E(80)14 COPY NO. 55

20 February 1980

CABINET

MINISTERIAL COMMITTEE ON ECONOMIC STRATEGY

REVIEW OF DEPLETION POLICY

Memorandum by the Secretary of State for Energy

We decided to defer the review of depletion policy by officials, which I circulated last October (E(79)58). Since then there have been further increases in world oil prices, economic growth expectations have diminished, some further slippage in UKCS field developments has occurred and we have re-imposed gas flaring controls at the Brent field. I have, therefore, arranged for the report to be updated to take account of these changes. A copy of the revised report, which begins with a convenient summary of conclusions and recommendations is attached.

2. The prospect for oil remains a substantial hump in production in the 1980s followed by a sharp decline. The revised estimates show a slightly lower, flatter profile than before, with oil production peaking at 126-127 million tonnes in 1984-86. The bulk of this will come from fields already in production or under development and, while there are chances of some further slippage, higher prices are already stimulating the companies to intensify their development efforts. The demand estimates are also now reduced. Unless we take action, the prospect is an excess of production over domestic demand of some 200-250 million tonnes or more during the 1980s, with net exports of around 30 million tonnes a year at peak. If the recent rise in oil prices results in increased activity and hence higher production in the late 1980s the excess of production over domestic demand could be higher still.

3. The declining production projected by officials for the 1990s already assumes a doubling of exploration efforts from present levels. As their analysis makes clear, smoothing the profile will require action

both to defer medium term production and to step up exploration for the longer term. I attach the greatest importance to stepping up our exploration effort which will bear fruit in the 1990s. This is in no way inconsistent with taking action to smooth the hump projected in the 1980s. Given careful handling, we can, I believe secure the industry's co-operation in both these objectives.

4. There are inevitably very considerable uncertainties and no depletion policy will be risk free. There will be fluctuations in oil prices and production profiles. But I believe the strategic and security of supply arguments for seeking to prolong UK net self-sufficiency in oil are compelling. They have been strengthened by recent events in the Middle East. The desirability of avoiding a sharp pattern of "re-entry" and the potential economic gains from holding oil in the ground are in my view lesser but supporting arguments.

5. Detailed decisions will fall to be taken over the coming months on field development applications, a number of which have been submitted and on other measures which will begin to influence the level of peak production. Such action could defer up to about 12 million tonnes of annual production and revenues worth up to about £250m a year at peak in 1984-86. I believe therefore we need to decide now the policy we wish to adopt. The remaining option of "production cutback" would be more costly (up to £1 - 1½ billion annual revenue foregone at peak) and does not become available until 1982. We do not need to take a view on this now and I would recommend we review it in about a year's time.

6. I endorse the report's recommendations and invite colleagues to agree that we should begin moving towards the policy of slower depletion in the 1980s. We will need to discuss with the oil industry how this policy can best be implemented. I would therefore like, if my colleagues agree, to open discussions with the industry. Although there may well be leaks about such discussions they are unlikely to amount to anything more than existing speculation about our policies. In the light of these discussions I would advise my colleagues further on the timing and content of a statement we might make on our policy, bearing in mind the closeness of the EEC Council Ministers' meeting at the end of March.

7. The report from officials also includes some preliminary comments on gas, in particular the need to encourage exploration. A further report on gas depletion will be submitted to us.

D.A.R.H.

Department of Energy
20 February 1980

DEPARTMENT OF ENERGY

INTERDEPARTMENTAL WORKING GROUP ON DEPLETION POLICY

1979 REVIEW OF DEPLETION POLICY

8 February 1980

CONFIDENTIAL

DEPARTMENT OF ENERGY

INTERDEPARTMENTAL WORKING GROUP ON DEPLETION POLICY

1979 REVIEW OF DEPLETION POLICY

I. SUMMARY AND RECOMMENDATIONS

Oil

1. (i) The UK's initial priority has been the rapid development of its offshore oil resources in order to realise early the benefits for the economy, the balance of payments and security of supply. Net self-sufficiency should be reached during 1980. There is then some choice between early production at higher levels, leading on present estimates to renewed net imports around 1990, and prolonging self-sufficiency into the 1990s. (Paragraphs 4-7).

(ii) Offshore oil is a limited resource. Economically recoverable reserves are estimated in the range 2,400 - 4,400 million tonnes, with a central estimate of 3,300 million tonnes. Discovered oil accounts for some two thirds of the central estimate. Of the remainder only about half is conventional oil in shallow water likely to be producible before the end of the century. (Paragraphs 8-10).

(iii) The present prospect is a total net exportable surplus between 1981 and 1990 of 200-250 million tonnes, depending on economic growth assumptions. The surplus during the years of peak production would be some 30 million tonnes a year. The forecasts then show net imports growing rapidly to reach 40-50 million tonnes a year, or about half total requirements, by the end of the century. The forecasts assume a substantial upturn in exploration, without which prospects for the 1990s will be significantly worsened. (Paragraphs 10-11, Figure 2).

(iv) Net oil exports could be worth some £3 billion a year at peak. But, at higher future oil prices, the net import bill would be growing at about £1 billion a year during the 1990s, to stand at some £9 billion a year by the end of the century. (Paragraph 12, Figure 3).

(v) As oil production declines we shall also face the need to step up investment in replacement supplies of nuclear power and coal. Substantial expansion of both has been assumed in calculating potential net oil import requirements in the 1990s. The more rapid the decline in UKCS oil output, the more severe and difficult problems of adjustment in the pattern of energy supply could be. (Paragraph 14).

(vi) The attainment and duration of net self-sufficiency in oil will continue to be a focus of public interest. There are sound practical arguments, on security of supply grounds, for seeking to prolong the period of self-sufficiency and maintain our oil producing potential in the longer term. (Paragraphs 15-18).

(vii) Real oil prices are likely to continue to rise, enhancing the value of oil conserved for later use. Microeconomic assessment shows benefits, in some cases substantial, from taking up options for deferring production. (Paragraphs 19-21).

(viii) A production profile in which a sharp peak is followed by a sharp decline, may intensify problems of adjustment faced by British industry. These will be most acute for industries producing traded goods whose contribution will become increasingly important as oil production declines in the 1990s. (Paragraphs 22-27).

(ix) Avoiding a rapid decline in production in the 1990s will require both deferment of some earlier oil production and increased exploration. Securing both objectives at the same time could present problems. But the companies will have some difficulty in raising serious objection to medium term restraint, if carefully presented and linked to success in renewed exploration with consequent improvement in longer term prospects. Specific assurances in relation to production from new finds are a possible further incentive to exploration and could be reviewed, if necessary, in future. But they would not be warranted at this stage. (Paragraphs 28-31).

(x) Depletion policy will affect the offshore supplies industry. Some flexibility will be desirable to take account of the needs of the large capital goods and services sectors. UK platform yards, with one exception, will have work till 1981. Flexibility could also be needed to provide one further order and beyond 1981 to assist an orderly rundown in the number of yards. (Paragraphs 32-34).

(xi) There are important points to watch internationally. But, if handled with sensitivity, these need not prevent [illegible] adopting a conservationist depletion policy. The UK is committed within the EEC to net exports of 5 million tonnes

1985. At likely levels of UK demand for oil in the short to medium term, this should not significantly limit Ministers' freedom of action in depletion policy. (Paragraphs 35-37).

(xii) Uncertainties about the size of our oil reserves, UKCS production, demand and the price of oil are considerable and it is desirable to maintain a reasonably flexible policy. There can also be room for argument about the respective weight to be given to the energy, economic and self-sufficiency arguments. But they all point in the same direction. We believe that taken together they support the desirability of deferring production from peak in the 1980s to later years and we recommend Ministers should adopt such a policy. (Paragraphs 38-39).

(xiii) We also recommend an early start in implementing measures. Otherwise, Ministers' room for manoeuvre during the years of peak production will now begin to diminish. The measures available, the years in which decisions would be required and the estimated maximum effect in 1984-86, (when peak production of around 126 million tonnes a year is currently forecast) are:

Measure	First Decisions From	Maximum Annual Reduction in 1984-86 (m. tonnes)
Gas Flaring Restrictions	1980	2
Refusal of Upward Profile Variations	1980	4
Development Delays	1980	6
Production Cut-backs	1981	15
Total		27

(Paragraphs 39-40)

(xiv) If Ministers accept our recommendations, initial reliance in smoothing the profile will need to be placed on gas flaring restrictions, refusal of upward profile variations and development delays. The greater part of the potential from these three measures would not be obtained without the Government's intentions on depletion policy becoming known. Our specific recommendations are:

a. Gas Flaring. We recommend that flaring restrictions be continued at the Brent field and tightened if appropriate. Current restrictions are assumed in the production forecasts. Further potential exists at other fields and we recommend that controls on gas flaring at other fields be tightened as far as is economically and technically feasible.

b. Upward Profile Variations. The economic and technical case for refusing consent to production in excess of agreed programmes ("upward profile variation") differs according to the circumstances of the field. We recommend action where economic and otherwise practicable. Some action can be pursued on its merits but the major potential deferment under this heading will turn on a decision, due in 1980, whether to allow increase in production at BP's Forties field. This will need to be examined in detail at the time and if the decision is to defer it will need to be defended on depletion policy grounds.

c. Development Delays. We recommend a close administrative and technical scrutiny of development applications, with particular reference to plans for associated gas. Formal and more prolonged development delays raise more complex issues. The general arguments favour delay, which would begin to affect production levels from 1983, and the oil industry have indicated a preference for this measure. But such delay, consistent with assurance given to the industry, could be applied in the near future only to two or three fields and would fall on relatively few of the companies operating in the UKCS who might argue that this was inequitable. We do not believe it is practicable to lay down firm and rigid guidelines on development delays and recommend that each case should be examined on its merits. (Paragraphs 41-44, Figure 4).

(xv) Production cutback offers the greatest scope for deferring oil at peak (roughly equivalent to the combined effect of the other measures). But it is the least economically attractive of the measures and, under the terms of assurances given to the industry, cannot be implemented before 1982. The economic case for applying production cutbacks will turn critically on up-to-date assessment of oil price movement and prospects. The Government is committed to detailed consultations with the industry before cutbacks are implemented and decisions will, therefore, be required during the first half of 1981. We recommend that a further review be prepared and submitted to Ministers in about a year's time taking account of developments meanwhile and reporting on the possible use of this measure. (Paragraphs 41-45).

(xvi) if implemented to the full the three measures immediately available would reduce Government revenue from the North Sea by about £1½ billion a year (at 1979 prices) over the years 1982 to 86 - though there would be offsetting increases in tax revenue in later years. The effect on the PSBR in those years might be somewhat larger. There would also be a short run small loss of GDP, though, since this relates to lower oil production, the effect on employment would not be significant. If there were an associated improvement in competitiveness, non-oil output might rise to offset some or all of this loss. A profile which would keep the UK roughly at self-sufficiency would involve the use of production cutback, with more far-reaching economic consequences. This will be the subject of a report in a year's time. (Paragraphs 46-47)

(xvii) A depletion policy announcement is not required immediately. If, however, Ministers accept our recommendations, they will come under pressure at home to make clear their depletion policy. Some pressure to do so is also likely internationally. We believe a Government statement on its depletion policy would be desirable. **An early convenient opportunity** for such a statement, assuming the oil supply position remains stable, would be in the spring. A statement might be on the lines that Government is anxious to encourage exploration but wishes to avoid a sharp build-up in production followed by a sharp decline, that some action to smooth the profile will be necessary and that company proposals will be assessed accordingly. Careful timing and attention to presentational detail will be essential. (Paragraphs 48-49).

Gas

2. (i) Further work is proceeding on gas depletion. A further report will be submitted later this year. (Paragraph 50).

(ii) The appropriate rate for depletion of gas reserves is bound up with the prospects for other fuels. Uncertainties, particularly over UKCS reserves and availability of gas from other sources, are considerable. Depletion policy needs to be kept under regular review. Work so far suggests:

(a) Efforts will be needed to encourage exploration and to improve our knowledge of reserves. Some incentive to renewed exploration could result from possible gas gathering developments in the Northern Basin and expected purchase by BGC of additional quantities of Southern Basin gas.

(b) the degree of likely variation in UKCS gas production is not so great as to contribute significantly to the sort of macroeconomic problems which may arise in the case of oil.

(c) While there are practical interconnections between gas and oil production, e.g. the timing of associated gas in the context of gas gathering, gas and oil depletion can for most purposes be considered separately. (Paragraphs 51-59, Figure 5).

INDEX

II INTRODUCTION

3. The Interdepartmental Working Group on Depletion Policy, chaired by the Department of Energy, comprises officials from the Foreign and Commonwealth Office, the Scottish Office, the CPRS and the Treasury. The Group have conducted a review of depletion policy, in the light of latest developments and prospects, and now submit their report and recommendations to Ministers. The report deals mainly with oil but also includes a shorter final section on gas.

Background to Depletion Policy

4. Oil was first found in the UK Continental Shelf in 1969. Large further discoveries in succeeding years established the possibility, by about the time of the 1973 oil embargo and the subsequent fourfold increase in the world price of oil, of offshore oil production at levels matching home consumption, at least for a period during the 1980s. UKCS oil is relatively light and high value crude and would not on its own be the best way of meeting UK oil product requirements. But, after trade in crude and products, net self-sufficiency, or more, on a value basis became attainable. The initial priority has been the rapid development of these indigenous resources, in order to realise early the benefits for the economy, the balance of payments and the Exchequer and the degree of enhanced security of supply which they held out.

5. The UK is now expected to reach net self-sufficiency in oil during 1980. The present prospect is that production will then rise to an early peak before declining during the second half of the 1980s and thereafter. Decline in production will be accompanied by a falling away of the economic benefits which have built up in recent years and will lead to a renewed and growing requirement for net oil imports. The continuing annual deterioration in the balance of payments which this implies would need to be offset, as it proceeded, by a large scale expansion of exports combined with the development of other indigenous energy sources. In the long run there is little doubt that the necessary adjustments would take place and that payments would balance. But the strains for the economy created by a rapid decline in production could be very considerable.

6. The major part in bringing the UK Continental Shelf to its present state of development has been played by private oil companies. Their interests have coincided well with those of the UK, as producer country, during this period of initial build-up of production. But this coincidence of interest will not necessarily hold good at all stages in the exploitation of the resources of the Continental Shelf. The principal factors which could lead to diverging interests are shown at Figure 1. Of these, perhaps the most important, in considering the peak of production and its subsequent decline, are the potential impact on the rest of the economy including the effect on manufacturing industry of a loss of competitiveness in the 1980s and the desirability of stretching out as far as possible our indigenous supplies. Oil companies cannot reasonably be expected

to attach weight in their planning to these wider economic factors. The valuation they place on future oil, influenced both by discount rates and in some cases conservative planning assumptions about future oil prices, may also understate its potential value to the economy.

7. Many of the factors involved in evaluating depletion policies, for example the size and makeup of reserves, the possible timing of future production and the path of future world oil prices, are very uncertain. It is not, therefore, possible to lay down any simple, once-for-all blueprint: the framework within which policy develops needs to be kept under continuing review and updated at regular intervals in the light of the latest available information. The scope for Government action to influence rates of total UKCS production in the period before 1982 is limited by assurances (detailed at Annex II) given in 1974 by the then Secretary of State in the interests of a rapid build-up of output. But some decisions on development of fields falling outside the terms of these assurances and on rates of gas flaring will need to be taken over the next twelve months. These decisions will begin to influence the extent of the Government's remaining freedom of manoeuvre in depletion policy during the period of peak production currently forecast for the mid-1980s.

III OIL PROSPECTS

Oil Reserves

8. The quantity of recoverable oil reserves originally in place on the UKCS is estimated by the Department of Energy to be in the range 2,400 to 4,400 million tonnes; of which, to the end of 1979, some 183 million tonnes had been produced. The central estimate (3,330 million tonnes) underlying this range is made up as follows :-

TABLE 1: Central Estimate of Oil Reserves Originally In Place (1,2)

		M. Tonnes
A.	**Existing Discoveries**	
1.	Fields in production or under development	1330
2.	Fields possibly in production by 1984 (presently under appraisal)	150
3.	Fields unlikely to be in production by 1984 (including some presently under appraisal)	550
	Sub-Total	2030
B.	**Future Discoveries**	
4. (i)	Licensed (including 6th Round)	420
(ii)	Unlicensed	260
(iii)	Stratigraphic (licensed and unlicensed)(3)	200
(iv)	Deep-water (over 1000 feet) All structures	420
	Sub-Total	1300
	Total A & B	3330

Notes:

(1) The estimates are central in the sense that in each category and in the total, there is considered to be a 50% chance that reserves may be above the figure given and an equal probability that they may lie below.

(2) Includes an estimated 60 million tonnes of natural gas liquids.

(3) Stratigraphic oil is not detectable by seismic survey or other normal techniques preliminary to exploration drilling and both quantities and discovery are less predictable than for other categories.

9. The reserves estimates shown in lines 1, 2 and 3 of Table 1, are based largely on proven data. The estimates under line 4 for future finds have been obtained by statistical techniques and are subject to wider uncertainty. Particular uncertainty attaches to the quantities of recoverable reserves that could be discovered in "stratigraphic traps", which can only be found by exploration drilling, and in deep water, where the technologies for exploration and production have yet to be developed and commercial exploration is unlikely until late in the century.

10. Oil so far discovered amounts to some 2030 million tonnes, i.e. nearly two thirds of the current central reserve estimate (3330 million tonnes). Of the remaining 1300 million tonnes, only about half (680 million tonnes) is conventional oil in shallow water. We can have some confidence that this oil will contribute to production in the late 1980s and during the 1990s but only provided there is an increase in the rate of exploration above current levels. The greater part of this oil lies in territory already licensed but not yet fully explored.

<u>Supply and Demand Prospects</u>

11. We have considered possible oil production and demand forecasts against a range of assumptions about economic growth and future oil prices. (Our detailed assumptions are at Annex I). They are illustrated in Figure 2. It will be seen that the present prospect is a total net exportable surplus during the years of peak production of some 200 million tonnes, in the middle demand case, or up to 250 million tonnes if demand followed the lower path which on latest expectations about income growth could be more likely, although there are offsetting risks that substitution of oil by other fuels, notably coal, may not be as high as assumed. In the years of peak production the exportable surplus would be approaching or in excess of 30 million tonnes a year. During the 1990s, however, on the basis of present policies supply would rapidly fall short of demand, leading to an early net import requirement of perhaps around 30 million tonnes a year in 1995, increasing to 45-50 million tonnes a year by the end of the century.

12. The same prospect is illustrated in value terms at Figure 3 to show the potential implications for the balance of payments. The central assumption used was that oil prices will increase to \$40 a barrel (in 1979 money values) by 2000. The effect of assuming larger and smaller real oil price increases: by the year 2000 to \$33.00/barrel and \$48.00 respectively (1979 money values) are also shown. On the central assumption, exportable oil would be worth about £3 billion a year at peak. But from the late 1980s the UK's net oil import bill would be growing at some £1 billion a year to stand at about £9·billion annually by 2000. All figures at 1979 money values.

13. The decision whether or not to take action to smooth the production profile and defer some production to later years depends on a number of factors including energy policy, the weight to be given to the desirability of maintaining self-sufficiency, for as long as possible, micro and macro-economic and related fiscal considerations, the effect on the oil and offshore supplies industries, and international considerations. These factors are considered in the next Section (Section IV).

IV CONSIDERATIONS RELEVANT TO DEPLETION POLICY

14. Oil is expected to become scarcer and more expensive in the international market during the rest of the century and beyond. The world will need to look increasingly to energy conservation and other sources of supply, in particular nuclear power and coal, for meeting its longer term needs. This implies a prolonged period of transition in world energy markets and one which could well be punctuated by further disruptions of the kind we have experienced in 1973/4 and more recently. The UK's indigenous oil resources are insufficient to insulate us from these wider developments and, as UKCS production declines, we can expect to face both a growing requirement for net imports of oil and a need to step up investment in replacement supplies of nuclear power and coal. The more rapid the decline in UKCS oil output, the more severe and difficult the problems of adjustment in the pattern of energy supply could be. These arguments favour deferring some oil from peak production in the 1980s for later use and so restraining the rate at which indigenous production would otherwise decline during the 1990s.

Self-Sufficiency

15. The microeconomic and macroeconomic arguments are primarily concerned with the consequences of rates of change in oil production and attach no special significance to self-sufficiency. Self-sufficiency is, and will remain, a focus of political and public interest as a yardstick against which North Sea prospects, policies and performance can be measured. Additionally, there is a case on security of supply grounds for favouring a slower rate of depletion with the explicit aim of prolonging the period when indigenous production can meet a substantial proportion of our demand.

16. Complete self-sufficiency is, not possible. For economic and technical reasons UK oil refineries require a mix of crude oils of different types and qualities and, at peak production during the 1980s, we can still expect expect to import about half our crude oil requirements. There are limitations on what we can do, even with North Sea oil, to help ourselves in a crisis as we are committed, if the relevant international arrangements to which the UK is party are activated, to sharing our oil supplies to a limited extent during an emergency. Moreover, even with normal UK oil supplies in a period of crisis during which other countries were short of oil, we would not emerge unscathed since we would be significantly affected by the consequent reduction in world trade and likely boost to world inflation.

17. But international oil supplies are likely to remain vulnerable to political and other events in the Middle East and with UKCS oil (and BNOC trading a large proportion of it) the UK is in a more favourable position to deal with supply interruption than its competitors. Even in times of shortage, with high value, low sulphur crude to sell at prevailing prices, we should normally be better placed to buy other crude or enter swap deals to meet our refinery balance than other countries. We may also obtain some benefit in a crisis from our close relations with our two resident multinational oil companies (Shell and BP), though the UK accounts for only a small part of their total sales and they have stressed their own international obligations in the event of a crisis.

While, like other Western countries, we take part in IEA and EEC arrangements to share available oil supplies in an emergency, these arrangements would only come into force in a major crisis (they were not activated during the Iranian crisis) and, in any case, they have yet to be tested in conditions of acute oil shortage when they could break down. In a situation where individual countries were bidding openly or otherwise for available supplies there would therefore be advantage in our having sufficient (or nearly sufficient) UKCS productive potential either to meet our own needs directly or to trade with others for grades of crude more suitable to our refineries. Extending net self-sufficiency could provide a further limited degree of flexibility in that it might be possible to relax temporarily measures in force to defer production, if it were desired to increase UKCS output in the event of a supply crisis. Such security would greatly increase our freedom for manoeuvre during a crisis and should enable us to minimise the penalties which it would entail for the UK.

18. There is therefore likely to be advantage for the UK in a longer rather than shorter period of net self-sufficiency - an advantage which would be lost or diminished if early and substantial net exports were undertaken during the 1980s.

<u>Microeconomic Considerations</u>

19. To assess the potential value to the UK of oil produced early or later, we have taken a discount rate of 5% p.a. in real terms and assumed a world oil price of $40 a barrel in the year 2000, implying an average annual rate of increase in the sterling price of oil of around 3½% between the early 1980s and the end of the century. On these assumptions, our assessments show substantial benefits from later as compared with early production.

20. The benefits are greatest where development of fields is delayed (because company capital expenditure and revenue are delayed together) or where tighter control of gas flaring is introduced at fields already in production (because the total net benefit includes the value of the gas consumed). The assessments suggest that the maximum income gain from measures under these two heads open to Government (discussed in Section V below) would be approaching £500m. (discounted to present values). For example delaying the development of Phillips Toni/Thelma/Tiffany field for five years would be worth some £50m and there would also be economic benefits from delaying BNOC's 30/17b. Income gains would, of course, diminish at higher discount rates or with further sharp and early oil price increases. They would, however, be greater still if substantial further upward movement in oil prices were concentrated in the later part of the period or if real oil prices in 2000 were higher than the $40 a barrel we have assumed. Development over the past year have increased the chances of such an outcome and an interdepartmental review of longer term oil price assumptions is currently underway. The economics of refusing consent to upward variation from agreed oil production programmes vary from case to case, depending in particular on the expenditures associated with proposed production increases.

21. The microeconomics of deferring oil by cutting back output at fields already in production (the scope for which is also discussed in Section V) are, in most cases, more finely balanced (because the expenditure has already been incurred). They are in particular

dependent on the oil price profile and the tax position of the individual field. The economic attraction of this measure is, therefore, likely to be more marginal. As production cutbacks cannot be implemented before 1982, a detailed and up-to-date assessment of the case will be required in the next review.

<u>Macroeconomic Considerations</u>

22. The macroeconomic effects of UKCS oil production are similar to those of other industries. But there are two distinguishing features. First, oil has a very direct impact on our external accounts since it either displaces imports or is itself exported. Secondly, output from the UKCS is finite and, having built up to a peak in the first half of the 1980s, is likely to decline thereafter.

23. Since North Sea oil yields additional income it represents an economic benefit to the community at large. But it is increasingly evident that it also creates problems of adjustment for some key sectors of the economy - notably those producing internationally traded goods. The improvement in the oil account of the balance of payments causing some appreciation in the real exchange rate, relative to what it would otherwise have been, and some loss in industrial competitiveness. This occurs because much of the improvement in the oil trade account is offset by a deterioration in the non-oil account at least in the medium term and a change in relative prices is required to bring this about. As a result, real profitability in the more open sectors of British industry suffers, and there is some shift in resources from traded to non-traded sectors of the economy. These effects on competitiveness and the structure of UK production would be reversed as oil runs out. But the speed and size of these changes will have important consequences for industry. The transitional costs of adjusting to sharp and sudden changes may be severe, and much greater than those of adapting to more gradual, fully anticipated movements. Even temporary appreciation of the rate for sterling may have irreversible consequences for particular industries. Some of the loss of competitiveness we have experienced over the last two years is attributable to the actual and prospective effects of North Sea oil production.

24. The scale of appreciation in the real exchange rate will depend on how far the additional income from oil is saved and invested abroad rather than spent. The post-tax income accruing to UK oil companies is likely to be deployed in this way as they turn to overseas exploration. The abolition of exchange controls will allow the rest of the private sector maximum scope for increasing its overseas investment. It seems unlikely, however, that such additional investment will be large enough relative to the contribution of oil and gas to prevent further appreciation in the real exchange rate. In theory it would be open to Government to reduce the appreciation by official purchases of foreign currency in the exchange markets, and to use the proceeds either to repay foreign debt or to build up the reserves. In practice, however, the monetary complications that could arise from financing such an operation over the next few years - given the problems in achieving offsetting PSBR reductions - are likely to rule it out as an option at least for the foreseeable future.

25. There is no precise link between the oil production and exchange rate profiles. Much will depend on Government monetary and exchange rate policies and on foreign exchange market expectations. The fiscal and monetary policies pursued by the authorities may have an important bearing on the timing of changes in the real exchange rate: and equally, while speculative capital movements may have little net effect on the real rate in the medium term, they can have a major short-run impact on the timing and smoothness of the changes that take place. Yet there is some link between the rate of oil production and the real exchange rate, however imprecise. While a "hump" in the production profile will not automatically produce a matching hump in the real exchange rate, it increases the risk that one will occur, thereby aggravating the long term adjustment problems that North Sea oil will anyhow pose for industry. Depletion policy cannot solve these problems: but it may help to smooth out disruptive movements in competitiveness.

26. Slower depletion would tend to reduce GDP and Government revenue from the North Sea and, to the extent that the exchange rate is lower, to increase prices. Such an outcome would be particularly unwelcome in the immediate future. However, unless there were a major impact on market expectations, which seems improbable, the macro-economic effects of slower depletion, such as they are, would only be felt in the medium term. Government revenue is unlikely to be significantly affected by present depletion decisions until 1982/83. Moreover, the case against slow depletion depends on the benefits of oil being more valuable if they are realised sooner rather than later. The view that North Sea oil will be generally helpful to the Government in meeting its objectives is not sufficient to establish such a case. It is not clear that the macro-economic problems at the time of peak production in the mid 1980s - the period likely to be principally affected - will be any more severe than those in later years.

27. We believe on balance that there is a case on macro-economic grounds for smoothing out the production profile. But the macro-economic effects are not closely predictable nor are they likely to be substantial. The case rests more on the desirability of seeking to eliminate avoidable shocks and disruptions which could be significant.

<u>Licensing and Exploration</u>

28. Varying the size and timing of licensing rounds offers no scope for influencing the rate of oil production at peak during the 1980s. Licensing policy may, however, be able to contribute towards moderating the rate of rundown forecast for the 1990s.

29. The quantity of shallow water territory with attractive prospects which remains available for licensing is small. As output from existing fields declines, new production in the late 1980s and 1990s is likely to depend more importantly on the further development of existing finds and on the exploration companies undertake in blocks already licensed (some of which may be relinquished and relicensed). The production forecasts (see Figure 2 and Annex 1) assume an increased rate of licensing in the Seventh Round and subsequent allocations. Figure 2 shows the possible resulting

contribution to production in the 1990s based on what is known of the potential reserves and their prospectivity. The forecasts also assume that there will be a substantial increase in exploration of territory already licensed. Unless there is, prospects for the 1990s, which are already poor, will be significantly worsened.

30. The Seventh Round of licensing should help improve the general climate for exploration. However, as indicated earlier, a rapid decline in production during the 1990s will not be avoided unless action is also taken to defer some production from the 1980s. The objectives of both wishing to postpone production and the desirability of enhanced exploration do not sit comfortably together. But they are not inconsistent. The oil industry has itself claimed in the past that uncertainty about medium term depletion policy is a factor inhibiting new exploration, though it is doubtful whether this argument has been a real factor as opposed to a negotiating tactic. In practice, however, the industry well knows that prospects for the 1990s are poor and, against this background, would have difficulty in raising serious objections to a cautious Government approach to medium term production, if presented on a basis that the Government is anxious to encourage exploration but it cannot, until longer term prospects improve as a result of exploration, avoid some medium term restraint.

31. If it became clear that the rate of exploration was being adversely affected by depletion measures, the Government could consider the possibility of giving specific assurances about the exercise of its powers of depletion control in relation to new finds (e.g. assurances to the effect that production would not be curtailed in the 1990s). But we do not believe that further specific assurances of this kind would be warranted or should be given at this stage.

<u>Offshore Supplies Industry</u>

32. Two sectors of the offshore supplies industry which could be affected by depletion controls are those providing capital goods and services for field development. Although the most sensitive part of the capital goods market is offshore fabrication, consisting of platform and module building yards, there is also a very large market for the products of the general engineering sector. The services sector is an increasingly important one, particularly in Scotland.

33. At present there are five main platform fabricating yards in operation of which four have work in prospect till mid-1981. Further work will be needed for one yard from the spring of this year and could be provided by the Brae field order. Additional early field development approvals beyond this could result in orders going overseas.

34. Beyond 1981, with or without Government action to delay field developments, orders will turn down and it is unlikely that the industry will be able to sustain more than three operational yards for most of the decade. It is important that the necessary rundown be achieved in an orderly manner, which points to the need for some flexibility on the timing of development plan approvals. By the late 1980s there could be some upturn in field developments, depending on progress in exploration and appraisal work meanwhile, and the possible impact of measures being considered to encourage the development of marginal fields. But the chances are that the fields coming forward for development would be smaller ones, using lighter equipment or other new technology which does not require the full facilities of the conventional platform yard.

International Considerations

35. Our partners in the EEC and the International Energy Agency are interested in the rate at which we deplete UKCS oil and it is a potential source of controversy. This derives partly from the fact that individual Member States are, or could become, recipients of traded UKCS crude. Following the Iran crisis, we have also come under pressure both in the IEA and EEC to accept the general proposition that "restrictions" on indigenous energy production should be removed. The European Council meeting at Strasbourg in June 1979 emphasised the development of indigenous production as one way of meeting import ceiling targets. The Community had already agreed in 1974, and reaffirmed in 1978, that the EEC's dependence on imported energy and oil should be limited to 50% by 1985; and there is also an IEA Agreement to stimulate and increase production from sources of energy other than imported oil as quickly as possible, consistent with IEA members' economic and social conditions. While we took credit in the context of last year's supply shortages for the degree of flaring which we permitted, we have in general firmly resisted pressure to relax flaring restrictions.

36. Following the Tokyo Summit the UK has agreed to an EEC national oil import target which commits us to net exports of 5 million tonnes in 1985. At the lower levels of UK oil demand considered likely in the short to medium term, this should not significantly limit HMG's freedom of action in depletion policy. During negotiations, however, we came under pressure to commit ourselves to higher levels of UKCS production. Such pressure is likely to recur in tight market conditions, and will be particularly strong if the EEC and IEA are faced with the need to agree new measures to cope with an actual or expected shortfall in supply. In such circumstances we would expect further pressure on us from our partners to increase our production and to avoid action which OPEC countries might use to justify reductions in their own.

37. We do not believe that these points need prevent us from adopting a more conservationist depletion policy. They should however be taken into account in the formulation and presentation of such a policy. Our partners are already aware of our concern over depletion and there are good arguments which we can deploy both to distinguish our own case from that of the OPEC producers and show that a more conservationist policy is of benefit to our partners as well as to ourselves. We can in particular highlight the small size of UK reserves in relation to those of the major world producers and the likelihood that we should be unable to sustain high production levels for long. The prospect

is that a rapid rundown of UK production in the later 1980s and 1990s would bear as quickly on the achievement of group oil dependence targets, and on countries in receipt of traded UK crude, as on the UK. This dilemma is, in any case, likely to emerge for the EEC in discussions on energy objectives for 1990 which are just beginning. We can also stress that UKCS production is no substitute for genuine energy conservation and making real progress in the transition away from oil. While the EEC Commission have shown keen and continuing interest in UK depletion policy, our sovereignty over these resources is not in question, and the Commission are on record as stating that Community energy policy in no way diminishes the control exercised by Member States over the rate of exploitation of resources.

Balance of Advantage

38. Net self-sufficiency in oil during the 1980s will be followed by renewed dependence on less secure overseas sources for a growing proportion of our oil supplies in the 1990s and a need for expansion in replacement of indigenous energy supply. There is likely to be advantage for energy policy in ensuring that, when our indigenous oil production runs down, it does not do so at such a rate as to cause difficult problems either of switching to alternative indigenous supplies or of paying for increased imports. The real price of oil is likely to increase substantially over the period of peak UKCS production and subsequent decline, and micro-economic analysis suggests that there is likely to be net national advantage in conserving oil for later use. Macro-economic considerations also point towards trying to ensure a reasonably smooth profile and an orderly pattern of adjustment for the rest of the economy as North Sea oil production peaks and then declines. Finally, security of supply arguments favour a longer rather than a shorter period of self-sufficiency.

39. There are, of course, considerable uncertainties about the size of our oil reserves, what level of oil production will in fact be achieved, the growth of oil demand, the movement of oil prices, etc. It is therefore desirable to maintain a reasonably flexible policy. There can also be room for argument about the respective weight to be given to the energy and economic policy and self-sufficiency arguments discussed above. But they all point in the same direction. <u>We believe that taken together they support the desirability of deferring some production from the peak in the 1980s to later years and we recommend that Ministers should adopt such a policy.</u> The scope for doing so is however limited by the Varley assurances which the Government have recently confirmed in answer to a Parliamentary Question. <u>We also recommend an early start in implementing measures.</u> Otherwise, Ministers' room for manoeuvre during the years of peak production, will now begin to diminish. The scope for varying the production profile is discussed in Section V following.

V. SCOPE FOR DEPLETION MEASURES

The Instruments Available

40. Four instruments (which are discussed in more detail at Annex II) are available to Government. Their scope, the years in which decisions would be required and their estimated maximum effect in 1984-86 (when peak production of 126-127 million tonnes is currently forecast) are summarised in Table 2 below:-

TABLE 2: Potential for Deferring Oil at Peak

Measure	First Decisions Required From	Maximum Annual Reduction in 1984 (m. tonnes)
Gas Flaring Restrictions	1980	2
Refusal of Upward Profile Variations	1980	4
Development Delays	1980	6
Production Cutbacks	1981	15
Total		27

41. Production cut-back offers the largest potential for deferring oil during the years of peak production (more than equivalent to the combined effect of the other measures available). The maximum potential of this measure is illustrated at Figure 4. Thereafter cut-back and the rate of recovery of deferred oil could be adjusted to maintain production at around the level of net self-sufficiency and to provide a smooth re-entry profile. However, from the oil companies point of view (as expressed by UKOOA) production cut-back would be the least popular of depletion measures. Moreover, under the terms of the Varley assurances cut-back cannot be made before 1982. Ministers do not, therefore, need to take a decision on production cut-back now, but Government has agreed with UKOOA to give 6 months's notice; thus if cuts were to be implemented from the earliest possible time - 1982 - an announcement would be required by mid 1981. If therefore Ministers wish to start moving towards a slower depletion profile, they will need to rely initially on the remaining three measures:-

Gas Flaring. Gas flaring controls have been introduced at the Brent field and their continuation is assumed in the production forecasts. The case for such a policy, both on economic and gas conservation grounds, is strong and in the case of Brent, action was justified in terms of the value of the gas saved alone, but also has the incidental benefit of deferring oil production. Where smaller quantities of gas are at stake (e.g. Forties, Ninian and Tartan) the case for a tougher line on flaring would turn on the value of the oil deferred, as well as the gas and the justification, therefore, rests ultimately on oil depletion grounds. Action on gas flaring could account for some 2 million tonnes a year at peak in 1984-1986.

Profile Variations. The Government can turn down applications to exceed the production profile already agreed for individual fields - consents for which can be issued on a 6 monthly basis. Decisions relating to a fairly small amount of oil at the Beryl (Mobil) field will be due shortly. But a more important decision in respect of the Forties (BP) field - the major tranche of production (about 3 m tonnes p.a.) deferrable under this heading will be required in 1980. Refusal in the case of Forties would need to be justified in terms of the advantages of stretching out indigenous oil supply and this would become known. Current estimates suggest that refusal of profile variations would defer around ½ million tonnes of oil in 1980 building up to a maximum of 4 million tonnes annually from 1982. The deferred production would be recovered in the late 1980s and early 1990s. The use of this measure to help smooth the production profile is illustrated in Figure 4.

Development Delay. Four substantial fields are expected to come forward for development and be in production by 1984.(these account for the reserves listed at line A2 of Table 4). These include two "protected" pre-1976 discoveries: Hutton (Conoco) and Beryl B (Mobil) for which development applications have been submitted. While the Government's scope for action in respect of "protected" fields is limited, officials could adopt a tougher line during the pre-approval project discussions held with companies and thereafter undertake more detailed and critical examination of the development application, particularly with respect to gas gathering proposals, with the effect of delaying development by an average of one year, or more where practical. Such an approach could commence immediately without specific reference to depletion policy and could be adopted to delay development approvals on a further two fields, expected to come forward in the near future, which are not protected by the Varley assurances - 30/17b (BNOC/Shell and Esso) and Toni/Thelma/Tiffany (Phillips/AGIP/Petrofina). But here, in addition, the formal power to delay development can be used, perhaps to delay development by some five years. If Ministers wish to use their formal powers to delay development on depletion policy grounds, a decision in respect of 30/17b would be required in early 1980 and for Toni/Thelma/Tiffany shortly thereafter, so that the licensees could avoid unnecessary expenditure on preparing development proposals. In addition to these main fields there are also development prospects for a number of subsidiary accumulations one or two of which could also be delayed. The combined effect of a five year delay for 30/17b and Toni/Thelma/Tiffany and administrative action to delay Hutton and Beryl B by a one year period would transfer some 6 million tonnes of annual production that would have occurred in the mid late 1980s into the 1990s. The effect of these measures on the production profile is illustrated at Figure 4.

General Assessment of the Available Measures

42. The opportunities for deferring UKCS production which the measures discussed above represent will arise progressively over the next few years. There is scope for varying the degree to which each is applied and the combination of measures used. The measures are not, however, alternatives, in that early options forgone - particularly in the case of the least flexible, development delay - will cumulatively reduce Ministers' freedom of manoeuvre and the potential for action during the years of peak production.

43. A tougher policy on gas flaring has merit both on economic and gas conservation grounds and can stand to some extent independently of oil depletion policy. We recommend that flaring controls be continued at the Brent field and be tightened if appropriate and that controls on gas flaring at other fields be tightened as far as is economically and technically feasible. Refusal of upward profile variations and close and extended scrutiny of field development applications can also be pursued to some extent on merit. But beyond a point it would be seen that the Government was exercising an active depletion policy and would be pressed to make clear their intentions. We recommend the taking up of these options where economic and otherwise feasible.

44. Development delays raise more complex issues. The general arguments discussed above in favour of slower depletion would point to the fields discussed above being delayed. In general terms the oil industry has indicated, through UKOOA, that if depletion policy is to be exercised, they would prefer it to be through development delays with an adequate and equitable queueing procedure. In practice, however, development delays, as a result of the Varley assurances, could be applied in the near future only to two or three fields. Development delays would therefore fall disproportionately on relatively few of the companies operating in the UKCS who might argue that this was unfair and inequitable. It could also have potentially wider effects for the morale in the oil industry and the offshore industry. There is the further point that, if the Government delayed the fields in question, it might have to show its hand as early as the first half of 1980 whereas it might prefer to maintain a more flexible position. We do not believe that it is practicable to lay down firm and rigid guidelines on development delays and recommend that each case should be examined on its merits.

45. Decisions on the case of production cutback (paragraph 41) will fall to be taken during the first half of 1981. The economic case for applying them will turn critically on up-to-date assessment of oil price movement and prospects. We recommend that a further review be prepared and submitted to Ministers in about a year's time, taking account of developments meanwhile and reporting on the possible use of this measure.

Effects on Revenue and GDP

46. We have examined the likely economic effects of the lower profile of oil production during the first half of the 1980s which would result from adopting the measures discussed (other than the production cutback) above. Preliminary estimates suggest that the immediate options open to Ministers, i.e. delay, control of gas flaring and refusal of upward profile variation, would, if implemented to the full, result in little change to North Sea tax revenue in 1980. The three measures would reduce revenue by perhaps around £¼ billion a year at 1979 prices between 1982 and 1986. When the possible consequences for prices and activity are taken into account, the increase in PSBR in those years might be somewhat larger. Lower oil production in the early years would reduce net oil exports directly and would delay North Sea related capital expenditure. There would be a short term small loss in GDP as a result of these effects of somewhat less than ½% in those years, though since this relates to a loss of oil production the effect on employment would not be significant. The current account of the balance of payments would be somewhat worse with lower net exports of oil only partly offset by lower interest, profits and dividend outflows overseas. But, to the extent that the exchange rate was lower than it would be otherwise, better competitiveness should help to offset the loss of output and the worse current account. All the direct effects of the lower oil production would, of course, be reversed in the longer term, as lower production in the 1980s was recovered in subsequent years.

47. Going beyond this modified profile would involve the use of production cut-backs. This could keep the UK at or near self-sufficiency in oil during the 1990s but would undoubtedly have more wide ranging implications for the economy: in particular, the loss of Government revenue (possibly up to a further £1-1½ billion a year at peak) and the impact on the balance of payments would be much greater. Production cutbacks are not for decision this year and a detailed analysis will be included in the next review. The possible revenue losses quoted compare with a current forecast UKCS tax revenue of around £7 billion a year during the years of peak production - a figure which has increased by some 15% or around £1 billion a year as a consequence of the higher than expected recent oil price increase.

Presentation

48. Some of the measures described above can be pursued on merit. If, however, Ministers wish to pursue other measures - notably development delay for "unprotected" fields and refusal to upward profile variation at Forties - they will find themselves

under pressure to make clear their depletion policy. There is now widespread expectation that the Government will announce its policy on this subject. They are also likely to come under continuing pressure to do so internationally (paragraphs 35-37). It would be possible for the Government's policy to emerge piecemeal through a series of individual decisions. But this would not be very satisfactory. We believe it would be preferable for Ministers to issue a statement setting out the general policy they intended to follow. Such a statement, however, would need to be drafted with considerable care since it would be examined closely by the oil industry, our international partners, OPEC countries and the financial community. Careful timing would be essential, taking account of the relevant international negotiations (of which the EEC budget negotiations are the most immediate consideration) the state of the world oil market, planned OPEC meetings and potential foreign exchange market consequences at the time. The earliest convenient opportunity for such a statement is likely to be in the spring assuming the position on world oil supplies remain stable.

49. If Ministers broadly endorse the conclusions of this report and favour a statement on depletion policy, it might be on the lines that the Government is anxious to encourage exploration but wishes to avoid the position of a sharp build-up in production being followed by a sharp decline. It would take account of the presentational points discussed at paragraphs 30 and 37 above. The statement might then go on to say that the Government believes, therefore, that it is likely to be necessary to smooth the production profile in the 1980s and that they will assess companies' proposals accordingly. Ministers will also wish to consider whether such a statement should be supported by a paper setting out the various factors drawing on the material in the present report which Ministers have considered in reaching their decision.

CONFIDENTIAL

VI. GAS DEPLETION

Introduction

50. Further work is in hand on gas depletion policy and we will report more fully in a subsequent report. Gas depletion raises complex issues which differ in important respects from those surrounding oil. In the case of oil, except via any exchange rate effects, the world market price is not affected by the size of UK reserves or their rate of depletion, and provides a reasonable reference point for a competitive oil price. In the case of gas, however, the high costs of transport produce a thin and fragmented world market which does not provide an equivalent benchmark. The value of gas in different markets at any time depends not only on the price of alternative fuels but also on its premium qualities (cleanliness, ease of control, lack of demands on space). The value of these premium qualities varies significantly from market to market and will be reflected in the market prices obtainable. So does the cost of supply vary according to the seasonality and scale of the market. The micro-economic objective of gas depletion policy should be to allocate our resources, so as to maximise over time the total value less the cost of supply of those reserves. If we run down our reserves too fast, we shall be selling gas in the short term into markets where its competitive price in relation to other fuels is low, at the cost of a higher subsequent bill for more expensive SNG with which to satisfy those markets willing to pay more later; if we deplete too slowly, there is a risk that low cost nuclear electricity will reduce the longer term value of the gas conserved.

51. In principle full examination of gas depletion policy involves the short and long run competitive prices of all fuels in the UK market as well as the economics of importing and exporting gas. Studies are in hand on competitive pricing for all fuels, but further work remains to be done. We have, therefore, concentrated at this stage on how far gas and oil depletion can be considered separately and whether an adequate basis exists for immediate decisions affecting gas. The report first examines the scale of UK gas reserves, and the possible production profile on current policies in relation to demand, to see whether potential variations in output are likely to raise significant macroeconomic issues as in the case of oil. It then looks briefly at possible implications of competitive energy pricing for the gas profile.

Reserves

52. The Department of Energy's estimate of the gas reserves originally in place on the UKCS lies between 35 - 80 trillion cubic feet (tcf) of which some 10 tcf had been produced up to the end of 1978 leaving remaining reserves at 25 - 70 tcf. The central estimate of total reserves available to the UK currently agreed with the British Gas Corporation (for planning purposes)

CONFIDENTIAL

is 70 tcf (including gas already produced). This is made up as follows:

Table 4: Central Estimate of Gas Reserves Expected to be Available to the U.K. (including Imports)

	Trillion Cubic Feet (tcf)
UK expected reserves (known discoveries)	39
UK hypothetical reserves (future discoveries)	10
Norwegian Imports (include 6 tcf not yet contracted)	11
Already consumed	10
Total	70

53. There are however major uncertainties over the planning figure of 70 tcf. The uncontracted Norwegian imports (6 tcf), although their existence is fairly well established, may be lost to foreign competition; on the other hand, recent drilling indicates that very much larger reserves may exist on the Norwegian shelf. In the UKCS, the figure of 39 tcf for reserves in present discoveries represents a mid point in the range 25 - 52 tcf. Reserves in future discoveries are put in the range 0 - 20 tcf but could go higher.

54. Discussions with licensees aimed at improving our reserve estimates are being put in hand. But not too much reliance should be put on these discussions. Improved estimates require more assessment drilling and more exploration, both drilling and seismic work. Because of the hitherto adequate supply situation from existing Southern Basin and prospective oil-associated finds, BGC has not needed to buy new gas for several years. Consequently, the offshore operators have had no reason to expect BGC to make an early offer for any gas which they might have available and therefore there has been little incentive to explore specifically for gas or improve knowledge of reserves in known gas areas; oil exploration (which has, of course led to the discovery of numerous gas deposits) has taken priority. Although development of new gas will be needed to meet demand beyond the medium term, uncertainty about how much of that gas will come from Norway or the Northern Basin (in the form of associated gas) is a further factor affecting UKCS gas exploration.

55. This situation reflects an underlying problem in gas depletion policy. Restricted market opportunities lead eventually to reduced incentives to explore and so postpone obtaining information for the further evaluation of gas depletion policy. We are likely to get some increase in our information about gas reserves in the Northern Basin as a by-product of the search for oil. A new gas gathering pipe, if recommended by the current Mobil/BGC study, would also improve market prospects for gas in the Northern Basin. In addition, BGC can be expected to negotiate

ite soon for much of the Southern Basin gas which has been scovered but not yet contracted; the accompanying establishment new prices for Southern Basin gas may arouse interest in ther exploration of territory already licensed. Consideration uld also be given to suitable mechanisms whereby our knowledge reserves can be further improved (e.g. through BGC paying ensees directly for exploration and assessment wells).

ply and Demand

The present supply and demand prospect (based on Department Energy forecasts) is illustrated at Figure 5. In contrast to , the main build-up of UKCS gas production is already ectively over. Output from the UKCS is likely to peak in the ly 1980s, but may not vary significantly between 1980 and 1995, gh there is some prospect of a slight dip in production in 1980s, depending upon the size and timing of imported gas plies. Thereafter it is expected gradually to decline and, on 70 tcf planning reserve assumptions, some supplementary supplies substitute natural gas (SNG) manufactured from coal or oil, or ral gas imported as LNG or by pipeline via the Continent ld be required by the closing years of the century. Overall gas s will continue to build up during the 1980s towards a peak l of around 22 - 23 billion therms a year (some 50 million es of oil equivalent). BGC's 1979 Corporate Plan then shows nstant level of demand at least to the end of the century. in practice sales could then decline during the 1990s and nd as costs rise and the SNG requirement grows. BGC policy, ed with the Department of Energy, has been to concentrate gas s in premium (domestic and industrial) markets with only more ted quantities being sold to the non-premium industrial markets re gas competes with low value fuel oil for bulk heat use). latter market, which is supplied on an "interruptible" basis, roviding benefits to BGC in the form of flexibility at the er peak of demand, will decline as cheaper methods of providing ibility, e.g. Morecambe Bay and storage fields, come on stream.

oeconomic Considerations

The profile of UK natural gas production in the '80s and on current policies is thus subject to considerable uncertainty, icularly in relation to the amount of further gas supplies which be obtained from the Norwegian sector in competition with r countries. Prospects on this subject should become clearer he course of the next six months. However, even if substantial a Norwegian supplies are not obtained, UK gas production is ady nearly at its peak and variation in the production level now to late '90s is likely to fall within a band of around illion tonnes of oil equivalent. This degree of variation ot of great significance in comparison with the variation in production which could fall by around 50 million tonnes in the de from 1986.

is 70 tcf (including gas already produced). This is made up a follows:

Table 4: Central Estimate of Gas Reserves Expected to be Available to the U.K. (including Imports)

	Trillion C Feet (tc
UK expected reserves (known discoveries)	39
UK hypothetical reserves (future discoveries)	10
Norwegian Imports (include 6 tcf not yet contracted)	11
Already consumed	10
Total	70

53. There are however major uncertainties over the planning figure of 70 tcf. The uncontracted Norwegian imports (6 tcf), although their existence is fairly well established, may be lost to foreign competition; on the other hand, recent drilling indicates that very much larger reserves may exist on the Norweg shelf. In the UKCS, the figure of 39 tcf for reserves in presen discoveries represents a mid point in the range 25 - 52 tcf. Reserves in future discoveries are put in the range 0 - 20 tcf b could go higher.

54. Discussions with licensees aimed at improving our reserve estimates are being put in hand. But not too much reliance shou be put on these discussions. Improved estimates require more assessment drilling and more exploration, both drilling and seis work. Because of the hitherto adequate supply situation from existing Southern Basin and prospective oil-associated finds, BGC has not needed to buy new gas for several years. Consequently, the offshore operators have had no reason to expect BGC to make an early offer for any gas which they might have available and therefore there has been little incentive to explore specificall for gas or improve knowledge of reserves in known gas areas; oil exploration (which has, of course led to the discovery of numerou gas deposits) has taken priority. Although development of new gas will be needed to meet demand beyond the medium term, uncertainty about how much of that gas will come from Norway or the Northern Basin (in the form of associated gas) is a further factor affecting UKCS gas exploration.

55. This situation reflects an underlying problem in gas depletion policy. Restricted market opportunities lead eventuall to reduced incentives to explore and so postpone obtaining information for the further evaluation of gas depletion policy. We are likely to get some increase in our information about gas reserves in the Northern Basin as a by-product of the search for oil. A new gas gathering pipe, if recommended by the current Mobil/BGC study, would also improve market prospects for gas in the Northern Basin. In addition, BGC can be expected to negotiat

quite soon for much of the Southern Basin gas which has been discovered but not yet contracted; the accompanying establishment of new prices for Southern Basin gas may arouse interest in further exploration of territory already licensed. Consideration should also be given to suitable mechanisms whereby our knowledge of reserves can be further improved (e.g. through BGC paying licensees directly for exploration and assessment wells).

Supply and Demand

56. The present supply and demand prospect (based on Department of Energy forecasts) is illustrated at Figure 5. In contrast to oil, the main build-up of UKCS gas production is already effectively over. Output from the UKCS is likely to peak in the early 1980s, but may not vary significantly between 1980 and 1995, though there is some prospect of a slight dip in production in the 1980s, depending upon the size and timing of imported gas supplies. Thereafter it is expected gradually to decline and, on the 70 tcf planning reserve assumptions, some supplementary supplies of substitute natural gas (SNG) manufactured from coal or oil, or natural gas imported as LNG or by pipeline via the Continent would be required by the closing years of the century. Overall gas sales will continue to build up during the 1980s towards a peak level of around 22 - 23 billion therms a year (some 50 million tonnes of oil equivalent). BGC's 1979 Corporate Plan then shows a constant level of demand at least to the end of the century. But in practice sales could then decline during the 1990s and beyond as costs rise and the SNG requirement grows. BGC policy, agreed with the Department of Energy, has been to concentrate gas sales in premium (domestic and industrial) markets with only more limited quantities being sold to the non-premium industrial markets where gas competes with low value fuel oil for bulk heat use). The latter market, which is supplied on an "interruptible" basis, so providing benefits to BGC in the form of flexibility at the winter peak of demand, will decline as cheaper methods of providing flexibility, e.g. Morecambe Bay and storage fields, come on stream.

Macroeconomic Considerations

57. The profile of UK natural gas production in the '80s and '90s on current policies is thus subject to considerable uncertainty, particularly in relation to the amount of further gas supplies which will be obtained from the Norwegian sector in competition with other countries. Prospects on this subject should become clearer in the course of the next six months. However, even if substantial extra Norwegian supplies are not obtained, UK gas production is already nearly at its peak and variation in the production level from now to late '90s is likely to fall within a band of around 10 million tonnes of oil equivalent. This degree of variation is not of great significance in comparison with the variation in oil production which could fall by around 50 million tonnes in the decade from 1986.

Microeconomic Considerations

58. Although there are microeconomic questions for gas at the field level (flaring, timing of development in relation to pipelines etc.) the microeconomics of gas depletion cannot, in contrast to oil, be considered primarily at this level. As already indicated, gas supply over time (depletion policy) involves, through the associated market clearing prices, complicated interactions with policy on supply and prices of all other fields. It involves considering the cost of all potential sources of gas including imports and synthetic substitutes and the potential price in all markets open to gas, including re-export trade.

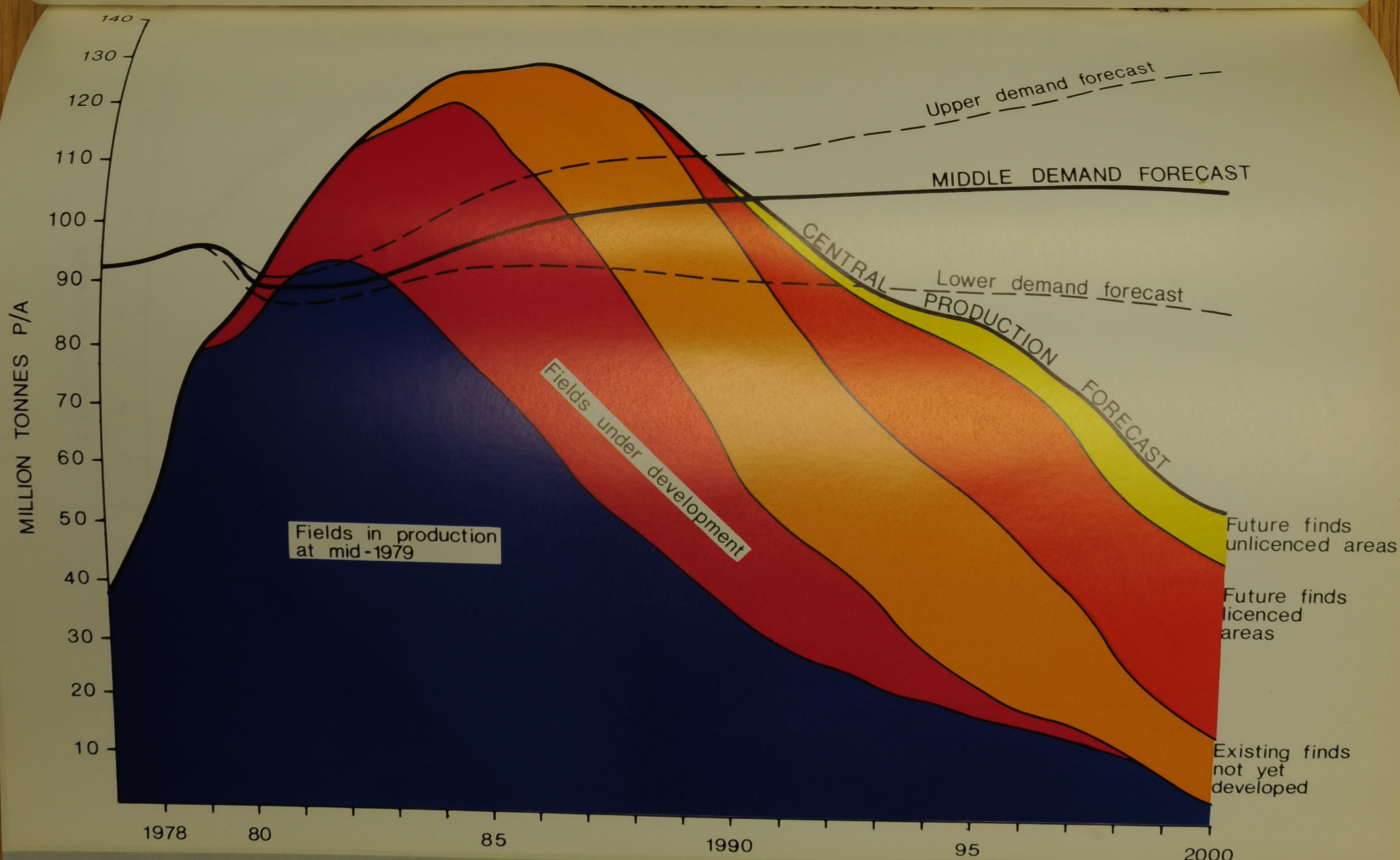
59. While more work remains to be done on these subjects, existing studies provide some broad indication of the probable direction and order of magnitude of the effect of full market pricing for energy. For gas the dominant effect would be on demand. The effect of even a rapid move to economic pricing would only build up slowly in the period to 1985. But in the 1990s demand could be falling off compared with current forecasts, because the price of gas would be higher in relation to other fuels.

FIGURE 1 FACTORS INFLUENCING VIEWS ON OPTIMUM DEPLETION PROFILE

Companies	Government
View of future oil prices	View of future oil prices
View of future cost movements	View of future cost movements
Private opportunity cost of capital (discount rate)	Social opportunity cost of capital (or social time preference rate)
Cash Flow	Phasing of balance of payments benefits and macro economic effects
Minimization of Tax Payments	Maximization and phasing of Tax payments
Oil supplies in relation to refinery and market needs	Adequacy and security of energy supplies
Load on management resources	Continuity of work for offshore industry
	International Commitments

CONFIDENTIAL

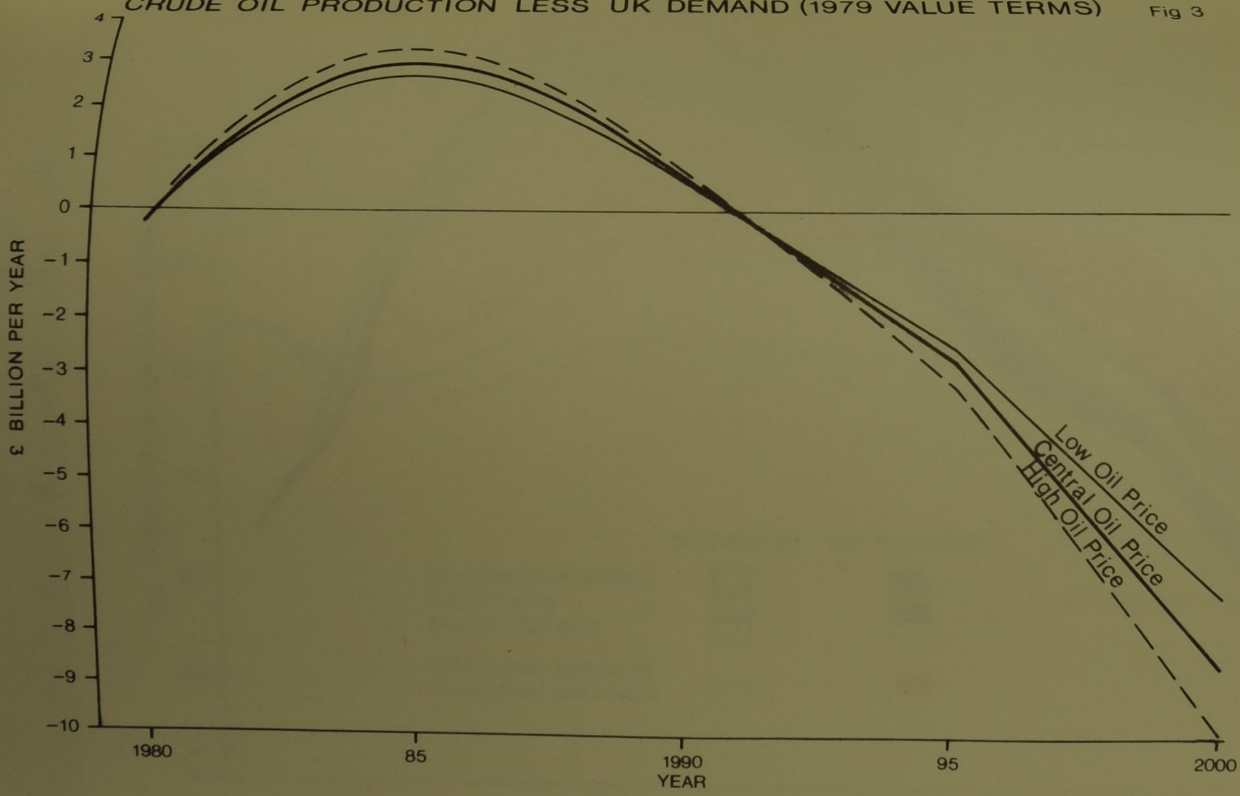
CONFIDENTIAL



CONFIDENTIAL

CRUDE OIL PRODUCTION LESS UK DEMAND (1979 VALUE TERMS)

Fig 3



CONFIDENTIAL

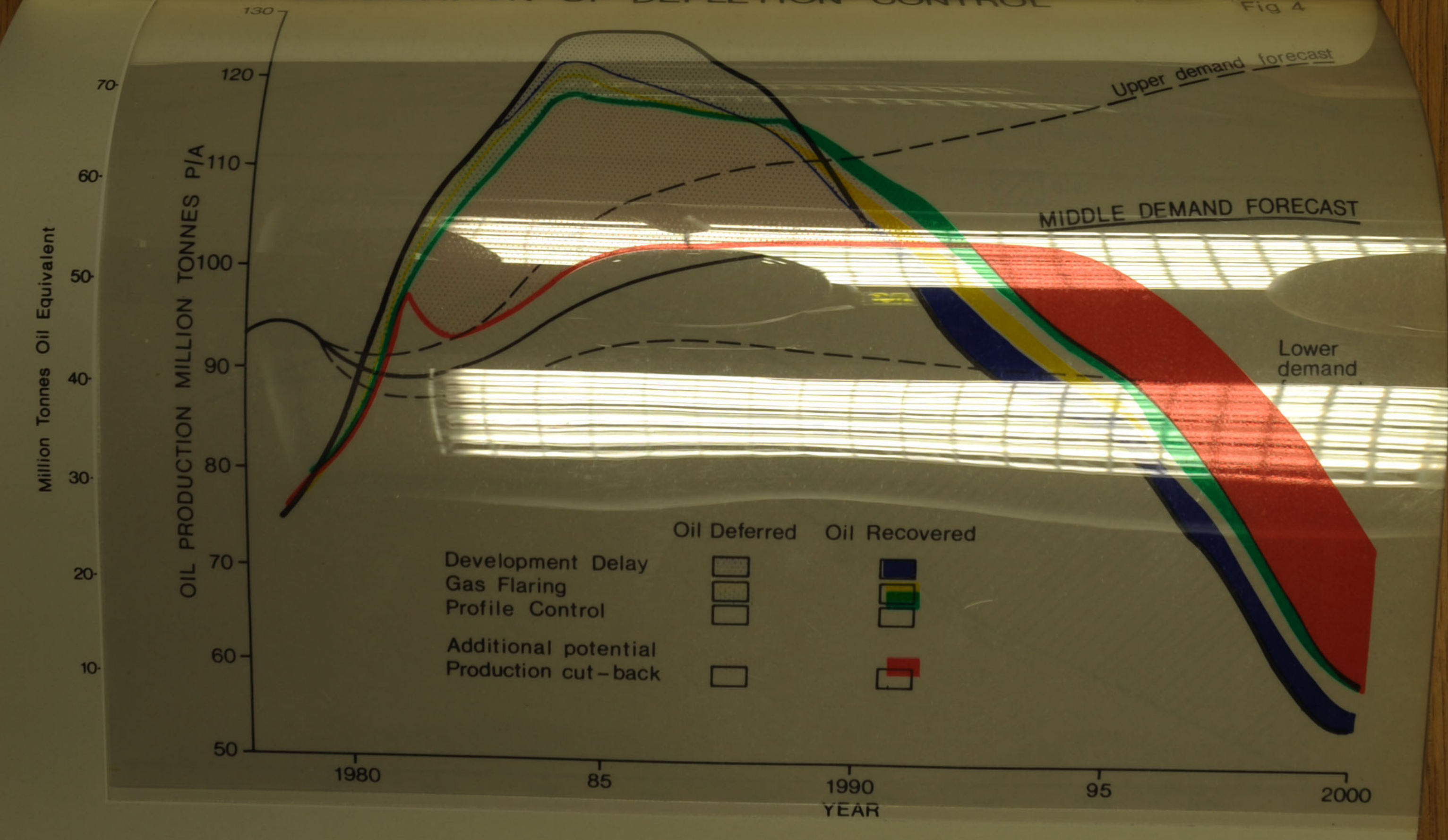
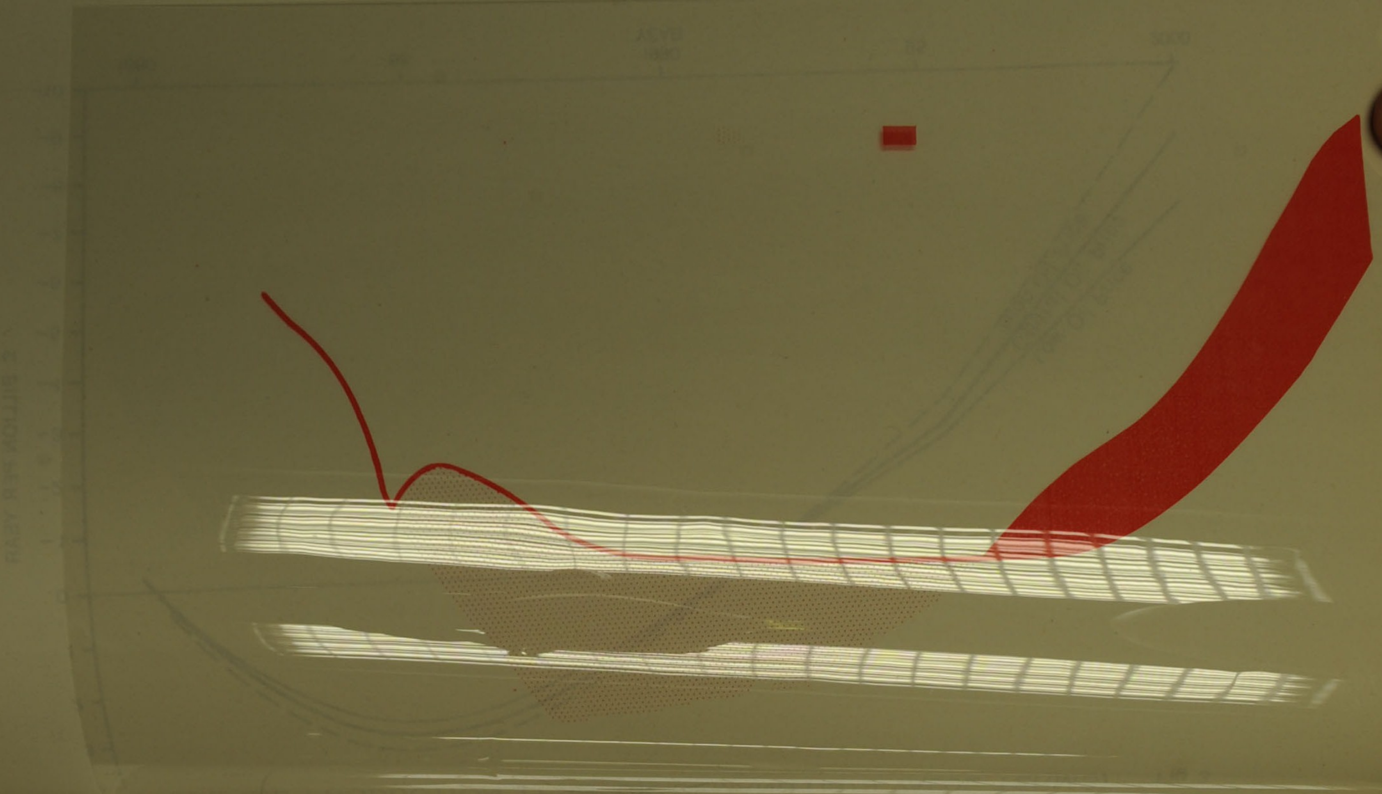


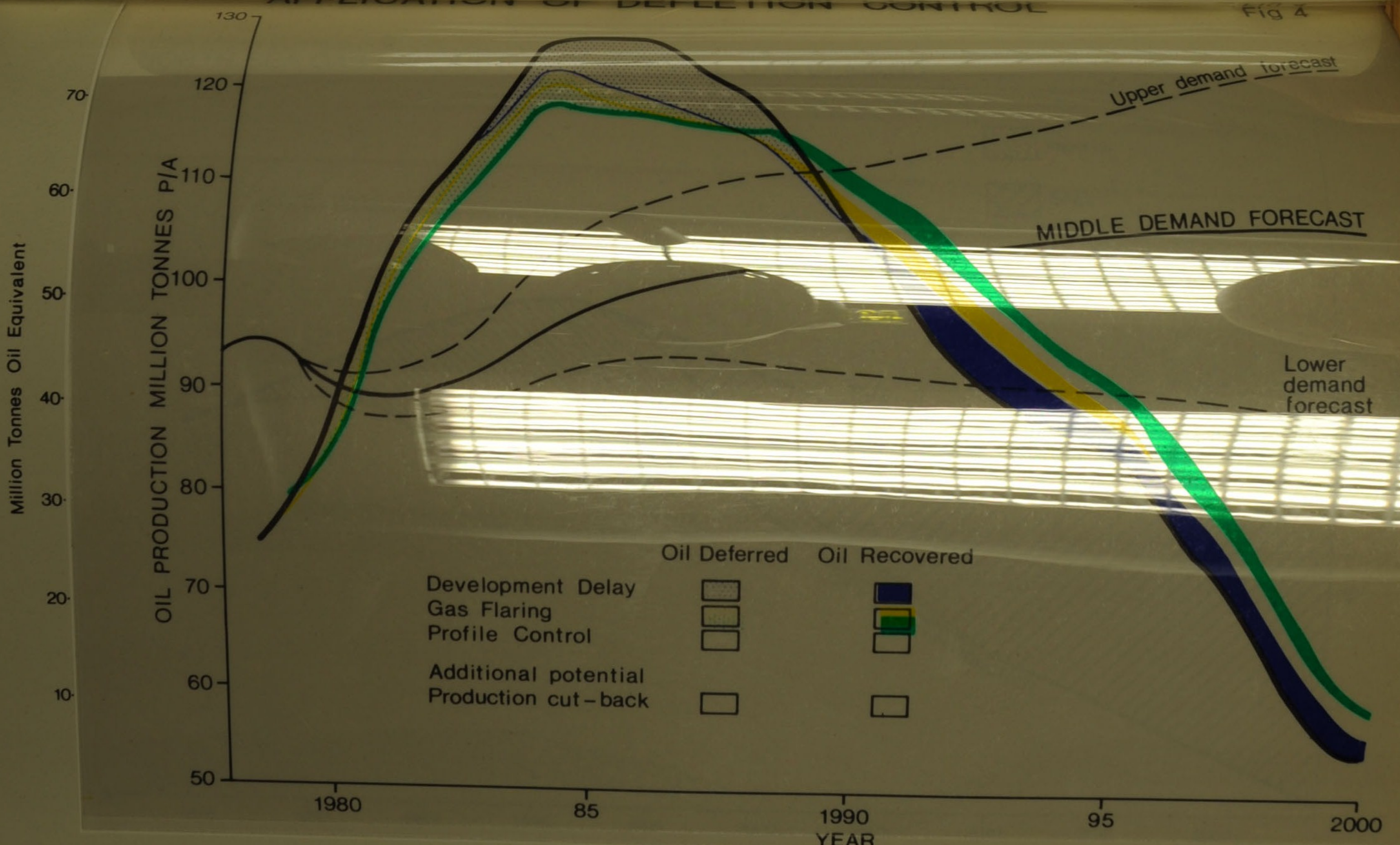
Fig 4
Million Tonnes Oil Equivalent
OIL PRODUCTION MILLION TONNES P/A
130
120
110
100
90
80
70
60
50
70
60
50
40
30
20
10
Upper demand forecast
MIDDLE DEMAND FORECAST
Lower demand
Oil Deferred
Oil Recovered
Development Delay
Gas Flaring
Profile Control
Additional potential
Production cut-back
1980
85
1990
95
2000
YEAR



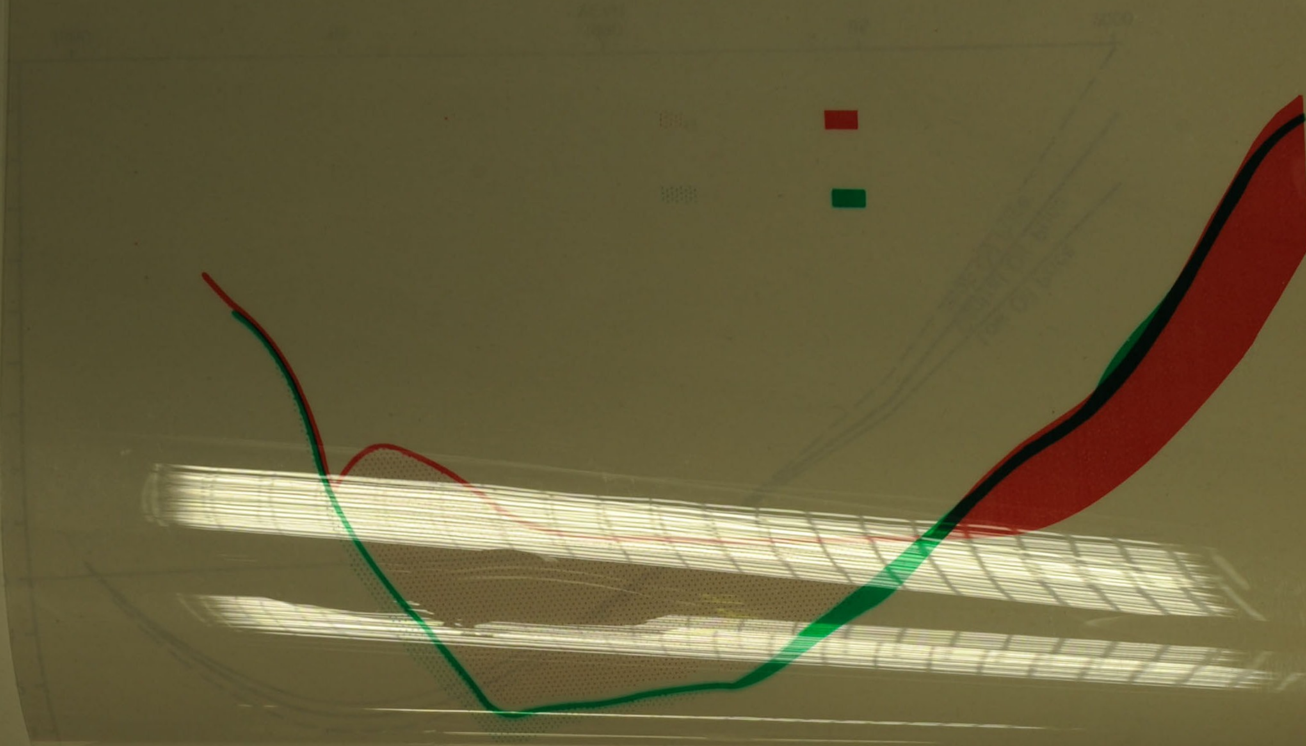
CONFIDENTIAL

APPLICATION OF DEPLETION CONTROL

Fig 4

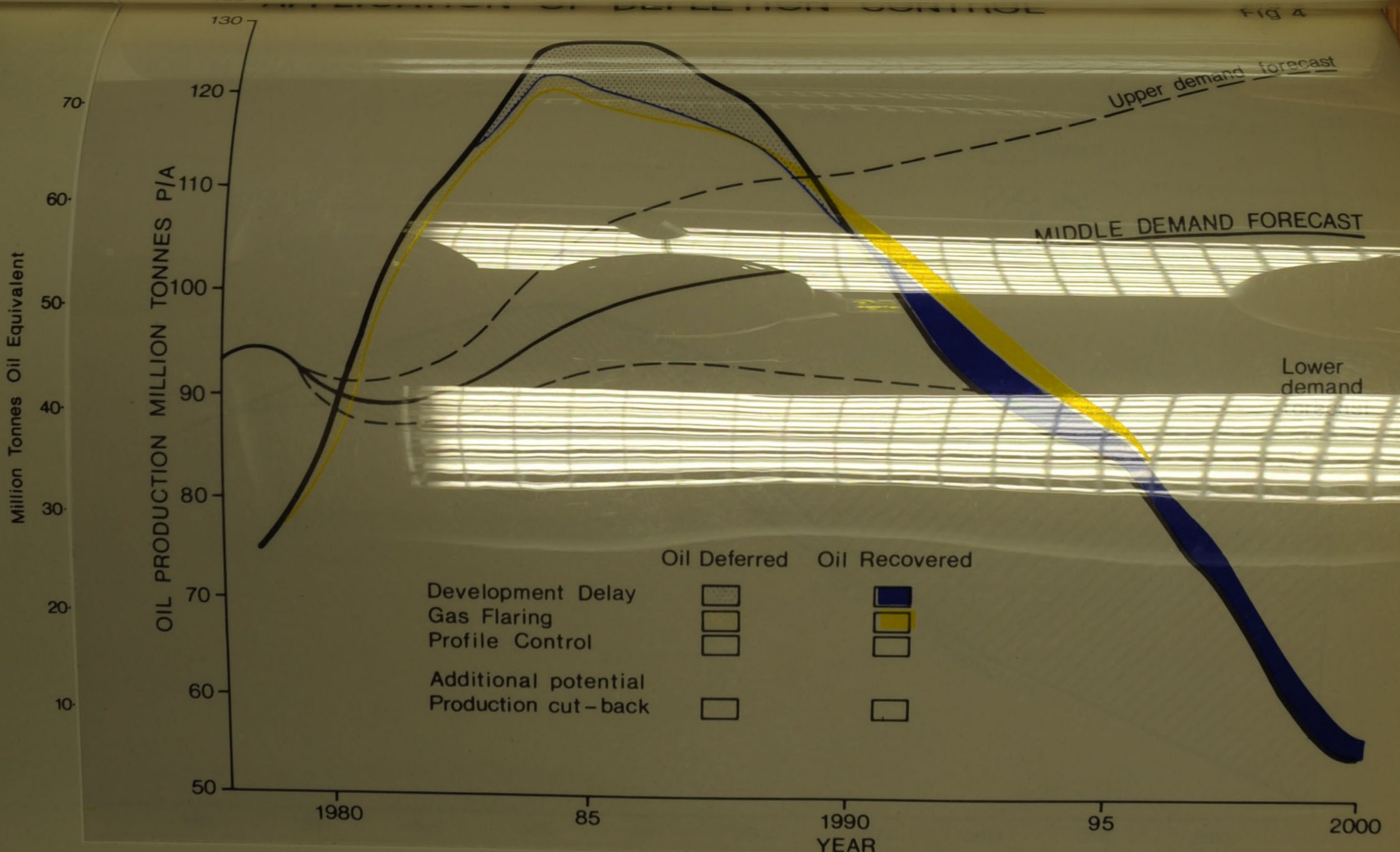


CONFIDENTIAL

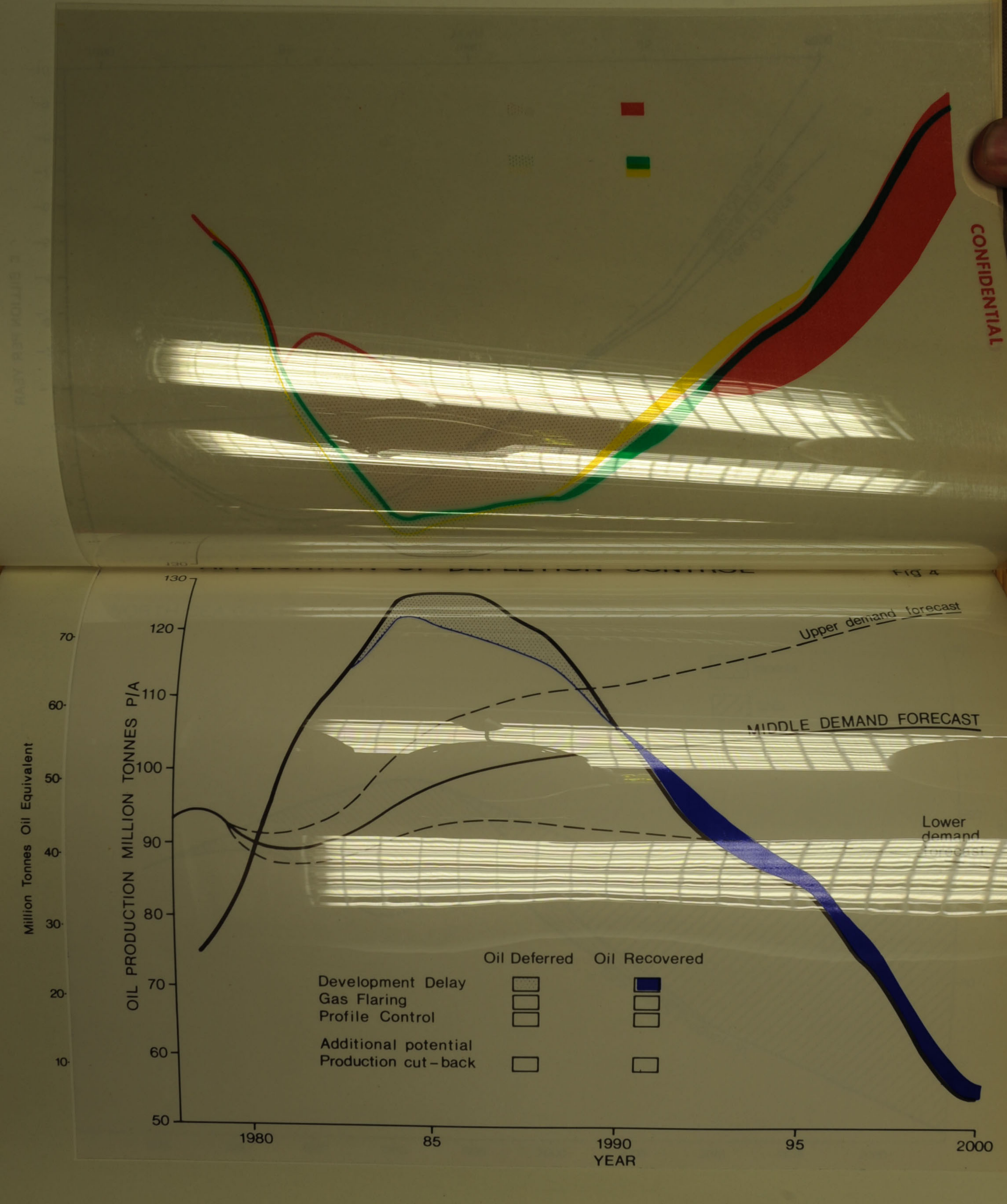


CONFIDENTIAL

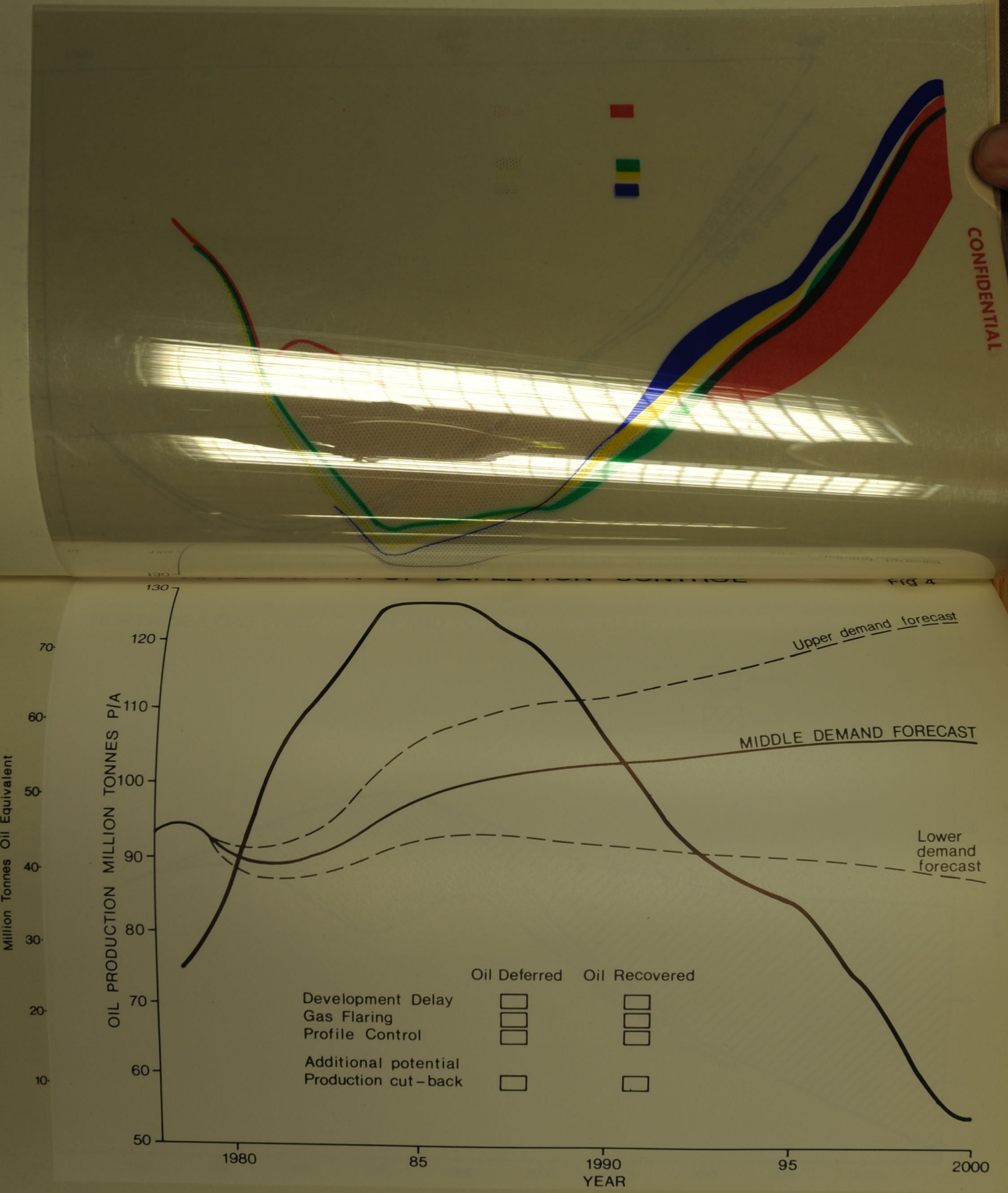
Fig 4



CONFIDENTIAL



CONFIDENTIAL
Fig 4
Upper demand forecast
MIDDLE DEMAND FORECAST
Lower demand forecast
OIL PRODUCTION MILLION TONNES P/A
Million Tonnes Oil Equivalent
130
120
110
100
90
80
70
60
50
70
60
50
40
30
20
10
1980
85
1990
95
2000
YEAR
Oil Deferred
Oil Recovered
Development Delay
Gas Flaring
Profile Control
Additional potential
Production cut-back



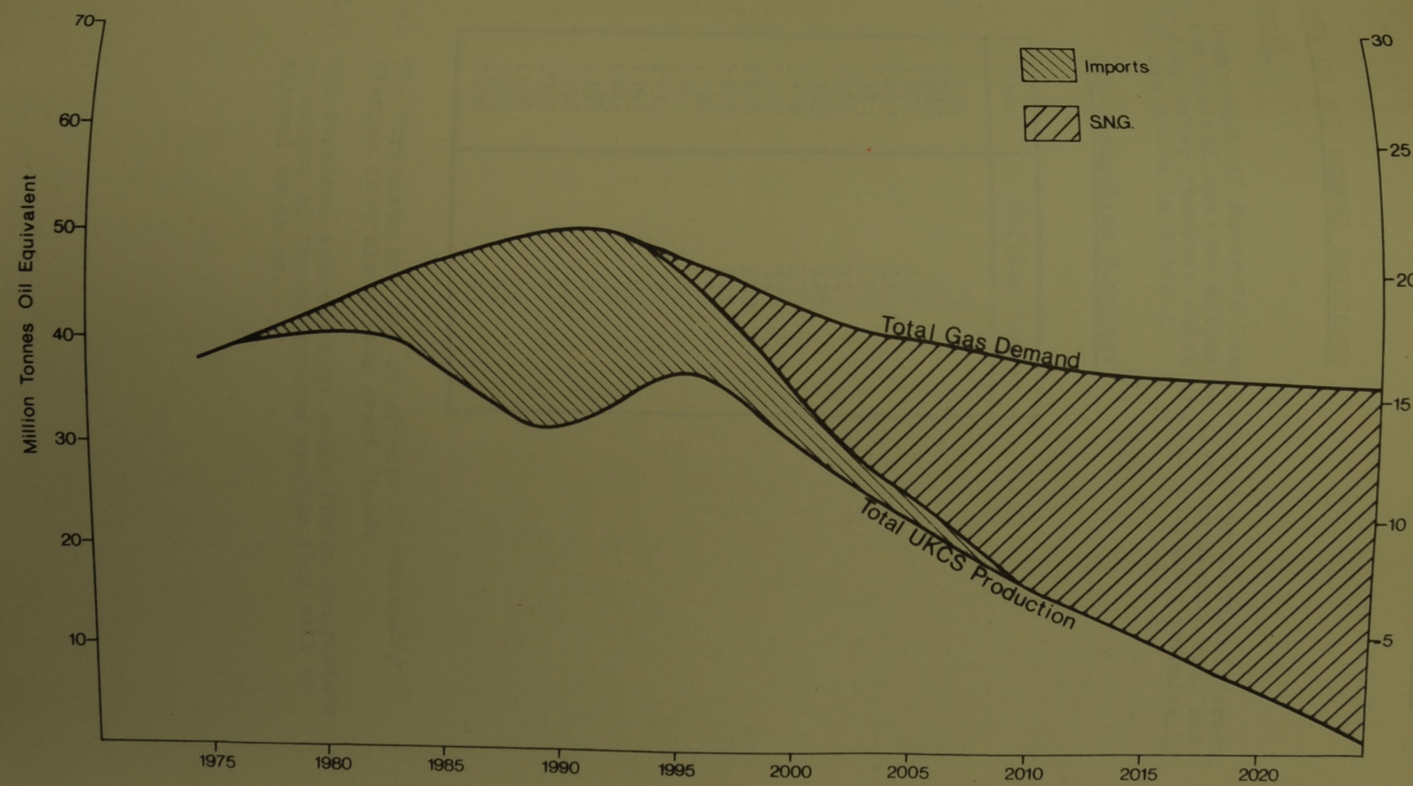
CONFIDENTIAL
Upper demand forecast
MIDDLE DEMAND FORECAST
Lower demand forecast
OIL PRODUCTION MILLION TONNES P/A
Million Tonnes Oil Equivalent
YEAR
1980
85
1990
95
2000
130
120
110
100
90
80
70
60
50
70
60
50
40
30
20
10
Oil Deferred
Oil Recovered
Development Delay
Gas Flaring
Profile Control
Additional potential
Production cut-back

Fig 4

CONFIDENTIAL

Fig.5

NORTH SEA GAS PRODUCTION AND TOTAL GAS DEMAND



CONFIDENTIAL

CONFIDENTIAL

OIL PRODUCTION AND DEMAND FORECASTS

Oil Production

1. The Department of Energy's long term oil production forecast, based on the central reserve estimates given in Section III, but excluding deep water reserves which are not currently technically producible, are shown in Table 1.

TABLE 1: Oil Production Forecast (1) (2)

Year	Million tonnes
1979	77
1980	86
1981	100
1982	110
1983	116
1984	126
1985	126
1986	127
1987	123
1988	120
1989	114
1990	106
1991	100
1992	92
1993	89
1994	86
1995	84
1996	80
1997	72
1998	64
1999	56
2000	53

Notes: (1) The forecasts are net of effects of continuing flaring controls at the Brent field.

(2) The forecast assumes that where fields can produce in excess of the programmed profile they will be allowed to do so.

2. The production profile corresponding to Table 2 is illustrated at Figure 2 where the component parts are also related to the individual categories of estimated reserves (Table 1). Beyond existing fields and fields under development or appraisal, the greater part of the new production under the profile would come from the further development of existing finds and, assuming increased exploration activity, from new finds in the territory already licensed. The potential contribution to production from shallow water territory remaining to be allocated in new licensing rounds is likely to be smaller and may not exceed some 10 million tonnes in 2000.

3. Past experience has shown a tendency for actual production to slip compared with forecast as companies have encountered technical problems in field development. Allowance has been made, in preparing the estimates for the medium term, for continued slippage of this kind in bringing new developments on stream. The greater part of the production capacity which will determine total output during the first half of the 1980s is, however, now operational. The peak is at present forecast at 126-127 million tonnes a year in 1984-86, with production from existing fields and those under development peaking at 119 million tonnes in 1984. There would be some scope for falling short of the total forecast, as a result of "natural delays", by some 10 million tonnes, but there are also chances that they could be exceeded.

4. Beyond 1984 the forecasts are subject to increasing degrees of uncertainty and are prepared with 80% confidence limits for individual years. This corresponds to potential upward or downward variation of 20 million tonnes in 2000. The central profile for the later years assumes that exploration drilling is carried on at a rate of about 60 wells a year. This is less than the 1975 exploration peak (79 wells) but considerably higher than the rate achieved in 1978 or 1979.

Oil Demand

5. The forecasts of UK oil demand which the Group have considered are:-

TABLE 2: Oil Demand Forecasts

Year	Middle Oil Demand	Low Oil Demand	High Oil Demand
1975	93	93	93
1976	93	93	93
1977	93	93	93
1978	94	94	94
1979	95	94	96
1980	90	89	92
1981	89	87	91
1982	90	88	93
1983	92	89	96
1984	95	91	101
1985	97	93	106
1986	100	93	108
1987	101	93	110
1988	102	93	111
1989	102	92	111
1990	103	92	112
1991	103	92	113
1992	104	91	114
1993	104	91	115
1994	105	91	117
1995	105	90	118
1996	106	90	119
1997	106	89	121
1998	106	89	122
1999	106	88	123
2000	105	88	124

6. These estimates have been prepared on a range of assumptions about economic growth, future oil prices and the rate of substitution of oil by other fuels. The low case assumes average UK economic growth (fairly closely in line with current expectations) of 1% a year to 1985 and 2% a year thereafter, with oil prices rising steadily in real terms and early substitution of oil in non-premium uses by coal. The middle estimate represents the effects of either a higher rate of economic growth (average 2.7% a year: 2% to 1985 and 3% thereafter) or a slower rate of oil substitution. The high oil demand estimate explores the possible consequences of higher economic growth combined with a reluctance among non-premium consumers, principally in industry, to switch to coal in preference to continuing to burn more costly imported oil.

DEPLETION MEASURES

The Instruments Available

1. The Government's two formal means of regulating depletion in the medium term are its power (conferred by the Model Clauses incorporated into first to fourth round licenses by the Petroleum and Submarine Pipelines Act 1975 and also incorporated in licenses issued subsequent to 1975) to delay the development of fields and to impose cut-back on fields already in production. The exercise of these powers in relation to pre-1976 finds, and to a lesser extent post-1975 discoveries under the first four licensing rounds, is circumscribed by the terms of assurances given in 1974 by the then Secretary of State, (the "Varley Assurances") and recently reconfirmed by Government. Pre-1976 finds, which are protected against explicit delay, and against production cut-back until 1982 and four years' production has lapsed, account for over half our reserves on central estimate (some 1,800 million tonnes within the 3,330 million tonnes at Table 1). Post-1975 finds under the first four rounds are not protected from development delay, but are protected from production cut-back until 150% of investment has been recovered, and those may account for a further 400 million tonnes. No assurances have been given for finds under fifth and sixth round licenses.

2. The powers available to the Government and the limitations on their use are as follows:

(a) development delay No formal delay can be imposed on the development of fields discovered before 1976. Of the 17 discoveries thought to be possible developments in the period to 1984, all but four are so protected. The power to delay development in the case of post-1975 discoveries does not specify any time period, but is likely, in practice, to be limited to postponing development by around 5 years. The issue of a licence implies that development within a reasonable time will be permitted and indefinite delay could be held by the Courts to frustrate the purpose for which the licence was granted. It would of course be necessary to have regard to the particular circumstances of each case. In the case, both of protected and unprotected fields, a number of detailed technical issues have to be explored and resolved before an application is made and some administrative latitude also exists in operating these processes.

(b) production cut-back The Government can, where necessary in the national interest, require a licencee to reduce production from a field below the level provided for in the approved production programme. This power is limited by the Varley assurances as follows:

(i) in the case of discoveries made before 1976, production cuts cannot be imposed before 1982 or four years from the start of production - whichever is the latter;

(ii) in the case of later discoveries under licences granted in the 1st to 4th rounds, no cuts can be imposed until 150% of investment in the fields has been recovered;

(iii) where production cuts are made they will generally be limited to 20%, having regard to technical and commercial considerations.

In practice, production cut-back would involve lowering a field's plateau level of output by around 20%, followed by a period in which production is higher than it would otherwise have been as postponed production is recovered within the life of the field and its equipment. The effect of the Varley assurances in this respect is that 1982 is the earliest date at which the power to cut-back production could be used.

(c) gas flaring restrictions All producing oil fields need to flare associated gas to a greater or lesser extent. So far they have by and large been allowed to do so, irrespective of slower progress than promised towards conserving gas through reinjection or pipe-lines to shore mainly because of the financial and supply pressures for a rapid build-up of production. Operators have consistently under-performed in comparison with both their initial and updated estimates of gas delivery, injection or treatment, and there is little evidence to suggest that their performance will be improved. A tougher policy on gas flaring, which essentially limits oil production and can therefore be used as an instrument of depletion policy, has the advantage that it could be implemented without delay and would be effective in the early 1980s before the formal instruments become available.

(d) profile variations In practice some oil fields perform better and some perform worse than expected in comparison with the level agreed in their production programme. For those fields which can perform better than expected, the Government could exercise its powers to refuse to authorise requests from operators for increased production, thus providing a further small, but useful, instrument for depletion control. As with gas flaring restrictions, this option also has the advantage that it could be implemented before the formal controls become effective.