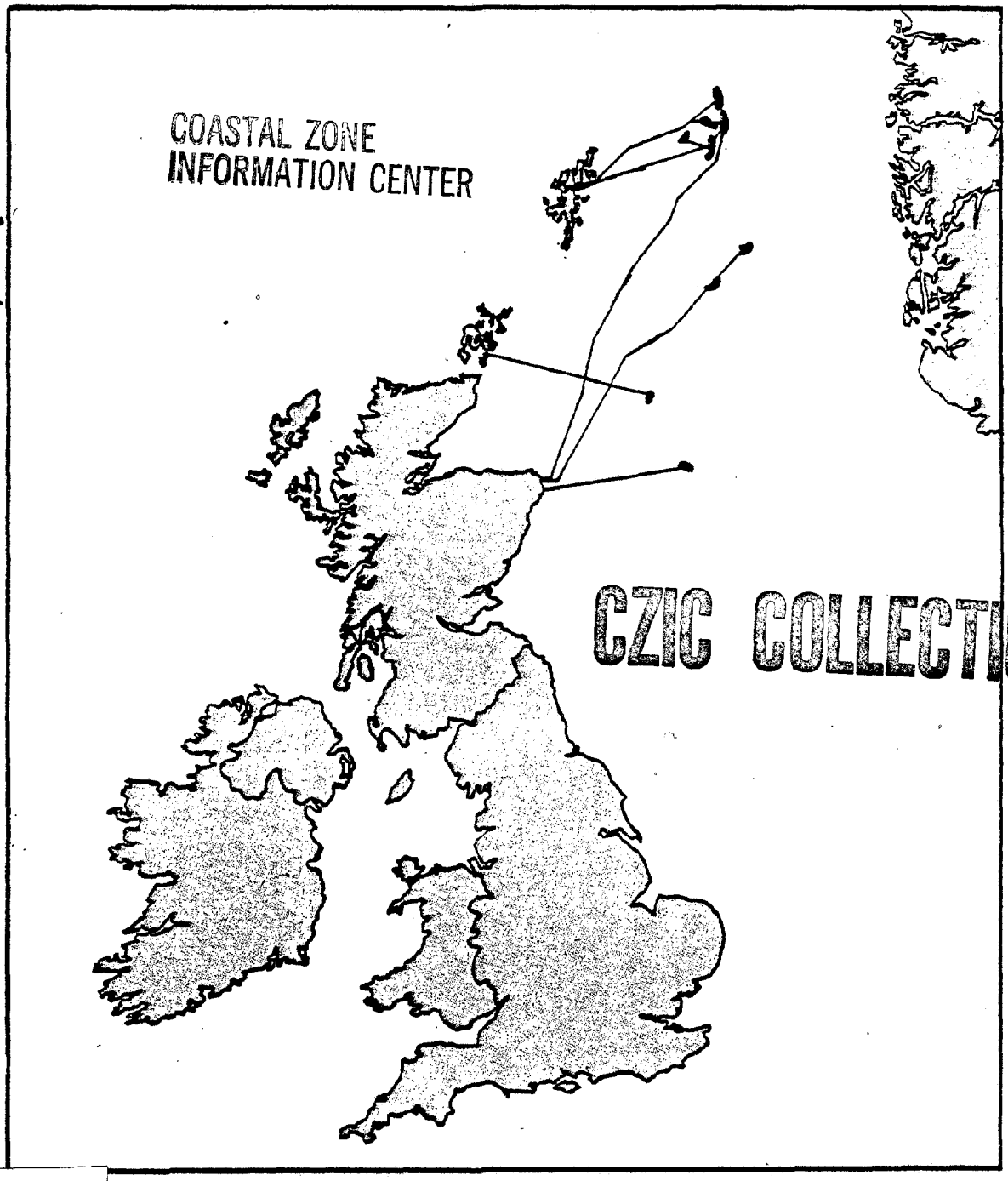
THE PACE OF OIL AND GAS DEVELOPMENT IN SCOTLAND (1970-1977):

POINTERS FOR AMERICAN PLANNERS



ERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Marine Services
Office of Coastal Zone Management

THE PACE OF OIL AND GAS DEVELOPMENT IN SCOTLAND (1970-1977):

POINTERS FOR AMERICAN PLANNERS

A Staff Working Paper

Helga Busemann

October 1978

New Jersey Department of Environmetnal Protection

Division of Marine Services
Office of Coastal Zone Management
P. O. Box 1889
Trenton, New Jersey 08625

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State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON

PLEASE ADDRESS REPLY TO:
P. O. BOX 1889
TRENTON, N. J. 08625

DIVISION OF MARINE SERVICES

October 1978

Dear Friend of the Coast:

This document is another one in this Office's series of working papers intended to contribute to a better understanding of coastal issues. This document reports on the pace of offshore oil and gas exploration and development in Scotland in the early 1970's.

Ms. Busemann began the research for this paper under a Fellowship from Columbia University prior to coming to this Department in 1976. While the Scottish experience is, of course, not directly translatable to New Jersey, there are a number of planning principles which hold true where Outer Continental Shelf (OCS) activities are contemplated. This staff working paper emphasizes, for example, the need for early planning and identification of potential conflicts. The Department of Environmental Protection has acted upon many of the recommendations presented in this report, which are offered here to assist other participants and observers in onshore planning in the United States for OCS activities. I hope this paper will clarify some of the issues surrounding Outer Continental Shelf planning and encourage further initiatives to ensure that this new coastal-dependent activity will be compatible with those other activities now existing in the coastal zone.

I invite your comments on this paper.

Sincerely,

David N Kinsey

David N. Kinsey, Chief
Office of Coastal Zone
Management

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1. INTRODUCTION

The offshore industry is new in Great Britain. It started in 1964 with the lease of blocks east of England where gas fields were found.[1] In industrial England, the onshore effects of these initial gas discoveries made little impact on the existing industrialized society. In contrast, further lease sales in waters east of Scotland resulting in significant oil and gas discoveries brought visible changes to the land and economy of Scotland. The growth of the offshore oil and gas industry in Scotland has been rapid and generated interest among planners attempting to understand the process of change. Because environmental and social baseline conditions before the coming of the offshore oil industry to Scotland and the northern islands of Shetland and Orkney were known and documentable, the region has served as a laboratory to planners fascinated with the process of growth and change.

This report is based on observations and interviews concerning the onshore impacts of offshore drilling in Scotland conducted during two visits there in 1975 and 1977. Its purpose is to examine some of the changes that have taken place since oil-related industry moved into Scotland in the 1970's and to discuss the extent to which these changes may be common to other frontier regions,** specifically to the Atlantic Coast which anticipates an influx of oil and gas exploration on the Baltimore Canyon and the Georges Bank.[2] Indeed this matter has assumed a certain urgency with the Exxon Corporation having spudded the first well in the Baltimore Canyon on March 29, 1978.

A similar study was performed by Pamela and Michael Baldwin in 1975[3]. While the Baldwin report inspired this writer's initial interest in offshore oil and gas, this report is intended as an update of their initial findings. In 1975 insufficient time had elapsed to document the pace with which new discoveries had been brought into production. The time to plan for onshore facilities between the moment of a commercial discovery and production is short. A discovery is termed "commercial" after several wells have been drilled which permit the size of a reservoir to be delineated. Whether a field is determined commercial depends on several factors including the depth of water, distance of the reservoir to land and whether a pipeline already exists which a company

*Footnotes may be found at the end of each chapter.
**A frontier region is one which is experiencing impacts of outer continental shelf oil and gas development for the first time.

can hook into. Once a field has been declared commercial there is the danger that there might not be enough time to ensure the orderly placement and development of onshore related facilities which could result in disbenefits to local communities. Since some facilities necessitated by Outer Continental Shelf development must be routed through coastal areas which are often unique, serving as recreational resources for a greater than local region, it is important that the relatively short life span of onshore facilities not spoil the longer lasting resource irreparably. This report indicates that with proper planning disruption can be avoided and looks at the Scottish oil and gas experience from that perspective.

Recognition that the Scottish offshore with its harsher climate and operating conditions has more relevance to the North and Mid-Atlantic frontier states than the gentler environment of the Gulf States, has focussed these states' search for a model on Scotland rather than on the Gulf of Mexico.[4] Also in the Gulf, development occurred gradually, moving from onshore to offshore over a period of twenty years. The oil and gas industry, in the Atlantic Ocean in contrast started to drill in deep waters right from the start as it did in the North Sea.

With Scottish lifestyles and economic conditions being so different from those in the northeastern urbanized states, Outer Continental Shelf (OCS) planners in the Atlantic states have had little to go on since the changes and onshore impacts which resulted from offshore activity in the Gulf of Mexico were never fully documented. Further, while Alaskan planners are carefully documenting impacts of oil and gas development there, their studies are for the most part still underway so that the literature is sparce.

It should be noted, however, that the volume of oil and gas discovered in the North Sea is much higher than that which may be found in the Atlantic Ocean and that the level of impacts on the Atlantic coast may subsequently not be as great as those described in this report.[5]

In the following chapters the following phases of exploration, development and production will be discussed:

Chapter II — Onshore bases and the evolution of Aberdeen into the oil capital of Europe

Chapter III — The pace with which well drilling and platform building has occurred

Chapter IV — The various modes of transportation (pipelines, tankers and terminals) used to land and bring the hydrocarbons to market

Chapter V	Downstream activities related to reviewing applications for refineries, gas processing and petrochemical plants
Chapters VI and VII	The benefits of planning to promote orderly development and conservation of land and water resources at the local and national government level
Chapter VIII	Recommendations to planners anticipating onshore impacts from offshore oil and gas drilling

Footnotes

[1]The British Continental Shelf Act of 1964 ratified the Geneva Convention of 1958 on the Law of the Sea. This conferred states bordering oceans with sovereign rights over the natural resources below the seabed to a depth of 200 meters. Where several states adjoin a water body, such as the North Sea, the application of median lines is used to apportion the seabed equitably. The Continental Shelf Act empowered the Secretary of State for Energy in Great Britain to grant licenses for exploration, development and production of oil and gas.

[2]Lease Sale 40 in the Mid-Atlantic covered tracts in the Baltimore Canyon estimated to contain between 0.4 and 1.4 billion barrels of oil and between 2.6 and 9.4 trillion cubic feet of gas. The lease sale was held August 17, 1976, but court challenges have held up exploration. Resource estimates for the total Baltimore Canyon amount to 6 billion barrels of oil and 32 trillion cubic feet of gas. Lease sale 42 was the first one scheduled for the North Atlantic. It was postponed on January 31st pending court challenges. Lease Sale 42 tracts are estimated to contain between .15 and .53 billion barrels of oil and 1.0 to 3.5 trillion cubic feet of gas. Mean resource estimates for the total Georges Bank are .9 billion barrels of oil and 4.4 trillion cubic feet of gas. (All estimates are those of the U. S. Geological Survey).

[3]Pamela L. and Michael F. Baldwin, Onshore Planning For Offshore Oil, Washington, D.C., Conservation Foundation, 1975.

[4]See the Baldwin book supra and James K, Mitchell, "Onshore Impacts of Offshore Oil: Planning Implications for the Middle Atlantic States", J. of American Institute of Planners J., October 1976, p. 386, and New Hampshire Department of Resources and Economic Development, The Impact of Offshore Oil: New Hampshire and the North Sea Experience, Concord, New Hampshire, 1975. The New England River Basin Commission has also drawn from the North Sea experience developing criteria such as the Tech Updates for OCS development along the Atlantic Coast.

[5]Britain now ranks tenth in the world as a petroleum producer (New York Times, March 22, 1978, p. 1). The Baltimore Canyon by contrast is estimated to contain about 6 billion barrels of oil of which Lease Sale 40 is estimated to contain one sixth. See Footnote 2 above.

II. ONSHORE BASES: ABERDEEN AND ITS SATELLITES

Support bases are ports or facilities for boats supplying offshore drilling rigs during exploration, development and production. During exploration two supply boats are customarily used to service one exploratory rig or platform. During exploration, such boats transport approximately 1,000 tons of materials per month including fuel, drilling fluid and chemicals. Support bases also include the helicopter ports which transfer work crews offshore. Because of economics, they are usually located closest to offshore operations. Both marine and helicopter bases are potential generators of growth with marine bases attracting the ancillary OCS industry and air bases inducing a demand for housing by helicopter crews and supervisory personnel.

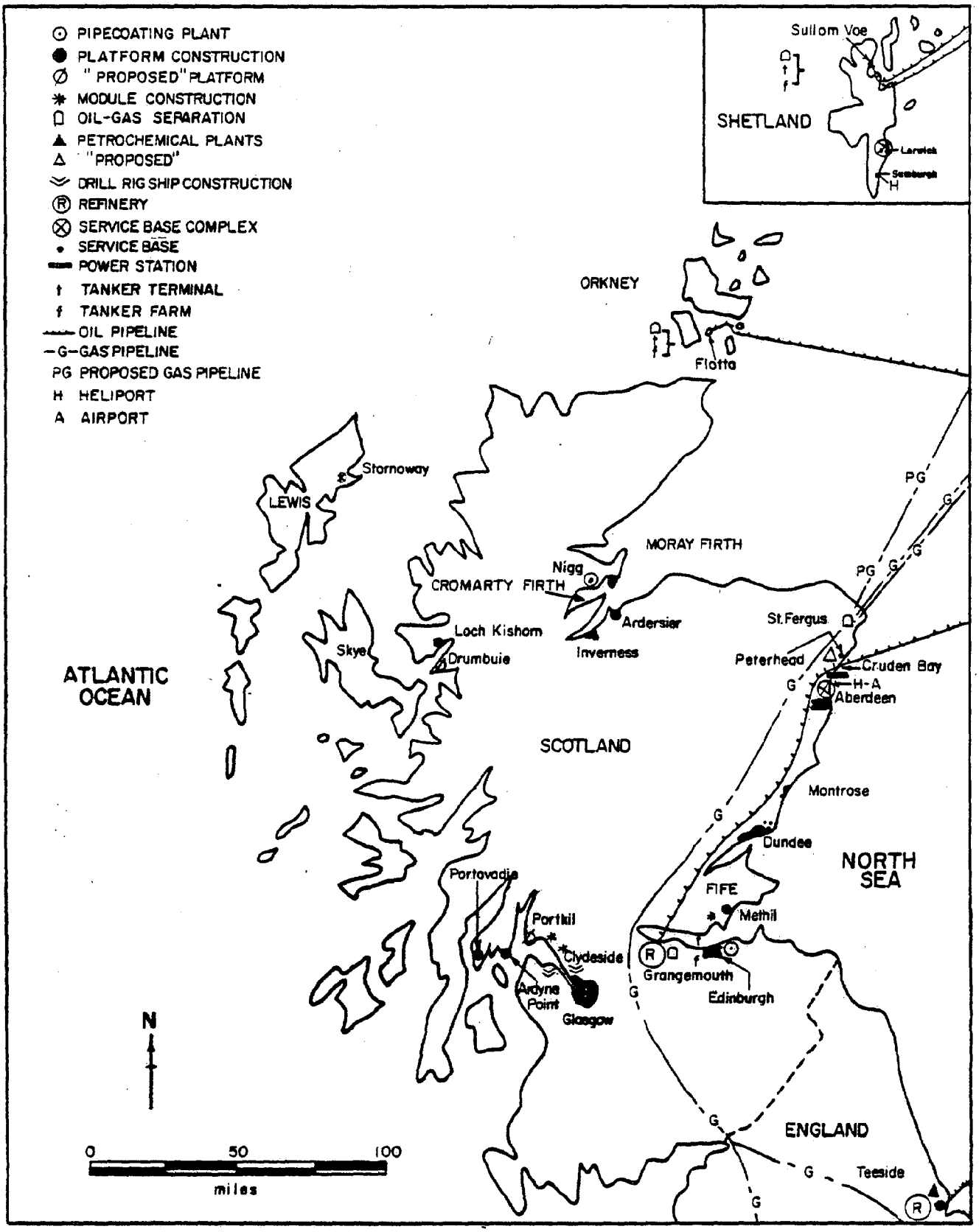
Aberdeen's rise as Europe's oil capital started following the discovery of the Forties field by the British Petroleum Company (BP) in 1970. Thereafter, engineering and specialized tool companies established headquarters in the city with the presence of one attracting the other. In addition, the city government set out to woo the oil industry by sending delegations to other countries to solicit business as well as hosting conventions such as "Offshore Scotland" and "Offshore Europe" similar to the Offshore Technology Conference held in Houston annually.

Aberdeen is now the principal support base for both operations off the mainland of Scotland and off the Shetland and Orkney Islands to the north (See Figure 1). It is the principal air base for operations off the main coast of Scotland, while Sumburgh is the major airport for operations off the Shetland Islands. Aberdeen owes its position as a primary onshore support base to its all-weather harbor, proximity to offshore fields and an existing infrastructure which includes the availability of ship repair, boat charter, and catering services; housing; labor force and its airport which services helicopters operating within a 200 mile radius. Space at the harbor itself is very limited and has forced all but essential water-dependent activities elsewhere.

Two integrated service companies which deliver "one-stop shopping" services to a number of individual oil contractors as well as individual oil bases leased by Shell Oil, Total Marine, a French oil company and Amoco are located at the Harbor. ("One stop shopping" enables supply ships to stock up on equipment, fuel and food at one dock and head back to the platform or drilling rig in less than 24 hours in contrast to the past when ships might spend one or more days in refueling). In addition, Aberdeen's fishing industry and a new roll-on, roll-off ferry have berths in

Figure I

SUPPORT BASES and ONSHORE FACILITIES IN SCOTLAND



the Harbor. Because of space constraints, oil companies maintain only essential dock space at the harbor while leasing additional space elsewhere in the Aberdeen area for storage and offices.

Interestingly, British Petroleum, which maintained a supply base in Aberdeen until the Forties find, moved its operations to Dundee shortly thereafter because of the growing congestion at the harbor. Even so, it retains its administrative headquarters near the airport in Aberdeen.

Since the discovery of oil, ship movement in the Harbor has increased considerably necessitating the installation of radar equipment. The Harbor Authority expanded, modernized and deepened some of the quays up to 32 feet at low tide to accommodate the new oil activity and traditional uses of the harbor. At the same time, the fishing fleet also benefited from the expansion and realignment of quays since its own piers were modernized in the process.

Aberdeen's airport is almost as important as its harbor. The airport now has international service to London and other oil capitals in Europe such as Stavanger in Norway and Amsterdam in Holland. The airport also services helicopters carrying personnel back and forth from the rigs. Because of the close rapport which the American oil industry in the Gulf Coast maintains with British oil interests, there was talk in 1977 of establishing an airlink between Aberdeen and Houston.

Aberdeen vis a vis Shetland Islands

Between 200 and 300 miles separate the oil fields in the eastern Shetland Basin from Aberdeen. Notwithstanding this distance, Aberdeen has remained the primary support base for these fields rather than the Shetlands which are closer to them. This is because Aberdeen eliminates the double-handling of materials and equipment which would have had to be delivered to the Shetlands from the mainland in any case and which is costly and time-consuming. The Sumburgh Airport on the Shetlands, however, serves as the major helicopter base to transfer personnel to the Shetland oil fields. It seems that poor weather and primitive road conditions between Sumburgh and Lerwick have resulted in air personnel preferring to wait out delays in Sumburgh rather than in Lerwick. This has in turn spurred considerable development in previously isolated Sumburgh.

Other ports along the Scottish coast have tried to attract the oil industry but with limited success, despite the congestion at Aberdeen Harbor. This is probably because they lack some of the amenities of Aberdeen such as its airport, labor force and services. Where they have specialized in providing a particular service, however, such as pipeline

storage, in the case of Peterhead, they have fared better. The following discussion of satellite bases on the Scottish coast may serve to put in relief Aberdeen's advantages as a service base.

Peterhead

Peterhead is located north of Aberdeen close to three pipeline landfalls. See Figure 2. Until legislation was passed in 1972 to remove an 1884 stipulation that no activity other than fishing take place in the picturesque "Harbor of Refuge", it seemed that oil and gas activity might pass Peterhead by.[1] The local port authority leases space to two integrated service companies and a number of individual oil companies. The harbor serves as a base for the storage of pipeline sections. While the pipeline for the Forties field is complete, two gas pipelines are being constructed just north of the harbor with the pipeline lay barges operating out of Peterhead. Although an application for a transfer terminal for bulk chemicals was turned down for safety reasons, Peterhead may yet develop into a distribution center for the gas liquids and their derivatives being processed at the nearby St. Fergus terminal. Indeed an ammonia plant in Peterhead was proposed although it is doubtful whether it will be built now because of a slump in the fertilizer market.

Dundee

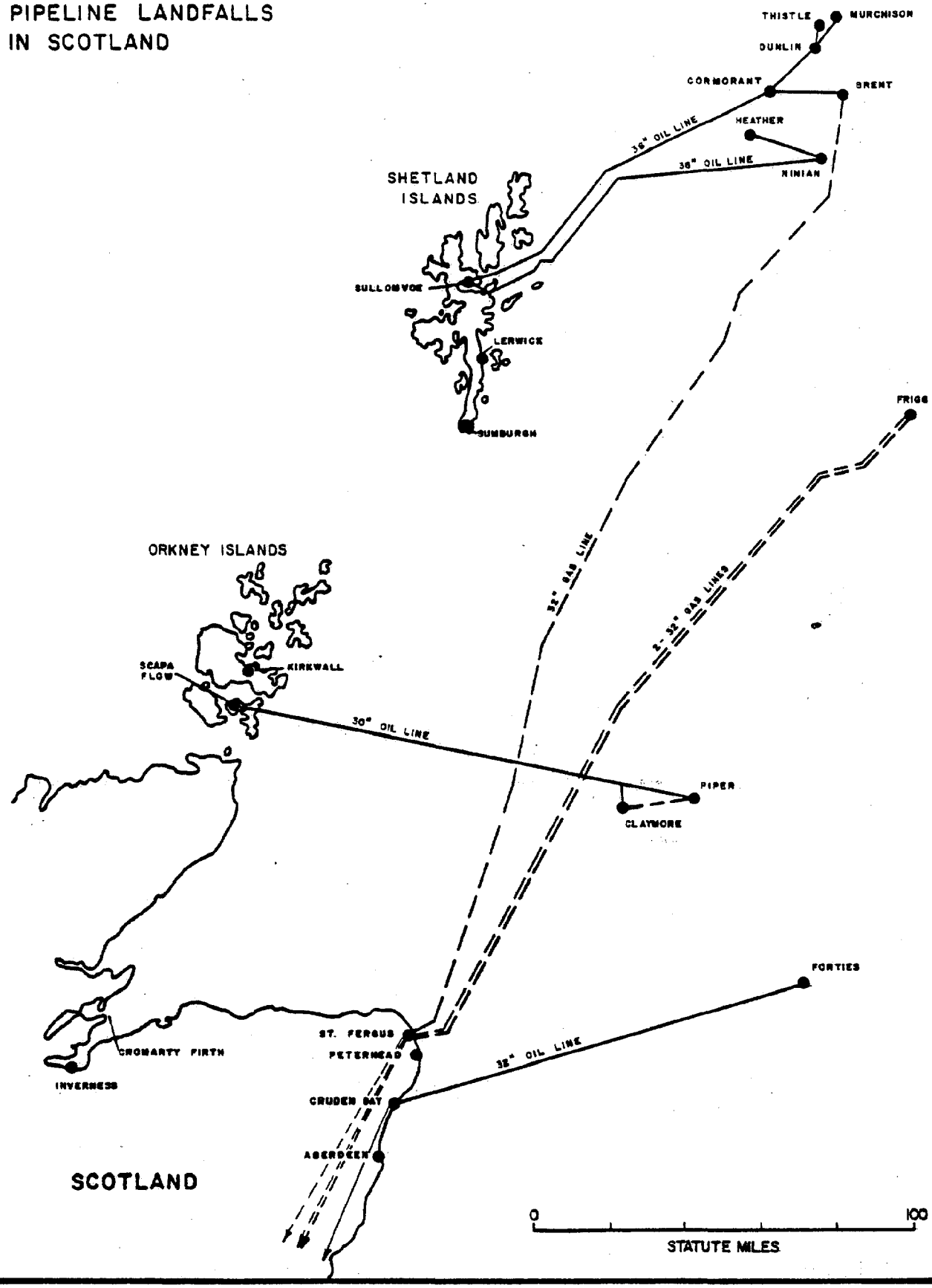
Dundee is a regional center with a university, rail and water access located south of Aberdeen. In addition to servicing the British Petroleum marine base for the supply of equipment and fuels it also serves Conoco and acts as a "one-stop service base" for other companies. Dundee has welcomed these new activities which fill a gap left by the decline of the jute industry which had previously been an important generator of port activity. It has failed to draw the anciliary industry, however. This is probably due to its proximity to Aberdeen and that city's market influence which extends into the Dundee area.

Montrose

Montrose located between Aberdeen and Dundee could also have served as an onshore support base. Even though its Harbor Authority modernized the port for oil and gas by dredging and deepening the channel which measured six feet initially, it has failed to attract more than about one or two bases but has some ancillary services.

FIGURE: 2

PIPELINE LANDFALLS
IN SCOTLAND



The Firth of Forth

The river Firth of Forth is somewhat removed geographically from direct onshore support activity but its wide flat banks, deep water channels and its proximity to an urban labor market in the vicinity of Edinburgh have attracted secondary oil and gas construction activity. Platform and coating yards have located along the mouth of the river.

The location of yards in a relatively urban setting is beneficial to employees who may be laid off between platform orders or following the shutdown of a pipeline coating yard since they will find it easier to obtain other work in contrast to locations where the yard may be the only employer in a region.

Summary

The bridgehead that was established in Aberdeen during exploratory drilling in the 1960's became permanent once significant volumes of hydrocarbons were found and attracted a large ancillary industry. The OCS industry's proximity to Aberdeen University has provided that institution with an on-site, live and fertile laboratory for research and the monitoring of socio-economic and environmental impacts. In addition, experts from the University have been employed as consultants on pipeline building projects. In this way oil activities have gained acceptance by the community. Also, capitalizing on Aberdeen's natural assets was the city government which encouraged the modernization and expansion of the harbor and airport. It also played an important role in creating a hospitable climate for the industry to work.

Aberdeen's success in becoming Britain's oil capital has not been accomplished without a price. This has been in the form of increased traffic congestion, inflation and housing shortages. Housing construction, for example, has declined as workers left traditionally relatively low paying jobs for the higher wages offered by oil companies. In addition, the difficulty of finding accommodations in Aberdeen, even in the off-season because of the oil industry practice to reserve whole blocks of rooms in hotels, has probably caused Aberdeen's summer tourism industry to suffer even though "bed and breakfast" establishments have taken up some of the slack.

Support Bases in the Middle Atlantic

Unlike Scotland, no oil company has gravitated to any particular port in the Mid-Atlantic. While Atlantic City, closest to the tracts leased in Sale 40, has been selected by companies as a helicopter base, the inlet into the island harbor often subject to frequent shoaling, barely satisfies

the minimum 20 feet depth requirement of the workboats. The inlet is, in addition, bordered by fringes of wetlands which are strictly regulated by the New Jersey's Department of Environmental Protection. Lastly, the City has not proven very hospitable to the oil industry since casino gambling emerged as the potential future savior of the aging city. Until significant discoveries are found, therefore, most oil companies will probably operate their boats out of Rhode Island which has wooed the companies and leased space to them at a former naval base on apparently rather favorable terms. Nevertheless, because of the existing infrastructure and the location of the field office of the U. S. Geological Survey which supervises oil industry operations, it seems more than likely that Atlantic City will emerge as a limited center of oil activity, should commercial volumes of oil and/or gas be found.

A Rutgers University study indicated that Perth Amboy within the bi-state Port of New York and New Jersey met more of the physical criteria for support bases than other locations in New Jersey.[2] The Port Authority of New York-New Jersey also identified several sites within the bi-state port as potential support bases.[3] Since oil companies traditionally prefer to use non-union laor, however, it is possible that they may avoid the bi-state port which is heavily unionized. Outside of New Jersey, Lewes in the state of Delaware has been cited as a potential support base. If more southerly tracts are leased in future lease sale there is a strong likelihood that the industry will site a support base in Lewes which has already been soliciting the OCS industry to locate there. With respect to pipelines, New Jersey's proximity to the leased tracts make it more likely that it will be a landfall for any gas and/or oil pipeline as commercial discoveries are found. The state of New Jersey has taken this eventuality into account in its coastal energy policies which would permit pipelines subject to a number of conditions and performance standards.[4] Though platform construction yards are not dependent on the locations close to the center of exploration and development since they could be floated into place from the Gulf of Mexico, Brown and Root, a large platform fabricator, has bought land in Cape Charles, Virginia to build a platform yard.

Footnotes

[1]The British government viewing oil in terms of serving a national interest, acted swiftly to revoke the 1884 stipulation. It subsquently authorized the expansion and modernization of the harbor. The Harbor is managed by a local authority as an agent to the Secretary of State which obtained jurisdiction of it in 1960.

[2]Rutgers University, Center for Coastal and Environmental Studies, Bruce Hoff et al, Onshore Support Bases for OCS Oil and Gas Development: Implications for New Jersey, September 1977.

[3]The Port Authority of New York and New Jersey, Support Bases for Offshore Drilling: The Port of New York Potential, May 1977.

[4]See U. S. Department of Commerce, National Oceanic and Atmospheric Administration and N.J. Office of Coastal Zone Management, State of New Jersey Coastal Management Program, Bay and Ocean Shore Segment, Draft Environmental Impact Statement, May 1978, page 137, et. seq. See also N. J. Department of Energy, The State Energy Master Plan (Draft) Paper, June 1978 and the background policy paper, Determination of the Need for Energy Facilities, May 1978.

III. WELL DRILLING AND PLATFORM BUILDING

Estimates concerning reserves in a frontier area remain assumptions until exploratory drilling either confirms or negates them. Often it may require a number of exploratory wells to be drilled before oil and/or gas is found. Following a strike, appraisal wells are drilled to determine the size of the find and whether economics would warrant its recovery. Table 1 shows that 262 exploratory wells were drilled between 1967 and 1976 in the waters of Scotland and the Shetland Islands. During that period 14 commercial fields were discovered ("commercial" is determined by the individual companies, not the government). Definitions may vary depending on estimated costs of production. This success ratio of 1 to 18 is considered high relative to that in other oil producing regions including the Gulf of Mexico where a ratio of 1 to 40 is more typical.

Table 1 shows that an average of 3.7 exploratory and 6.67 development wells were drilled per year during the 1967 to 1976 period. The higher development drilling well rate probably results from the greater certitude an operator has of a site following its appraisal as compared to when he drills a "wildcat" for the first time.

Rig time measures the amount of time that a rig actually operates.

To develop the fourteen commercial fields 20 platforms have been ordered, twelve of which will be of steel and seven of concrete. The Argyll field is deploying a converted drilling rig as its platform.

Table 1
Wells Drilled East of Scotland and Shetlands
1967-1976

	Exploratory Wells	Rig Time (Years) Deployed in Drilling Wells	Wells/Rig /Year	Development Wells	Rig Time Years	Wells/Rig/Year
1967	7	.8	4.7	-	-	-
1968	1	.8	5.16	-	-	-
1969	8	2.1	5.45	-	-	-
1970	10	2.2	4.15	-	-	-
1971	17	4.0	4.6	-	-	-
1972	16	6.8	2.72	-	-	-
1973	26	10.7	2.42	-	-	-
1974	51	20.6	2.46	-	-	-
1975	73	25.6	2.75	8	1.1	7.27
1976	53	18.3	2.82	48	7.9	6.07
	262					

Source: Development of the Oil and Gas Resources of the United Kingdom 1977 - Department of Energy

Once a discovery has been determined to be commercial, the most important decision concerns the design of the platform needed to recover the oil. As platforms are becoming more sophisticated and complex, costs are increasing. Over 40 development wells can be drilled from one platform and drain a large field through directional or slant drilling. Operators are producing all but the largest fields from one platform in the Scottish North Sea. The large Brent and Forties fields with reserves of one billion barrels of oil each are being produced from four platforms. The more recently discovered Ninian field, however, also with a one billion barrel estimated reserve, is expected to be drained with only three platforms which will have 40 wells each in contrast to the 27 wells on the Forties platforms.

Over one third of the platforms being installed on the Scottish North Sea are of concrete rather than the traditional steel. This is because of their reputed stability in those stormy and deep waters. Another advantage is their storage capacity during emergencies and between loadings when tankers are used as the transportation mode to shore.

Table 2 indicates the time lapse for the first nine fields which are being produced in the North Sea between the discovery and the first platform installation. This period averaged 3.33 years between 1967 and 1976. The installation of the Montrose platform took six years, the longest interval, possibly because this was the first field discovered and no operative procedures were in place. Platforms on the smaller fields were installed in as little as two years after they were established as being "commercial".

The table also shows the interval between platform installation and production start up. Once a platform is in place, production wells are drilled. This interval has averaged 1.1 years in Britain. The British government has permitted production start-up before the completion of all wells and before pipelines were in place. In the United States, start-up does not usually begin until all development wells have been drilled and pipelines are in place. In the United States, development drilling is generally completed in two years following platform installation. Britain's speed has been more rapid based on its desire to reduce imports of fuel and to improve its balance of payments.

Table 2

Time Interval (in years) between Discovery and Installation of First Platform and between Platform Installation and Production Start-Up for 9 Fields in the North Sea

Field	1 Discovery	2 Installation of Platform	3 Time Interval between (1) and (2)	4 Production Start Up	5 Time Interval between (2) and (4)	6 Time Interval between (1) and (4)
Argyll	1971	3/75	4	1975	0	4
Auk	1971	7/74	3	1976	2	5
Beryll	1972	7/75	3	1976	1	4
Brent A	1971	5/76	5	1976	1	5
B	"	8/75	4	-	-	-
D	"	7/76	5	-	-	-
Claymore	5/74	7/75	1	1977	2	3
Forties A	11/70	6/74	4	1975	1	5
B	"	6/75	5	-	-	-
C	"	8/74	4	-	-	-
D	"	6/75	5	-	-	-
Montrose	1969	8/75	6	1976	1	7
Piper	1973	6/75	2	1976	1	3
Thistle	1973	8/75	2	1977	2	4

Source: Oil and Gas Journal "Petroleum 2000", August 1977 and Department of Energy, "Development of the Oil and Gas Resources of the United Kingdom 1977", Her Majesty's Stationery Office, London, England

Table 3 reveals that of the twenty platforms built or on order between 1967-76 no more than three were built in any one yard. This is probably due to operator's desire to have platforms (which may take between one and two years to construct) installed as rapidly as possible and the reluctance to place an order with any plant that has any kind of backlog. While this speed is desirable from the operator's point of view, the idle periods between platform orders are often disruptive for a community which will be impacted by worker layoffs. Such impacts are discussed in more detail in Section IV.

The figure of 5.4 years nevertheless represents a remarkably swift rate of development which is much shorter than the eight year figure between discovery and production cited by United States industry for the Atlantic Coast.[1]

The controversy that the actual siting of platform yards has provoked has been described in the earlier literature about the North Sea.[2]

Table 3

Platform Building Pace in "Scottish" North Sea

Field	Company	Discovery Date	Estimated Reserve (in 000 barrels) as of 8/1/77	Platform Type	Platform Building Yard
Producing Fields:					
Argyll	Hamilton	1971	under assessment	converted rig	
Auk	Shell	1971	60	steel	Methil, Scotland
Beryl	Mobil	1972	511	concrete	Norway
Brent	Shell	1971	1,680		
Platform A				steel	Methil
B				concrete	Norway
D				concrete	Norway
C				concrete	Ardyne Point Scotland
Claymore	Occidental	1974	416	steel	France
Forties[3]	BP	1970	1,750		
Platform A				steel	Teeside, England
B				steel	Teeside
C				steel	Nigg Bay, Scotland
D				steel	Nigg Bay
Montrose	Amoco	1969	146	steel	France
Piper	Occidental	1973	620	steel	Scottish/(Ardesier) French-joint enterprise
Thistle	BODL	1973	555	steel	Teeside

Table 3 (continued)

Field	Company	Discovery Date	Estimated Reserve (in 000 barrels) as of 8/1/77	Platform Type	Platform Building Yard
Fields Under Development:					
Claymore	Occidental	1974	416	concrete	Ardyne Point
Comorant	Shell	1972	150	concrete	Ardyne Point
Dunlin	Shell	1973	584	concrete	Holland
Heather	Local	1973	146	steel	Ardesier
Ninian A	Chevron	1974	1,022	concrete	Loch Kishorn
B	"	"		steel	Nigg Bay
UK Stratford	Conoco	1974	428	steel	Nigg Bay

[1] Reserves are being reassessed.

[2] The UK Stratford field straddles the British-Norweigan sectors and will be developed under a unitization agreement still being worked out.

Source: Department of Energy
Development of Oil and Gas Resources of the United Kingdom 1977

Footnotes

[1]The March 1978 issue of Offshore reported that the Claymore field was brought into production in 3.5 years. Swift development was attributed to proximity of the Shell field to the large Piper field and the economies of scale which would result by Claymore production being routed through the Piper pipeline. Dick Mutch, "Claymore Fields Set North Sea Record", p. 102.

[2]Pamela Baldwin and Michael F. Baldwin, Onshore Planning Offshore Oil, op. cit, and New Hampshire Department of Resources and Economic Development, The Impact of Offshore Oil: New Hampshire and the North Sea Experience, 1975.

IV. TRANSPORTATION: PIPELINE, TANKERS, AND TERMINALS

Oil and gas are coming ashore today by pipeline, tankers and through newly built marine terminals as shown on Table 4. This chapter discusses the several modes in which oil and gas are landed in detail.

Pipelines

In 1977 two pipelines were landing oil in the Scottish North Sea: one with its landfall in the Orkney Islands and the other landing on the mainland of Scotland. (A third pipeline was in place although oil will not flow through it until the terminal at Sullom Voe in the Shetlands is ready to receive it, in late 1978). Gas pipelines were not in place and gas was either reinjected back into the wells or flared pending completion of the pipelines. (See Table 5). Speed in laying pipelines depends in part on weather conditions, the particular lay barge being used, water depth and size of pipelines. On the average it took about one day to lay one mile of the pipeline landing in the Shetlands. To speed up the process, it is possible for a single pipeline to be laid by two lay barges starting at opposite ends of the pipeline. It is also possible to start constructing a pipeline before a platform is in place as was the case with the Ninian field.

Oil

In the Gulf of Mexico a veritable "spaghetti" network of pipelines has been built over the past 25 years. To avoid this, the Bureau of Land Management, at the insistence of frontier states on the Atlantic Coast has stipulated that common carrier lines (with several companies sharing in their cost and maintenance) be constructed in designated corridors.

In Britain in contrast there seems to be no strong compulsion by the government to encourage the concept of common carrier pipelines. On the other hand, the concept works on an informal basis where operators of small fields adjacent to a larger field have found it economically desirable to hook into the major trunkline rather than build their own line or tanker it ashore.

British Petroleum built the first oil pipeline. The 111 mile submarine line comes ashore at Cruden Bay on the Scottish mainland, a few miles north of Aberdeen. Cruden Bay is the closest landfall to the offshore tracts, which served as an important locational factor in view of the high cost ($1 million per mile) of submarine pipelines. An onshore pipeline of approximately 130 miles links the offshore pipeline to BP's Grangemouth refinery.

Table 4

Transportation of Oil and Gas to Shore in Scottish Sector of North Sea
6/77

Field Name	Owner	Discovery Date	Estimated Reserve Million Barrels	Production Startup	Landing Mode	Comments
Argyll	Hamilton	1971	?	1975	Floating system	Production from a converted platform
Auk	Shell	1971	60	1976	Floating system SPAR	
Beryl	Mobil	1972	511	1976	Floating system	
Brent	Shell	1971	1,680	1976	Tanker initially; then pipeline	Gas being flared until gas line is in place
Claymore	Occidental	1974	416	1977	Tanker, then pipeline hookup to Piper	
Forties	BP	1970	1,750	1975	Pipeline	
Montrose	Amoco	1969	146	1976	Floating system	
Piper	Occidental	1973	620	1976	Pipeline	
Thistle	BODC*	1973	555	1977	Floating system, then pipeline hookup to Piper line	

Source: (British) Department of Energy, "Development of the Oil and Gas Resources of the United Kingdom 1977". Her Majesty's Stationery Office, London England.

*British Oil Development Corporation. (See Chapter VII).

Table 5

Major Pipelines in Scottish Sector of North Sea

Field	Terminal	Owner	Length	Diameter	Completion Date	Comments
Oil:						
Forties	Cruden Bay	BP	111 mile	32"	1975	Links to onshore pipeline to Grangemouth refinery and tankfarm at Dalmeny
Piper	Flotta terminal Orkney Islands	Occidental	124 mile	30"	1976	Sells to British refineries
Claymore	Piper tie in	Occidental	8 mile	30"	?	
Oil Pipelines Under Construction:						
Ninian	Sullom Voe Shetland Islands	Chevron	105 miles	36"		
Heather	Ninian	Union Oil	22 mile	16"		
Brent	Sullom Voe Shetlands	Shell/Esso				
Comorant	Sullom Voe		93 mile	36"		
Thistle	Dunlin	BODL Ltd.	7 mile	24"		
Dunlin	Comorant	Shell	17 mile	24"		
Gas Pipelines Under Construction:						
Brent	St Fergus	Shell	281 mile	36"		
Claymore	Piper	Occidental	16 mile	22"		

Table 5 (continued)

Major Pipelines in Scottish Sector of North Sea

Field	Terminal	Owner	Length	Diameter	Completion Date	Comments
Norwegian Pipeline:						
Ekofisk	Teeside (England)	Philips	220 mile	34"	1975	
Frigg	St. Fergus	Total	225 mile	32"	May 1978	

Source: (British) Department of Energy, "Development of the Oil and Gas Resources of the United Kingdom 1977", Her Majesty's Stationery Office, London, England.

Shell's pipeline from the Brent field to Shetland is now in place although oil is not yet flowing through it. The pipeline is 93 miles long. The oil is to be pipelined to the Sullom Voe terminal late in 1978 when all four platforms on the Brent field are completed. From Sullom Voe tankers will transport it to British refineries. Oil from the one producing platform on Brent is already being tankered to refineries owned by Shell and Esso, owners of the field, in Britain.

The Brent pipeline will also transport oil from the Dunlin, Comorant and Thistle fields the first two of which are owned by the Shell-Esso group. The Thistle field is owned by the British National Oil Corporation.

A 105 mile oil pipeline into the Shetlands has been completed to land oil from the Ninian oil field owned by the Chevron group. It will also land Union's oil from the Heather field. The oil companies indicated that two separate lines were needed to land oil from the Brent and Ninian oil fields which are located in relatively close proximity to one another offshore. The two pipelines are 32 inches each in diameter. The construction of a larger diameter pipeline holding a larger capacity which might have eliminated the second pipeline was apparently not deemed technically feasible in view of the prevailing water depth, water pressure and state of the art. A fourth pipeline takes oil from the Claymore and Piper Fields to the Orkney Islands where it is transferred by tanker to market.

Gas

Unless liquefied by cooling - an expensive process over short distances - gas cannot be transferred ashore by tanker. Therefore, it must be transported by pipeline.

In Britain the gas industry is a monopoly regulated by the British Gas Corporation. Oil companies sell gas found in the British North Sea to the British Gas Corporation which introduces the processed natural gas into the national gas grid. It sells back any gas liquids or derivatives to the oil or chemical companies.

British gas is building a terminal on 500 acres at St. Fergus to process gas from Shell's Brent field which is expected to provide 15 percent of Britain's gas. St. Fergus was the closest environmentally sound landfall to the Brent field.[2] It will also receive gas from other fields including the Norwegian Frigg field. Norway is allowing gas from Frigg to be transported to Scotland since the technology to lay a pipeline across the deep trench separating the field from the Norwegian mainland does not exist yet. Both the operator of the Frigg and Brent fields, Total Marine

and Shell Oil are building facilities directly adjacent to those of the British Gas Corporation from whom they are buying back all but the methane which is going into the British Gas grid system. Shell is building an onshore gas pipeline with Esso from St. Fergus to Moss Morran (near Edinburgh) - a distance of some 150 miles -to process these liquids further and then transport them to Britain, Europe or the United States.

Two pipelines have already been constructed into St. Fergus and the design of the terminal allows for a third should that become necessary. Constructing the pipelines involved breaching the dunes in two places. Because of the care (which included selecting the proper season for construction) with which the dune sections were removed, replaced and reseeded, no long term impacts are expected from this operation.

British Gas, British Petroleum and others are undertaking a study to determine the feasibility of building a gas pipeline gathering system to recover gas found in other fields which is currently being flared.

Marine Terminals

Aside from some oil from British Petroleum's Forties Field being refined and marketed in Scotland, most other oil (in the absence of overland oil pipelines) goes to England by tanker.

The new tanker activity has necessitated the building onshore of transfer terminals and single point mooring buoys where tankers are offloading oil directly from platforms. Single point mooring buoys are sometimes called deepwater ports in the United States. The discussion below describes onshore marine terminal construction on the Orkney and Shetland Islands to which large volumes of oil are being or will be delivered by pipeline. The completed Scapa Flow terminal is in the Orkney Islands; the Sullom Voe terminal in the Shetland Islands (see Figure 2) is expected to start operating late in 1978.

Scapa Flow received its first oil in 1977 from the Piper field. The terminal is designed to handle 500,000 barrels a day through the pipeline and store four and a half million barrels of oil (or a 9 day's supply from the oil fields) in five, one-half million and two, one million barrel storage tanks. Each tank is surrounded by a berm or dike to contain the contents should a break occur in the tanks. Associated gas is separated at the terminal. The lighter gases are used to power the oil burners. Propane is

stored in two 100,000 barrels for shipment by 30,000 dead weight ton liquid petroleum tankers. Crude oil tankers load from single point mooring buoys in the port while liquid gas is loaded onto smaller tankers docking at a jetty.

Water treatment facilities remove oil from ballast tanks on board the tankers and remove impurities in the formation waters contained with the discovered oil. Water is discharged into the ocean with no more than 25 parts per million (ppm) oil permitted as effluent. (In the United States the range is between 30 and 52 ppm). Sampling stations monitor pollution. The terminal has fire fighting equipment, skimmers, and low toxicity dispersants to handle accidents. This equipment was tested shortly after oil was first landed at the terminal when a single point mooring line came loose from a tanker in winds ranging up to 68 knots, in 6 to 8 feet high waves. Thereafter, the Harbor Authority mandated that future loadings would not be permitted under storm conditions. (Storm gauges which had signaled the danger were apparently ignored).

Sullom Voe

The Sullom Voe terminal though larger will have facilities comparable to those at Scapa Flow. It is being built to handle one million barrels of oil and associated gas per day initially, with expansion up to 3 million barrels per day possible.* Its storage capacity is equivalent to between 4 and 7 days of production. Jetties are intended to handle tankers between 13,000 and 300,000 dwt. LPG gas will be offloaded on a separate jetty. About three tankers a day or 1,000 per year are expected in the harbor. The planning that was involved in the siting of this terminal is described in Section VI.

Mini-Terminal

Following the discovery of the Forties field, British Petroleum built a tanker-loading island in 72 feet of water at the end of half a mile of underwater pipeline in the Firth of Forth river, downstream of its refinery at Grangemouth. The terminal permits tankers to load crude oil which will be marketed in England. The terminal can handle tankers up to 30,000 dwt. and load at the rate of 15,000 tons per hour. A tank farm located a mile inland from the river is connected to the terminal by an underground pipeline. The tank farm was built on spoils from oil shale mining operations during the 1910's. Landscaping permitted the tanks to be placed into a hollow which is surrounded by a high grassy bank.

*If reports on July 11, 1978 of a major oil strike by British Petroleum west of the Shetlands are confirmed, then the foresight in providing excess capacity at the terminal will have been more than vindicated.

The tanks are thus not visible from nearby and constitute no eyesore. In addition to the storage tanks there is a treatment plant to handle oily ballast water. BP officials are proud of the design of this terminal and make a point to show it to visiting planners both from Britain and overseas.

Footnotes

[1]Dr. William Rtichie and L. Walton, Environmental Appraisal of Pipeline Landfall Site Area at St. Fergus (Rattray Bay), University of Aberdeen, November 1975. See also: Dr. William Ritchie, Environmental Problems Associated with a Pipeline Landfall in Coastal Dunes at Cruden Bay, Aberdeenshire, Scotland, American Society of Civil Engineers (reprint from Proceedings of the 14th Coastal Engineering Conference, Copenhagen, Denmark, June 1974.

[2]The Loch of Strathberg just north of St. Fergus was British Gas' first choice for a landfall but was ruled out because it was in the path of a bird migratory route.

V. PROCESSING: OIL, GAS, PETROCHEMICALS

Important as is onshore planning for offshore exploration and development, it becomes even more crucial for the production phase when processing facilities will be built to market the oil and/or gas. The siting of such facilities can be crucial in determining land uses for many years since such plants may attract ancillary industries such as the chemical industry for which oil and gas are essential feedstocks. In Britain, North Sea oil has replaced imported oil to a large degree. Even so, a company such as British Petroleum, with its production from the large Forties field, plans to continue to import heavy, sulfurous Arabian crude oil. The Arabian product is cheaper than the high-grade, low-sulfur North Sea oil and will be used for blending and to fill an existing demand. When questioned about the potential adverse air impacts from burning Arabian crude oil, officials indicated that Britain's island position and consequent superior dispersion characteristics made air pollution less of a problem than in other countries.

A 1977 report by an organization similar in function to the Chamber of Commerce in the United States estimated that Arabian crude could well continue to command thirty percent of the British oil market, thereby freeing some North Sea oil for export.[1]

Because of Scotland's limited demand for new petrochemical production, most petrochemicals produced in new plants in Scotland are expected to be exported to either England, Europe or the United States.

Below, four projects are described concerning the construction of processing facilities to indicate the type of facilities that the British government is reviewing during the production phase of North Sea oil and gas extraction.

The first project consisted of an ammonia plant which was to be built by a Swedish firm in Peterhead to capitalize on the gas by-products produced at the nearby gas plant at St. Fergus. There is some doubt now whether the plant will be built because of the large investment costs in building the plant and the uncertainty of the world fertilizer market.

A second more active project involves a chemical plant to be built by the Shell Oil Company. The original proposal was to build it in Peterhead using the harbor to export bulk chemicals by tanker. Harbor limitations obliged Shell to look for another site. Local opposition was base on potential tanker hazards and the inadequacy of the seawall surrounding Peterhead Harbor. The seawall was not believed to be high enough to contain heavy seas during a storm and protect the

tankers and their potentially hazardous cargo from damage. If the chemical plant had been approved in Peterhead, it would doubtless have had a sizeable impact on the small community in terms of attracting workers from the two existing industries: fishing and agriculture. Peterhead's largest industry, the Cross and Blackwell cannery has already suffered as a result of the oil industry which tempted low paid employees to defect to the higher paying oil-related jobs in the harbor.

Shell has now submitted a new proposal to build the plant in Moss Morran on the Firth of Forth estuary opposite Edinburgh. The new location is probably preferable to the Peterhead site in terms of being able to absorb the plant and tanker-related traffic and impacts. Certainly the additional traffic generated by the new Shell plant would constitute only a small increment to existing traffic on the Firth of Forth in contrast to the same impacts that this would generate in Peterhead Harbor where there are no tankers at all. A public hearing on the Moss Morran-Edinburgh site was held by the Secretary of State for Energy for Scotland and approval issued in March 1978. Shell is building a liquid gas pipeline from St. Fergus to Moss Morran. This will bring the number of onshore subterranean pipelines between St. Fergus and the Edinburgh area to five. (These include the three gas lines at St. Fergus which hook up to the British Gas grid, BP's oil line between Cruden Bay and Grangemouth and the Shell line under discussion.) This number could increase to six should British Gas decide it needs another pipeline to transport fuel from a gas gathering system currently under study. More subterranean pipelines in this region may not be permitted in the future, however, since the easements acquired from the farmers for maintenance could mean a reduction of land devoted to agricultural use.

While Peterhead has been spared for now from the impacts resulting from the building of two chemical plants, the pressure from the petrochemical industry to locate close to the St. Fergus plant should not be overlooked.

Government and business interests in other areas of Scotland have been trying to attract processing industries because of the growth potential believed to be associated with them. The Cromarty Firth region which already contains two platform yards, a pipe coating yard, a gin distillary and an aluminum smelter is seeking to attract still more oil and gas facilities. The Highland Regional Council, for

example, is trying to promote approval of a proposal to build a grass roots refinery whose products would be exported to Europe and possibly the United States. The refinery proposal has the tacit backing of the Brown and Root platform yard in Nigg Bay. Brown and Root sees the refinery as adding diversity to the local economy from which it would benefit in that it believes workers would have increased job opportunities when laid off between platform orders. This seems to be a false assumption, however, since refineries are capital-intensive and employ relatively few people after the construction phase.

The expansion project mentioned above concerns the addition of an alkylation plant at British Petroleum's Grangemouth refinery.[2] B.P. already expanded facilities at the refinery recently to build a gas separation plant at an adjacent site it owns to stabilize the Forties crude.

BP is also planning to reverse the flow of one pipeline that had been used until the advent of North Sea oil to import crude into the refinery. The oil in the "reverse flow" pipeline will now be exported from BP's Finnart terminal on the west coast and will provide BP with two outlets for its Forties production by 1980.[3]

Implications of Downstream Processing Plants for Mid-Atlantic Frontier States

The decision to build a refinery is not one that is taken lightly because of the costs involved. New Jersey, Pennsylvania and Delaware between them contain nine major refineries. With the proximity of the Mid-Atlantic refineries to the Baltimore Canyon and the Georges Bank and the absence of a refinery in New England, it seems all but inevitable that these states will be impacted by downstream processing activity. These states, however, unlike Scotland, have serious air pollution problems and may have a greater problem in absorbing emissions from oil and gas plants. Air pollution is certain to become more and more of an issue as the industrial states bordering the Atlantic Ocean become the focus of scrutiny because of the high incidence of cancer found there, believed in part to be related to industrialization.[4]

While new oil, if it substitutes for imported oil, will probably be refined in existing refineries and would not result in new emissions, gas, if found, would require the building of several processing plants which would most certainly add to existing emissions. Gas plants while smaller in size than refineries, perform the same functions

as refineries in removing impurities and by-products from the raw material. In addition, they have some of the same impacts such as noise, odor, 24 hours-a-day lighting and air emissions. To date the industry has not indicated to the Mid-Atlantic states what production facilities will be needed except to rule out new refineries. At the same time state governments have not addressed in detail how they will review proposals for potential downstream facilities in terms of what may or may not be acceptable from an environmental carrying capacity viewpoint although they do have, of course, existing authorities and procedures for reviewing any facilities with the potential to release air pollutants. The upward revision by the U. S. Geological Survey of the gas estimated to be found in Lease Sale 40 from between 2.6 and 9.4 trillion cubic feet to 13.3 tcf, indicates that gas plant planning could have significant implications for the maintenance of air quality, especially if it turned out that the gas were to have a high sulfur content.

Footnotes

[1] Petrochemicals in Western Europe: The Potential for North Sea Oil and Gas, The Scottish Council (Development and Industry), May 1977. The Scottish Council estimated exports in the 1980's of 60-70 million tons/annum of crude oil, 1.9-2.0 billion cubic feet of natural gas, 2-3 million tons/annum of gas liquids, 1-2 million tons/annum of petrochemical feedstocks.

[2] Scottish Economic Planning Department. "North Sea Information Sheet: November 1977," p.5.

[3] Ibid. p. 3.

[4] See Mason, Thomas, J., McKay, Frank W. et al., Atlas for Cancer Mortality (1950-1969), DHEW Publication #(NIH)75-780, Washington, D.C.:U.S. Government Printing Office. p. x and Council on Environmental Quality, Carcinogens in the Environment, (Washington, D.C.: U.S. Government Printing Office 1975, p. 23), and New York Times, "Latest Data Show Jersey 3rd in Cancer," May 2nd, 1978, p. 28.

VI. PLANNING BY LOCAL GOVERNMENT

Thus far this report has dwelled on the pace with which development has taken place in Scotland from the moment of discovery to the building of platforms, drilling of development wells and landing the hydrocarbons at a refinery or terminal. This chapter and the next look at how planners have attempted to deal with the fast pace set by industry. This chapter looks at how local government - the Shetland Island Council - is handling oil and gas activity which has located there because of its proximity to the rich oil and gas fields off its shores. The next chapter looks at how the British government facilitated the development of oil and gas production by invoking a national interest in energy.

The story of how the local government in the Shetland Islands seized the initiative in dealing with industry to ensure that oil would not disrupt the island environment and way of life has been well documented by the Baldwins and others.[1] Here the writer attempts to assess how effective such planning was in retrospect.

Generally, the early planning by the Shetland Island Council paid off. The Council is, however, the first to admit where it fell short of its goals. These shortcomings may be attributed to the Council's lack of technical expertise and to its having accepted so-called "facts" at face value without having performed its own independent analyses. Some of the Council's less successful experiences are outlined below to point out the gullibility of even such a sophisticated entity as the Shetland Island Council in relying on industry in the absence of other information.

Technical Expertise: Industry versus the Government

One dispute between the Council and the industry concerned the designation of pipeline corridors. Initially, the Council had requested in its plan that any needed pipelines would have to come ashore at one pre-designated site. The second pipeline which was built, however, comes ashore several miles south of the first one. It was sited there because of seabed conditions which made the placement of more than one pipeline in the initial pipeline corridor infeasible. The Council was not informed of this until the time came for the second line to be laid. Considerable friction them ensued between the government and the industry which could have been avoided had the industry been more open with the Council.

Another dispute between the Council and the industry concerned the layout and design of the facilities at the Sullom Voe terminal whose construction generated major environmental impacts including dredging and the filling-in of water inlets to accommodate the dredge spoils. One minor issue in the dispute revolved around the siting of storage tanks which is outlined briefly here to illustrate the importance that governmental units anticipating development should attach to performing their own independent impact analysis.

In this instance the industry advocated surface placement and the Council subterranean placement of the storage tanks. While the industry position prevailed ultimately on technical grounds with the Council conceding that the siting of tanks in terrace fashion, which eliminated the need for tall venting stacks and a potential eyesore, was preferable to its original proposal, it is possible that the dispute and bitterness generated thereby could have been entirely avoided by greater openness between the Council and the industry initially. Possibly, also, such a dispute might not have arisen in the United States because of the environmental review process mandated by the U. S. National Environmental Policy Act of 1969 which requires the various advantages and disadvantages and alternatives of a project to be presented for public review. Be that as it may, the incident illustrates the real need for a local unit of government, whether or not an environmental impact statement is needed, to perform independent analyses of projects having a potential for impacting the environment.

Work Force Estimates

An error of the Council was to take on trust the labor force figures which the industry supplied on the construction of the terminal.[2]

From the point of view of planning and accountability, this was probably the Council's biggest mistake because of the adverse impacts that this might have had, if not remedied, on the surrounding community. Initially, in 1973-1974 the labor force for the Sullom Voe Terminal had been estimated to be about 1200 workers. To accommodate this population the Council required a temporary worker camp to be built before construction began.[3] In 1976 the industry increased its work force estimates to 3,000 people. To avoid overcrowding and overburdening local facilities, the Council required a second camp to be built before permitting work to continue at the terminal.[4]

Faulty estimates of the work force and inadequate accommodations to house it probably contributed to delays in the building of the terminal, now anticipated to start partial operations in 1978. Other costs, however, such as those relating to design and inflation, have also contributed to delays in completion of the terminal. The Council's condition that worker accommodations be completed prior to construction start-up was intended to avoid the type of problems which occurred at the platform yard in Nigg Bay where no provisions had been made for an influx of 3,000 workers during the peak construction phase. At Nigg Bay the platform company had to charter two passenger liners to serve as a work camp - a far from satisfactory arrangement in view of the closeness of living and sleeping quarters and the disruption that different work schedules inflicted on the sleep cycles of the workers.

Many of the problems outlined above related to the Council's relative lack of expertise vis a vis industry. They could have been averted if there had been better understanding and information exchange between industry and the Council. The experiences have made the Council all the more determined to require a disclosure of industry plans. These difficulties notwithstanding, the Council and industry have worked out a better cooperative relationship on offshore oil and gas-related matters than exists elsewhere between these two interests. In the absence of the formal government and industry task force which the Council had established early in the planning process to facilitate communications, the Shetlanders might have been even worse off today than they are.

Overall, the Council's experience with industry indicated that both found more to be gained through cooperation -which increased the element of certainty and predictability in decision-making - than in feuding which resulted in loss of valuable time.

Inflation

Despite its best efforts the Council has not been able to deal with the inflation of prices and the flight of the local labor force into higher paying oil and gas jobs. Disturbing the Council is the migration of some young fishermen to the oil and gas industry which if it were to set a trend could result in the diminution of the fishing industry where skills are passed on from father to son over a long period of time. The Council is also concerned that short-term, high paying oil and gas-related jobs are luring young people away from pursuing high educational goals. Its main worry is that the oil and gas industry will reduce the diversity

of activities and jobs in the Shetlands and narrow a "four-footed" economy built on knitting, fishing, tourism, and agriculture to a "one-footed" oil based economy. As the Director of Planning put it, "a four-footed stool can balance itself; not so, a one footed stool ... and what happens when there is no more oil?"[5] Already he reported that unemployment was higher in 1977 than it was in 1971 because of laid off workers from oil-related jobs staying on in the Shetlands.

Cumulative Impacts

OCS planning is so difficult because no one knows until exploration actually begins, whether the educated guesses which have been made will be borne out. Once a field has been discovered the practice both in Britain and the United States allows the resources to be produced as rapidly as possible and for facilities - both onshore and offshore - to be put in place. Seldom are facilities designed for downstream discoveries because of uncertainty as to whether the initial find will be followed up by another. This type of incremental building makes for industrial sprawl which planners would, of course, like to avoid especially in coastal areas where the competition for land is already so intense. Although the north-and-mid-Altantic states have urged Congress to separate exploration from development so that comprehensive planning can take place, the likelihood of this happening appears dim because it is viewed as delaying the recovery process.[6] New regulations promulgated by the U. S. Geological Survey would require it to perform an environmental impact statement (EIS) on exploration plans which could have major implications during the development phase. The regulations are new and it is not clear the extent to which a whole area would be analyzed or whether drilling would be held up pending the completion of the EIS. There is no guarantee that following the filing of an EIS that other discoveries might not be made which could change the development picture still further.[6]

With planning for OCS onshore impacts being so difficult because of the uneven sequence of discovery, it becomes all the more important for OCS planners to know as much as possible about industry practices so that at least some of the cumulative impacts and economies of scale can be factored into the OCS planning. This relates especially to the acquisition of land for pipeline corridors and onshore landfalls and facilities such as gas processing plants. In the North Sea, as discussed in Chapter IV, several pipelines have already been built in the short span of ten years and more are expected to be built. At St. Fergus, the British Gas Corporation has, however, provided extra land for a

third pipeline landfall. On land it is somewhat easier for planners to require companies to acquire additional acreage for expansion if necessary. At Sullom Voe in the Shetlands space has been set aside for a refinery should one ever be needed. Planners should, therefore, be aware of this problem and try, to the extent possible, to require that extra land be acquired in conjunction with a new facility so it will be available for expansion if necessary. In this way a new and undeveloped area may be saved from disturbance later on.

Compensation

The Shetland Island Council is probably better equipped through its Reserve Fund to mitigate against impacts than other local governments. The Reserve Fund, established by the Zetland County Council Act of 1974, is funded by the industry. The fund is intended to compensate Shetlanders now, during the disruptive construction phase and in the future when adverse impacts are expected from the phasing out of oil and gas production. Shetlanders call it a "disturbance fund." Its intent and purpose is the same in many respects to that of the Coastal Energy Impact Program (CEIP) approved by the U.S. Congress as part of the Coastal Zone Management Act Amendments of 1976 although the funding formula and eligiblity are vastly different. (CEIP, for example, provides relatively little money for outright grants, but advances credit assistance to governmental units for facilities requring "front-end" financing until they become self-sustaining).[8] The formula by which monies are collected in the Shetlands has never been made public but is based in part on number of pipelines, amount of oil flow, and the percentage of money that the Council has invested in oil and gas related facilities. (The CEIP formula is based on acres leased, oil and gas landings, production and new employees). While no drop of oil has landed in the Shetlands yet, the fund has been collecting money for three years with some of the interest distributed by social service agencies to the elderly and others including fishermen and pre-existing and new industries in need of financial help. The rationale for activating the fund before oil has been produced is that Shetlanders are already experiencing significant impacts from anticipated development.

Advisory Groups and their Role

A general criticism directed by planners at the oil industry has been its secretiveness with respect to disclosing specific information on the number, type and location of onshore facilities needed to process the offshore resources. Usually the practice has been for industry to obtain sites and then disclose its plans. This has made the work of planners trying to promote orderly land use development that

much more difficult. The Shetland Island Council has been very bitter about the industry's close-mouthed behavior, and determined to maximize communications with the industry on oil and gas-related matters.

In 1973 the Council established the Sullom Voe Association, consisting of representatives of the industry and the Council, as a forum for the transfer of information and industry expertise. Later the Association established an environmental advisory task force to assess the impacts resulting from the building of the Sullom Voe Terminal. This task force which produced a number of recommendations on oil spill contingency planning, firefighting, safety, and monitoring disbanded shortly before publication of its report[9] because of concern that environmental issues were being manipulated to the advantage of the oil industry.[10]

The Shetland Island Council appears to believe that it is better to have a forum for discussion then none at all however, and has been instrumental in organizing a successor to the environmental task force. The new 15 member entity (the Shetland Oil Terminal Environmental Advisory Group [SOTEAG]) is made up of two representatives each from the Council and industry, as well as representatives from the national (equivalent to our federal) government having statutory environmental protection responsibilities. Also included are representatives from universities and local fishermen's and birdwatchers' associations. By-laws of SOTEAG preclude either Council or industry representatives from serving in any managerial capacity on the task force and require any minority viewpoints to accompany a main report.

Planning: Public Participation

It should in all fairness be pointed out that it is only in retrospect that the Shetland Island Council's activities have been regarded in such an idealized light by its own constituency, although planners from other parts of Britain and abroad have admired its initiative, vision and actions throughout. At the beginning when the Council went to Parliament to obtain its unusual land use powers, it was looked upon suspiciously because of the secrecy it maintained in lobbying for these powers. This continued later on when the Council would conduct long and secret negotiations with the industry. Such concentration of power in the Council did not sit well with many of the independent-spirited Shetlanders accustomed to New England, town-hall-style decision-making although later on their criticism became more muted as the Council acquired their trust. What line

to draw between the delegation of power to one's government and retention of the right to know remains tenuous, especially when values one holds dear are at stake. On the surface it appears that the Shetlanders did well by their Council although some terms of the negotiations remain undisclosed to this day.

Summary

In the Shetlands as elsewhere planners regarded the development of offshore oil and gas as too important to be left solely to the industry and initiated a number of ways to maximize on benefits deriving from the new activity. At the same time they took steps to protect their island's environment and way of life. While the Shetland Island Council failed in some areas to retain its early initiative in negotiating with the industry because of its lack of technical expertise, its successes have been overriding stemming in large part from the speed with which it acted when it first learned of the potential role that oil and gas adjacent to its shores might play on the island. Further it demonstrated a willingness to work with and overcome its difficulties with the industry having accepted as a given the different constituency to which the industry was accountable.

The Council also early on recognized the importance of oil and gas to the national economy and that failure to take it sufficiently into account might result in central government actions which might be contrary to its people's way of life and even cost them some of their independence. Accordingly, it reconciled the inevitability of oil and gas to its shores with its value system. This coming to terms with the situation resulted in few, if any, conflicts with the national government.

Footnotes

[1]See Footnotes 3 and 4 in Chapter 1, Introduction. See also, Scotland Oil, Edited by A. MacGregor Hutcheson and Alexander Hoff, (Edinburgh: Oliver and Boyd, 1975) and The Shetland Way of Oil, Edited by John Button (Shetland: Thuleprint Ltd., 1975).

The Shetland Island Council acquired powers through the Zetland County Council Act of 1974 to acquire land around Sullom Voe, future site of the oil terminal, which it later leased back to some of the oil companies, obtaining rental income therefrom. In addition, it acquired "port-authority" powers in order to better control and tax traffic in and out of the harbor terminal. At the same time it obtained the authority to participate in commercial ventures in order to assure that the local citizenry rather than outsiders benefit from new oil-related jobs. The Council is currently a partner in the company which is building the construction camp at Sullom Voe and in the company which will tow and pilot tankers in and out of the harbor.

[2]The Sullom Voe Terminal is being built to handle a throughput of two million barrels a day of oil by the mid-1980's. The terminal will consist of fifteen crude oil and four liquid petroleum storage tanks, a gas separation plant, ballast tanks, a settling pond and a 96 Megawatt (MW) power plant. (The island's power needs by contrast are met by a 28 MW plant). While the terminal is being built by the industry, the harbor and jetty portion is being built by the Council who will lease it back to the industry.

[3]In addition, the Council proposed that the housing stock of nearby villages be expanded to accommodate oil and gas personnel expected to remain in the Shetlands for the duration of the oil boom, estimated to be 20 to 25 years. Dispersal of this incoming "permanent" population among several villages by the Council was preferred over the building of a "new town" in order to facilitate the acculturation of the newcomers and to distribute any benefits that might come from building new homes and facilities among the existing population.

[4]Except for the community facilities such as a gym, pool, movie, the work camps will be taken down after the work on the terminal has been completed.

[5]Mr. J. M. Fenwick, Director of Planning, Shetland Island Council, in an interview, May 13, 1977.

[6]The Congress is currently (as of May 1978) considering amendments to the 1953 Outer Continental Shelf Land Act (67 Stat 463) (43 USC 1338F). The Amendments are contained in Senate Bill #9 and House bill #1614.

[7]Department of the Interior, U. S. Geological Survey, "Outer Continental Shelf Oil and Gas Sulphur Operations; and Oil and Gas Information Program," Federal Register, January 27, 1978, p. 8880, et. seq.

[8]See Department of Commerce, National Oceanic and Atmospheric Administration, "Coastal Energy Impact Program", 43 Federal Register, February 23, 1978, p. 7546, et. seq.

[9]The Sullom Voe Environmental Advisory Group, Oil at Sullom Voe Environmental Impact Assessment, (Shetland: Thuleprint Ltd., May 1976). Note that there is no British counterpart to the U. S. National Environmental Policy Act of 1969 (42 USC 4371) and its environmental impact statement requirements.

[10]Personal Communication from J. M. Fenwick, April 24, 1978.

VII. PLANNING BY BRITAIN'S NATIONAL GOVERNMENT

The last chapter described the approach of the Shetland Island Council -- a local government unit -- to planning for oil and gas development. This chapter briefly describes how the British government is accelerating oil and gas-related development because of its importance to the national economy in terms of reducing the balance of payment deficit.

Various measures have been taken by the British government to accelerate oil and gas production as being in the national interest. Workers waiting to obtain government-subsidized housing, for example, are put on the top of a waiting list if they are working on a project considered as being in the "national interest." In order to obtain maximum benefits from offshore drilling, the British government established a Manpower Services Commission to train people in new skills. It also established an Offshore Supplies Office to help foreign oil companies identify and obtain help and services from British companies. In addition, the Department of Energy uses its authority in issuing exploration and development licenses to exert leverage on oil and gas companies, giving preference to companies which place orders with British rather than foreign companies. Leverage is also used by the government-owned British National Oil Corporation, established in 1976, to acquire a 51 percent interest in all oil and gas operations operating in Britain. Amoco, a holdout to this procedure, did not receive a lease during the last licensing round until it had acquiesced in BNOC's participation.

The British government has also used its national interest powers to acquire information and in the siting process as discussed below.

The British National Oil Corporation (BNOC)

The problem of access to industry information appears as one common to both local and national governments. While the Shetlanders partially resolved this through the advisory task force approach, the British government formed the British National Oil Corporation (BNOC). The three objectives for forming BNOC cited in a recent Congressional report were:

1. Participation as a way to increase the public share of North Sea oil wealth,

2. Participation as a way to improve the Government's oil information; and,

3. Participation as a way to enhance Government control over North Sea development and disposal.

Interestingly,the latter two objectives related to information access.

Siting - The Public Hearing Process

In Britain, as in the United States, local governments exert considerable power with respect to land use. But regarding the siting of facilities having a national or "greater than local interest", such as energy, the Secretaries of State for Scotland and for the Environment in England may, if they choose, intervene in the local siting process by convening a public hearing to consider a pending proposal. Such hearing is then presided over by a state-appointed hearing officer who will submit his findings and recommendations to the Secretaries. Although it is not a foregone conclusion that they will always approve every site reviewed at a state-called public hearing, there is a strong presumption that they will favor national interests over local concerns. While they took no part, for example, in the decision to turn down Shell's proposal to build a petrochemical plant in Peterhead, which was opposed locally, the Scottish Secretary did call for a hearing on the alternate site in Moss Morran which is possibly a more acceptable site because of its proximity to an urban labor force and infrastructure.

Siting - Planning Guidelines

The siting of onshore oil and gas facilities related to offshore drilling has been facilitated in Scotland by the Scottish Development Department which in 1974 inventoried the Scottish coast for potential development sites for gas and oil facilities to guide both local government and prospective developers to such needed sites. Sites were mapped and criteria developed which favored the clustering of facilities and the use of sites close to existing labor pools and infrastructure.[2] While the Development Department obviously wanted planners to follow the guidelines, it made clear that the guidelines did not have the force of law and were not intended necessarily to override existing development plans of local government units. Notwithstanding such disclaimers, the guidelines issued by the highest level of government, have undoubtedly influenced developers to locate in the government-recommended areas.

Comment

The "national interest" clause in the Coastal Zone Management Act Amendments of 1976[3] is one by which Congress sought to have coastal states consider the siting of energy facilities in their coastal zone. While the British government seems to intervene quite successfully at the local level to obtain consent for the building of energy facilities in the

name of the national interest, it remains a question still whether local governments in the United States will acquiesce quite that easily to being overridden by higher governmental units without additional state enabling legislation. The petroleum industry, however, is seeking a strict interpretation of the "national interest" both as enunciated in the Act as well as in Federal regulations which spell this out in greater detail.[4]

Footnotes

[1]U. S. Congress Senate. Committee on Energy and Natural Resources. Controlling oil: British Oil Policy and the British National Oil Corporation by Edward N. Krapels, Publication 95-59 (Washington, D.C.: U. S. Government Printing Office: October 1977) p. 20-23.

[2]Scottish Development Department, North Sea Oil and Gas Coastal Planning Guidelines, August 1974. The coast was classified into "preferred development" and "preferred conservation" zones. The guidelines spelled out the criteria used to identify development zones. They included:

a) avoidance of a scatter of industrial development

b) full use of existing labor pools, housing and public services

c) economic provision of additional services

d) possibility of diversification to cushion any subsequent decline

at p. 6.

[3]Coastal Zone Management Act Amendments of 1976 (P.L. 94-370)

[4]See memorandum of points and authorities in support of motion for preliminary injunction in American Petroleum Institute vs. Robert W. Knecht (U S. Department of Commerce) filed in United States District Court Central District of California #773375 ALS (1977).

VIII. CONCLUSIONS AND RECOMMENDATIONS TO OCS PLANNERS

The pace with which oil and gas from the North Sea has been produced has been rapid, as documented, averaging 4.4 years between discovery and first production or 5.4 years if one compares this with American practices.* This is shorter than the eight years which industry representatives usually cite for start-up of production following a successful find in the United States.

Whether the time period is 4.4, 5.4 years or even 8 years, however, it is short in view of the long term planning, siting, and construction decisions which have to be made during this time. Frontier states need time, for example, to gain an understanding of the workings of this new industry as well as the economic, social and environmental and siting implications thereof. Not least they need to assemble a competent staff to handle and monitor the new activity, and establish an organizational structure to do this if necessary. The period is, namely, not one of planning alone, but one of building and installing platforms, pipelines and pumping stations to recover initial production. Beyond these considerations, planners need to ensure that facilities built to recover hydrocarbons do not leave irreversible scars in the ocean or on the land once oil and gas have been extracted and producers abandon the region. This leaves precious little time to evaluate alternatives later on when the pressure to bring the resource to production is intense.

When the oil and gas industry ventured into the Gulf of Mexico in the 1950's, it proceeded first into state waters and only much later into federal waters. Few regulations existed and there was little contact between the industry and local communities. The accelerated search for offshore oil and gas in frontier states and a previously unknown environmental activism have, however, spurred states potentially affected by OCS development in the 1970's with a demand for greater participation in the OCS leasing and development program. At the same time these states have called for reforms of the 1953 Outer Continental Shelf Lands Act.[1] Amendments to that Act are now awaiting action by a Conference Committee in the U. S. Congress. If passed, as expected in 1978, they would provide states with a greater participatory role in the initial selection of tracts for leasing, review

*In Britain the time for an oil/gas field to be brought into production is measured from the time a field has been discovered, while in the United States this period is measured from the time of a lease sale. It, is assumed here that a discovery will be made within one year of a lease sale.

of lease stipulations and operating orders, review of industry exploration and development plans, environmental baseline and monitoring studies and provide them with funds, such as the CEIP mentioned previously, to carry out these and other functions. Thus such states may be in a better position in the future to handle planning related related to offshore oil and gas production than previously. This does not, however, obviate the need for early planning, acquisition of competent personnel and inventorying of suitable sites for development described in this report.

Below are some recommendations directed to planners in frontier states who may be anticipating drilling off their shore. It should be recognized that they are based on observations and interviews conducted in Scotland and should not be regarded as exhaustive. Also public agencies at the state and local levels in American frontier states including New Jersey have been carrying out many of these recommendations since the Department of the Interior accelerated its leasing program in 1973. Coastal planning under the federal Coastal Zone Management Act of 1972 and the 1976 Amendments provided the impetus and financial support for the considerable OCS planning that has taken place in the United States.

Prior to Exploration

1. State and local governments should start as soon as possible to:

   a) learn about the oil and gas industry;

   b) acquire competent personnel (including some people recruited from the oil and gas industry) to develop an understanding of the industry they may be dealing with for the next 20-30 years;

   c) Visit states where development has taken place.

2. Establish an organizational unit to handle, monitor and coordinate this new activity with other units of government which could be affected.

3. Identify objectives as to how and where development should take place and set minimum standards. Inventory the land; determine to what extent industry facilities should be clustered or consolidated, for example. Identify areas suitable for development and those which are environmentally sensitive. Determine measures which should be taken to protect areas of environmental concern.

4. Ensure that the regulatory authority exists to permit or restrict development, to grant rights-of-way, etc. Amend regulatory authority where it is deficient.

5. Identify problems (potential air, water, land use disposal, adequacy of sites, etc.) that can be foreseen arising from new industry location. Assess the extent to which potential problems may be mitigated. Undertake initial impact studies.

6. Obtain funding for planning studies.

7. Review existing applicable legislation and administrative procedures to ensure that the state's objectives are met. Where gaps exist, work with relevant administrative units to obtain reforms.

8. Establish task force consisting of representatives of oil industry, labor, environment, universities, federal, state and local governments to obtain information and serve as trouble shooting organization and clearinghouse of information. The success of such task force and the acceptability of its findings will depend on its membership. Member selection should strive to achieve a balance of views and skills. The Bureau of Land Management is currently organizing a national intergovernmental program including industry representatives to select mutually agreeable transportation routes from offshore to onshore in the various lease areas.[2]

9. Begin program of public education. Include other units in government, legislature, universities and the public. It takes months, if not years, sometimes for a new activity to obtain acceptance. Produce a guide for local officials and planners outlining the types of impacts they should anticipate from OCS-related activites.[3] Include a section for developers as to the types of procedures they will be required to follow to obtain permits.

10. Seek information on training opportunities for local people. To the extent possible, work with industry to encourage it to offer jobs to local people.

<u>During Exploration and Development</u>

11. Scrutinize industry drilling safety and oil spill contingency plans. Review industry schedules. Compare schedules with experience elsewhere.

12. Don't take anything for granted. Undertake or sponsor independent checks of data.

13. Ensure that infrastructure exists to accommodate construction crews building new facilities.

14. In addition to the basic task force (See 8) which should be meeting regularly, establish additional groups to monitor both the socio-economic impacts from offshore drilling (such as jobs, new housing, impacts on schools) and the physical impacts affecting the ocean and surrounding land and coastal environment.

15. Consider the cumulative or incremental impacts which may be generated by several lease sales and require that companies set aside additional acreage and/or capacity for increased production, to the extent feasible.

During Production

17. Since production may overlap with exploration and development, continue the actions noted under the previous section. In addition, keep abreast of production rates. Watch for possible fall offs or irregularities in production.

18. Confirm whether downstream facilities proposed in previous years are still necessary based on new information or whether new facilities, not anticipated, will be needed because of unexpectedly high production rates. In the latter case, determine where additional facilities should go.

19. Monitor impacts of downstream activites.

Shut Down

20. Determine which facilities can be converted to other uses and those which should be decommissioned for another use.

21. Consult with industry how best to reabsorb or retain workers about to be laid off as a result of shut-down.

Footnotes

[1]Some of the provisions of the 1953 Outer Continental Shelf Lands Act (43 USC 1338F) have been incorporated into administrative (Outer Continental Shelf) Operating Orders by the U. S. Geological Survey of the Department of the Interior. Funding for OCS planning was started in 1975 with a $3 million appropriation in supplemental funds under the Coastal Zone Management Act administered by the U. S. Department of Commerce.

[2]See undated monograph by Bert Rodgers, Bernie Hyde and Tom Burke, U. S. Department of the Interior, Bureau of Land Management, Role of BLM in Coordination of Planning For Pipelines on the OCS.

[3]The New England River Basin Commission, Factbook, November 1976, describing facilities related to offshore oil and gas development has proved very useful in providing information to planners. The looseleaf format of this book allows technical updates (Tech Updates) to be inserted as and when they become available. The data have been collected with funding provided by the Resource and Land Investigations (RALI) Program of the U.S. Department of the Interior's Geological Survey.

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William M. Adams, Scottish Council, Aberdeen

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Dr. R. G. McCrone, Scottish Economic Planning Department, Edinburgh

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Neil Monroe, British Petroleum, London

Robert Moore, Department of Sociology, University of Aberdeen

Peter Paige, Shell, U.K, London

Christopher Patey, Mobil Oil, London

Dr. William Ritchie, Department of Geography, Aberdeen

O. J. Shirley, Shell Oil Company, New Orleans, Louisiana

Michael Whitall, British Petroleum, Lerwick

Jonathan Wills, BBC, Lerwick

Philip Wiper, British Petroleum, Lerwick

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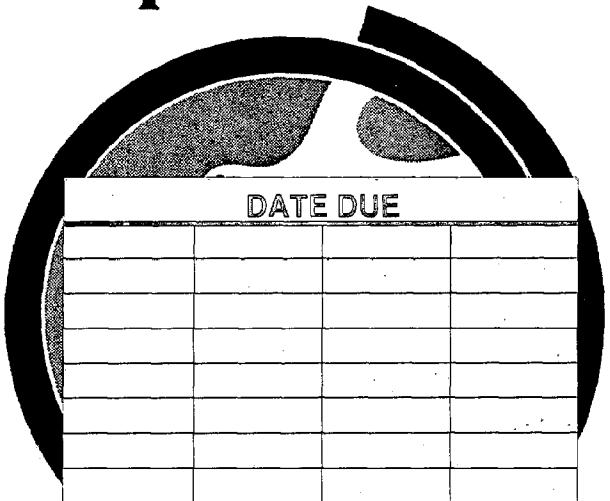

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