. Project costs are recorded within the Fixed Asset System, which comprises a Project Ledger and an Asset File. The Project Ledger is a database for the collection of costs relevant to each project. The Asset File records the creation of assets, specifically in the case of identifiable assets and collectively by category for other capital expenditure such as expenses of a general nature encountered on major projects.

7.44. BC's Investment Manual requires all expenditure included in submissions of capital projects for approval to be sectionalized under 14 main headings (the first of which, relating to exploration for reserves, being recorded, when relevant, as a memorandum item only). Each of the main sections is further divided into sub-sections covering major categories of works within each main heading. Comprehensive lists are provided of the items which fall to be included under each sub-section. Each section and sub-section has its own numeric reference for use when entering data in the Fixed Asset System.

7.45. As soon as a project has received Stage II approval, full details are entered in the Project Ledger, items being identified by their section and sub-section reference numbers and given the status of approved expenditure.

7.46. As the various works included in the Stage II approval are given Stage III authorization, appropriate entries are made in the Project Ledger to record the extent to which expenditure has been authorized against each sub-section. Commitments entered into, eg orders placed, contracts let, are likewise recorded, as is expenditure as incurred. Expenditure incurred on each specific asset or category of asset is identified by reference number and additionally recorded in the Asset File.

7.47. A detailed report for each project is prepared by the system for each accounting period. This gives for each sub-section the total approved expenditure, the total authorized, the total committed and the total spent in the year to date, the relevant totals for previous years and the aggregated totals to date.

7.48. The reports derived from the Fixed Assets System are supported by returns reporting progress on related contracts (including the effect of variations orders issued or anticipated; contractual pricing adjustments, and contractual claims outstanding or anticipated) and actual expenditure compared with phased allocation.

Monitoring the capital investment programme

7.49. Detailed summaries of individual project cost statements are prepared for each colliery within an Area and much less detailed summaries of an Area's capital expenditure for the accounting period and cumulative to date are prepared, which include comparisons with budgeted capital allocations. These latter Area summaries are aggregated to provide a report to the Board, in which each Area's performance against budgeted allocations is set out.

Annual Reviews and Completion Reports

7.50. As part of the formal monitoring of all projects over £0.5 million, BC has a system of Annual Reviews and Completion Reports. Projects with a completion time of less than 12 months or less than £1 million in cost require only a Completion Report, in abbreviated form. Over £1 million, Completion Reports and Annual Reviews are both required, and provide:

- (a) a brief description of the project, its costs and objectives, and the expected results compared with the prospectus;
- (b) progress achieved; difficulties encountered; action taken; and actual expenditure;
- (c) marginal benefits, in terms of manpower, cost savings, increased output; changes from those put forward in the prospectus and the reasons for these changes;
- (d) overall colliery results on project completion, in physical and financial terms, expected now compared with those expected at Stage II;
- (e) other factors of importance; and
- (f) conclusion and recommendations for approval or otherwise, including action to be taken, eg stopping the project.

7.51. Annual reviews should be prepared as at the anniversary of the project's approval at Stage II and the first review becomes due no later than 15 months from project approval; Completion Reports are due within 15 months of completion. Annual Reviews and Completion Reports are made to the decision-taking level where Stage II approval was given. The decision-taking level is responsible for seeing that any remedial actions necessary during the progress of the project and on completion to achieve the prospectus' results are taken and reported upon in the appropriate Annual Reviews and Completion Report.

7.52. Since November 1985 the procedure has been established whereby Annual Reviews and Completion Reports are subject to review by the Accountability Meetings, an arrangement incorporated into the Capital Investment manual issued in May 1987. We were told that these procedures were taken very seriously indeed. Annual Reviews were previously dealt with by a sub-committee of the Project Committee. The Project Committee now deals with them itself, providing advice to Accountability Meetings.

7.53. The Annual Reviews do not include current pit profitability, although we were assured that this is on hand when they are reviewed by the Project Committee, in the form of the Financial Trend Statements.

7.54. Annual reviews and Completion Reports use, as the standard against which expenditure is measured, the Stage II estimate, not the Stage III committed sum. In our 1983 report we said (paragraph 10.59):

We remain concerned that in circumstances where tender sums are different from Stage II estimates, monitoring may be against an inappropriate amount. We consider that there should be an automatic formal notification to Headquarters in all cases where the tender sums differ from the Stage II estimates by an amount greater than some fixed percentage or amount. We recommend that the NCB institute such a formal system of notification and, whether or not a revised Stage II submission is required, that monitoring of progress is measured against a sum that reflects the tender price.

We put it to BC that these arguments still stood, and that once the contract was let, the key reference point was the contract price: the changes we had suggested would improve control of capital investment in respect of annual expenditure; monitoring against commitment; and monitoring against approval. BC pointed out that BC's Capital Investment Manual made provision for the circumstances in which a project is likely to exceed the approved out-turn total cost. BC took the view that there was a need to safeguard the Stage II approval as the contract between those responsible for managing the project and those responsible for

approving it. There would be difficulties in frequently changing that contract, since this would call into question the original approval and so weaken accountability. For this reason, the project management monitored progress against Stage III authorization, and the approving body did so against the Stage II approval, expressed at out-turn prices. BC told us, however, that our arguments were being considered by the Working Party on Project Management which BC has established to see how best they could be accommodated.

Post-investment appraisal

7.55. We distinguish between the post-investment audit which BC carries out for every capital investment project for the Completion Reports, and full scale post-project appraisal which sets out to examine wide issues—the thinking behind the investments as well as the project management, and close comparison of all the outcomes, including those outside the control of local management, with objectives and expectations—by an independent team on a few, selected projects. Amongst the evidence we received, Professor Atkinson, head of the Mining Department at Nottingham University, told us that few British mining houses carry out such studies. He told us that such appraisals have three major benefits: the opportunity to initiate corrective action on current projects; managers know their claims will be compared with performance; and the quality of future proposals and control over them is invariably improved. We were told that BC was in a unique position to carry out such studies, since it did not, as do other mining houses, have to contend with the problems of having to deal with units in a number of different countries, exposure to the effects of unpredictable changes in metal prices, and movements in exchange rates.

7.56. We put this to BC, which told us that the Headquarters organization which monitored project performance and advised Areas and other formations on technical and other matters provided a means of transferring experience from one part of BC to another. BC gave as examples of changes arising from lessons learnt through the project monitoring arrangements: changes in the Capital Investment Manual, the introduction of a new project control procedures, the use of externally contracted quantity surveyors, and the accumulated experience gained from the development of successive new mines—for example, the reduction in the number of faces planned for Asfordby in the light of experience with heavy duty equipment at Selby. BC also drew attention to symposia organized for BC by the professional institutions, whereby delegates might learn of ways in which others had improved their capital productivity.

Project management and control

7.57. The amount of detail used in the control system varies according to the complexity and total cost of the project. The system is expected to provide:

- (a) Clearly defined plans in both physical and financial terms;
- (b) records of actual performance, both physical and financial, at regular intervals;
- (c) the means of comparing the actual and planned performance, with the facility to highlight significant differences by main resources, eg contractor, BC labour, materials issue, and so on;
- (d) a facility to assess the likely effect of variations and knowledge to date on future events, the completion date and out-turn costs; and
- (e) reports on progress and completion, based on the 'exception' principle, to various levels of management, as appropriate, including the decision-taking level.

Optimum use of computers is expected to assist in managing and controlling the project.

7.58. This was the subject of recommendations in our 1983 report. At that time BC made some changes and improvements to its system of project control. In 1983 the Department of Energy commissioned management consultants to carry out an appraisal of the proposed Asfordby coal mine, including reviewing the financial appraisal, key assumptions, critical factors affecting the project which might have been omitted, and identification of any other factors. In their report (July 1983)

the consultants expressed concern about the organization and control of the project. In 1985 BC commissioned a study of project management at Asfordby, from the same consultants, who reported in October 1985. This report recommended: organizational changes, notably that there should be a full-time project leader; that the project team should all be situated on site; that the project control function should be strengthened (from 9 to 15); and that an up-to-date computer system be employed. BC accepted this report, and, furthermore, commissioned the consultants to implement the project control system, including providing project control staff whilst BC staff were trained to take on these new roles. The system is now in full use at Asfordby, and, we were told, also in use elsewhere. The consultants' staff are being phased out as BC staff develop expertise. Asfordby, so far, is running to time.

7.59. At the time the consultants' proposals for implementation of the project management system were accepted, the CIC asked the Head of Environment and Planning to promulgate project management methodology, and the lessons from Asfordby, within BC. A project management manual is to be issued as soon as possible. BC told us that it would cover the consequences of differences between operational and project management; the objectives of project management; team structure; the relationship of the project team with line and departmental management; relationships with outside bodies (other than consultants and contractors); project management and control; information systems; accountability and review; and training and career development. We were told that the lessons being learned at Asfordby and elsewhere were being absorbed and would continue to be so, and that the computer information systems were now being used for smaller projects with the aid of desktop computers.

7.60. We asked BC whether there was enough major project control work to sustain in-house development of project management skills. At present there is no traditional career path through project management. On the contrary, colliery management is still the recognized route to senior positions. In the course of our inquiry, as preparations were being made to replace four smaller Areas with four Groups, it had been agreed in principle that there will be a project management function under central Headquarters control, although the details had still to be settled. This will provide a core of experienced Project Managers and staff for projects in certain locations and of a certain size (still to be determined), including some larger projects in operational mines in the new Groups.

Project control performance

7.61. In our 1983 report we examined the results of 77 large major projects completed by December 1981. Analysis of the time taken to complete these projects compared with the time estimated at the Stage II submission revealed that all but six of the projects were completed late. The details are as follows:

<i>Number of projects</i>	
<i>(table taken from MMC 1983 report)</i>	
Early or on time	6
Up to 12 months late	35
13-24 months late	26
25-36 months late	5
37-48 months late	3
Over 48 months late	2
Total	77

7.62. At the time of that report the NCB (as it was then) had just issued new instructions on project planning, appraisal and management, with the aim of improving the progressing of major projects from the planning to the commissioning stage. These instructions had come into force in April 1982. The main changes were the introduction of:

- (a) changes in project sectionalization;
- (b) the extension of the Contract Plan;
- (c) the changes in the arrangements for technical changes;

- (d) changes in the arrangements for contract administration;
- (e) changes in the appointment of management resources;
- (f) changes in the use of consultants; and
- (g) changes in the design and construction of coal preparation plants.

These revised arrangements were described in Chapter 10 of our earlier report. In December 1982 BC introduced monitoring against out-turn prices. From January 1983 onwards the following changes were also introduced:

- (a) risk assessments by Headquarters departments;
- (b) the requirement for Stage I submissions for all projects costing over £5 million;
- (c) the preparation and presentation of papers by Area Directors; and
- (d) the submission of all Completion Reports and, where necessary, Annual Reviews to quarterly accountability meetings.

7.63. In February 1988 BC's CIC considered a paper on major project performance against Stage II prospectus. This examined performance on the 37 major projects (excluding Asfordby) approved at Headquarters since 1 January 1983, of which:

- (a) 17 had been completed;
- (b) 17 were still in progress; and
- (c) three had been aborted or the colliery concerned closed.

Asfordby new mine was not included in the review because of the size of the project, which it was thought would distort the information. The latest Annual Review indicated that this project would be completed within the time and cost approved at Stage II.

7.64. In order to establish the project performance it was necessary for appropriate adjustments to be made to eliminate the effects of the major industrial dispute (1984 to 1985) on the actual project cost and duration. After making these adjustments the analysis showed that, for those 17 projects which had been completed:

<i>Number of projects, 1983-88</i>	
On time or early	12
Up to 12 months late	4
13-24 months late	1
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Total	17
	<hr style="width: 100%;"/>

Of the 17 which had not been completed, the estimated durations gave the following results:

<i>Number of projects, 1983-88</i>	
Early or on time	12
Up to 12 months late	4
13-24 months late	1
	<hr style="width: 100%;"/>
Total	17
	<hr style="width: 100%;"/>

7.65. Appendix 7.1(i) and (ii) shows these data in graphical form. However, the need to make adjustments to allow for the effects of the 1984-85 strike has meant that an element of judgment has been applied, making conclusions drawn from this analysis less certain than they might otherwise be. Three of the completed projects analysed by BC were amongst those we selected as our case studies. BC's calculations in the analysis of project performance do not correspond with

calculations made by our staff based on the information provided to us, on two out of three of these projects (in one case less favourably, in the other more favourably). BC agreed that the data would bear alternative interpretations, but considered its to be the more reasonable.

7.66. The analysis also showed the estimated and actual cost of the 17 completed projects, and the 17 uncompleted projects. None of the completed projects had cost more than its Stage II estimate. Whilst most were within 15 per cent of the Stage II estimate, two were more than 30 per cent under the estimate. This is shown in graphical form in Appendix 7.1(iii). Of the incomplete projects, all are expected to come in at or under their Stage II estimates, although only one at more than 15 per cent under.

7.67. Until recently (end 1984/early 1985) the Stage II cost estimates prepared by the quantity surveyors were intended to reflect a situation where supply and demand in the construction industry were in normal balance. At the time many of the projects we examined went out to tender, market conditions were such that prices obtained for civil works on contracts let were exceptionally low. This explains why so many of the contracts were let at markedly below the Stage II estimate. BC has changed its instructions to those preparing Stage II estimates, and they are now required to make the estimate on the basis of the market prices currently being tendered.

7.68. BC concluded from the analysis referred to in paragraphs 7.63 to 7.66 that actual and expected project durations compared with Stage II showed a marked improvement over projects approved before January 1983, and that actual project costs on completed projects were some 12 per cent less than that approved at Stage II, on average. Ongoing projects were estimated to be going to cost, on average, 4 per cent less than the Stage II estimate. BC also noted that the average estimated cost of projects approved after January 1983 was some £12 million, about a third of that for those approved pre-January 1983; this reflected the policy of developing a strategy for a colliery and then undertaking a series of separate smaller and more easily managed projects rather than undertaking a single large composite project with much longer duration. BC concluded from this analysis that projects approved since January 1983 were generally being completed on time and within estimated costs and that results on completion were better than those of Stage II, and that these improvements could be attributed to the preparation of more robust Stage II plans and estimates and better project control following the introduction of revised procedures.

Monitoring the heavy duty investment programme

7.69. Table 7.1 shows, by colliery, the investment in heavy duty equipment from 1982-83 to 1987-88:

TABLE 7.1 Investment in heavy duty in collieries in production as at March 1988

Colliery	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	£ million Total
<i>Scottish Area</i>							
Barony	—	—	—	—	—	—	—
Bilston Glen	1.331	(0.012)	3.347	—	2.119	—	6.785
Longannet Complex (including Castlehill and Solsgirth)	—	2.106	4.376	—	—	—	6.482
Monktonhall	—	—	—	1.900	—	—	1.900
Others	—	—	—	—	0.352	—	0.352
<i>North-East Area</i>							
Dawdon	—	—	—	—	—	—	—
Easington	—	—	—	1.800	—	—	1.800
Ellington Combine	—	2.210	1.389	—	—	—	3.599
Murton	—	—	—	—	—	—	—
Vane Tempest/Seaham	—	—	—	—	—	—	—
Wearmouth	—	—	—	—	—	—	—
Westoe	—	—	—	—	—	—	—
Others	—	—	—	—	—	—	—

<i>Colliery</i>	<i>1982-83</i>	<i>1983-84</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>	<i>£ million</i> <i>Total</i>
<i>North Yorkshire Area</i>							
Allerton Bywater	—	—	—	—	0.136	1.636	1.772
Barnsley Main (Barrow)	2.731	—	—	—	—	—	2.731
Dearne Valley	—	—	—	—	—	—	—
Denby Grange	—	—	—	—	1.793	2.258	4.051
Grimethorpe	2.795	1.964	(0.054)	2.500	—	1.034	8.239
Houghton/Darfield	0.414	0.028	—	—	2.532	—	2.974
Kellingley	2.859	(0.029)	3.405	—	—	—	6.235
Park Mill	—	—	3.262	—	—	—	3.262
Prince of Wales	—	—	—	—	—	—	—
Riccall	—	—	—	—	—	—	—
Royston	—	—	—	—	—	2.035	2.035
Sharlston	—	—	—	—	—	—	—
Stillingfleet	—	—	—	—	—	—	—
Whitemoor	—	—	—	—	—	—	—
Wistow	—	—	—	—	—	—	—
Others	—	—	—	—	—	0.237	0.237
<i>South Yorkshire Area</i>							
Askern	—	—	—	—	—	4.103	4.103
Barnburgh	—	—	—	—	—	—	—
Bentley	—	—	—	—	0.979	1.729	2.708
Brodsworth	—	—	—	—	—	—	—
Dinnington	—	—	—	—	—	—	—
Frickley/South Elmsall	—	—	—	—	0.932	—	0.932
Goldthorpe/Hickleton	—	—	—	—	—	—	—
Hatfield/Thorne	—	—	—	—	2.523	—	2.523
High Moor	—	—	—	—	—	—	—
Kiveton Park	—	—	—	—	—	—	—
Maltby	—	—	—	5.800	—	—	5.800
Manton	—	—	—	2.500	3.096	2.952	8.548
Markham Main	—	—	—	—	—	—	—
Rossington	—	—	—	—	0.806	3.753	4.559
Shireoaks/Steetley	—	—	—	—	—	—	—
Silverwood	—	2.644	—	—	3.289	3.532	9.465
Thurcroft	1.965	—	—	—	—	—	1.965
Treeton	—	—	—	2.700	—	—	2.700
Others	—	—	—	—	0.125	3.531	3.656
<i>Nottinghamshire Area</i>							
Annesley/Bentinck	—	—	—	2.600	—	—	2.600
Bevercotes	—	—	6.829	—	2.289	3.643	12.761
Bilthorpe	—	0.083	—	—	—	2.313	2.396
Blidworth	—	—	—	—	—	—	—
Calverton	—	—	—	—	—	1.695	1.695
Clipstone	—	—	1.789	—	2.439	2.259	6.487
Cotgrave	3.031	2.075	2.930	—	—	2.062	10.098
Creswell	—	—	—	—	—	—	—
Gedling	—	—	1.783	—	—	2.212	3.995
Harworth	2.772	(0.058)	3.004	—	—	—	5.718
Allerton	—	—	2.693	—	—	3.323	8.782
Rufford	—	1.969	—	5.200	2.886	—	10.055
Sherwood	—	1.585	—	3.000	—	2.375	6.960
Silverhill	—	—	—	—	—	4.362	4.362
Sutton	—	—	—	—	—	—	—
Thoresby	5.446	(0.015)	—	2.800	—	3.568	11.799
Welbeck	—	3.033	5.456	—	—	2.516	11.005
Others	(0.014)	—	0.055	—	0.731	11.772	12.544
<i>Central Area</i>							
Baddesley	—	—	—	—	—	—	—
Bagworth/Ellistown	2.674	3.172	3.018	0.400	—	—	9.264
Bolsover	—	—	—	—	—	—	—
Coventry	3.863	—	3.286	—	—	7.639	14.788
Daw Mill	4.111	4.012	(0.277)	9.000	2.851	—	19.697
Donisthorpe/Rawdon	—	—	—	—	—	—	—
Markham	—	—	—	3.100	—	2.508	5.608
Renishaw Park	—	—	—	—	—	—	—
Shirebrook	—	—	2.288	—	—	1.614	3.902
Warsop	—	—	2.868	2.600	—	—	5.468
Others	—	—	—	—	(0.006)	—	(0.006)

Colliery							£ million
	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	Total
<i>Western Area</i>							
Agecroft	2.930	—	—	—	—	—	2.930
Bickershaw Complex	—	—	—	—	—	3.705	3.705
Florence	—	1.872	—	—	—	—	1.872
Hem Heath	0.160	3.404	—	2.900	1.912	—	8.376
Holditch	—	—	—	—	2.377	—	2.377
Lea Hall	—	—	—	—	—	2.556	2.556
Littleton	—	—	—	3.000	2.598	—	5.598
Parkside	—	—	—	2.000	—	—	2.000
Point of Ayr	—	—	—	—	—	—	—
Silverdale	—	—	—	—	—	—	—
Sutton Manor	—	—	—	—	2.322	—	2.322
<i>South Wales Area</i>							
Betws	—	—	—	—	2.088	—	2.088
Blaenant	—	—	—	—	1.987	—	1.987
Cynheidre	—	—	—	—	2.370	—	2.370
Deep Navigation	—	2.018	—	—	—	—	2.018
Marine/Six Bells	—	—	—	2.600	—	—	2.600
Merthyr Vale	—	—	—	—	—	—	—
Oakdale	—	—	—	—	—	—	—
Penallta	—	—	—	2.200	—	—	2.200
Taff Merthyr	—	—	2.015	—	—	—	2.015
Tower/Mardy	—	—	—	—	2.094	1.300	3.394
Trelewis	—	—	—	—	—	—	—
Others	—	—	—	—	0.253	0.700	0.953
<i>Kent Area</i>							
Betteshanger	—	—	—	—	2.323	—	2.323
Others	—	—	—	—	0.525	—	0.525
Adjustment to previous years (all Areas)	—	—	—	0.800	—	—	0.800
<i>Sub-total</i>	<u>37.068</u>	<u>32.061</u>	<u>53.462</u>	<u>59.400</u>	<u>53.487</u>	<u>88.922</u>	<u>324.400</u>
Investment at closed collieries	<u>4.541</u>	<u>2.538</u>	<u>5.158</u>	<u>11.700</u>	<u>2.495</u>	<u>—</u>	<u>26.432</u>
Total	<u>41.609</u>	<u>34.599</u>	<u>58.620</u>	<u>71.100</u>	<u>55.982</u>	<u>88.922</u>	<u>350.832</u>
<i>Source: BC.</i>							

7.70. The installation of heavy duty equipment has become an integral feature of modern longwall mining. Most of the investment in heavy duty equipment has been in the provision of roof supports of the chock shield or shield support category. (Heavy duty shields are those with a yield load in excess of 250 tonnes per chock.) The supports are moved forward hydraulically in conjunction with the armoured face conveyor after the passage of the coal-cutting machine. The unsupported roof behind the advanced chocks is then allowed to collapse.

7.71. BC's investment in heavy duty face equipment began in 1977 with the installation of the first set at Kellingley Colliery, North Yorkshire, although it was 1982-83 before the current levels of investment were committed to heavy duty installations. By 1985 BC regarded heavy duty investment as of sufficient importance to be given priority status within the capital expenditure programme.

7.72. In the BC capital investment manual, the procedure for investment in heavy duty supports is listed as 'mandatory'. Area Directors have delegated authority to approve installation applications provided that they meet the financial criteria established for capital expenditure as a whole, and that an average of 500,000 tonnes per year can be produced from the faces on which the equipment will be successively deployed over an eight-year equipment life. Where applications do not meet these criteria, they can still be approved by Headquarters. Over the period 1986-87 and 1987-88, 54 heavy duty installations were approved and 22 were rejected during the Business Planning Cycle. Others would also have been rejected as part of the planning process at Area, prior to submission of the formal Business Plan. The benefits from an investment in heavy

duty equipment depend on the geology of the colliery, the size of the face to be worked, machine available time and machine operating time. These variables can differ from face to face.

7.73. Capital expenditure attributed to the Heavy Duty Programme from 1982-83 to 1987-88 amounted to £351 million, some 9.2 per cent of total deep mining capital expenditure for that period. For the years 1986-87 and 1987-88 this includes expenditure for the purchase of other heavy duty equipment (ie roadheaders, shearers, gate end boxes etc), and price/accrual adjustments from previous years. However, data obtained from the case studies, for example Cynheidre, show that expenditure on other face equipment (non-heavy duty)—necessarily part of investment in heavy duty supports—is excluded from BC's total.

7.74. BC told us that the biggest single contributor to the 48.4 per cent increase in productivity since 1982-83 'is the increasing proportion of heavy duty shield support installations and the associated higher performances achieved'. By 1987-88 the proportion of heavy duty faces had risen from the 1982 figure of 5.6 per cent to 48.0 per cent.

7.75. However, a number of other changes have occurred over this period (1982-83 to 1987-88) which had an equally significant impact upon productivity:

- (a) the 57 per cent reduction in the number of faces currently worked;
- (b) the 51 per cent reduction in colliery numbers from 191 to 94;
- (c) the 56 per cent (end-year) manpower reductions;
- (d) the widespread investment in the computerised Mine Operating System (MINOS), totalling some £13 million, is intended to give rise to substantial productivity increases via the monitoring and automation of significant activities underground, and contributing to increased safety underground;
- (e) the increased reliance upon retreat mining;
- (f) improvements in machine available time; and
- (g) increases in overtime working, with the proportion of overtime shifts more than doubling since the 1984-85 dispute.

BC told us that many of these changes have, however, in whole or part, been made possible by the introduction of heavy duty equipment. Its installation at a colliery may permit the number of faces at that pit to be reduced, or make possible an increase of low cost output. Heavy duty equipment had also contributed to increased manpower productivity, permitting reductions in the labour force, and to better reliability, giving rise to higher machine available time.

7.76. Of the £351 million capital expenditure on heavy duty equipment since 1982-83, £26.4 million was incurred at 12 pits which have since closed. While many of these pits were within the 'high cost tail', not all of them had been consistently within that category. Where they had been, however, production increases associated with heavy duty equipment elsewhere did not occur.

7.77. The reason BC gave for there having been heavy duty equipment investment at collieries which it was subsequently decided to close was that the introduction of heavy duty shield supports at almost all of those collieries was, in effect, a last management effort to improve the collieries' relatively low performance. In the main, because of intrinsic operational difficulties of the mining environment at these collieries, productivity levels remained markedly below the national average, and this failure to realize significantly better results was a major factor towards their eventual closure. Much of the heavy duty equipment installed in collieries later closed was subsequently salvaged and redeployed. We also noted that some collieries had greatly increased productivity without heavy duty equipment. BC told us that the reasons for the improvements in these cases (where the geology was not always suitable for the use of heavy duty

equipment) included more retreat mining and increases in the number of shifts wherever possible, together with significant reductions in manpower reflecting the general restructuring of the industry.

Indicators of capital performance

7.78. BC told us that it calculated returns on capital employed for each of its main activities at corporate level only. The calculation is made by expressing the operating profit for the year as a percentage of the simple average of opening and closing fixed and current assets, less creditors due for payment within one year (all at balance sheet values). The return for BC as a whole for 1986-87 was 6.6 per cent.

7.79. Returns are not calculated on capital employed at individual collieries, Areas or regions. BC told us that much of the working capital (debts, creditors, stocks, stores and so on) was managed on a regional or even a national basis, and that some collieries still showed operating losses. Under these circumstances BC had decided that the introduction of a capital charge for each colliery would best bring home to Area and colliery management the need to achieve a return on capital. The capital charge was calculated by applying a rate, approximating to the rate payable by BC on its borrowings, to the written down value of the fixed assets employed at or in support of each colliery.

7.80. BC told us that both Area and colliery management clearly understood that the objective is to achieve (at least) breakeven after capital charges at each colliery. Every accounting period, a cost per GJ after capital charge and a profit/(loss) after capital charge were ascertained and included on the profit and loss statement for each colliery. In BC's view, the system of capital charges enables management to estimate the effect of alternative plans, involving different levels of capital expenditure, on the bottom-line profitability of a colliery and of the Area as a whole.

7.81. We asked BC what indicators of capital performance it used to assess the actual performance of completed projects. Except where there are clearly measurable marginal benefits arising from the project, eg manpower savings or improved machine available time, the financial assessment was related to the performance of the colliery after completion of a project and reflected the effect of a combination of factors at that time, only one of which was the completion of the project. BC told us that while it could establish that a project had achieved its objective(s) in physical terms, changes in other circumstances could obscure the benefit obtained in financial terms. BC accepted, however, that, as a general rule, the financial contribution of a project should be assessed as part of the Completion Report procedure.

Conclusions and recommendations

Proceeds

7.82. The discounts which BC allows, other than those which are quality-related, are averaged over collieries by reference to two main categories of coal, bituminous graded and bituminous non-graded. Three other categories exist, viz anthracite graded, anthracite non-graded and South Wales bituminous, but these all relate to South Wales only.

7.83. As long as the bulk of the coal produced is supplied to some 30 national customers from whichever collieries are best placed to meet the customers' needs most economically, it would make no sense to do other than credit each colliery with proceeds established after deduction of the company-wide average discounts.

7.84. We do not believe that the same considerations will necessarily apply in the future when the ESI is privatized and there may be a significant increase in the number of power generating companies seeking supplies of coal from local sources. We believe that the present policy would result in the insulation of individual collieries from their markets, protecting them from the consequences of their geographic position and the nature and grade of their products. Crediting each colliery with its own net proceeds would enable the true profitability of each colliery to be established, by linking it to its own markets.

Monitoring results

7.85. Within the present framework BC has satisfactory arrangements for measuring cost, output and quality against targets for individual collieries, and for monitoring capital expenditure on individual projects and in aggregate.

Annual Reviews and Completion Reports

7.86. The Annual Review provides a formal means by which the decision-taking level can monitor project progress. BC has, since 1985, improved its procedures, and we are satisfied that adequate attention is now given to this task.

7.87. Completion Reports provide a formal means of holding managers responsible for overall project performance (in terms of adhering to time and cost), and for initiating sanctions if this is unsatisfactory. This is an effective way of encouraging well-run projects.

7.88. At the time when many of the projects we examined went out to tender, market conditions were such that prices for the contracts were exceptionally low because of excess capacity in the construction industry. This explains why so many of the contracts were let at markedly below Stage II estimates. BC has now changed its instructions to those preparing Stage II estimates, and they are now required to make their estimates on the basis of the price expected at the time the contract is expected to be let. The previous practice could, in some circumstances, be misleading, and we think this is a welcome change.

7.89. In our 1983 report we commented unfavourably on the way project costs were monitored at Headquarters against Stage II estimates rather than against sums which reflect the prices contracted at Stage III. BC agreed with us that Headquarters monitoring should be against both figures, and we recommend that this should be implemented. This will improve control of capital investment in respect of annual expenditure; monitoring against commitment; and monitoring against approval.

Post-project appraisal

7.90. BC's Annual Reviews and Completion Reports currently fulfil a specific and rather narrow role. We therefore recommend that, in addition, BC establishes a procedure to choose some four or five completed projects each year and subjects them to detailed Headquarters post-project appraisal. We believe that BC is well placed to conduct such reviews and to ensure that the lessons, both favourable and unfavourable, are disseminated widely among its staff. One suitable area for early review would be recent heavy duty installations. This should provide a solid basis for ensuring that the future of the remaining Heavy Duty Programme continues to be soundly based.

Project management

7.91. We note that BC is shortly to issue a manual on project management; this, which we recommended in our previous report, is to be welcomed.

7.92. There is to be a project management function under central, Headquarters control. BC should ensure that thereby expertise once developed is retained and used, and that there is a career path through project management in BC. BC will, nevertheless, continue to need to purchase specialist help in project management and control from outside from time to time, both to refresh its in-house team with new ideas, and to deal with 'lumpiness' in the construction programme.

7.93. The changes BC has made, and continues to make, to its project management improve planning, and financial and programme control. However, we think that BC still has some way to go fully to absorb the lessons recently learned about project control, and may be able to take further advantage of advice from consultants. BC's cost estimating which we commented on in our previous report is still inaccurate, but the errors have been of overestimation.

Indicators of capital performance

7.94. BC does not think it worthwhile to attempt to calculate the actual return on capital of an individual capital investment project after the project is complete. We think that, since the justification for expenditure is ultimately expressed in

money terms, the post-completion analysis of the project should always include a financial assessment of the project, including a calculation of the return on capital, and a statement of the contribution to the actual change in colliery performance since the project was approved.

7.95. We believe that the absence of proper calculations of returns on capital employed for individual collieries is of little consequence at the present time with BC treating its mines collectively as a coal supply system. In these circumstances we regard the inclusion in a colliery's profit and loss account of a capital charge, calculated by reference to BC's average rate of interest payable and the written-down value of the colliery's tangible fixed assets (plus other capital assets used at or in support of the colliery), as a useful reminder to the colliery management that a satisfactory return should be achieved on assets employed.

7.96. However, we believe that this procedure may well be inadequate in the likely circumstances following privatization of the ESI; and the more so in the event of privatization of BC. We believe that BC should now be giving thought to ways in which it could fully attribute fixed and working capital to individual collieries or groups of collieries.

R G SMETHURST (*Chairman*)

JAMES ACKERS

F E BONNER

M B BUNTING

ROBERT CLAYTON

A FERRY

S N BURBRIDGE (*Secretary*)

13 September 1988