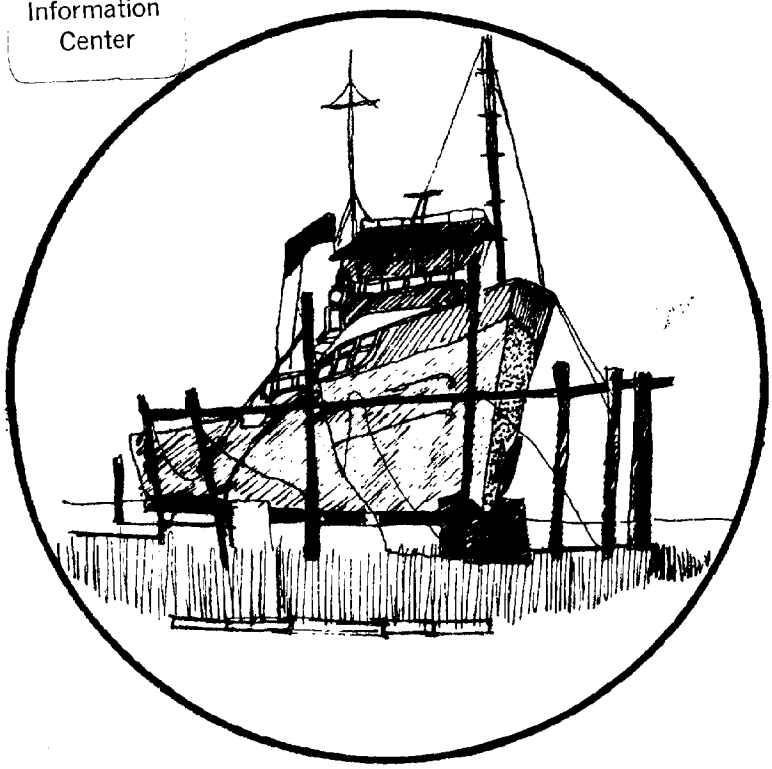
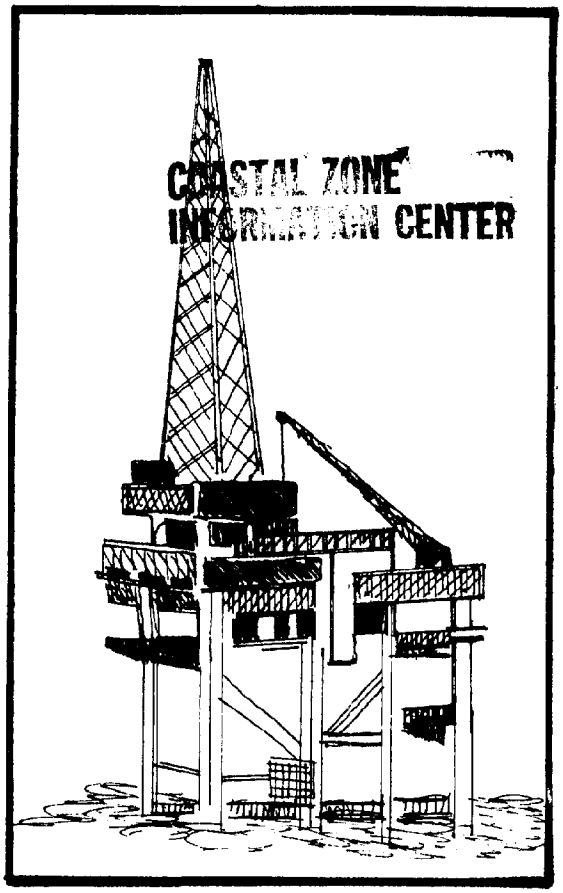
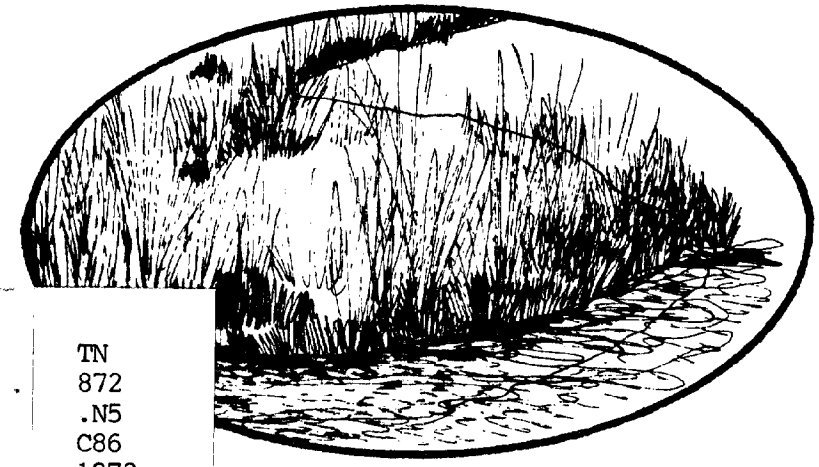




CUMBERLAND COUNTY
ONSHORE DEVELOPMENT ALTERNATIVES

AN IMPACT ANALYSIS OF OFFSHORE OIL AND GAS DRILLING



CUMBERLAND COUNTY PLANNING BOARD

CUMBERLAND COUNTY ONSHORE DEVELOPMENT ALTERNATIVES

AN IMPACT ANALYSIS OF OFFSHORE OIL AND GAS DRILLING

January, 1978

U.S. DEPARTMENT OF COMMERCE NOAA
COASTAL SERVICES CENTER
2234 SOUTH HOBSON AVENUE
CHARLESTON, SC 29405-2413

Cumberland County Planning Board
800 E. Commerce Street
Bridgeton, New Jersey 08302

This report was prepared under terms of contract to the New Jersey Department of Environmental Protection, Office of Coastal Zone Management, with financial assistance under the provisions of Section 305 of P.L. 92-583 Federal Coastal Zone Management Act of 1972.

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PREFACE

OUTER CONTINENTAL SHELF (OCS)

In 1977, the New Jersey Department of Environmental Protection made available funds to Cumberland and eleven other counties for the study of the possible implications of OCS activity for New Jersey. Emphasis was to be placed on the onshore impact which might result from the leasing program of the U.S. Department of Interior. Facility planning for OCS development was the ultimate goal.

BACKGROUND

Limited supplies of fossil fuels onshore resulted in the exploration for these resources offshore. The earliest offshore production in the USA began in 1896 off Summerland, California.

Initially, offshore oil production in both California and the Gulf of Mexico was limited to shallow waters, not far from shore. Later, as the technology advanced, offshore activities moved into areas of progressively deeper water (more than 1,200 feet) and even into areas with difficult climates and strong winds, such as the North Sea and Alaska. As known onshore oil and gas reserves are depleted, new developmental areas such as the Outer Continental Shelf (Figure 1) are being sought out for development. The outer continental shelf consists of the subsea lands lying seaward of the territorial limits of the states and extending to the boundary of federal and international claims of jurisdiction.[1] In New Jersey the State's seaward boundary extends three miles beyond the line of low mean tide. The federal government had jurisdiction to 12 miles, until the recent extension of national control to the 200 mile limit. As early as 1948, President Truman proclaimed the entire continental shelf as under U.S. jurisdiction for the purpose of mineral development.

The Department of Interior (DOI) is responsible for the development and management of the OCS. On August 17, 1976 DOI held the first lease sale of OCS lands in the Mid-Atlantic Region. This was known as Lease Sale No. 40. The tracts extend off the coast from a point south of Long Island to near Cape Charles, Virginia, in water depths of 30-610 feet. The tracts are located at a distance of from 47 to 92 miles off the N.J. shore. Of 154 tracts selected for leasing by DOI, 93 were actively leased. The location of these is shown in Figure 2.

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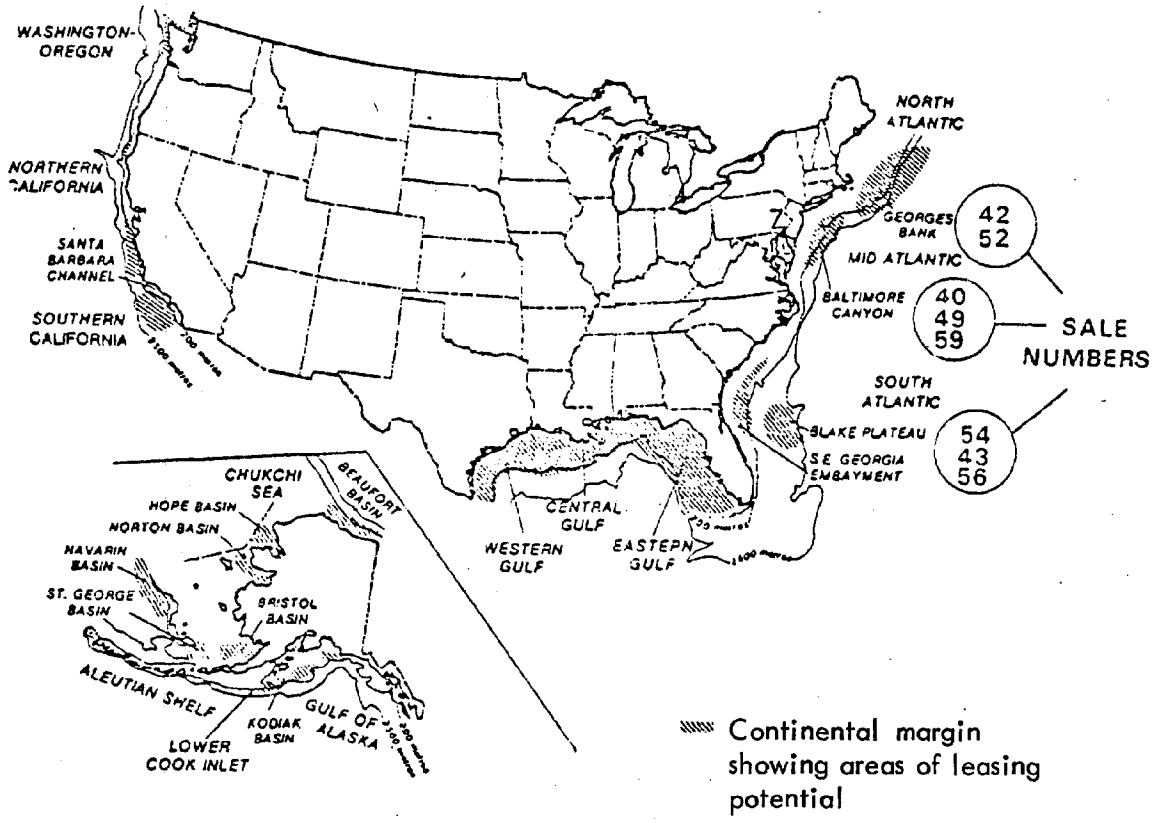
[1] Outer Continental Shelf Lands Act of 1953 (67 Stat. 462; 43 U.S.C. 1331-1343, 1964).

FIGURE 1

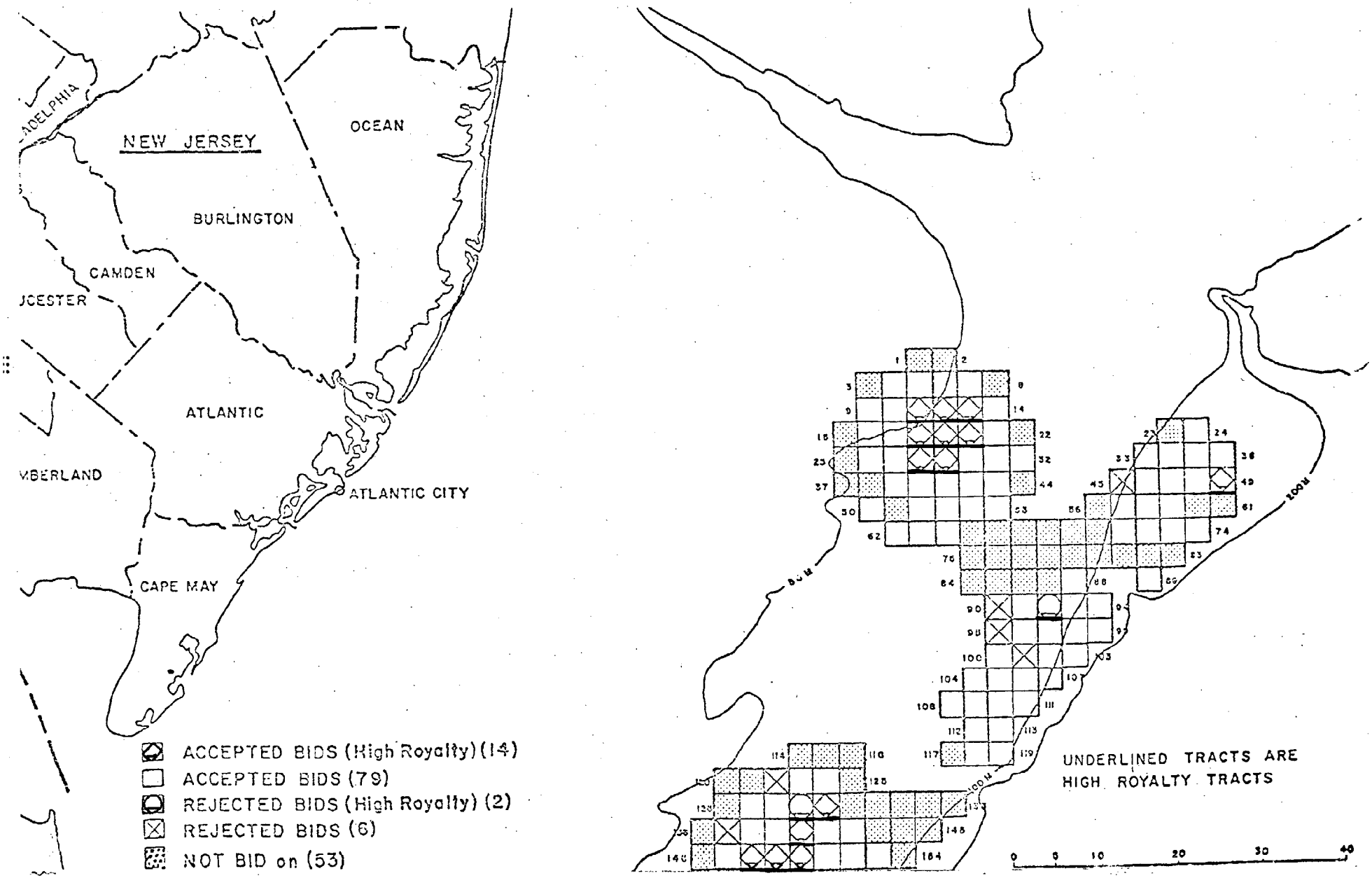
AREAS OF THE OCS UNDER CONSIDERATION FOR LEASING



Source: Leasing and Management of Energy Resources on the Outer Continental Shelf, Bureau of Land Management, U.S. Geological Survey, 1976.

FIGURE 2

DISPOSITION OF TRACTS IN LEASE SALE NO. 40



Companies or consortiums paid $1.1 billion for these leases. Participating companies are listed below:

Exxon	31 Tracts
Shell	15 "
Chevron	12 "
Mobil	8 "
Murphy	8 "
Continental Oil	6 "
Houston Oil and Minerals	4 "
Gulf Oil	4 "
Tenneco	2 "
Texaco	2 "
Transco	1 "
Union Oil	1 "

A proposed second OCS lease sale #49 in the Mid-Atlantic Region (Baltimore Canyon) is scheduled for February, 1979. For this sale the Department of the Interior has selected 136 tracts (774.273 acres) which lie off the coast of New York (Long Island), New Jersey, Delaware, Maryland and Virginia (Cape Charles). Water depths range from 115-4700 feet. The tracts are located from 60-100 statute miles seaward from the coastline. Some of these are unsold tracts from the earlier lease sale #40 in the Baltimore Canyon. The total area of proposed OCS Sale #49 extends farther north and south and seaward of that offered in lease sale #40 (See Figure 3).

No one can guarantee the extent of oil or gas reserves. Based on seismographic projections done by the U.S. Geological Survey, the American Petroleum Institute, the Bureau of Land Management and the Office of Technology Assessment, there is a recoverable reserve of oil and gas. There are great differences between the various estimates.

The Office of Technology Assessment, has developed two estimates or "assumptions" concerning recoverable resources. The low assumption estimates 1.8 billion barrels of oil and 5.3 trillion cubic feet of gas to be discovered and recovered. The second (high discovery assumption) projects 4.6 billion barrels of oil and 14.2 trillion cubic feet of natural gas. On the average, a peak production rate of from 313,000 to 650,000 barrels per day is predicted.[1] Current private and industrial usage in New Jersey requires about 680,000 barrels of petroleum per day.[2] The Office of Technology Assessment also estimates that 25 to 54 platforms would be installed on the Outer Continental Shelf, each with 24 producing wells.[3] The location and extent of oil and gas deposits can only be verified by exploratory drilling. Until it is known how much oil and gas may be present, it is difficult to predict what the actual offshore and onshore effects

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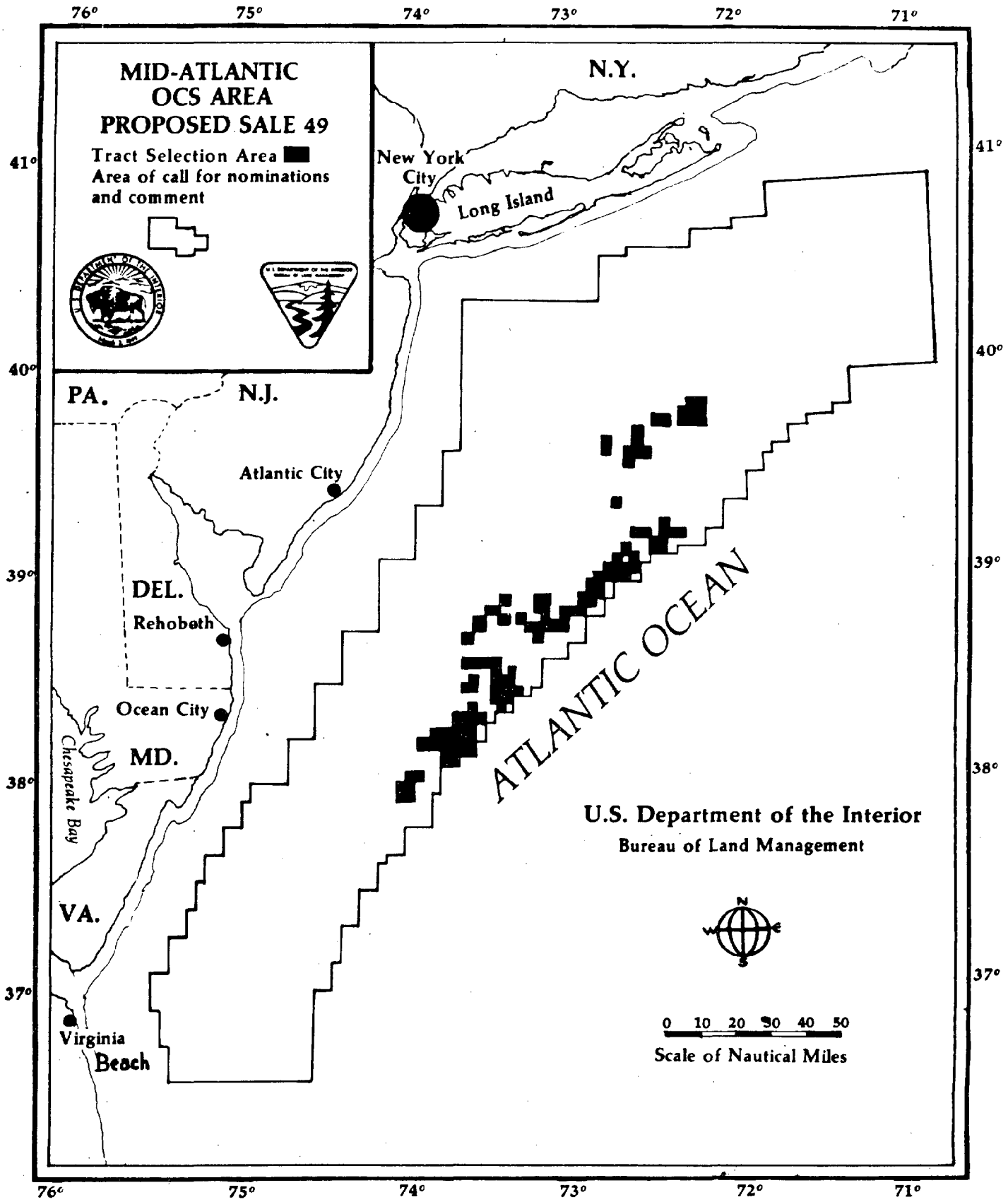
[1]Coastal Effects of Offshore Energy Systems, U.S. Congress Office of Technology Assessment, p. 15.

[2]"Byrne Won't Sacrifice Environment", Asbury Park Press, 2/16/77, P.A. p. 15.

[3]Coastal Effects of Offshore Energy Systems, U.S. Congress Office of Technology Assessment, 1976, p. 15.

FIGURE 3


MID-ATLANTIC
OCS AREA
PROPOSED SALE 49
Tract Selection Area
Area of call for nominations and comment
76°
75°
74°
73°
72°
71°
41°
40°
39°
38°
37°
N.Y.
New York City
Long Island
PA.
N.J.
Atlantic City
DEL.
Rehoboth
Ocean City
MD.
VA.
Chesapeake Bay
Virginia Beach
ATLANTIC OCEAN
U.S. Department of the Interior
Bureau of Land Management
N
W
E
S
0 10 20 30 40 50
Scale of Nautical Miles

of production may be. However, planners must consider the effects should any considerable quantity of oil and gas be discovered. In effect, they must anticipate the range of possible impacts to be expected.

Oil companies originally planned to start drilling some time in April, 1977. That plan had to be delayed because of litigation initiated by the Natural Defense Resources Council of the New York counties of Nassau and Suffolk. The questions raised concerned the adequacy of the impact statements that DOI filed on lease sale #40. It was claimed that DOI had violated, thereby, the National Environmental Policy Act by permitting the sale of lease #40. While the lower court ruled in favor of the plaintiffs, the appeals court reversed that decision. Cecil Andrus, the Secretary of the U.S. Department of Interior, now expects exploratory drilling to begin in 1978,[1] although Suffolk County has petitioned the U.S. Supreme Court to review the case.

According to State Senator R. J. Zane, the exploration state will not create a large number of new jobs for local people, since the oil companies will bring highly skilled workers from other areas of ongoing active or prior exploration like Louisiana or Texas.[2] Highly skilled personnel will work directly on the exploration platforms.

As transportation costs are a significant locational factor in siting onshore support bases, the oil companies have indicated an interest in Atlantic County, an area which is closest to the offshore tracts (See Figure 2).

Companies which expect to start drilling in 1978 (once they have obtained the necessary USGA, USEPA and US Army Corps permits) planned to operate helicopters out of Atlantic City. However, they will be using Davisville, Rhode Island, as their temporary support base, since they were offered land for this purpose at a very reasonable cost. There is, however, one Company which is interested in securing a support base in Brigantine, near to Atlantic City. An application to develop the site for a base is currently being reviewed by the New Jersey Department of Environmental Protection.[3]

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[1] "78 Target for Federal Oil Drilling, Atlantic Press, 6/10/77, pp.1,6.

[2] Senator R. J. Zane Speech "The Development of Offshore Oil and Gas Resources and the location of Support Facilities", January 19, 1977, Penns Grove, Salem County, N.J.

[3] The projected site of an onshore support base for offshore oil and gas exploration is located essentially on a wetlands site at Rum Pt. on the Brigantine side of Absecon Inlet. (Statement by Acting Comm. Rocco D. Ricci "The Role of DEP in Developing and Redeveloping Atlantic City).

ABSTRACT

This study reviews the oil company siting criteria for OCS facilities, analyzes the physical and economic potential for such development, in Cumberland County and distinguishes acceptable and unacceptable OCS and energy facility sites and areas. Included is a detailed description of the County, emphasizing economic conditions, environmental hazards and existing land use patterns. Economic and physical siting criteria are applied to determine the feasibility of siting OCS facilities within the County; zoning laws and environmental criteria help to distinguish unsuitable and suitable locations and types.

The OCS facilities which are economically feasible include: repair and maintenance shipyards, tank farms, pipeline corridors, oil and gas processing facilities, certain ancillary industires, (office and administrative functions and a helicopter support facility). The shallowness of the Delaware Bay (and shallow areas in or at the mouth of the two major rivers) preclude many facilities which require waterfront location. Within certain limitations, however, select waterfront facilities could be developed. The areas recommended for development of ancillary industries are numerous. Existing labor forces, skills and facilities (capital plant) would encourage their location in one of the area's three cities, - Bridgeton, Vineland or Millville. Existing shipyards in Dorchester are recommended as the site of a repair and maintenance facility. Millville airport is the recommended site for a helicopter support base. Constraint areas include the coasts near the oyster seed beds and oyster grounds, much of the coastal tidelands zone the Greenwich and Mauricetown historical districts and certain natural habitat areas.

The recommendations attempt to balance public and business community desires for development with both private and public desires for preserving environmental quality. While not as well developed in terms of tourism/recreation as the Atlantic shore counties, there is a considerable wealth of natural environment, amenities and cultural heritage to be preserved. On the other hand, high regional unemployment and a large, already-established, energy-consuming industrial base tend to favor some development and faster public desire for certain amounts and types of OCS impact. The recommendations herein attempt to adhere to and compromise this polarity of interests.

The role of the County and State in the siting of OCS facilities is assessed in the final sections of the study. The County is viewed as the coordinator, or intermediary, between State and Federal sectors on one hand and the municipalities on the other. Municipal agencies see it as an interpretor of regulations, a source of information, a guide in developing and planning and a defense against what the public or individual interests perceive to be potentially adverse effects of (or barriers to) OCS development.

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to the many people who aided in the preparation and assembly of this report. The advice and assistance of John J. Holland, Director of the Cumberland County Planning Board and Helga Busemann of the DEP/OCZM staff were particularly helpful in the matters of style and organization. Thanks are also due to Barbara Ackley, Chairman of the Cumberland County Planning Board and Cumberland County Freeholder Edward Salmon for their review of the report and helpful comments.

Of particular aid in securing pertinent data concerning the oyster industry were Donald E. Kunkle and Daniel O'Connor of the Rutgers University Oyster Research Laboratory at Bivalve. My greatful appreciation is extended to both of them and to L. Albertson Huber of the New Jersey Division of Fish, Game and Shellfisheries.

Specific data on the Maurice River area and its nearby facilities came from Robert Morgan, Vice Director of Dorchester Shipyard, Allen Decker, Coordinator, also of that firm, Captain Paul Cox of the Cumberland County Vocational Technical School and Van Loan Whitehead III of Whitehead Bros. Co. I am greatful for their efforts in my behalf and for the great volume of information they supplied to me in interviews and through correspondence. Lewis B. Finch, Manager of the Millville Municipal Airport provided detailed data on that facility.

Thanks are also extended to Robert Hamlin, Director of the Cumberland County Economic Development Commission for the use of his department's data.

Greatful acknowledgement is also extended to the staff of the Cumberland County Planning Board, in particular to Judy Scott, who helped in the initiation of this project and to Kenneth Sheppard who prepared the maps and did the printing of the final report.

Finally, thanks are due to Diane May and Elizabeth Smith for their patience in typing the report, its tables, and attendent correspondence. For editing, technical advice and locational theoretics, I wish to thank my husband, Chester Zimolzak, Chairman of the Department of Geography at Glassboro State College.

OCS PLANNING METHODOLOGY

The methodology used in this study utilizes the recommendations of ASPO the American Association of Planning Officials, and many other sources. ASPO supplied a skeletal framework for developing an operative plan. It organized the methodology into 22 work elements stating the objective of each element and explaining the tasks involved to reach that objective. All planning is broken down into three categories:

a) Technical planning - what are the industry requirements for each type of activity;

b) Policy planning - which areas are suitable; which are preferred; which are to be avoided or excluded and why; and

c) Implementation planning - evaluating institutional mechanisms (e.g. ordinances, zoning, government, agencies, etc.) and their ability to cope with proposals for or actual locations of OCS related facilities.

Much of the technical planning (the first five elements) is handled by the industries themselves; they set the limits and requirements for the location of each type of facility. This plan utilizes data supplied by the oil industry and the basic locational criteria, therefore, are assumed.

The resultant methodology developed for Cumberland County includes nine steps:

I Site Identification: Identification and mapping of "candidate" sites available in Cumberland County coastal area on the basis of industrial criteria.

II Site Classification: All sites were classified into two categories:

a) Available industrial land parcels which meet criteria; and
b) Available areas of vacant land not zoned industrial and/or not currently for sale, but which meet the necessary criteria.

III Land Use Regulation Assessment: All County and local plans and ordinances were consulted, as well as all relevant federal and state legislation. The purpose was to anticipate any potential conflict between the regulations of various governmental levels when applied to given parcels of land which meet the criteria supplied by industry.

IV Criteria Revision: Revised criteria were drawn up based on conflict of interest data obtained from surveying other industrial, public and private users of the area. Meetings were (and will be) held with special interest groups, agencies and officials.

V Site Selection: Ultimate decisions (based on surveys of industry, public opinion and law) as to which sites are not only suitable but also generally acceptable.

VI Review of Data and Precedent: Other sources of data and comparable plans from other coastal areas were reviewed to insure legitmacy of decisions.

VII Both long range and short term planning objectives were determined. A preliminary schedule was developed emphasizing those projects likely to happen first.

VIII Locational decisions were cross-checked with industrial location theory and locational analysis literature, categorizing industrial types as definite, probable, and possible. Types were assigned priority in terms of both need and chronology (time/order).

IX A survey was made of existing industrial and service facilities which might be useful; certain industrial facilities and buildings may meet some oil and gas related needs. They contain some capital equipment and/or are put to similar usage. These facilities may qualify for conversion, expansion or adaptation. Methods used to obtain data and reach decisions included: field research, plan assessment, library research, telephone survey, personal interview, correspondence, public meeting attendance, survey of comparative literature, media survey and clip file, technical consultancy, map analysis and interpretation, and consultation with various government and technical agencies.

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CHAPTER I

PHYSICAL, CULTURAL AND ECONOMIC CHARACTERISTICS OF CUMBERLAND COUNTY

A. INTRODUCTION

This summary presents the findings of the study entitled "Cumberland County Onshore Development Alternatives - An Impact Analysis of Offshore Oil and Gas Drilling" which was completed for the New Jersey Department of Environmental Protection, Office of Coastal Zone Management in December of 1977.

The report was prepared within a year, with financial assistance from NOAA, through the DEP/OCZM, under the provisions of Section 305 of P.L. 92-583 Coastal Zone Management Act of 1972.

The U.S. Congress, recognizing the distinct and irreplaceable value of the county's coastline, promulgated a law, The Coastal Zone Management Act of 1972, within which we read" . . . it is national policy . . . to preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone for this and succeeding generations".[1]

The New Jersey State Coastal Zone Management program recognizes and considers national interest in the planning and siting of energy facilities. State and County energy policies, especially important because of the Department of Interior's sale of lease #40 in the Baltimore Canyon Trough for oil and gas exploration and production, take into consideration the Middle Atlantic States' role in national energy management and supply.

This report is a part of the New Jersey Coastal Zone Energy Facilities Planning Program in which twelve New Jersey coastal counties participated (Cape May, Cumberland, Salem, Gloucester, Camden, Atlantic, Burlington, Ocean, Monmouth, Middlesex, Union and Hudson). The location of Cumberland County is shown in Figure 4.

The program was directed by David Kinsey of the Office of Coastal Zone Management, Department of Environmental Protection in Trenton. The objectives of the study are as follows:

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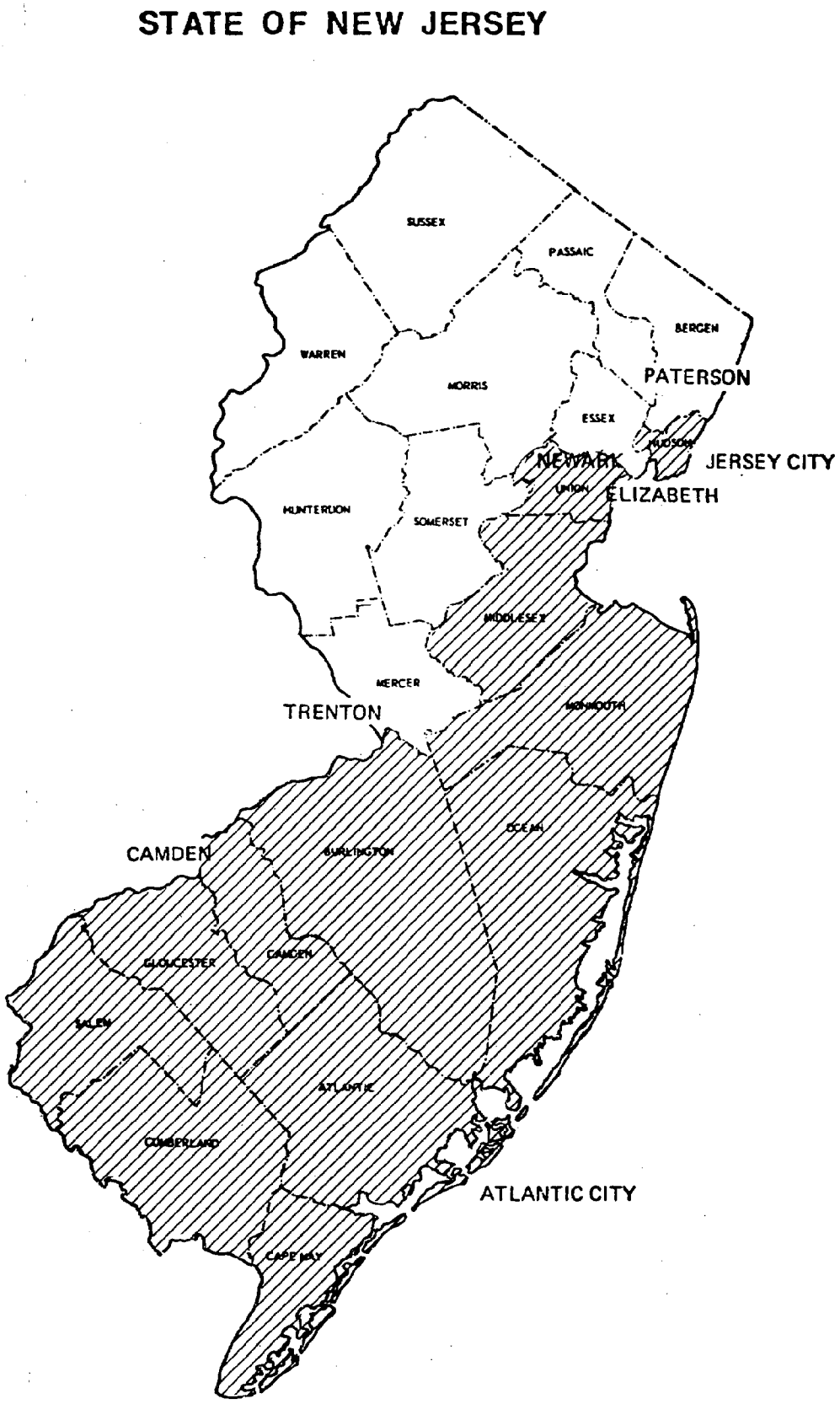
[1]The Coastal Zone Management Act, Section 303.

FIGURE 4



COUNTIES PARTICIPATING IN OCS ENERGY FACILITIES PLANNING PROJECT

a) Identify the suitability or unsuitability of sites for energy facilities, (including the planning process) and an assessment of beneficial or adverse impact;

b) Help the State in the creation of a Coastal Zone Management Plan, and also assess its responsibilities in meeting regional and local energy needs; and;

c) Help the Federal Government in planning the energy supply and allocation for the Country.

In response to fulfilling these objectives, a general survey of the coastal areas of Cumberland County was done. Portions of ten municipalities were included in the study; not only those which border directly on the Delaware Bay (the Township's of Maurice River, Commercial, Downe, Lawrence, Fairfield and Greenwich), but also the cities of Millville and Bridgeton and the Townships of Stow Creek and Hopewell which include tidal portions of streams entering the Bay. Two rivers, the Maurice and Cohansey, have some potential for navigation and, therefore, the siting of facilities related to OCS development. About 44% of the County (221 square miles) is included in the region under the Coastal Area Facility Review Act, 1973.[1] (See Figure 5) About forty miles of coastline is included, together with coastal wetlands and certain drainage areas contiguous to the two major streams. The Delaware River and Delaware Bay (adjacent to the County) form an intensively used waterway for deep water shipping, intracoastal navigation and shipment, industrial waste disposal, commercial fishing and some recreational activity (particularly boating and pleasure fishing). The upper reaches of the Bay and River from Salem to Trenton, is one of America's most intensively industrialized areas. Raw materials, fuel, grains, manufactured goods and construction materials move to and from the industrialized zone via the Bay to the open ocean.

Cumberland County is near this industrial region but is not directly a part of it. It is along the route of shipment but it has not benefited economically from it directly. While Cumberland County now has little industry which is related to movement through the Bay, it has a limited potential for such development. Such industrial usage may present the County with certain problems and conflicts over land use and water use. Recreational and fishing uses, in particular, are concerned with the potential problems which might arise as a result of local OCS development.

Of all the possible areas and usages open, only a few are practical, given environmental, economic and natural (physical) constraints. Much of the coastline and wetlands are in fish and wildlife management areas. The Bay is extremely shallow over much of the area adjacent to the County. The two rivers have shifting, meandering channels and will require periodic dredging if used for boats with any considerable draft. Marinas and pleasure craft tend to congest the coastline, the rivers and parts of the Bay. Despite limitations, some development is possible, perhaps even desirable. Currently, nuclear power plants have been developed in the Bay area just north of the County. Proposals for development may be anticipated for the lower Delaware Bay as energy usage and demands increase.

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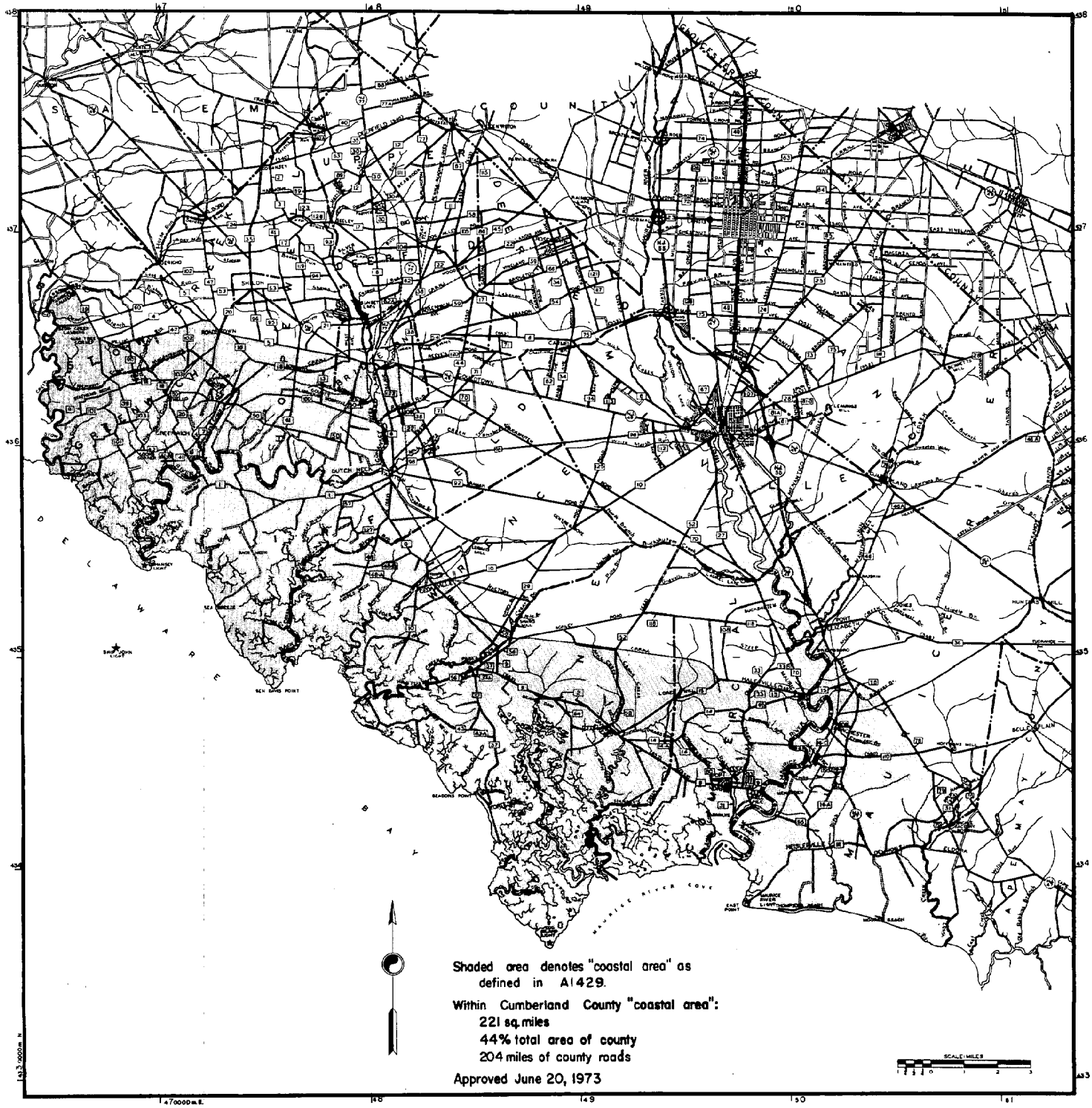
[1] "Coastal Area Facility Review Act" P.L. 1973, Chapter 185, approved June 20, 1973.

Figure 5

CUMBERLAND COUNTY AREA DESIGNATED IN "COASTAL AREA FACILITY REVIEW ACT" OF 1973



MAP PREPARED BY THE CUMBERLAND COUNTY ENGINEERING DEPARTMENT

In Cumberland County, the Bayside tract of land (Greenwich Township) is owned jointly by PSE & G Company and Atlantic Electric Company, and is under consideration as one of several possible sites for future (not yet designated) nuclear units in the late 1980's to early 1990's. The size of nuclear units is expected to be similar to those already existing in Salem, and four such units may be located at the Bayside tract.

Associated with the installations of generating capacity, there would be concomitant installation of electrical transmission outlet capacity to transport the power northward to major New Jersey power distribution centers and to integrate the Bayside with the Pennsylvania-New Jersey-Maryland Power Pool.[1]

If oil and gas are found offshore, (Baltimore Canyon Trough), there is a likelihood that pressures for new nuclear facilities will decrease while pressures for new oil and gas related facilities increase. Even if nothing is found, a certain number of support service bases, repair and maintenance facilities, and other onshore based operations will be required for the exploration phase. Increasing pressures from environmentalists and tourist interests along the Atlantic Coast seashore, together with high (and increasing) land costs, may discourage or limit the possibility for potential energy facility sites there. As an alternative location, Cumberland County offers some possibilities.

How much investment will actually result from any oil or gas finds which might occur is as yet unknown. Projected reserves are not great compared to other producing areas, nor is exploitation guaranteed. Marketing along the east coast is more than probable. Refining capacity in the industrialized Delaware River area and the Raritan Bay area is already in place; it is not likely that any new refineries will be built.[2] The petrochemical industry of the area is no longer expanding; only limited new facilities may be developed. Resultant production from Baltimore Canyon will be transported to these existing refining and manufacturing locations. Offshore oil is viewed as a replacement for currently imported foreign fuel supplies.

The oil poor, energy difficient Northeast is almost wholly dependent on fuel supplies from outside the area (particularly the Middle East). New local supplies will more likely stem the exodus of industry and population rather than bring about great new investment and growth.

The possibilities and facilities studied are limited in scope; all types of positive and negative impacts are accorded evaluation. Because of the limits of navigation (physical and/or economic), only repair and maintenance yards, pipe coating yards, supply bases, drilling mud supply areas and stockpiling/warehousing facilities have been considered. The shallowness of the New Jersey portion of the lower Bay and preexistent plans for the State of Delaware appear to preclude the development of any deepwater port facility along the New Jersey shoreline. Transco Exploration Company is not planning the location of any deep water port in the Delaware Bay (near Greenwich Township).[3]

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[1] Letter with this information received from PSE & G Company, Newark, N.J. Copy of the letter is attached to the report. Appendix 1.

[2] Information submitted by representative from Shell Oil Co., Meeting Feb. 14, 1977 in Trenton

[3] Letter from Transco Exploration Company is attached to the report. Appendix 2.

Since 1972, U. S. domestic production of natural gas has been declining. Additional imports of gas in the form of liquified natural gas (LNG) are generally more economical in terms of transportation and storage. LNG facilities required include liquefaction plants at the producing fields, large oceangoing LNG tankers, import receiving terminals, storage depots and gassification plants, and gas transmission pipelines. Capital investment for these facilities is extremely high. Associated with these facilities are certain environmental and socio-economic impacts. Currently, an LNG import terminal is in operation at Everett, Mass., in the densely populated Boston vicinity.[1] It is owned by the Distrigas Corp., and is receiving gas from Algeria. The other major operational project involves exporting LNG from Alaska to Japan. A third project has recently received FPC approval while several other projects are in various stages of construction or planning but have not received full FPC approval. Some projections indicate that at least 10% of the total U. S. gas demand will be supplied by LNG imports by 1985. Prospects for locating LNG facilities in the Delaware Bay area are not yet mature. We need extensive study on this subject. The OTA Oceans Program proposes to conduct a preliminary technology study of an LNG transportation system. The General Accounting Office is also conducting an LNG study which is specifically a detailed safety and risk analysis. LNG facilities would likely meet with a great deal of local public opposition. Navigational congestion makes the location of such facility questionable in the Delaware Bay area, despite the desparate need for additional, lower-priced natural gas in the region. Electrical generating facilities based on oil or gas are a distinct possibility, should costs be sufficiently high to warrant the building of new facilities. Pipelines are an alternative to water shipment. Such pipelines, pumping stations and attendant maintenance, repair and stockpiling facilities are considered even though water transportation is generally much cheaper where available.

All these possibilities are considered in accordance with their ability to be located economically in the County, their compliance with federal/state laws and municipal codes, their impact on the environment and their anticipated effects on existing land use and service infrastructures.

In addition, in an effort to broaden planning beyond the limits of impact alone, special attention is paid to the abilities of already existing local facilities to meet the needs of any projected increase in economic activity. Area manufacturing, transportation and service functions and facilities are analyzed with an eye to their contributory possibilities and their effectiveness in meeting the projected needs of OCS developmental demands.

Further, there is the inclusion of an analysis of all available industrial zoned sites and available sites not zoned industrial, located in study areas. Certain of these have direct utility for OCS related usage; others are assessed in terms of their utility for indirectly related industrial activity.

Pipe and cable works, drilling machinery plants, pressure gauge and fluid or gas control device manufacturing facilities are among the industrial types which might be located in the County, depending on the success of explorations in finding large reserves. Any such auxiliary industry is not generally owned or planned by oil companies but may be located in the County by other

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[1]LNG Tankers Fuel Terminal Debate, Atlantic Press, 1-5-78.

private interests in response to industry demands. Such analysis is tempered with the knowledge that some such facilities already exist in New Jersey and the Delaware Valley. Location of any new plants will depend, in large measure, on the inability of those facilities to meet demands or on the decision of competing companies not currently located in this area to build, new facilities here.

B. HISTORY OF THE DEVELOPMENT OF THE COUNTY

Cumberland is one of New Jersey's less completely developed counties. With a little more than 120,000 inhabitants and an area of 503 sq. miles, it ranks among the least densely populated of New Jersey's counties. Three cities, Bridgeton, Vineland and Millville, concentrate 75% of the total population. Small settlements along Route 553 and the lower Maurice River and a group of suburbs encircling the municipal boundaries of Bridgeton account for much of the rest of the population. Vast areas of the County, particularly the coastal zone and the eastern portions, are extremely sparsely populated. Farmland is overwhelmingly concentrated in the western half of the County and the region immediately adjacent to the settled core of Vineland.

The County was formed in 1748 from a portion of Salem County. The earliest settlements were associated with fishing and whaling along Delaware Bay. The great farming potential of lands in the western half of the County resulted in an extreme concentration of population in that area until the Civil War.

Industrial enterprises have long been an important part of the economy. Glass, made from high quality local sands, was the first major employer, and remains the most important single industrial employer. Food processing has been a major employer for over 100 years as have textiles and clothing. In general, the County posesses a light industrial base, though forges, foundaries and shipbuilding have been important at various times.

In the most recent decades, foreign competition (glass, clothing, textiles), the movement or consolidation of plants (food processing), and the economic downturn have left the County with an unstable industrial base and a high rate of unemployment.

The location, adjacent to the megalopolitan corridor and midway between the densely populated areas of the Jersey Shore and the Delaware River Valley,has never been fully exploited. Growth has been steady, but employment fluctuations and disparate growth patterns in various economic sectors have led to an uneven and frequently changing developmental pattern.

The potential for development in conjunction with OCS oil and gas exploration is generally regarded with positive feelings by the local people. The public perception is generally one of need to develop the County to a greater extent. To be sure, environmental considerations are part of the public concern, but OCS is definitely not viewed in a negative manner in Cumberland.

C. PHYSICAL MILLIEU

Cumberland County is a part of the Atlantic Coastal Plain. The area is best characterized as "flat", though a few areas in the western portion of the County might be loosely called "hilly"

or rolling. Only a very few stream bank areas exceed 10% slope and some 98% of the County would fall in the category of 0 to 3° slope. While flat land is not a scarce commodity in South Jersey, the area posesses some additional physical advantages. There is a plentiful local water supply, much of the land is quite well drained, the area has frontage on the Delaware Bay, two navigable (and improvable) rivers are present, and much as yet undeveloped space exists.

The coastal areas are extremely flat and most (though not all) of the coastal zone is categorized as tidal wetlands. Over 50,000 acres are classified as such, and a considerable portion of the wetlands have been reserved as fish and wildlife management areas. These wetlands have an additional function, serving as a buffer for inland areas against damage from marine storms. The coastline itself is fairly irregular, with a half dozen peninsulas of noticeable size. Several small boat ports exist, but larger vessels have always sought harborage along the County's two major rivers. The Bay areas adjacent to the County are quite shallow south of the Cohansey River, but soft bottom has allowed vessels of 15-18 ft. draft to navigate at high tide. The main channel for deep draft vessels follows a route through the approximate center of the Bay. The Maurice and Cohansey Rivers posess some potential as navigable streams.

While local flooding can and does occur, it does not often present any great problems. The 20 foot contour roughly parallels the coast at a distance of one to two miles inland from the coastline. The sandy soil provides for quick, efficient vertical drainage, and surface accumulations of standing water quickly disappear.

Ground water reserves are extremely good. Most industrial, commercial and residential supply comes from wells rather than surface sources. There are several dozen lakes and ponds used for supplemental irrigation and recreational purposes. While no shortages or major pollution problems have occurred to date, the water resource is not completely documented. Much of the water is quite "soft" and free of undesirable impurities. Ground water supplies in adjacent counties, in particular those of the Pine Barrens area, are enormous.

The soils of Cumberland County tend to be extremely sandy. Those of the Southeastern third of the County tend to be the coarse sands of the outer coastal plain, while the northwestern areas are covered with soils of finer particles, characteristic of the inner coastal plain. None of the soils in the County are of outstanding fertility, and most of those classed as "farmable" are already under cultivation. Drainage presents problems largely in those areas immediately adjacent to streams. The percolation qualities of the area soils are usually satisfactory to good in areas not immediately adjacent to the coast or to major streams. Detailed information on soils is available for most townships and municipalities in the County.

D. EXISTING ECONOMIC BASE

1. Industrial Base

The Economic base of Cumberland County includes some mineral industry and a fair development of the sales/service function. However, it is increasingly a manufacturing area, - emphasizing consumer goods and light manufactures.

The chief industrial employers are glass, food processing, clothing and textile operations. Only glass and food processing are based on local area resources. Glass, in particular, has

a long tradition in the area and that industry has created a local pool of skilled labor. Some of these skills, however, are limited to that industry, and have a low-level of transferability. The others depend largely on unskilled or semi-skilled labor and generally pay lower wages. Unlike most South Jersey counties, only a limited number of people commute outside the County to their place of work. As such the labor force is essentially self-contained (Table 1).

Local industries have not proven particularly stable employers. The County unemployment rate is in excess of 10%, well above state and national averages. As in the nation at large, minority unemployment rates were higher. Although area unemployment has been reduced over the last year, the County is still regarded as a chronic unemployment area.

Table 1

COMMUTING IN THE CUMBERLAND COUNTY AREA

State	County of Residence	Commuters to Cumberland
N.J.	Atlantic County	2,049
	Cape May	461
	Gloucester	1,917
	Salem	1,893
	Other N.J. Counties	1,142
	Total	7,462

State	County/Area of Destination	Commuters from Cumberland
N.J.	Atlantic	970
	Cape May	207
	Gloucester	713
	Salem	1,035
	Other N.J. Counties	616
Penna.		897
Delaware		214
	Total	4,652
	Net commuting balance	- 2,810

Source: U.S. Census 1970

The glass industry has been suffering from both domestic and foreign competition. While high grade glass sands are available locally, the absence of fuels (gas) locally has resulted in a shaky supply. Glass employment increased in 1976, but the picture is not overly bright, as evidenced by the currently threatening cutback at Owens Illinois in Bridgeton[1]. The federal government rates glass as a slow-growth sector. Competition from foreign glass, domestic alternatives (paper, plastic, steel, aluminum), legislation (in several states) banning throw away bottles, and projected increases in price/decreases in supply of natural gas are the important negative factors. Locally, aging equipment is also blamed for loss of competitive advantage. Banning of plastic food containers, higher prices of metals and increases in home canning are positive factors in the future of glass.

The garment industry has continued to decline under pressures from cheap foreign imports. No contrary trend is apparent, as more of the underdeveloped areas of the world institute export-oriented garment industries. Textiles suffer the same competitive pressures from the same sources.

Food processing has continued to decline radically as an area employer. Obsolete structures and equipment as well as increased mechanization are often stated as the cause. Decreasing farm acreages, competition of produce from the South and West, increased produce imports from Latin America (and processed foods), as well as diminishing local production of fruits and vegetables adversely affect the area. Increases in meat-packing and fast foods can be anticipated however, and Seabrook Bros. & Sons, Inc. plans a new plant.

There are five strong negative factors which adversely affect industrial location and diversification within the area:

1) the absence of a stable fuel supply within the region;

2) the low level of skill in some segments of the area labor force;

3) an outmoded, obsolescent or overspecialized industrial plant;

4) a weak transportation infrastructure, coupled with peripheral location (off New Jersey's "main street", no large markets to the east, other counties closer to megalopolitan centers); and

5) the general economic stagnation (or decline) of the Northeast and nearby market/manufacturing centers.

2. The Agricultural Base.

Farmland represents about 25% of the total area of the County. It is located primarily in the north-central and western portions of the County, adjacent to the municipality of Bridgeton and within the corporate limits of Vineland. Truck farming is dominant in most of the County,

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[1]Owens-Illinois Inc., News Bureau, January 10, 1978

though dairying, poultry and grain production are represented. The area has witnessed several booms in certain commodities: grapes, peaches, poultry, eggs, and a half-dozen different vegetable crops. Disease, changing markets and demand fluctuations have created problems for area farmers and necessitated repeated investment and technological change.

The original farms in the area were small family units. In the markets of the last 30 years, such units were unable to remain competitive and consolidation into larger units took place rapidly. Vegetable farming, however, does not require units of enormous size. Proximity to the markets of megalopolis, a slight climatic advantage over inland areas, and plentiful water supplies early encouraged the emphasis on truck farming. Recent expansions in Southern produce farming and improved transportation routes from those areas have seriously sharpened competition for the region.

Throughout South Jersey, land development pressures have made serious inroads into the base of agricultural land. Such pressures in Cumberland County exist, but have not sharply reduced the number of farms nor greatly reduced the acreage.

Recently the supply and price of farm labor has become a problem. Higher wages, better working conditions and better living conditions required by law have greatly increased labor costs. At the same time there is a marked tendency to increase mechanization and/or switch to crops which do not require hand labor to any great extent.

For many years a complimentary economic arrangement existed between three segments of the area's economy: farmers, food processing plants and the glass industry (containers). In recent years this interrelated economy has been disrupted. Steel, paper and plastic containers, generally manufactured elsewhere, have proven strong competition for glass. Several area food processing plants have closed. Some farmers have changed to grain and soy bean production from vegetable farming. The construction of grain elevators (Upper Deerfield) and increased national/international demand have made this conversion easier. Area poultry farming has declined rapidly in the face of falling prices (until recently) and competition from the Southeast and Upper South.

Despite changes, the area's farm economy is reasonably healthy. Employment continues to drop, creating a large pool of locally resident, unskilled labor, but farms continue in business,-operated by owners and reduced labor forces. Area production can be marketed locally should demand increase, and area food prices, particularly for produce, are quite low.

3. Fish Resources

Cumberland County has a long history of fishing and shellfish production. Oysters have been "farmed" in the Delaware Bay since the 19th century. Pollution controls, established over the last ten years, have cleaned-up the Bay to a certain extent; increased yields and catches will probably result. Some 15,000 acres of oyster beds in the Delaware Bay are potentially productive.

After long bouts with oyster drill damage, pollution problems, and especially MSX disease, all of which caused reductions in the oyster harvests, the industry is showing some signs of

recovery. Some large harvests in the lower Bay, an area which suffered almost total decline, have brought renewed activity in the oyster planting and along the lower Maurice River. Winter weather (Jan. 1977) caused great damage to docks and vessels. Finfish are relatively unimportant, though small boat and shorefishing do a brisk tourist business on some of the County's small Bay settlements. Oyster and crab catches are of commercial importance.

4. Tourism and Recreation

This economic sector has received relatively little emphasis. The County's beaches are littered and badly maintained. Offshore waters are often muddy and are certainly less than ideal for (ocean) swimming. There are no state parks or tourist-oriented state forests within the County, though two such facilities straddle the County's borders.

There are many positive attractants which are little known and not widely used. Outstanding municipal park systems exist in all three cities, Bridgeton, Millville and Vineland, all of which possess artificial lake swimming facilities. Almost no town the size of Bridgeton, anywhere in the Country, can boast such a fine zoo. Several small museums, a number of excellent historical sites, excellent period architecture (Bridgeton, Greenwich), a commercial-industrial-recreation complex (Wheaton-Millville) and much better than average hunting and sport fishing prospects round out the existing potential.

There are several community groups currently organized to develop and improve tourism and recreation in the County.

Increasing popularity of boating has seen an increase in the number of marinas and boatyards in the County. There is some problem in serving all storage demands. Some 600-700 berths exist. The quality and type of services available are highly variable.

5. Existing Transportation Network.

The transportation infrastructure of Cumberland County is relatively weak. There are no major through routes of any great importance. The highway network consists mainly of two lane roads; local road density is high, but primary route density is quite low. (Not one federal, numbered route traverses the County). The railroad network reaches the three urban centers, but lines dead-end in small settlements in the interior of the County. There is no direct rail connection between Millville and Bridgeton. Most airports are used exclusively by crop-dusters (some four in number) though Millville Airport will now institute commercial service (Allegheny Air Lines). Shallow draft craft and pleasure boats make use, currently, of the two navigable rivers.

a. The existing highway system has several strong positive characteristics. Route 55 is complete for most of the length of the County. A four-lane, limited access freeway, it provides rapid connection between Millville and Vineland, the two largest cities, at the same time it circumvents urban congestion. It's terminus (current) near Port Elizabeth gives it access to the navigable Maurice River. Extension of the route to Cape May County, (the Garden State Parkway) and northward to N.J. 42 can be relatively easily accomplished. It has an extremely wide right-of-way and might be considered as a possible route for an oil or gas pipeline. It has direct connection to state route 49 and U.S. 40, major east-west routes which converge

on the Delaware Memorial Bridge, the N.J. Turnpike and Interstate 295 - all in Salem County. In general, County roads are well maintained. (See Figure 6).

b. The railroad network of the County is rather sparse, but could be made comprehensive with a few connections. (See Figure 7) Rails serve all but four of the municipal divisions, those four in the extreme west. The Cohansey river is not paralleled (or served) by a railway below Fairton, but the Maurice River is served to Dorchester. An abandoned section (Dorchester-Leesburg) could be refurbished, as the right-of-way is in fair shape. Conrail currently operates all rail lines. Direct connections exist to the Delaware Valley (Philadelphia-Camden) and to the New York - N.E. New Jersey metropolitan area. A three mile extension (and bridge), from Commercial Township to Bricksboro, would give the Maurice River area complete and direct access to the total New Jersey rail network.

c. The area's two navigable rivers have considerable unused potential. The Cohansey has a 15-20 foot draft for most of its length from Fairton to its mouth on the Bay. Dredging is necessary in several places on the inside of its meanders. The Maurice River requires dredging at the mouth and in three small segments in order to maintain a 15 foot channel to Dorchester. Currently boats of 11 to 14 foot draft are repaired at the existing Dorchester shipyard. The bridge at Mauricetown hinders navigation above that point.

d. There are five airports in Cumberland County of which four are classified as general aviation airports. (See Table 2). These four are small fields with private plane, air taxi and aerial spray application services. The fifth is Millville airport, a large and growing unit which has recently instituted full-scale commercial service in addition to commuter flights. (Allegheny Airlines, commercial; Jersey State, Aero Service - commuter) (See Figure 8).

The Millville Municipal Airport is located three miles southwest of the center of that city. It has a total area of 847 acres, three mile-long, paved, lighted runways, and has near ideal weather conditions by East Coast standards. The field has a key FAA Flight Service Station where flight plans may be filed. All charts and publications are available there, and complete and current weather briefing can be obtained at all times.

The airport has multiple, large hangars, paved taxiways and aprons, large fuel storage facilities, full fire protection, passenger/pilot accommodations, parts supply and even light aircraft sales. There are no landing fees. It contains one helipad, Class III, and complete helicopter services. Adjacent to the airport is a large industrial park known as Airpark Industry. (For details, see Appendix 3).

6. Existing Energy Facilities

Currently there is only one power plant in the County, located in Vineland, having a generating capacity of 67 megawatts (steam) and 29.9 megawatts (combustion turbine). The facility was built in 1936 to burn coal. There are 7 fossel fuel fired units. Once converted to oil it has returned to coal generation. The plant is city-owned. Other power needs are served by Atlantic Electric. In addition to transmission lines from other plants outside the County, it has two oil-fired generators located in Upper Deerfield Township near Carll's Corner, used for peak demand period generation. Two large nuclear generating stations exist in adjacent Salem County. One is currently in service. Public Service Electric and Gas Company owns

FIGURE 6

EXISTING HIGHWAY SYSTEM
CUMBERLAND COUNTY, N.J.
1977

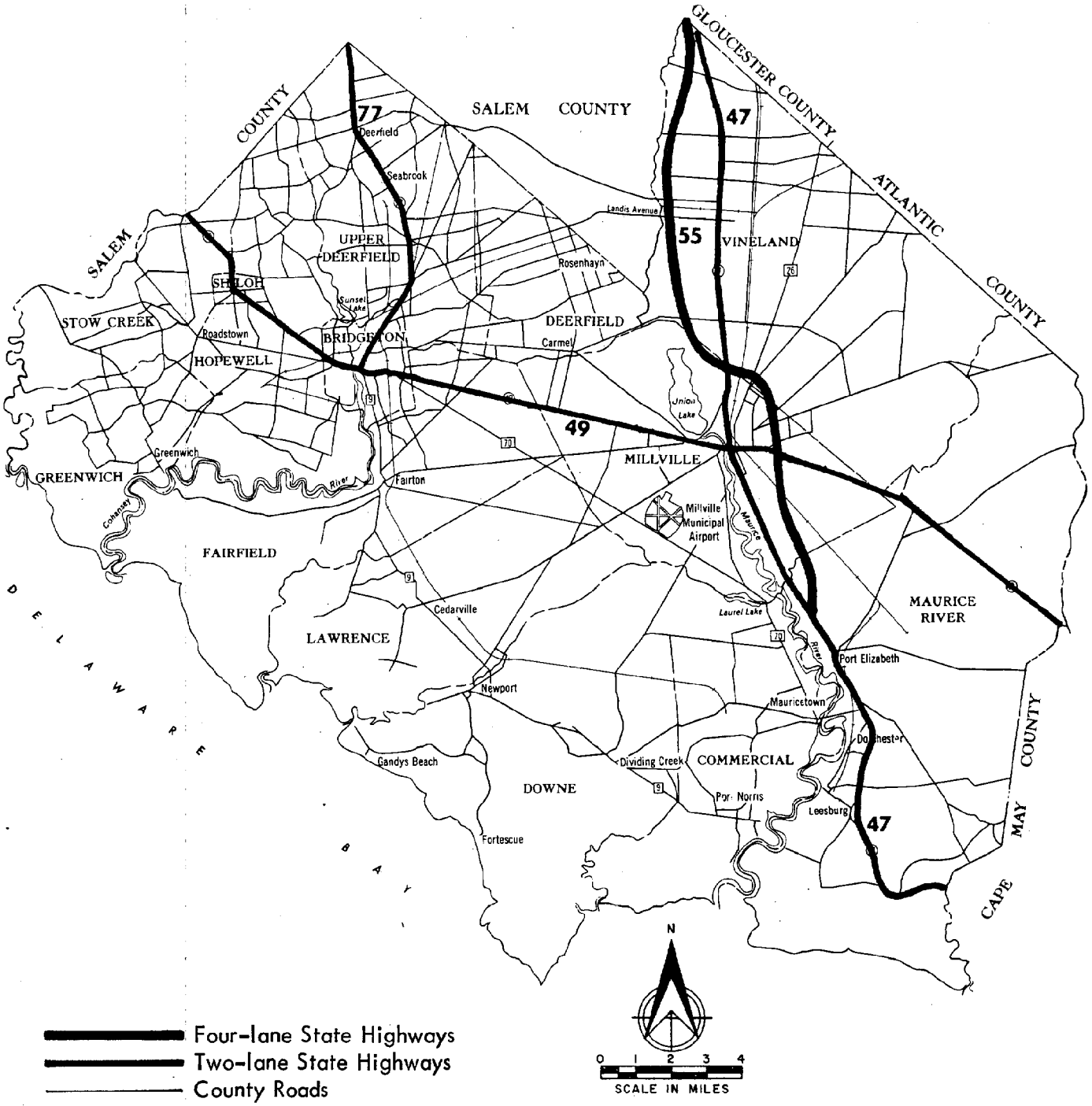

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FIGURE 7

RAILROAD LINES
CUMBERLAND COUNTY, N.J.
1977

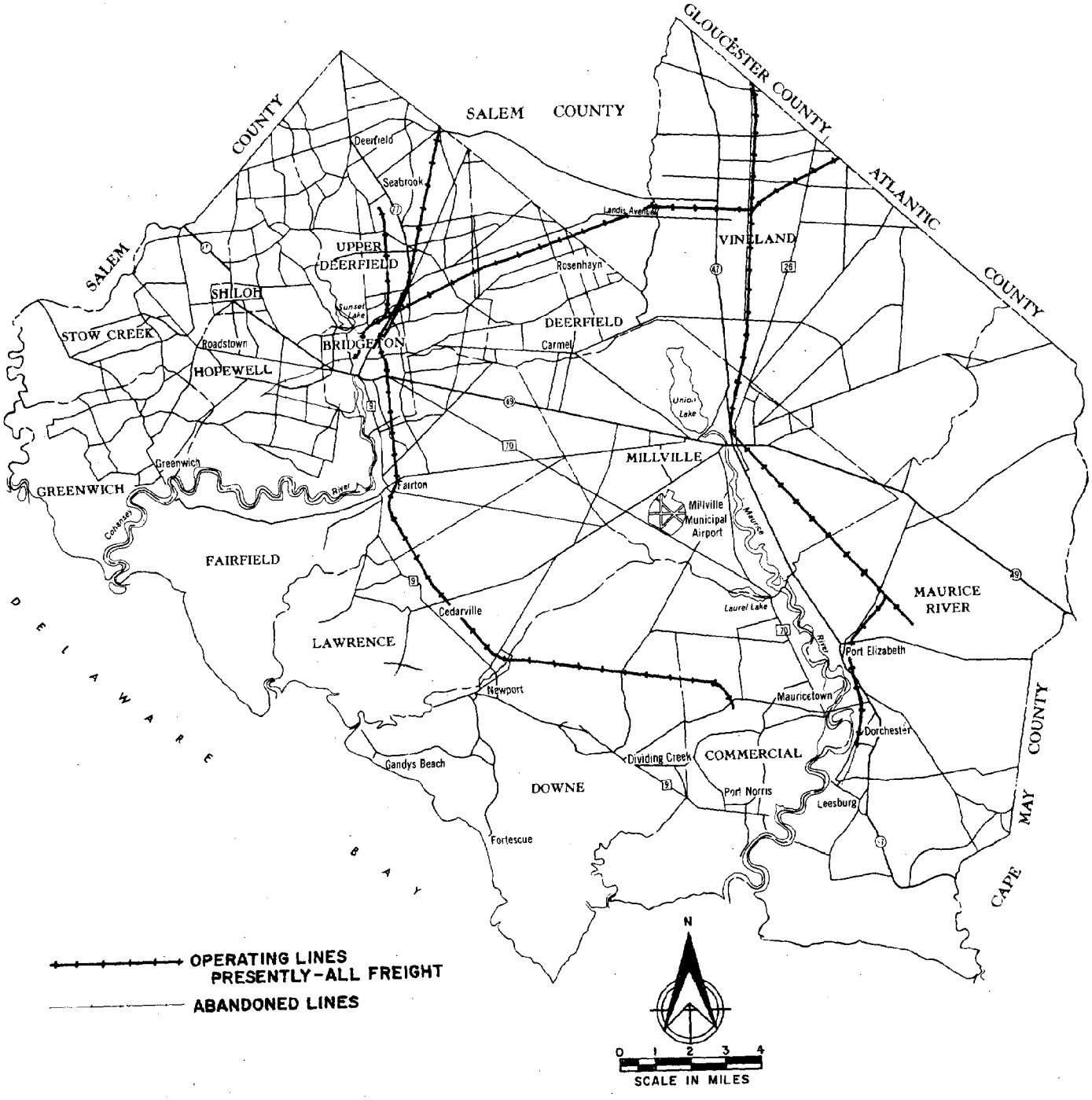

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FIGURE 8

AIR TRANSPORTATION FACILITIES
CUMBERLAND COUNTY, N.J.
1977

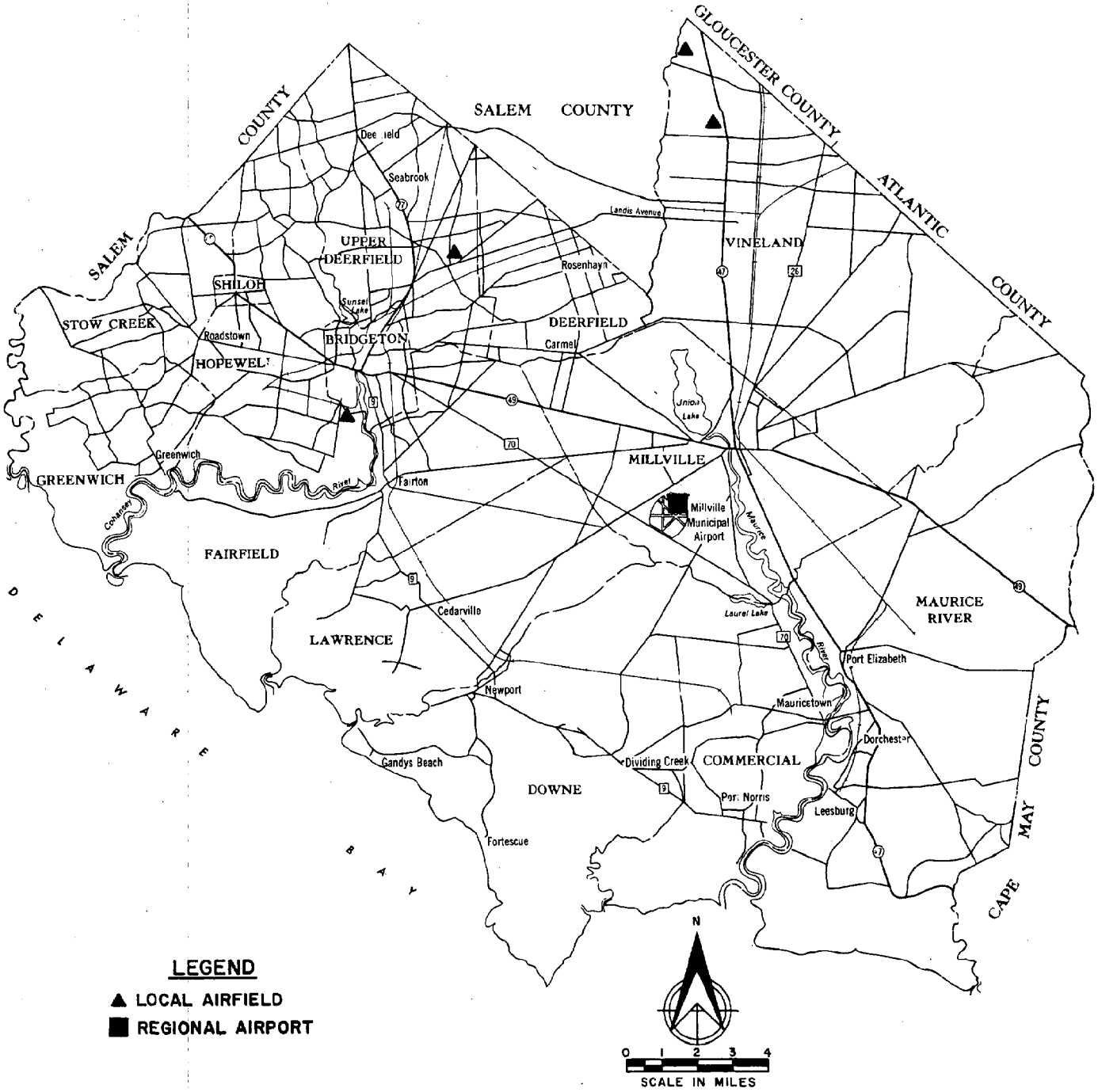

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Table 2

AIR TRANSPORTATION FACILITIES

General Aviation Airport	Name	Township	Localization	Function
	1. Buck's Airport	Upper Deerfield	Woodruff	Crop dusting Service
	2. Kroelinger Airport	Vineland	N. Delsea Dr.	Maintenance of Aircraft, charter service
	3. Li Calzi Airport	Bridgeton	Dutch Neck Rd.	Crop dusting service
	4. Rudy's Airport	Vineland	Near Willow Grove Lake (Salem County)	Repair and Maintenance
Commercial Airport				
	1. Millville Municipal Airport	Millville	Cedarville Rd.	Commuter flight, full scale commercial service

a large tract of land (called the Bayside Tract) in Greenwich Township. While there are no plans for development currently, the Bayside tract is under consideration as a site for nuclear units which may be built in the 1980's or 1990's. Both Atlantic and Public Service have transmission lines in the area and are integrated with the Pennsylvania-New Jersey-Maryland power pool. All areas of the County are well served with electrical energy and necessary extensions in service are easily accommodated. (See Figure 9)

Currently, gas is supplied by South Jersey gas which receives its supplies by the Transco pipeline. This is a 20" pipeline with a pressure of 200 to 250 lbs. Within five years it is to be extended through Cumberland to Atlantic County. All except the three westernmost municipalities (Shiloh, Greenwich, Stow Creek) are served by a network of pipelines with a pressure of 60 lbs. and diameters of from 4 to 12 inches. Gas pipelines extend along the Maurice River to Leesburg. Pipelines parallel Delsea Drive (N.J. 47), New Jersey route 553, and branch out to cover the populated portions of the three largest municipalities. (See Figure 10). Gas is in high demand for commercial, residential and industrial use. The local glass industry is a particularly large consumer. (Industry in South Jersey consumes about 37% of the total gas supply). There are no natural gas storage facilities within the County; two propane storage (60,000 gallon capacity) facilities exist in Bridgeton.

FIGURE 9

ELECTRIC TRANSMISSION LINES
CUMBERLAND COUNTY, N.J.
1977

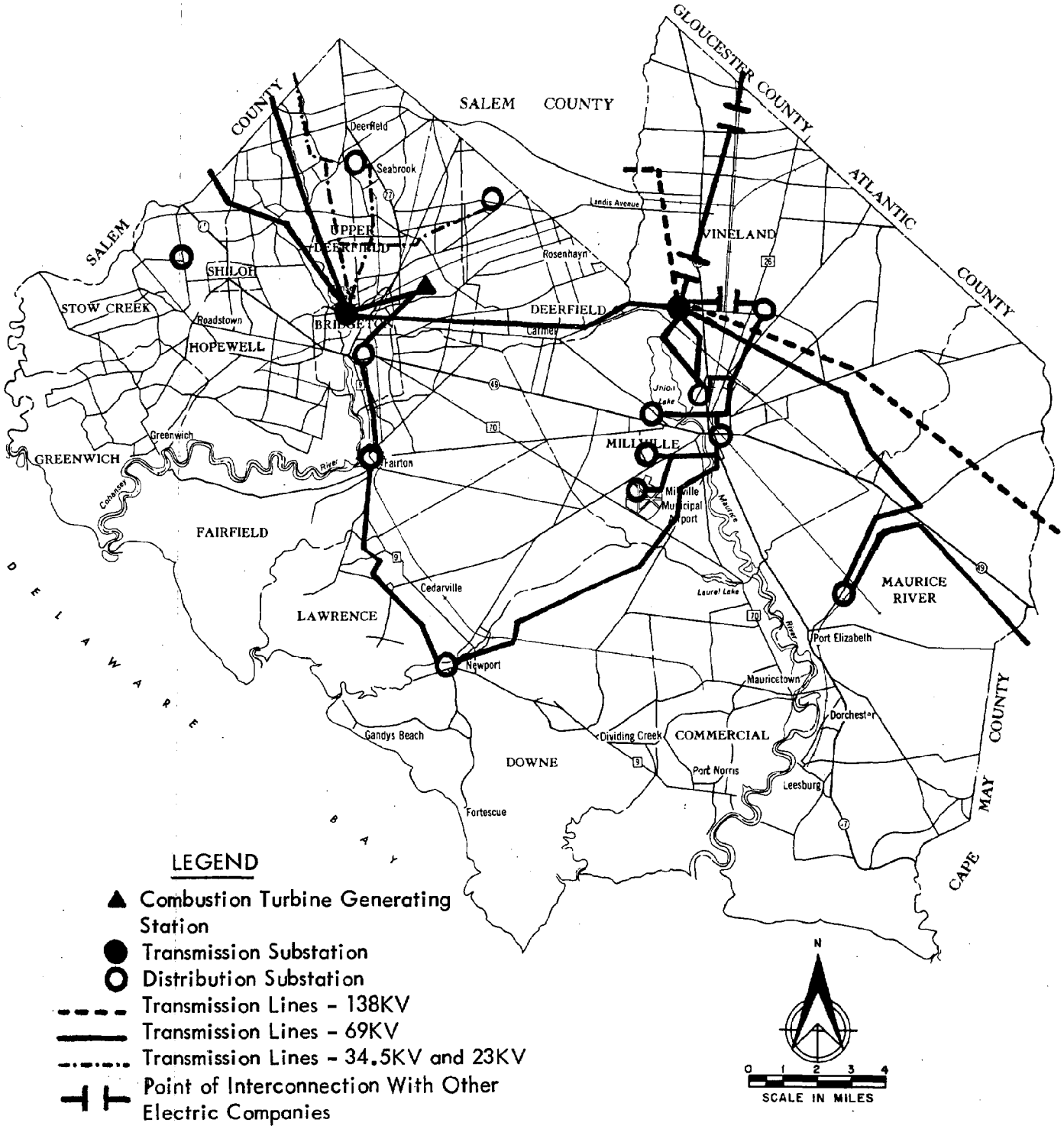

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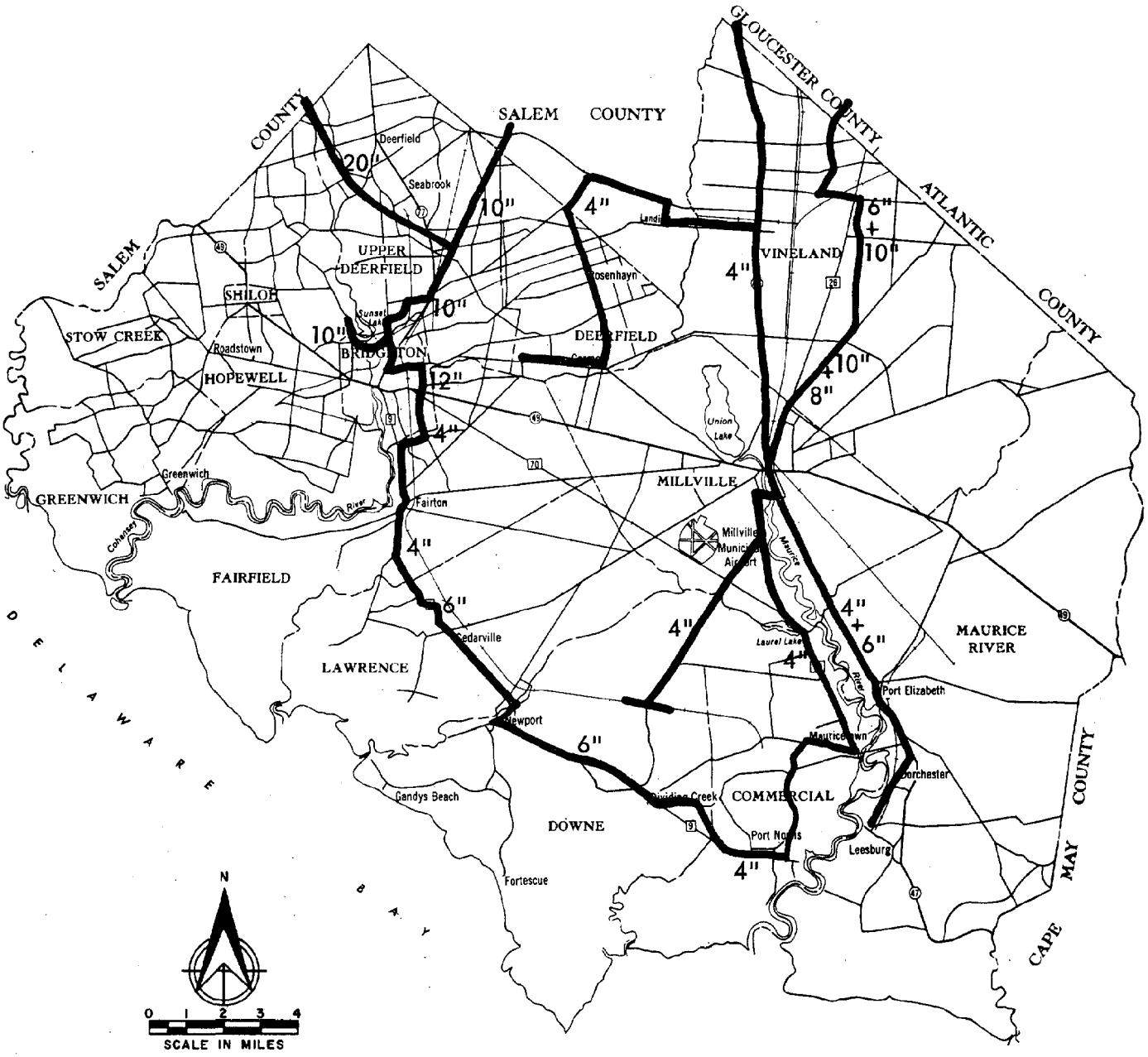
FIGURE 10

GAS PIPELINES
CUMBERLAND COUNTY, N.J.
1977



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E. EXISTING LAND USE PATTERNS

There is no current land use map for Cumberland County. The most recent is that done in 1965. With rare exception, there has been little change, as the County has not undergone the growth predicted in the original plan. Most new housing development continues to be located within the established municipalities of Vineland and Millville or in the areas of Upper Deerfield, Stow Creek, Hopewell and Fairfield Townships immediately adjacent to the City of Bridgeton. Any other newer residential development consists of a sparse, "false front" facade of housing/business along the major highways of the County.

Over one-half the County remains undeveloped (See Table 3). Vast areas of vacant or wooded land exist in all parts of the County. Indeed, the area south of New Jersey Route 49 is one of extremely low population density except within the corporate limits of Bridgeton and Millville and in the Laurel Lake area.

The entire County has been planned and zoned. Industrial areas have been reserved in all municipalities except Downe Township. These industrial zones tend to cluster along the shores of the Delaware Bay, the Maurice and Cohansey Rivers, and along major highways. Each of the three large urban centers has multiple industrial parks or districts.

Agriculture is best developed in the northern one-third of the County, though such land use is in evidence in every township. About 80,000 acres (nearly 25% of the County's area) is in agricultural use. Fairly large areas are reserved for forest/fish/wildlife management. Land listed as "resource development" is essentially coincident with the deposits of glass sands. Where exploitation is completed, sites might be adaptable to and assigned to other uses.

Virtually the entire shore area consists of a narrow beach fringing vast areas of tidal and riverine wetlands. These last are contained almost wholely within the area of CAFRA jurisdiction/regulation. Some 44% of the County is subject to CAFRA control, including many of the waterfront areas which are currently zoned for industrial use.

The County Plan has established 11 land use categories. Major categroies are shown in Table 3. The largest area is assigned to "low density residential-agricultural", reflecting the underdeveloped nature of much of the County as well as the desires of the citizenry to retain much of the current landscape character.

Table 3

EXISTING LAND USE IN CUMBERLAND COUNTY

Major land use category	Acres	% of total area
1. Developed Areas	29,935.3	9.30
2. Public open space	35,158.3	10.93
3. Agriculture	79,573.5	24.77
4. Undeveloped	176,868.9	55.00
Total	321,536.0	100.00

Source: Land Use Survey, 1964 - Cumberland County Planning Board

F. ASSESSMENT OF THE CURRENT ECONOMIC CONDITION OF CUMBERLAND COUNTY

The total work force of Cumberland County numbers over 65,000. There are a relatively large number of unemployed, some 7,800 in 1976 (average number of unemployed), and a current rate of 10.1% was noted in November, 1977. This high rate of unemployment has been a long standing feature, and a rate of 7% or more unemployed has been noted consistently over the last 20 years. The labor market of the County is largely "self-contained", with a low percentage of commuters in or out by New Jersey standards.

Recent stagnation (or even decline) in manufacturing employment has been balanced by growth in the non-manufacturing sector, which now represents more than half of total employment. The County labor force has had relatively rapid growth, averaging almost 2%/year since 1960. Employment opportunities have not quite kept pace. Growth in employment opportunity has been greatest in Vineland and Millville, while Bridgeton has suffered both absolute and relative decline. Female participation rates are lower than might be anticipated in an area characterized by services and light manufacturing. There is strong evidence of rural underemployment, - in particular, among black males.[1]

The area seems to be recovering along with the national economy. Unemployment rates have dropped considerably from the peak reached in 1975-76. There has been a steady increase in employment in the building trades, but levels of such employment are still well below those reached in the early 1970's. A number of large contracts, both military and civilian, have bolstered manufacturing employment in recent months, but manufacturing sector employment is still below prior levels.

An estimated 9,000 potential workers in the County are classified as disadvantaged[2] and an area CETA office has been active in re-training and employee placement.

While the economic picture is not overly bright, the County is managing to hold its own.

G. SOCIAL STRUCTURE AND DEMOGRAPHIC SUMMARY

With some 129,000 people, the County has an average density of less than 250/sq. miles, considerably below the state average of nearly 1000/sq. mile. The normal household consists of about three people (3.18 in 1970). Mean and median income per household are slightly below national averages ($9,100 and $8,200) respectively.

County population is somewhat younger than the state average. In 1970, almost 35% of the total population was under 18. Some 55% were included in the normal labor force age brackets (18 to 64), while 10% were over age 65. Of the County total, some 13.6% were black and almost 6% were Spanish speaking. The sharp decline in the number of births, which is

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[1] L.J. Kotlikoff, M.I. Kotlikoff, Human Resources in Cumberland County: An Economic Analysis, August, 1973, pp. 56-58.

[2] Cumberland County Economic Development Commission, Progress Report 1976, August 1, 1977, p. 27.

characteristic for the Country during the last 10 years, has not been manifested in Cumberland County to the same degree. The fertility rate is the fifth highest in the State. Males account for 47.5%, somewhat below the state average. Population growth rates in the decade 1960 to 1970 were below those of the state, but slightly above the national average.

Table 4

POPULATION
CUMBERLAND COUNTY
1970

Municipality		Population[1]	Rank	Land Area[2] (sq. mi.)	Density (persons/sq. mi.)	Rank
Bridgeton	(c)	20,435	3	6.5	3,144	1
Commercial	(t)	3,667	8	34.0	108	9
Deerfield	(t)	2,464	9	16.7	148	6
Downe	(t)	1,777	11	55.8	32	14
Fairfield	(t)	4,990	5	43.0	116	8
Greenwich	(t)	963	13	19.0	51	12
Hopewell	(t)	3,970	6	31.4	126	7
Lawrence	(t)	2,329	10	35.6	65	10
Maurice River	(t)	3,743	17	94.7	40	13
Millville	(c)	21,366	2	44.3	482	3
Shiloh	(b)	573	14	1.3	441	4
Stow Creek	(t)	1,050	12	18.8	56	11
Upper Deerfield	(t)	6,648	4	31.8	209	5
Vineland	(c)	47,399	1	69.5	682	2
County Total		121,374		502.4	242	

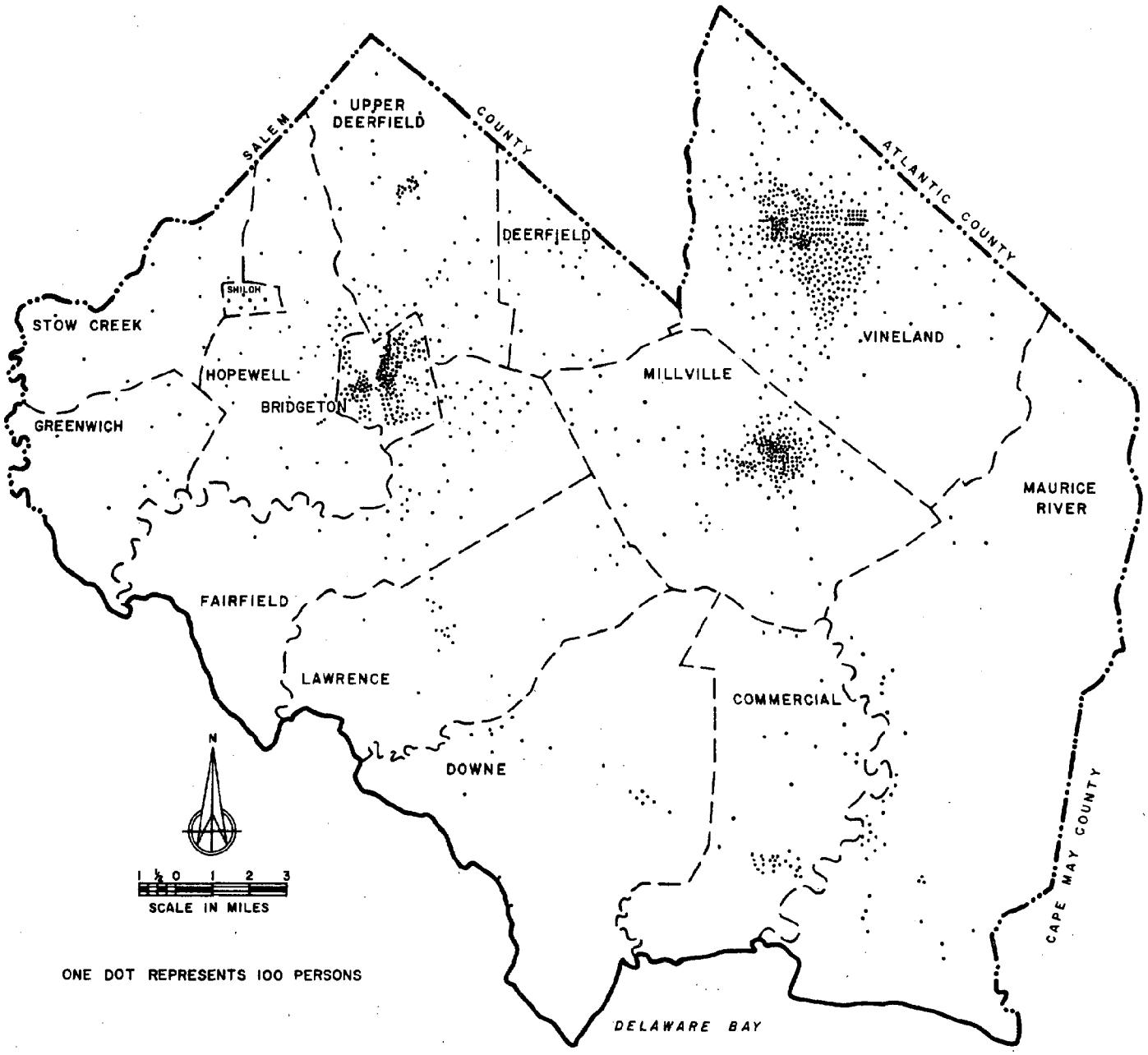
Key: c - city
t - township
b - borough

Source:

[1]1970 U. S. Census
[2]Population Data 1970 - Cumberland County Planning Board, 1973, p. 11.

FIGURE 11

POPULATION DISTRIBUTION
CUMBERLAND COUNTY, N. J.
1970 U. S. CENSUS



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CHAPTER II

OBJECTIVES AND ASSUMPTIONS OF THE COUNTY OCS AND ENERGY FACILITY STUDIES

In accordance with the national policy to accelerate the development of energy resources in frontier areas such as the Atlantic Ocean, the Department of the Interior and the oil and gas industry have identified potential areas for oil and gas development. To help states cope with the possible onshore effects of such potential development, the Federal Office of Coastal Zone Management within the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce made available in 1976 additional monies for states to plan for development of outer continental shelf (OCS) oil and gas. New Jersey is located adjacent to the Baltimore Canyon which extends from offshore Long Island to North Caroline and is believed to contain between 0.4 to 1.4 billion barrels of oil and 2.6 to 9.4 trillion cubic feet of gas. New Jersey received a grant of $337,000 to plan for possible energy activities resulting from OCS development and allocated $180,000 of these planning funds to the twelve counties believed most likely to be affected by outer continental shelf and other energy facility development.

The exploration of the OCS for energy represents a novel industrial enterprise for New Jersey and other Mid-Atlantic states and will involve them and the oil and gas industry, federal and local governments and the private sector in a new set of relationships. The purpose of this study was to provide counties with an opportunity to evaluate land uses as they might or might not be suitable for OCS and other energy related facilities; to assist the state in developing guidelines for the management of siting of such facilities and also to aid it in developing the energy element as mandated by the New Jersey Coastal Area Facility Review Act of 1973 and the federal Coastal Zone Management Act Amendments of 1976.

A. BACKGROUND

The U.S. Bureau of Land Management which has supervision over public lands and resources within the Department of the Interior has scheduled two sales for the Mid-Atlantic states. Lease Sale No. 40 took place in August 1976. Action on it had been held up pending litigation. A second sale, No. 49 is scheduled for 1978. Estimates of recoverable oil and gas from 2.6 to 9.4 trillion cubic feet of gas respectively. Recovery of this oil could take place between 20 to 25 years.

The litigation which had held up exploratory drilling had centered on the adequacy of the environmental impact statement prepared by the Department of the Interior and particularly on the adequacy of safeguards in the event of damage to the coastal environment which constitutes a recreational resource to millions of people in the affected region. There is little doubt that drilling in the Atlantic will take place in the not too distant future and that the litigation has served to delay rather than postpone operations.

Until exploration of the leased tracts actually takes place, no one will know for sure whether federal government and industry estimates of oil and gas are correct. Exploration for oil and gas off New Jersey's shore in the not too distant future, however, appears likely. New Jersey's response to this federal program was enunciated by the Governor in testimony before the Department of the Interior in 1976. He said that it is in New Jersey's interest to support such activity as long as it is carried out in an environmentally sound manner. The state has applied for federal planning monies to learn more about OCS related activity and ensure that facilities be sited in locations which will respect existing land uses and the environment.

B. OBJECTIVES

Below are listed a number of objectives which the study was to achieve:

1. To provide counties with the opportunity to analyze the capability of local government to cope with problems and respond to the opportunity that OCS and energy facility development could present.

2. To permit counties to identify geographic areas which might or might not be suitable for specific energy facilities from the local government's perspective.

3. To rank facilities in terms of their feasibility and compatibility with existing land uses.

4. Permit counties to establish or recommend a process to the state to facilitate decision-making respecting energy siting within the context of New Jersey's coastal zone management program and the ongoing CAFRA permit program and to recommend alternative strategies to the state concerning energy facility siting.

5. Permit counties to address the subject of energy production within the context of state and national interests and the extent to which energy facilities should or should not accommodate state, regional or national interests.

C. ASSUMPTIONS

The following assumptions were made about the study:

1. Each of the counties would have to deal with some form of new or expanded energy facility within their jurisdiction within the next few years.

2. Some OCS activities such as exploration and development would take place within the next few years.

3. Such energy facilities would affect the various counties differently.

4. The counties were permitted to shape the State's basic scope of work to their individual specifications based on their geographic location, economy and life styles. If one county were to focus in depth on one aspect of energy facility siting such as LNG or pipelines, for example, it was free to do so. Each county was, however, to include in its report:

a. an inventory of existing facilities, land and water uses and coastal resources including zoning.

b. analysis of these facilities as they might affect future development.

c. report how it had coordinated with local and state government in coming to conclusions concerning constraints and potential development.

d. recommendations to the state with respect to

(i) ranking facilities,

(ii) providing alternatives to proposed facilities where feasible,

(iii) political constraints, and

(iv) improved state-local coordination.

5. The study was designed to be carried out by one person working full time for a period of one year.

6. The state recognized that each county would be approaching OCS development and energy facility siting from a different level of concern and expertise.

7. The study assumed coordination and interaction between participating counties.

8. The final product would consist of twelve individual county recommendations based on findings which would be tied together by an "introduction" and "conclusion" prepared by the New Jersey Office of Coastal Zone Management, sponsor of the project.

D. PARTICIPANTS IN THE STUDY

As OCS activities may impact the coast, the New Jersey Office of Coastal Zone Management invited counties bordering on New York-New Jersey Harbor, the Atlantic Ocean and the Delaware River to participate in a study to evaluate the possible impacts of OCS activity on their counties. Twelve counties accepted the offer and received $15,000 to carry it out. They are Hudson, Union, the CAFRA counties - Middlesex, Monmouth, Ocean, Burlington, Atlantic, Cape May, Cumberland, Salem - and Gloucester and Camden. Because of administrative problems, Hudson County only worked on this project for four months.

E. INTERACTION BETWEEN STATES AND COUNTIES

To provide a mechanism for state and counties to meet and discuss common problems, meetings were scheduled in a different location each month. When sufficient interest was evinced in a particular subject representatives from other state and federal agencies or from outside industries were invited to attend meetings. In addition, counties filed monthly reports of their progress. Midway through the study, counties were also asked to file interim reports of progress to date or hand in a detailed chapter outline of their final product. During the last few months since the Department of Energy was established, a representative from that Department has attended the monthly meetings and been invited to attend any county OCS related gatherings.

CHAPTER III

ENVIRONMENTAL INVENTORY

A. ENVIRONMENTALLY SENSITIVE AREAS

This survey establishes ten categories of environmentally sensitive areas: coastal and tidal wetlands, shellfish and finfish (spawning growth and harvesting) areas, recreation areas, inland waterways, natural habitat areas, forests, scenic landscapes, historical sites, potential archeological sites and air quality regions. The County contains a valuable agricultural area which has not yet been subject to great developmental pressures, a shellfish resource which is gradually recovering from environmental damage and natural calamities, and a vast area with great potential for recreational development. As such, environmental concerns are of special importance to the citizenry and the future of the area.

1. Coastal and Tidal Wetlands

Cumberland County has some 38 miles of coast, all of it fronting on the Delaware Bay. This region consists of a narrow ribbon of beach, broad expanses of tidal flats, and some 51,000 acres of tidal wetlands. This unique feature represents some 20% of southern New Jersey's coastal plain wetlands. This area serves as wintering grounds, breeding areas and migratory stopover for a great array of waterfowl and other wildlife. Wetlands also contribute to the fertility of the nearby ocean, particularly to its sounds, bays and estuaries.

Marsh areas extend up to five miles inland, forming a maze of interconnected fresh, salt and brackish water ponds and waterways interspersed with areas of marsh vegetation. The resulting environment is near ideal for a variety of flora and fauna, both land and water types. This region has proven to be a valuable recreational resource, a commercial asset (especially shellfish), and an excellent buffer against damage from marine storms. The wetlands extend up the two major rivers and many minor streams for a considerable distance inland, and, indirectly help maintain the area's water table, an exceedingly valuable resource.

Filling, drainage and pollution can pose a serious threat to this environment by altering the water balance, reducing the water quality, destroying habitat, and otherwise damaging the delicate environmental balance which currently exists. Most of the County is not badly drained. Only 16% of the land area has major drainage problems or an excess of water.

Development of such areas presents two great problems in addition to environmental damage: 1) costs of drainage, sewerage, and other water control facilities and, 2) the probability of and problems associated with flood control, wind, water and storm damage.

2. Recreation Zones

While the area's beaches are not well developed, they do have some recreational potential. Certain areas do have low appeal because of extensive mud flats exposed at low tide, muddy bottoms or other detrimental features. However, some areas such as Fortescue possess clear waters, good bottom and reasonably pleasant beachfront conditions. Lower wave height makes swimming easier if less dynamic. Such beach environments were once developed for tourism (18th and 19th centuries) and are utilized widely in Europe for resort purposes. Current usage is related to shore fishing, boat fishing and pleasure boating. These forms of recreational activity have not reached their full potential. Alteration of the environment would adversely affect the recreational potential. Local citizenry and seasonal users are particularly fearful of oil spills, since these (and their effects) are rather frequently encountered in the upper reaches of the Delaware Bay. This beach front area represents one of the last free, truly public areas of New Jersey's coast.

3. Shellfish and Finfish Growing and Harvesting Areas

The Delaware Bay region has long been an important fish and seafood source area. Once even whaling was important, and sturgeon (thought to have been destroyed) supplied caviar to East Coast restaurants. Subject to disease, pollution and parasites, this has been a long ailing segment of the County's economy. Recent improvements in water quality, environmental laws and improved conservation practices are all resulting in improved harvests. Any development might hamper this comeback or even totally and unalterably destroy this valuable resource.

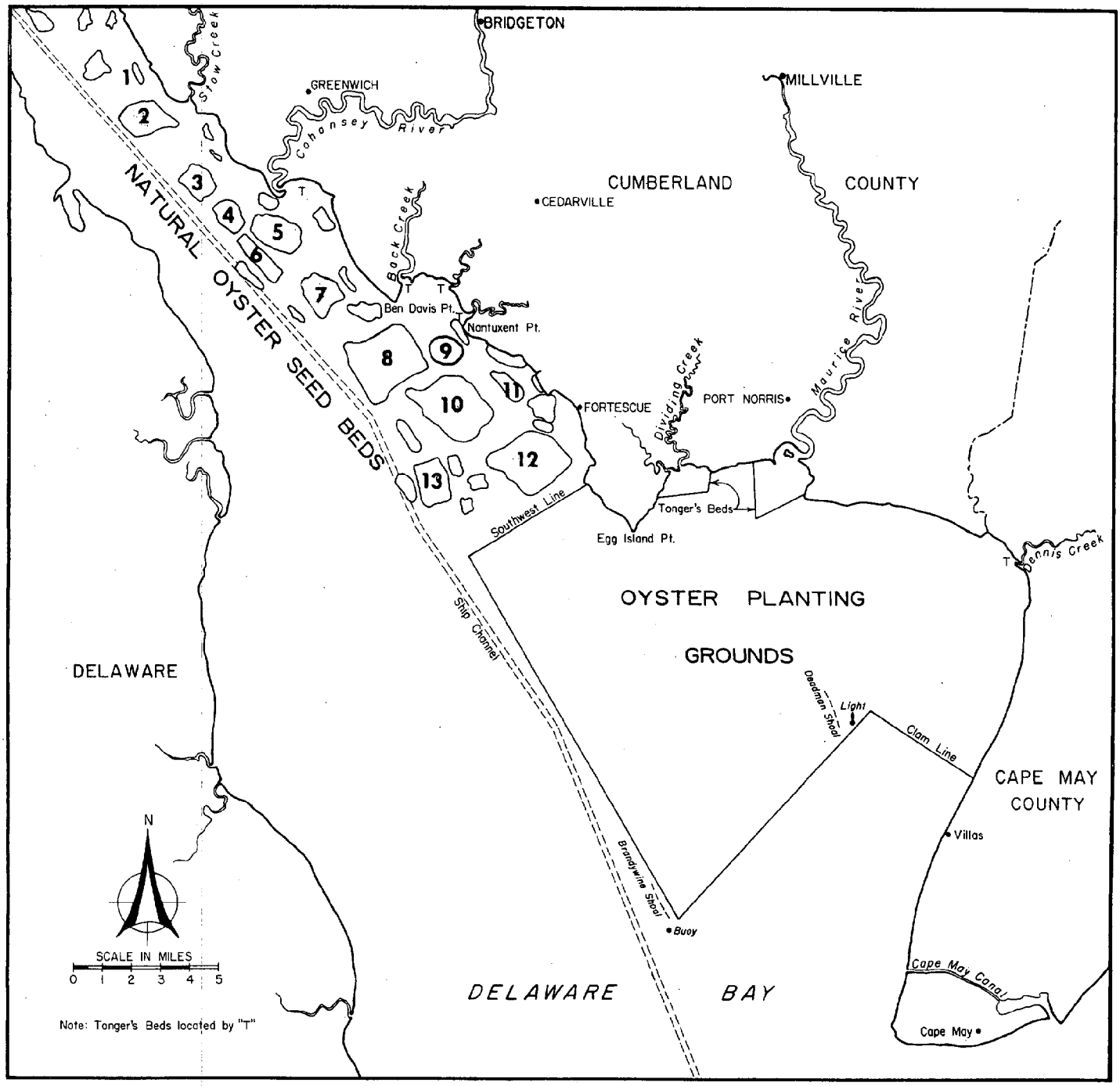
a. Delaware Bay - Oyster Growing Areas - The areas of Delaware Bay adjacent to the Cumberland County Coastline constitute the greatest single oyster producing area in the State of New Jersey. This coastline is bordered by extensive marshes with tidal rivers (the Cohansey and Maurice) and many short creeks and streams which flow directly into the Bay. The influent of fresh water into the Bay is one of the major factors which determines the rate of oyster growth. Other important factors are food supply and water temperature. Marshes adjacent to Delaware Bay are the nursery grounds for shellfish and fish. They play an important role in the coastal ecosystem.

The New Jersey portion of Delaware Bay, between the Cumberland County shoreline and the main shipping channel, is divided into four oyster growing areas. The first of these is the State's natural seed oyster bed area which extends from the upper Bay south to a line running from the mouth of Straight Creek to Ledge Light (below Fortescue). The second area, consisting of the leased oyster planting grounds, is located below the natural seed oyster beds and extends to the clam line. The third is the tonging area in the mouths and beds of the rivers and creeks which flow into the Bay. The fourth area is located below the clam line (see Figure 12).

There are a total of 15,000 acres of oyster seed beds owned and controlled by the State DEP. These areas are extremely important for the maintenance of the species. Natural seed oysters

FIGURE 12

OYSTER GROWING AREAS



Source-Division of Shell Fisheries and U.S. Coast & Geodetic Survey
Prepared by The Cumberland County Planning Board

are grown mainly on the beds listed below (smaller beds are not included):

1. Upper Arnold's	4. Middle	7. Shell Rock	10. New Beds	13. Ledge
2. Arnold's	5. Cohansey	8. Benny's	11. Beadon's	
3. Upper Middle	6. Ship John	9. Hog Shoal	12. Egg Island	

In order to assure suitable conditions for seed oysters to attach and grow, the State passed a law requiring that 40% of the oyster shells be returned to the Bay. When seed oysters reach a size of one inch or more, they are transplanted to the lower Bay planting grounds. There are over 30,000 acres of State planting grounds in Delaware Bay.[1] Oystermen lease tracts of ground from the State; there are 164 such owners of leases.

In 1957, MSX disease attacked the oysters of Delaware Bay, greatly reducing the harvests. Research has shown that if planted seed oysters are small, MSX will destroy about 40-50% of them.[2] When oystermen plant large seed oysters (3-4 years old) in May and harvest them in October, MSX will destroy only 10% of the seeds. Planting small seed is viewed as a questionable practice; oystermen lose twice, - to MSX blight and the oyster drill. The oyster drill (predator) favors saltier water, and low salinity levels help control their incidence. This is why a rational oyster drill control program should be seriously considered.

The existing oyster industry is located in the Port Norris area along the lower Maurice River. There are nine operating firms listed in table 5. These companies sell shucked oysters locally and in other states.

Table 5

EMPLOYMENT IN THE OYSTER INDUSTRY

Company Name	Employment
1. Jersey's Best, Inc. (Robbins Bros.)	150
2. Bivalve Packing	40
3. George L. Gaskill	15
4. Port Norris Oyster Company	95
5. Reed and Reed	45
6. Jeffrie's Oyster Farm Inc.	60
7. George O. McConnell	30
8. Peterson Packing	15
9. Jack King	15
10. Robert Bailey	15
Total employment	485

Source: Data was acquired by Daniel O'Connor of the Rutgers University Oyster Research Laboratory, Bivalve, N.J.

[1] Oysterman Still Plays His Trade, Millville Daily, 4/29/77.
[2] MSX (Minchinia nelsoni) disease.

Statistical data (see table 6) show that the state of the oyster industry is improving. In 1957 production was 5,573,000 pounds. After the mysterious disease (MSX) struck, the oyster production in Delaware Bay dropped to a low of 167,000 pounds (1960). In 1976 production had reached 1,403,000 pounds.

The oyster industry constitutes an extremely valuable natural resource in Cumberland County, and there are plans currently under consideration to improve its productivity.[1] There is also a proposal to build a modern research laboratory in the Port Norris-Bivalve area. The existing Oyster Research Laboratory is small and the condition of the buildings is bad. A revitalized oyster industry could bring the total employment to 2,000 people. Rational, well managed programs could increase production up to 1 million bushels of oysters per year.[2]

b. Oil and Gas Development and the Oyster Resource - Dr. Harold H. Haskin, head of Rutgers University Research Laboratory at Bivalve has expressed his opinion on the localization of oil related facilities in the areas of natural oyster seed growing on several occasions. In 1976, he opposed a proposal to build a deep water port facility for deep draft tankers (either in the Delaware Bay or off the open coast) with pipeline transfer to Bayshore storage facilities (Greenwich). According to him this proposal is, "a threat particularly for the Bay resources and, to a somewhat lesser extent, to open coast resources". He pointed out that the oil industry completely ruined the shellfish industry in the Raritan Bay-Arthur Kill region.[3] Haskin also pointed out that if a deep water port facility were to be located in the Delaware Bay, channel dredging would be required. This in turn would result in an additional influent of salt water, and, therefore, an increase in number of predators (oyster drills) which already present a major problem to the oyster industry.

Haskin studied adult oysters and larvae which were chronically exposed to low level Nigerian or Iranian crude oil (0.3 ppm) and #2 fuel oil (0.1 ppm)[4].

The findings of this study indicated:

a) significant mortality of oysters exposed to low levels of crude oil contamination,

b) inability to reproduce (spawn) or a weakness in reproduction,

c) reduction in swimming activity of larvae, and

d) retardation in the development of larvae as well as a reduction in setting. (See Appendix 4 for details).

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[1] Oyster drill control program - hydraulic dredging.
[2] Oyster Industry Rebirth Eyed, Vineland Times Journal, 10/22/77.
[3] Statement on Senate Bill 200 Creating the New Jersey Oil Transport Facility Corp., 1974, pp. 1,5,8.
[4] H. H. Haskin, The Petroleum Industry in the Delaware Estuary, Rutgers Univ. & the Academy of Natural Sciences of Philadelphia, Jan., 1977, pp. 18-22.

Table 6

ANNUAL PRODUCTION AND VALUE OF THE OYSTER INDUSTRY TAKE
STATE OF NEW JERSEY
(SELECTED YEARS)

Year	Thousand Pounds	Value $	Year	Thousand Pounds	Value $
1880	17,735	2,080,000	1954	7,329	3,634,000
1887	23,523	2,270,000	1955	5,204	2,603,000
1890	10,207	1,219,000	1956	5,573	3,058,114
1891	9,860	1,228,000	1957	2,588	1,693,711
1897	11,351	1,388,000	1958	829	675,836
1901	18,789	1,697,000	1959	206	189,233
1911	8,691	810,000	1960	167	159,948
1921	14,172	2,070,000	1961	1,100	933,444
1929	19,916	3,327,000	1962	1,553	1,422,234
1930	11,825	1,849,000	1963	515	558,737
1931	14,402	1,686,000	1964	1,098	1,024,410
1932	8,564	822,000	1965	523	713,637
1933	7,612	587,000	1966	694	796,126
1939	5,096	542,000	1967	1,027	916,992
1940	5,942	712,000	1968	1,320	1,073,139
1944	5,640	2,921,000	1969	1,045	820,187
1947	5,853	2,194,000	1970	668	545,089
1949	7,086	2,784,000	1971	848	674,532
1950	7,242	2,897,000	1972	1,714	1,370,071
1951	5,761	2,406,000	1973	1,397	1,329,232
1952	7,994	3,397,000	1974	1,010	1,028,702
1953	8,484	4,119,000	1975	972	902,833
			1976*	1,403	1,315,876

* preliminary data

Source: Data for 1880-1964 "Oyster Resources, Cumberland County Planning Board, July 1966, p. C-7.

Data for 1965-1976 - Completed by Daniel O'Connor, Oyster Research Laboratory, Bivalve, New Jersey.

Dr. Haskin and Oyster Research Laboratory staff members Donald E. Kunkle, Daniel O'Connor and Clyde A. Phillips oppose any pipeline corridor from Delaware Bay to the interior of the State. There is always a possibility of leakage from the pipe or oil spills which might affect the cultivation of oysters.[1]

4. Inland Waterways

Two major rivers, the Maurice and the Cohansey, drain most of the County. Their sluggish, meandering tidal courses wind inland from the Delaware Bay to the very centers of Bridgeton and Millville, while their headwatersextend beyond these cities into Salem and Gloucester Counties. They are two of the major streams of South Jersey. Marinas and boat storage facilities dot their banks, giving evidence of their use as a recreational resource. They have some potential for navigation as noted elsewhere in the report, but their recreational value may be much greater. Canoeing along their upper reaches is an increasingly popular sport. In several areas above N.J. 49 they have been dammed into man made lakes, some of which have excellent beaches and are popular public recreation areas (eg. Union Lake in Millville) for urban dwellers. One of the tributaries of the Maurice River runs through Parvin State Park, with its extensive public beaches and picnic areas. (See Figure 13)

5. Natural Habitat Areas - Fish and Wildlife Management Areas

The entire shoreline of the County and the extensive forests are all important wildlife areas. Each individual sub-type of undeveloped land area constitutes an important element in the area's ecology. Some 37,000 acres are administered by the state as fish and wildlife areas. Each is designated for an extensive type of land use. Hiking, camping, picnicking, nature study, hunting, fishing and boating are permitted but rather tightly controlled. Several, (Egg Island, Turkey Point) are accessible only by foot or watercraft. (See Figure 14).

The express purpose for establishing these areas were fish and wildlife protection and water conservation. The County supports a wide variety of finfish, shellfish and wildlife resources. Wetlands, estuaries ponds, streams, forest and farm allexist in close juxtaposition, providing ample and varied food supplies and excellent breeding grounds. Dozens of waterfowl species breed or stopover in the area in winter , in particular in the tidal marshes, some mink, otter and beaver are found in the area, while muskrats are rather plentiful. Both salt and fresh water fish abound in area waters. Oyster and crab grounds in the Delaware Bay are among the most important in the state.

6. Forest Areas

Some 37% of the County (119,102.0 acres) is in forested area, most of it located in the eastern half of the County. (See Figure 15). The woodlands consist of vast stretches of almost unbroken forest, seldom interrupted even by paved roads. About 2/3 of all the undeveloped land in the County is in forest, - a portion of Belleplain State Forest (some 1,500 acres) extends into the eastern portions of Maurice River Township. Much of the forest has been incorporated into State Fish and Game Preserves, including regions of mixed forest/marshland along the rivers and the Delaware Bay.

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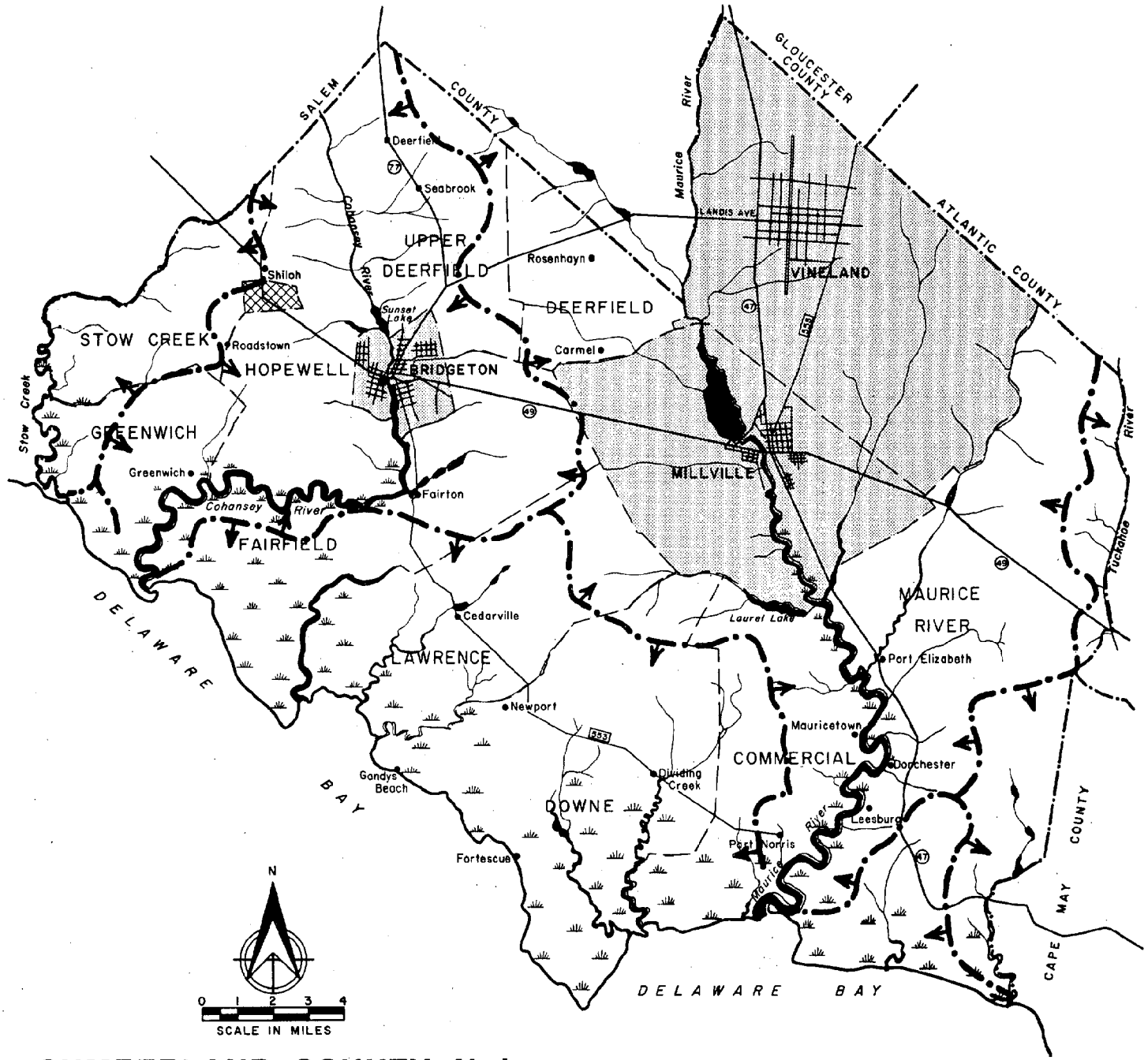
[1] Paul S. Galtsoff, Herbert F. Prytherch, "Effects of Crude Oil Pollution on Oysters in Louisiana Waters", U.S. Dept. of Commerce, Bureau of Fisheries, Bulletin no. 18, 1935.

FIGURE 13

DRAINAGE BASINS



CUMBERLAND COUNTY, N. J.

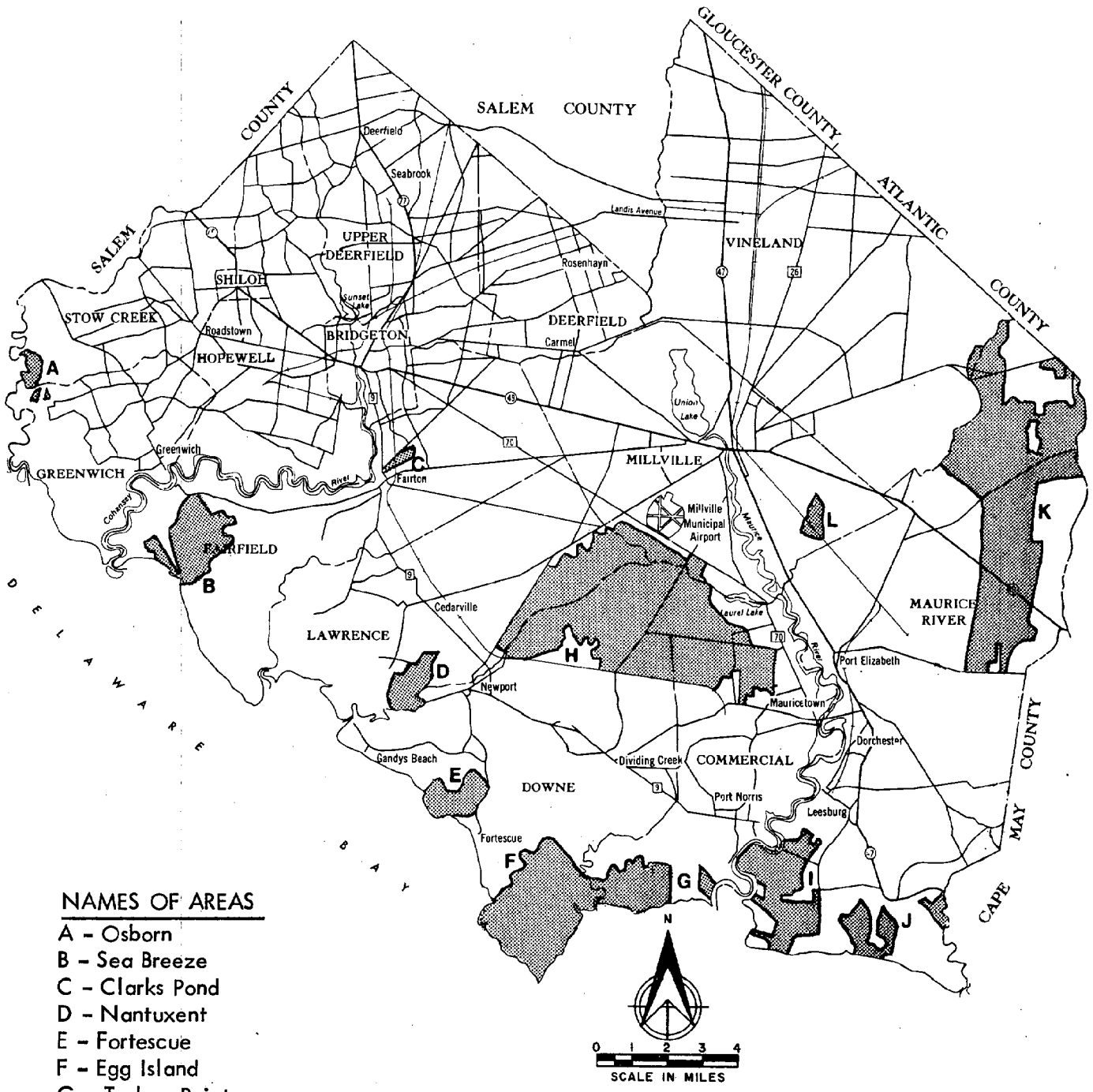
- Cities
- Borough
- Unincorporated Towns
- Municipal Boundaries
- Cumb. Co. Court House
- State Highways
- County Highways

DRAINAGE DIVIDE(Major Ridge Line)

PREPARED BY THE CUMBERLAND COUNTY PLANNING BOARD

FIGURE 14

STATE FISH & WILDLIFE MANAGEMENT AREAS
CUMBERLAND COUNTY, N.J.
1977



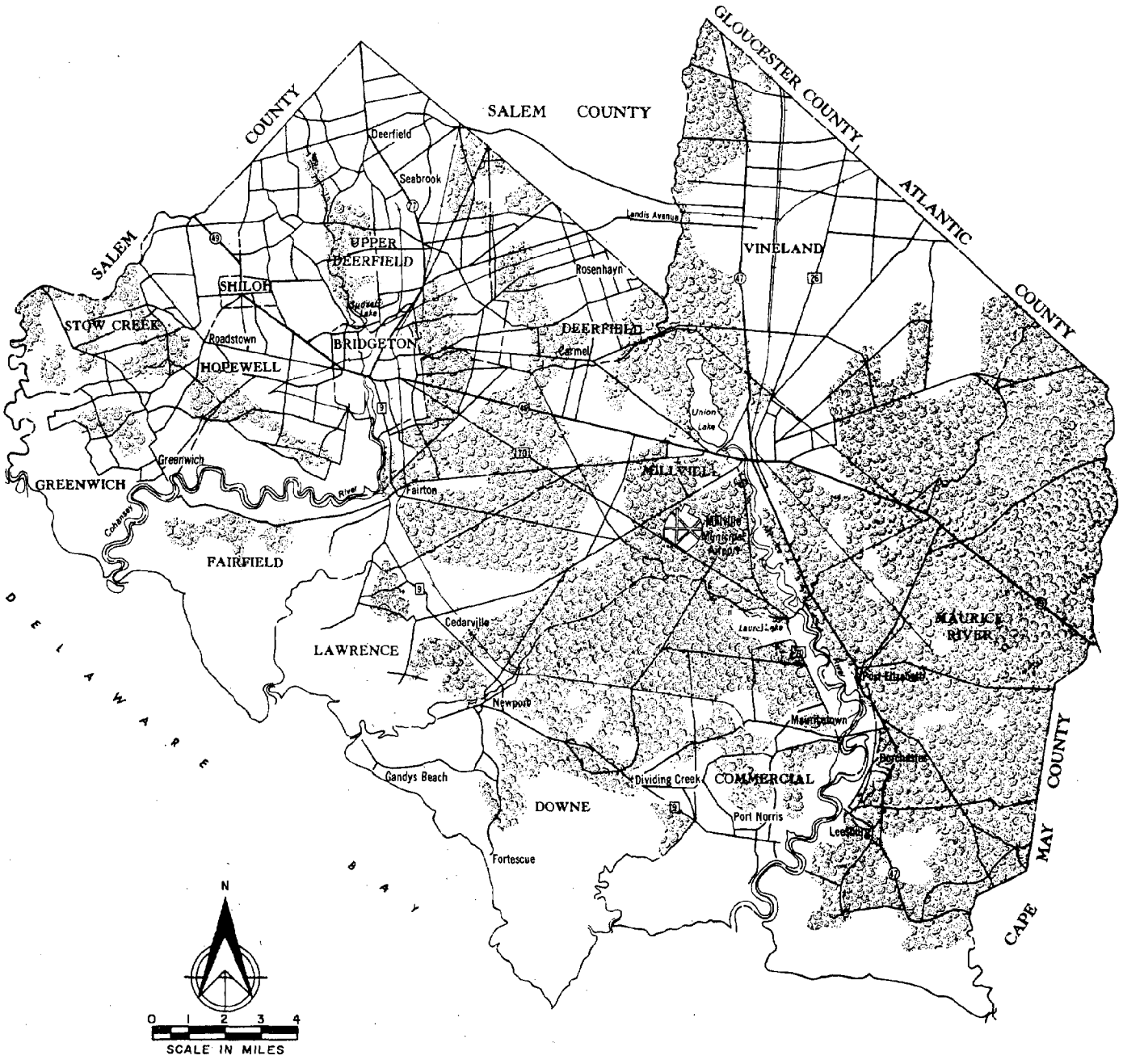
NAMES OF AREAS

A - Osborn
B - Sea Breeze
C - Clarks Pond
D - Nantuxent
E - Fortescue
F - Egg Island
G - Turkey Point
H - Millville
I - Heislerville
J - Corson
K - Peaslee
L - Menantico

PREPARED BY THE CUMBERLAND COUNTY PLANNING BOARD

FIGURE 15

FORESTED AREAS
CUMBERLAND COUNTY, N.J.
1977



PREPARED BY THE CUMBERLAND COUNTY PLANNING BOARD

As a wood resource it is highly variable. Much of the area is in scrub pine and scrub oak, but valuable stands of cedars and tulip poplars do exist. Most of the area was timbered at one time or another. Cedar boards, shingles and shakes were long produced and firewood and pulpwood were once important products. Such forest industry is largely of local importance today. By far the greatest value of the forests currently is as a scenic amenity or an area of wildlife habitat. Nonetheless, it respresents an important potential natural resource in the future, when it attains commercial height and girth. Continued urban growth in South Jersey will further enhance its use as public open space.

7. Scenic Landscapes

There are three major areas of landscape in Cumberland County which constitute a scenic resource, though none are officially reserved or otherwise recognized as such. Most public and quasi-public recreation areas are clustered within the boundaries of the three major urban areas. Outlying State-owned lands are largely devoted to wildlife management areas. However, the scenic resource is almost entirely associated with privately owned lands.

Notable scenic landscapes are located in the western portion of the County, in the area bounded by route 553 to Fairton and then by the Cohansey River to the Delaware Bay. In an area of unusually flat topography such as South Jersey, the rolling countryside of this district constitutes a scenic resource. Farms are large and well maintained. Numerous small settlements contain some architectural gems; their overall appearance generally reflects another era. The result is one of the few, pleasant, rolling country landscapes to be found in the southern part of the State. Numerous historic sites and structures further enhance the scenic value. Any large scale industrial development would adversely affect this entire district, one of southern New Jersey's best known and widely visited "Sunday drive" landscape areas.

The second scenic landscape district is associated with the wetlands fringing on the Delaware Bay. These are not easily accessible by car, and are most widely known to sportsmen. Wildlife, waterfowl and marsh vegetation blend into an unusual experience in landscape viewing. The Bay is accessible at 8 points, all of which have large stretches of undeveloped or lightly developed beach front. The occasional farm or structure does little to distract from this wild, natural environment. Certainly a portion of this area should be preserved in its natural state. Higher areas referred to as "necks" often have small towns and isolated farmsteads of considerable age or architectural value.

The third scenic landscape area is the valley of the Maurice River. The River itself constitutes a scenic resource, with broad, deep meanders winding through a landscape of marsh grass, willow and an occasional cedar among wild hayfields. The small towns which line its banks from Port Elizabeth to the Bay are reminiscent of New England fishing villages. Some settlements are in varying stages of decay and disrepair, while others are well kept and tidy. All are between a foreground of riverscape and a background of forest. The old oyster houses, docks and converted schooners give an unusual, yet attractive character to the landscape. Oil and gas development support facilities suggested for this region (repair and maintenance yards) would do little to detract from the landscape, though refineries or chemical plants would obviously destroy the scenic value.

8. Historical Sites

Historical sites abound in Cumberland County. Most noted are the New Jersey Liberty Bell in Bridgeton and the town of Greenwich, the site of a "tea party" in 1774. In all there are 82 registered sites and buildings in the County. (See Figure 16).

The settlement of Greenwich contains the County Historical Society headquarters, an ancient log granary dating from earliest Swedish settlement, an old school, several old churches and meeting houses, and many fine architectural structures dating from the 18th and 19th centuries, stretching along Ye Greate Street from Greenwich to Othello (Head of Greenwich), There is perhaps no equal to this settlement anywhere else in New Jersey. The area is potentially threatened by plans to develop nuclear generating stations (4) on the nearby Bayside tract (PSE & G).

A second clustering of historic sites and structures occurs in Bridgeton. They are quite well preserved in most cases, and many are well marked and even landscaped. The municipal park in that city contains many outstanding structures and a historical museum within its borders. Lack of any great amount of industrially-zoned, developable space virtually precludes any adverse impact from potential OCS industrial development.

The third cluster includes some 47 structures in Mauricetown, near the Maurice River. An early lumbering settlement, only two structures of 18th century origin remain. However, the town is a virtual treasure of 19th century architecture with almost all known styles represented. The former shipyards were located along the river; oyster boats, coastal schooners and cord-wood boats were built here over most of the 19th century. The shipyard site itself has potential as a future tourist/historic site. The New England architectural flavor and the obvious trappings of a seaport and fishing community make it of special interest. Projected industry for the Maurice River district is not environmentally detrimental. Relatively strict local zoning ordinances in Commercial Township preclude any of the more damaging industrial types.

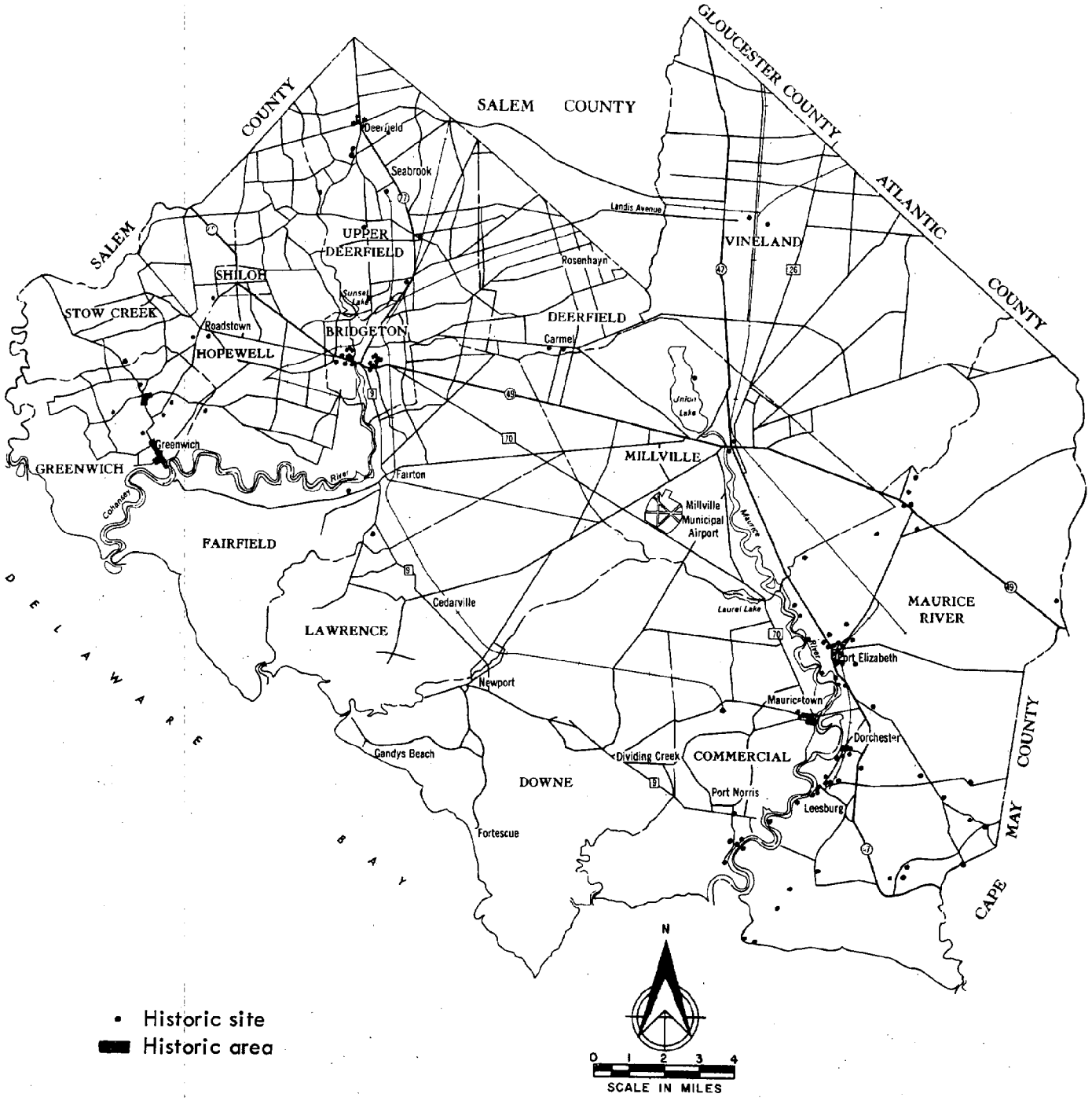
While these three districts account for most historical sites, many more structures and sites will be nominated for the state and federal registers in the future. Other concentrations of historic buildings are located in Cedarville, Fairton, and Port Elizabeth. Currently, pictorial guides to Greenwich and Mauricetown have been published by the Cumberland County Planning Board. The County posesses a wealth of historical interest which might well become the basis for a tourist function in the future.

9. Archaeological Sites

Cumberland County has had little research done on its earliest inhabitants, the Indians, or even its earliest European settlers. Some archaeological finds have been made, indicating that Indians made considerable use of the shellfish resource and the Delaware Bay region. George Woodruff has gathered an outstanding collection of Indian artifacts housed in Bridgeton Library. He regularly lectured on South Jersey Indian Culture at Princeton. Early Swedish settlement is known to have existed along the Maurice and Cohansey Rivers. Some of the archaeological potential is indicated in the section.

FIGURE 16

HISTORIC SITES & AREAS*
CUMBERLAND COUNTY, N.J.



* Historic sites and areas of record-1977
Prepared by the Cumberland County Planning Board-1977

10. Air Quality Regions

Cumberland County has recently set up an air-monitoring program in the industrial areas of the County, as required by the New Jersey D.E.P. Generally, the area's air is relatively clean, since local industry is mainly of low pollution types. Recent industrial pressures, coupled with the oil shortage, have resulted in a certain degree of relaxation of the stringent state air pollution standards, and many Cumberland County industries may now burn high sulfur oil. Recently, the Vineland Electric Utility was allowed to shift from oil to coal. None of these changes have had any great adverse effects on the local air quality.

Nonetheless, fresh air is clearly recognized as both an amenity and a resource. Recently the County was designated as a "fresh air county" by the State. Most municipalities have specific zoning ordinances with regard to air pollution. Such ordinances generally state that: dissemination of smoke, dust, odors, fumes and obnoxious gases shall be within the limit of industrial tolerance standards set by the N.J. Department of Health, Bureau of Adult and Industrial Health. Some communities specifically forbid refineries, gas plants, concrete plants or other potential OCS related industries (see section on zoning).

CHAPTER IV

ONSHORE FACILITIES AND ANCILLARY INDUSTRIES RELATED TO OIL AND GAS DEVELOPMENT

A. OIL COMPANY SITING CRITERIA FOR ONSHORE FACILITIES

Table 7 (chart) shows locational criteria for major onshore facilities related to oil and gas development. The siting criteria were developed by oil companies over almost 20 years of ongoing offshore operations. These criteria have evolved and improved over time and have to be taken into consideration when looking for sites to locate onshore facilities related to oil and gas development.

The prime criterion is the distance between a potential onshore site and an offshore operation site. The economic distance limit for location of onshore facilities is 200 miles. Cumberland County lies entirely within this economic boundary. Distance plays an important part in deciding where all types of facilities are sited.

However, there are other counties in New Jersey with primary locations along the shore and with distances to offshore operation sites of approximately 60-100 miles. There are four major groups of siting criteria for onshore facilities:

1. The physical siting criteria

   a) location, land siting
   b) water depth

2. Existing infrastructure:

   a) transportation access[1]
   b) energy supply
   c) water supply

3. Labor Force

4. Other specialized criteria or relevant factors

[1] Data for transportation access is not shown in chart.

Characterization of the siting criteria for onshore OCS related facilities represents a very difficult task. However, some generalizations can be made.

1. The Physical Siting Criteria:

   a. Land Siting Criteria – Onshore facilities require from 5 to 1500 acres of land. The largest tract of land needed is for steel platform fabrication yards and refineries.

   b. Water Depth – This is a governing factor, indeed a primary consideration. Depth requirements vary from 15 up to 60 feet (m.l.w.) for waterfront based facilities (see Table 7 for details).

2. Existing Infrastructure

   a. Transportation Access – Access to good roads and to rail sidings is very important for facilities supporting offshore drilling. These facilities need road or rail in order to transport supplies or raw materials.

   b. Energy Supply

      Fuel – Diesel Fuel – These facilities need large amounts of diesel fuel to supply derrick barges, tug boats, helicopters and drilling rigs at the offshore site (see Table7 for details).

      Electricity – Electric energy is required at sites for: steel platform fabrication yards, concrete platform fabrication yards, pipe coating yards, marine terminals and at processing facilities (see Table 7 for details).

      Gas – Several facilities required gas (see Table 7 for details).

      Water Supply – The amount of water needed varies with offshore activities. It depends heavily on the number of platforms being serviced.

3. Labor Force

      Employment – Onshore facilities employ large numbers of skilled and unskilled workers. Size of employment depends on offshore activities. The largest employment is at fabrications yards (see Table for details).

4. Other siting criteria play a role in the location of individual types of onshore facilities. These can include pre-existent plant, ownership and available equipment, among others.

B. MAJOR ONSHORE FACILITIES RELATED TO OIL AND GAS DEVELOPMENT

Offshore activities associated with the development of oil and/or gas, require various types of onshore facilities. In the exploration phase the number of onshore facilities is limited. Drilling rigs which drill exploratory wells need onshore support (eg. drilling mud, cement, brackish

water). These rigs require temporary service bases. They do not have to be located in the frontier area (eg. temporary service base Davisville, R.I.). After the discovery of commercial quantities of oil and/or gas, the individual company initiates the development phase. This phase consists of the construction of all onshore facilities needed to extract, partially process, transport, store and finally process oil or natural gas. In this stage a permanent service base is established in the frontier area. The siting and location of other onshore facilities is dependent on various factors, shown in Table 7 . This Table includes siting criteria for each of the major facilities.

Major onshore facilities related to oil and gas development can be divided into three types:

1. Facilities Supporting and Servicing OCS Development

2. Transporting and Storing Facilities

3. Treating and Processing Facilities

1. Facilities Supporting and Servicing OCS Development

a. Temporary Service Bases - Temporary service bases are established by oil or service companies. The bases do not have to be located in a frontier area, and acreage is leased on a short-term basis.

The major function of temporary support bases is to support offshore operations during the exploratory phase by: a) transferring supplies (drilling mud, cement, water, equipment, tools, and other items) and b) by transferring personnel between onshore and offshore sites. Service bases are generally located in protected harbors; they require good roads, rail access, and a nearby commercial airport.

b. Permanent Service Bases - Permanent service bases have virtually the same requirements as temporary service bases. They are usually located in frontier areas (if there is an available site), to reduce the cost of operations. The permanent base provides the same services and support during the development phase as the temporary base does during the exploratory phase. However, it differs as to the amount and intensity of required supplies and services.

c. Steel Platform Fabrication Yards - Steel platform fabrication yards are large facilities, consisting mostly of cleared land, buildings, shops and administrative offices. The main function is construction of drilling production platforms (completely or partially). A platform yard does not have to be sited in the frontier area. Platforms are towed long distances to the offshore site. Necessary acreage is purchased by the construction company (eg. Brown and Root in Virginia).

d. Concrete Platform Fabrication Yards - Concrete platforms are constructed at large yards equipped with dry-docks separated from deep adjacent water by a coffer dam. The yard could contain: one or more dry docks, dock space on a deep waterway for receiving raw materials, a concrete mixing plant, warehousing and office buildings, cement

storage silos and buildings for deck module manufacturing. Concrete platforms are preferred in areas where high winds and rough seas prevail, (eg. the North Sea).

e. Steel Platform Installation Service Bases - Steel platform installation service bases are very similar to temporary service bases. They require warehouse space and repair and maintenance facilities for vessels and barges. The base will likely be sited at a fabrication yard, if one exists close to the offshore site. These bases install steel platforms at offshore sites, (3-12 month process). One base can support the installation of several platforms.

f. Pipe Coating Yards - A pipe coating yard is a large facility characterized by rows of stacked pipe, lanes for forklifts and other mobile equipment, and several low, sprawling structures in which the pipe is prepared and coated. A pipe is coated with concrete and asphalt sealers to protect it under water and allow it to sink. A permanent yard is established if long term opportunities exist. If scale or opportunities are limited, a portable plant or "railhead" pipe coating operation may be established. Access to sources of pipe and raw materials is an important locational factor.

g. Pipeline Installation Service Bases - Pipeline installation bases are located close to the route of the pipeline because of the volume of materials to be shipped. This facility is established by oil or service companies during exploration and can support many installation activities. Vessels used for installation service include: lay barges, tug boats, cargo barges and jet or bury barges. The main function of this facility is the installation of marine pipe lines. It is likely established for a short term.

h. Repair and Maintenance Yards - A repair and maintenance yard is not strictly a facility. It refers loosely to the many firms which provide repair service for vessels and equipment used in OCS development. Repairs include hull, electronic, mechanical and inspection work for 60-200 foot tugs, crew supply and research vessels, repairs to much larger drillships and semi-submersible rigs, pipeline lay and jet ranges, pipe supply barges, and repairs to OCS related equipment.

2. Transporting and Storing Facilities

There are two methods for transporting oil and gas to onshore processing facilities:

a) pipeline systems and,

b) tanker systems.

a. Pipeline and landfalls - A pipeline system may include a pressure source, gathering pipelines offshore, major trunk line (s), intermediate pressure booster stations, a landfall, and an onshore destination. The landfall is generally located at a site which has the shortest distance to offshore OCS development. Oil can be transported onshore by one oil company or by a consortium of oil companies which build a common carrier pipeline.

b. Tanker System - Marine Terminals - A marine terminal includes a berthing system for vessels loading or unloading, equipment storage tanks, terminal control and safety

equipment, and navigational facilities. Storage tanks occupy most of the land. Marine terminals may be developed for several purposes:

Transshipment Terminals,
Crude Oil Receiving Terminals, and
Product Terminals.

Crude Oil Receiving Terminals can be built onshore or offshore (deep water port). Water depth requirements of crude carriers must be taken into consideration.

c. Tank Farms - Tank farms may be located adjacent to refineries, marine terminals or pipelines.

3. Treating and Processing Facilities

a. Partial Processing Facilities - A partial processing facility separates oil, gas, water and dissolved or suspended mineral impurities from the crude oil mixture. Partially processed products are stored in tanks. Partial processing can be performed offshore at a facility on the production platform itself, onshore at a separate facility, or at storage or refining facilities. Generally, natural gas is removed from the well stream at the platform and transported onshore in a separate pipe.

b. Gas Processing and Treatment Plants - A gas processing and treatment plan is designed to divide impurities and valuable liquefiable hydrocarbons (ethane, butane and propane) from the raw gas stream before it enters a commercial gas transmission line. The best location site for the plant is between the gas pipeline landfall and the closest commercial transmission line. Coastal sites are preferred.

c. Refineries - Built near to deep waters to permit use of deep draft crude carriers if shipped by tankers, they are able to be located at a variety of sites where pipelines are used. A typical refinery will include processing units, storage tanks, water treatment facilities, offices, machine shops, storage and warehouses, an electrical substation, firehouse, pumping station, truck loading areas, pipeline, rail spur, parking areas and a buffer zone. Sites are often large, but with only a small percentage of total area in intensive use.

d. Petro-chemical Plants - Refers to a variety of processing facilities producing a variety of chemicals derived from petroleum sources, including natural gas, natural gas liquids from gas processing plants, and products of oil refineries. Because of the complexity of the industry, there is no standard size nor standard combination of products produced by petrochemical plants. At one extreme, a plant may simply consist of several additional processing units added to an oil refinery; at the other extreme, it may be a huge complex producing a large number of products and occupying sites of several thousand acres. Generally speaking, a plant located in a frontier region may tend to be less complex than one located in an area with an existing petrochemical infrastructure. Like the siting considerations for an oil refinery, the discovery of commercial quantities of

oil and gas in frontier areas does not necessarily imply that petrochemical plants will be developed, since there are many complex factors which influence petro-chemical plant development.

C. ANCILLARY INDUSTRIES

Oil companies have the responsibility for exploration, development and production of oil and gas. During the different developmental phases they have need for many specialized industrial operations, unique types of equipment and supplies, and highly specialized services. Oil companies generally contract these out to various firms. Generally we can divide ancillary industries into two major types: waterfront oriented and land oriented industries. Among the commonest types of water oriented ancillary industries are: wellhead equipment, fishing and tool rental, cement, mud, diving, inspection and testing, trucking and stocking, supplies and services, fabrication shop, welding and machine shop and oil spill recovery services.

Waterfront oriented ancillary industries are shown in Table 8. This Table shows important locational siting criteria and requirements for ancillary industries. Data are shown for energy and water, employment, equipment, ownership and capital investment.

1. Siting Criteria for Waterfront Oriented Ancillary Industries

a. Physical Siting Criteria

Land Siting Criteria - All these firms do not require large tracts of land. The size of tracts needed varies from less than one acre up to 50 acres. The largest tracts of land are required by firms which fabricate dock sections and platform modules.

Draft - Generally, 15-20 feet, but fabrication shops require drafts of up to 25 feet.

Dock Space - Requirements vary from 200-750 feet (200 feet per supply boat). It is necessary for loading supplies onto barges and supply boats which then transport them to offshore drilling site.

b. Existing Infrastructure

Railroad Access - Required for most of the ancillary industries, for receiving raw materials (e.g. from steel mill), delivery of supplies to company site (distribution point) and transporting crew.

Highway Access - Highly desirable for shipping supplies, raw materials, for rapid delivery of the equipment, transportation of personnel and, in the case of emergency needs, for transportation of crew. (If there is no available heliport).

Heliport Access - Is required for some types of ancillary industries. In general for transportation of the personnel to offshore drilling site, emergency crew and quick delivery of important parts of equipment to the offshore drilling site.

Energy and Water Requirements - Ancillary types of industries need diesel fuel for supply vessels and trucks and oil spill cleaning equipment. Electric, gas and water uses are minimal (personal use).

c. Labor Requirements

Training for New Jobs - Generally, firms existing in oil and gas producing regions offer their services in new oil and gas development regions. For the initial phase of the activity they bring with them highly skilled personnel who provide the necessary services to oil companies or drilling contractors. These firms often train local people for new jobs related to oil and gas development. The time for training varies from 6-24 months.

Employment - The number of employees depends on the types of services and number of rigs being served by certain types of industry.

Composition - Ancillary industries belong to the types of industries which have a great impact on local labor. Almost every one of them hires more than 70% local people.

Wages - Approximately $8,000-$100,000 per year.

d. Other Relevant Factors

Equipment - Typical equipment: various types of trucks, cranes, forklifts and specialized equipment for certain types of services and operations.

Ownership - In most cases oil companies or drilling contractors lease land to establish ancillary industries.

Capital Investment - Range from $25,000-$5 million per facility.

Water oriented types of ancillary industries generally are located near ports, producing local impacts comparable to a large-scale marine industry (cluster tendency). This industry generates significant economic activity, new jobs, tax revenues, business opportunities, and cash flow in the area development. These industries increase demands on waterfront land, existing port facilities and public services.

2. Types of Ancillary Industries - Waterfront Oriented

a. Wellhead Equipment Companies - Wellhead equipment companies provide drilling contractors and oil companies with surface equipment that controls oil and gas wells during drilling and production. The company supervises the installation and maintenance of wellhead equipment. During drilling operations, the following wellhead equipment is required: blowout preventer stacks, drilling chokes and mud manifold systems, related drilling control systems, casing heads and hangers, and marine riser systems.

Prior to the production phase, wellhead equipment is installed on development wells. It includes: casing and tubing heads, hangers, and valves and chokes that are used to control the flow at the wellhead.

b. Fishing and Tool Rental Companies - Generally, tool rental companies rent tools to oil companies for several functions, including: drilling, cutting, fishing and installing certain types of equipment. Some companies provide the services of highly skilled operators.

Tool rental companies may be used for pipe cutting and underreaming, installation of casing and tubing, "fishing" or retrieving downhole equipment, directional drilling, and other functions.[1]

c. Cement Companies - Cement companies provide highly specialized cementing and stimulation services for offshore drilling operations. The companies deliver cement to offshore rigs which is already blended in proper proportions with required cementing materials. Only those types of cement which meet certain class specifications are used for offshore drilling. The company owns and operates the heavy machinery on the rig that mixes the cement with water, and pumps the slurry down the hole. This operation helps to seal casing in the drilled hole and to separate the various formations encountered. In addition to cementing, a cement company generally provides well stimulation services, such as acidizing and fracturing, during workover operations. Cement companies are likely to expand or relocate; they might subcontract with local companies for the appropriate classes of bulk cement.

d. Mud Companies - Mud companies deliver drilling fluids and provide engineering services to drilling contractors. Drilling fluid is a complex mixture of clay, weighting agents, and chemical additives in water. During drilling processes mud is pumped downhole to perform a variety of functions. These functions include: cooling and lubricating the drill bit, transporting drill cuttings to the surface and controling formation pressure, thus preventing the oil and gas from flowing up the well during drilling. Mud company facilities include a central office and a number of distribution points from which supplies are sent to the rigs being serviced. A distribution point is primarily a storage area that includes a warehouse for sacked goods and open land where pressurized tanks for bulk storage of dry muds may be placed. Generally, there is a small office and laboratory adjoining the warehouse. Currently, there are two basic types of mud companies: small and large.

Small mud companies operate in the region and large mud companies operate worldwide. The small mud supplier would most likely attempt to lease the necessary storage space from another service company, or oil company, at a major service base. They would rather buy, or build, the necessary heavy equipment in the frontier region rather than ship it from an established oil production region.

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[1] Any piece of equipment in the hole that is not connected to the rig equipment at the top is called a "fish".

e. Diving Companies - Diving service companies provide divers and equipment for underwater construction, inspection and maintenance required by the offshore oil and gas development.

Divers install risers on production platforms, survey pipelines, assist in burying pipelines, complete pipeline tie-ins, set offshore moorings for tankers, inspect and maintain subsurface structures and equipment and perform other underwater functions. In general, there are two types of diving companies: large major diving companies and small independent diving companies.

Large diving companies are specializing in heavy sub-sea construction and also provide other marine services: drilling vessel support, sub-sea maintenance, repair, search, inspection, salvage, oceanographic and other diving related studies. Small diving companies specialize in underwater inspection. They are limited to surface-supported diving activities.

Diving activity is most intense during the development phase, when platforms and pipelines are installed and development wells are drilled.

Inspection and minor repairs would be made by a small diving company while major repairs would be done by large companies. The diving company's major equipment would be stored at the construction company's support base.

f. Inspection and Testing Companies - Inspection and testing companies provide a number of services to the oil and gas industry. Drilling operations are subject to tubular goods inspection, and structural and equipment inspection.

Oil field tubular goods such as casings, tubing, drill pipe, and line pipe are inspected in order to determine whether they meet federal government, industry, and company specifications. Inspection companies send their crews and testing equipment to the customer's storage site. Tubular goods may be inspected visually, hydrostatically or by a more sophisticated technique such as electronic or magnetic flux inspection. Pipelines must be hydrostatically tested before they can be placed in operation. Oil pipelines are generally tested over a 24-hour period; gas pipelines are generally tested over an 8-hour period. Pipelines are tested at 125% of the designated operating pressure. Once a pipeline has been laid and placed in operation, it may be periodically inspected for corrosion and other types of damage by running a special electronic device called a "pig" through it. The frequency of pipeline inspection depends upon a number of factors (e.g. fishing operations, subsea conditions,etc.). Some pipelines are inspected as often as every six months,while others are inspected only once a year or once every two years.

g. Trucking and Stocking Companies - Trucking and stocking companies provide bonded storage and transportation services for oil field tubular products required by offshore operators during development drilling. These firms receive stocks of tubular products (e.g. casings, tubing, drill pipe, and line pipe) from the steel mills, store them, and then deliver to the operators.

Trucks are used to deliver tubular products to land-based operators, and boats and barges are used to deliver material to offshore operators. Most of the companies that stock

tubular products also specialize in tubular goods, transportation and handling. Oil companies prefer to do business with Interstate Commerce Commission regulated companies because their rates are lower than the intrastate rates regulated by State Commissions. In frontier areas it is possible for an initial stocking yard to be established by a company without a trucking operation. Material could be delivered by barge or railroad to the yard, stored, and loaded onto supply barges or boats.

h. Supplies and Services - Supply houses provide oil and gas production and processing related equipment (tools, spare parts, and a wide assortment of other supplies) to rig, platform, and supply boat operators. Additionally, suppliers also manage the acquisition of equipment and provide several other services that oil companies or drilling contractors require.

Existing local businesses have a big chance to benefit from offshore drilling, by providing services and supplies to oil and gas companies.

There are basically two types of supply houses. First there is the independent supplier who handles a relatively low volume of business. This firm usually exists prior to oil and gas activity and expands to meet new demands in their region. Second, there is the large oil field supply company that owns and operates a number of supply houses in different regions undergoing oil and/or gas development. These large firms may have several centrally located supply stores. Railhead and waterfront facilities may also be adjacent to the store. Supply houses offer an extremely wide variety of products related to the oil and gas industry and marine related industries. Large supply companies within one region may have several centrally located supply stores (hardware stores). They should be located near suppliers and central to oil and gas development areas in order to minimize shipping costs.

i. Fabrication, Welding and Machine Shop Services - Oil and gas development requires a great number of services among which are firms offering: fabrication, welding, machine shop, emergency repair, contract labor, and boat contracting services. Some firms offer only one or two such services. Most companies do provide fabrication, welding and machine shop services, since these services are closely related.

j. Oil Spill Recovery Services - Oil and chemical spill contaminant and recovery services are generally provided through contractural agreements. Spill control firms may work for oil company cooperatives, the U. S. Coast Guard, petroleum storage terminal operators, or port authorities. Equipment is stored at strategic locations and has to be transported to the spill site. Companies that provide oil spill recovery services are unlikely to establish a business in a frontier region where oil and gas development has just begun. When problems of oil spills exist, those firms offer a proposal to the appropriate organization (oil company groups , port authority, storage terminal) for consideration and action.

3. Siting Criteria - Land Oriented Ancillary Industries

a. Physical Siting Criteria

Land Siting Criteria - Land oriented ancillary industries do not need a lot of

space. The size of the tract of land needed for establishing certain industries varies from less than one, up to 20 acres. See Table 9 (chart).

b. Existing Infrastructure

Railroad Access - Not necessary for most of these industries.

Highway Access - This siting factor is extremely important for all land based industries. It is a major governing factor in location and must be taken into consideration as the prime factor when selecting a site for land oriented industries. Good road access is required for delivery of supplies (equipment, parts, food), and also to transport personnel to the service base.

Airport Access - Is required for some types of industries which deliver supplies (food) or personnel directly to offshore drilling sites.

Energy and Water Requirements - Ancillary types of industry need diesel fuel for various types of trucks and turbine fuel and aviation fuel for helicopters. Electricity and water uses are minimal.

c. Labor Requirements

Training for New Jobs - Almost all of these companies established in new producing areas offer training for new jobs related to oil and gas development. The period of training extends up to two years.

Employment - Varies, depending on the number of rigs being served and the types of services performed by the particular company.

Composition - All these industries give local people opportunities for jobs. 50 to 70% are hired locally.

Wages - Varies, depends on skills of the workers. Highly skilled $12,500-35,000 per year.

d. Other Relevant Factors

Equipment - Various types of trucks, tools.

Ownership - Existing companies lease land to establish their businesses in new exploration areas.

4. Types of Ancillary Industries - Land Oriented

a. Helicopter Company - Transport crews, deliver supplies, and provide emergency services to offshore rigs and platforms. The Company owns its helicopters and employs necessary personnel for operation, repair and maintenance.

In general helicopter services are contracted by oil companies, drilling contractors or service companies.

The most frequently used helicopters for offshore operations are turbine (jet) powered. These helicopters have faster speeds than conventionally powered ones. If the local airport is chosen by oil companies as a helicopter base, secondary benefits may result in the upgrading of the range size of the existing airport. It also can provide an opportunity for local construction contractors and laborers if a new facility is needed. Also, a local source of fuel will be needed for helicopters. A helicopter facility consists of the helicopter landing area and a number of helipads, for the craft based at the facility. A large helicopter facility includes a maintenance hangar, offices, a waiting room and an adjoining automobile parking area. Generally, the crews and supplies transported offshore leave from the helicopter base. A helicopter company will move into a frontier region only after obtaining a firm service contract from an oil company. One contract will lead to others. Initial contracts are generally obtained during the exploratory phase. Initially, a helicopter company must choose whether to construct a new base or operate from an existing airport. A currently existing airport is generally favored because it has the necessary area, clearance, the proper licences, radar equipment and services like refueling and firefighting. If an existing airport is within a reasonable distance of the offshore rigs and platforms, an operator will attempt to lease the necessary property at the airport. Initially, experienced personnel from an established OCS region would be sent into the frontier area.

b. Catering Company - A catering company provides food service on offshore rigs, development and production platforms, and derrick barges. Food service includes purchasing all necessary food, offshore meal preparation and clean-up after meals.

Catering companies provide all necessary personnel for meal preparation (cooks, bakers, and assistants), but oil companies provides the galley equipment (stove, refrigerators, etc.). The caterer is responsible for transportation of employees and delivering supplies to contractor's (oil company's) service base dock. The oil company is then responsible for moving them and supplies by boat or helicopter offshore.

Although local businesses may expand in order to offer catering services to oil companies in a new area, catering companies established in frontier areas indicate that the expansion and relocation of existing caterers is more common. Local employees and local food purveyors are generally utilized.

Generally a catering company operates out of one central onshore facility that services an entire offshore area. A catering company obtains a contract with a particular oil company. Caterers generally subcontract with a local food purveyor for the necessary food supplies. Local suppliers may be contracted to deliver directly to the service base dock or to a warehouse at the caterer's onshore facility. From there the food is trucked by the caterer to the oil company's service base dock.

c. Logging and Perforating Companies - Logging and perforating companies provide oil companies and drilling contractors with well logs and perforating services. Companies specialize in either open hole or cased hole logging, downhole equipment installation,

fishing tool services, and wireline services. The company negotiates a contract with an oil company or a drilling contractor.

d. Drilling Tools and Equipment Companies - Drilling tools and equipment companies are among the first companies to establish facilities in a frontier area.

The company manufactures and sells the tools and equipment required by contractors or oil companies during the drilling process. The drilling contractor or an oil company awards contracts to such companies.

e. Completion and Production Service Companies - Completion and production service companies provide the petroleum industry with specialized equipment and services after a development well has been drilled. Completion equipment controls the flow of fluids from the reservoir to the surface equipment. Packers, surface and subsurface safety equipment, and production testing systems are operated by trained specialists. Well completion operations occur during the development phase of OCS activity.

The well completion process also includes perforating and well stimulation services provided by a different company.

f. Labor Contractors (Companies) - Oil and gas development requires a variety of skilled and unskilled labor. There are existing firms which contract workers for irregular services (eg. vacation leave replacement, well workover, equipment installation and maintenance and emergency repairs). Other small firms provide painting, sand blasting and cleaning. Firms which provide labor service (metal workers, welders, painters, machinists, and general laborers) often provide transportation to the departure site from which the oil Company transports workers to offshore drilling rigs. Avilability of work force that is either experienced in oil and gas industry procedures, or underemployed personnel capable of being trained in the necessary skills, is a key factor in any decision to start business in a frontier region. The firm which establishes a business likely brings experienced personnel to train local people. Good automobile and truck access, and the availability of helicopter services, are important siting requirements.

CHAPTER V

SUITABILITY ANALYSIS OF CUMBERLAND COUNTY FOR MAJOR ONSHORE FACILITIES AND ANCILLARY INDUSTRIES

A. GENERAL STATEMENTS ON LOCATIONAL SUITABILITY

In general, Cumberland County has limited possibilities for the development of major OCS facilities. CAFRA regulates development on 44% of the County's land. Coastal Management Strategy for New Jersey discourages much OCS related onshore development in this area. It permits and encourages solar and wind powered generating plants, including experimental and demonstration projects.[1] If it does not expressly forbid certain major OCS facilities, it does place strong limitations on the construction and operation of onshore support facilities, bulk storage of oil and gas, petrochemical industries and refineries.[2] Any such construction requires a permit from the DEP. Each proposal must insure adequate environmental safeguards and be accompanied by an environmental impact statement.

The siting criteria for major OCS facilities present definite limitations. Many such facilities are coastal dependent and/or waterfront based (except tank farms, gas processing plants and treatment plants). Water oriented major facilities often require great water depths. In general, all water dependent facilities require more than 15 feet of water depth at m.l.w. Cumberland County does not have such depths adjacent to its shore line, nor a continuous channel of such depth in either of its two major rivers. Both the Cohansey and Maurice Rivers have shallow channel dpeths at their mouths.

Ancillary industries present some of the greatest possibilities for Cumberland County. If major OCS facilities and support bases are to be encouraged to concentrate in built-up urban areas of the coast, [3] ancillary industries can often be located in the inland area,

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[1]Coastal Management Strategy for N.J. CAFRA Area, September 1977, pp. 26-34.
[2]Coastal Area Facility Review Act, P.L. 1973, Chapter 185, June 20, 1973, pp. 2-4.
[3]Coastal Management Strategy for New Jersey: CAFRA Area, DEP, September 1977, p. 26.

outside the CAFRA zone. Existent facilities can often be enlarged, adapted or otherwise rendered useable as ancillary industry facilities. Many are essentially non-polluting, and some appear to have distinct locational advantages in Cumberland.

B. LOCATIONAL SUITABILITY OF OCS FACILITIES BASED ON LOCAL ZONING ORDINANCES AND INDUSTRIAL CRITERIA

On July 27, 1977 Cumberland County Planning Board sent to the zoning officers of the 14 municipalities the results of a study of local zoning ordinances.[1] The study was designed to determine the types of uses related to offshore drilling which were permitted or prohibited by local zoning ordinances. The municipalities were asked to check the types of uses related to oil and gas development to determine if the results (interpretations) were correct. Six municipalities studied the results and sent back the tables. Four of these municipalities sent comments, suggestions and corrections (See Table 10).

Table 10

MUNICIPALITIES WHICH RESPONDED TO LOCAL REGULATION STUDY

Municipalities	Received Revised Table of Uses Related To Offshore Drilling Which Are Permitted Or Prohibited
1. Commercial	
2. Deerfield	
3. Downe	
4. Fairfield	X - with comments
5. Greenwich	
6. Hopewell	X
7. Lawrence	X
8. Maurice River	X - with comments
9. Stow Creek	
10. Upper Deerfield	
11. City of Bridgeton	
12. City of Millville	X - with comments
13. City of Vineland	X - " "
14. Borough of Shiloh	

All Cumberland County municipalities have zoning ordinances. Thirteen of them have industrial zones. Only Downe Township does not have an industrial zone. Each OCS related use was assessed for conformity to industrial zoning in each municipality (See Table 11).

[1] If there was no zoning officer in the municipality, the result was sent to the building inspector.

Table 11

MUNICIPAL INDUSTRIAL DEVELOPMENT REGULATIONS

Municipality Name	Name of Industrial Zone	Provisions and Regulations for Industrial Use	Industrial Performance Standards Established	Environmental Commission	Comments
1. Commercial	Industry General District	General provisions for building energy related facilities and industrial uses Article V - General regulations, Section 5 position 2 - prohibited uses Article VI - Special Regulations, Section 6 position 1. Article IX - General provisions Section 9 position 1.	No	Yes	
2. Deerfield	General Industrial Zone (G1)	Article V - Permitted uses (Table) Article VI - General Regulations Section 601 position 11 Section 708 position 1 (a - f)	No	No	
3. Downe	Do not have industrial zone	Section 505 Regulations Applicable to Special Industrial Development in R-1, R-2, R-3 and B-1 Zones (Positions h,i,k)			
4. Fairfield	Industrial District and Planned Business Industrial	Article V Permitted Uses (Table) Article VII - Special Regulations Position 708 - Industrial Uses Section 1 (a-f)	No	Yes	
5. Greenwich	General Industry (G1) District	Permitted uses (Table) p. 23 Article V-Application of Regulations Section 5. position 1 - General provisions for uses prohibited in industrial zone p. 23	Article VIII General Standards and requirements. Position 8 Industrial Performance Standards Section 4. B. Standards of Performance (1-12) pp. 21,22		Article IX Special Standards and Requirements, Position 5. page 6.

6. Hopewell	Agriculture Industry Zone (A-1)	Permitted uses (Table) Article V. Application of Regulations Section 5 Position 1. Use Regulations Article VIII - Supplementary District Regulations, Section 8 Industrial Uses, Position 9 (A-E) General provisions - "Prohibited uses in all zones"	No	No	
7. Lawrence	Industrial District	Article XI - Regulations for Industrial District Position 1 (a-d), Article XXII - General Regulations Position 6	No	No.	
8. Maurice River	Industry Zone District	Article V - General Provisions, Section 1 - Applicability of Regulations, Article XI M-1, Industry Zone District, Section 1. Permitted uses	No	No	
9. Stow Creek	Industrial 1	Article X - Industrial Zone (I-1), Section 10 Uses Permitted, position 1. A (1-7), Section 10 Uses prohibtted, position 2. (A-G)	No	Yes	A municipal advisory body created pursuant to N.J.S.A. 40:56A-1 et. seq.
10. Upper Deerfield	General Industry (G-I)	Article III Application of Regulations 98-5 Use Regulations 98-6 Area Regulations Article VII Special Standards & Requirements 98-11 - Industrial parks Article VIII Planned Unit Development 98-46 position 3 Industrial uses (1-15) p. 9900 98-48 C. Industrial and office uses (1-4) p. 9917-9919. Prohibited uses in all zones	Article VI Supplementary District Regulations, 98-29 Industrial Use Standards B. Standards of performance (1-12 positions)	No	
1. City of Bridgeton	Industrial District (I-1)	Article 100 General Provisions section 102 position 2. 39. Article 400 Industrial District section 401 position 1	Article 100 General Provisions, Section 102, posit. 2.76 Article 700 Common Regulations & Standards Sect. 704- Performance Standards Positions 1-9		

12. City of Millville	Research Industry Zone (I-R) General Industry Zone (I-1) Water Front Industry Zone (I-2) Air Park Industry	Article V General Regulation Section 6: 2-517 Prohibited uses Article XIV. Research Industry Section 6:2-1401-1409 Article XV. General Industry zone Section 6:2 1501-1508 Article XVI Water Front Industry Section 6:2-1601-1608 Article XVII Air Park Industry Section 6:2-1701-1707 Article XVII Special Height Limitations Section 6:2-1801-1802	Section 6:2-1405 Performance requirements Standards of the State Department of Health	
13. City of Vineland	Industrial Park District (I-1) General Industrial Zone (I-2) Commercial Industrial Dist. (I-3)	Article XV-Industrial Park District Section 1 - permitted uses (page 47) Article XVI - General Industrial Zone Section 1. Permitted uses (page 53) Article XVII - Commercial Industrial District - Section 1. Permitted uses (page 55)	Article XV - Industrial Park District. Sec. 3 Other Requirements, positions 6-13, performance standards (pp.48-50) Article XVI General Industrial Zone, Sec. 4 Performance standard for permitted uses (page 54) Article XVII Commercial Industrial Dist. Sec. 4 Performance standards for permitted uses, (p.56)	Yes
14. Shiloh	Industrial Zone (I)	Article VI General Regulations Section 6, position 1, General use. Section 6. position 7, prohibited uses Article X, Regulations for Industrial Zone	No	No

Facilities which required water depths from 16 up to 60 feet were not considered even if the local zoning regulations permitted them. They are marked on the table as not applicable in Cumberland County. Among the types studied were: tank farms, oil and gas pipelines, partial processing facilities, gas producing and treatment facilities, refineries and petro-chemical plants. In addition the possibility of locating a pipe coating yard in Cumberland was taken into consideration. This possibility exists only if there is no alternative site with 20-30 feet water depth (and better land location), and where land transportation to the support base can be considered economically acceptable. The results are shown in Table 12. In general, local ordinances permitted tank farms (underground), pipeline corridors (except the Townships of Commercial and Greenwich) and (in some municipalities) processing facilities. (See detailed tables of permitted and prohibited uses related to OCS development in Cumberland County).

C. CUMBERLAND COUNTY SUITABILITY FOR ANCILLARY INDUSTRIES

1. Helicopter Services

There are no existing helocopter firms in the area. However, Boeing Vertol and other nearby Delaware Valley firms could supply craft and parts. Millville airport has expressed an interest in oil/gas firm usage of its heliport. Local personnel (former servicemen and/or current airport employees) have well developed helicopter repair and maintenance skills. There are a number of trained helicopter pilots living locally. Over 1000 workers in 40 industries are employed at the Millville Airport Industrial Park. One company, Airwork Service, a division of Purex Corp., employs 600 in aircraft engine overhaul and helicopter repairs.

Currently there is one helipad and a repair hanger for helicopters. Presently, five State Police helicopters (turbine jet powered types) use the facility, (New Jersey, Delaware, Maryland, Pennsylvania and New Jersey State Police). Millville airport is quite willing to lease space for exclusive oil company use. There are three storage tanks for turbine aviation fuel with a combined capacity of 50,000 gallons. Communications services include radio, telephone, radar tower, and an FAA Flight Service Station (gives weather reports 24 hours a day).

2. Catering Services

Cumberland County is an area of active vegetable farming operations, - principally in the western portion of the County and the areas near Fairton and Cedarville. The farmlands are reasonably fertile and the crops grown here are noted for taste and quality. Southern New Jersey farmers are among the best known horticultural specialists in the nation. Vineland and Bridgeton are the major centers for food processing, mainly the freezing and canning of vegetables. Food processing industries employ about 2,000 people, (50% in the summer season).[1] In addition to existing plants, there are prospects for opening Seabrook Brothers and Sons vegetable freezing plant in 1978 (Upper Deerfield Township). There are also firms which handle wholesale meat products, groceries, dairy products, fresh fruit and vegetables, and other items. These local firms may wish to expand business by offering food services to oil companies.[2]

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[1]For details see Appendix 5 - Food Processing Industries in Cumberland County.

[2]Opinion submitted by Barbara Ackley, Chairman of the Cumberland Co. Planning Board.

KEY
+ permitted
- prohibited
o not applicable

Table 12

Locational suitability of OCS facilities based on industrial criteria and local zoning ordinances

Municipality	Service bases	Platform fabrication yards[1]	Steel platform installation service bases	Pipeline installation service bases	Marine terminals	Pipe coating yards	Tank Farms	Pipeline and landfalls	Partial processing facility	Gas processing & treatment plant	Refineries	Petrochemical facilities	Comments
1. Commercial	o	o	o	o	o	+	+	-	+	+	+	+	
2. Deerfield	o	o	o	o	o	-	+	+	-	-	-	-	
3. Downe		No Industrial Zone											
4. Fairfield	o	o	o	o	o	+	+	+	-	-	-	-	
5. Greenwich	o	o	o	o	o	-	+	-	-	-	-	-	tank farm, underground only
6. Hopewell	o	o	o	o	o	+	+	+	-	-	-	-	
7. Lawrence	o	o	o	o	o	+	+	+	-		+	-	tank farm, underground only
8. Maurice River	o	o	o	o	o	-	-	+	-	-	-	-	new ordinances are currently being prepared
9. Stow Creek	o	o	o	o	o	+	+	+	+	+	+	-	
10. Upper Deerfield	o	o	o	o	o	+	+	+	-	-	-	-	tank farm, underground only
11. City of Bridgeton	o	o	o	o	o	-	+	+	-	-	-	-	pipeline, exception flood plain
12. City of Millville	o	o	o	o	o	-	+	+	-	-	+	+	
13. City of Vineland	o	o	o	o	o	-	+	+	-	-	-	-	tank farm, underground only
14. Borough of Shiloh	o	o	o	o	o	-	+	+	-	-	-	-	

[1] Steel and concrete

The local food purveyors would be responsible for obtaining the supplies and delivering them by truck or rail to the service base (Atlantic County) and then by boat or helicopter to offshore drilling rigs. This proposition is actively supported by residents of Upper Deerfield Township and would also be acceptable to other Townships. Participation in offshore food preparation and housekeeping services were also considered as desirable for the County as a means of reducing the unemployment rate.[1] If there is need for a site to locate a new facility (catering company), Vineland has offered the necessary office and warehouse space, and from that regional base supplies can be easily trucked to the projected service base.[2] The City of Bridgeton, in particular, offers excellent opportunities with a new industrial park (S.E. portion of the city) and many existent and available structures suited to warehousing and similar usage. (See Appendix 6).

3. Supply Companies

Existing local supply and service companies have a big chance to benefit from offshore drilling. From the industrial point of view, waterfront locations for service companies are preferred, but if there is no available site on the waterfront, a site with rail and highway access would be deemed acceptable and sufficient. Cumberland County has existing supply and service firms which employ 3,500 people.[3] The primary types are: trucking, aircraft/air transport, petroleum, concrete and ship/boat repairing firms, (for details, see Appendix 7).

To determine how these firms feel about offshore drilling development, a questionnaire was sent to 40 such firms (manufacturing, supply and services). The results are shown in table 13. Eleven of the 40 firms answered the questionnaires. These firms expressed the opinion that they would like to do business with oil companies should they need their products or services. The firms answering would be apparently able to expand services or supplies in order to meet oil company needs because they have the available land and/or other possibilities for expansion. An additional questionnaire was sent to supply companies. It consisted of various lists:

1. products which were needed by OCS firms and which could be supplied from normal stock,

2. products which would be specifically ordered for the rigs during the exploration stage, and

3. products and equipment offered by a typical oil/gas supply firm.[4]

Respondents were asked to check items they could supply on each list from current stock. Firms which answered the questionnaire are shown in table 14.

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[1]Information from questionnaire No. 1 Upper Deerfield Municipality-Cumberland County Planning Board.

[2]Information from questionnaire No. II which was sent to the Zoning Officer in Vineland. Original available at Cumberland County Planning Board.

[3]Source: Cumberland County Industrial Directory, 1975, pp. 1-62.

[4]Source: Tables 19.1 and 10.2 from Factbook, Chapter 10, Ancillary Industries NERBC - RALI, pp. 10.83, 10.84, 1977.

Table 13

MANUFACTURING, SUPPLY AND REPAIR COMPANIES WHICH OFFER SERVICES/SUPPLIES TO OIL COMPANIES [1]

Company Name	Employment	Would you like to do business with oil companies if they need your product or services? (Yes) (No)	Would you be able (or desire) to expand your lines of equipment (products) or services to meet oil companies needs? (Yes) (No)	Does your company have the possibility to expand your existing facility? Do you have available land? (Yes) (No)
A. MANUFACTURING COMPANIES				
1. Wheaton Industries General Machinery Div. N. 10th Street Millville, N.J.	125	Yes	Yes	Yes
2. Babbit Manufacturing Co. 719 Park Avenue Vineland, N.J.	10	Yes	Yes	No
3. Kane Steel Company S. 12th Street Millville, N.J.	60	Yes	Yes	Yes
4. Delsea Parker Corp. Orange Street & Wade Boulevard Millville, N.J.	31	Yes	Yes	Yes
5. Murray Industries, Inc. P.O. Box 179 350 S. Lincoln Avenue Vineland, N.J.	7	Yes	Yes	Yes

Continued on next page

Continued from Page 69

Company Name	Employment	Would you like to do business with oil companies if they need your product or services? (Yes) (No)	Would you be able (or desire) to expand your lines of equipment (products) or services to meet oil companies needs? (Yes) (No)	Does your company have the possibility to expand your existing facility? Do you have available land? (Yes) (No)
B. SUPPLY COMPANIES				
1. Kimball & Prince Lumber Co. Box 216 Almond & S.E. Blvd. Vineland, N.J.	9	Yes	Yes	Yes
2. Automotive Parts Company 809 Landis Avenue Vineland, N.J.	44	Yes	Yes	Yes
3. Pagano Brothers Automotive Parts, Inc. 516 Wood Street Vineland, N.J.	22	Yes	Yes	Yes
4. Sol Sofsky Aluminum Manufacturing & Supply Co. N. Delsea Drive Vineland, N.J.	9	Yes	Yes	Yes
5. Jones Electrical Supply Co., Inc. Orange Street Millville, N.J.	15	Yes	Yes	Yes
C. REPAIR COMPANY				
Millville Tool & Machine Co., Inc. S. Delsea Drive R.D. #2 Millville, N.J.	17	Yes	Yes	Yes (10 acres)

1. Data from Questionnaire No. 3

Table 14

PRODUCTS AND EQUIPMENT OFFERED TO OIL COMPANIES BY CUMBERLAND COUNTY FIRMS, 1977

Name of the Items	COMPANY			
	Kimball and Prince Lumber Co.	Automotive Parts Company	Pagano Bros. Automotive Parts	Jones Electrical Supply Company Inc.
1	2	3	4	5
bolts (assorted sizes)	x	x	x	
hoist (assorted sizes)	x	x	x	
puller (assorted tonnage)		x	x	
wire rope clips (assorted sizes)	x		x	
wrenches (assorted)	x	x	x	
packings (assorted)				
electric tools (assorted sizes)		x	x	
swedge nipples (assorted)			x	
pry bars	x		x	
flashlights	x	x	x	
flashlight batteries	x	x	x	
spotlight	x	x	x	
spotlight batteries	x	x	x	
marking chalk	x	x	x	
padlocks (assorted)	x	x		
rubber hose (assorted)		x	x	
steel measuring tapes	x	x	x	
grinding and sanding discs	x	x	x	
emery cloth (assorted grits)	x	x	x	
grease guns		x	x	
gun grease		x		
wire rope slings (assorted sizes)				
wire rope (assorted sizes)				
manila rope (assorted sizes)				
steel pipe and fittings	x		x	
paint (assorted colors)	x	x	x	
paint brushes (assorted sizes)	x	x	x	
step ladders (assorted lengths)	x			
claw hammers	x	x	x	
sisal rope (assorted sizes)				
nylon rope (assorted sizes)	x	x		
work gloves (assorted sizes)	x	x		
oil filters (assorted)		x	x	
steel crow bars	x		x	
rubber dinghies				

Continuation of Table 14

1	2	3	4	5
winches, hand operated	x			
electric wire (assorted gauges)	x	x	x	x
electric fittings (assorted)	x		x	x
cleaning fluid	x		x	
pipe dope paste	x	x		
cleaning mops	x	x		
cleaning buckets	x	x	x	
steel and brass hinges	x			
deck booms	x	x	x	
corn brooms		x	x	
coco mats				
bulletin boards (assorted sizes)	x			
green plush mater for chart room				
dart boards				
ping pong balls				
ping pong paddles				
ping pong tables				
lumber (assorted types and sizes)	x			
tarpaulin (assorted sizes)				
nails and spikes	x			
abrasives		x		
anti-seize compound		x		
band-it products				
bearings		x		
belt dressing		x		
bearing grease		x		
bench grinders		x		
bench vises		x		
bull plugs				
butterfly valves				
c-clamps				
cable clamps				
calipers				
cement buggies				
chain-conveyors				
chain hoists				
chisels		x		
conveyor belting				
combination square sets				
cutting oil				
cut-off wheels				
dial indicators		x		
drill bits		x		
drill press		x		
electric drills		x		
electric motor cleaners				
fastening tools (hilti)				
files		x		

Continuation of Table 14

1	2	3	4	5
fish buggies				
flexco fasteners				
flexible couplings				
flexible pipe		x		
grinding paste				
grinding wheels		x		
hacksaw blades		x		
hammers (ball pen)		x		
hammer drills		x		
hand cleaner (Go-Jo)		x		
hand trucks				
hose clamps				
hose (air, oils, water, steam)		x		
idlers				
jacks (hydraulic)		x		
impact sockets		x		
lathes				
lubricants (chain, gear)		x		
metric wrenches		x		
micrometers		x		
machine shop equipment		x		
measuring tapes		x		
nuts and bolts		x		
oil feeders				
penetrating oil		x		
packing (sheet and valve)				
pipe wrenches		x		
pillow blocks		x		
pliers		x		
portable grinders		x		
pressure gauges		x		
pumps (general purpose)				
punches		x		
roller chain				
sand paper		x		
sanding belts				
sanding discs		x		
saws (electric)		x		
scales (platform)				
screw extractors		x		
shackles				
silicone lubricant		x		
spelter sockets				
shim stock		x		
sprockets				
swagne nipples				
sheaves				
teflon tape		x		

Continuation of Table 14

1	2	3	4	5
thread sealing compound		x		
threaded rod		x		
timing belts				
tools (electric)		x		
tools (mechanics, machinists)				
v-link belting				
vee belts				
welding equipment repairs - (torches, tips, regulators)		x		
wheelbarrows				
wiping rags		x		
wire brushes		x		

Table 15

STATISTICAL COMPARISON OF SUPPLY PRODUCTS OFFERED BY CUMBERLAND COUNTY FIRMS, 1977, WITH THOSE OF TYPICAL OIL/GAS SUPPLY FIRMS

Supply Companies	Number of Products Supplied from normal stock		Number of Products Ordered Specifically For the Rigs		Number of Products Offered by Typical Supply Firms	
	Supplies required by three exploratory rigs					
	# of items listed	available products	# of items listed	available products	# of items listed	available products
1. Kimball and Prince Lumber Co. Vineland	22	14	34	20	87	20
2. Automotive Parts Company Vineland	22	17	34	13	87	13
3. Pagano Brothers Automotive Parts Vineland	22	17	34	12	87	12
4. Jones Electrical Supply Co., Inc.	22	-	34	2	87	-

Kimball and Prince Lumber Company was able to supply 38% of the listed items for three exploratory rigs. Automotive Parts Company 30%, and Pagano Brothers Automotive Parts Company 29%. (See Table 15). If these firms would like to do business with the oil companies, they will have to expand their existing stock to meet the new demands of drilling rigs. Not one of the firms which answered the questionnaire can supply 50% of the necessary products to drilling rigs.

These firms can operate as independent suppliers. From the existent location of these firms, supplies can be trucked to support base sites with waterfront locations, and then via boat to offshore drilling sites.

4. Contract Labor Firms

OCS oil and gas development needs skilled and unskilled workers alike for operations and services. If the region adjacent to the new exploration area has an available work force, labor contractors might establish business there.

Cumberland County is an area of surplus labor (largely unskilled), and also has some trained operatives with applicable skills. In 1970, the County labor force totaled 49,845; of that, 38% was in Vineland, 18% in Bridgeton and 18% in Millville. The unemployment rate in 1977 was 10.1%. It tends to peak during the months of December to April, when there is no

activity in agriculture. Presently, the number of unemployed is quite high, some 5600 people. Rates are well above both the national and state averages. (As mentioned earlier, glass, garment manufacturing and food processing, the area's major employers, are suffering from both foreign and extra-regional domestic competition). This situation alone justifies the location in Cumberland County of firms which contract labor.

These firms themselves employ approximately 50 people, and train local people for new jobs. Some firms provide transportation to support bases and from that point oil companies provide transportation to and from offshore drilling sites. The best location for such firms would likely be Vineland, Bridgeton or Millville, the largest cities of the County with relatively good road access, proximity to the airport and available space for offices and parking lots. Bridgeton's slightly greater distance presents no major problem. There is much available office space in that city, and its role as County seat may make it a choice location.

5. Contract Labor Services.

These companies are quite large and require a wide variety of skilled workers (eg. certified welders, pipe fitters, iron workers, machinists, metal fabricators, and boat operators). Companies providing welding and machine shop services might also be located in the County.

There are many existing small firms in the County which provide welding and machine repair.[1] There are more than 2000 trained, local mechanics and repairmen.[2] However, new machine shops and welding facilities could also be located within the County. These companies could have a big impact on the local labor market. Each would employ from 25-300 skilled personnel. The best locational sites for these services are Vineland, Bridgeton and Millville, where considerable skilled labor already exists, (see tables 16 and 17). Conceivable, the County Vocational School could play a major role in training such labor. Local zoning ordinances universally permit such facilities in industrial zones.

a. Local Training Facilities for New Jobs

Cumberland County Vocational School - Currently the County Vocational School is training students in marine trades. Practical training takes place on the "Cumberland Queen", a boat 84 feet in length. Study is under the supervision of Captain Paul Cox, and there is evidence of oil company interest. Some of these students were hired by Tidex International, Inc. in New Orleans, La.[3] These students trained in Marine Science can be hired on OCS jobs as boat operators.

Cumberland County College is planning to offer short term courses in Petroleum Technology. The courses will probably start in the academic year 1979-1980. Students will

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[1] R-Vay Tooling Company, Vineland (Machine building and repair); Millville Tool and Machine Co. (general machine shop), among others.

[2] Data 1970 U.S. Census .

[3] Letter from Tidex International Inc., to Capt. Paul Cox, Cumberland County Vocational Technical School.

receive a diploma, A.A.S., in Petroleum Technology. First enrollment plans are 35 FTE's.[1] Fifth year enrollment is projected as 55 FTE's. Students will learn drilling methods, well completion and production, and petroleum technology.

The Program will be modeled after that of Delgado College, New Orleans, La. The purpose of this program is to prepare students for jobs in area oil rig operations, surveillance and maintenance, when oil drilling operations begin in Baltimore Canyon.[2]

Table 16

CUMBERLAND COUNTY INDUSTRIES RELATED TO THE OCS OIL AND GAS DEVELOPMENT IN 1975[1]

Rank Size	Type of Industry[2]	Employees
1	Trucking	1,640
2	Aircraft	764
3	Petroleum (Sale, Distribution & Service)	350
4	Machinery (Machine Parts & Metal Working Equip., Manufacturing)	270
5	Concrete (Manufacturing of Concrete Products, Ready Mix)	258
6	Utilities and Related Supply	247
7	Pipeline Contractors and Pipework & Manufacturing	202
8	Electronic (Manufacturing, Sale & Distribution)	138
9	Ship and Boat Repair & Boat Building	128
10	Supplies and Services to Industries	89
11	Machinery, Sale & Repair	34
12	Automotive Parts, Sale & Repair	28
13	Welders and Related Iron Work	19
14	Well Drilling	10
	Total Employees:	4,177

Source:

[1]Industrial Directory, Cumberland County, New Jersey 1975, pp. 1-62.
[2]See detailed information on each type of industry in Appendix 7.

D. UNSUITABLE TYPES OF ANCILLARY INDUSTRIES

Logging and perforating companies, drilling tool and equipment companies, and completion and production service companies are three types of firms which are not likely to locate in

[1]Full time equivalent enrollments, - a measure used in higher education. Five part-time students, each with one 3 credit course = 1 FTE.
[2]"CCC Team Studying Oil Industry Jobs", Vineland Times Journal, 10/17/77, p.3. "County Freeholders Discuss Planned Petroleum Courses, Millville Daily, 11/3/77 pp. 1, 2.

Cumberland County. Each of these industrial types if highly specialized, with a need for highly-skilled, experienced personnel. Large firms already exist in established oil field areas, sending supplies and specialists throughout the world. The development of local offices and branches is contingent on the size of reserves found and future production levels.

Table 17

CUMBERLAND COUNTY: RANK SIZE OF PLACES WITH INDUSTRY RELATED TO THE OCS OIL AND GAS DEVELOPMENT IN 1975

Rank Size	Name of City or Other Community	Employees
1	Vineland	2,229
2	Millville	1,158
3	Bridgeton	630
4	Port Norris	69
5	Dorchester	50
6	Leesburg	20
7	Rosenhayn	8
8	Newport	5
9	Fairton	3
9	Port Elizabeth	3
10	Cedarville	1
10	Malaga	1
	Total Employees:	4,177

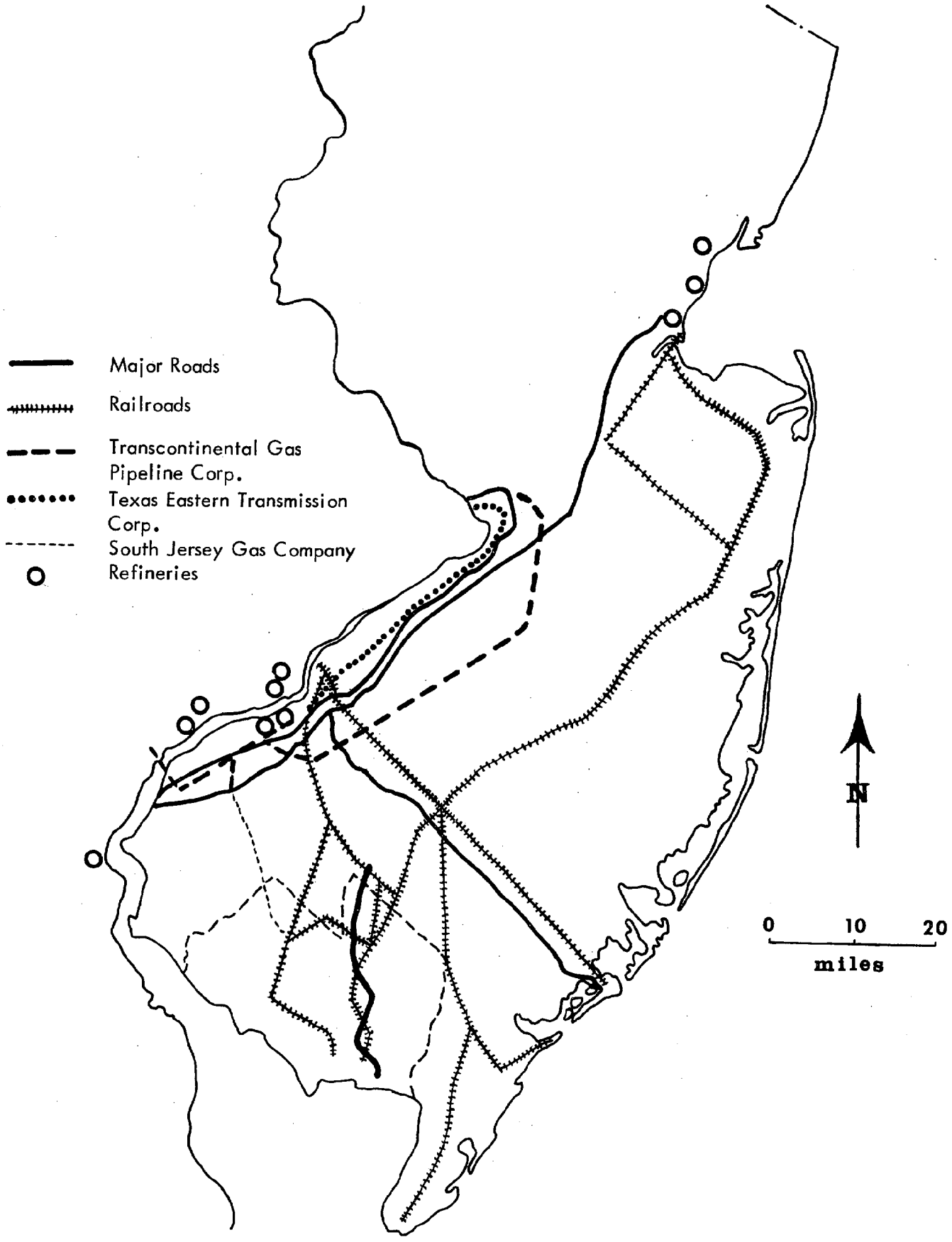
E. CUMBERLAND COUNTY SUITABILITY FOR MAJOR OCS FACILITIES

As mentioned previously, oil company locational criteria and CAFRA regulations and guidelines severely limit the types of major OCS facilities which could be located in Cumberland County. However, at least three types of such facilities can be located in Cumberland: ship repair and maintenance yards, pipeline corridors and tank farms.

Existing ship repair and maintenance yards along the Maurice River have the advantages of existing capital plant, trained local labor and space for expansion. A detailed survey of these facilities is presented in Section F of this chapter.

Possible pipeline corridors exist in Cumberland along established highway and rights of way (see figure 17). Alternatives exist for serving either the Delaware Valley refinery complex, the Raritan Bay refinery complex or both. The assessment of these routes, their impact and viability, requires future study. It is assumed that the oil and gas will be transferred onshore by pipeline. It is further assumed that existing refinery complexes, mentioned above, will be the recipient installations. Gas production will undoubtedly be shipped by pipeline to

FIGURE 17 EXISTING RIGHT-OF-WAY CORRIDORS



the Transco or Texas Eastern major pipelines (Figure 17). The potential for connection through Cumberland is worth exploring further. The viability of locating pipelines through Cumberland will of course be dependent on the volume of oil and gas found offshore as well.

The most serious limitation on tank farms is the frequent local zoning requirement for underground storage facilities (Greenwich, Lawrence, Upper Deerfield, Vineland). The additional prohibition of tank farms in Maurice River Township and in the floodplain area of Bridgeton would make the central portion of the County the most likely site for such a facility (Commercial, City of Millville, Fairfield, Deerfield). Land already zoned industrial and situated along potential pipeline corridors tends to favor a location in Fairfield near Fairton. An existent industrial park there is partially within, partially without, the CAFRA zone. Minor changes in the CAFRA boundary may be both necessary and possible in order to accommodate this function. Another prime potential location is situated in Millville, southeast of the developed area, adjacent to both N.J. 55 and a railroad right of way. Further studies of the suitability of these sites will be conducted in conjunction with future pipeline corridor studies. (Figure 18).

Both sites have potential problems. That at Millville is located in close proximity to the Menantico Fish and Wildlife Management Area. Underground drainage and percolation conditions would have to be thoroughly researched. A series of construction guidelines and operating safety precautions would be necessary to insure against water and land pollution from tank/pipeline ruptures or other spillage. The Fairton site has the advantage of relative distance from officially designated Fish and Wildlife Management areas. Nearby (one to two miles distant) Clarks Pond Management area can possibly be insulated from any pollution threat. The pipeline corridor (hypothetical proposed corridor) from the Bay through Maurice River Township to the Millville site would be routed between several such areas. A similar corridor from Nantuxent Cove to Fairton (and then via the railroad right of way north) might prove less environmentally hazardous on land. However, the seed oyster beds in Nantuxent Cove and the mouths of adjacent streams (tonger areas) might be endangered by the location of a pipeline in this area. Prohibition (by zoning) of common carrier pipelines in Commercial Township complicates a corridor routing from the Port Norris area to Fairton along that railroad right of way.

F. EXISTING CUMBERLAND COUNTY INDUSTRIES POTENTIALLY RELATED TO OCS OIL AND GAS DEVELOPMENT

Existing firms in Cumberland County which are potentially related to oil and gas development currently employ 4,177 people. This is 9% of the total employment in Cumberland County. Table 16 shows a rank/size correlation of these industries. Trucking and aircraft industries are among those with the largest employment, (57% of the total).

Most of these industries are located in Vineland, (53%) and Millville (28%). Other places are shown in Table 17. Detailed location of specific types of industries is shown in Table 18. Appendix 7 includes table 1-13 which contain data for industries related to the OCS (name of the firm, president, employees, address, phone).

Table 18

CUMBERLAND COUNTY PLACES WHICH LOCALIZE INDUSTRY RELATED TO OCS OIL AND GAS DEVELOPMENT IN 1975[1]

No.	Type of Industry	Localization	Employees	Total Employees
1	Trucking	Vineland	1,245	
		Bridgeton	250	
		Millville	72	
		Port Norris	60	
		Rosenhayn	8	
		Newport	5	1,640
2	Aircraft	Millville	614	
		Vineland	150	764
3	Petroleum (Sales, Distribution & Service)	Vineland	165	
		Bridgeton	113	
		Millville	66	
		Port Elizabeth	3	
		Port Norris	3	350
4	Machinery	Millville	236	
		Vineland	29	
		Bridgeton	5	270
5	Concrete (Products, Ready Mix)	Vineland	207	
		Millville	51	258
6	Utilities and Related Supply	Vineland	186	
		Millville	31	
		Bridgeton	30	247
7	Pipeline Contractors, Pipework and Manufacturing	Bridgeton	166	
		Vineland	36	202
8	Electronic (Manufacturing, Sale & Distribution)	Vineland	129	
		Port Norris	6	
		Bridgeton	3	138
9	Ship & Boat Repair & Bldg.	Millville	55	
		Dorchester	50	
		Leesburg	20	
		Fairton	3	128
10	Supplies & Services to Industries	Millville	33	
		Vineland	30	
		Bridgeton	26	89
11	Machinery - Sale & Repair	Bridgeton	19	
		Vineland	15	34
12	Automotive Parts, Sale & Repair	Vineland	25	
		Bridgeton	3	28
13	Welders & Related Iron Work	Vineland	12	
		Bridgeton	5	
		Cedarville	1	
		Malaga	1	19
14	Well Drilling	Bridgeton	10	10
			Total Employees:	4,177

[1] Industrial Directory, Cumberland County, N.J. 1975, pp. 1-62

1. Inventory of Existing Shipyards Along the Maurice River

Of all existing firms in the County, those most directly related to OCS oil and gas development are the area's shipyards. A series of such facilities, one currently working and one only recently closed, line the banks of the Maurice River. Limitations on draft preclude their use for large vessels, but small OCS boats and barges can navigate the existing channel and can easily be accommodated for repair and maintenance in existing shipyards. (See Figure 18).

a. Dorchester Shipyard

Location - Dorchester is located on the left bank of Maurice River, approximately nine miles from the mouth of the river and 149 miles from the Baltimore Canyon Trough (offshore drilling tracts). The shipyard contains 11 acres; however, only 6 acres are currently utilized. The land is solid with little fill.

Capabilities

Dock Space: 500 feet, accommodates 3 vessels.

Water depth at dock site: 12 ft. at m.l.w. and 17 ft. at high tide.

Dorchester Shipyard has Master Ship Contracts. All services are offered on a 24 hour basis in case of emergency. Dorchester has full fire protection and meets the U.S. Navy fire protection criteria. Dorchester Shipyard does not have a tug boat at this time.

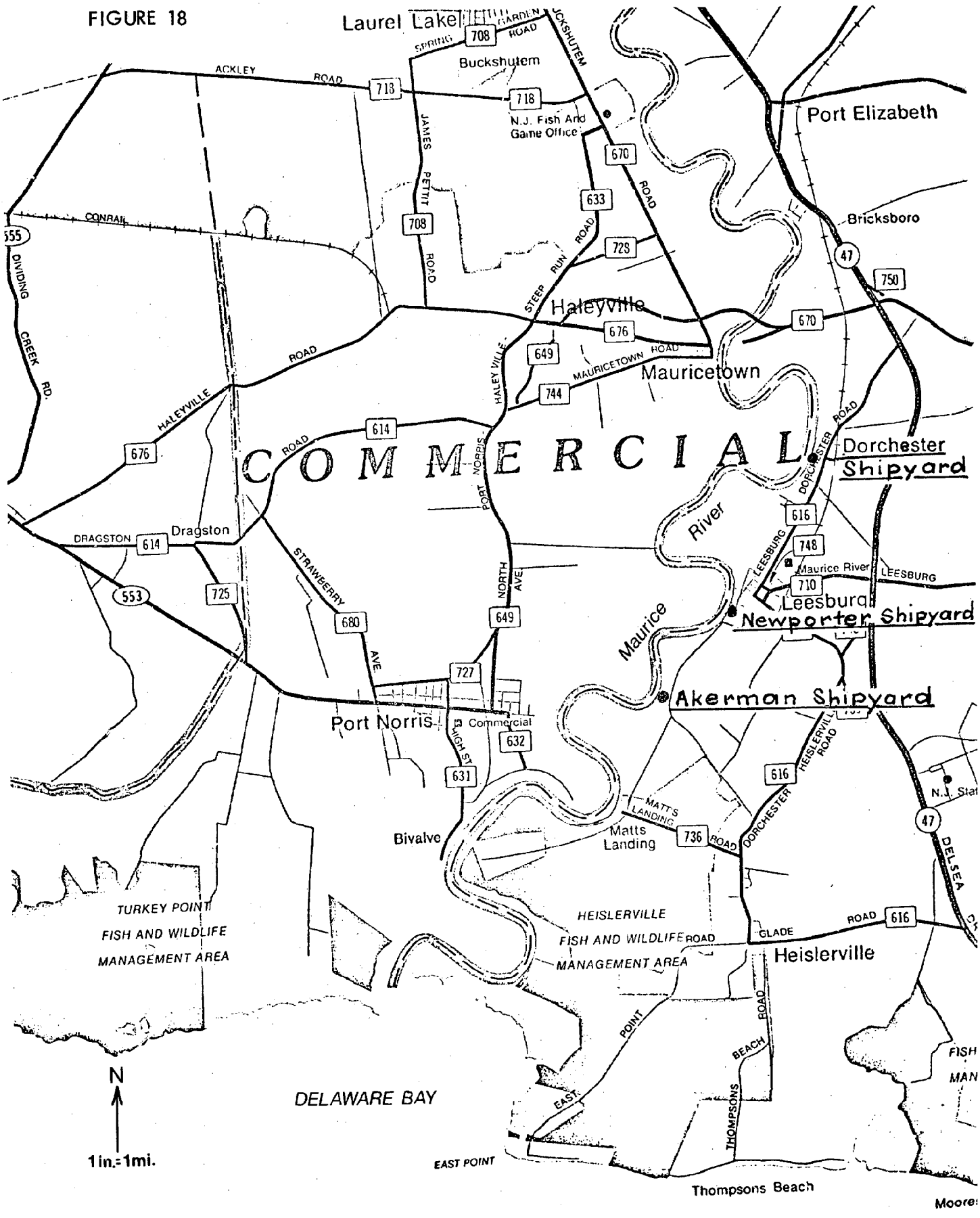
Dry Dock Space - Dorchester Shipyard presently handles 500 ton, 160 foot length, and 35 foot beam vessels on railway #3 which was originally designed for building mine sweepers. There are three other railways: #1 railway, 250 tons, 28 foot beam; #1 1/2 railway, 75 tons, 20 foot beam; and #2 railway, 200 tons, 24 foot beam. Railway No. 1 1/2 is covered and was originally designed for building sail boats. Presently it is used for fixing pleasure boats and pilot boats. This offers possibilities for work in the winter or in bad weather. At the end of every rail is a small storage area for diesel parts, paint, etc.

Types of Services - In 1850, James Ward built a marine railway at Dorchester.[1] Since that time shipybuilding and repairing has been a major function of that site. The largest vessel ever constructed at Dorchester Yard was a rescue tug. It measured 165 feet in length and was built during World War II. During that period, Dorchester Shipyard was practically reconstructed and re-equipped to meet the needs of government contracts.

From 1962 to 1967, Dorchester Shipyard built mine sweepers and tugs for the Coast Guard. According to Robert Morgan, Manager of Dorchester Industries, Inc., that type of work was uneconomical. Currently, the company is making a bigger profit by providing repair and maintenance services. Among the recent contractors are the U.S. Navy (which)

[1]D. J. Steward, New Historical Atlas of Cumberland County, N.J., 1876.

FIGURE 18



EXISTING SHIPYARDS ALONG THE MAURICE RIVER

constitutes approximately 40% of the total contracts), the U.S. Army, the oyster companies and private pleasure boats.

Government owned vessels repaired by Dorchester Shipyard over the past few years include the U.S. Navy mine sweeper U.S.S. Mascoutah (medium tug) and miscellaneous barges. U.S. Army vessels include LCM 8's, "Q" Boats, "J" Boats, LT tugs, ST tugs, and miscellaneous barges. The Corps of Engineers' vessels include the survey boat Shuman, the tug Pilot, the tug Palmyra and miscellaneous barges.

Employment - During World War II, Dorchester Shipyard employed 600 people. In the period 1962-67, they employed 450 workers. Currently Dorchester employs 60 workers.

Job Specifications

Machinists	2	
Electricians	2	
Carpenters	9	
Painters	2	
Mechanics	3	
Welders	9	(6 workers certified for steel by U.S. Coast Guard; 2 workers certified for aluminum by U.S.C.G.)
Caulkers	2	
Laborers	4	

The rest of the employees not listed above are qualified shipyard workers with many years of experience.

Repair and Maintenance Functions - Presently Dorchester handles two types of repair:

a. hull repair and
b. mechanical repair.

Hull Repair - Repair and maintenance of the hull refers mainly to the hull plates. This includes scraping and painting, replacement of damaged plates, and repair to the hull superstructure. Other necessary underside repairs may involve the shaftings, propellers and steering mechanisms, including bow and stern thrusters. Hull maintenance requires that the vessel be partially or completely out of the water.

Mechanical Repair - Mechanical repairs cover the major and auxiliary drive trains, diesel engines and reduction gears in addition to auxiliary mechanisms such as generators, pumps, winches, anchorage gear, heating, ventilating, and refrigeration equipment.

Capacity of Equipment

Fork Lift	4,000 lbs.
Hydrocrane	8,000 lbs.
Two Mobile Cranes	25 tons each

Work boat maintenance includes a third type of repair--electronic. Electronic repairs cover radios (single side bank and high frequency), radar, lorans, compasses, fathometers, automatic pilot mechanisms, gyrocompasses, etc. This type of equipment is usually repaired on board the vessel or removed from the vessel for shop work if extensive repairs are necessary.

Dorchester does not have complete electronic repair facilities and therefore subcontracts its electronics work to a Cape May firm.[1]

Dorchester also subcontracts for its diving needs. Currently, this appears to be the best solution.[2]

Land Transportation Network - Dorchester does not have direct access to main highways. From Dorchester to State Road 47 is a distance of one mile. From Dorchester to State Road 55 (four lane) is an approximate distance of 5.5 miles. The railroad (Conrail) is less than one mile from the Dorchester Shipyard. The distance to Millville Airport is approximately 10 miles. The local road which connects Dorchester with State Road 47 is presently used by Whitehead Brothers Sand Company (located north of Dorchester) for the transporting of sand to Millville Glass Co., Bethlehem Steel Corp. and other customers. Trucks are loaded with sand up to 20 tons. Valuable information about traffic volume is available on a map of counting stations for Cumberland County.[3]

Water Transportation - Presently traffic on the Maurice River extends to Dorchester Shipyard, though navigation to the bridge at Mauricetown is possible. Water flow in the river is 2 knots. (For commercial and recreational use of the river, see "Suitability Analysis") in this chapter.)

Existing Shops at Dorchester Shipyard

Woodworking Ship - This facility contains approximately 3500 square feet of usable space, and could be used for storage or warehousing. Previously, these buildings were used for an electronics shop and can be so utilized again if there is a need. Underneath the building is a large cellar which could be utilized for storage (Fig. 19).

Slab Building - This building is designed to allow construction which requires that a surface be perfectly level, especially heavy fabrication. It has a movable cover and walls.

Navy Store Building - Used for storage of government equipment and supplies

Closed Storage Building - Used for lumber and equipment storage.

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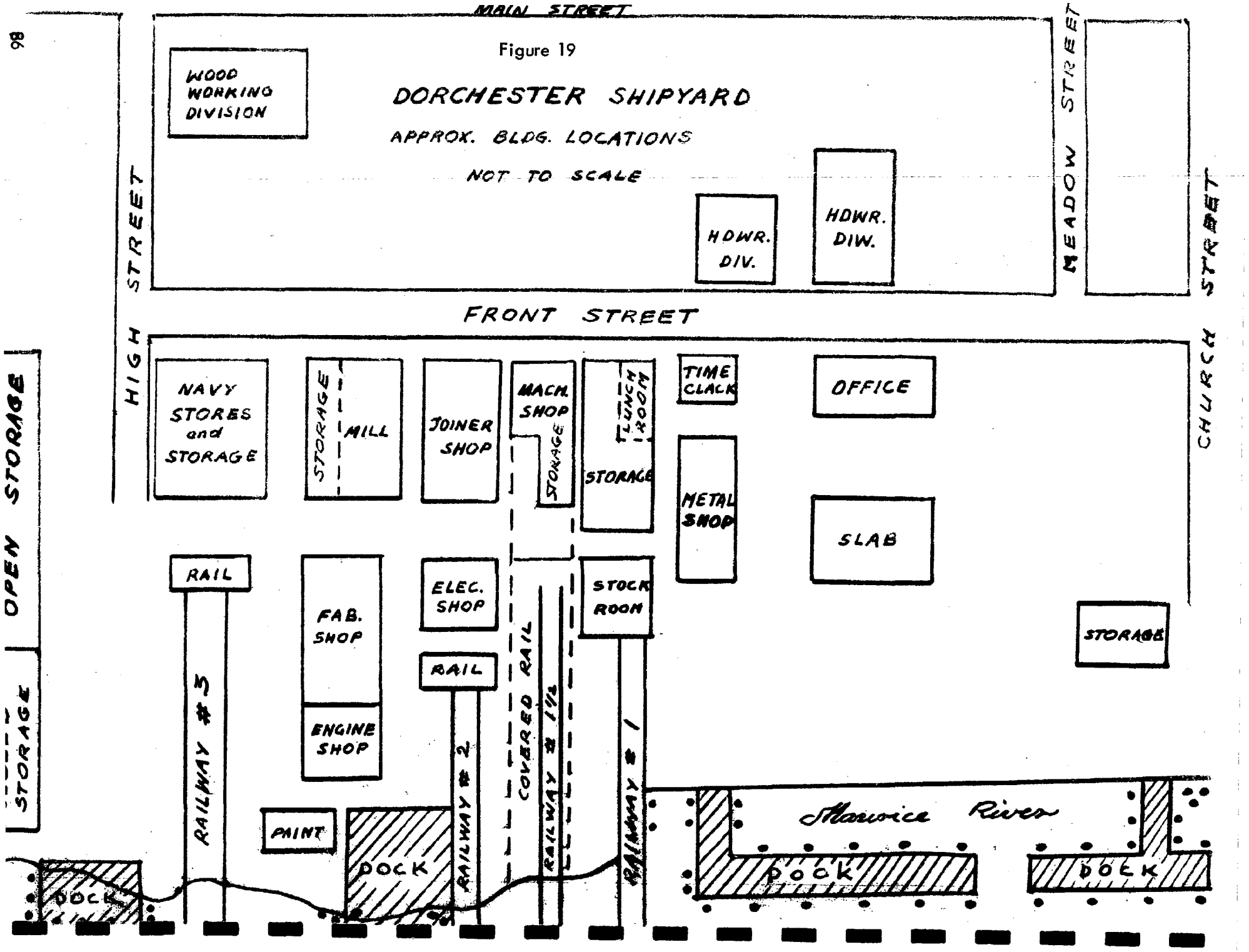
[1]Commend Electronics, P.O. Box 478, Cape May, N.J. 08204.
[2]Mr. Richard Florio is the diver who serves Dorchester Shipyard.
[3]Map was done by Dept. of Transportation, Trenton, 1975, and can be obtained at the Cumberland County Planning Board.

Figure 19


DORCHESTER SHIPYARD
APPROX. BLDG. LOCATIONS
NOT TO SCALE
MAIN STREET
FRONT STREET
HIGH STREET
MEADOW STREET
CHURCH STREET
WOOD WORKING DIVISION
HDWR. DIV.
HDWR. DIW.
NAVY STORES and STORAGE
STORAGE
MILL
JOINER SHOP
MACH. SHOP
STORAGE
LUNCH ROOM
STORAGE
TIME CLACK
OFFICE
METAL SHOP
SLAB
STORAGE
OPEN STORAGE
STORAGE
RAIL
RAILWAY #3
FAB. SHOP
ENGINE SHOP
ELEC. SHOP
RAIL
RAILWAY #2
COVERED RAIL
RAILWAY #1½
STOCK ROOM
RAILWAY #1
PAINT
DOCK
DOCK
DOCK
DOCK
Monroe River

Open Storage - Used for any purpose

Electrical Shop - Used for maintenance quipment, wiring, and circuits. A second part of this building is used to make wood cabinets for boats and other wood items. Above the work area is a second story which is now used for storage, but which can be adapted to electrical or machine shop usage.

Mill Building - Used for lumber work--full scale mill, fully equipped.

Paint Shop - The shipyard currently uses the sandblasting method to remove old paint from boats and the airless spray method for painting.

Storage of Diesel Fuel - There are two tanks below ground--one holding 6,000 gallons and the other holding 7,000 gallons. Diesel fuel is used for the ships and various needs of the yard. Woodruff Oil Company delivers oil by truck. When the ship or boat needs hull work, such as welding, all fuel has to be pumped out of the ship and is stored in these tanks.

Engine Shop - General Motors Dealership for parts, engines and supplies. Diesel engine repair.

Machine Shop - Basic work; machine parts. Equipment: engine lathe up to 18", gap lathe of 48", 2 Bridgeport milling machines, key seater for keyways up to 1 1/8", "Do-All" metal bandsaw, spray weld equipment (for building up shafts) and all the associated equipment necessary to provide marine services.

Joiner Shop - This shop is fully equipped to perform all types of marine jointery work, including work on wood, steel, aluminum, and fireproof panels.

Fabrication Shop - Dorchester works on milled steel and aluminum as well as on fiberglass. In 1972, the Dorchester Shipyard built the 36" pipe for the Maurice River Bridge.

Plumbing Shop

Metal Shop

Hot Boxes - Electric power for welding at every location where needed; also portable units.

b. Newporter Shipyard

Location - Newporter Shipyard is located on the left bank of the Maurice River, approximately 5 1/2 miles from the mouth of the river. The Shipyard contains 10.48 acres. This tract of land is divided by County Route number 616 - Leesburg - Dorchester Road, (River Road) (Figure No. 18). The remainder of the land on the opposite side of the road is wooded. There are opportunities to increase the area adjacent to waterfront by buying land.

Types of Services - In 1850, James Ward built a marine railway there. Shipbuilding was the principal business of this place.[1] In 1976, its last year of operation, Newporter Shipyard employed 25 people. Presently, the Shipyard is closed and can be utilized by OCS according to Van Loan Whitehead III, Whitehead Brothers Company representative. The main function was shipbuilding - a pleasure motor sailer named the "Newporter". This large size pleasure boat (40 foot in length) did not find a local market and was sold in Connecticut. Because this operation was uneconomical, Newporter Shipyard was closed in 1976.

Capabilities

Waterfront: 650 feet

Dock Space: Water depth at dock site is 12 feet at l.m.w. and 17 feet at high tide. The river is 525 feet wide at this point.

Dry Dock Space - Newporter Shipyard has two existing railways. The main railway can handle boats of 125 ton capacity. The other, a maintenance railway, just boats of 25-30 tons.

Transportation Network - Newporter Shipyard does not have direct access to the main roads. The distance from Newporter Shipyard to State Route No. 47 is slightly more than one mile. Newporter Shipyard does not have a railroad connection, though an abandoned right of way extends from the present terminus north of Dorchester to the town of Leesburg where the Newporter Shipyard is located. The distance to this railroad is 1.5 miles. The distance to Millville Airport is approximately 11 miles.

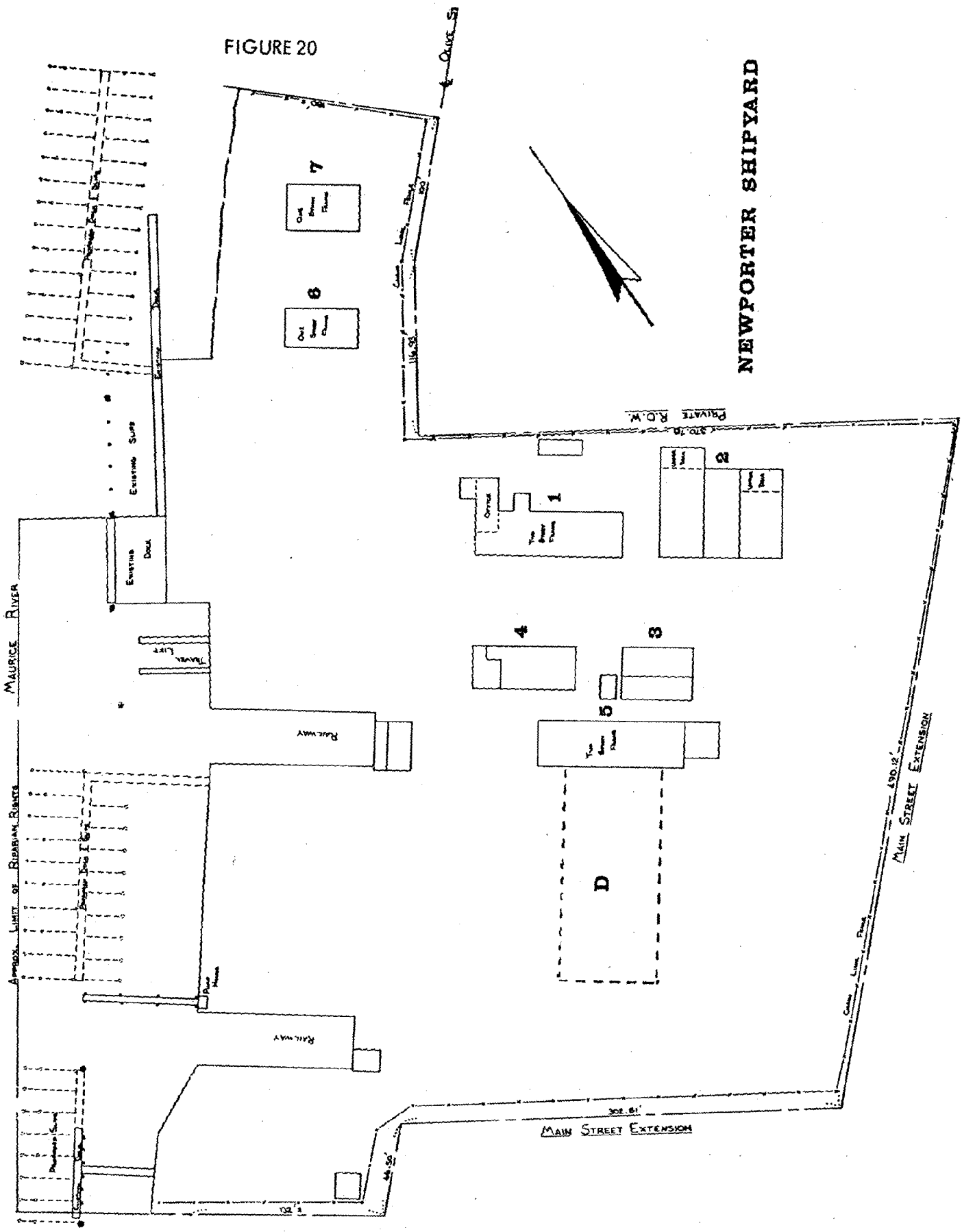
Existing Buildings (See Figure 20)

No. 1 bldg. Office and storage:	
a. Lower Floor	3580 sq. ft.
b. Upper Level	3000 sq. ft.
No. 2 Building	
a. Section	2250 sq. ft.
b. "	1440 sq. ft.
c. "	1680 sq. ft.
No. 3 Building	960 sq. ft.
No. 4 Building	1600 sq. ft.
No. 5 Building	3600 sq. ft.
No. 6 Building	1350 sq. ft.
No. 7 Building	1500 sq. ft.
Total	20,960 sq. ft.

Total area of buildings is 20,960 sq. ft.

[1] D.J. Steward, New Historical Atlas of Cumberland County, New Jersey, 1876.

FIGURE 20


NEWPORTER SHIPYARD
MAURICE RIVER
MAIN STREET EXTENSION
MAIN STREET EXTENSION
PRIVATE R.O.W.
RAILWAY
RAILWAY
D

The buildings are in perfect condition. They are maintained and painted, and one of them was recently re-roofed.

Newporter Shipyard also has a concrete deck platform, size 100 x 40 feet (marked on the map, figure 21, by the symbol D). This platform was once covered and used for boat building.

All the buildings have heavy capacity wiring, three phase. The shipyard is enclosed by a chain link fence.

c. Akerman Shipyard[1]

Location - Akerman Shipyard is located on the left bank of the Maurice River, approximately four miles from the mouth. The shipyard contains 102.63 acres contiguous (Figure 19). The Akerman Shipyard tract of land is divided by River Road (a local road). Part of the land (12.24 acres) adjacent to the river is solid, compact ground. The land on the opposite side of River Road is wooded.

Capabilities -

Waterfront: 470 feet, with dock space.

Water depth at dock site: 12 feet at m.l.w. and 17 feet at high tide. Maurice River is 525 feet wide at this point. (For detail see Figure 21).

Dry Dock Space - Akerman Shipyard currently has a railway of 50 tons capacity.

Transportation Network - Akerman Shipyard has a weak transportation infrastructure. It is not connected directly with any major highways or railroads. The distance from Akerman Shipyard to State Route 47 is about 2 miles. The distance to Millville Airport is approximately 12 miles.

Structures - One building of 15,000 sq. ft. exists. It was recently painted and it is in very good condition. The original building was designed for pleasure boat building. Inside are three separate operation halls; the middle one is the largest (100 x 40 feet). The two halls on either side are smaller and have a diagonal roof. The building has heavy capacity wiring, three phase. In 1976, Akerman Shipyard employed 15 people and worked as an auxiliary base to the Newporter Shipyard.

2. Suitability Analysis of Dorchester Shipyard

Of the three shipyards along the Maurice River, the Dorchester Shipyard appears most promising as the potential location of a small craft repair and maintenance base. Existing capital

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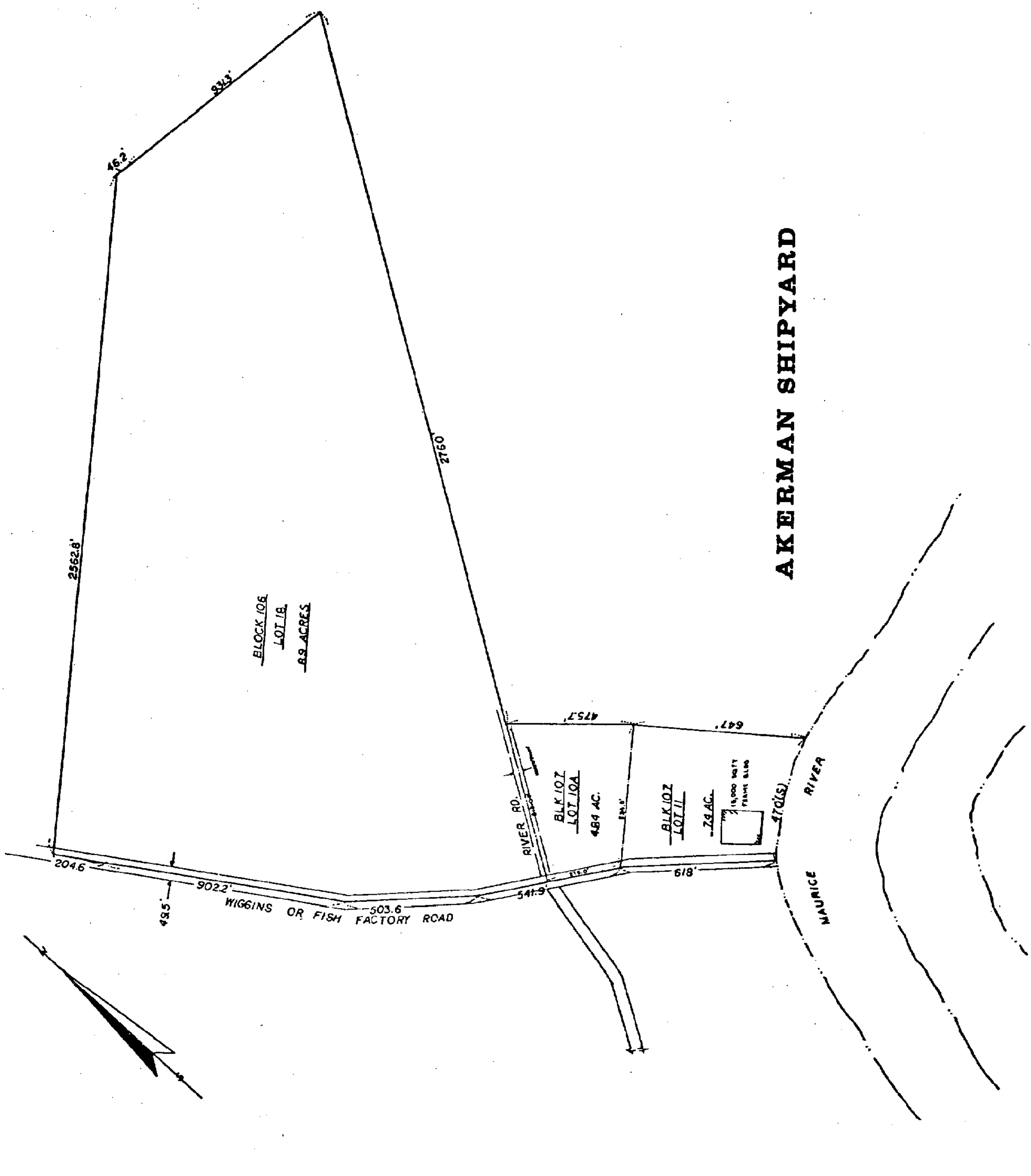
[1]The name of the shipyard is taken from that of the former owner, a Mr. Akerman, who sold the shipyard to Whitehead Bros. Company, current owners.

FIGURE 21


AKERMAN SHIPYARD
BLOCK 106
LOT 18
89 ACRES
BLK 107
LOT 10A
4.84 AC.
BLK 107
LOT 11
.74 AC.
RIVER RD.
WIGGINS OR FISH FACTORY ROAD
MAURICE
RIVER
2562.8'
2760
931.3'
46.2'
204.6
902.2'
503.6
541.9
618'
470'(S)
475.7'
647'
49.5'

plant, trained labor and proximity to transportation facilities favor it over the other two shipyards. (See Table 19).

a. Alternative No. 1: Equipment Repair Yard. Dorchester Shipyard is capable of repairing standardized equipment installed on the platform and related specialized equipment (e.g. pumps, generators and compressors). The damaged piece may be replaced immediately and removed to the local repair and maintenance yard for servicing.

The repair and maintenance services can expand in direct relationship to the amount of offshore activity.

Dorchester has many fully equipped shops; these provide services, employees and management who are qualified shipyard workers with many years of experience. All services are offered on a 24 hour basis in cases of emergency. Contracted work is completed on time, since the firm normally works under penalty agreements. For that matter, Dorchester has never defaulted on, nor delayed completion of,any contracted work. This is very important for oil companies and drilling contractors, because any delay with delivery of equipment (replacing parts) or supplies to drilling rigscosts money. The repaired parts at Dorchester yard can be quickly delivered by helicopter (Millville heliport), to the support base (Atlantic County) or directly to offshore drilling sites. Heavier equipment repaired at Dorchester can be transported by barges or work boats to offshore drilling sites.

b. Alternative No. 2: Repair and Maintenance Yard for Low Draft Vessels and Barges. Dorchester shipyard is currently repairing vessels and various types of barges (mainly U.S. Navy and U.S. Army). The same type of work and services can be offered for OCS development. The Shipyard is located within the 200 mile economic distance zone from the offshore drilling site. Presently, commercial traffic on the Maurice River extends only to Dorchester. U.S. Navy barges which need repair and maintenance work require tug boats to pull them up the river to the shipyard. (Normally, contractors provide tug boats as Dorchester Shipyard does not currently own one). Maurice River from Dorchester to its mouth does not present any navigational problems for bringing vessels needing repair to the Shipyard.[1] (See Maurice River dredging projects below.)

In 1971 the Corps of Engineers in Philadelphia did a very detailed map of depths for the Maurice River. Soundings were taken at 100 foot intervals and refer to local mean low water depths, (expressed in feet and tenths). Detailed maps showing the depths of the Maurice and Cohansey Rivers are available at the Cumberland County Planning Board. From Dorchester to the Maurice River mouth water depths never drop below 10 feet m.l.w., except in one place (8.2 feet). However, the entrance to the mouth of the Maurice River is shallow and it does present navigational difficulties. The channel at the mouth officially has only 5 foot depths (reported 1971). Because of this the vessels are brought up river on high tide (range 5 feet); U.S. Navy vessels repaired at Dorchester require 11 feet draft, they are 85 feet in length with a 24 foot beam. For offshore operations, however, it is important that all services be available "round-the

[1] According to Bob Morgan, Manager of Dorchester Industries, in 1976 a firm considered Dorchester Shipyard as a possible site for repair and maintenance services for OCS. Information was submitted to the Planning Board in a telephone conversation on June 7, 1977.

Table 19

Dorchester Shipyard - Opportunity Analysis

Specification	Description	Adaptation to OCS Development Needs (Improvements)
1. Size of Shipyard	11 acres	5 acres can be used for new development
2. Draft	Entrance channel to Maurice River mouth - 7 ft. l.m.w. River 10 feet l.m.w.	Project for dredging channel at Maurice River Corps of Engineers, Phila.
3. Dry dock space	Railway No. 3 500 ton 35 ft. beam " No. 1 250 ton 28 ft. beam " No. 1 1/2 75 ton 20 ft. bm. " No. 2 200 ton 24 ft. beam	Shipyard has possibility to expand dry dock space New rail can be built to handle vessels up to 2000 tons
4. Highway Access	Poor	Enlarge local road which connects Dorchester with Rt. 47
5. Railroad access	None	From Shipyard to railroad is about 1 mile distance. Shipyard can be connected with railroad. There is existing railroad right-of-way and bed.
6. Airport access	National service	Millville Airport also has a heliport which can be adapted to OCS needs.
7. Water supply	3 wells, 300 feet,	According to manager, Robert Morgan, more pumps could possibly generate 3000 gallons water per minute
8. Sewage disposal	None	There is available land for building a sewage disposal facility.
9. Septic tank	Yes	
10. Parking	None	There is available land for parking.

clock". Dorchester offers such services, but without dredging navigation "round-the-clock" is impossible. In an effort to improve the utility of the waterway, and the shipyard facilities, the possibilities of dredging must be considered.

c. Types of Vessels and Barges Which Can Be Repaired At The Shipyard - There are wide ranges of vessels used for the support of offshore drilling: tug boats, crew, supply boats, ocean research and seismic vessels and a variety of barges. The length of the vessels varies from 60-200 feet.

Of the above mentioned types, Dorchester Shipyard is capable of repairing crew boats and some of the barges.

Crew Boat - This boat requires a five foot draft and has an 80 foot length. Crew boats are used for transportation of crew from temporary or permanent bases to the offshore drilling site. Attached is a specification sheet for crew boats which are built by Black Gold Marine Inc., in New Orleans, Louisiana, and are projected for use in East Coast waters.[1] (See Figures 22 and 23).

Barges - According to informed sources, barges are often used for offshore operations. They are 78 ft. in length, and require a draft of 8-9 feet.[2]

In the Gulf Coast area, where ports are shallow and often located on the banks of a river, a special work boat (which requires 10 feet draft) was designed.[3]

3. Possible Conflicts: OCS Activities With Existing Use of the Maurice River

Conflict with Recreation Traffic - Normally the Maurice River traffic to Dorchester is not heavy. In Summertime, however, in particular on the nice, sunny weekends and holidays, traffic on the Maurice River can present some problems at a place called Matt's Landing Road. There are four existing marinas in that area (see Table no. 20). These can dock large numbers of pleasure boats (245). Additionally, more than 150 boats, which belong to the "rampers", can also cause congestion at that site.

4. Maurice River Dredging Project

Maurice River water depths data show that the entrance channel is in desparate need of dredging, if the waterway is to be improved and/or fully utilized.

The existing Maurice River maintenance dredging project was first authorized by the River and Harbor Act of 1919, and modified in 1935 (see project information sheet, Fig.24). The

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[1]Letters with information from Black Gold Marine, Inc., from Nov. 30, 1977.
[2]Information was submitted by Scott Kobus from Zapata Offshore Company-Meeting, June 13, 1977, Trenton.
[3]Information submitted by Bob Morgan, Manager of Dorchester Industries.

FIGURE 22 SEA SCORPION, CREW BOAT SPECIFICATION SHEET

SEA SCORPION

BLACK GOLD MARINE, INC.
Harvey Operations Office, Harvey, La.
(504) 340-6971

Name: M/V SEA SCORPION
Builder: Camcraft, Inc.
Year Built: 1976

Dimensions:

Length	100'
Beam	22'
Depth	9' 4"
Max. Draft	5'
Deck Space	48' x 18'
Passengers	46
Cargo	25 Long Tons
Fuel	2,400 gallons
Water	500 gallons
Ballast	7,500 gallons
Wheels	34 x 32 Bronze
	4 Blade

Performance:

Speed	28 MPH
Fuel/hr.	70 gallons
Range	800 miles w/Res.
Air Controls	Yes
Flying Bridge	Yes
Fire Pump	Yes

Black Gold Lounge Area

Machinery:

Main	3 ea. 12V71 Turbos
Generator	2 ea. 3-71 Diesels
Driving	2 ea. 30 KW Delco
Compressed Air	2 Quincy 150 CFM

Electronics:

Radio	Drake TRM 150 Watt SSB
	RF 12 Channel VHF
	RF-422 Ringer Ensign IV
Radar	Decca 914A
Loran	Decca DAL 222
Fathometer	Pacifica 2600

OTHER:

- Fully Air Conditioned
- 5 Bunks
- 2 Club Areas and Lounge Areas
- Water Cooler
- 3 Man Crew
- Oversized Galley
- 2 Marine Heads
- U.S.C.G. Certificated to Carry aviation fuel
- PAS Premium Engine Monitoring Controls

BLACK GOLD MARINE, INC.

4528 ONE SHELL SQUARE / NEW ORLEANS, LOUISIANA 70139 / (504) 522-0793

FIGURE 23. M/V MAGNUM FORCE, CREW BOAT SPECIFICATION SHEET

BLACK GOLD MARINE, INC.

4528 ONE SHELL SQUARE / NEW ORLEANS, LOUISIANA 70139 / (504) 522-0783

SPECIFICATION SHEET

Name: M/V MAGNUM FORCE
Type: Force 10
Builder: Camcraft, Inc.
Year: 1978

Dimensions:

Length	125'
Beam	25'-6"
Depth	11'
Max. Draft	6'
Deck Space	64' X 24'
Passengers	66
Cargo	Up to 50 tons
Fuel	10,000 Gal.
Pot. Water	1,000 Gal.
Rig Ballast	20,700 Gal.
Sanitation Tank	1,300 Gal.
Wheels	44"

Performance:

Speed:	
Light	28.5
Normal	26
Fuel/hour	140
Max. Range	1500 Miles
Fly. Bridge	Yes
Fire Pump	Yes

Machinery:

Main	2 16V149TI Det. Diesel GM's
Generator	2 471 GM's
Driving	2 Delco 40 KW's
Comp. Air	2 Quincy w/2 60 gal. rec.

Electronics:

Radios:	
SSB	Drake TRM
VHF	Ensign IV w/weather & ringer
Radar	2 Decca 914 A dual auto track "C"
Loran	Simrad LC 204
Fathometer	Datamarine Pacifica

Other:

Fully air conditioned - 10 tons.
Passenger bunks - 6.
Game Room.
Lounge Areas.
Water Cooler
5 man crew.
Large galley.
Marine heads.
U.S.C.G. Certified - 200 miles.
A.B.S. Load Line
Full engine monitoring.
All aluminum.
Hydraulic steering.
Storage areas.

FIGURE 24

Division: North Atlantic
District: Philadelphia

I-73840-N
I-73841-N

PROJECT INFORMATION SHEET

NAME OF PROJECT: MAURICE RIVER

AUTHORIZATION: River and Harbor Act of 25 June 1910, based on House Document No. 664, 59th Congress, 1st Session, and modified by the River and Harbor Act of 30 August 1935, based on House Document No. 275, 73rd Congress, 2nd Session.

LOCATION: This river rises in Gloucester County, New Jersey, flows southerly and southwesterly through Cumberland County, and empties into Delaware Bay about 89 miles below Philadelphia, Pennsylvania.

DESCRIPTION: The project provides for a channel 8 feet deep and 150 feet wide across the bar at the mouth in Maurice Cove (1935 modification); 7 feet deep and 100 feet wide to the Millville drawbridge, thence at like depth and 60 feet wide to mill dam and a turning basin in Millville. Work remaining consists of a channel 8 feet deep and 150 feet wide across the bar at the mouth in Maurice Cove and dredging to a 7-foot depth, 60-foot width and 650-foot length in the upper end of the project. It is this portion of the project which is being considered for deauthorization.

SUMMARIZED FINANCIAL DATA:

Estimated Project Costs (1955 Price Level)

Federal	$233,000
Non-Federal	-0-
Total	$233,000
Funds Allotted to Date	$100,984
Last Year Funds Allotted	1933

REASONS FOR CLASSIFICATION OF INACTIVE: The modification stated that the artificial cut near Fowlers Island would be closed by local interests; to date this stipulation has not been complied with.

Table 20

MARINAS AT MATT'S LANDING ROAD

No.	Marina Name	Owner	No. of boats Presently docked	Additional No. of boats (Rampers)	Boats Capacity
1	Anchor Marina	Tony Mesi	70	100	70
2	Bailey's Marina	Robert Bailey	70	-	90
3	Haye's Driftwood Marina	John Hayes	55	50	55
4	John Robinson Marina	John Robinson	50	-	50
			245		

project was never started and the Corps is now considering deauthorization.[1] The existing project provides for a channel 2.3 mile long, 8 feet deep and 150 feet wide) in the Maurice River Cove. This portion of the project is shown on the attached map between points A and B, (Figure 25). Another portion of this project is in Millville extending on the map from points C to D, (7 foot depth, 60 foot width and 650 foot length).

Originally, area oystermen had been leery of this project. According to Al Huber,[2] since 1932 the Corps of Engineers planned to dredge the channel at the mouth of the river. To start the project, the Corps needed the signature of every local oysterman who leased oyster grounds from the State of N.J. In principle, they had to agree with this project. The oystermen feared that the silt from the dredging would be deposited on the oyster grounds, killing the shellfish. The Corps of Engineers (at that time) did not want to be responsible for any adverse impact from the dredging. It was planned to dispose of silt from the dredging in the waters of the Delaware Bay (an action which would likely have resulted in the death of the oysters)[3].

According to Corps of Engineers recent opinions, if the maintenance dredging project should take place, the silt from dredging won't be disposed of on the oyster grounds because they are under the protection of DEP.

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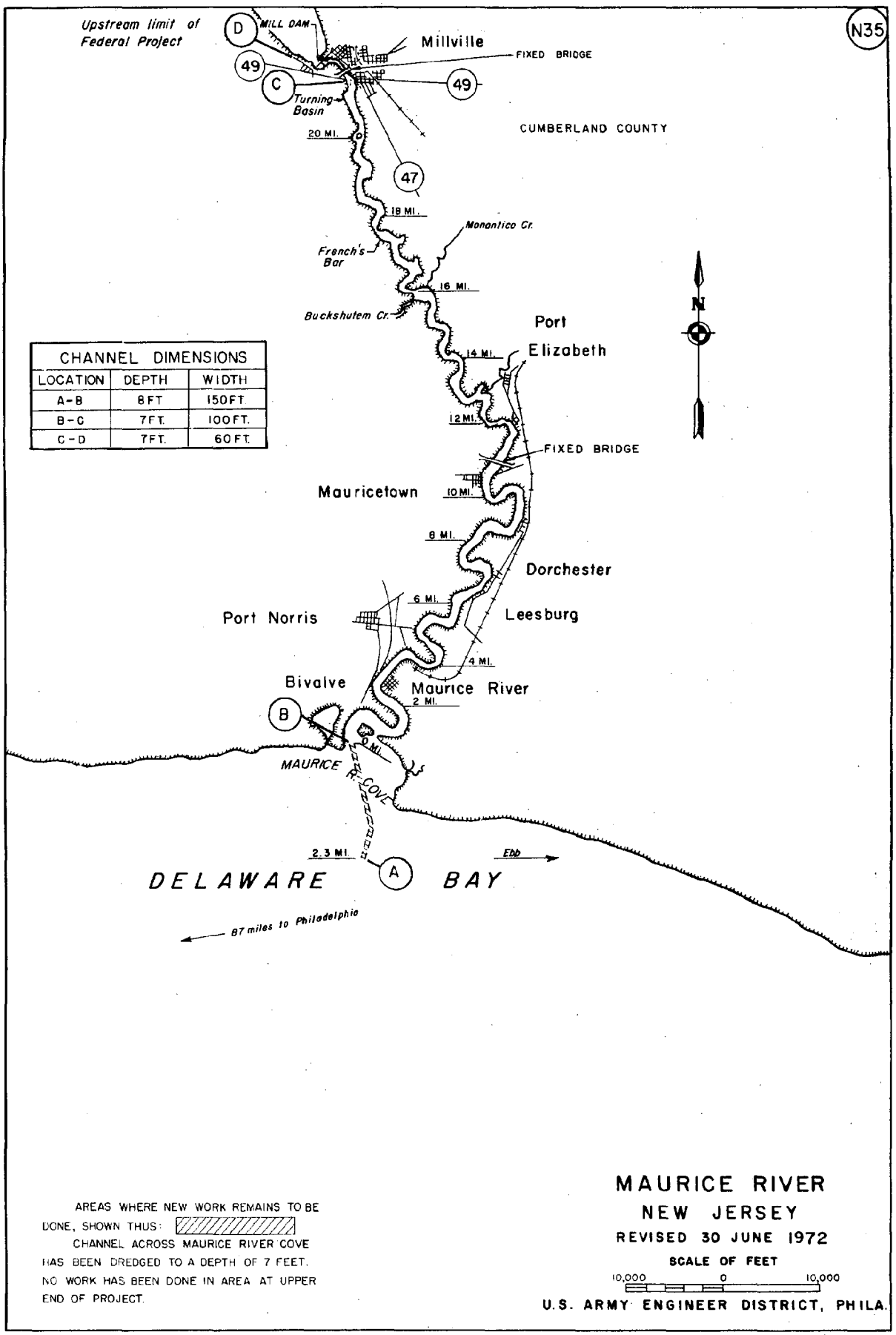
[1]Corps of Engineers (Philadelphia) representatives held a public hearing at Port Norris on October 6, 1977, to find out how local residents felt about the plan. Attendance list is attached (Appendix 8).

[2]Al Huber, Division of Fish Game and Shellfisheries, Port Norris, N.J.

[3]There are three existing methods for channel maintenance dredging:

1) Disposal of dredged material near maintenance dredging site (dumped directly into the water).
2) Hydraulic pipeline dredge method - dredged material is transported by pipe to a disposal site onshore (economic distance one mile).
3) Bucket dredge - dredged material is loaded directly into scows, without overflow, and transported to a separately - approved, enclosed rehandling basin and disposal area.


Upstream limit of Federal Project
D
MILL DAM
Millville
FIXED BRIDGE
49
C
49
Turning Basin
20 MI.
CUMBERLAND COUNTY
47
18 MI.
Monantico Cr.
French's Bar
16 MI.
Buckshutem Cr.
Port Elizabeth
14 MI.
12 MI.
FIXED BRIDGE
Mauricetown
10 MI.
8 MI.
Dorchester
6 MI.
Port Norris
Leesburg
4 MI.
Bivalve
Maurice River
2 MI.
B
0 MI.
MAURICE R. COVE
2.3 MI.
A
Ebb
DELAWARE BAY
87 miles to Philadelphia
N35
N
CHANNEL DIMENSIONS
LOCATION | DEPTH | WIDTH
A-B | 8FT | 150FT
B-C | 7FT. | 100FT.
C-D | 7FT. | 60FT.
AREAS WHERE NEW WORK REMAINS TO BE DONE, SHOWN THUS:
CHANNEL ACROSS MAURICE RIVER COVE HAS BEEN DREDGED TO A DEPTH OF 7 FEET. NO WORK HAS BEEN DONE IN AREA AT UPPER END OF PROJECT.
MAURICE RIVER
NEW JERSEY
REVISED 30 JUNE 1972
SCALE OF FEET
10,000 0 10,000
U.S. ARMY ENGINEER DISTRICT, PHILA.

Whitehead Brothers Sand Operations Company has offered a site for disposal of silt from the dredging project, located north of Dorchester. (For a plan of the site, see figure 26). According to Van Loan Whitehead III, (representing Whitehead Bros. Co.), the site is accepted by the N.J. DEP, but the Corps preferred a site for disposal of materials located not farther than one mile from the dredging site.

Dr. Harold Haskins, shellfish expert, stated that in that case (if the dredged material were to be disposed of onshore), dredging should not damage the oysters.[1] The only support for dropping the proposal came from a local group called "Save Our River Environment". The maintenance dredging project is supported by the Cumberland County Board of Freeholders, Cumberland County Economic Development Commission, Cumberland County Planning Board and local oystermen. The Corps of Engineers now needs statistics from County officials, showing commercial use of the Maurice River. Documentation of the project is required by the Corps to justify the economic viability of the dredging project.

Due to the worsening depth condition, commercial use of the Maurice River has been decreasing in recent years, as shown by statistical data in Table 21. Maurice River is mainly used for the transport of shellfish from oyster grounds to the processing facilities, at Bivalve and Port Norris, and also for transportation of marine shells (unmanufactured).[2] Other major uses of the Maurice River waterway are Dorchester repair and maintenance yard (explained earlier) and Whitehead Brothers Sand Operations Company located north of Dorchester.

Increased usage by the shipyard and the sand company might help justify the need for dredging. (With the existing natural gas shortage Whitehead Brothers Company presently uses fuel oil for drying sand). Transport of fuel oil from Bridgeton by truck is costly. The Company is planning to built two storage tanks of 100,000 gallons capacity each. To lower the cost of fuel transportation, the company is planning to ship fuel oil to the operation site by barges. Their plans for the future also include transportation of sand by barges to their customers (generally to the Bethlehem Steel Corp. and Millville Glass Co.).

Currently, shipment of sand by rail is decreasing. If the dredging project can be done, it would be of great help to such water dependent industries. Dorchester Shipyard would also have a greater opportunity to serve as a small repair and maintenance base for OCS low draft vessels and barges.

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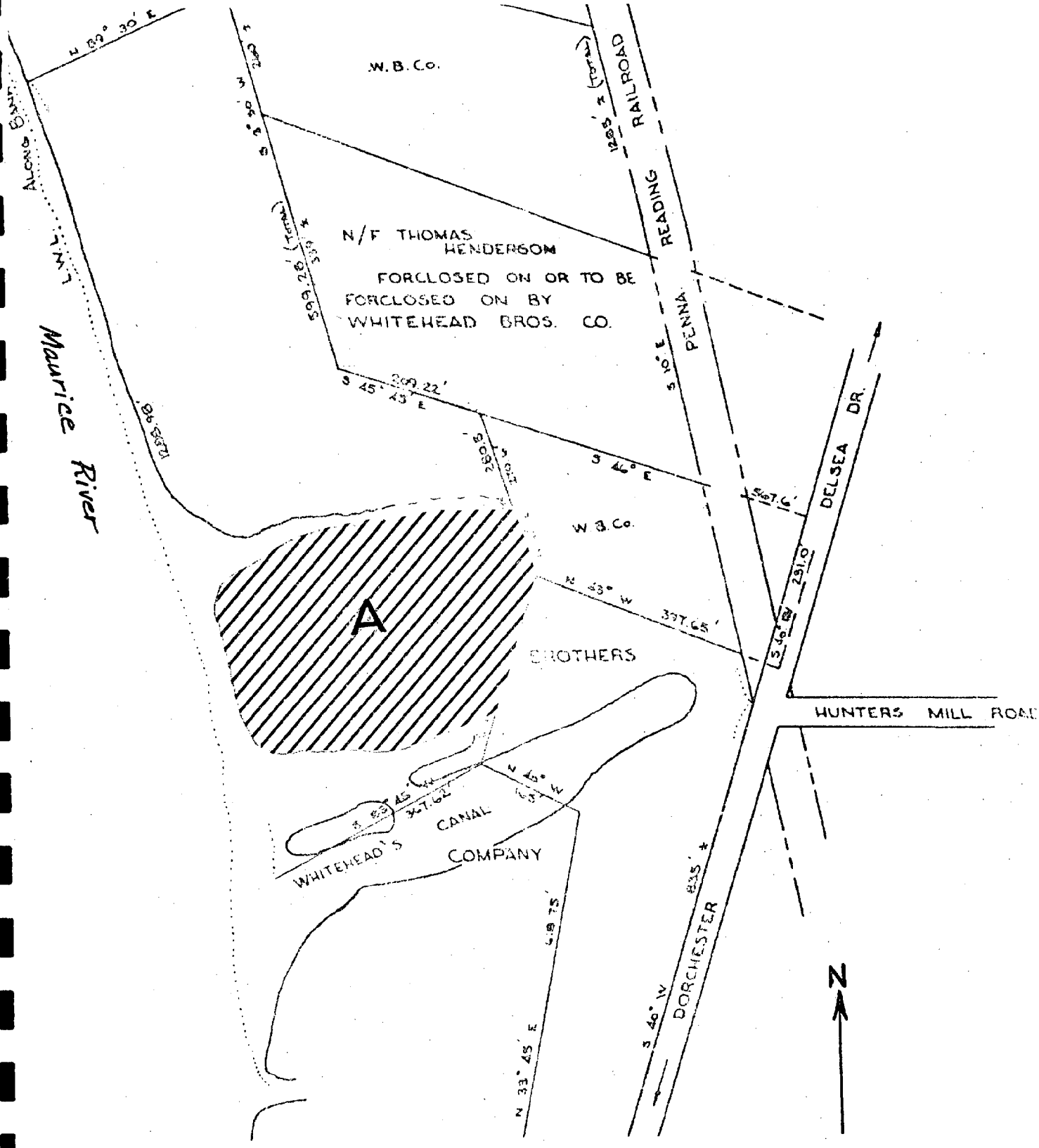
[1] Dr. Harold Haskin , Head of the Rutgers University Oyster Research Laboratory at Bivalve.
[2] Harvest Season for Shellfish is October - February.

FIGURE 26



A - Site for disposal of silt from the dredging of Maurice River Cove.

Table 21

COMMERCIAL USE OF MAURICE RIVER

Years	Tons	Tons/Miles	Total Vessels Trips	Passengers
1935	63,721	-	-	43,200
1940	63,330	490,603	14,132	11,266
1945	25,928	201,928	6,468	320
1950	90,885	636,195	7,598	None Reported
1955	None Reported			
1960	5,500	38,850	17,053	43,802
1965	6,491	45,437	1,421	2,018
1970	7,464	40,790	-	7,340
1975	16,380	85,680	7,793	8,680

Source: Waterborne Commerce of the U.S. Army Corps of Engineers, pp. 169, 227

CHAPTER VI

FINDINGS AND FINAL RECOMMENDATIONS ON SITING OF OCS FACILITIES IN CUMBERLAND COUNTY

The constraints of water depth, zoning, and environment greatly limit the possibilities for locating OCS facilities in Cumberland County. However, there are some types which can meet these constraints and which are considered as both possible and desirable. Pipelines, gas processing facilities, tank farms, repair and maintenance yards and ancillary industries are the types which appear to meet both economic criteria and environmental/zoning constraints.

Available services, capital plant, local labor skills and large areas of vacant land would tend to encourage the above mentioned types. Gas processing plants will of course depend on the location of pipelines. Tank farms would have to be in the form of underground storage to meet zoning regulations in many municipalities. Pipeline location would also influence such a locational decision.

Area labor skills and existing capital plant would greatly favor the location of repair/maintenance yards and ancillary industries in Cumberland.

A. THE LOCATIONAL CRITERIA: OPTIONS

Earlier sections have summarized oil company locational criteria for OCS facilities and analyzed the possibilities of meeting these criteria in Cumberland County. The overall potential for the County to attract such industries is moderate. The limitations imposed by CAFRA regulations and navigational depths in the adjacent waters of shoreline areas virtually preclude most types of water-oriented OCS facilities. However, these same limitations apply to most New Jersey counties fronting on the Atlantic or the Bay. Cumberland, then, represents something less than ideal locational conditions, but so, too, do most other New Jersey areas.

It can be assumed that the oil companies have submitted locational criteria that are optimal rather than minimal. It is known, too, that special adaptions have been and are made where and when economic opportunities justify investment and where natural environments present hazards or barriers. Since the size of oil and gas deposits are unknown, planning is proceeding on the basis of economic unknowns. Until the exploration phase is completed and the size of reserves are known, it is impossible to assess the full impact or the complete range of locational

options. In the light of this fact, all conclusions herein are based on optional locational criteria, supplied by the oil companies, and are representative of the least cost option.

On the other hand, the State and its agencies have proceeded on the assumption that oil will be found and onshore impact is a virtual certainty. The primary concern of the State and its agencies has been the minimalization of environmental damage. This can be characterized as the least environmental risk option. In essence, these are polar positions and the final locational recommendations must attempt to reconcile two, often opposing, points of view.

It is the assumption of this study that a set of locational criteria must be developed which are both within the bounds of economic realities and, at the same time, do not conflict to any degree with the spirit or the letter of the law or the State's goals of a clean, livable environment.

It is in the context of this basic conflict that the following criteria have been drawn up. The idea is the rational location of facilities rather than an unplanned, least investment cost based proliferation of facilities in a haphazard fashion. That situation would benefit no one. Any area that presents major environmental hazards should be rejected. Any area that does not come reasonably close to fulfilling oil company locational criteria should be rejected as well. The term environment should be used in its fullest sense, not just in the sense of detriment to wildlife or the pollution of waters.

1. Rational Siting Criteria for Energy Facilities

Clustering - It has been assumed that clustering of energy facilities into designated areas is environmentally sound practice. This assumes that regulations are most easily enforced and pollution most easily controlled if related facilities are sited at one location. It is further assumed that clustering presents certain economic benefits to the investing firm. Both statements are true in some cases, but they do not represent universal truths. The use of the air and waters as sinks for waste has a certain degree of legitimacy. The clustering of air and water polluting facilities, however, leads to the overloading of water bodies and air, with a commensurate disutility of the sink function and heavy environmental damage. It is the assumption of this study that dispersal, rather than clustering may be the answer to minimizing environmental damage.

The economies to be obtained from clustering are normally limited to pertochemical industries and refineries. It is the assumption of this study that neither of these types of facilities will be built in the area because of already existing capacity of this type in the areas of Raritan Bay/ Northeast New Jersey and the Delaware Valley. The dispersal of functions in such a densely populated area as that of New Jersey or the East Coast would probably result in fewer hazards and less potential for disastrous impacts. In particular, the dispersal of the locations of non-polluting or low level pollution facilities and industries is being encouraged. This dispersal, as opposed to clustering, minimizes the social costs and investment impacts that might otherwise overtax the few municipalities which would receive the total impact caused by clustering.

Land Use Compatibility - Areas of existing industrial development have the multiple advantages of existent capital plant, transportation infrastructure and available utilities. It is assumed further that areas already zoned and developed for industry would present a situation of minimal

conflict with surrounding areas. Areas totally undeveloped present the next most compatible location, providing that the recipient area is not lacking in open space or that the undeveloped area does not constitute a watershed for drinking supply or serve an environmental function of similar importance.

2. Environmentally Sensitive Areas

Cumberland contains several classes of environmentally sensitive areas:

- Major Aquifers
- High Water Table Areas
- Coastal Wetlands
- Flood Prone Riverine Sites
- Coastal Wetlands
- Fish and Wildlife Management Areas
- Seed Oyster Beds and Oyster Grounds
- Watershed Areas
- Intensively Utilized Agricultural Areas

The location of such areas is described and mapped in earlier chapters or can be obtained from the Cumberland County Plan. Data available on acquifers is quite sparse, and much research on ground water in Cumberland remains to be done. Needless to say, such environmentally sensitive areas are unsuitable to most types of OCS facilities.

3. Compatibility with County and Local Plans and Zoning Ordinances

Each location must be consistent with the aims, goals, ordinances and plans of Cumberland and the individual municipalities located therein. Chapter V identifies zoning conflicts and outlines prohibited and permitted uses. Several municipalities in Cumberland are currently in the process of developing master plans. Vineland, Bridgeton and Upper Deerfield have completed master plans. These, together with the Cumberland County Plan (1964), are available at the County Planning Board.

4. Transportation Infrastructure

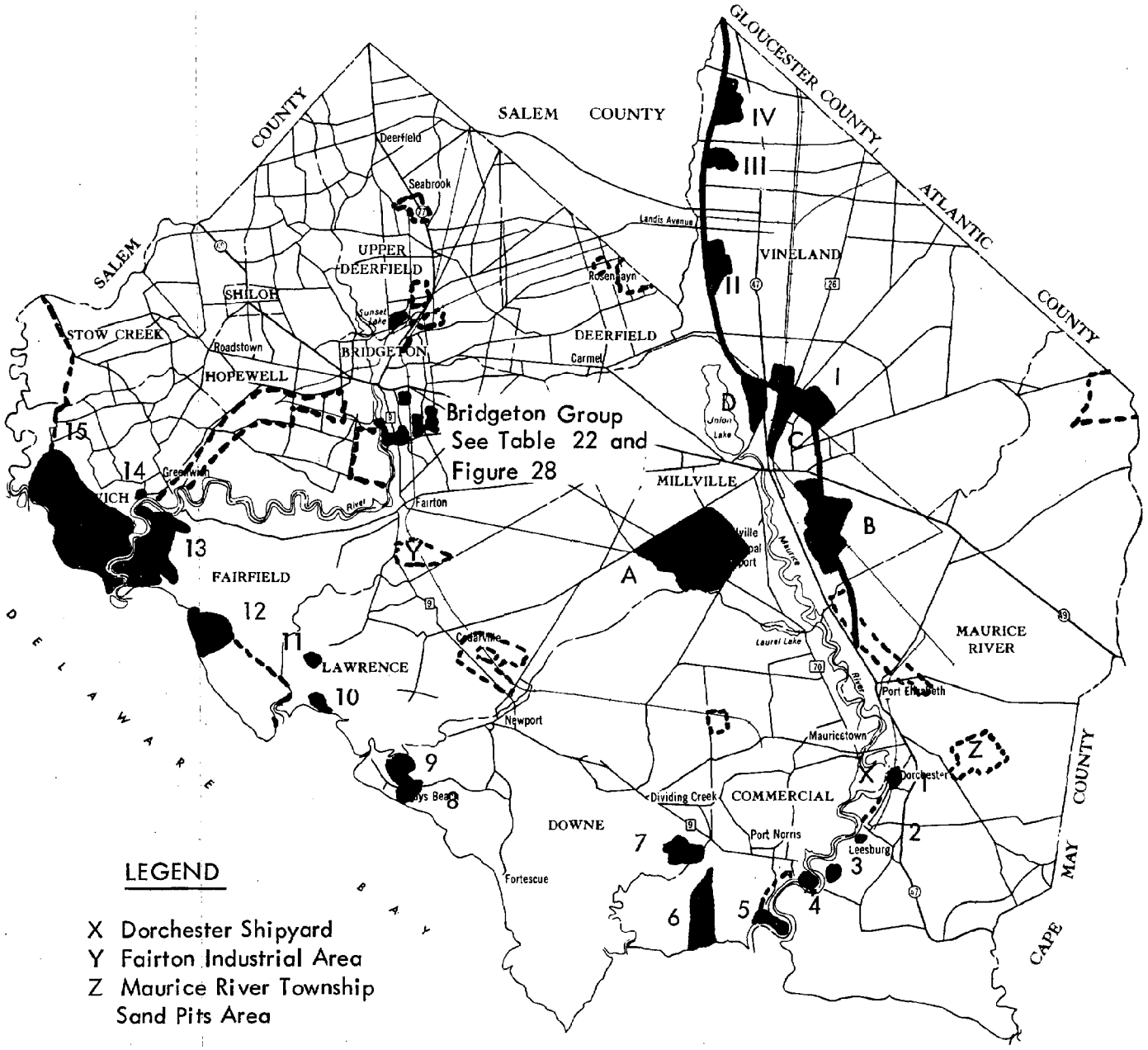
In general, the transportation infrastructure of Cumberland was not designed for heavy usage. Rail facilities are sparse and most highways are of the two lane, medium duty category. The low County traffic density, however, coupled with excellent maintenance, flat topography and straight rights-of-way, would allow for traffic increases without overburdening the system. Maximum efficiency can be obtained by concentrating OCS related facilities in close proximity to N.J. 55, N.J. 49, N.J. 77 and existing railroads. The municipalities of Vineland, Millville, Maurice River, Fairfield, Bridgeton and Upper Deerfield posess the best transportation facilities. (See Chapter II, figures 6 and 7).

B. AVAILABLE SITES AND OPPORTUNITY AREAS IN CUMBERLAND FOR OCS FACILITY SITING

The entire shoreline of Cumberland County must be classed as unsuitable for the location of any major OCS facility on the basis of oil company locational criteria, economic feasibility, physical site characteristics and environmental constraints. A total of 7 sites (figure 27) with direct waterfront location are listed with the Cumberland County Economic Development Commission. (Sites 5,6,8,9.10,12,13, and 15 are for sale). Of these, only three (12,13,15) are currently zoned industrial. Site 15, the Bayside Tract, is owned by utilities and is being

FIGURE 27

PARTIAL INVENTORY OF POTENTIAL OCS FACILITY SITES IN CUMBERLAND COUNTY



LEGEND

X Dorchester Shipyard
Y Fairton Industrial Area
Z Maurice River Township Sand Pits Area

Land Zoned Industrial and Containing Sizable Vacant Tracts

Sites 1 through 14 are listed with Cumberland County Economic Development Commission

Sites A through D are the 4 Millville Industrial Parks

Sites I through IV - Vineland Industrial Areas (I) and land zoned for industrial usage

Bridgeton Group - includes: S.E. Bridgeton Industrial Park, vacant land for sale and structures/plant for sale

considered for the future location of a nuclear facility. Sites 12 and 13 are immediately adjacent to a State Fish and Wildlife Management area. All coastal sites are located within the CAFRA jurisdictional area, and for most of their extent, are coastal wetlands. No coastal site could accommodate deep draft vessels, and all are adjacent to either oyster seed beds or oyster grounds.

It is recommended, therefore, that no water-oriented or other major OCS facility be located in these areas. However, there are other areas in Cumberland suitable to OCS activity. A listing of available sites and areas zoned industrial, is found in Table 22. The location of selected available sites and structures is shown in figures 27and 28.

1. Pipeline Corridors

There are two hypothetical pipeline corridors proposed in this study (figure 29). Both follow existing transportation rights of way for most of their length. Corridor I would follow N.J. 47 from Delmont to Port Elizabeth, and then follow N.J. 55 to Gloucester County and, ultimately, to the Delaware Valley refinery complex. Corridor II would follow County routes from Nantuxent Cove in Lawrence Township to Fairton, and would proceed from that settlement along the Conrail right of way to Upper Deerfield, near Seabrook. It would then proceed northwest along (oil), or join with (gas), the 20" pipeline (South Jersey Gas) right of way to the Delaware Valley refinery complex.
Tank farms could be located at Millville or Fairton, though further research is necessary before a final recommendation can be made on either the tank farms or the pipeline corridors. The environmental constraints posed by the oyster seed beds in Nantuxent Cove are a major limitation affecting Corridor II. The ready market for gas in Bridgeton (glass industry), the low incidence of local environmental hazards at Fairton in the proposed tank farm area, and the directional routing toward the existing South Jersey Gas pipeline, all tend to favor this Corridor location. It is recommended therefore, that Corridor II be utilized for a gas pipeline only. Proximity to several State Wildlife Management Areas might pose some serious environmental hazards to the location of an oil pipeline along the route of Corridor I with its proposed tank farm in Millville (see Chapter V). The route itself, however, obviates certain other environmental constraints since stream and grade crossings have been minimized in the limited access highway design of N.J. 55. Further research is necessary before firm conclusions can be reached and final recommendations made.
A gas processing facility along Corridor I has possible locational advantages at point Z (figure 29). This area is located in the midst of extensive sand holdings and a region zoned for mineral resource (sand) exploitation. Zoning changes may be necessary to accommodate the facility. The area itself, however, presents few environmental restraints.

2. Ancillary Industries

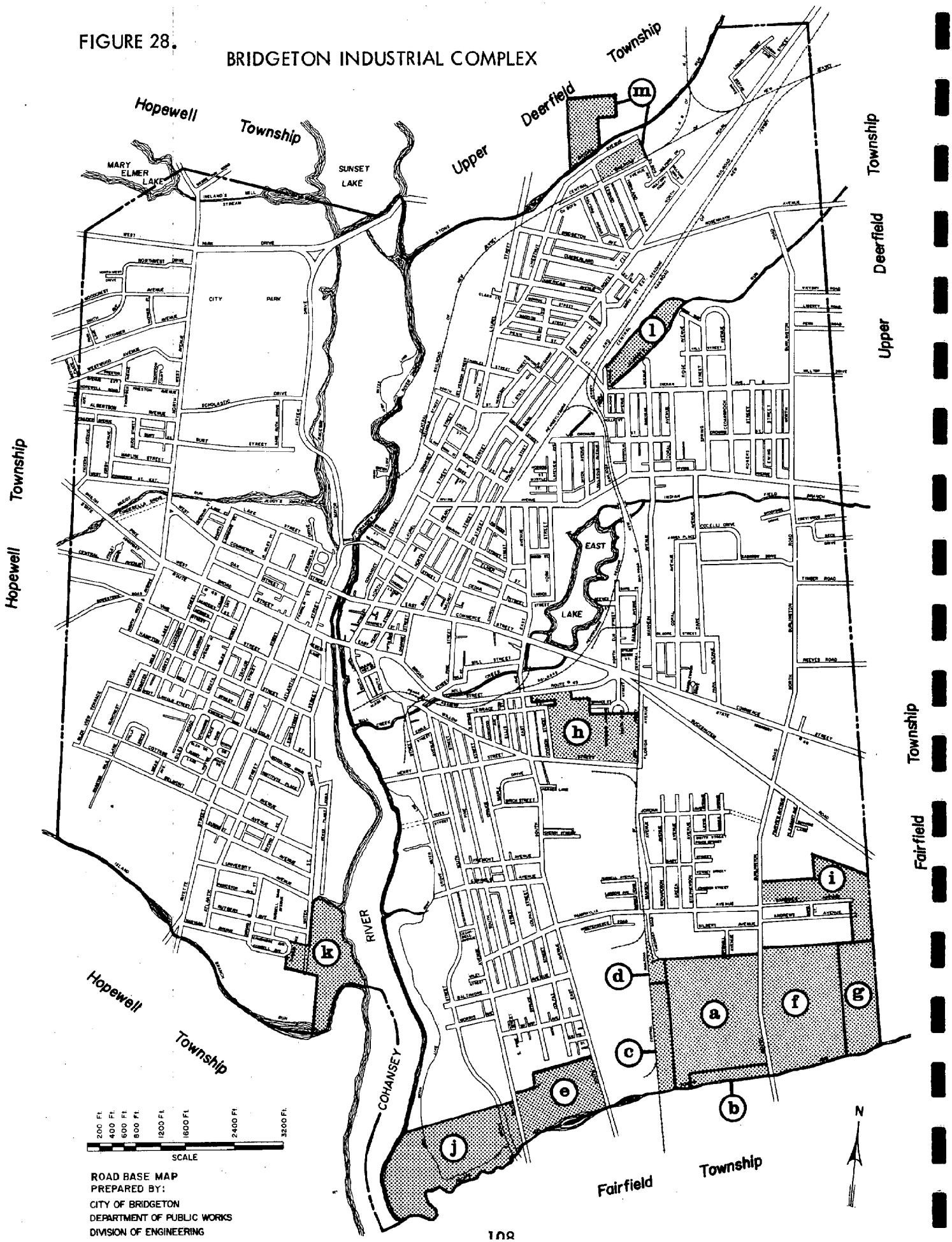
The nature and range of these industries is such that any number of sites could be suitable. Existing labor skills and transportation facilities would tend to act as economic draws to one of the three cities in Cumberland. These industries and their locational criteria have been discussed in detail in Chapter V.

3. Repair and Maintenance Facilities

Because of existent capital plant, these facilities are logically located in the Maurice River area. A detailed discussion of various sites and their respective merits is found in Chapter V.

FIGURE 28.

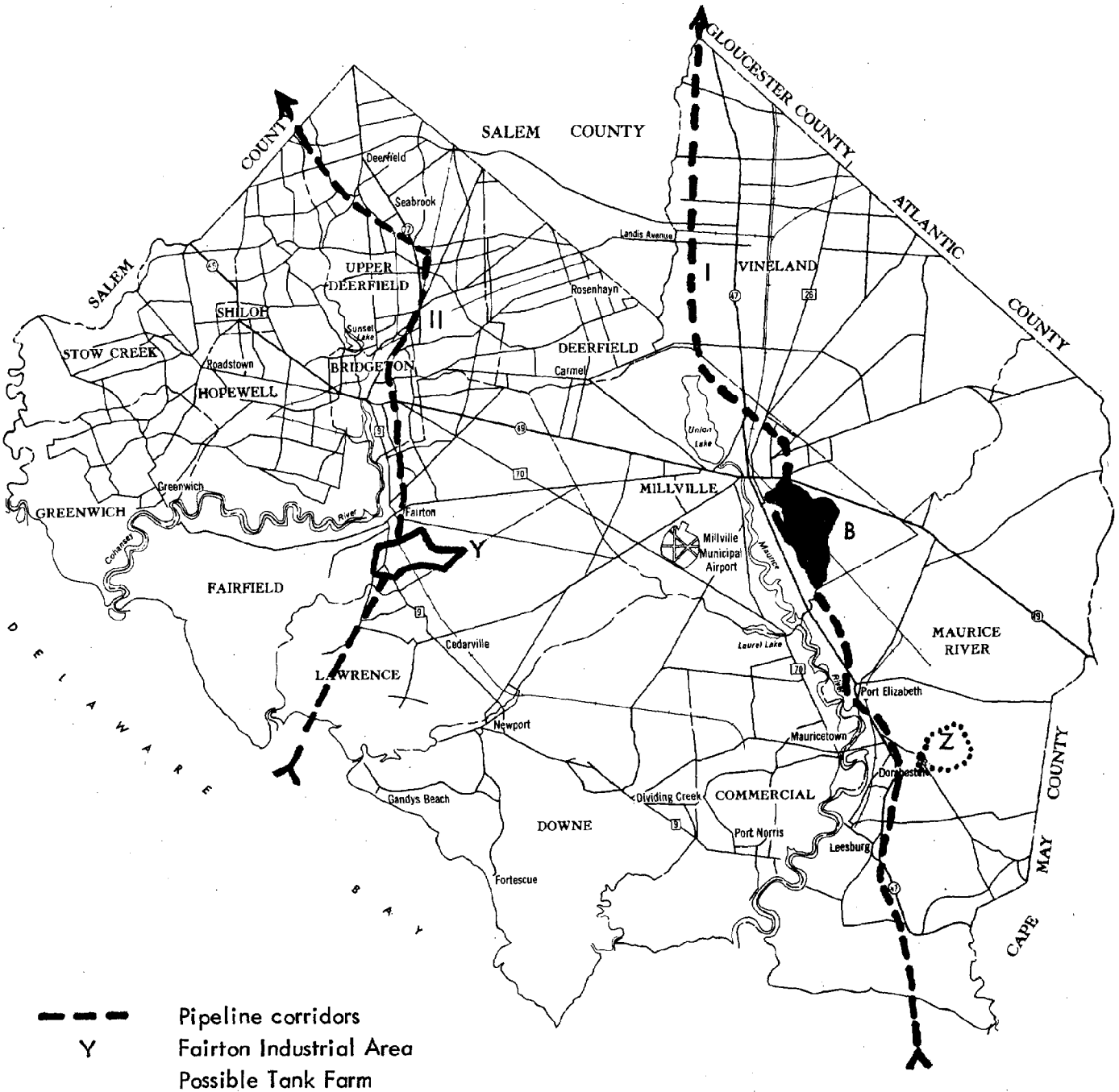
BRIDGETON INDUSTRIAL COMPLEX



ROAD BASE MAP
PREPARED BY:
CITY OF BRIDGETON
DEPARTMENT OF PUBLIC WORKS
DIVISION OF ENGINEERING

FIGURE 29

HYPOTHETICAL PIPELINE CORRIDORS AND ATTENDENT FACILITIES



— — —	Pipeline corridors
Y	Fairton Industrial Area Possible Tank Farm
B	Millville Industrial Park #1 Possible Tank Farm
Z	Possible Gas Processing Facility - Maurice River Township

Table 22

PARTIAL INVENTORY OF POTENTIAL OCS FACILITY SITES IN CUMBERLAND COUNTY

Site No.	Municipality	Type of Tract	Acreage	Owners
1.	Maurice River	Former Sand Operation	59.45	Whitehead Brothers Co.
2.	"	Newporter Shipyard	19.48	"
3.	"	Akerman Shipyard	102.63	"
4.	Commercial	Land partly filled with oyster shells	140.00	Miller Berry (Private)
5.	"	Wetland	243.71	Austin Berry (Private)
6.	"	Wetland - salt hay	1000.00	Clarence Berry (Private)
7.	Downe	Partly wooded + meadows + 15-20 acre farm	158.00	M & M Land Co.
8.	Downe	Wetland & Beach	68.50	"
9.	Downe	Wetland	251.70	"
10.	Lawrence	Wetland - tidal marsh	68.50	Robert M. Harris Real Estate, Inc.
11.	Lawrence	Wetland	20.00	William Mounts (Private)
12.	*Fairfield	Wetland - tidal marsh	550.43	Robert M. Harris Real Estate, Inc.
13.	*Fairfield	Wetland - tidal marsh	1191.03	"
14.	*Greenwich	Cohansey River Marina	4.20	Robert Weber (Private)
15.	*Greenwich	Land Zoned Industrial-Bayside Tract	4500.00	PSE & G, Atlantic Electric Not currently for sale
		TOTAL	8454.57	

* Zoned Industrial

MILLVILLE INDUSTRIAL PARKS

A.	*Millville	Industrial Park Airport	1100.00	City of Millville
B.	* "	Park No. 1	800.00	"
C.	* "	General Industrial		Millville & Private Owners
D.	* "	Millville Industrial Research Industrial Park		

VINELAND INDUSTRIAL AREAS

I.	*Vineland	Vineland Industrial Area	
II.	* "	Block 50, vacant land	80.00
III.	* "	Block 88, vacant land	48.00
IV.	* "	Block 89, vacant land	45.00

* Zoned Industrial

Continuation of Table 22 BRIDGETON GROUP[1]

Site No.	Bridgeton	Type of Tract	Acreage	Owners
a.	*Bridgeton	Industrial Park	69	City of Bridgeton
b.	* "	Block 189, lot 5	5	W.F. and E. Weber
c.	* "	Block 189, lot 4	7	"
d.	* "	Block 189, lot 3	1.2	"
e.	* "	Farmland	42	G. Bonham
f.	* "	Farmland	58	H. B. and Opel Smith
g.	* "	Vacant land	21	T. R. Coney
h.	* "		31	Cohansick Land Assoc.
i.	* "	Vacant land	34	T. R. Coney
j.	"	Vacant land	27	C.F. Bea
k.	* "	"	27	L. Fogg
l.	* "		8	Roarke Agency
m.	* "	Bridgeton and Upper Deerfield	8	Roarke Agency

* Zoned Industrial

(For listing of available, vacant industrial structures - See Appendix 6)

C. PRIORITY RECOMMENDATIONS

The location of any OCS facilities in Cumberland is of course subject ot public opinion as well. Economic feasibility, environmental suitability and perceptual desirability, than are the important factors in any locational decision. Economic feasibility and enviornmental suitability each have dimensions of site and situation, - the specific parcel of land on which a facility is located as well as the regional context within which that facility is found.

The County situational context is one of singular importance. It is within 100 miles of the OCS drilling sites by air, and the Maurice River area is 150 miles distant by water routes. The County is peripheral to the megalopolitan corridor, yet central to the Baltimore Canyon oil lease lands.

The suitability of various facilities and sites has been discussed, in both economic and environmental contexts. Public acceptance is reflected in zoning, the press and answers to questionnaires sent to municipalities. It is appropriate to rank/order, then, the various types of facilities and to express this in a priority format. In order to do so, each type of facility is weighted on a scale of 1 to 5 (very positive = 5, very negative = 1) in terms of economic viability, environmental suitability and the public perception of desirability. Summary ratings are given for each facility as well.

[1]Information submitted by W. A. Snyder, Coordinator of Bridgeton Industrial Commission

Table 23

OCS FACILITIES - PRIORITY RATING

Priority Ranking	Economic Viability Rating	Environmental Suitability Rating	Public Desirability Rating	Summary Ranking
1. Repair and maintenance yards, small vessels	5	5	5	15
2. Ancillary industries	5	5	5	15
3. Gas pipeline	5	4	5	14
4. Oil pipeline	5	3	5	13
5. Pipe coating yard	3	4	5	12
6. Permanent & temporary service base	3	4	5	12
7. Platform and Pipeline service bases	2	4	5	11
8. Gas processing & treatment plant	3	4	4	11
9. Platform fabrication yards	1	3	5	9
10. Repair &maintenance yards[1]	1	3	5	9
11. Marine (deepwater) terminals	3	2	3	8
12. LNG plants	3	1	2	6
13. Refineries	1	1	2	4
14. Petrochemical plants	2	1	1	4

[1]Large vessels

As seen in the ranking, Cumberland has maximum locational ratings for small vessel repair and maintenance yards, ancillary industries and gas and oil pipelines. Pipe coating yards, various types of service bases and gas processing plants have moderate ratings. (The site/siutation is possible if other, better suited alternative areas cannot be found for one reason or another). Facility types 9 through 11 are possible, but only at great investment cost and/or environmental risk. Refineries, LNG plants and petrochemical plants are virtually unacceptable unless stringent, site specific controls are applied.

CHAPTER VII

FINAL RECOMMENDATIONS ON FACILITY SITING POLICIES

The location of OCS and other energy related facilities in Cumberland must be based on the economic possibilities tempered with environmental concerns. The County does not represent the most promising nor the most economic location possible on the East Coast. Several companies early favored Atlantic County for the location of support bases. Proximity would favor the pipeline landfall there as well. However, increasing land costs and environmental concerns associated with the gambling-rejuvenated economy will tend to discourage location there. Strong environmental pressures in Ocean and Cape May Counties may reduce their locational attractiveness. As a result, Cumberland may be a good compromise location. If this eventuality should arise, the County does have some distinct advantages.

Oil company locational criteria are based on California and Gulf Coast (or even overseas) experience. Criteria can and will be flexible if necessary, or if ideal conditions are not present. Unlike the Gulf Coast offshore areas, the Baltimore Canyon is in close proximity to high land cost, urban areas and well developed tourist regions. Distance criteria applied to onshore support facilities may have to be modified in the light of these facts. Deepwater facilities are at a premium in the region, bays and estuaries are crowded with traffic and ringed with existent industry in many of the more ideal waterside locations, i.e. Upper Delaware Bay and River or Raritan Bay.

As in parts of the Middle East and Venezuela, special shallow draft vessels may have to be designed and used. Less than ideal conditions may have to do.

The idea of a deepwater port in Delaware Bay is still a possibility. Cumberland County interests at one point wished to construct such a facility 30 miles offshore for the unloading of supertankers. Greenwich Township was mentioned as the site for a possible recipient tank farm.[1] Local opinion (Greenwich) did not support this plan.

In the event that such a plan could become a reality, it is necessary to develop a series of siting policies.

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[1] "Tank Farm Plan Remains Alive", Vineland Times Journal, 11/16/77.

A. RECOMMENDATION FOR LAND USE POLICY

1. Any such offshore site (deepwater port) must carefully avoid the congestion of the main shipping channel, yet be able to accommodate deep-draft tankers. Such sites are available in the lower Bay directly south of the Maurice River and in Blake Channel, west of the main shipping lane. Such a facility is to be discouraged to avoid endangering the environmentally sensitive oyster grounds.

2. Any land based facility with a waterfront location must be free of spillage, leakage and other water pollution. Individual cases must be weighed, matching damage potential to environmental sensitivity at each site.

3. Existing land uses must be considered in all siting decisions. State and federal regulations must be stringently applied, but local zoning ordinances and public opinion must also be considered.

B. SPECIAL DESIGN RECOMMENDATIONS

1. Site specific design are of the essence. Rather than changing the environment, a permanent situation, companies might change the equipment design, - a temporary adaptation. Local and County governments should adopt site specific regulations.

2. The flat nature of the countryside precludes hiding the structures and equipment from view. The various yards or warehouse facilities projected are not normally offensive. However, some types of equipment/facilities could prove to be aesthetically displeasing. Careful consideration should be given to facility layout. This, together with good maintenance,can reduce visual blight. The California offshore experience is rife with examples of specialized structures and facilities so designed.

3. Safety is extremely important. Any and all facilities will be ipso facto located near to populous urban areas; therefore,strict safety measures are of paramount importance. Safety squads, fire equipment and security must be supplied at the expense of the oil and gas companies involved. The Federal Government has a coastal energy impact program which is designed to aid local governments in coping with infrastructure impacts on communities. The program should be adopted by municipalities which anticipate such impact.

4. A meaningful bond should be established to insure against large scale environmental damage, a particular hazard in densely settled areas. Cumberland's lower population density and its concentration of major urban centers away from the shorelines may prove to be a decidedadvantage in the light of this situation.

5. Facilities for OCS related activities should use existent structures and facilities where at all possible in order to minimize congestion and visual blight.

6. Facilities should be dispersed throughout the Delaware Bay region and shore areas in order to diminish the possibilities of a major calamity and conflicts among various uses of land and water resources.

7. Local zoning ordinances should meet all state and federal standards for environmental protection and safety. Where more stringent, they should take precedence.

8. State regulations should be devised to apply to individual sites. Most now apply to broad areas, often erring in both directions through overgeneralization.

9. Buffer zones (vegetational belts) should be instituted around each facility for both aesthetic and safety reasons. Vegetation can absorb pollutants as well as screen unsightly installations. It also acts to absorb the impact of explosions and to retard fire.

10. Site standards and controls must be set. A dismantling requirement (for inactive or abandoned facilities) should be investigated.

CHAPTER VIII

COUNTY ROLE IN COASTAL ENERGY FACILITY SITING

The coastal counties of southern New Jersey are anticipating some kind of intensive development associated with OCS development. The Atlantic coastal counties, with their already well-developed beaches and tourist functions have strong reservations about certain types of development, anticipating a variety of environmental problems. Those counties along the Delaware River and the Delaware Bay generally have fewer reservations, as tourism and tourist sites are much less well developed and industrial land use/industrial traffic are already a part of that area's development. Cumberland County is no exception. With high unemployment, limited development, large tracts of developable land and fewer concerns with the destruction of a tourist/recreation resource, the County would welcome many types of development.

Though County powers are limited, the County does play an important role in implementing state and federal policy. In essence, it acts as a go-between in relationships between the state and federal governmental units and the various municipal units which compose the County. Each municipal unit in Cumberland County has an active planning board; some are more advanced than others in developing their individual plans and development programs. The County aids them with guidance, data and expertise supplied by the Cumberland County Planning Board. In the case of offshore energy recovery planning, each County has been assigned an important role by DEP/OCZM, - that of investigating, anticipating and planning for possible onshore development associated with OCS activities. The County's role is an active one, representing exchange of ideas and information, interfacing with the state, other counties, the municipalities contained within the County, various pressure groups (pro and con), and the public at large.

A. COUNTY-STATE RELATIONSHIPS

Each County is to supply information which reflects the suitability of developmental sites for the siting of energy facilities. Data is collected on available land; criteria for siting are analyzed and individual sites evaluated for potential use. Local policies, local opinion, zoning constraints,and the like,are included in evaluating the suitability of various locations. Existing legislation is used to guide such siting decisions within the County,and information is disimenated in both directions, to and from the state and municipalities through the County. Counties also channel information on public opinion and policy to other levels of government, especially the state and its various agencies. In effect, the County's position on various proposals and plans, both negative and positive, provide valuable inputs to both legislators and governmental agencies, - inputs which can aid in further decision making.

B. COUNTY/COUNTY RELATIONSHIPS

The cooperation of all counties concerned is of the essence. Frequent meetings (monthly) of the OCS contacts and the informed exchange of information have aided in preparing plans and avoiding unnecessary conflict and duplication of efforts. A regional meeting (Salem, Camden, Cumberland, Burlington and Gloucester counties) helped to aid in the exchange of information among counties with similar problems, attitudes and potentials. Similarly, Cumberland County has sought to cooperate with the neighboring counties, Cape May, Gloucester, and Salem, - specifically on technical matters, the respective suitability for various OCS facilities, and the potential routes for pipelines which would cross county boundaries.

In effect, county/county relationships should involve policy coordination and exchange of information on projected plans. The decision of any one county could potentially affect all others; in particular, those which are adjacent. Environmental and economic impacts extend beyond county lines. Coordination of County policies can increase the attractive aspects as well as reduce the negative impacts of OCS development. It can greatly simplify dealings with governmental agencies as well as with private concerns. Common problems, as well, can be identified, and common or complimentary solutions can be reached.

C. COUNTY/MUNICIPAL RELATIONSHIPS

The County, first and foremost, acts as liason between the State (government/agencies) and municipal governments. Many County officials and agencies have an active role to play in municipal affairs, - administrative and regulatory functions apply equally to municipalities. The County Planning Board gives guidance and information to municipalities, provides much raw data to local governments and aids in developing and implementing OCS policy.

The County must also coordinate the efforts of various municipalities to avoid conflict with laws, regulations and policies. Again, the exchange of information is an important function.[1] Municipalities, often must make decisions which impact beyond the borders of the individual unit. The avoidance of conflict and the development of complimentary policies are an important goal.

Public opinion is most frequently and most vocally expressed at the municipal level. The County can best assess and coordinate the various elements of local public opinion because of its familiarity with municipal leaders and structures. It in turn transmits such opinions to State officials and agencies.

D. COUNTY/PUBLIC RELATIONSHIPS

Certain Cumberland County offices, the Cumberland County Library, and the Cumberland County Planning Board are located in one building. As such the dissemination of information to and from many agencies/levels is expedited. The press is an important asset to the process and is invited to functions and/or is informed of decisions, - in turn transmitting information to the public.

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[1] Information on OCS related facilities was sent to all municipalities.

Municipalities were polled for information in a series of questionnaires.[1] Recently, requests for more information and public addresses by County Planning Board employees have been filled. Two public meetings (Bridgeton Senior Citizens and Cumberland County Planning Board Assembly) were held this year.

The County Library and County Planning Board are repositories of information, - state and federal publications, pertinent regulations and laws, and policy statements are available to the public at one location. The County also distributes information to the owners/operators of sites and facilities which might be impacted by OCS activities or which might wish to offer services or otherwise participate in OCS development.

Public views are actively sought from all groups and individuals. The County has aided in informing local business and industrial units of opportunities, possibilities and problems wherever possible.

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[1]General questionnaire - 1. if municipalities encourage or discourage certain types of OCS related facilities. 2. Cumberland County study of local ordinances (permitted and prohibited uses in industrial zones). 3. manufacturing, supply and repair firms. Answers to questionnaires are available at the Cumberland County Planning Board.

CHAPTER IX

COUNTY VIEW OF STATE AND NATIONAL INTERESTS IN COASTAL ENERGY FACILITY SITING

The Cumberland County Comprehensive Plan, and most public opinion in the County, supports the idea of rational, planned economic development. The growth and population pressures envisioned in the 1966 plan have not materialized, and the employment picture has not brightened as predicted. Consequently, many of the attitudes prevalent then have changed. Many individual areas would welcome OCS development. (See Table 24).

Current municipal zoning incorporates and/or conforms to state standards of performance on various types of industrial pollution. Individual municipalities do have ordinances banning certain industrial types, including some OCS related facilities. The physical millieu also precludes certain OCS investments as impractical and uneconomic. Almost all municipalities have ordinances which favor light, clean consumer goods industries and services. The climate of public opinion is generally favorable to industrial development, and many OCS developments would seem to be compatible with local ordinances.

Unlike the Atlantic Ocean shore counties, there is no well-developed tourist function, nor are there any well established beach resorts. Open space is not at a premium because of the low level of utilization of much of the County and the high proportion of the citizenry concentrated in the three largest municipalities. The "lower county" municipalities are the least populous, the least developed and contain the largest share of open space. Many of these municipalities once prospered on fisheries, seafood processing and (in the distant past) a tourist function. In recent years, however, economic conditions are best characterized as "depressed", as the fisheries and farming have declined. (Stow Creek and Greenwich are the notable exceptions to this generalization).

The County certainly recognizes the problems of the nation and the state in terms of the energy crises. With high rates of fuel energy consumption in its commercial, intensive agriculture and its industrial emphasis on the natural gas using glass industry, the County is extremely concious of energy prices and energy needs both within and beyond its borders. Without wishing to become overdeveloped, with cautious concerns about environmental pollution and with a strong desire to preserve its physical and cultural character, it is nonetheless open to OCS development. Offshore oil/gas deposits are viewed as a new potential resource and the overall attitude is one of cooperation and cautious optimism.

Table 24 Answers to Questionnaire on Community Desire for OCS Onshore Facilities

+ Encourage - discourage o no answer

Facility type (selected)	Municipalities														Total no. of municipalities which encourage certain types of facilities.	Total no. of municipalities which discourage certain types of facilities	No answer
	Commercial	Deerfield	Downe	Fairfield	Greenwich	Hopewell	Lawrence	Maurice River	Stow Creek	Upper Deerfield	City of Bridgeton	City of Millville	City of Vineland	Borough of Shiloh			
1. Pipelines	+	+	+	No answer	-	+	+	Comments in the press	+	+	-	Comments in the press	No answer	+	8	2	
2. Repair and maintenance yards	+	+	+		-	+	+		+	+	-			+	8	2	
3. Pipe installation service bases	+	+	+		-	+	+		+	+	-			+	8	2	
4. Pumping Stations	+	-	+		-	+	+		+	+	-			+	7	3	
5. Partial processing facilities	-	+	o		-	+	+		+	+	-			-	5	4	1
6. Natural gas processing and treatment plants	-	+	+		-	+	+		+	-	-			o	5	5	
7. Refineries	-	+	-		-	+	+		-	-	-			-	3	7	
8. Petrochemical industries	-	+	-		-	+	+		-	-	-			-	3	7	
9. Storage - tank farms	-	+	+		-	+	+		+	-	-			-	4	5	1
10. Storage - warehouse facilities	+	+	+		-	+	+		+	+	-			+	8	2	
11. Nuclear power plants	-	-	-		-	+	o		+	+	-			-	3	6	1
12. Conventional power plants	-	+	+		-	+	+		+	o	o			o	5	2	3

Comments:

Upper Deerfield Township - received four additional answered questionnaires.

Downe Township did not answer partial processing facilities, because of lack of information

Stow Creek - nuclear power plants - of 9 persons 5 voted for nuclear power plants, 4 vote against.

A. PUBLIC VIEW OF COUNTY ACTION

The public has been quite responsive to County actions regarding an OCS plan. Public interest runs quite high and people/groups express their opinions quite willingly and openly. Municipal officials and public agencies have been fairly cooperative in supplying information, and utilities/industries/business of the private sector have been most helpful. Generally, there is a public perception of the County as a guiding force, a source of information and the intermediary in relationships with the state and federal agencies.

Certain municipalities, notably Greenwich, have expressed great concern over the impact of OCS development. This is understandable in the light of the area's historical district. Maurice River, Commercial, and Lawrence Townships have expressed the greatest interest in developing OCS facilities, while Vineland and Millville have interest in attracting/developing ancillary industries and supply functions. There is some concern, previously mentioned, about the impact of development on the oyster industry. Certain individuals and interests feel that the CAFRA boundaries incorporate too much land and/or have too stringent regulations, looking to the County for support or inquiry in these matters.

In general, South Jersey public opinion has tended to reflect a belief in exploitation by the northern portion of the state. Cumberland County is no exception. Identification with regional interests is quite strong. Regulations and decisions eminating from Trenton are respected, but carefully scrutinized. Environmentally concerned individuals look to the state for preservation of the environment, particularly with regard to wetlands and water pollution. The segments of the public which favor development find the CAFRA regulations restrictive and look to the County government and federal policy for some form of variance or change. Opinions regarding the wetlands (develop versus preserve) are quite divided.

Overall, the County is viewed as the proper agency for dealings with the state, while the state is viewed as the proper agency for dealings with the U.S. government. National policy for development of the OCS oil/gas reserves is generally regarded with favor. County citizens see the oil/gas reserve as a partial answer to energy shortages and a valuable natural resource for the Northeast in general and New Jersey in particular. Essentially, the public wants some development and some positive economic impact from the resource. Any and all resources (mineral, fish, natural environment, etc.) of the outer continental shelf are viewed by virtually all people as the property of the United States rather than as an international resource. Most of the public sees it as a "New Jersey" or at least "Northeastern" resource, perhaps preferring a greater involvement of the states themselves than is currently the case. Oil spills and explosions are the greatest public fears, though tempered with a desire for development. Refineries and Petrochemical plants are considered least desirable, overall, of all possible development types. Certain municipalities and business interests however, have indicated they would welcome even these facilities.

The Cumberland County Vocational School has begun training programs for potential OCS employees and many area businesses and industries perceive a role for themselves in supplying the needs of OCS oil companies. Many of these agencies and interest groups look to the County for leadership in attracting development, though appeals are also made to State and federal agencies.

B. POCKETS AND AGENCIES OF DISCONTENT

Five municipalities (Commercial, Fairfield, Greenwich, Stow Creek and Vineland) have environmental commissions. These are not, however, necessarily opposed to OCS development. Greenwich is perhaps most concerned because of its historical district.

SORE (Save Our River Environment) is an active local group which expresses periodic concern over the possible effects of OCS development and/or dredging on the Maurice River. They are quite strongly opposed to any oil/gas development which might alter the landscape or physical condition of that river.

The oystermen express greatest concern over where dredged material might be dumped. Oyster lab experts oppose pipelines and deep water ports in the area of the Delaware Bay. Dredging is viewed as environmentally compatible if disposal of dredged material takes place at carefully regulated and selected sites. Any development which used great amounts of fresh water might result in increased salinity levels and consequent increased presence of (and damage) by oyster drills.

Individuals owning lands and homes or cottages along the Bay represent some degree of opposition to OCS development, fearing pollution of the waters and destruction of the fish resource. State fish and wildlife agencies have expressed concerns over habitat destruction or pollution.

Certain local business interests, land owners, land development concerns, and economic development agencies view current state, county and federal policies as too restrictive and, therefore, a hindrance to development.

C. OPINIONS CONCERNING OCS OIL AND GAS DEVELOPMENT

The Cumberland County Economic Development Commission is interested in the OCS oil and gas development project and its possible impact on Cumberland County. In 1976 Clarence Dicks, Chairman and William Snyder, Vice-Chairman of the Economic Development Commission were in Louisiana to assess the impact of several years of offshore drilling in that area.

The information and accompanying slides from that trip were presented to Maurice River Township officials. Dicks said that "Dorchester is the largest shipyard between New York and Virginia, fully capable of servicing the shuttle boats used". He also said that Maurice River Township "has a river that is very good for support industries".

In answer to audience questions, they both agreed that "the number of ships using the river would probably not interfere with its use for recreation".[1]

Robert Morgan, Manager of Dorchester Industries, Inc., has a different opinion on that subject. He thinks that in the summer time, Maurice River can become congested at a place called Matts Landings Road. At that site there are four existing marinas.[2]

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[1] Offshore Drilling Impact, Millville Daily, 7/1/76, p. 15.

[2] Information submitted by Robert Morgan, Manager of Dorchester Industries, Inc., on March 23, 1977.

Frank H. Wheaton, Jr. and Bob Morgan (both from Dorchester Industries), also visited Louisiana. Bob Morgan learned about offshore oil and gas development there and its onshore impact in Louisiana. He thinks that Dorchester has a chance to serve offshore oil and gas development, - by repairing and maintenance of the smallest OCS boats. Wayne T. Bell, Jr., OCS Coordinator of Ocean County Planning Board, who visited Dorchester Shipyard, concluded: "Dorchester Shipyard is one of the largest ship repair yards in Southern New Jersey exclusive of the Philadelphia or South Amboy yards".[1]

Rutgers University Center for Coastal and Environmental Studies eliminated Maurice River as a possible site for Support Bases. They listed several drawbacks to the use of the area for support facilities, specifically water depths, wildlife management, poor transportation infrastructure, lack of prior urban/industrial development and less competitive distance to OCS drilling sites than those found in seashore counties.[2]

Bob Morgan (from Dorchester Industries) agrees with the Rutgers findings relative to support bases. Dorchester presently has the function of ship repairs and maintenance. This is the type of work Dorchester Shipyard wants to do for OCS oil and gas development.[3]

Mr. A.W. Sitarski of Exxon felt that the area had limited potential as a location for a permanent support base. He also felt that distance mitigated against the use of Millville airport as a heliport base. The potential for small vessel repair functions at Maurice River shipyard sites was viewed positively (figure 30).

John Gaffigan, Manager of industrial development for "Ameri-Port" of the Delaware River Port Authority, expressed his opinion about OCS development and its impact on Cumberland County. He thought that the Maurice River would be an ideal site for a supply base.[4] William Snyder (Mark Forest Associates, Vineland) expressed his opinion about Millville Municipal Airport. "It has a good shot of becoming the base for oil company air operations". Inland airports are favored because salt air is destructive to air craft.[5]

The opinion was also shared by Lewis B. Finch, Superintendent of the Millville Municipal Airport.

William Snyder is worried that "hamlets like Port Norris and Dorchester could expect to be taken over completely". He mentioned that it is recommended that support facilities be located in towns of some size, in order to minimize adverse impact.[6]

In the beginning of 1977, Cumberland County Economic Development Commission began seeking onshore oil support facilities for its shores on the Delaware Bay and the Maurice River. It placed

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[1]Ocean County Planning Board OCS Monthly Report, October 7, 1977.
[2]CCES Weekly Newsletter to Counties, April 4, 1977, p.4.
[3]Phone conversation with Robert Morgan, April 7, 1977.
[4]Commission Looking for Oil Boom To Boost Area's Economic Growth, Bridgeton Evening News, December 11, 1975.
[5]County Sites Seen as Possibilities, Millville Daily, June 4, 1976.
[6]Offshore Drilling Impact, Millville Daily, 7/1/76, p. 15.

FIGURE 30

EXXON COMPANY, U.S.A.
POST OFFICE BOX 222 · LINDEN, NEW JERSEY 07036

A. W. SITARSKI
STATE GOVERNMENT RELATIONS REPRESENTATIVE

November 17, 1977

Ms. Czeslawa Zimolzak
Senior Planner
Cumberland County Planning Board
800 East Commerce St.
Bridgeton, N.J. 08302

Dear Ms. Zimolzak:

This letter will acknowledge your correspondence of October 28, 1977, relative to shipyards along the Maurice River and relating to questions directed toward O.C.S. onshore facilities planning. Please be advised that the views we express are Exxon's alone and it would be advisable for your office to contact other potential O.C.S. operators or boat contractors for similar information.

In general, the areas along the Maurice and Cohansey Rivers in Cumberland County would appear to have rather limited potential as locations for permanent OCS operating bases. Distance from the tracts leased in OCS Sale 40 combined with the limited water depths in the existing river channels are the two primary factors which lead us to this view. Further, from the descriptions of the highway, railroad, and air transportation facilities provided us, it appears that these factors could impose additional problems upon an OCS operator.

Aside from the question of boat operations, it must be recognized that helicopters are a prime means of moving personnel and minor supplies offshore. Small increases in distance which these craft must traverse between the offshore facilities and the onshore site significantly impact the pay load which may be carried. In general, the distances from Cumberland County to a number of tracts in the OCS Sale 40 area would impose unacceptable load restrictions on the helicopters unless a separate refueling facility could be established at an intermediate point.

Operations in the Mid-Atlantic area will require a wide variety of ocean going vessels. The bulk of these vessels will likely be "work boats" in the 200-250' length class. These vessels require water depths of 14-20' at low tide. Because of the extremely high costs associated with OCS operations, these boats, as well as the small type "crew boats" must be available for operations on a "around-the-clock" basis without the possible restrictions imposed by tidal influences. We are unaware of any areas in the United States, or for that matter worldwide, where service bases routinely operate on high tide.

Regarding the question of what kind of roll the Dorchester, Newporter and Akerman Shipyards might play in OCS activities, the following observations are offered:

There may be some possibility that these yards could be used for repair and maintenance of OCS related marine vessels. To what extent this might occur we cannot realistically judge, since aside from the technical considerations of water depth, navigational restrictions, i.e., bridges, etc., and distance from the basic operations, the practical consideration of economic competitiveness with similar facilities must be included in the analysis.

On a purely technical basis, the subject sites appear to have potential water depth limitations at one or more points along the river channels which would preclude navigation by anything other than the smallest vessels which might be utilized on the OCS. The information which we have reviewed does not indicate any highway, bridge or other vertical obstructions below Mauricetown, which would preclude movement of OCS vessels upon the rivers. However, in the event our information is not complete, I would suggest potential restrictions both vertical and horizontal be considered. "Offshore workboats" normally require a minimum vertical clearance of 60' at high tide. Minimum horizontal clearance of this same magnitude is required. For the large pipe laying and derrick barges used on the OCS, vertical clearances of 100+ at high tide are required. In addition, these vessels range upwards of 100-150' in width and 200-300' in length. When combined with the tug boats necessary to move these barges, the resultant "vessel length" may be greater than these rivers can handle. In our view, the potential utilization of the subject shipyards will likely be limited to repair of the smaller vessels used on the OCS. This view could, of course, be modified in the event that dredging operations to deepen and maintain these river channels could be undertaken.

We hope these comments respond to your questions and we appreciate your interest in OCS activities.

Very truly yours,

AW Sitarski

AWS/mds

advertisements in the January 3 edition of the Oil and Gas Journal and also in the Wall Street Journal. "Industry is welcome in Cumberland County on the other Jersey Shore, with miles of waterfront on the Delaware Bay . Sites available with air, rail, trucking, water."

Summarizing the opinions of local and regional officials, Maurice River and Dorchester Shipyard appear to be first rank targets for offshore drilling support facilities. The other existing facility that might benefit from offshore drilling is Millville Municipal Airport. There are also possibilities for oil pipelines in Cumberland County.

The opinions are generally positive toward OCS development projects. There is great desire for new jobs in the County, which has high unemployment. Among the opinions expressed thus far, only a few statements of "worry" have been expressed about adverse impact on the environment. Harold H. Haskin, Rutgers University professor, opposes oil pipelines in the Upper Delaware Bay, where there are existing natural oyster seed beds.[1] Donald E. Kunkle, Laboratory Supervisor for the Oyster Industry at Bivalve said, "Only as long as the environmental integrity of the Delaware Bay is preserved, the oyster industry has a future".[2]

"Sore", a group of Environmentalists from Mauricetown, N.J., also opposes oil support facilities on the Maurice River. They feel that there exists a potential conflict with the oyster industry. One part per million of oil in salt water will give an oily taste to oysters. There is a substantial risk of damaging the commercial fishing trade and the area's tourist business.[3] It should be noted, however, that repair and maintenance yards present no substantial risks.

D. QUESTIONNAIRE

On July 13, 1977 Cumberland County Planning Board sent a questionnaire to 14 municipal Planning Boards. The questionnaire dealt with OCS energy facilities, asking if the municipalities would encourage or discourage certain types of energy facilities which might result from oil and gas development. Ten municipalities answered. In general,answers were received after two to four months from the date of sending.

Comments Submitted by Municipal Planning Boards in Answer to Questionnaire

1. Greenwich Planning Board

Comments on OCS development: "Greenwich being the unique, historic and agriculture community that it is, we are trying to preserve this as a very real and treasured asset to the County and State. We would be hopeful that all of our surrounding neighbors and the County specifically would protect this material asset".

Comments on repair and maintenance yards, pumping stations and partial processing facilities: "Our concern here is that such facilities might require influx of workers that would burden our school, fire, police and sewage services".

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[1]Harold H. Haskin, Statement on Senate Bill 200, Creating the N.J. Oil Transport Facility Corporation, 1974, pp. 1-8.
[2]Donald E. Kunkle, Requested Information about the Oyster Industry -, April 6, 1977, pp. 1-3.
[3]"SORE," Newsletter #3, Mauricetown, p. 1.

Comments on pipeline installation service bases and storage warehouse facilities: "We would discourage any facilities where truck transportation is required since it would require movement of these transport services through our Historic District".

Comments on the pipeline corridor, projected for Cumberland County by F. Brunjens, Shell Oil Company : "Where those lines are located within the waters bounding our waterfronts, we would be concerned about any leakage, spillage, or ecological damage".

2. Lawrence Planning Board - Submitted its comments and the opinions of the members of the local governing body. Generally, they encouraged OCS development with caution concerning fragile ecosystem areas. They made a strong appeal for local control, within the state/county guidelines. Cautious, yet anxious for development, they even offered to re-zone certain areas for industry. They also expressed the opinion that the CAFRA boundaries, as currently constituted were overly restrictive and detrimental to development.

3. Maurice River Planning Board approved five items concerning establishment of support and service facilities, which are listed below:

Temporary service bases, permanent service bases, repair and maintenance yards, steel platform installation service bases and pipeline installation service bases.[1]

4. The questionnaire was a problem for some municipalities. For example, Stow Creek Planning Board members decided to vote on each individual item in the questionnaire.

5. The City of Bridgeton Planning Board discourages virtually all energy related facilities, because there is no land available for development.[2]

6. The City of Millville Planning Board questioned whether they were competent (or even permitted), to answer any questions which dealt with localization of energy facilities related to oil and gas development.[3] The discussion ended with George Schock's (Board member) statement, "What we will say is we'll take all the good things, but none of the bad".

The problem of offshore oil and gas development and the planning of onshore facilities is relatively new to municipalities. I have received phone calls questioning the meaning of OCS technical terms like pipeline landfall, partial processing facilities and many others. Of the 10 municipalities answering, five would like to have a meeting devoted to OCS oil and gas development (City of Millville, Commercial, Hopewell, Stow Creek and Upper Deerfield).

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[1] "Planners Approve Service Facilities, Millville Daily, 10/27/77.

[2] Opinion submitted by James Giles, Jr., Chairman of Bridgeton Planning Board Telephone conversation, September 26, 1977.

[3] Planners Feel Ward Workshops Served A Useful Purpose, Millville Daily, 10/25/76, pp. 1,3.

CHAPTER X

CONCLUSIONS

RECOMMENDATIONS FOR SPECIFIC SITES

All recommended sites are shown on figure 31.

1. Dorchester Shipyard. Available land for expansion, the existing structures, skilled work force and variety of services offered render this a prime site for a maintenance and repair yard (OCS related vessels and barges of shallow draft types). It is also a suitable site for the repair of standardized equipment installed on the platforms and related specialized equipment. Limitation imposed by water/sewage disposal problems and abandoned rail facilities can be overcome with relatively minor investment.

2. Pipeline corridors can follow the right of way of existing route N.J. 55 at relatively minimal cost with minimal disruption to the environment. Limitations include the sites at which it would come ashore (Thompson's or Moore's Beach) which are near important oyster grounds, and the problem of clearance/coverage at interchanges and overpasses. A gas pipeline only is recommended for the western portion of the county (fig. 31) because of potential oil pipeline damage to oyster seed beds in Nantuxent Cove.

3. Ancillary Industries

a. Millville Heliport

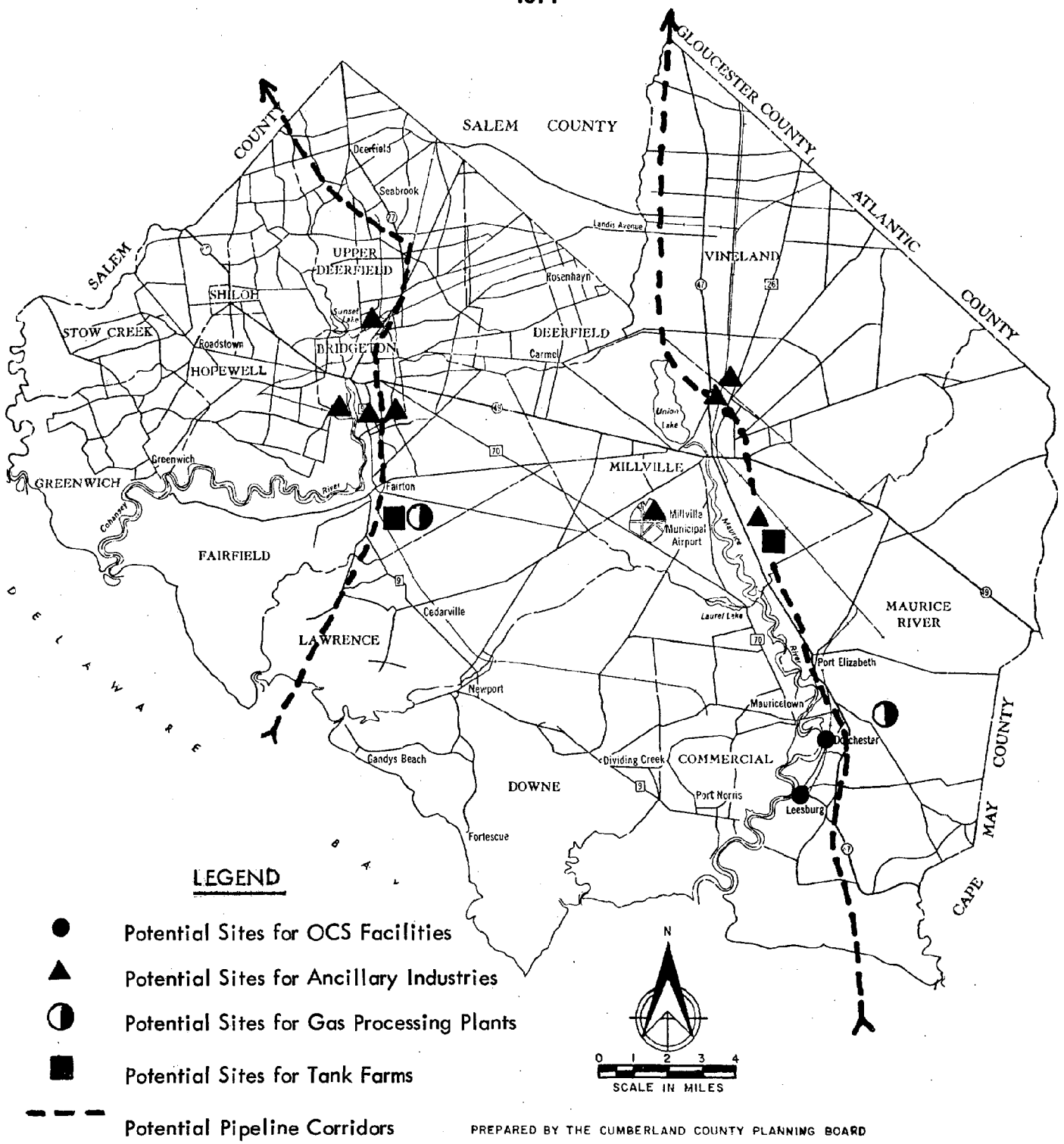
Location of a heliport is proposed for the existing Millville Municipal Airport. The site has available land (industrial development area) for expansion, clearance, proper licenses, radar equipment and refueling and fire fighting services. There are four existing helipads and a full line of services which make this a seemingly ideal function for this site. However, the distance from offshore drilling sites might limit its suitability for this function. Larger fuel requirements (to overcome distance), would reduce the amount of cargo or number of passengers which could be carried in a single trip (See A. W. Sitarski opinion, fig. 30). Space available and mechanical services (in particular engine repair) might outweigh these disadvantages.

FIGURE 31

POTENTIAL SITES FOR ENERGY FACILITIES

CUMBERLAND COUNTY, N.J.

1977



PREPARED BY THE CUMBERLAND COUNTY PLANNING BOARD

b. Catering services, supply companies, contract labor, contract labor and services - machine and welding.

Land oriented ancillary types of industries are particularly adaptable to available sites in Cumberland County. Many currently existing facilities can be expanded in order to meet oil company needs. There is available industrial space in Vineland, Millville and Bridgeton for the location of new ancillary industries (new capital investment). Bridgeton contains a series of existing structures which might be utilized for such facilities. All these industries require access to rail and highway would be best located in Vineland. Office and warehousing functions have particular locational advantages in Vineland as well. These are best located in a series of industrial sites along N.J. route 55, especially the Vineland Industrial Park. Rail requiring facilities are best located in the South Vineland industrial/commercial zone (near the Millville boundary line), and the convergence of N.J. 55 and Delsea Drive (N.J. 47).

4. Tank Farms and Gas Processing Plants. These facilities are dependent on the routes taken by gas an oil pipelines. The transportation infrastructure, available land (large tracts) and zoning compatibility favor locations at Fairton (tank farm and/or gas processing facility), Millville #1 industrial park (tank farm) and the Maurice River Township sand mine complex area (see figure 31, gas processing plant). Environmental problems may be a negative factor at Millville (Menantico Wildlife Area), but there are few problems at the other two sites. Further, detailed research is necessary before final decisions can be reached on the pipelines and attendent facilities.

Current unemployment rates and the fuel/energy demands of existing County industry represent developmental pressures. The County would favor the location of certain OCS investments in order to help maintain its current industrial base, - perhaps even enlarging and diversifying that base in the process. The large inventory of undeveloped land is viewed as a resource which might be used with minimal environmental damage.

All positive and negative impacts have been discussed in the body of the text. The tidal wetlands and the oyster grounds represent the most delicate environmental areas and resources. Every effort should be made to prevent the destruction or degradation of these zones in the siting of OCS facilities.

SELECTED BIBLIOGRAPHY

1. Books

Arthur D. Little, Inc., Potential Onshore Effects of Deepwater Oil Terminal-Related Industrial Development. Report to the Council on Environmental Quality. 2 vols. of 4. New York, 1971.

Baldwin, Pamela L. and Malcolm F. Baldwin, Onshore Planning For Offshore Oil: Lessons from Scotland. The Conservation Foundation. Washington, D.C., 1976.

Center for Coastal and Environmental Studies. Onshore Support Base Study for OCS Oil and Gas Development (Draft copy). New Brunswick: Rutgers Univ., August, 1977.

Engineering - Science, Inc., An Air Quality Study for Revision of the State Implementation Plan in Southern New Jersey. Part I. McLean (Virginia), 1976.

Goldstein, Eleanor C., Energy, Social Issues Resources Series, 2 Vols. Gaithesburg (Maryland), 1976.

Haskin, Harold H., Oil and Oyster Industry in the Delaware Estuary. Rutgers Univ. and the Academy of Natural Sciences of Philadelphia, 1977.

Haskin, Harold H., Statement on Senate Bill 200, Creating the New Jersey Oil Transport Facility Corporation, New Brunswick: Rutgers Univ., 1974.

Morrell, David, Who's in Charge?-Government Capabilities to Make Energy Facility Siting Decisions in New Jersey. Center For Environmental Studies, Report #48, 1977.

New England River Basins Commission, RALI Factbook-Onshore Facilities Related to Offshore Oil and Gas Development. Boston, 1976.

Resource Planning Associates, Inc., Identification and Analysis of Mid-Atlantic Onshore OCS Impacts. Cambridge, Massachusetts, 1975.

Sheen Technical Subcommittee. (Offshore Operators Committee). Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extractions in Offshore and Coastal Waters. May, 1976.

Sheen Technical Subcommittee (Offshore Operators Committee) Environmental Aspects of Produced Waters From Oil and Gas Extraction Operations in Offshore and Coastal Waters. September, 1975.

Woodward-Clyde Consultants. Mid-Atlantic Regional Study: An Assessment of the Onshore Effects of Offshore Oil and Gas Development. Clifton, N.J., 1975.

2. Magazines and Newspapers

"Byrne Won't Sacrifice Environment". Asbury Park Press, February 16, 1977.

"CCC Team Studying Oil Industry Jobs". Vineland Times Journal, October 17, 1977, p. 3.

"Commission Looking for Oil Boom To Boost Area's Economic Growth". Bridgeton Evening News, December 11, 1975.

"County Freeholders Discuss Planned Petroleum Courses". Millville Daily, November 3, 1977, pp. 1,2.

"County Sites Seen as Possibilities". Millville Daily, June 4, 1976.

"County Seeks Oil Facilities". Atlantic Press, January 12, 1977.

"LNG Tankers Fuel Terminal Debate". Atlantic Press, January 5, 1978.

Mitchell, James K., "Onshore Impacts of Scottish Offshore Oil: Planning Implications for the Middle Atlantic States". AIP Journal 42 (October 1976), pp. 386-398.

"Oyster Industry Rebirth Eyed". Vineland Times Journal, October 22, 1977.

"Offshore Drilling Impact". Millville Daily, July 1, 1976. p. 15.

"Planners Approve Service Facilities". Millville Daily, October 27, 1977.

"Planners Feel Ward Workshops Served A Useful Purpose". Millville Daily, October 25, 1977, pp. 1, 3.

Rolfs, Donald H., "Workhorses Under Sail". New Jersey Outdoors, Jan./Feb. 1977, pp. 8-25.

"Tank Farm Plan Remains Alive". Vineland Times Journal, November 16, 1977.

3. Federal and Congressional Documents.

U.S. Army Corps of Engineers. Waterborne Commerce of The United States. 1935-1976.

U.S. Congress - Office of Technology Assessment. Coastal Effects of Offshore Energy Systems: An Assessment of Oil and Gas Systems, Deepwater Ports and Nuclear Power-plants Off the Coast of New Jersey and Delaware. Washington, D.C.: Government Printing Office, 1976.

U.S. Department of Commerce-Bureau of Fisheries. Effects of Crude Oil Pollution on Oysters in Louisiana Waters. Authors: Galtsoff, Paul S. and Herbert F. Prytherch. Bulletin #18 (1935).

U.S. Department of the Interior, Geological Survey. Mineral Resource Management of the Outer Continental Shelf. Circular #720, (1975).

U.S. Department of the Interior - Bureau of Land Management. OCS Lease Sale No. 42 - Final Environmental Statement. (Proposed 1977 Outer Continental Shelf Oil and Gas Lease Sale Offshore the North Atlantic States) 5 volumes. Washington, D.C.: Government Printing Office, 1977.

U.S. Department of the Interior, Geological Survey. Policies, Practices, and Responsibilities for Safety and Environmental Protection in Oil and Gas Operations on the Outer Continental Shelf. Washington, D.C.: Government Printing Office, 1977.

U.S. Department of the Interior. Regulations Pertaining To Mineral Leasing, Operations and Pipelines on the Outer Continental Shelf as contained in Title 30 and Title 43 of the Code of Federal Regulations and the Outer Continental Shelf Lands Act (67 Stat. 462). Washington, D.C.: Government Printing Office, 1976.

U.S. District Court. Eastern District of New York. Court Transcript. County of Suffolk, et al., Plaintiffs, against Secretary of the Interior, et al, Defendants, National Ocean Industries Association, et al., Intervenor - Defendants; The National Resources Defense Council, Inc., Plaintiff, against Secretary of the Interior, Defendant. Final Memorandum and Order 75 C 208 and 76 C 1229. New York, 1976.

4. State Documents

New Jersey Department of Conservation and Economic Development. Fishery and Wildlife Resource Monograph. Trenton, 1964.

New Jersey Department of Environmental Protection, Division of Marine Services, Office of Coastal Zone Management. An Inventory of the New Jersey Coastal Area. Trenton, 1975.

New Jersey Department of Environmental Protection, Division of Marine Services, Office of Coastal Zone Management. Alternative Boundaries for New Jersey's Coastal Zone. Trenton, 1976.

New Jersey Department of Environmental Protection, Division of Marine Services, Office of Coastal Zone Management. Alternative for the Coast. Trenton, 1976.

New Jersey Department of Environmental Protection, Division of Marine Services, Office of Coastal Zone Management. Interim Land Use and Density Guidelines for the Coastal Area of New Jersey. Trenton, 1976.

New Jersey Department of Environmental Protection, Division of Marine Services, Office of Coastal Zone Management. Ocean Resources: Mineral. (Staff Working Paper by Richard Kantor). Trenton, 1976.

New Jersey Department of Environmental Protection, Division of Marine Services, Office of Coastal Zone Management. Ocean Resources: Physical. Trenton, November 1976.

New Jersey Department of Environmental Protection, Division of Marine Services, Office of Coastal Zone Management. The "Call for Information:" On Coastal Energy Facility Siting: An Analysis of Responses. Trenton, March 1977.

New Jersey Department of Environmental Protection, Division of Marine Services, Office of Coastal Zone Management. Coastal Management Strategy for New Jersey - CAFRA Area. Trenton, September 1977.

New Jersey Department of Environmental Protection, Division of Marine Services, Office of Coastal Zone Management. Energy Facility Siting Issues in New Jersey's Coastal Zone. Staff Working Paper by Helga Busemann. Trenton, December 1977.

5. County Documents

Cumberland County Economic Development Commission. Cumberland County Industrial Directory 1975. Bridgeton, 1975.

Cumberland County Economic Development Commission. Overall Economic Development Program Progress Report 1976. Bridgeton, 1977.

Cumberland County Planning Board. Oyster Resources. Bridgeton, 1966.

Cumberland County Planning Board. The Cumberland Plan 1966: A Comprehensive Twenty Year Development Program. Bridgeton, 1966.

Cumberland County Planning Board. Population Study. Bridgeton, 1967.

Cumberland County Planning Board. Land Use - 1964: An Inventory and Analysis of Land Use, Physical Environment, Growth Controls and Principal Utility Services. Bridgeton, 1965.

Kotlikoff, L.J., and M.I. Kotlikoff, Human Resources in Cumberland County: An Economic Analysis. Economic Development Commission. Bridgeton, 1973.

Snyder, W. A. The Anticipated Impact of Offshore Oil and Gas Drilling on the Cumberland County Area. Bridgeton, 1976.

Steward, D. J., New Historical Atlas of Cumberland County. Philadelphia, 1876.

APPENDIXES

APPENDIX 1

PSE&G

SEP 6 1977

Public Service Electric and Gas Company 80 Park Place Newark, N.J. 07101 Phone 201/622-7000

August 30, 1977

Cumberland County Planning Board
800 East Commerce Street
Bridgeton, New Jersey 08320

Attention: Mrs. Czeslawa Zimolzak, Senior Planner

As requested in your letter dated August 5, 1977, the following information pertains to PSE&G requirements for new electric generation and transmission facilities for the Bayside tract in Greenwich Township.

1. PSE&G has no committed plans at the present time for development of electric power generation facilities at Bayside. However, the Bayside tract is under consideration as one of several possible sites for future not-yet-designated nuclear units in the late 1980's to early 1990's.

2. Associated with the installation of any generating capacity at the Bayside tract would be the concomitant installation of electric transmission outlet capacity to transport the power northward to major New Jersey power distribution centers and to integrate Bayside with the Pennsylvania-New Jersey-Maryland Power Pool.

   Typically this would require the construction of several overhead transmission lines which would operate at 500,000 volts. The exact number and timing of these transmission lines would depend upon the amount and timing of generation installations at Bayside. For purposes of illustration only, three 500,000 volt transmission lines, each on a separate right-of-way approximately 350 feet wide, will provide transmission outlet capacity from PSE&G's Salem Generating Station which upon completion in 1979 will contain two large nuclear generating units. The size of nuclear units, which may be installed at Bayside, is expected to be similar to that installed at Salem, and as many as four such units may be located at Bayside in the late 1980's to early 1990's.

Very truly yours,

R. D. Stys

R. D. Stys
Manager-Electric Planning

DAB:mas

The Energy People

APPENDIX 2

Transco
Exploration Company

A Subsidiary of Transco Companies Inc.

2700 South Post Oak Road
P. O. Box 1396
Houston, Texas 77001
713-626-8100

October 19, 1977

Cumberland County Planning Board
800 East Commerce Street
Bridgeton, New Jersey 08302

Attention: Czeslawa Zimolzak
OCS Project Planner

Gentlemen:

Transco Exploration Company is not considering at this time locating a deep water port in the Delaware Bay, near Greenwich Township.

If we should consider such in the future, we will contact you.

Yours very truly,

TRANSCO EXPLORATION COMPANY

G. L. Drenner, Jr.
Vice President - Production

GLD:sb

APPENDIX 3

Aircraft Industries in Cumberland County

Firm	President	Employees	Address	Phone	Product
Aero Service Company	Graham Denham	2	Millville, N.J. Box 86 Municipal Airport	825-6700	Minor Aircraft Engine Repair
Airwork Service Div. Purex Corp.	T. Dickson, Jr.	600	Millville, N.J. Municipal Airport	825-6000	Aircraft Engine Overhaul
Cresci-De Boliac Aviation Equip.	Theodore Jacobson	150	Box 1 N.W. Blvd. Vineland	691-1700	Manufacture Dump Bodies, Hoists, Ground Support Equipment
D & M Aircraft Products	Donald Crabill	2	803 Whitaker Ave. Millville	825-2999	Aircraft Equipment & Analysis
Eastern Aero Supply Co.	Mario Federici	7	Millville Airport	825-2500	Wholesale, Pilot & Airplane Parts
Hawkins Avionic Co., Inc.	Donald Crabil	3	803 Whitaker Ave. Millville		Distributors for Avionic Equipment

Source: Cumberland County Industrial Directory 1975.

APPENDIX 4

OIL AND THE OYSTER INDUSTRY IN THE DELAWARE ESTUARY

by H. H. Haskin

Taken from Chapter 7

in

Report to the National Science Foundation

RANN PROGRAM - Grant No. ENV 74-14810-A03

"The Petroleum Industry in the Delaware Estuary"

A Joint Project of

Rutgers University and The Academy of Natural Sciences of Philadelphia

January, 1977

b. Exposure to WSE

Dunaliella was relatively unaffected by WSE at concentrations up to 5 ppm. Likewise, Nannochloris demonstrated only slight inhibition at 4.3 ppm. Monochrysis is inhibited at 5 ppm. but is relatively unaffected by concentrations of less than 3 ppm (see Figures 16 and 17). Similarly, Isochrysis (Figures 18 and 19) is inhibited at 5 ppm, but the effect is transitory, not being observed by the fifth day of the experiment. Similar decreases of toxicity with time were also noted for Skeletonema, discussed below. This decrease in toxicity is probably associated with the loss of the more volatile fractions, which still occurs to some degree despite the use of a closed system (Dunstan et al, 1975).

The experiments with Skeletonema differ from those previously discussed in that three clones, designated MB-4, MB-6, and MB-7, were utilized. All were isolated from a single water sample at Monmouth Beach, N.J. All three clones appear far more sensitive than the other species tested, in general exhibiting inhibitory responses at 2.5 ppm or less. However, the nature of the response varied markedly between the three clones. Clone MB-7 was totally inhibited at 2.25 ppm, and exhibited intermediate inhibition at approximately 1 ppm (Figure 20). By day six of the experiment the inhibitory effects are no longer noted at the two lower concentrations (Figure 21). Clone MB-4 was totally inhibited at concentrations as low as 0.56 ppm throughout the seven day duration of the experiment (Figure 22). In contrast, MB-6 was stimulated at concentrations of 0.5 and 1.1 ppm, and did not show significant inhibition at concentrations up to 2.6 ppm (Figure 23).

D. Discussion of Results

1. Chronic Exposure of Adults

a. Survival

The finding that significant mortalities occur in adult oysters exposed to low levels of crude oil for long periods of time is new. Other laboratory studies of oysters exposed to oil have resulted in findings that oysters are quite resistant to kill by oil (e.g. Mackin and Hopkins, 1961; Anderson and Anderson, 1973). This difference is most probably due to method of exposure of the oysters to the oil. Oil adsorbed on clay may include oil fractions not found in water soluble extracts of oil or volatile fractions readily lost to the atmosphere from films of oil layered on the surface of laboratory aquaria. In addition, the clay particles, with adsorbed oil, are filtered from the water by the oyster and are taken into the gut as food particles, thus insuring introduction of the oil into the oyster.

The threshold concentrations for significant oyster mortality are not yet firmly established. Nigerian crude at 0.3 ppm produces mortalities at least double those in control oysters, as does #2 fuel at 0.1 ppm. The Iranian crude tested appears relatively benign with mortalities about 1.3 x controls at a concentration of 0.5 ppm (Table 2).

With background level of total oils in the lower Delaware Bay at about 0.04 - .05 ppm and total oils in the River and upper Bay approximating 1.0 ppm, at least on occasion, the oyster may have a narrow margin of safety for survival. Critical for an evaluation of this situation is knowledge of the nature of total oils in the lower Bay, including an estimate of their toxicity to oysters.

b. Reproduction

In four chronic exposure studies with adults, ability of oil-treated oysters to spawn has been tested. In two of these oysters treated with Nigerian crude at 0.8 ppm spawned weakly or not at all (CES I and II). In the other two, oysters treated with Nigerian crude at 0.3 and 0.5 ppm equalled the controls in spawning as did those treated with Iranian crude at 0.5 ppm. Oysters exposed to #2 fuel at 0.5 ppm failed to spawn (CES VI and VII). Together, these four studies indicate a Nigerian crude threshold concentration for inhibition of spawning somewhere between 0.5 and 0.8 ppm. The corresponding threshold concentration of the #2 fuel oil is less than 0.5 ppm. It appears that oysters may reproduce successfully at any oil concentration at which they can survive, since the threshold for survival is apparently below that for delay in gonadal development and discharge of gametes.

2. Exposure of Larvae

a. Acute Exposure Studies

Swimming activity is reduced at concentrations of Nigerian crude in the range of 0.4 to about 1 ppm. The slow recovery of activity at the higher concentrations may indicate permanent damage to the larvae that could interfere with feeding. This may in turn result in the observed retardation in growth and delay in setting in the larvae.

b. Chronic Larval Studies

The concentrations of Nigerian crude oil at which retardation in development and reduction in setting consistently occur agree well with those which inhibit swimming activity in the larvae (0.5 - 1.0 ppm). It is also of interest that the larval stages of the oyster appear to be no more sensitive to damage by

oil than the adults, and perhaps even less so. Adults are killed by chronic exposure to 0.3 ppm of Nigerian crude, while larvae at 0.25 - 0.5 ppm frequently survive, grow and set as well as do the controls. The length of time of exposure to the oil must, however, be considered in such comparisons. In the chronic adult studies significant mortalities separating oil-exposed animals from controls usually did not occur over the first few weeks.

Studies of the effect of treatment of oyster larvae with oil at different stages of development yielded important results. For a given concentration of oil (1.5 ppm or less) the effect of the treatment is progressively reduced by delay to later and later developmental stages. Even in oil at 1.5 ppm substantial setting will occur if the larvae are not exposed to the oil until they are within a day of onset of setting. Conversely, larvae treated with oil at their earliest developmental stages and then withdrawn from treatment at various stages recovered from the oil exposure. Those surviving the period of exposure set as well as those never exposed. These observations clearly have application in interpreting probable events in the estuary as larval broods may be moved into and out of areas of local oil pollution or as concentrations of oil resulting from spills are moved through the oyster territory.

Although it was shown earlier that chronic exposure of adult oysters to Nigerian crude oil will strongly inhibit spawning, larvae were obtained this year from adults exposed to crude at lower concentrations. These larvae developed and set as well as those from unexposed (control) adults. This is an important observation in that it indicates that petroleum-derived oils, reputedly concentrated in molluscan gonads, may not be concentrated sufficiently to endanger early stage larvae through their stored food supply.

Important questions had been raised on how realistic it was to be exposing oysters and larvae to oil on clay at 10% by weight and oil that had been adsorbed on dry clay rather than wet, as would occur naturally in the estuary. The opinions were: (1) th the adsorption on dry clay and storage in air before preparation of slurry would allow for the production of oxidation products more toxic than the crude itself and (2) the unrealistically high proportion of oil to clay might serve to concentrate the oil on sensitive oyster epithelia, thus increasing the toxicity. Three findings reported here answer, in great part, these questions.

(1) Oil on clay at 1% is as toxic as oil on clay at 10% to both oyster adults and larvae (CES VI compared with CES IV).

(2) The slurries prepared by adding crude oil and #2 fuel directly to wet kaolin clay in a mixer are about as toxic as those obtained by adsorbing the petroleum and fuel oil on dry clays, suspended in pentane, followed by evaporation of the pentane.

(3) Delaware River natural sediments with high oil content (4400 µg/g. dry wt) are as toxic to oyster larvae as 10% oil on clay at the same total oil concentration.

3. Growth of Phytoplankton

The results presented here indicate that Hannochloris, Monochrysis, Isochrysis, and Dunaliella exhibit considerable tolerance to the petroleum hydrocarbons of Nigerian crude oil, assuming that the clones used are representative of their respective species. The concentrations required to reduce their growth were far in excess of those found in Delaware Bay under normal conditions, and may even exceed concentrations found immediately following an oil spill. The rapid decrease in toxicity with time, presumably due to a loss of the volatile fraction, indicates that any major inhibition of growth following a spill would be very transitory in nature.

A number of problems in interpreting the data appear, however. Each type of oil or oil fraction is distinctly different in its hydrocarbon composition, which can result in differential toxicity. For example, #2 fuel oils have been shown in general to be more toxic than crude oils (Gordon and Prouse, 1973; Nuzzi, 1973), and considerable differences between various #2 fuel oils have also been demonstrated (Winters et al, 1976). Therefore, tolerance to one oil at certain concentrations does not necessarily imply tolerance to all petroleum hydrocarbons at similar concentrations.

The second major problem involves the differential response between algal clones of the same species, as was demonstrated with Skeletonema. Most studies to date employing algal cultures to test the effects of possible environmental toxicants have utilized only one clone of each species. This could possibly lead to erroneous conclusions, and caution is urged in interpreting such data. It appears probable that a large amount of genetic variability exists in phytoplankton populations, making it very difficult to characterize a species response based on only one genotype in culture.

These several algal species important as oyster foods have been shown to be less sensitive to crude oil, as judged by their growth, than are either adult or larval oysters. Limited studies also indicate that larval food species grown in water soluble fraction of crude oil do not concentrate petroleum fractions

sufficiently to endanger the larvae which feed upon them. Tentatively it appears that the oyster populations of the estuary are not endangered through their phytoplankton food web. A firm conclusion on this, however, would be premature until more is known of algal sensitivity to oil-derived compounds other than from Nigerian crude oil.

Statement of Work to be Accomplished

Based on points emphasized in the discussion of results above, the following work should now be accomplished in pursuing the general objective of this project:

(1) Determine the lower threshold concentrations of #2 fuel oil for toxicity to larval and adult oysters on chronic exposure. How much less than 0.1 ppm for adults, and how much less than 0.25 ppm for larvae should be known. Similar thresholds for other refined products and selected crudes should also be determined.

(2) Determine the toxicity of ambient oils in the lower estuary for oysters. This probably may be most profitably approached by examining the toxicity of oils on sediments in the lower estuary. Characterization of oils in toxic sediments will be an important step toward identification of most hazardous materials.

(3) Oyster bioassays should be continued with candidates for most toxic components provided by our chemical colleagues, e.g. Larson with photo-oxidation products of #2 fuel oils; Faust with phenols and chlorinated hydrocarbons; Hunter with fractions of oils from toxic sediments.

(4) Toxicity of various fuel oils for good oyster foods among the microalgae in Delaware Bay should be determined. Although the microalgae appear to be relatively insensitive to Nigerian crude, other investigators have found them very sensitive to toluidines and cresols in certain fuel oils.

(5) Histopathology of adult oysters under stress of chronic exposure to toxic crudes will probably be completed within this contract year. If not, it should be continued.

APPENDIX 5. FOOD PROCESSING INDUSTRIES IN CUMBERLAND COUNTY

1975

Firm Name	Owner or Manager	Employ	Address	Phone	Product
April, Morris Bros, Inc.	Morris April	155*	Rt. 49, Box 53 Millville, N.J.	455-1212	food processing, buy and sell produce
Bridgeton Meat Packing	Charles Fisher	4	654 Shiloh Pike, Bridgeton	451-6270	Meats
Bruno Cheese Co. Inc.	Joseph Cappuccio	3	1296 Magnolia Rd. Vineland	691-3194	Cheese Manufacturing
Casa Di Bertacchi, Inc	Larry Bertacchi	17	4 W. Powell Street, Millville	825-2422	Frozen meat processing
Consolo, WM. & Sons Farms	Bill Consolo, Jr.	15	1269 N. Main Road, Vineland	691-3377	Farm Supplies, Fresh Fruits, Vegetables
Ebner's Dairy, Inc.	Gerald Ebner	9	West Ave. & Forest Grove, Vineland	692-8805	Dairy Products
Green Giant Co.	Wm. Connell	4	Mill Road, Vineland	692-0550	Food packaging (vegetable)
Hunt-Wesson Foods, Inc.	T.V. Granger	40 300**	Eagle & Grove St. Bridgeton	451-5100	Food Processing
John Pepper, Jr. Foods, Inc.	John Pepper, Jr.	150	215 N. Mill Rd., Vineland	691-3700	Frozen Food Processing
Manischewitz Food Products Corp.	John F. Bechtold	115	214 N. Delsea Drive, Vineland	692-6350	Manuf. of Kosher Foods
Minot Food Packers Inc.	John B. Morello	50	Bank & Penn Sts., Bridgeton	451-2035	Food Processing

* 1977 Closed

** In Season

Finkelstein Farms Inc.	Joseph Finkelstein	25	Greenwich, N.J. 08323	455-0400	Egg Breaking Plant
Southland Frozen Foods, Inc.	Charles. Rizzuto	30* 60 full-time	215 N. Mill Rd., Vineland, N.J. 08360	692-4187	Frozen Foods
Nardelli Bros., Inc.	James Nardelli	8	N. Main Rd., Cedarville	447-4621	Fruit & Produce Distrib. Wholesale Farm Supplies
Pappas Clement Co., Inc.	Dean Pappas	20 80*	E. Maple Avenue, Cedarville	447-4596	Cannery
Plochman Inc.	Carl Plochman	20	1159 N. Delsea Drive Vineland	692-7400	Manufacturing of Mustard
Progresso Foods Corp.	Robert Novak	275 175*	500 Elmer Rd., Vineland	691-1565	Food Processing
Springer & Thomas, Inc.	G. Sanford Thomas	25	Laurel & Glass St., Bridgeton	451-4000	Wholesale Meat Products
Sunny Slope Farms of N.J.	Alfred Caggiano	30 winter 350 summer	Greenwich Rd., Bridgeton	451-0022	Fruit Growing and Sale
Suzy Bel Canning Co., Inc.	Franklin J. Fader	15 60*	S. Delsea Drive Port Elizabeth	825-1905	Food Processing
Fillottas Wholesale Provisions Corp.		6	2071 S. Main Rd. Vineland	691-8484	Wholesale Processed Foods
Venice Maid Co.	Laurence Pepper	400	270 N. Mill Rd. Vineland	692-2100	Food Processing
Vineland Kosher Poultry Co.	Irving Raab	20	1182 S. Mill Rd. Vineland	692-1871	Poultry dressing Plant
Zukerman M. & Co.	Nathan Zukerman	12	270 Delsea Drive Vineland	691-3445	Wholesale Grocers

Source: Cumberland County Industrial Directory, 1975 pp. 1-62

APPENDIX 6

BRIDGETON, N.J./Available Industrial Buildings/1978*

A. 170,500 sq. ft. former printing plant with 15' to 21' clearance, heavy-duty concrete floors, fireproof roof, sprinklered, direct fire alarm system, 300,000-gal. water tank, natural gas, fully fenced, 23 acres, built 1945 to 1965, 4 rail and 4 truck unloading docks, Conrail siding. Sale at $4 per sq. ft. or lease.
Willow Street near Route 49.

B. 36,000 sq. ft. warehousing facility, pre-fabricated steel, 6-inch concrete floors, 24-foot clearance, 25-foot column spacing, Central Railroad siding with loading docks for 5 cars, sprinklered, full utilities (no gas). Built 1968. Lease only, at 12¢ per sq. ft. per mo. South East Avenue.

C. 15,000 sq. ft. former iron foundry, 20' clearance, on 4 1/2 acres along Cohansey River. Heavy concrete floors. City water, sewer, electricity. No rail, loading docks, sprinklers, heat. Sale or lease. 89 Water Street.

D. 15,000 sq. ft. warehouse, brick and metal exterior, 12 to 14' clearance, 7500 sq. ft. on each of two floors, unheated, no rail ro loading docks, 14-foot column spacing. Electricity is only utility. Sale or lease, terms depending on improvements prospect desires. 78 Water Street.

E. 10,000 sq. ft. former marine terminal on Cohansey River, metal exterior, on 27 acres, 12 to 14-foot clearance, loading dock, 96-foot pier on river, water and electricity only. Asking $250,000. Southern end of Water Street.

F. 4,900 sq. ft. divided into two floors, brick exterior, 12-foot clearance, concrete floor, all utilities (no gas). Built 1920. Sale for $15,000 or least for $250. mo.
21 Water Street.

G. 62,102 sq. ft., divided into buildings of 44,964, 10,838 and 6,300 sq. ft., block concrete floors, 15-foot clearance, 6.5 acres downtown, city sewer and water. Sale only: $250,000. 110 Cohansey Street

H. 10,000 sq. ft. facility modernized in 1973, block (8,900) and corrugated metal (1,100). 12-foot ceilings, on 7.5 acres, with rail adjacent. One loading dock. Sale only at $200,000. 415 S. East Avenue.

* Listed by Bridgeton Industrial Commission

APPENDIX 7

Trucking Industry in Cumberland County

t	Employees	Address	Phone	Product
lini	135	Oak & Brewster Rds. Vineland	692-7012	Trucking
siglia	10	Main & Grant Ave. Vineland	692-7790	Trucking
Gifford	15	55 Wade Blvd. Millville	825-2750	Trucking
cham	25	S. Delsea Drive Millville	825-1647	Trucking
ett	5	Newport, N.J.	447-4507	Trucking
raluzzo	23	310 Chestnut Ave. Vineland	691-1142	Trucking
astine	25	Strawberry Ave. Port Norris	785-8088	Trucking
d. Fogg	21	145 Roadstown Rd. Bridgeton	451-0119	Air Freight Service and Trucking
Garton	16	116 Almond St. Vineland	691-0487	Trucking
rlow	9	475 Burlington Ave. Bridgeton	45;-2089	Transportation of glass and canned goods
zinger	4	Morton Avenue Rosenhayn	451-1120	Trucking
ovsky	8	1535 S. State St. Vineland	691-0436	Trucking
lsky	2	2235 W. Main St. Millville	825-5200	Trucking
Bianda	220	Box 160 Landis Avenue Bridgeton	451-2410	Trucking-General Commodities

Millville Trucking, Inc.	John Reginak	20	P.O. Box 181 Orange Street Millville	825-0794	Trucking
National Freight, Inc.	Bernard Brown	1000	57 W. Park Ave. Vineland	691-7000	Trucking
Port Norris Express Co., Inc.	Samuel Leonette	35	North Avenue Port Norris	785-0147	Sand Trucking
R.D.S. Trucking Co., Inc.	Ralph Dauito, Jr.	50	1713 N. Main Rd. Vineland	691-3033	Trucking
Raffo, Caesar J. Transport, Inc.	Wilbert Pagliughi	3	561 Broadlawn Terr. Vineland	691-0197	Transporting Petroleum Products
Reginak Trucking Company	John Reginak	10	P.O. Box 181 Orange Street Millville	825-0794	Trucking
Tischler Motor Freight	Samuel Tischler	4	Morton Avenue Rosenhayn	451-1172	Trucking

Table 2

Petroleum Sales, Distribution and Service, in Cumberland County

Firm	President	Employees	Address	Phone	Product
Agway, Inc.	Harold Huster	7	851 N. Pearl St. Bridgeton	455-1373	Wholesale and Retail Petroleum Products
Bailey Fuel Company	Ogden Bailey	2	Box 108 Millville	825-1225	Retail Fuel Oil
Boetsma, Peter, Inc.	Frank B. Mayhew	6	416 Howard St. Millville	825-0349	Distributor of Petroleum Products
Burris, Al, Inc.	Al Burris	3	571 N. East Ave. Vineland	692-4830	Fuel Oil and Oil Burner Service
Cavagnaro, Walter, Inc.	Harry J. Hearing	2	479 Magnolia Rd. Vineland	692-9125	Petroleum Products
Cheli Oil Co.	David Cheli	8	7th & Park Vineland	692-3755	Fuel Oil, Heating and Air Conditioning
Dan-D-Oil Co., Inc.	John Grusemeyer	10	Belmont & Water St. Bridgeton	455-1406	Petroleum Products
Enterprise Fuel Co.	Paul T. Hinson	3	2042 Wheaton Ave. Millville	825-1230	Retail Fuel Oil, Heater and Air Conditioner Installations
Fiocchi Bros. Oil	Edo Fiocchi	7	Chestnut & Blvd. Vineland	691-4075	Fuel Oil
Laury Heating Co.	G. B. Laury	17	511 Plum St. Vineland	692-3861	Fuel Oil, Heating and Air Conditioning
Marcacci Fuel Service	Peter Marcacci	3	1065 Hendee Rd. Vineland	692-8038	Fuel Oil, Gasoline and Motor Oil
Martin & Fallows Oil Co.	Lewis Martin	3	South Delsea Drive Port Elizabeth	825-1109	Distributor of Fuel & Heating Oil
Miles Petroleum, Inc.	Miles Lerman	14	Weymouth Road Vineland	691-7600	Distributor of Petroleum Products
Modern Heating Co.	John Pace	3	2 Centerton Rd. Bridgeton	451-1811	Fuel Oil, Heating

Firm	President	Employees	Address	Phone	Product
Moore Fuel, Inc.	Wm. Moore III	30	525 N. High St. Millville	825-1145	Retail Fuel Oil
Moore's Fuel Service	Judson Moore	3	76 W. Main St. Port Norris	785-0620	Fuel Oil
Osborn's, Inc.	Herbert D. Osborn	7	100 Mary Elmer Dr. Bridgeton	455-1985	Fuel Oil, Heating
Pedroni, G. M., Oil Co.	Daniel Pedroni	10	Wheat Road Vineland	691-4855	Fuel Oil and Gasoline Distribution
Petrunis, A.J., Inc.	A. J. Petrunis	16	173 Water St. Bridgeton	451-7558	Fuel Oil, Plumbing, Heating and Air Conditioning
Premier Oil Co.	Frank H. Neal, Jr.	3	1600 Wheaton Ave. Millville	825-0325	Retail Fuel Oil
Quality Petroleum Products Co.	Kenneth Wilson	7	331 S. Fifth St. Millville	825-0547	Wholesale Auto Supplies and Distributor of Petroleum
Raffo Oil Co., Inc.	Wilbert Pagliughi	7	561 Broadlawn Terr. Vineland	691-0197	Retail & Wholesale Fuel Oil
Reed & Loper, Inc.	Lawrence G. Loper	3	1804 Fairton Rd. Millville	825-0039	Retail Fuel Oil
Riggins, L. S., Oil Co.	L. S. Riggins	40	3938 S. Main Rd. Vineland	825-7600	Petroleum Distributor
Rossi, George A., Oil, Inc.	George A. Rossi	13	511 Paul Street Vineland	692-7856	Distributor of Petroleum Products
Susdelli Oil Co.	Felix Sasdelli	12	531 Peach Street Vineland	692-3838	Petroleum Products
Standard Fuel Co.	Frank Angelucci	10	419 Chestnut Ave. Vineland	691-0991	Fuel Oil, Gasoline
Townsend Oil Co., Inc.	Joseph X. Young	4	Barrett Run Road Bridgeton	455-0333	Fuel Oil

Troxell Oil Co.	Albert J. Troxell	6	1051 Hendee Rd. Vineland	691-4752	Distributor of Motor Oil
Tyrol Distributors	Roy Shive	10	517 S.E. Blvd Vineland	691-3740	Wholesale Oil & Air Conditioning Parts Supplies
Veale, Harry L., Fuel Co.	Harry L. Veale	2	193 Centerton Rd. Bridgeton	451-1149	Fuel Oil
Whitaker, R. B., & Son	John S. Whitaker, Sr.	12	High & McNeal St. Millville	825-5353	Fuel Oil, Ice, Cold Storage
Vineland Oil Co.	Joseph Pipitone	3	321 N.E. Blvd. Vineland	691-8630	Retail Fuel Sales
Woodruff Oil Co.	Anna S. Woodruff	60	73 Water Street Bridgeton	455-1111	Coal and Oil, Heating, Air Conditioning

Table 3. Machinery, Machine Parts & Metal Working Equipment Manufacturing in Cumberland County

Firm	President	Employees	Address	Phone	Product
user Machine rks	P. Hauser	1	3004 S. Main Rd. Vineland	696-2077	Manufacturing of Machine Parts & General Machine Work
.E. Imperial Corp. nducter Fitting Div.	Frank Walder	100	Orange St. & Eden Rd. Millville	825-0233	Electrical Components
ıtional Cash gister Co.	Tom Barkovic	5	3030 Atlantic Ave. Bridgeton	451-2420	Manufacture of Business Equipment, Sales & Service
orth American esel, Inc.	E. Yost	6	Delsea Drive Vineland	692-8600	Diesel Engine Repairs & Parts
Vay Tooling ompany	Robert Shropshire	17	P.O. Box 236 Elmer Road Vineland	692-2218	Custom Built Machines & Machine Repair
enz Manufacturing o.	John Wenz	12	N. Delsea Drive Millville	825-0899	Manufacture of Precision Metal Parts
heaton Industries General Machinery vision)	Michael Zee	114	No. Tenth St. Millville	825-1400	Automatic Equipment
ıyber Industries, c.	Raymond Longbottom	2	2231 N.E. Blvd. Vineland	691-9745	Machine Shop
illville Tool & achine Co.	Carl G. Schreib	10	S. Delsea Drive Millville	825-4613	General Machine Shop
.P. Machine Shop	Steve Howath	3	415 Oxford St. Vineland	692-1192	Machine Shop

Table 4. Concrete Industries in Cumberland County

Firm	President	Employees	Address	Phone	Product
Burris, Thomas A., Inc.	Thomas Burris	9	2809 S.E. Blvd. Vineland	691-3689	Concrete Installation & Contracting
Capitol Concrete & Supply Co., Inc.	Albino Vendrasco	20	Sherman Avenue Vineland	691-2221	Ready Mix Concrete
Cummines, R.E. Concrete Products	R. E. Cummines	2	67 W. Chestnut Ave. Vineland	691-4040	Concrete Products
Formigli Corporation	Robert Stoelker	35	P.O. Box 2104 Delsea Drive Vineland	825-7792	Pre-Stress Concrete Products
Henry, E.P. Company	Jems C. Henry, Jr.	32	4200 S.W. Blvd. Vineland	825-6200	Manufacture concrete Products
Kennedy Concrete, Inc.	Ruth Fitzpatrick	9	1969 S.E. Ave. Vineland	692-8650	Ready Mix Concrete
Millville Ready Transit Mix Concrete Co., Inc.	Russell Romano	50	North Second St. Millville	825-2995	Ready Mix Concrete
Vineland Transit Mix Co., Inc.	Frank Romano	100	1305 N. Main Rd. Vineland	696-2900	Ready Mix Concrete
Burcham's Block Co.	Russell M. Burcham	1	So. Delsea Drive Millville	825-1647	Concrete Blocks

Table 5. Utilities and Related Supplies (Plumbing, Heating & Electrical Contracting) in Cumberland County

Firm	President	Employees	Address	Phone	Product
Ace Plumbing Supplies	Larry Bu nan	5	601 S. Delsea Dr. Vineland	692-9374	Plumbing, Heating, Electrical & Auto Supplies
Atlantic City Electric Co.	Charles Robbins	23	14 N. Pearl St. Bridgeton	451-6000	Public Utility - Electric
Chammings Electric, Inc.	Paul Chammings	43	514 Cherry St. Vineland	691-0653	Electrical Maintenance
Curtis Electrical Contractors	Peter Curtis	3	421 Elmer St. Vineland	692-7847	Electrical Contractors
Del Collo, Lou Jr., Inc.	Lou Del Collo	2	N. Burlington Rd. R.D.#7 Bridgeton	455-1352	Electrical Contracting
Economy Electric Co.	Eldridge Lore	5	29 Lincoln St. Bridgeton	451-2348	Electrical Contracting
Flanagan Bros., Inc.	Gilbert Flanagan	12	Silver Run Rd. Millville	825-2969	Electrical Contractor
Jones Electrical Supply Co.	George Herr	11	212 Maurice St. Millville	825-2215	Wholesale Distributor Electrical Supplies
Kay Ele ctrical Supply Co.	Alan Handman	6	2644 N.W. Blvd. Vineland	692-2020	Electrical S upplies
Scalfo Electric, Inc.	Henry P. Scalfo	17	402 E. Wheat Rd. Vineland,	692-5196	Electrical Contractor
Scarpa Electric Company	Anthony P. Scarpa	35	158 E. Garden Rd. Vineland	692-9280	Electrical Contractor
Snell, William E., Inc.	Edward Ferrarie	55	2nd & Elmer St. Vineland	691-2288	Electrical Construction
Deltronics Corp.	Frank A. Hignutt	8	Box 446 Millville	825-8200	Pump Repair
Sperling, Russ, Electrical Contractor	Russ Sperling	20	1940 S.W. Blvd. Vineland	692-9362	Electrical Contractor
Vineland Electric Supply	Arthur E. Balsamo	2	East & Chestnut Ave. Vineland	691-1267	Wholesale Electrical Supplies

Table 6. Pipeline and pipework in Cumberland County

Firm	President	Employees	Address	Phone	Product
Big Bee Construction Co.	William F. Nocco	15	520 Chestnut Ave. Vineland	691-8969	Excavation Demolition Pipework
Gentile Brothers	Fred Gentile	16	855 N. Pearl St. Bridgeton	451-2994	Construction, Pipework
Castellini R. T. Company	Theodore Castellini	21	805 Sheridan Ave. Vineland	692-6442	Pipeline Contractors
Jersey-Tyler Foundry Co. *	O. B. Gladish	150	P.O. Box 537 Rosenhayn Ave. Bridgeton	451-0840	Manufacture of soil pipe

* 1977 closed

Table 7. Electronic Industries in Cumberland County

Firm	President	Employees	Address	Phone	Product
Andrews Glass Co.	Robert Conaty	110	3740 N.W. Blvd. Vineland	692-4816	Glass Manufacturing Electronics
Evey Engineering Co., Inc.	Gaylord H. Evey	5	714 S.W. Blvd. Vineland	692-2610	Electronic Manufacturing Equipment
Midstate Radio Supply Co. *	Anthony Bianca	3	653 N. Pearl St. Bridgeton	455-2665	Wholesale Distributors of Radio and Electronic Parts
Electronic Inspection Machines, Inc.	Robert F. Dunn	14	P.O. Box 849 1001 S. Delsea Dr. Vineland	327-0650	Automatic Gauging Equipment Conveyors
Gamma Industries	Harry Richardson	6	1 Gamma Drive Port Norris	785-1050	Industrial Nucleonics, Radio Isotopes

* 1977 closed

Table 8. Ship & Boat Repair and Boat Building in Cumberland County in 1975

Firm	President	Employees	Address	Phone	Product
Dorchester Industries, Inc.	Robert L. Morgan	50	Front Street Dorchester	785-1242	Building and repairing boats.
Flanigan Bros.	Ralph Flanigan	3	Main Street Fairton	451-1459	Building and repairing boats.
Newporter Shipyard[1]	Van Loan Whitehead	20	P.O. Box 281 River Road Leesburg	785-2120	Boat building and repair.
Silverton Marine Corporation	John Luhrs	55	South Race Street Millville	825-4117	Pleasure boats.

[1] Newporter Shipyard is now for sale. There is no current activity.

Table 9. Supplies and Services to Industries in Cumberland County

Firm	President	Employees	Address	Phone	Product
Hankins, H. H. & Bros.	F. M. Hankins	22	12 W. Broad St. Bridgeton	451-1212	Lumber, Hardware Building Supplies
industrial Supplies, Inc.	James L. Smith	15	128 Buck Street Millville	825-1234	Supplies and Service to Industries
Lowenstern Supply Corp.	Leon Lowenstern	30	742 N. Delsea Dr. Vineland	692-8589	Plumbing Supplies Mechanical Contracting
National Bearings, Inc.	Warren Hoff	8	215 Buck Street Millville	825-1550	Industrial Supplies
Schaefer Fire Fighting Equipment	James F. Schaefer	4	543 N. Laurel St. Bridgeton	451-2962	Fire Fighting Supplies and Equipment

Table 10. Machinery, Sale and Repair, in Cumberland County

Firm	President	Employees	Address	Phone	Product
San-Temp, Inc.	G. Thomas Ambrose	10	211 Elmer Rd. Vineland	692-2420	Mechanical Contractors
Trout's Power Equipment, Inc.	Herbert F. Trout	3	51 S. Pearl St. Bridgeton	451-3535	Industrial Maintenance and Garden Supplies
Monroe, Div. of Litton Industries	Robert Ponisi	5	1522 N. Delsea Dr. Vineland	692-0121	Business Machines
Davis, H.M. & Sons, Inc.	Robert Davis	16	Rts. #49 & #3 Bridgeton	451-6464	Electric Motors Sales and service.

Table 11. Automotive Parts, Sale and Repair, in Cumberland County

Firm	President	Employees	Address	Phone	Product
Pagano Bros., Inc.*	John Pagano	3	525 N. Pearl St. Bridgeton	455-0482	Automotive Parts
Tichenor Motor Parts Co.	Richard N. Tichenor	14	231 Wood St. Vineland	692-3545	Wholesale Distributor Automotive Equipment
Tichenor Distributing Co., Inc.	Norwood Tichenor	11	225 Wood Street Vineland	692-3545	Wholesale Distributor Automotive Equipment

* 1977 closed

Table 12. Welders & Related Iron Work in Cumberland County

Firm	President	Employees	Address	Phone	Product
Barber Rudy, Welding	Rudy Barber	1	South Avenue Bridgeton	455-0665	Welding
Bebe Alen L.	Alen Beebe	1	2 Franklin St., Cedarville	447-4510	Mobile Welding
Boulevard Iron Works	Louis Fregona	3	787 E. Blvd. Vineland	696-2141	Welding & Iron Works
Bridgeton Welding & Spring Works	James Trout	2	Bridgeton Ave. Bridgeton	451-0606	Welding, Fabrication Auto & track spring service
City Iron Works	Rinaldo Francesconi	4	1706 N.W. Blvd. Vineland	691-2032	Welding General Iron Work
Schiapelli Welding & Machine Co.	Victor Schiapelli	2	620 Almond St. Vineland	691-1871	Welding & Machine Work
Spina's Welding & Iron Works	Camillo V. Spina	1	1532 E. Grant Ave., Vineland	692-8826	Welding Machine & Iron Work
W.W. Manufacturing Inc.	Walt Lescher	2	60 Rosenhayn Ave., Bridgeton	451-5700	Welding, Steel Fabrication Repair Work
Vineland Welding Equipment Co.	Arthur Lange	1	P.O. Box 445, Malaga	696-0154	Welding Supplies & Equipment
L.C. Oxygen Supply, Inc.	Dave Rosenberger	2	1813 S. Delsea Drive, Vineland	692-7734	Industrial Welding Equipment

Table 13. Well Drilling in Cumberland County

Firm	President	Employees	Address	Phone	Product
D'Agostino Well Drilling Co.	Russell D'Agostino	10	R.D. #6 Bridgeton	451-4922	Water Well Drilling Pump and Tank

APPENDIX 8

Meeting - "Maintenance Dredging Project of Maurice River"
with representative from U.S. Army Corps of Engineers.

October 6, 1977

Name	Who you represent
Edward H. Salmon	Cumberland County Freeholder
William A. Snyder	" " Eco. Devel. Comm
JOHN MEEHAN	U.S. ARMY CORPS OF ENGRS
FRANK VINCI	
BARRY LEATHERMAN	
T. BRUCE HEWLCIN	
Meade Sanders	for Assemblyman Hurley
B.B. Carpenter	Bridgeton Evening News
George Gaskill	Port Norris
Eric Critchlow	NJDEP
Carl Johnson	Millville Daily
Candy Saniecch	Freelance writer
L.C. Huber Engr.	Shell Fisheries
A.M. Allmgarard	
Barbara Ackley	Cumberland County Planning Bd.
John Holland	"
Czeslaw Zimolzak	" " " "
Robert Hamlin	Cumberland County Economic Dev. Comm
Henry Hill	Central Labor Union
Cliff Passignano	EPA
CHUCK FISHER	CC FREEHOLDER
Edward Lippincott	Clerk to Board of Freeholders
Richard C. Peek	Mayor - Millville
MICHAEL LASCARIDES	DIR. MILLVILLE INDUSTRIAL COMM.

FRANK H W HEATON J.R.	Dorchester Industries Dorchester
Dennis M. Gorski	aide to US Rep. Wm. Hughes
Carl G. Platt	Contractor
Ezra S Cox Jr	M.R.T. Committeeman
Joanne K King	King Oyster Farms Port Norris
George McConnell	George O McConnell Co. (oyster [illegible])
George [illegible] McConnell	General [illegible]
James P. MacLean	[illegible] Bros: Oyster Grower
[illegible] Anderson	Shell Fisheries Council
Samuel Peterson Sr.	Capt Petersons Oysters
Geo Jenkins	[illegible]
[illegible]	

Port Norris, Oct. 6, 1977.

APPENDIX 9

Permitted and Prohibited Uses Potentially Related to Oil and Gas Development by Municipalities

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas : Permitted or Prohibited in the City of Bridgeton

Types of OCS Facilities		Types of Industries	
Permitted	Prohibited	Permitted	Prohibited
A. Industrial District 1. Administrative offices, 2. Storage yards for equipment, warehousing, and 3. Tank farm underground only. B. All Zones except Open Development District on the Flood Plain 1. Pipelines (along existing right of ways).	A. Open Development Districts on the Flood Plain 1. Pipeline[1]	A. Industrial District 1. Manufacturing machinery or parts, 2. Machinery rebuilding servicing and repair and 3. Electronics.	A. All Zones 1. Petrochemical industry.

1. It is clearly stated that pipelines for the transmission of petroleum products are prohibited in Open Development Districts on the Flood plain only.

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas: Permitted or Prohibited in the Township of Commercial

Types of OCS Facilities

Permitted

A. Industry
General District

1. Storage, warehousing,
2. Gas processing plant,
3. Tank farm and
4. Refineries.

Prohibited

A. All Zones

1. Common or or contract carriers; pipelines.

Types of Industries

Permitted

A. Industry
General District

1. Manufacturing machinery or parts,
2. Machinery rebuilding and servicing, repair shop and
3. Sand and clay or gravel mining.

B. Residence
Agriculture

1. Sand and clay or gravel mining.

Prohibited

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas:
Permitted or Prohibited in the Township of Deerfield

Types of OCS Facilities

Permitted

A. General Industry District

1. Tank Farm.

B. Planned Commercial-Industrial District

1. Truck terminal,
2. Storage and distribution facilities and
3. Contractors offices and storage facilities; administrative and business offices.

C. All Zones

Pipelines (along existing right of ways).

Prohibited

Types of Industries

Permitted

A. General Industry District

1. Manufacturing machinery or parts and
2. Concrete plant.

B. Planned Commercial Industrial District (PCI)

1. Fabrication of metal products,
2. Manufacturing machinery or parts (light machinery)
3. Machinery rebuilding and servicing repair shop and
4. Electronics.

Prohibited

A. All Zones

1. Petrochemical industry.

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas Permitted or Prohibited in the Township of Downe[1]

Types of OCS Facilities		Types of Industries	
Permitted	Prohibited	Permitted	Prohibited
A. R-1, R-2, R-3, and B-1 Zones[2] 1. Administrative business offices, 2. Truck Terminal facilities and 3. Warehousing and storage.		A. R-1, R-2, R-3 and B-1 Zones 1. Manufacturing of light machinery 2. Manufacturing of machine equipment and 3. Fabrication of metal products.	
B. All Zones 1. Pipelines (Along existing right of ways).		B. R-2 Resort Residence Zone 1. Manufacturing and repair of boats and marine equipment	

1. Downe Township does not have industrial zone.

2. R-1 Rural Residence
   R-2 Resort Residence
   R-3 Residence Zone
   B-1 Highway Business Zone

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas
Permitted or Prohibited in the Township of Fairfield

Types of OCS Facilities

Permitted

A. General Industry District

1. Warehouse storage and distribution facilities,
2. Contractors offices and storage facilities; administrative and business offices,
3. Truck terminals,
4. Tank farms and
5. Pipe coating yard.

B. All Zones
Pipelines (along existing right of ways).

Prohibited

A. All Zones

1. Any use not specifically permitted is prohibited.

Types of Industries

Permitted

A. General Industry District(1) and PBI

1. Fabrication of of metal products,
2. Manufacturing light machinery or parts,
3. Machinery rebuilding and servicing
4. Electronics and
5. Manufacture of concrete products.

Prohibited

A. All Zones

1. Manufacture of heavy chemicals and
2. Manufacture of semi-finished chemicals explosives, combustible gases.

1. Planned Business (Industrial)

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas Permitted or Prohibited in the Township of Hopewell

Types of OCS Facilities

Permitted

A. Agriculture Industry

1. Contractors office and storage facilities
2. Truck terminals
3. Pipecoating yard and
4. Tank farm (underground only).

B. All Zones

1. Pipelines (along existing right of ways).

Prohibited

A. All Zones

1. Gas processing plant (gas manufacturing).

Types of Industries

Permitted

A. Agriculture Industry District

1. Machinery construction or service,
2. Metal products fabrication,
3. Manufacture light machinery or parts,
4. Concrete mixing or batching plant or concrete manufacture and
5. Electronics.

Prohibited

A. All Zones

1. Chemical manufacture and
2. Cement manufacture.

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas Permitted or Prohibited in the Township of Greenwich

Types of OCS Facilities

Permitted

A. General Industry

1. Warehousing and storage yards and
2. Tank farm underground only

Prohibited

A. All Zones

1. Tank farm above ground (bulk storage more than 5,000 gallons)
2. Gas processing plant,
3. Refineries and
4. Pipelines.

Types of Industries

Permitted

A. General Industry

1. Marina; boat building storage and repair.

Prohibited

A. All Zones

1. Petrochemical industry.

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas Permitted or Prohibited in the Township of Lawrence

Types of OCS Facilities

Permitted

A. Industrial (I) District

1. Warehousing and storage
2. Tank storage farm, underground only,
3. Pipecoating yard and
4. Refineries.

B. All Zones

1. Pipelines (along existing rights of ways).

Types of Industries

Permitted

A. Industrial (I) District

1. Manufacturing of metal products and machinery,
2. Repair and servicing of related industries,
3. The assembly of completely fabricated parts and
4. Boat building and repair.

B. All Zones

1. Excavation of sand, gravel and other natural mineral deposits.

Prohibited

A. Industrial (I) District

1. Foundry work and basic manufacture of metals work.

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas Permitted or Prohibited in the Township of Maurice River[1]

Types of OCS Facilities

Permitted

A. Industry Zone (M-1)

1. Warehousing and storage facilities.

B. All Zones

1. Pipelines (along existing right of ways).

Prohibited

Types of Industries

Permitted

A. Industry Zone (M-1)

1. Manufacturing of light machinery (carburetors, pumps and small machine parts).

B. Resource Development Restoration Zone District (M-2)

1. Extraction of sand, gravel, rock, earth minerals and clay, and
2. Storage, stockpiling and distribution (shipment by rail or truck).

Prohibited

1. New ordinance are currently being prepared.

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas: Permitted or Prohibited in the City of Millville

Types of OCS Facilities

Permitted

A. Waterfront Industry

1. Industries requiring large amounts of water for cooling (water-oriented and related industries).
2. Office and warehousing

B. General Industry

1. Warehousing and storehouses, storage yards
2. Offices and
3. Tank farm underground only.

C. Air Park Industry

1. Air transportation facilities and
2. Warehousing and storage facilities.

D. All Zones

1. Pipelines (along existing right of ways).

Prohibited

A. All Zones

1. Refineries

Types of Industries

Permitted

A. Research Industry

1. Manufacturing machinery parts and
2. Electronic instruments and devices.

B. General Industry and Air Park Industry Districts

1. Electronic instruments and devices,
2. Machinery rebuilding, servicing and repair and
3. Sand, clay or gravel mining.

C. Water Front Industry

1. Boat and marine engine builders.

Prohibited

A. All Zones

1. Chemical plant manufacturing. (petro-chemical industry)

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas: Permitted or Prohibited in the Borough of Shiloh

Types of OCS Facilities

Permitted	Prohibited
A. Industrial Zone 1. Offices and storage facilities and 2. Tank farm	A. All Zones 1. Refinery (or other processing establishment).
B. All Zones Pipelines (along existing right of way).	

Types of Industries

Permitted	Prohibited
A. Industrial Zone 1. Manufacturing machinery or parts, 2. Machinery rebuilding and servicing, repair shop and 3. Electronics.	A. All Zones 1. Chemical plant manufacturing and 2. Cement manufacturing.

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas Permitted or Prohibited in the Township of Stow Creek

Types of OCS Facilities

Permitted	Prohibited
A. Industrial Zone 1. Warehousing and storage facilities, 2. Pipe coating yard, 3. Tank farm and 4. Refineries.	
B. All Zones Pipelines (along existing right of ways).	

Types of Industries

Permitted	Prohibited
A. Industrial Zone 1. Preparation and fabrication of metal and metal products, 2. Preparation and fabrication of chemicals and chemical products, 3. Blacksmith shops, metal working, or machine and welding shops and 4. Repair and maintenance yards.	A. All Zones 1. Chemical plants

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas
Permitted or Prohibited in the Township of Upper Deerfield

Types of OCS Facilities

Permitted

A. General Industry (G-I) District

1. Warehousing and and storage facilities,
2. Tank farm underground only and
3. Pipe coating yard

B. All Zones

Pipelines (along existing right of ways).

Prohibited

A. General Industry (G-I) District

1. Refineries

Types of Industries

Permitted

A. General Industry (G-I) District

1. Machinery repair shops and
2. Construction machinery and service.

Prohibited

A. All Zones

1. Petrochemical industry and
2. Cement manufacturing.

Types of Uses Potentially Related to Offshore Drilling for Oil and Gas Permitted or Prohibited in the City of Vineland

Types of OCS Facilities

Permitted

A. Industrial Park Districts

1. Administrative and business offices and
2. Tank storage farm underground only.

B. General Industrial Zone Districts

1. Administrative and business offices,
2. The warehousing and storage facilities,
3. Truck Terminal facilities and
4. Tank farm - storage facility (underground only).

C. All Zones

Pipelines (along existing right of ways).

Prohibited

A. All Zones

1. Refineries
2. Tank storage

Types of Industries

Permitted

A. Industrial Park Districts

1. Electronics products manufacturing
2. Fabrication of metal products and
3. Manufacturing of light machinery (carburetors pumps and small machine parts).

B. General Industrial and Commercial Industrial Districts

1. Manufacturing of light machinery
2. General industrial machine equipment manufacturing and rebuilding and
3. Manufacturing of dry concrete mixes or other such products and
4. Earthmoving equipment sales and service.

Prohibited

A. All Zones

1. Chemical plant manufacturing and
2. Cement manufacture