OCS STUDY
MMS 86-0015

INDICATORS OF THE DIRECT ECONOMIC IMPACTS DUE TO OIL AND GAS DEVELOPMENT IN THE GULF OF MEXICO

--NARRATIVE/VOLUME I--

-RESULTS OF YEAR I-

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REPORT AVAILABILITY

Preparation of this report was conducted under Contract between the Minerals Management Service and Centaur Associates, Inc. Extra copies of the report may be obtained from the Public Information Section (Mail Stop OPS-3-4) at the following address:

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PREFACE

This document presents the results of and analysis of the direct economic impacts of oil and gas exploration, development and production in the Gulf of Mexico. The information presented in this volume include the direct primary effect and secondary direct effects exclusively for offshore oil and gas activities.
Virtually all data presented in this document is based on an analysis of the personnel and financial records of nine of the major offshore producers.

This document was prepared under contract by Centaur Associates, Inc. Michael L. Frankel and Garry L. Brown were responsible for its overall development. Michelle Barnes and Scott Carlin also assisted in its preparation.

Peat, Marwick Mitchell & Co. served as subcontractor throughout the project and had primary responsibility for the data processing of the personnel records. The major contributors at our subcontractor were Roger Figura and William Woodford.

The gratitude of the project team is extended to each of the member companies represented on the Offshore Operators Committee, Socioeconomic Subcommittee. The nine offshore producers represented on the Socioeconomic Subcommittee were:

- AMOCO
- CHEVRON
- CONOCO
- EXXON
- GULF
- MOBIL
- ODECO
- SHELL
- TEXACO

The staff from each of these firms provided invaluable guidance in the development of a viable methodology. All firms represented on the Socioeconomic Subcommittee subsequently contributed extensive amounts of data at a significant cost to their respective firms. Without the guidance and assistance of each of these firms this project could not have been undertaken.

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1.0 INTRODUCTION, RESEARCH METHODOLOGY AND DESCRIPTION OF RESEARCH

This study was designed by the Minerals Management Service, the Offshore Operators Committee, and Centaur Associates to document the direct economic impacts of Gulf of Mexico offshore oil and gas activity in 1984 and estimate impacts per unit of activity for use in the environmental impact assessment process. It is a major step toward the collection of the economic information necessary to address many of the socioeconomic questions relating to oil and gas development in the Gulf of Mexico. The study objective was to estimate the direct primary and secondary direct effects of Federal oil and gas leasing in offshore areas. These effects are the employment, wages, and salaries immediately associated with the offshore producers. The secondary direct impacts are the expenditures resulting from contract, service, and other purchases made by offshore oil and gas exploration and production companies.

1.1 Relationship of Study to Minerals Management Service Mission

The Gulf of Mexico is the most developed Outer Continental Shelf (OCS) oil and gas region in the world. Since the first Outer Continental Shelf lease sale in 1954 there has been a responsibility charged to the Federal government of ensuring that the development of the OCS oil and gas resources is timely and orderly and does not result in excessive impacts to the human in natural coastal environment.

The Minerals Management Service (MMS), by virtue of the Outer Continental Shelf Lands Act, the Submerged Lands Act, and subsequent amendments, is required to provide information needed for prediction, assessment, and management of impacts on the human, marine, and coastal environments of the Outer Continental Shelf and near shore areas which may be affected by OCS oil and Gas activities.

As a result of these responsibilities, the OCS Environmental Studies Program was initiated in 1973. The Studies Program in the Gulf of Mexico Region is designed to provide information for both management decisions and the monitoring of the impacts. The Studies Program has three overall goals:

- To provide the information needed for assessing and managing the environmental impacts on human and coastal environments.
- To predict impacts on the marine environment resulting from low level activity, pollution and catastrophic spills.
- To monitor human, marine, and coastal environments in order to provide data and information for identification of significant changes in the quality and productivity of these environments, detection of change trends and identification of the causes of these changes.

The socioeconomic component of the Studies Program is directly required to meet the first program goal. Some of the socioeconomic questions that are being addressed in the Gulf of Mexico under the MMS Studies Program are:

(1) How many people are employed directly and indirectly as a result of the OCS oil and gas program? What are the employment classifications, their specific activities, and the residence locations of the labor force?

(2) What is the scope, magnitude, and location of socioeconomic activities and facilities associated with and affected by the OCS oil and gas program?

(3) To what extent have OCS oil and gas leases and developments affected specific socioeconomic characteristics, such as demography, employment, income, revenue, social services, and land use?

(4) What data bases and indicators are available that could be used to evaluate the socioeconomic effects of OCS oil and gas leasing and development?

(5) How does the changing status of oil and gas leasing, exploration, development, and production on the OCS affect socioeconomic activities, patterns, and trends?

(6) What onshore, offshore, and transportation facilities are used for offshore oil and gas exploration, development and production?

(7) What are the basic social, cultural, and economic conditions in the coastal area of the Gulf of Mexico that are affected by the OCS leasing program?

(8) What are the significant socioeconomic resource use conflicts within the OCS and coastal zone and how can they be resolved?

This study represents a major step toward the collection of the economic information necessary to address many of these questions. Specifically, this study is designed to provide information and data which directly addresses the program objectives one through five.

To assess the socioeconomic impacts of oil and gas development requires the estimation of the various economic impacts. The total economic impact in turn drives socioeconomic measures such as population and associated demographic impacts. The total economic impact has five components. Relative to this study, these are:

- The direct effect is traditionally considered the initial demand for the product. In this case, it is the actual purchase of oil and gas from the offshore producers in the Gulf of Mexico.

- The direct primary effect is the employment, wages and salaries associated with positions with the offshore oil and gas producers and processors. In short, these effects are the wages and salaries received by the employees of the oil and gas producers associated with their activities in the Gulf of Mexico region. The primary producers are the actual lease holders or operators which explore, develop, produce and subsequently process oil and gas.

- The secondary direct effect results from the purchase of inputs by the primary producers from the various businesses which supply them. For example, the purchase of an offshore platform or the purchase of crew boat transportation services represent a secondary direct effect.

- Indirect effects are the activities which result from the purchase of goods and services by the direct suppliers of the offshore producers. These indirect impacts extend throughout the economy as each supplier makes purchases from other suppliers.

- Induced effects result from the purchases of goods and services resulting from the wages paid by the primary, direct, and indirectly affected businesses. Induced household purchases have a component which reflects the additional indirect and induced effects of expenditures by households. This is known as the multiplier effect.

Only those activities designated above by shading are included within the scope of this study (specifically they are the primary direct and secondary direct effects). Exhibit 1-1 depicts these various impacts and shows the relationship between each. This exhibit designates those economic activities which are included in Phase I of this study. Throughout the remainder of this document the primary direct effects are referenced as "producer" impacts. All data referenced as producer employment or payroll thus refers to the primary direct effects. Secondary direct impacts are referenced as such and include only information relating to initial expenditures by the offshore producers. The wages and salaries associated with the transportation and processing of oil and gas are also included in the secondary direct effects.

The initial direct effect (demand for oil and gas) is not documented in this report. For socioeconomic impact analysis initial demand is an initial assumption and serves as a policy input. This report and socioeconomic assessments treat demand for oil and gas as a given. Indirect and induced impacts are not included in this document. A separate undertaking using a different methodology is required to determine the indirect and induced impacts. Exhibit 1-1 specifically

identifies those economic activities covered by this research effort and the impacts which are to be included in Phase II of the study. The indirect and induced economic activity excluded from this report are to be the focus of an independent modeling effort being undertaken for the Minerals Management Service.

1.2 Study Objectives

The study objective was to document the primary and direct economic impacts of offshore oil and gas activity in 1984 for the Gulf of Mexico. This study was also intended to determine impacts per unit of activity, for use in the environmental impact assessment process. To meet this objective, the study goals were:

- Measure the primary direct economic impact of offshore oil and gas exploration, development and production in 1984. Direct impact measurements include both wages and employment.

- Determine the geographic distribution of primary direct impacts of offshore oil and gas activity. Geographic distribution of the primary or producer impacts are to be determined at the county/parish level for locations in the coastal areas of the Gulf of Mexico.

- Document the relationship between place of work and place of residence for personnel employed by offshore producers.

- Measure the direct secondary economic impact of contract, service and other purchases made by offshore oil and gas exploration and production companies. These direct impacts are also measured in terms of both wages and employment.

- Develop a framework and set of reference data for estimating the combined direct primary and direct secondary economic impacts per unit of activity.

1.3 Information Sources and Data Types

Virtually none of the information necessary to address these questions was available from published or unpublished secondary sources. This was recognized by the Minerals Management Service in the early planning stages of the project and avenues were explored for the collection of this information directly from the firms involved in offshore oil and gas activities. The volume, confidential nature, and level of detail required in the socioeconomic information indicated that a major commitment from the companies in the industry would be required.

The Offshore Operators Committee (OOC) was identified as the best conduit

for coordinating the desired collection of data. The Offshore Operators Committee is the primary trade association representing the offshore oil and gas producers in the Gulf of Mexico. Membership in the OOC consists of approximately 50 member producer companies. According to the Offshore Operators Committee their membership represented between 98 and 99 percent of all offshore oil and gas production in the Gulf of Mexico. Major contract and support industries are not directly included in the OOC's membership. Approximately 50 offshore contract and service businesses hold associate memberships with the Offshore Operators Committee.

In mid 1984, the Offshore Operators Committee at the request of Minerals Management Service formed an ad hoc Socioeconomic Subcommittee expressly to supply the required data to Minerals Management Service. The Socioeconomic Subcommittee members were designated by the OOC in consultation with the Minerals Management Service. The Socioeconomic Subcommittee members were selected so that the largest volume of offshore activity throughout the Gulf could be included in the member companies. The nine offshore producers represented on the Socioeconomic Subcommittee were:

- AMOCO
- CHEVRON
- CONOCO
- EXXON
- GULF
- MOBIL
- ODECO
- SHELL
- TEXACO

The staff from each of these firms provided invaluable guidance in the development of a methodology. All firms represented on the Socioeconomic Subcommittee subsequently contributed extensive amounts of data at a significant cost to their respective firms. Without the guidance and assistance of each of these firms this project could not have been undertaken.

In 1985 the Gulf Oil Company, a member of the Socioeconomic Subcommittee, was purchased by Chevron. At the time that the data were collected, Gulf Oil was operating independently of Chevron. Throughout the project Gulf Oil was represented independently of Chevron and separate data were submitted from each firm. Since that time Gulf Oil's operations in the Gulf of Mexico have been integrated with those of Chevron.

The nine producers making up the Socioeconomic Subcommittee were responsible for over 50 percent of offshore energy production in the Gulf of Mexico in 1984. An additional discussion of the proportion of drilling and oil and gas production associated with the Socioeconomic Subcommittee members appears in Section 1.4.

Unless expressly noted, all information presented in this document was derived by manipulations of information supplied by the OOC Socioeconomic Subcommittee. Information from other sources, such as contract and service companies or secondary sources, is specifically highlighted in the text as being from alternative sources.

It should be noted that a parameter of the study methodology was that virtually all data had to be provided exclusively from the nine firms making up the OOC Socioeconomic Subcommittee. As such, many alternative methods of collecting information or a larger scale survey of the industry were specifically precluded under this contract. All information was, therefore, to be provided by the OOC Subcommittee and, to the degree that they were relevant, secondary sources. Many additional approaches to this research were considered but were precluded by the contract. A condition of the project approach was that data collection had to be limited to the nine producers making up the OOC Socioeconomic Subcommittee. Contacts with other offshore producers were specifically precluded under this contract.

Four types of data were assembled as part of this effort. The three data sets provided exclusively by the OOC Socioeconomic Subcommittee member companies follow.

- Producer employment records for 1984. Approximately 12,500 employment records were obtained from the offshore producers in our sample. The data pulled from the personnel files were for all Gulf of Mexico employees of the nine producers participating. The data elements extracted from each employee record were: 1984 wages/salary, job description or classification, residence zip code, work site (onshore or offshore), staging area (if applicable) and work schedule.

- Producer expenditure records for 1984. Detailed expenditure records were provided by each of the offshore producers participating in the study. These data consisted of an itemization of all expenditures for goods and services broken down by nineteen categories of activities (i.e., air transport, geophysical exploration, platform fabrication, etc.).

- Budget Documents for specific projects or activities undertaken in 1984. The activities for which budget data were obtained were: geophysical exploration, exploratory drilling, platform fabrication and installation, development drilling, pipeline installation, and production/operations/ maintenance. Physical characteristics of these activities were also provided so that expenditures could be calibrated with the physical measures used in the environmental impact statement process.

Economic impact ratios for the offshore contract and support industries were developed through discussions with approximately 50 firms supporting the offshore producers in the Gulf of Mexico. Impact ratios derived

include payroll to revenues, employment to revenues, average wages and salary, location of employees (offshore/onshore) and expenditures to revenues.

A copy of the complete formal information request used by the OOC is presented in Appendix A at the end of Volume II. Appendix A consists of the packet of background information provided, steps taken to assure confidentiality of company data and the specifications for the information requested.

1.4 Methodology and Manipulation of Data

Exhibit 1-2 is a schematic representation of how the various data sources were used to determine the primary and secondary direct economic impacts of offshore oil and gas development. Direct producer employment and wages at the county/parish level were generated from manipulations of the personnel records. The county/parish allocations of employment and income were based on the residence zip code of each employee as indicated in their personnel records. Mineral Management Service and State lease production records for 1984 were used to adjust results to account for production from producers not in the OOC subcommittee sample.

Employment resulting from the purchases of goods and services is derived by applying key business ratios for each service industry to total expenditures by the offshore producers.

Physical descriptions of activities were converted to expenditures based on actual detailed project records supplied by the participating companies.

Geographic Applicability of Data

Information presented in all sections of the report apply only to offshore activities in the Gulf of Mexico. All data provided by the offshore producers was exclusively for expenditures and employment associated with offshore activities in the Gulf of Mexico region. Data relating to any onshore oil and gas activities or offshore work in other geographic areas were specifically excluded from the data supplied by producers. In a limited number of cases, personnel shared responsibilities between the study area and other oil and gas operations. In these situations, only that proportion of wages and employment associated with Gulf of Mexico activity were included in the study results. No other manipulations or adjustments were required in the study results to account for activities within the geographic scope of the study. As such, the data presented are believed to be highly reliable with respect to their geographic delineation of offshore activity exclusively in the Gulf of Mexico.

Time frame of Data

All information presented are for calendar year 1984. Virtually all data were directly available from company records for the desired reporting

period. No modifications to the information were required to adjust for inflation or the company fiscal year.

Effect of Corporate Mergers and Industry Structure on Data

During the study period three of the OOC Socioeconomic Subcommittee companies were involved in mergers. This did not affect the study results or analytical approach. In all cases, the combined or modified companies were included in all analyses as they existed in 1984. The integration of the merged companies offshore operations and accounting systems were not completed at the time the data was submitted by the various firms. For example, Gulf Oil was purchased by Chevron in early 1985. However, the necessary accounting and personnel information was available independently for both of the firms as they existed in 1984. Thus firms were treated as separate entities during this analysis.

Many fields are explored and developed under joint venture agreements in which several firms share both the expenses and revenues. Expenses and revenues are shared only through an accounting allocation and individual fields are physically operated by the field operator. All data provided by the producers were exclusively for operations in which they were the field operator. Data for activities in which an operator only had a financial interest were not provided in the data submitted by that producer. Fortunately, production volumes in all Federal and State lease records are carried under the name of the field operator. Thus, all analyses were done using data from the field operator and production levels specified in terms of the field operator.

For example, if company A had a 50 percent interest in a field for which they were the field operator, data were obtained on the total costs of the project and assigned exclusively to that company. Production from that field was also listed in Minerals Management Service and State records exclusively under Company A's name. No double counting occurred since all firms submitting data specifically excluded information for fields in which they were not the operator.

By obtaining all information at the field operator level, the maximum level of detail could be obtained from the company records. This also eliminated the requirement to allocate activity using the complex formulas and arrangements specified in joint venture agreements.

Ability to Differentiate Between Activities in Federal and State Waters

Information on offshore production in both State and Federal waters was also listed independently for the various firms in the drilling and production records systems for 1984. An additional OOC Socioeconomic Subcommittee member purchased an operator active in the Gulf of Mexico which was not participating in the study. Again, in this instance production, personnel and accounting information were available for 1984 which excluded the additional activities of the newly purchased firm.

The data obtained from producers sought to differentiate between activities and expenditures in the Federal OCS and various State waters. None of the nine participating producers were able to track physical activities, internal expenses or contract purchases by operations in Federal and State waters. Further, no internal company data were available on which to allocate wages and salaries or expenditures between Federal and State waters.

All nine OOC firms participating in the study used functional or spacial delineations of their operations which did not differentiate between activities in the Federal OCS and various State leases. For example, onshore personnel were typically assigned to a division such as exploration which made no distinction between exploration in State or Federal waters.

Onshore personnel in staging areas were assigned to support operations in numerous areas which included leases in both Federal and State waters. Offshore personnel working at specific platforms or areas could for the most part, be identified as working specifically in State or Federal waters.

In sum the job site location of employees working offshore were used to differentiate between persons working in the various State waters and the Federal OCS. As such, offshore producer employment and wages and salaries are broken out by Federal and State water activities. Onshore producer employment and producer expenditures with contractors, however, could not be linked to OCS or State operations. All information for these activities, therefore, includes the combined economic impacts for State and Federal waters.

This is not believed to be a significant problem since State waters represent a relatively small proportion of offshore production in the region. As such, total economic impacts may be used as a surrogate for Federal OCS impacts with the understanding that they are slight over estimates. The following is a summary of the percent of offshore production in 1984 broken out by State and Federal waters:

	Percent Located in Federal Waters	Percent Located in State Waters
Gulf Offshore Oil Production:	89.71%	10.29%
Gulf Offshore Gas Production:	94.46%	5.54%
Gulf Offshore Energy Production:	93.07%	6.93%

(energy measured in barrel equivalent units)

Exhibits containing economic activity associated with both the Federal OCS and State waters overestimates impacts in 1984 by an estimated five to ten percent. Discussions with the OOC membership indicate that relatively little exploration or development activity is taking place in Louisiana or Texas State waters. The assumption that State water activities represent between five and ten percent of the employment and payroll effects is reasonable. Detailed information on 1984 offshore production by Federal and State lease area is subsequently presented in Exhibits 1-8 to 1-11. Although production from State waters is significant, it is clearly a very minor portion of offshore activity in the Gulf.

All tables including combined data for the Federal OCS and State waters contain the following note on each page: "Data include economic activity associated with both the Federal OCS and State waters." These estimates may be used for estimating Federal OCS impacts with the understanding that they represent an over estimate of between five and ten percent.

A more detailed discussion of each of the data types used to construct this report follows. Each of the three types of information provided as part of this report are discussed in terms of three aspects: (1) specifications of the raw data, (2) methodology and processing of data, and (3) assumptions necessary for understanding the results.

An additional discussion of the assumptions and how they relate to the reliability of the data are included in Section 5.0, Summary and Limitations of Results.

1.5 Producer Personnel Records

Each of the nine companies represented on the OOC Socioeconomic Subcommittee provided key information taken from each employee's personnel record. Data were provided for all employees associated with offshore oil and gas exploration, development and production in the Gulf of Mexico.

The following information was obtained for approximately 12,500 personnel associated with offshore personnel in the Gulf of Mexico: position or job description, income, employee's home zip code, work location, staging area used, division or group of the company to which the employee is assigned, date of hire, percent of time assigned to offshore activity and percent of time associated with activities within the Gulf of Mexico region.

A discussion of the specific information received from the OOC Subcommittee members and the steps taken to standardize it follow.

1.5.1 Job Description and Company Functional Area in Personnel Records

Over one thousand unique job classifications or personnel description codes were encountered in the approximately 12,500 individual personnel records reviewed. This resulted primarily because each of the various

firms submitting information used different job descriptions in their personnel records system. This large number of unique codes required the development of a standardized system for classifying all jobs. A system was designed to communicate the richness of the data, retain all information relevant to the assessment of socioeconomic impacts and reduce the various job classifications to a number which would make the analysis manageable and relevant. A structured system was developed in which every personnel record was classified in terms of the three following aspects:

- Physical description of work site
  --Corporate headquarters
  --Offshore structures (platforms)
  --Staging area and onshore non-headquarters work sites
  --Non-site specific offshore

- Functional areas
  --Undetermined
  --Administration
  --Safety, training and environmental affairs
  --Structures, engineering and construction
  --Exploration, development and drilling
  --Production, operations and maintenance
  --Vessels and transportation
  --Warehousing and storage

- Skill level
  --Undetermined
  --Unskilled labor
  --Supervisory
  --Skilled labor
  --Clerks/secretaries
  --Skilled technical
  --Professional/managers

All analysis throughout the report is displayed using this classification system. Information using the nonstandardized job descriptions was desired by the Minerals Management Service and is useful in the following respects:

- The unique flavor of the offshore oil industry is better retained in the company job descriptions than in the standardized personnel classification system. For example, once classified, a roustabout becomes an offshore worker in an unskilled position associated with production.

- This information serves to verify the classification system and provides information on exactly what jobs fall into a specific classification code. A brief review of this appendix may help users understand what types of jobs relate to each classification code.

- There may be times when the exact profiles of the various jobs in each segment of the offshore oil industry are relevant to MMS, other researchers or industry officials.

- Such an exhibit may also be used to answer questions dealing with the exact job titles found in each of the reports more general job descriptions. For example, this information indicates that the positions found in the job title "onshore/staging area-transportation- supervisory" were assistant transportation foreman, head aircraft mechanic, aircraft maintenance supervisor, transportation supervisor and transportation foreman.

Exhibit 1-3 presents an example of a typical industry job description for each of the 50 standardized job descriptions used in subsequent sections of this report. For example, this table indicates that a typical industry job title for a manager involved in geophysical exploration is an "exploratory party chief". The precise job descriptions used throughout this report are also summarized in this exhibit. Exhibit 1-4 presents the company job descriptions falling under each staff classification. The number of occurrences and the percent of total employment are also indicated. All company job descriptions are presented exactly how they appeared on the oil company personnel records. It should be noted that these company job descriptions are not formal position titles, such as vice president for operations but rather are a description of each persons position as they are listed on a firm's personnel records.

Data in Exhibit 1-4 are based on 5,666 personnel records out of the total twelve thousand personnel records used for this report. The additional six thousand records are not included in the information presented in this section since they would not provide additional information beyond the level of detail presented in the body of the report. These additional records did not add information to this appendix, and thus were not included, for one of the two following reasons. First, many records had job descriptions virtually identical to the classification system used for this report. Second, some personnel records had job descriptions which were less informative than the classification system used for the report. For example a "warehouse laborer working at a staging area" was classified as staging area/ warehouse/unskilled labor under the system used in this report. Thus many of the initial company job descriptions did not provide additional information and simply would have added to the number and complexity of the job descriptions used in the report.

The division of the firm to which each employee was assigned was also provided for most employees. This information was used to clarify the job description information and classify the position by functional area.

1.5.2 Wages and Salaries As Reported in Personnel Records

Information on income included wages, salaries and bonuses. Paid bonuses and extra pay days were included in all wage information. However, profit sharing, bonuses or income in the form of stock option plans was not included. All payroll data were annualized or summed for calendar year 1984. A limited number of employee records specified income in terms of a range such as $25 to $30 thousand per year. In these cases, the mid-point was used for all analyses presented in this volume.

This information was considered highly sensitive by many of the participating firms. Concerns relating to the publication of salaries of specific individuals and of top management salaries in general were extensive. Accommodations were made in the methodology in which detailed salary information was not required for top management. Specific salary information for upper income ranges was not specified by five of the nine participating companies. These data were specified as "over $100 thousand", in broad increments (i.e., between $90 and $100 thousand), or not provided for these top positions. Records in which salary information was withheld for top management totaled several hundred records. Midpoint salaries were used in all calculations and a salary of $100 thousand was used as the surrogate salary for top management positions in which no salary data were provided. In no situations were records for top management totally withheld by the OOC participants. Rather, they were provided without salary data and the $100 thousand surrogate salary was added.

The fact that profit sharing income and stock option bonuses were not included and that detailed income were not specified for all top management positions requires that caution be used when interpreting the maximum salary information presented for professional positions. Maximum income specified for top management positions often understate the actual maximum salary received. This error is relatively small and applies only to approximately two hundred records and only to salaries in the upper ranges.

Average salaries and total salaries paid may also be slightly underestimated due to the under reporting of upper salary ranges. This underestimate is slight and is on the order of one to two percent of total wages. Income data were for calendar year 1984. These data consist only of wages and salaries and does not include other salary based payments or costs by employers such as benefits, insurance payments, FICA taxes or unemployment compensation.

1.5.3 Employee Residence Information As Reported in Personnel Records

The country/parish of residence was not directly available from the employment records maintained by producers. Employee residence was specified in terms of each employee's home zip code as carried on employer records for tax reporting purposes. Full employee addresses were not provided to protect the confidentiality of producer employment records.

Residence zip codes can not be easily converted to county of residence since approximately one third of zip codes in Gulf of Mexico States were located in two or even three counties/parishes. A Bureau of the Census program was used for determining county/parish of residence from individual zip codes.

This program was based on 1980 census data and included changes in zip code boundaries through 1983. This program converted each zip code to the unique county/parish specified by the Federal Information Processing Standards (known as FIPS county codes) and indicated the percent of the population in that zip code located which was located in that county/parish. Thus, for zip codes with residences in more than one county/parish multiple fractional personnel entries were generated to reflect the probability that an employee living at that zip code resided in that county/parish. All personnel records were run through this conversion file. This resulted in the division of approximately 6,000 records into 12,000 new fractional records representing partial employees. For example, a producer employee with a zip code in which 63 percent of the population was located in Cameron Parish and 37 percent of the population was located in Calcasieu Parish resulted in two fractional records for that employee being generated. All other information in the employee's record remained the same except that the records were modified to represent 37 and 63 percent of one person-year of employment.

1.5.4 Work Location Information as Reported in Personnel Records

Work location was specified on each employee record. For onshore employees this was simply the physical location of their office. There were thirty-three unique onshore work sites and staging areas identified in producer employment records. Many small work sites were collapsed into the predominant location or nearest town. For example, all work sites in the greater New Orleans area were specified simply as "New Orleans" and various individual docks or warehouses in the Morgan City area were all classified as "Morgan City". This was necessary to protect the confidentiality of individual companies and reduce the data to a manageable level.

For personnel working offshore, the work location description field consisted of the offshore location to which they were physically assigned. This was typically identified as an offshore field, specific platform, group of related structures, Minerals Management Service lease block, MMS lease area or offshore company operational unit.

The various offshore platforms or fields required standardization to make subsequent analysis of the data meaningful and to protect the confidentiality of the individual participant firms. The lease areas used for designation of offshore work sites coincide with the standard Minerals Management Service lease area designations such as "Ship Shoal Area" or "South Timbalier Area".

Additional lease areas were designated so that activity in State waters could be captured. Lease areas in State waters were simply designated by the Minerals Management Service lease area name followed by the term "State Waters". Lease areas in State Waters consist of offshore areas directly adjacent to the various Minerals Management Service designated lease area divisions.

State lands under lease in marshlands and interior lakes were not included in these State water areas. The economic activity associated with operations in interior lakes or non-coastal marshlands were not included in any of the estimates in this document. A detailed listing of the geographic areas used for all analyses is presented in Exhibit 1-5. For employees with offshore work locations specified in terms of a platform or Minerals Management Service lease area this task simply consisted of looking up the physical location and assigning it to the appropriate lease area. Employees assigned to a field or operating unit were slightly more difficult to assign. In these cases, employee records were split between the relevant offshore locations. This procedure was similar to that employed for zip codes located in multiple counties/ parishes in that multiple employee records were created representing fractional employees in each of the corresponding lease areas. This procedure resulted in the generation of approximately 6,000 additional records representing fractional employees split between two or more offshore locations.

1.5.5 Staging Site Information as Reported in Personnel Records

Staging sites were specified for all employee working offshore. These data were coded precisely as supplied by the producers. The conversion program applied to this field of the personnel records was primarily to standardize the location names. Staging locations which were specified as individual company docks, company compounds and very small or isolated locations were standardized as the nearest town or port.

Approximately ten percent of the personnel assigned to offshore locations were not assigned to a specific staging location. These personnel were typically specialized technical personnel or drilling crews that reported to various staging locations on a shift by shift or project by project basis. The staging area for these personnel records were classified as "various locations".

All onshore work locations were classified either as headquarters or staging area. Several non-headquarters locations were encountered which served more as operations centers or regional offices. For example, Lafayette, Louisiana serves primarily as a center for various exploration and development activities but does have some personnel traveling to offshore locations. Thus, there appears in the data several locations without personnel reporting to offshore jobs. These locations are typically regional offices or processing plants. This was done to simplify the tabular presentation of results.

1.5.6 Allocation of Personnel Records to Gulf of Mexico Offshore Operations

For the most part, the operating divisions of the OOC subcommittee members coincided with the study objectives to include only data for offshore personnel in the Gulf of Mexico. Some personnel had shared responsibilities. This included both personnel with onshore and offshore job requirements and offshore Gulf of Mexico and other offshore responsibilities. Each personnel record was thus coded by the company to reflect the percent of their responsibilities associated with offshore-Gulf of Mexico activities. This resulted in the generation of approximately 1,000 personnel records reflecting a fractional person because they had shared responsibilities.

1.5.7 Processing of Personnel Records

The data were received from the nine producers making up the Socioeconomic Subcommittee in various formats. The producer-supplied personnel data varied from specialized data bases which were derived by pulling the requested data from automated personnel-payroll systems to hand written employee lists. Most data required key punching and verification from the original form. Each file was then run through a series of conversion programs to standardize the information. Exhibit 1-6 is a process flow chart of the data manipulation that was undertaken before the personnel data were entered into the final producer personnel data base. This exhibit also indicates the master personnel file size at various stages of development and processing for the producer personnel data base.

Exhibit 1-7 is an example of one record for an offshore producers employee as it was received from the company and how it evolved during the conversion stops and was stored in the master file. As can be seen, virtually all data received had to be modified extensively to make it compatible with information for other firms and the study objectives. This example also demonstrates how zip codes with multiple affiliated counties and personnel assigned to several offshore locations resulted in the subdivision of personnel records and the generation of records representing fractional employees.

The nine firms in the sample represent approximately half of offshore production. A mechanism was thus required to convert the sample results to estimated activity by the universe of all offshore producers.

1.5.8 Scaling of Results to Reflect Universe

A standardized measure of economic, physical or production activity was required to adjust the OOC Socioeconomic Subcommittee provided data to account for the offshore operations of firms not in the sample. Numerous activity measures were examined and MMS and State lease production records were identified as the only information source adequate for this task. Other data sources such as royalty payments, company expenditure

data, rig activity indexes, drilling activity indexes and structure and facility inventories were investigated for use as a measure of company level economic activity.

Minerals Management Service and State lease production records were used for this purpose and meet the following criteria:

- Information was available for calendar year 1984. This was the same period for which the OOC supplied data was available. This information was also available on a timely basis and was available with only a three or four month time-lag.

- The data was available by company and also specified the operating producer. This was required because the OOC supplied data was for all activities in which the individual firms were the operating partner or exclusive operator. Other data sources specified royalty payments or production allocated to different partners participating in a joint venture. Information in this format was incompatible with the data provided by offshore producers.

- The data was available for specific geographic areas such as lease area. Generalized or Gulf-wide data would not have allowed any analysis by offshore area. Data was sought which would facilitate adjusting the study results by lease area or region.

- Identical and consistent data were available for both Federal and State waters. Other information sources either did not capture activity in both Federal and State waters or was incompatible.

- The information from these sources is highly reliable and based on the audited production volumes on which royalties are paid.

- The information had to be comprehensive and include both oil and gas related activities since both are significant in the Gulf of Mexico.

A data base was established which consisted of 1984 gas production and casing head gas production, 1984 oil production, number of production oil wells and number of production gas wells. All data were identified by lease area and operating company. The sources of this information were the following:

(1) Minerals Management Service, Monthly Production and Well Counts by Lease 9-152, Gulf of Mexico OCS region, MPROD data base.

(2) Railroad Commission of Texas, Texas Crude Oil/Gas Well Production, Offshore State waters, printout issued February 20, 1985.

(3) Petroleum Information Corporation, A.C. Nielson Company, Annual Summary Report by Field, Reservoir and Operator for 1984, Issued June 26, 1985. Data based on an on site review of all State of Louisiana lease production records.

During 1984 no commercial production was reported in the State waters of Florida, Mississippi or Alabama.

These data were aggregated into production by the nine OOC Socioeconomic Subcommittee member firms, production by all other non-study operators and total production. Data from both Federal and State waters were included in all analyses. Data on individual operators production by lease area were available but can not be presented in this document since it is of a proprietary nature.

Oil Production for OOC Subcommittee Membership

Exhibit 1-8 presents data on offshore oil production from the Gulf of Mexico by Offshore Area. These data designate production associated with firms in the OOC sample and firms not in the OOC sample. On average the nine firms in the sample produced over 61 percent of offshore oil from the Gulf of Mexico. Within the Federal OCS off the coast of Louisiana 66 percent of oil production in 1984 was associated with the nine companies participating in the Study. Only 20 percent of oil production in the Federal OCS off the Texas coast was produced by firms in the OOC sample.

Gas Production for OOC Subcommittee Membership

Exhibit 1-9 presents similar data on offshore gas production from the Gulf of Mexico by Offshore Area. These data include both production gas and casing head gas from oil wells. These data designate production associated with firms in the OOC sample and firms not in the OOC Sample. On average firms in the OOC sample produced 44.2 percent of offshore gas in the region. In the waters off Louisiana the sample was responsible for 48 percent of production. These firms were responsible for 60.5 percent of gas production from Louisiana State waters and 48 percent of offshore gas from the OCS off Louisiana and Mississippi. Firms in the OOC sample produced only 29 percent of gas from the Texas OCS and 24.5 percent of gas from offshore gas in Texas State offshore waters.

Production Wells for OOC Subcommittee Membership

The number of offshore production wells in the Gulf of Mexico are shown by offshore area in Exhibit 1-10. Using this approach the results closely parallel the gas production data (Exhibit 1-9), in that firms in the OOC sample represent 24.2 percent of wells in the Texas OCS and 61.7 percent of production wells off Louisiana and Mississippi.

Energy Production for OOC Subcommittee Membership

Exhibit 1-11 summarizes offshore energy production in the Gulf of Mexico by Offshore Area. These data are again divided into production from firms in the OOC sample and firms not in the OOC sample. Total energy production was calculated by adding oil, gas, and casing head gas using a barrels equivalent measure of oil. Natural gas (production gas and casing head gas) was converted to a barrel equivalent measurement using the BTU equivalent for Gulf of Mexico oil and gas in which 5.714 thousand cubic feet of gas equals the energy content of one barrel of crude oil. When oil and gas are combined, (Exhibit 1-11) slightly over 50 percent of offshore Gulf of Mexico energy production in 1984 was associated with the activities of the OOC Socioeconomic Subcommittee study participants. Within the Texas OCS, 27.1 percent of energy production was produced by operators in the our study sample. Within the Louisiana and Mississippi OCS, 55 percent of energy production was attributable to the nine offshore operators supplying data to the study. Within Louisiana State waters 53.2 percent of production was attributable to the producers involved in the study.

Summary of Offshore PRoduction for OOC Subcommittee Membership

Exhibit 1-12 summarizes and compares the percent of offshore activity associated with the nine companies participating in the study using various measures of activity for 1984. The OOC participants were responsible for 61.3 percent of oil production and 44 percent of gas production in the OCS. They were responsible for 39 percent of oil and 48 percent of gas production in the combined State waters of Louisiana and Texas. When the number of producing wells operating in 1984 was used as a measure of activity the firms in the study sample were responsible for 59 percent of wells in State waters and 57 percent of producing wells in Federal waters. When feet of exploration and production well drilled were calculated, firms in the OOC sample were also responsible for 47 percent of drilling activity in the OCS as measured in linear feet of exploration and production wells drilled in 1984. Information on the number of linear feet of both production and exploration wells drilled in State waters was not available by company.

Based on the assessment of these data and alternative activity measures which were available, production in barrel equivalent units was identified as the best information on which to scale study results. Offshore production was viewed as a good measure of activity on which to scale study results because it was: available by offshore operator, consistent and reliable, matched with comparable data for both State and Federal waters, available by lease area, and obtainable for the same period for which company data were available. In addition, both oil and gas activities are of major importance in the Gulf and other information sources only covered one aspect of this activity. The OOC participant firms also felt this was the best measure on which to scale the study results since production closely relates to a corresponding level of exploration and production activity.

It is also worthy of note that the various measures of the sample covered by the OOC participants ranged from no more that 57 percent to a low of 44.3 percent. The energy production index (Exhibit 1-11) thus represents both the average and mid point between all available alternative measures. Even if we assume the worst case, the energy equivalent measurement only differs from any of the alternatives by several percentage points.

Scaling Results of Producer Employment Survey

Onshore employment was scaled using the ratio of Gulf wide production associated with the OOC Socioeconomic Subcommittee to total production. The sample of firms participating in the study were responsible for 661 million out of 1,319 million barrel equivalent units of production. This represented slightly more than 50 percent of total combined oil and gas production. Onshore employment was scaled by multiplying each personnel record by 1.9937. Thus, records representing half a person year were modified to represent one person year and records representing one person year were increased to represent almost two person years.

Offshore producer activities were scaled by lease area or several lease areas rather than by the regional average. The ratio of combined oil and gas production by the OOC firms in the sample was again used (Exhibit 1-11). The scaling of producer employees records was conducted using each of the three following approaches: (1) no scaling was required for areas in which OOC participants were responsible for all offshore production, (2) scaling by individual lease area and (3) scaling by combining several lease areas.

Within eight major offshore areas personnel records did not require factoring since all production was attributable to firms participating in the study. The survey had thus captured all activity in this area. For example all production in the Grand Isle area resulted from the activities of one of our nine participants. Personnel records for individuals working on a platform in the Grand Isle area were thus left unadjusted.

Additional records required scaling by individual lease area. For example, in the South Pass Area the nine study participants were responsible for 64.4 percent of production. The records for the 196 producer employees located offshore in South Pass were thus multiplied by 1.553 to simulate activity by producers not in the sample.

Finally some personnel records were scaled by combining several lease areas. This was the case when there were a limited number or no personnel records in our sample working in a specific offshore areas. For example, there were very few personnel records for offshore employees in the State waters adjacent to the East Cameron Area. Thus "East Cameron" and "East Cameron State Waters" were combined for scaling purposes. In this case each employee record for the East Cameron Area was scaled by 1.090 to reflect the production in the adjacent State water block.

The scaling of both onshore and offshore producer employees was therefore done by simulating individual personnel records within the master data base of producer employees. Exhibit 1-13 specifies the sample adjustment mechanism and specific sampling ratio used for offshore personnel for each leasing area.

All information on the estimated primary economic impact of offshore producers was generated using tabular frequency counts of the adjusted personnel records data base. All estimates were thus done by tabulating all personnel records for the desired fields. All results were subsequently rounded to the nearest whole person. The estimated impacts presented in Section 2.0 were all based on the personnel records after they had been modified to reflect the universe of all offshore activity.

Information based exclusively on the records of the study participants is presented on the reverse side of each page. Thus, for each exhibit presenting scaled producer personnel information there is an identical page presenting the raw data for the OOC Subcommittee survey participants.

1.5.9 Background and Assumptions for Personnel Records

All information relating to the primary direct effect of the offshore producers is presented in Section 2.0. When applying this information a user must be cognizant of the following factors.

- All information is presented on an annual basis for 1984.

- All employment information is standardized in person years of employment. This was necessary because the producer personnel work in multiple offshore areas, share responsibilities between the Gulf and other regions, share responsibilities between onshore and offshore activities and many residence zip codes straddle multiple county/parish boundaries. In addition, the scaling of the records generated numerous fractional employees.

- This information is exclusively for personnel employed by the offshore producers. All employees and activity expenditures associated with contractor work or purchased goods are excluded from these estimates of economic impact. Work performed by contractors is captured in the data and information on contractors in Section 3.0. For example, if a producer operates company owned helicopters or seismic exploration vessels and uses a contractor for the overflow, impacts show up as wages and salaries to the producer company employees. Purchases of air transportation or seismic

work from an outside source are documented independently in Section 3.0 of this volume and are identified as the secondary direct impacts.

- The distribution of employment and wages to employee county/parish of residence, work location, staging site and offshore lease area are based on employee assignments and residence location on December 31, 1984. Producer personnel departments indicated that the information provided for this date is consistent with records from other times during the year and that seasonal employment is not significant with offshore producers.

1.6 Producer Expenditure Data

Offshore producers have a major economic impact on both the regional and national economy through their heavy use of contracting for offshore services. This information makes up the impacts known as the secondary direct effects. Data were collected on the total 1984 purchases and expenditures by the nine study participants. These data included all external purchases of goods and services. These data excluded taxes of all types, lease payments and royalty payments to the Minerals Management Service and the various Gulf States. The following is a list of expenditure categories utilized for the collection to this information.

- Air transportation;
- Boat, barge and marine transportation and rental;
- Catering and on water hotel (boatel) services;
- Cement, cementing services and cementing equipment;
- Contract labor and engineering services;
- Exploratory drilling;
- Development drilling;
- Diving equipment and services;
- Drilling fluids, mud logging and chemical purchases;
- Fuel and utility purchases;
- Pipe and pipeline contracting;
- Platform installation;
- Platform and equipment fabrication;

- Production enhancement and well reworking;
- Tubulars;
- Seismic and geophysical services;
- Well logging, wireline, perforation, testing and acidizing;
- Other field services and tool rentals; and
- All "other" and expenditures not classified.

These categories were derived based on discussions with various producers and the Minerals Management Service and were selected because they were both intuitively descriptive and could be identified from the producer accounting systems. Producers could not identify expenditures by Standard Industrial Classification code (SIC). Many of the Socioeconomic Subcommittee firms had cost accounting systems which tracked costs using a system similar to this breakout. Expenditure data were sorted into these categories by the accounting departments of the study participants. Expenditure information was for calendar year 1984. This information was developed by the nine study participants through a sorting of their general payments ledgers. This accounting system lists all non payroll checks issued. Taxes, all payroll related expenses and financial costs such as interest were excluded from the expenditure summaries. This analysis was done on a cash flow basis, for calendar year 1984. Expenditure information in these accounting systems included all capital and operating expenditures which were paid for in 1984. By summarizing expenditures on a cash flow basis, impacts are correctly attributed to the period in which they actually took place.

Expenditures could not be broken out by physical location by any of the offshore operators. A sampling of the zip codes to which producer checks were mailed was investigated as a mechanism for estimating the geographical distribution of the expenditure impacts. Discussions with producer accounting departments indicated that most checks were mailed to a centralized accounting office at the contractor's corporate headquarters which was located at a different location from where the work was performed. This approach was discounted since it would have produced misleading results and would have placed a major burden on the study participants. Exhibit 1-14 outlines the procedures employed in the conversion of producer expenditure data into impacts at the contractor level. Expenditure data were summarized for the study participants by expenditure category. Expenditures by the producers were then converted to impacts through the application of unique impact ratios for each of the 19 major sectors.

The information collected from offshore contractors to develop impact ratios consisted of: (1) wages and salaries as a percent of 1984 revenues, (2) average revenues per employee in 1984, (3) percent of 1984 revenues purchasing goods and services and (4) the percent of employees working offshore in 1984.

Secondary direct impacts were measured in terms of:

- The wages and salaries paid by offshore contractors, support industries and general businesses for supplying goods and services to the offshore operators.

- Expenditures made by offshore contractors, support industries and general businesses in support of their sales to offshore operators. These typically consist of subcontracts and the general purchases of goods and services.

Data presented in Section 3.0 include the secondary direct impacts (expenditure impacts) exclusively for the nine subcommittee firms. This information was factored to account for the activities of other firms through the application of the ratio of offshore production attributable to the companies in the sample. Expenditures and expenditure related impacts were thus scaled by the same factor used to adjust producer personnel and payroll.

1.7 Producer Activity Budgets

The nine OOC firms supplied budgets of 1984 project costs for certain activities associated with offshore oil and gas activities. This information was requested from producers as a mechanism for converting future physical activity measures into estimated economic activity. This information is of particular relevance in the environmental impact statement process and for documentation of the plans of development.

Information was obtained for the six major types of activities undertaken by the offshore producers. Individual project budgets were provided for the following types of activities:

- Geophysical surveying;

- Exploratory and delineation drilling;

- Development drilling;

- Platform construction and installation;

- Pipelaying; and

- Production, operations and maintenance.

Key physical characteristics of each of these activities were also obtained. For example, in exploratory drilling the water depth, drilling depth, days on location, type of drilling rig and if the well was completed and tested were obtained. The key physical attributes were selected because they were suspected of being the major factors affecting costs and could easily by estimated by the Minerals Management Service staff for a given development scenario.

Actual project budgets used to convert physical measures of activity were primarily for 1984 but did include a limited number of projects from 1983 and early 1982. This was required to obtain an adequate sample size and because many large projects required more than one year for completion or do not fall precisely within a calendar year. The individual project budgets submitted by the nine Subcommittee members provided itemized expenditures to the degree they could be broken down. Exhibit 1-15 is an example of the format and content of a typical budget document as it was received from a study participant.

These data were used for the two following purposes:

- The development of general rules of thumb for determining project costs and expenditures for projects in which the basic physical characteristics were known or could be estimated. For example, a simple model was developed which converts water depth, platform size (as measured in number of well slots) and if a platform was to have on board processing, into an estimate of platform design construction and installation costs.

- The development of distribution profiles which indicate the basic types of line item expenditures and costs associated with a unit of expenditure in each of the six major cost categories.

The individual project cost models were determined through the use of descriptive statistics and regression techniques. For geophysical surveying, exploratory drilling, development drilling, platform fabrication/installation and pipeline construction, multiple or single variable linear regression equations were developed to predict total project costs. The statistics generated for each model were: correlation coefficient, standard error of the estimate, t-statistic, coefficient of multiple determination, standard error of multiple estimate and F-ratio. In all cases, very basic physical descriptions of the anticipated activity can be converted into a cost estimate. Simple descriptive statistics were used to describe production, operations and maintenance.

Line item expenditures were averaged for all projects in each category to provide basic information on the types of costs associated with an expenditure in any of the six groups. The nineteen basic expenditure types used to document producer expenditures were again used to categorize project costs.

2.0 DIRECT IMPACT OF OFFSHORE PRODUCERS

This section presents the direct economic impact in 1984 of the offshore producers operating in the Gulf of Mexico region. The methodology used to derive this information and associated assumptions are presented in the previous Section 1.0. Several essential assumptions used to develop this information will therefore be repeated.

- The annual information is for 1984. Point specific data such as residence county/parish were for December 31, 1984.

- These estimates are exclusively for personnel employed by the producer companies. All activity and expenditures associated with work performed by contractors are specifically excluded from the estimates in this section. Contractor impacts are presented in Section 3.0. This would include work normally conducted solely by contractors (i.e. platform construction) and the contracted component of activities performed both by producer company personnel and contractor personnel (i.e. air transport).

- Estimates include only activity relating to offshore activity in the Gulf of Mexico. Economic activity associated with onshore oil and gas operations and non Gulf of Mexico operations has been excluded from all information in this section.

- All information in this section includes offshore activities in both the Federal OCS and State waters. Most data could not be broken out by Federal and State water activity. Onshore personnel in staging areas were assigned to support operations in numerous areas which included leases in both Federal and State waters. Offshore personnel working at specific platforms or areas could, for the most part, be identified as working specifically in State or Federal waters. In sum the job site location of employees working offshore were used to differentiate between persons working in the various State waters and the Federal OCS. As such, only offshore producer employment and wages and salaries are broken out by Federal and State water activities. This is not believed to be a significant problem since State waters represent a relatively small proportion of offshore oil and gas production in the region. As such, total economic impacts may be used as a surrogate for Federal OCS impacts with the understanding that they are overestimates of between five and ten percent. All tables including combined

data for the Federal OCS and State waters contain the following note on each page: "Data include economic activity associated with both the Federal OCS and State waters."

- Several totals vary slightly (less than 1 percent) between the detailed exhibits. This resulted because each table was generated by tabulation of the original full data set of 50,000 records. Most of these personnel records were for fractional employees which subsequently were rounded to the nearest whole number in all table subtotals and totals. Exhibits with extensive subtotals may have very slight differences between their grand totals. Therefore, the most general tables carry the highest degree of precision.

- All estimates of the direct impacts of offshore producers include information on both the number of employees and the total wages, salaries and bonuses they received.

- The distribution of employment and wages to employee county/parish of residence, work location, staging site and offshore lease area are based on employee assignments and residence location on December 31, 1984.

Data on the producing companies were derived and analyzed by work site (Section 2.1), job type (Section 2.2), employee residence (Section 2.3), offshore work location (Section 2.4), and staging site (Section 2.5).

The information extracted from the personnel records for the producers included: job description, residence location, onshore work location (if applicable), offshore work location (if applicable), staging site (if applicable), and corporate division as well as wage and salary information. The complexity of the data precluded its presentation in one comprehensive table and thus all analyses are performed using two or three of the relevant data elements.

All information on the estimated primary economic impact of offshore producers were generated using tabular frequency counts of the adjusted personnel records data base. Producer employment and payroll were thus derived by tabulating all personnel records for the desired fields. All tabular results were subsequently rounded to the nearest whole person.

Presentation of Unscaled Results

The estimated impacts presented in Section 2.0 were all based on the personnel records after they had been modified to reflect the universe of all offshore activity. Each table has a corresponding table based on the

actual producer personnel records. Unscaled data is presented on the back of every page. The unfactored exhibits on the back of each page are also designated with the following:

- The exhibits containing the unscaled data are designated with a "U" following the exhibit number. For example there is an Exhibit 2-1 and an Exhibit 2-1U. The second exhibit is identical to the first with the exception that it is based exclusively on the raw data provided by the producers in the OOC sponsored sample.

- Each table based on the unfactored data is also clearly marked at the top of every page with a bold and underlined "Unscaled" label.

- Unfactored exhibits have the following note on the bottom of each page: "Note: The information in this exhibit is based exclusively on the data provided by the nine OOC members participating in the study."

- Each unfactored exhibit title contains the underlined words "Data For..." Exhibits containing factored information all contain the term "Estimated" in the title.

In addition each page for which unscaled data were generated contains the note: "Unscaled data from OOC study participants is presented on the reverse side of this page". This information is presented such that the unscaled data is a mirror image of the unscaled results presented in the report.

Exhibit 2-1 summarizes the data components and level of detail of each of the tables in this section. This matrix is also useful for locating specific information sorted by the desired geographic or organizational classification.

An estimated 23,935 jobs at production companies were directly the result of offshore oil and gas leasing in the Gulf of Mexico in 1984. This estimate was derived by factoring and scaling a sample of 12,319 producer employee records. Producer employment is given in person-years of annual employment or full-time position equivalents. This was required because a limited number of workers were seasonal, temporary, or part-time. Also, some individuals had on land or non-Gulf of Mexico responsibilities. For example, some personnel associated with the design of platforms were undertaking projects for both the Gulf of Mexico and other geographic areas. These personnel records were entered as fractional employee records to reflect the percent of their work related to the Gulf of Mexico.

2.1 Direct Producer Impacts by Work Location

Of the estimated 23,935 positions with offshore production companies, 9,881 were located offshore and 14,054 were located primarily onshore.

The designated offshore positions include only individuals working exclusively "offshore". Offshore employees include personnel with no onshore work site. In all cases, employees designated as "offshore workers" in this report spend virtually all of their regular work week offshore. They included the three following types of offshore workers:

- Regular rig crews which were assigned to a specific operating unit or field. These workers include all positions from field managers to roustabouts. In all cases, however, they were assigned to a specific platform, group of offshore structures or oil and gas field.

- Individuals assigned to movable vessels. They included all workers assigned to a geophysical exploration vessel or drillship operated directly by the producing company.

- Individuals which report to various rigs on an as needed assignment basis. Offshore workers in this class include various exploration, development or maintenance positions which are sent out to various fields operated by the company on a rotating or on an as needed basis. These employees work exclusively offshore and their schedules are based on a one week on/one week off schedule. Personnel in this group consisted primarily of specialized repair personnel and drilling personnel.

All offshore employee records included in the study sample worked the standard industry work schedule in the Gulf of Mexico of one week on with one week off. Offshore personnel encountered in this study all worked 12 hour days while stationed offshore. Approximately five percent of offshore employees received a bonus in the form of being paid for a 13 hour day or for an extra work day. Employees typically received these bonuses for being "on call" during their 12 hours off. For example, many specialized repair technicians received a bonus because they are expected to be available at any time they are needed. As previously noted all salary data presented in this section are total wages and salaries received and specifically include income for any bonuses or extra pay days.

It should also be noted that a significant number of the onshore positions may actually have spent some time offshore. For example, many engineers, members of the training staff, and managers make offshore trips on an occasional basis. No data were available on the number of

office headquarters personnel making occasional trips offshore. From a socioeconomic perspective this information is not of direct relevance since these persons are salaried professionals or work a standard 40 hour work week. These offshore trips can perhaps be viewed as being similar to a business trip and are a normal condition of employment in this industry. These positions also include personnel such as pilots who work offshore but return home on a daily basis.

2.1.1 Employment by Work Site

Exhibit 2-2 summarizes producer employment by work location for both onshore and offshore positions. Exhibit 2-2 also presents the percent of total estimated producer employment by work location. Work location is defined as the site to which the employee normally reports to work. For office workers this would be the location of the office not their residence location. For offshore workers this would be the location of the staging area to which they were assigned.

Exhibit 2-3 presents information on the estimated number of producer positions in both onshore and offshore positions by work site in graphic form.

Thirty-three unique work sites were identified in the producer employment records. Many small work sites were collapsed into the predominant location or nearest town. For example, all work sites in the greater New Orleans area are specified simply as "New Orleans" and various individual docks in the Morgan City area were all classified as "Morgan City". This was necessary to protect the confidentiality of individual companies and reduce the study results to a manageable level.

More than 80% of the offshore Gulf of Mexico workers and over 90% of the onshore Gulf of Mexico workers reported to work sites located in Louisiana. An estimated 14,054 onshore producer employees reported to work sites located throughout the region. Approximately 13,500 of these persons were located in Louisiana and 500 were located in Texas. Within Louisiana, over ten-thousand onshore positions were located in the New Orleans area. This represents approximately 40 percent of total producer employment and 70 percent of onshore employment. Approximately 1,300 onshore positions were located in the Lafayette area. Total onshore employment in other areas totalled 2,000 persons. They were located at the following work sites:

- Intracoastal City
- Cameron
- Leesville
- Grand Chenier
- Empire
- Abbyville
- Cocodrie
- Grand Isle
- Houma
- Buras
- Lake Charles
- Baton Rouge
- Dulac

A total of approximately 500 onshore positions were found to be located in Texas. Approximately sixty percent of the onshore personnel in Texas reported to work sites in the greater Houston area. A greater percent of the producer positions in Texas were located offshore. This may be because many of the administrative functions for activity in the State are handled by the offshore divisions located in New Orleans or Lafayette. This estimate for Texas appears low. A more detailed discussion of this is included in Section 5.0, Summary and Research Limitations.

The estimated 8,075 producer company offshore workers based in Louisiana were reporting to work in 18 locations. Morgan City is the largest work site for offshore workers with an estimated 2,737 persons reporting there. Venice is the second most significant work site for offshore workers with an estimated 1,848 producer personnel reporting there.

An estimated 501 offshore personnel report to locations in Texas. The significant work sites for offshore workers in Texas are Freeport and Galveston which had an estimated 388 and 97 offshore workers respectively.

Mississippi, Alabama and Florida also had an insignificant number of offshore workers reporting to work sites in these states. Given the level of activity in the Mobile Bay area and a Florida location in 1984 this number appears low. This may occur because persons associated with this work were still formally stationed in Louisiana and were only temporarily assigned to these locations as most of the exploration and development activity in these areas was being done by contractors and were supervised by staff positions located in the New Orleans area.

Workers classified as "Multi-location" workers, or workers with more than one work location to which they report made up 1,071 offshore employee positions. While all onshore personnel could be linked to a specific work site, these multi-location workers represented about ten percent of all production company workers located offshore. These workers were not assigned to one specific offshore location and were required to use various staging sites depending on their work assignment that rotation. Examples of the types of personnel assigned to "multi-locations" are: maintenance specialists providing a specialized function on numerous offshore platforms, company drilling supervisors overseeing contract drilling operations on various contractor drill ships and at different locations during the year, and production well workover teams which are sent to numerous platforms depending on the specific need.

2.1.2 Wages and Salaries by Work Site

Payroll information by work site was developed from the producer employee records. Of the 23,900 positions with the production companies it was estimated that $854 million in wages, salaries and bonuses were generated in 1984. This information is detailed by work site in Exhibit 2-4. This exhibit also includes the distribution of producer payroll by work location. On average, employees at producing companies received $35,713

in wages, salary and bonuses per person annually in 1984. Average salaries ranged from a low of $16,250 in Sulphur, Louisiana to a high of $45,857 in La Habra, Louisiana. Production company employees with work sites in New Orleans received on average $38,048 in 1984. The average salaries in Lafayette and Houston were higher than the industry average. Average income per employee in Pennsacola, Mobile and Biloxi were well above the regional average with per employee incomes of between $41,000 and $45,000 in 1984. This resulted because these positions were primarily staffed by supervisory and professional employees supervising contractor work in these areas.

Per employee income in the major staging areas averaged approximately $30,000 per annum. Of the total payroll paid by producers, $389 million was associated with persons reporting to work sites in New Orleans. Total payroll by work site is also presented in Exhibit 2-4 for each of the 33 work sites and staging locations used by the offshore producers. For example producer personnel reporting to Grand Isle received wages and salaries totaling an estimated $33.7 million in 1984.

2.1.3 Staff Classifications by Work Site

Exhibit 2-5 specifies producer employment by staff classification for each of the 33 work locations identified. Using Morgan City as an illustration, we see that an estimated 993 producer personnel were classified as unskilled laborers, 1,405 were skilled labor, 273 were supervisory, 56 positions were clerical, 433 were skilled technical position and 412 were professional positions.

Exhibit 2-6 standardizes producer position information to provide the relative proportion of positions at each work site falling into each staff classification category. Exhibit 2-7 presents similar Gulf wide information graphically.

Using the Morgan City data again as an example, we see that 28 percent were classified as unskilled labor, 39 percent were skilled labor, 8 percent were supervisory personnel, 2 percent were clerical and secretarial positions, 12 percent were skilled technical staff, and 12 percent were professionals and managers.

Of the total number of positions with producer companies, 7,700 or 32 percent were classified as professional positions. Over seventy percent of these professional positions are located in the New Orleans area. An additional 650 professional positions are located in Lafayette and 400 in the Morgan City area. Grand Isle, Houston, and Intracoastal City all have over 100 professional positions. Also, 300 professional positions exist without specified work sites. These positions are specialized professional jobs offshore for which a distinct location is not specified.

Approximately ten percent of total employment with the producing companies in 1984 was classified as unskilled labor. Of these 2,500 positions, approximately 1,700 were located in Venice, Morgan City or Cameron, Louisiana.

Skilled labor positions totalled 4,564 person-year equivalent positions with production companies in 1984. This represented 19 percent of all positions with the offshore producers. Virtually all of these positions were located in staging sites or offshore. Between the various locations there was a great deal of variation in the percent of total positions classified as skilled labor. For example, skilled labor positions represented about 13 percent of positions in Intracoastal City and almost 40 percent of positions in Morgan City.

Supervisory personnel represented about 11 percent of the positions or 2,659 person-years of employment. These positions were found primarily in the staging ports. Both Grand Isle and Intracoastal City had a large number of positions classified as supervisory. Combined, these two locations claimed almost 1,200 out of the total 2,659 supervisory positions with producers. Within these two staging areas, supervisory personnel represented 58 and 59 percent of all employees.

The clerical employment accounts for about seven percent of the total employment with producers and totalled an estimated 1,629 positions. These positions were located primarily in New Orleans and Lafayette, where they make up about 10 percent of all producer positions.

Positions classified as skilled technical totalled 4,742 person-years of employment. This represents 20 percent of total employment with the producers in 1984. These skilled technical positions were found in both the New Orleans area and at various staging locations.

Only 144 out of the estimated 23,935 positions could not be classified. This represents less than one percent of all position.

2.2 Direct Producer Impacts by Staff Classification

A profile of the data on positions by staff classification was developed using type of location rather than actual geographic location. Locations were classified as (1) corporate headquarters, (2) onshore staging area, (3) non site-specific offshore, and (4) offshore structures. Exhibit 2-8 presents separately the skill mix of production company personnel for headquarter, staging area, offshore site specific and non site-specific offshore.

In Exhibit 2-9 similar information is presented graphically for headquarters personnel, non-site specific offshore personnel, offshore personnel and onshore staging area personnel. Exhibit 2-10 summarizes minimum, maximum and average salary by job classification and presents total producer payroll by job classification.

Producer offshore oil and gas related employment and payroll resulting from positions physically located at the various corporate headquarters totalled 9,447 full-time positions or close to 42% of all positions. These positions resulted in a total payroll of $360 million dollars in 1984. Information is also provided on the profile of headquarters personnel by staff classification. For example, out of the 9,447 positions, 1,380 are clerical in nature, 2,568 are skilled technical positions, and 5,297 are professionals.

Producer employees working in staging areas totalled 4,545 positions. Of this total, 298 were unskilled laborers, 625 were skilled laborers, 442 were supervisors, 309 were clerks and secretaries, 1,121 were skilled technical staff and 1,749 were professionals or managers. On average, these employees in these positions received $35,744 in wages and salaries in 1984. Total wages and salaries received by production company personnel assigned to staging areas were $162 million.

Offshore production company employees assigned to specific structures or fields numbered 9,237 full-time equivalent persons. Of this total, 3,818 were in skilled labor positions, 1,995 in unskilled labor positions, 1,981 were supervisory, 959 were skilled technical, and 441 were professionals and managers. Only 43 persons working offshore were classified in clerical positions. Minimum, maximum and average salary information for each of these types of employees is included in Exhibit 2-8. Total wages and salaries received by offshore producer personnel were estimated at $307 million. Offshore structure and field employees received an average $33,278 per person year position equivalent.

Non-site specific offshore personnel totalled 706 person years of employment. These positions were relatively equally distributed among all staff classifications except clerical in 1984. These employees received approximately $25 million in wages and salaries.

Exhibit 2-10 presents detailed information on employment and payroll by location classification (i.e., headquarters), functional area (i.e., exploration), and job classification (i.e., unskilled labor). This table also specifies minimum, maximum and average salary for each of the approximately 50 types of positions.

Over 3,000 headquarters personnel (about 30 percent) were classified as being associated with general administration or company overhead activities. An approximately equal number of persons were classified as being associated with exploration and development activities. Structure design and engineering staff totalled an estimated 761 persons or about 8 percent of headquarter personnel. An additional 1,170 headquarter personnel were classified as holding positions related to production and maintenance activities. Approximately 200 headquarters personnel were associated with positions relating to safety, training and environmental affairs. This information and the profiles of staging area personnel and offshore personnel are summarized graphically in Exhibit 2-11.

The 4,545 positions located onshore in the various staging areas were classified by the functional areas of administration, warehousing and storage, transportation, construction, exploration and development, and production and maintenance. Production and maintenance positions made up approximately 50 percent of all positions in the staging areas and totalled 2,300 persons. Administration personnel totalled 552 persons and made up approximately 15 percent of all positions in the staging areas. Between 125 and 475 positions were each associated with warehousing and materials handling, transportation, construction and exploration and development. Approximately 15 percent of positions in staging areas could not be classified by the type of activity with which they were associated.

Approximately 80 percent, or approximately 7,200 of the positions on offshore structures were classified as relating to operations and maintenance. An additional 619 positions related to drilling from fixed structures and 147 were classified as performing administrative activities. An additional 1,300 offshore positions could not be classified by functional area. However, 1,100 of these unclassified positions were supervisory in nature. It is believed that they were primarily involved in supervising operations and maintenance on platforms or are assigned to drilling operations located in various lease areas during the course of a year.

Of the approximately 700 offshore personnel not assigned to a specific site, 486 or 69 percent are associated with geophysical exploration activities. Twenty-four persons were associated with vessel operation and transportation and 195 worked full-time offshore but reported to multiple platforms.

Exhibit 2-12 standardized the information from Exhibit 2-10 to show the relative distribution of the various producer jobs. These data include producer employment by staff classification as a percent of total employment and producer payroll by staff classification as a percent of total payroll. To use offshore personnel as an example we see that they receive 39 percent of the producer company payroll and represent 36 percent of company positions. This exhibit also provides the distribution of both payroll and employment by job classification. For example Exhibit 2-12 can be used to determine the percent of either payroll or employment which is associated with managers involved in administration at the corporate headquarters.

The personnel data files were also analyzed to determine the distribution and ranges of salaries by work site classification and are presented in Exhibit 2-13. Exhibit 2-14 graphically displays the frequency distribution of wages and salaries for all production company workers. Exhibit 2-15 presents similar data graphically broken out by type of work site. The number of headquarters personnel receiving various salaries was almost equally distributed between $15,000 and $60,000 per year. The frequency of headquarter personnel receiving salaries in excess of $60,000 declined sharply. Staging area onshore staff have the lowest average salaries and were clustered between $25,000 and $50,000 per year.

Offshore workers assigned to specific sites received an average salary of $33,278. The salaries of offshore workers were predominantly between $25,000 and $35,000 per year.

2.3 Production Company Employment and Payroll by Residence Location

While it is important to know the producer employment by work location, it is more important to know where these workers reside. These data are necessary for socioeconomic impact analysis because most impacts occur when the wages and salaries paid by the producers are spent by the employees in the counties/parishes in which they reside.

The development of independent information on employment and wages and salaries received was necessary because many employees in the offshore industry do not reside in the same area as they work. The extent and incidence of this occurrence is examined in subsequent subsections (see Section 2.4 and 2.5).

2.3.1 Production Employment by Residence Location

A separate profile of direct producer impacts has been developed for employment by state of residence. Estimated employment by state of residence is displayed graphically in Exhibit 2-16.

Data on producer employment by state of residence and the type of work location (i.e., staging area) is summarized in Exhibit 2-17. Employees of the offshore producers resided in 26 states. These states were located in all regions of the United States. Approximately 20 of these states had very slight employment impacts of two to eight persons. Several southern states such as Georgia, Oklahoma and Tennessee had slightly greater employment effects of approximately 20 persons each. Almost 20,000 producer employees had their residence in Louisiana, 1,960 in Mississippi, 1,413 in Texas, 475 in Alabama, and 205 in Florida. This table also breaks out employment by residence for the various work location types (i.e., headquarters). This profile indicates that virtually all personnel working at headquarters reside in Louisiana or Texas. An estimated 123 headquarter personnel also reside in Mississippi and commute to Louisiana.

Among staging area personnel most were again from Louisiana or Texas. Some greater proportion were however from bordering coastal states. For example, 245 staging area personnel commute from Mississippi and 20 commute from Florida. Among offshore platform staff 414 commuted from Alabama, 152 from Florida and 1,488 from Mississippi. Employees with residences in non Gulf coast states were primarily found in offshore positions. For example, 15 persons were found commuting from Tennessee and 19 from Georgia to take offshore positions. Non-site specific offshore personnel again were drawn primarily from Texas, Louisiana and Mississippi. Approximately 10 percent of these positions were being filled by residents of other states and most of the persons commuting from other regions of the country were employed in these positions.

This may be explained by the fact that most of these positions were of a specialized or technical nature and may be drawn from a less regional labor pool, were relatively well paid and have more of an incentive to commute a greater distance, and can often arrange to work shifts longer than one week.

The types of positions being filled by residents of various states varies dramatically. Exhibit 2-18 depicts the relative proportion of positions which employees from each of the Gulf Coast states filled in 1984. Personnel with residences in Louisiana held positions in all location classifications although they were slightly over represented in company headquarter positions and held a slightly lower percent of offshore positions. This can be attributed to the fact that many producers base their headquarters in Louisiana. As can be seen in Exhibit 2-18, most producer employees residing in Florida, Mississippi and Alabama held primarily offshore positions. In addition, approximately 10 percent of producer personnel from these states held positions located onshore in staging areas.

A similar, more detailed, profile of producer employment by residence was developed at the county/parish level. This information is presented in Exhibit 2-19. As can be seen in this lengthy table, employees with the producers reside in over 250 counties/parishes throughout the United States. Virtually every parish in the state of Louisiana has at least several person-years of employment with an offshore producer. The following are the estimated number of producer employees residing in some of the Louisiana Parishes:

- 4,524 employees - Orleans Parish;
- 3,665 employees - Jefferson Parish;
- 1,524 employees - Lafayette Parish; and
- 1,489 employees - St. Tammany.

Louisiana parishes with 200 to 1,000 employees with an offshore producer include: Calcasieu, Cameron, East Baton Rouge, Iberia, La Fourche, Livingston, Plaquemines, St. Bernard, St. Charles, St Mary, Tangipahoa, Terrebonne, and Vermilion.

Approximately 2,000 persons employed by the offshore production companies reside in Mississippi. Most of these persons appeared to live in counties adjacent to the two major highways feeding the coastal areas of Louisiana or in the Coastal counties of Mississippi. Additional residents of Mississippi who were employed with the offshore production companies came from a wide geographic range with virtually all counties having some employment with the offshore producers.

An estimated 1,400 Texas residents were employed by the offshore Gulf of Mexico production companies. With the exceptions of Marion and Harris counties, which had a large concentration of producer personnel, employees were from a broad geographic range within the state of Texas.

Almost 500 persons employed by the offshore production companies reside in Alabama. Half of the personnel reside in the coastal counties of Baldwin or Mobile, while most of the other half were found in the interior counties such as Coffee and Covington which were adjacent to the coastal areas of the Florida Panhandle. An additional 25 counties located throughout the state had minor employment ties to producer company positions.

Approximately 200 producer employees reside in Florida. Most of these persons come from the coastal counties of Escambia, Okaloosa, and Santa Rosa.

County of residence information is not provided in Exhibit 2-19 for states with only a few producer employees. This information was excluded to protect the confidentiality of these individuals. In addition, this information is of little relevance for socioeconomic impact assessment.

Exhibit 2-20 provides information on the types of producer positions held by producer employees from each county/parish. For example, information in this table indicates that out of the 150 producer employees residing in Mobile County, Alabama: 45 were unskilled laborers, 55 were skilled labor, 24 were supervisory, 14 were skilled technical and 12 were professionals. Similar information is available for Orleans Parish which indicated that of the 4,524 producer employees residing there, an estimated 2,236 were professionals or managers, 1,084 were skilled technical staff, 732 were clerks or secretaries and approximately 400 were supervisors or skilled or unskilled laborers.

Exhibit 2-20 provides similar data for each of 250 countries with residents employed by offshore producers in the Gulf. This information is provided at the state level for areas with less than 10 residents employed by the offshore producers.

Exhibit 2-21 specifies the distribution of estimated producer employment by county/parish of residence for 250 county/parishes. For example it is estimated that Baldwin County, Alabama is the county of residence of .33 of one percent of producer employees. The state of Alabama was the residence of an estimated 2 percent of producer employees.

2.3.2 Production Company Payroll by Location of Residence

Cumulative 1984 producer payroll by county/parish of residence and staff classification is detailed in Exhibit 2-22. This information is important in the analysis of the effect of oil and gas activity since it is actually the expenditures of the wages and salaries received by producer employees which drive the various local economies.

Total wages and salaries paid by the offshore producers to residents of Gulf States were as follows for 1984.

- Louisiana, $710 million;
- Mississippi, $64.7 million;
- Texas, $51.3 million;
- Alabama, $15.2 million; and
- Florida, $6.4 million.

Exhibit 2-22 breaks out producer payroll by staff classification for each of the counties/parishes with producer employment. Using producer employees which are residents of St. Mary Parish, Louisiana as an example we can determine that they received wages and salaries from the offshore producers totalling $30.1 million in 1984. These wages and salaries totalled $4.4 million from income of unskilled laborers, $4.5 million from the income of skilled laborers, $4.0 million from supervisors, $5.5 million from skilled technical employees and $10.8 million from professional employees. Similar information is presented in this exhibit for over 250 counties/parishes.

Exhibit 2-23 summarizes, graphically, producer payroll by state of residence and identifies payroll by staff classification (i.e., skilled labor).

Exhibit 2-24 specifies the distribution of estimated producer employment by county/parish of residence for 250 counties/parishes. For example it is estimated that Santa Rosa County, Florida receives 0.195 of one percent of producer employee wages and salaries. The state of Florida was the residence of an estimated 0.75 percent of producer employees.

2.3.3 Producer Payroll and Employment by Staging Area

At the request of the Minerals Management Service the data were also analyzed to determine where producer personnel residing in each county/parish were reporting to work. This place-of-residence/place-of-work matrix includes total employment, average salary and total payroll by county.

Producer Payroll and Employment by Staging Area for All Producer Employees

A very detailed breakdown of employment and payroll information by county/parish of residence and actual work location is presented in Exhibit 2-25. Thus, for a given county/parish it can be determined exactly to which locations producer personnel commuted. For example, Pearl River County, Mississippi had an estimated 209 producer employees residing locally. This southwest Mississippi county had 63 persons commuting daily to New Orleans. An additional 75 persons work out of

staging sites in eastern Louisiana such as Venice, Grand Isle and Houma. As an example of the level of detail available from this matrix there were an estimated forty producer employees from Pearl River County which were reporting to numerous staging areas. The staging site used by these employees varied by assignment. Very few residents of this county were identified as reporting to more distant staging sites in western Louisiana.

Average salaries for each of the county/staging area categories is also available. For example, the 44 persons traveling from Pearl River County to Venice received an average wage of $40,306. Combined these 40 producer personnel received a total of $1.59 million in wages and salaries.

Personnel records were also manipulated to generate a place-of-residence/ place-of-employment (work site or staging area) matrix for each of the counties/parishes which were providing the work force for the offshore producers. Exhibit 2-26 organizes employment, average salary and total payroll data by county/parish of residence for each of the 33 staging sites encountered. Using the data in this framework allows one to trace the payroll for any given work location directly back to the employees local residence. This is particularly relevant data for allocating local changes in employment back to the various areas supplying the local labor pool. This information provides a mechanism for tracing a staging area's payroll impact directly to the specific counties in which the workers reside.

An example of the type of information contained in Exhibit 2-26 can be demonstrated by using the producer labor profile for Buras, Louisiana. Out of the estimated 148 producer employees reporting to work at that staging location, 70 percent or 115 persons were from the local parish (Plaquemines Parish). Five persons commuted from Orleans Parish, nine from Jefferson Parish and 11 from other outlying Louisiana locations. Twelve additional persons had residences in Florida, Mississippi, Missouri, Tennessee and Texas. The relatively high proportion of local employees at this location may be explained by the isolated location of Plaquemines Parish on the east bank of the Mississippi.

Cameron, Louisiana also serves as a good example of the type of information contained in Exhibit 2-26. Cameron Parish has a relatively limited local labor pool and only 20 percent of the persons reporting to work at producer positions at this staging location reside in the local parish. Cameron drew an estimated 195 persons from the nearby parish of Calcasieu and the Lake Charles area. Remaining persons were drawn from fifty other counties and parishes in all areas of Louisiana, Mississippi and Texas.

Producer Payroll and Employment by Staging Area-Offshore Employees

Many socioeconomic analyses differentiate between producer employees and those personnel working exclusively offshore. The unique work schedule for offshore workers of one week on/one week off allows personnel in

these positions to commute much greater distances than would be the case or employees commuting daily. Exhibit 2-27 presents data on employment, average salary and total payroll by county/parish of residence and staging location exclusively for personnel working offshore.

Exhibit 2-27 was derived after eliminating the records for all personnel working onshore from the master data base. This table is similar in content to Exhibit 2-25 with the exception that only offshore personnel are included in the analysis. These data are indexed by county/parish of residence for each of the approximate 250 residence locations.

Using Pearl River County, Mississippi again as an example, it can be seen by comparing Exhibit 2-24 and Exhibit 2-27 that 129 out of the 209 persons working for offshore producers were working at offshore work locations. Out of the 80 onshore personnel, 62 hold onshore jobs in nearby New Orleans. Virtually all persons commuting to Grand Isle, Houma, Morgan City and Venice held offshore positions. In addition, all forty persons residing in Pearl River County and working offshore report to various staging sites on an as needed basis.

This table can also be used to determine the profile of offshore workers in a county/parish with a work force assigned primarily offshore. For example, out of the estimated 4,524 producer personnel residing in Orleans Parish only 427 hold offshore positions. These persons receive an average salary of approximately $33 thousand. The primary staging locations used by Orleans Parish residents working offshore for producers are: Grand Isle, Houma, Morgan City and Venice. Similar information is available for each of the 250 counties/parishes with residents holding offshore positions with producers.

2.4 Producer Employment and Payroll by Offshore Work Site

Employment and payroll data have also been analyzed using an additional dimension, the offshore work location. All platform locations have been standardized to one of sixty lease areas. Examples of the lease areas being used for this analysis are: South Pass and High Island-State Waters. A detailed listing of the 60 geographic areas used for all offshore analyses were previously presented in Exhibit 1-5. Individual platforms or fields required standardization to make subsequent analysis of the data meaningful and to protect the confidentiality of individual firms. These fields also coincided with the areas for which product production data is reported.

The lease areas used for this assessment coincided with the standard MMS lease area designations such as "Ship Shoal Area" or "South Timbalier".

Additional lease areas were designated so that activity in State waters could be captured. Lease areas in State waters were simply designated by the MMS lease area name followed by the term "State Waters". Lease areas in State waters consist of offshore areas directly adjacent to the various MMS designated lease area divisions. State lands under lease in marshlands and lakes were not included in these State water areas.

Information was obtained for all offshore workers in the sample on the physical location of their offshore assignment. These data were included in the personnel records data base and were used to generate information on the number of production company offshore workers by lease area and the staging locations supporting each lease area. These data were sorted so that the flow of personnel from a given staging area to various offshore locations could be determined.

When using the information on the offshore locations of producer employees it should be remembered that the data is not necessarily closely tied to production in a lease area. This information simply reflects the physical location where producer employees were stationed. For example, production in a lease area which is piped to a larger near shore platform may have relatively few persons assigned to the platform at the point of production. On the other hand, a platform complex which is processing product which is piped from other areas may show a relatively large offshore staff and very little production at that location. Offshore personnel were typically assigned to a field or group of fields and not a specific MMS lease ares. In cases where a field or operations group covered more than one lease area, personnel were split between the locations.

In addition, some producers utilize contractors extensively for the all phases of their offshore activities including the operations and maintenance of producing fields. In these cases, employment in the area was understated since very few of the producers personnel actually work offshore. The information in this section should be used primarily for determining the basic locations of offshore personnel and routing of personnel through the various staging locations rather than documenting the exact location of all offshore personnel.

Exhibit 2-28 summarizes the estimated number of offshore producer personnel by lease area. Exhibit 2-28 also includes information on total payroll and the percent of offshore producer payroll and percent of offshore producer employment associated with the various lease areas. Using the High Island area as an example it is estimated that 141 person years of producer personnel are assigned to this lease area. These producer personnel received $4.7 million in wages and salaries during 1984 and received 1.42 percent of the total offshore related payroll. Information is also included which indicates the percent of total producer employment which is associated with each producing lease area.

Approximately 10,000 producer personnel were stationed offshore. These employees received wages and salaries totalling $330 million in 1984 and were located in 63 offshore lease areas. Exhibit 2-29 graphically depicts the allocation of both workers and payroll between OCS waters, State waters, offshore exploration vessels and personnel working on numerous platforms.

An estimated 7,370 offshore producer personnel were assigned to locations in the OCS. These personnel received an estimated $242 million in wages and salaries (see Exhibit 2-28 for precise distribution between various OCS lease areas).

Producer personnel assigned to platforms in State waters totalled 1,244 persons and received wages and salaries totalling $38 million in 1984. This represents approximately 13 percent of all offshore producer positions. This number appears high given that in 1984 production from various State leases represented only about six percent of combined offshore oil and gas production. This may be explained by the fact that many of the near-shore platforms in shallow State waters are older and are more labor intensive than large and more recently constructed production platforms farther offshore. In addition, some platforms physically located in State waters receive and process products from wells located in the OCS farther offshore. Wells producing in State waters, on the other hand, are not typically piped farther offshore to structures in Federal waters for processing and transportation.

An additional 1,164 producer personnel were reporting to work offshore on multiple platforms in various areas. These personnel received an estimated $43.7 million in wages and salaries. Examples of the types of personnel assigned to this category include: maintenance specialists providing a specialized function on numerous offshore platforms, company drilling supervisors overseeing contract drilling operations on various contractor drillships and at different locations during the year, and production well workover teams which are sent to numerous platforms depending on the specific need. These personnel, although working offshore, could not be specifically tied to an individual work site in either State waters or the Federal OCS.

Eighty persons were assigned to offshore work on geophysical exploration vessels and received total wages and salaries of $2.9 million in 1984. These personnel represent a very small proportion of the total number of persons involved in geophysical exploration since this is typically a service supplied by contractors. A limited number of offshore producers do operate their own geophysical exploration vessels or vessels under long term leases.

The lease areas with more than 250 person-years of producer personnel assigned to them in 1984 were:

- Eugene Island;
- Eugene Island South Addition;
- High Island South Addition;
- Main Pass;
- South Pass;

- South Pass East and South Extension;
- South Pass-State Waters;
- Ship Shoal;
- Ship Shoal South Addition;
- South Timbalier;
- West Cameron; and
- West Delta.

Using the Ship Shoal Area as an example of the information available in the exhibit, it can be determined that this lease area has the largest offshore employment. The Ship Shoal Lease Area has 1,0377 producer employees with a total associated payroll of $31,677,980. These personnel are those physically located on platforms in the Ship Shoal Area and not necessarily those employees associated with oil and gas production originating in the Ship Shoal Area.

Exhibit 2-30 presents employment, average salary and total payroll by offshore work site and staging location. The information in this table is presented in this format to facilitate the determination of which staging sites were servicing any given offshore area. For example, it can be determined that offshore producer personnel assigned to a work site in the Eugene Island area were almost exclusively from Intracoastal City and Morgan City. Out of the 647 offshore personnel in this area, 617 were using these two staging sites. In addition, it can be determined that the personnel using other staging locations such as Grand Chenier and Lafayette were primarily supervisory and skilled technical personnel since they had an average salary 30 to 60 percent higher than the personnel using Intracoastal City and Morgan City. In this table, the total number of onshore producer employees is listed directly under the staging area. The number of employees using that location is listed by offshore work site. Similar information is provided for each of the 63 offshore locations showing producer personnel in 1984.

2.5 Offshore Work Site by Staging Area

Data for the offshore personnel were also assessed by staging location. Exhibit 2-31 presents a profile of the distribution of personnel reporting to work at a specific location. This information can be used to answer questions on the physical place of work for all personnel reporting to work at a given staging site. All onshore employment accounts for 14,054 full-time position equivalent persons and $524,503,323 in payroll dollars. Total offshore employment and payroll account for 9,874 positions and $330,042,110 in payroll.

An example of the type of information available in this exhibit is that the port of Buras, Louisiana has 149 producer personnel reporting to work. Twenty six remain onshore and the remaining 123 depart to platforms located offshore. Offshore personnel using Buras were located in the Brenton Sound Area (28 persons), Brenton Sound State Waters (58 persons) and West Delta State Waters (34 persons). The data also indicated that this location was also used on a very limited basis for three other locations.

A second example of the types of information available in Exhibit 2-31 can be demonstrated with the producer data for Galveston, Texas. Of the 137 producer personnel reporting to work at Galveston, 40 remain onshore and 97 depart for offshore assignments. Approximately two-thirds of the offshore personnel were associated with geophysical exploration vessels and most other offshore workers were associated with positions in the High Island/High Island State Waters area. Several persons were also stationed in the Sabine Pass Area. There does not appear to be a difference in average salary between offshore personnel working out of Galveston. Onshore personnel at this location appear to receive significantly less in wages and salaries than the offshore personnel.

Information pertaining to the impacts associated with producers expenditures and the processing and storage of offshore oil and gas follow in Section 3.0.

3.0 EXPENDITURE AND PRODUCER PROCESSING IMPACTS OF OFFSHORE PRODUCERS

Offshore producers have a major economic impact on both the regional and national economy through their use of contracting for offshore services and the purchase of materials. These expenditures make up what are referred to as the direct secondary effects. In addition the transportation, refining and processing of oil and gas produced offshore has additional impacts.

Data were collected on the total 1984 purchases and expenditures by the nine study participants. These data included all external purchases of goods and services and excluded taxes of all types, offshore lease payments and royalty payments to MMS and the various states. The following is a list of expenditure categories utilized for the collection and analysis of all producer expenditure information:

- Air transportation;
- Boat, barge and marine transportation and rental;
- Catering;
- Cement, cementing services and cementing equipment;
- Contract labor and engineering services;
- Exploratory drilling;
- Development drilling;
- Diving equipment and services;
- Drilling fluids, mud logging and chemical;
- Fuel and utilities;
- Pipe and pipeline contracting;
- Platform installation;
- Platform and equipment fabrication;
- Production enhancement and well reworking;
- Tubulars;
- Seismic and geophysical exploration services;
- Well logging, wireline, perforation, testing and acidizing;

- Other field services and tool rentals; and

- All "other" and expenditures not classified.

These categories were derived based on discussions with various producers and the Minerals Management Service and were selected because they were both intuitively descriptive and could be identified from the various producers accounting systems. Producers could not identify expenditures by Standard Industrial Classification code (SIC). Many of the firms on the Socioeconomic Subcommittee had cost accounting systems which tracked costs using many of the line items in this breakout. Expenditure data were sorted into these categories by the accounting departments of the study participants. Expenditure information was for calendar year 1984.

This information was developed by the nine study participants through a sorting of their general payments ledgers. Such accounting systems essentially itemized all non payroll checks issued. Taxes, payroll related expenses and financial costs such as interest were excluded from the expenditure summaries. Expenditure information in these accounting systems included all capital and operating expenditures which were paid for in 1984. By summarizing expenditures on a cash flow basis, impacts are correctly attributed to the period in which they actually took place. No financial or cost accounting data were used in the development of this section. For example, if borrowed funds were used to purchase capital goods, the entire expense was included in 1984 expenditures provided that it was paid for in 1984.

These expenditures are in themselves a measure of secondary direct economic activity. In addition to estimating the expenditures of the primary producers, the secondary direct impacts of offshore oil and gas activities were measured in terms of:

- The wages and salaries paid by offshore contractors, support industries and general businesses resulting from supplying goods and services to the offshore operators.

- The number of person-years of employment with offshore contractors, support industries and general businesses resulting from their sales to the offshore operators. Contractor employment was allocated between persons working both onshore and offshore.

- The secondary expenditures made by offshore contractors, support industries and general businesses in support of their sales to offshore operators. These typically consist of subcontracts and the general purchases of goods and services.

Data presented in this section includes both the secondary direct impacts (expenditure impacts) exclusively for the nine subcommittee firms and factored information to account for the activities of other offshore producers. All expenditure based impact estimates were scaled using the same mechanism that was used for the personnel and payroll data. Producer expenditures were scaled using the ratio of offshore production associated with the OOC Socioeconomic Subcommittee to total Gulf of Mexico offshore production. A detailed discussion of the use of total energy production volume as a measure of each producers activities is discussed in Section 1.0.

For example data were obtained from each of the OOC firms in the sample on their 1984 expenditures for the fabrication of platforms. This data was summarized to determine the total expenditures by the firms in our sample for the construction of platforms. Concurrent with this task discussions were held with the major platform fabricators to determine the key impact ratios (wages and salaries as a percent of revenues, average revenues per employee, average wages and salaries per employee and outside purchases as a percent of revenues). These ratios were then applied to the total value of expenditures by the firms in the sample to determine the secondary impacts of their offshore activities.

Results were also scaled to reflect the universe of firms operating offshore in the Gulf. The sample of firms supplying expenditure data were responsible for 661 million out of 1,319 million barrel equivalent units of production. Producer expenditures were therefore scaled by multiplying the expenditures for the nine OOC study participants by a factor of 1.993.

Exhibit 3-1 graphically outlines the methodology used to estimate the secondary direct effects using producer expenditure information. This exhibit also highlights sample numbers to demonstrate how sample results were manipulated.

3.1 Expenditures by Offshore Producers

The offshore operators make extensive purchases of contract services, materials and products. These expenditures include everything from the purchase of utilities, drilling contract costs, engineering consulting services and airplane rentals. These expenditures specifically exceeded taxes, debt servicing, lease purchase and royalty payments and profits. The summarized direct results of the survey of producer expenditures are presented in Exhibit 3-2. The total 1984 expenditures for the nine major offshore producers totaled $4.4 billion dollars in 1984.

These data were scaled to account for sampling based on the percent of offshore energy produced by the nine major offshore producers supplying data (see Section 1.5.8 for discussion). Total expenditures by producers resulting from offshore oil and gas exploration, development and production in the Gulf of Mexico region were estimated to have totaled $8.75 billion in 1984. Itemized estimates of total expenditures for offshore oil and gas activities in the Gulf of Mexico are presented in

Exhibit 3-3. Examples of these expenditures made as part of producers offshore activities are:

- Air transportation - $264 million;
- Boat, barge and marine transportation - $506 million;
- Catering services $76 million;
- Cement and cementing services $178 million;
- Contract labor and engineering services - $1.3 billion;
- Contract exploratory drilling - $717 million;
- Contract development drilling - $835 million;
- Diving $28 million;
- Drilling fluids, mud logging and chemicals $389 million;
- Fuel and utilities $289 million;
- Pipeline and pipelaying contracting $190 million;
- Platform fabrication $489 million;
- Platform installation - $118 million;
- Production enhancement services $227 million;
- Tubular (drilling and casing pipe) $630 million;
- Seismic and geophysical services $280 million;
- Well logging, wireline and perforation services $478 million;
- Field operating expenses, other oil field services tool rental $1 billion; and
- "Other" purchases and expenditures $656 million.

The relative importance of the various expenditure categories is presented graphically in Exhibit 3-4. For example, development drilling by contractors represented 9.6 percent of total expenditures by offshore producers in the Gulf of Mexico, pipeline construction and repair contracts made up 2.2 percent of their expenditures, fuel and utility costs represented 3.3 percent of offshore oil and gas related expenditures and drilling fluids, mud logging, and chemical purchases made up 4.4 percent of total expenditures.

Expenditures by the various producers required aggregation to provide the appropriate confidentiality to producer records. Exhibit 3-5 provides a relative range of the percent of individual company expenditures going into each of the expenditure categories. Exhibit 3-6 presents the same information graphically by charting the high, low, and average percent of total company expenditures going into each expenditure category for the nine firms supplying data.

Relatively large ranges in the percent of expenditures going to specific line items were experienced between the various producers. For example, in the category of geophysical exploration, companies surveyed spent between zero and 7.6 percent of expenditures for this service. The industry average was 3.2 percent. These large ranges resulted primarily because of different operating characteristics among the various firms. For example, one firm operated their own seismic vessels and another firm had a heavy demand for seismic work in 1984 since they had numerous unexplored lease blocks from bids in the early 1980's. In addition, some

of the extremely low or zero values resulted because some firms could not identify individual expense items and included them in the "all other" category.

Contract labor and engineering services was also an expense category which varied dramatically between the various producers. This resulted because several firms made very heavy use of contractors for most offshore positions including platform production. This category also tended to be a catch all category for many labor intensive services such as most maintenance and repair activities.

3.2 Contractor Economic Impact Ratios

A mechanism was developed for translating expenditures by the primary offshore producers into employment, wages and salaries. This was done through the application of key economic impact ratios to the data for producer expenditures. These ratios were developed with the cooperation of approximately 50 offshore contractors. A list of industry contacts and firms providing information and data appears in Appendix B at the end of the Volume II. The information supplied by the contract and support firms were:

- For 1984. Most ratios were for calendar year 1984. Some contractors only had the required ratios for their fiscal year 1984.

- Specific to the Gulf of Mexico Region. Many contract and service firms had significant offshore operations in other geographic regions. Data were developed exclusively for Gulf of Mexico operations.

- Applicable only to offshore operations. Many of the contract and service firms had parallel activities which encompassed onshore oil and gas operations. For example firms providing drilling mud and chemical services provided identical services to on land operations. Data were again developed exclusively for offshore operation.

The specific types of information supplied by the contractor companies were as follows:

- Wages and salaries paid as a percent of 1984 revenues;

- The 1984 employment to revenues ratio (or revenues per employee);

- Total 1984 payroll and number of employees (or average payroll per employee);

- The percent of 1984 revenues purchasing goods and services from other firms; and

- Percent of company employees working offshore.

Exhibit 3-7 presents the results of discussions with the oil service and contract companies serving the offshore producers. The highly sensitive nature of this information precludes the release of the information by company and many companies supplying this information requested that they not be identified. All ratios represent the average ratio for three firms in each industry. When significant differences existed between the responses from an industry group, companies were called back to verify or clarify the reported information and additional companies were contacted. For the most part, the various firms within each segment had vary similar or even identical ratios.

Impact ratios for two out of the nineteen industry segments were not derived from contact with industry sources. Fuel and utility purchases (Expenditure Category No. 10) were based on the 1982 Bureau of the Census data for petroleum sales and electrical utilities. This was because most fuel and utility purchases by offshore operators are for electricity for onshore operations and fuel for operating vehicles, vessels, aircraft or platforms. The ratios for the category "all other" (Number 19) were also not based on primary information. The impact ratio for this expenditure category were simply the arithmetic average of the ratios for all the other segments. Information on the types of line item expenses going into each category are listed in Section 4.0.

The economic characteristics as represented in the four impact ratios were very different among the 18 different classifications of businesses servicing the offshore oil industry. For example, firms providing catering services for offshore workers spent an average of 43 percent of their revenues on wages and salaries, paid an average wage of $17,200 in 1984, required $40,000 in revenues to support each employee and made outside purchases of goods and services representing 41.8 percent of their total revenues. In addition, 86 percent of their employees were located offshore on a regular basis.

On the other hand a more specialized and capital intensive contract segment such as seismic and geophysical exploration paid 27 percent of revenues out in the form of wages and salaries, required $87,183 in revenues to support a person-year of employment. Seismic and geophysical exploration companies paid average salaries of $23,801 per person-year of employment and spent over 50 percent of revenues on operating costs, capital equipment and material purchases in 1984. Similar information was derived for all the major industries supporting the offshore oil and gas industry.

3.3 Estimated Expenditure Impacts Associated with Producer Expenditures

The impact ratios for the various contract and service industries (Exhibit 3-7) were multiplied by the total estimated producer

expenditures (Exhibit 3-3) to derive the impacts associated with the expenditures made by the offshore producers. Producers spent an estimated $264 million on air transportation in 1984. Air transportation companies reported that on average 32.8 percent of revenues went for wages and salaries. Thus the wages and salaries paid by air transportation companies to their employees as a result of their sales to offshore producers were estimated at $87 million ($264 million x 33.8%).

Wage and Salary Impacts Associated With Producer Expenditures

Combined 1984 producer purchases, expenditures and contracts for offshore activities in the Gulf of Mexico resulted in an estimated $2.59 billion in wages and salaries with contractors and other general businesses. Exhibit 3-8 presents the estimated payroll generated by expenditures with the producers. The secondary direct wage and salary effects were highly concentrated in the specialized oil service industries such as contract exploratory drilling, contract labor, platform fabrication, well logging and testing.

Employment Impacts Associated With Producer Expenditures

Contractors and businesses supplying goods and services to the offshore producers in the Gulf of Mexico generated approximately 95,400 full-time equivalent positions. Estimated employment impacts associated with producer expenditures are also itemized in Table 3-5. The major employment impacts with the offshore oil and gas contractor industries in the Gulf of Mexico are as follows:

- Boat, barge and marine equipment - 6,074 employees;
- Contract labor and engineering - 19,005 employees;
- Contract exploratory drilling - 7,748 employees;
- Contract development drilling - 9,026 employees;
- Platform and equipment fabrication - 7,170 employees; and
- Other oil field services and tool rentals - 13,656 employees.

Information was also obtained from the various service industries on the proportion of their employees working offshore. These ratios were applied to the number of employees by industry category to obtain an estimate of the number of contractor employees physically working offshore and onshore.

Out of a total of 97,400 positions created by producer expenditures, an estimated 28,955 are located primarily offshore, 20,085 have an offshore component and 48,347 are located exclusively on land. The 20,085 employees with both onshore and offshore responsibilities include positions such as pilots and boat crews which return home daily and

specialized workers who spend several days offshore as part of a specific assignment and then return to shore. This class of employees also included individuals such as divers, who may spend extended periods both onshore and then offshore. The personnel departments of many contract and service industries were not always able to specify positions with some offshore and onshore component. In these cases, personnel not working exclusively onshore were included in onshore employment and the aggregation noted in Exhibit 3-8. For example, contract drillers were unable to specify which onshore personnel had both onshore and offshore responsibilities without conducting a person by person count of their personnel records. Personnel working exclusively offshore could be identified, however, by all service firms contacted. Exhibit 3-9 summarized the estimated number of contractor employees working offshore and onshore by industry.

Secondary Purchases Resulting from Producer Expenditures

The expenditures by producers in turn resulted in purchases by the contract and support firms of $3.8 billion. These expenditures included purchases of raw materials, operating expenses, capital purchases and subcontracts with other offshore support industries. These expenditures are significant since many are made locally and result in subsequent indirect and induced impacts. These expenditures are summarized in Exhibit 3-8.

Examples of expenditures made by the various contract and support industries are:

- Boat, barge, and marine transportation companies made purchases of $275 million directly to support their sales to the offshore producers.

- Contract exploratory drilling companies made capital and operating purchases totalling $286 million as a result of their activities in the Gulf of Mexico.

- Platform fabrication yards purchased $195 million in materials and services in conjunction with sales going to Gulf of Mexico.

The relative importance of the expenditure effects do not necessarily fall in the same industries which had the primary employment effects. For example, the purchases of tubular goods were estimated to have directly resulted in approximately 3,000 person years of employment (approximately three percent of the total expenditure employment effects). Purchases by tubular distributors and manufacturers on the other hand represent over 10 percent of the expenditure impacts of $409 million. This results because tubular products have a very large component of their total cost consisting of the purchase of raw materials such as iron and energy, require extensive amounts of capital equipment

and are not particularly labor intensive. Labor intensive contract industries have a more immediate employment effect but typically spend less on purchases with other firms.

Both Exhibit 3-10 and Exhibit 3-11 summarize the relative distribution of expenditure impacts among the major support industries. For example, contract development received 9.6 percent of expenditures made by the offshore producers. Expenditures for contract development drilling subsequently resulted in 11.7 percent of the secondary direct wage and salary impacts, produced 9.3 percent of the secondary direct employment effects and resulted in only 8.6 percent of the total direct secondary purchases.

3.4 Geographic Distribution of Expenditure Impacts Associated with Producer Expenditures

Throughout the contract period numerous mechanisms for determining the geographic distribution of the economic impacts associated with the offshore oil and gas producer's expenditures were investigated. Expenditures could not be broken out by physical location by any of the offshore operators. A sampling of the zip codes to which producer checks were mailed was investigated as a mechanism for estimating the geographical distribution of the expenditure or contractor impacts. A preliminary review of some of these data and discussions with producer accounting departments indicated that most checks were mailed to a centralized accounting office at the contractor's corporate headquarters which was located at a different location from where the work was performed. This approach was discounted since it would have produced the misleading results in which all impacts would be allocated to the locations of the accounting departments of the offshore contract and service firms. This would also have placed a major burden on the study participants.

Numerous public and private data sources which could have been applicable for allocating contractor impacts between the various coastal counties/parishes were also considered. The only promising data source for this task was the Bureau of the Census, County Business Patterns data series. This series consists of information on employment and payroll for each county/parish and is available in five year increments.

This data series specified employment and payroll by Standard Industrial Classification (SIC) code by county and parish. The industry sector resolution or breakdown varied greatly by county and industry. These data were available between the two five digit SIC Code level. The disclosure of individual data is determined by the Bureau of the Census primarily by the number of firms located in an individual county or parish. Census rules preclude the release of any information in which there are not more than three predominant firms in the county (or state) for that SIC code. This proved to be a significant drawback with this approach since well over half of all economic activity can not be disclosed at the county level and some information is not even disclosed at the state level.

There were disclosure problems with both the payroll and employment data for approximately half of all counties in Texas and Louisiana and the "state wide category" contains a great deal of the activity associated with oil and gas service businesses. The census information was unusable in this form for allocating expenditure impacts.

The following factors contributed to the decision not to use this mechanism to allocate the contractor impacts to the various counties and parishes.

(1) The primary problem with this approach is that SIC Group 138 includes "all" oil and gas field services regardless of whether they are located on land or offshore. The Census Bureau data does not differentiate between onshore and offshore oil and gas activity and SIC code type information is not separated by offshore and onshore oil and gas activities. Louisiana and Texas both have substantial onshore oil and gas exploration and production. In this situation this would result in allocating offshore impacts to many non-coastal counties which had substantial onshore oil and gas activities. Similarly Census Bureau data could not have been used to allocate impact data between states.

(2) Disclosure problems greatly detracted from the utility of the Census data. Disclosure problems are substantial because about half of all counties having employment specified as a range and no payroll data are presented. This problem could have been addressed by using the employment midpoints and estimating the payroll. Using this technique the information would be relevant for determining the relative order of magnitude of the impacts at the county/parish level. Unfortunately the disclosure problem is further complicated by the fact that 40 percent of total employment and payroll was classified as "statewide". This category is made up of firms with numerous locations statewide, operations split between numerous counties and large companies located in a county for which even a range of employment data can not be provided. Thus, highly accurate employment and payroll data were only actually available for about half of the various counties and parishes and even this information only includes about 60 percent of the economic activity in the oil and gas field services industry.

(3) This information is only available for SIC Industry Group Number 138 "Oil and Gas Field Services". Four digit information would have been broken out by 1381-drilling, 1382-exploration services, and 1389-"all other field services". Four digit level information is

only available at the state level. The use of such a broad indicator was only adequate for large and geographically diversified businesses such as contract drilling. It was not be appropriate for specialized business, such as exploration services or pipeline contractors, which operate out of only a limited number of specific locations. The use of SIC group 138 was too gross a measure to allocate offshore related impacts.

(4) Not all of our contract and support businesses fall into SIC Industry Group 138. For example platform fabrication, fuel/utilities, platform installation, and air transportation companies are not classified as oil field services under the SIC classification system. This would not represent a problem if they fell into narrowly defined industrial sectors. Unfortunately they were classified in broad categories which contain numerous activities unrelated to offshore oil and gas. For example platform fabrication operations are classified as ship building and repair (SIC 373) and fabricated metal products (SIC 34) and utilities are classified as electric services (SIC 4911). These groups consist predominantly of business with no link to offshore oil and gas exploration and development. Thus using this information to allocate the corresponding expenditure impacts would have resulted in a substantial portion of the offshore related expenditures to non-coastal areas or inappropriate coastal counties/parishes.

For these reasons the allocation of impact data are not included in this report. This information would be misleading even as a basic estimation technique for showing the general geographic areas in which contractor impacts occur. Such detailed information on geographical distribution of contractor impacts would require developing through a more extensive study and or a survey of the businesses making up the contract and support industry. An in-depth survey of the contractors and supply companies to the offshore oil and gas industry in the Gulf was specifically precluded under this contract.

3.5 Estimated Impacts Associated with Processing, Refining and Storage of Offshore Product

Additional impacts occur from the handling, storage, processing and refining of oil and gas which originates offshore in the Gulf of Mexico. Some preliminary processing of oil and gas occurs offshore on the actual offshore platform or near the location the product makes landfall. This "processing" consists primarily of the separation of raw oil and gas from other materials. The payroll and employment impacts due to this preliminary processing of oil and gas handling and storage are captured in Section 2.0 because it is actually conducted by the offshore

operators. The expenditures the operators make to transport, store and handle product and perform the preliminary processing are therefore included in the expenditure impacts in the first half of this section.

Additional impacts occur from the handling and processing of these offshore products which were not captured by the data provided by the offshore operators. The offshore operators were not able to provide data on the impacts for activities after they sold the oil and gas to onshore refiners or gas processors. In addition many of the offshore operators transferred title of the oil and gas produced offshore to their parent companies, which subsequently were responsible for processing the oil and gas and distributing it to the end users.

A mechanism was therefore required to estimate the effects of the transportation and processing of the offshore product after it had left the facilities of the offshore operators. Since this information was not available directly from the OOC offshore producers participating in the study it required estimation through the use of secondary sources. Information on these impacts was to be estimated at the county/parish level.

3.5.1 Estimated Impacts Associated with Refining and Storage of Offshore Oil

The estimation of refining impacts at the county level required the development of a unique methodology since oil produced offshore is mixed with oil produced onshore. For the most part onshore and offshore oil are combined and processed at numerous refineries throughout the Gulf of Mexico Region. There are not unique refineries and storage facilities for offshore and onshore produced oil. The approach to this problem was further complicated since county level impacts were required for a product in which specific processing sites could not be identified.

Data were not available on the actual throughput of oil refined by city, county or refinery. Data on oil refined was only available in a non-proprietary format at the state level. The operating capacities of oil refineries in the region were available from the Petroleum Supply Annual, 1984, by company, state, and city. Refinery capacity was summarized by county/parish by combining the various data for all refineries within a county/parish. The total refinery capacity for Texas and Louisiana counties is presented in the first column of Exhibit 3-13.

Refinery production information was not available and refinery capacity thus had to be used as a surrogate for actual production. In the recent operating environment the refinery industry has not been operating near capacity and thus a mechanism was required to adjust refinery capacity to an estimated throughput or measure of actual oil processed. This was accomplished by using the annual national 1984 utilization rate for oil refineries, as published by Oil and Gas Magazine (December 28, 1985). County level information of refinery utilization rates was not available.

The refinery utilization rate for 1984 was 76.3 percent of capacity. This was applied to each county's 1984 operating capacity to derive an estimated measure of actual refinery production, by county for 1984.

These refineries were processing product from both domestic offshore and onshore fields and imported oil. The estimate of county oil refinery throughput required further modification to account for that component of oil refining related to offshore oil production. This was accomplished by using the ratio of offshore production to total production refined. To compute this ratio the total offshore production (Exhibit 1-8) was divided by the total volume of refinery production in Texas and Louisiana. Exhibit 3-13 also specified the estimated volume of processed oil by county (for Texas and Louisiana, attributable to offshore oil.

A mechanism for converting estimated county level data for offshore oil refinery throughput to employment and payroll was also required. To derive the employment impact due to oil refining, a ratio of the average person-years of employment per thousand barrels of oil refined was used and multiplied by the total throughput associated with each county.

Total state employment by SIC code is published by the Bureau of the Census in County Business Patterns. Information for 1984 was not available and 1983 data for the relevant SIC Code 291 (Petroleum Refining) was used. County level employment data was not available and Census employment totals by state for SIC 291 were divided by the total oil refined in each state to derive a state-wide employment to refining ratio. This produced a state-wide ratio of person-years of employment per thousand barrels of oil refined. State-wide employment per thousand barrels of production was 0.032 person-years for Texas and 0.020 person-years for Louisiana.

To derive the payroll impact due to oil refining of offshore Gulf of Mexico production, a ratio of average payroll per thousand barrels of oil was used. Again using County Business Patterns, payroll information for county by SIC code 291 was used to derive a payroll ratio. Therefore, total state payroll was divided by the same state oil refined total used to derive the employment to oil refined ratio. State-wide payroll per thousand barrels of production was $1,090 for Texas and $676 for Louisiana.

When applied to each county's oil refinery utilization, this ratio computed the estimated payroll effect due to the refining of offshore oil by county.

The procedure that was utilized to estimate the refinery impacts at the county level for Gulf oil is presented in Exhibit 3-12. The assumptions relating to this approach are:

- It was assumed that offshore oil from the Gulf of Mexico was refined exclusively in the region. This appears a reasonable assumption since Gulf oil is not transported to other regions of the county for processing. It was further assumed that offshore oil from the Gulf was processed in either Louisiana or Texas. Virtually all Gulf oil is landed in Louisiana and Texas. It was assumed that it was not shipped to other states such as Alabama or Oklahoma for processing.

- It is assumed that all refineries within a state have the same employment and payroll impacts per unit of product processed. In effect this approach assumes that all refineries in the region have the same labor to product efficiencies and have the same rates of pay.

- The proportion of offshore oil to total oil refined was assumed to be constant for all refineries in the two states. Since oil from offshore enters the main oil pipelines in the region and is distributed throughout the area with other oil to be refined this appears reasonable. No mechanism exists for differentiating which oil leaving a pipeline originated offshore. This approach may tend to underestimate refining impacts in coastal areas and slightly overestimate impacts in interior counties since product may tend to be refined at the nearer locations.

Employment and Payroll Effects of Handling and Refining Offshore Oil

Total refinery capacity within Louisiana was 784 million barrels and was 1,436 million barrels within Texas, in 1984. When this was adjusted to account for unused capacity and product refined from non-offshore sources it was estimated that Louisiana refineries processed 452 million barrels of offshore oil and Texas refineries processed 47 million barrels of offshore oil.

Exhibit 3-13 presents this information by county/parish and estimates the associated employment and payroll impacts. Within the region there were an estimated 10,566 person years of employment generated. Of this total 9,054 were estimated to be in Louisiana and 1,512 were in Texas. Counties/Parishes with over 500 person-years of employment resulting from offshore oil production were as follows:

- Calcasieu 1,971 employees;
- East Baton Rouge 1,842 employees;
- Plaquemine 836 employees;
- St Bernard 889 employees;

- St Charles 919 employees;
- St James 948 employees; and
- St John the Baptist 1,075 employees.

Exhibit 3-13 also presents county/parish level information on the payroll impacts of refining offshore oil. It was estimated that refineries within Louisiana generated an estimated $306 million in wages and salaries as a result of processing offshore oil in 1984. Texas refineries generated an estimated $51 million in wages and salaries as a result of offshore oil refined in the state. Similar information is presented in Exhibit 3-13 for each Louisiana or Texas county in with there is a local oil refinery.

3.5.2 Estimated Impacts Associated With Processing and Handling of Offshore Gas

The estimation of gas processing impacts at the county level also required the development of a unique methodology since gas produced offshore enters into the regions gas pipeline system and immediately becomes mixed with natural gas produced onshore. For the most part onshore and offshore gas are combined and processed at numerous gas processing plants throughout the Gulf of Mexico Region. There are not usually specific gas processing plants exclusively for offshore and onshore produced gas. Like the problem with oil refining, the approach to this problem was further complicated since county level impacts were desired for a product in which specific processing sites could not be identified.

Exhibit 3-14 presents the methodology used for determining the county level impacts of gas processing and handling. Current data were available on the actual throughput of gas processed by city, county or refinery. Monthly gas throughput information was available by state, county, and company from various issues of Oil and Gas Magazine. These data were annualized and summarized into total 1984 gas throughput by county/parish. This number represents total processed throughput, from any source, processed within these states. Exhibit 3-15 included a county by county inventory of gas processing throughput in 1984 for Texas and Louisiana.

These processing plants were processing product from both offshore and onshore fields. Unprocessed gas was not imported to the region during this period and thus is not of relevance. This estimate required further modification to account for that component of gas processing related to offshore gas production. This was accomplished by using the ratio of offshore gas production to total gas processed in the region. To compute this ratio the total offshore production (Exhibit 1-9) was divided by the total volume of gas processing throughput in the region. Exhibit 3-15 also specified the estimated volume of processed gas by county, attributable to offshore gas.

A mechanism for converting estimated county level data for offshore gas throughput was also required. To derive the employment impact due to gas refining, a ratio of the average person-years of employment per thousand cubic feet of gas processed was used and multiplied by the total offshore throughput associated with each county.

Total state employment by SIC code is available from the Bureau of the Census in County Business Patterns. Information for 1984 was not available and 1983 information for the relevant SIC Code 4992 (Natural Gas Processing) was used. County level employment data were not available and Census employment. Total gas processing employment by state for SIC 4992 were divided by the total gas processed in the states of Texas and Louisiana to derive two separate state-wide employment to gas processed ratios. This produced a state specific ratio of person-years of employment per million cubic feet of gas processed. This ratio was .0013 person-years of employment per million cubic feet of gas throughput for Louisiana processors and .0050 person-years of employment per million cubic feet of gas throughput for Texas.

To derive the payroll impact due to gas processing of offshore Gulf of Mexico production, the ratio of average payroll per million cubic feet of gas processed was used. Again using County Business Patterns, payroll information for SIC Code 4992 was used to derive a gas processed to payroll ratio. Therefore, total state payroll was divided by the same state was processed total used in deriving the employment ratio. This ratio was $31.6 in annual payroll per million cubic feet of gas throughput for Louisiana processors and $132.79 in annual payroll per million cubic feet of gas throughput for Texas.

It should be noted the employment to gas processing throughput ratio for Texas is significantly higher than that of Louisiana. In other words Census data indicate that a unit of gas processed in Texas has a greater employment and payroll impact that gas processed in Louisiana. This is believed to result from the fact that many of the gas processing and distribution companies are headquartered in Texas. Thus the employment to gas processing impact ratios for Texas reflects additional gas processing activities such as storage, distribution and managerial activities which are not found as extensively in Louisiana.

When applied to each county's offshore gas throughput, this ratio specified the estimated payroll effect due to the processing of offshore gas by county. The assumptions relating to this approach are:

- It was assumed that offshore gas from the Gulf of Mexico was processed exclusively within the region. This appears a reasonable assumption since Gulf gas is not transported to other regions of the county for processing. It was further assumed that offshore gas from the Gulf was processed in either Louisiana or Texas. Virtually all Gulf gas is landed in Louisiana and Texas and unprocessed gas is not moved to other regions for processing.

- It is assumed that all gas plants within an individual state have the same employment and payroll impacts per unit of product processed. In effect this means that all gas processing plants in Texas have the same labor efficiencies and use the same pay scale and that all gas processing plants in Louisiana have the same labor efficiencies and use the same pay scale.

- The proportion of offshore gas to total gas processed was assumed to be constant through the two states. Since gas from offshore enters the main gas pipelines in the region and is distributed throughout the region with other gas to be processed this appears reasonable. This approach may tend to underestimate processing impacts in coastal areas and overestimate impacts in interior counties of Texas and Louisiana.

Employment and Payroll Effects of Handling and Processing Offshore Gas

Total gas plant throughput within Louisiana was 8.4 million cubic feet and 3.9 billion cubic feet within Texas in 1984. When this was adjusted to account for product processed from non-offshore sources it was estimated that Louisiana gas processing plants handled 5.4 billion cubic feet of offshore gas and Texas gas processing plants handled 1.07 billion cubic feet of offshore gas.

Exhibit 3-15 presents this information by county/parish and estimates the associated employment and payroll impacts. Within the region there were an estimated 11,006 person years of employment generated. Of this total 5,650 were estimated to be in Louisiana and 5,355 were in Texas. Counties/parishes with over 500 person-years of employment resulting from the processing of offshore gas were as follows:

- Acadia 794 employees;
- Cameron 594 employees;
- St Bernard 885 employees;
- St Mary 790 employees;
- Terrebonne 509 employees; and
- Vermillion 811 employees.

Texas counties had equally significant employment impacts associated with processing gas but were geographically distributed throughout the state. Within Texas there were over 100 counties with significant processing impacts.

Exhibit 3-15 also presents information on the payroll impacts of processing offshore gas within Louisiana generated by county. It was estimated that gas processing plants in Louisiana generated $137 million in wages and salaries as a result of processing gas which originated offshore in 1984. Texas processing plants generated an estimated $142 million in wages and salaries as a result of offshore gas processed in the state. Similar information is presented in Exhibit 3-15 for each Louisiana or Texas county with a local gas processing plant.

4.0 Analysis of Producer Activity Budget Data

The nine OOC member firms making up the Socioeconomic Subcommittee supplied itemized budget summaries for the six major types of activities conducted in offshore oil exploration, development and production. These budgets were analyzed to develop a mechanism for converting physical activity measures, such a platforms, into estimated economic activity impacts. Budgets for specific projects were obtained for the six following major types of activities undertaken by the offshore producers.

- Geophysical surveying;
- Exploratory and delineation drilling;
- Development drilling;
- Platform construction and installation;
- Pipelaying; and
- Production, operations and maintenance.

A total of approximately 200 projects budgets were received. Budget data received ranged from detailed itemized budgets to summaries of the key physical parameters and the total project cost. The budgets were primarily for 1984 but did include a limited number of projects from 1983 and early 1982. This was necessary to provide an adequate sample size and because many projects do not fall precisely within a calendar year.

Data presented in this section are each presented in three steps. This methodology is also presented in Exhibit 4-1. First, general rules of thumb for determining project costs and expenditures based on basic physical characteristics are presented. This was done primarily through the development of one or more linear regression models which relate project or activity costs to several physical measures of the activity. Both the physical measures of activity and the basic physical characteristics used for these linear regression models are designed to be consistent with the units of activity used by MMS in the environmental impact assessment process.

For example, a linear regression model was developed which predicted geophysical exploration costs when the length of the survey was estimated. A similar regression model predicts total platform costs for a given depth of water. Where possible, the information was reduced to one linear regression model. In several situations however two models became necessary. For example, two geophysical exploration models are presented, one when the survey duration is known and one when survey miles are known. In addition, several models were developed for pipeline construction costs. One is a simple linear regression for shorter length pipelines and one is a multiple linear regression model applicable for longer pipelines which takes into consideration pipeline diameter in inches.

Second, average distributions of expenditures are presented in terms of the average percent of total project costs for each line item. This information was derived by developing an average profile for the combined project budgets supplied by the OOC. Exhibit 4-2 is an example of the type of information received from each producer. Similar information was combined for each of the approximate 40 budget documents available for each activity type (i.e., exploratory drilling) and averaged to provide a more detailed profile of the line item expenditures making up a broad expense category.

Third, the expenditure profiles are converted to cumulative direct primary effects and the secondary direct effects per unit of project cost. The mechanism used for this was the application of the 19 industry specific impact ratios developed in section 3.0 to individual line items making up the expenditures for that activity. For example the average profile for exploratory drilling indicated that 3.9 percent of exploratory drilling costs were associated with marine transportation charges. It was previously estimated (see Section 3.0) that 24 percent of marine transportation costs were for wages and salaries. Thus it can be estimated that for every one million dollars going for exploratory drilling that $39 thousand goes for marine transportation and $9,360 results in wages and salaries for marine transportation employees. This information is organized in detailed impact tables for each of the major expense categories.

4.1 Geophysical Surveying

Geophysical surveying is used to identify areas with potential oil and gas reserves. It involves systematic investigations using several techniques. The geophysical survey methods pertinent to pre-drilling OCS exploration activities are: magnetic, gravimetric and seismic.

Seismic surveys account for virtually all expenditures and activity related to geophysical surveying. In 1983 (latest available data), 94 percent of geophysical expenditures worldwide were for seismic surveys (Geophysics, 1984).

Surveys in the Gulf of Mexico are made both by the oil companies themselves and through contracts with companies specializing in this work. The data presented in Section 2.0 and 3.0 on employment on geophysical vessels indicate that the operation of geophysical exploration vessels by offshore operators is relatively minor in the Gulf of Mexico. Only 80 producer personnel were employed directly by a producer company on geophysical exploration vessels compared with over 3,000 employees at geophysical contractors. Survey work may be undertaken for a single company, several companies in a joint venture or may be a speculative venture by the survey company. Purchases of publicly offered seismic data were included in the estimate of total producer expenditures for geophysical exploration (Section 3.0) These data were not used however as data points for predicting seismic costs per survey mile.

The following information was provided by producers on seismic contracts issued during 1984:

- Total costs;
- Average water depth in the survey region;
- Survey length in line miles shot; and
- Survey period in days on location.

Statistically strong relationships exist between the following three variables: total dollar cost of a seismic survey, miles covered in a survey, and the duration (in days) of the survey. However, duration and miles could not simultaneously be regressed as independent variables against the dependent variable total costs. This resulted because there was a relationship between survey miles and days on location. As one would expect, the more miles covered, the longer the survey took to complete. Two unique equations were thus developed, one which converts survey miles to project costs and one to convert survey duration to project costs. Both linear regression models estimate total survey costs.

Depth of the water in which the seismic activity occurs was found not to have influenced project costs and thus was not included in our cost model. This would be expected because the surveying procedures employed and equipment used are the same regardless of water depth. Several surveys conducted in water depths of less than 10 feet were received. They had a cost per mile of approximately 10 times the average for surveys conducted at deeper water depths. This results both because specialized swamp equipment is required and the survey speeds are much slower.

The correlation coefficient of 0.993 in the regression equation which relates miles covered and project cost. This relationship indicates that the two variables are almost perfectly related, meaning that 99.3 percent of the variance in a survey's cost was explained by the variance in the number of miles covered by the seismic survey. The regression equation for this relationship was:

$$Y = (745.730X + 38{,}407.00)$$

where Y = total survey costs
and X = survey miles covered

This regression equation indicated that, on average, seismic surveys had an average fixed cost of $38,407. This typically reflected the minimum vessel charges for one or two days. There is usually a minimum charge of a day regardless of how small an individual job was. In addition, there is an average variable cost of $745.73 per mile. Variable cost is the incremental cost for conducting additional geophysical surveying after an exploration project has been initiated. Exhibit 4-3 summarizes the

relationship between survey miles and estimated project cost. The total average cost per mile was $961 and included both the variable and fixed, or start up, charges. The standard deviation of total costs per mile of geophysical exploration activities was $271 per mile.

A component of this deviation may have resulted because of differences in quality of equipment, weather conditions and market conditions at the various times. A new 3D seismic technique has proven very successful in the Gulf. It is believed that most increased costs associated with this technique are adequately reflected in the measurement of miles covered. This results because the major factor effecting costs of these 3D surveys is a much narrower tow pattern and thus more line miles must be recorded. In short, this relationship can also be used for determining the costs of a 3D seismic survey.

There was also a strong relationship (correlation coefficient of 0.945) between the duration of the survey and the dollar cost of that survey. As the number of days increased, the survey cost increased at a constant rate. This would suggest that there are not necessarily major economies of scale to longer surveys. The regression equation relating days of seismic work to survey costs is:

$$Y = (22{,}307.90X - \$19{,}166.40)$$

where Y = total survey cost
and X = survey duration (days)

This correlation indicated that each additional day spent on a survey has an average variable cost of $22,307.90. The fixed or start-up cost cannot be estimated accurately with the equation using survey duration. The negative cost resulted because of the large number of survey points for surveys of a very short duration. As such this equation is <u>not</u> appropriate for predicting surveys of only several days in duration. Although this approach cannot accurately be used to predict the costs of short surveys of less than several days, it is a good estimation technique for surveys of a longer duration. In general this linear regression model can be used for estimating geophysical survey costs for surveys of five days or more. The correlation coefficient term for this equation is 0.945. This high correlation coefficient suggests that there is a strong relationship between the variables. The mean dollar cost per day of surveying is $27,543 with a standard deviation of $12,459. Exhibit 4-4 graphically presents this relationship and summarizes the key descriptive statistics for this linear regression relationship.

More detailed information is not available for geophysical exploration activities since these services are sold to the producers on a turnkey fixed price basis. Unlike other purchases made by the offshore producers, the firms typically only receive one invoice and do not have access to more detailed data on trip operating costs.

Physical measures of geophysical activity can be converted to secondary economic impacts using the impact ratios presented in Section 3.0. For example, each line mile of seismic work has a predicted cost of $961. It

can be estimated that for each line mile of seismic work conducted there are the following impacts:

- $331 in wages and salaries are generated;
- $422 in expenditures are created; and
- 0.011 person-years of direct employment are generated.

Using the same impact ratios, each day of seismic work had an average cost of $27,543 and generated the following:

- $9,227 in wages and salaries;
- 0.31 person-years of employment; and
- $12,394 in expenditures by geophysical contractors.

4.2 EXPLORATORY DRILLING

Budget data for 50 exploratory drilling projects were provided by the offshore operators. All Budgets were for 1984. The data collected and analyzed using multiple regression techniques consisted of the following:

- Project cost;
- Water depth;
- Drilling depth;
- Drilling duration measured in days on location; and
- Type of drilling rig.

Well costs per foot drilled and drilling costs per day were calculated for each exploratory drilling project. The unit costs for exploratory drilling varied considerably between the observations in the sample. Cost per foot of well depth varied between a minimum of $124 per foot and a maximum of $2,257 per foot with a simple mean of $591 per foot. The standard deviation of these data were $368 per foot. The variability in this relationship reduces its relevance as a mechanism for predicting expenditure for exploratory drilling activities.

Using the cost per day of exploratory drilling provided a mean of $80,445 a day with a range of $23,417/day to $302,859/day. The standard deviation of these data were $48,507, again making the daily cost of exploratory drilling a poor technique for predicting these costs for the Gulf. The $80,445 mean of the sample was simply the average daily cost of the exploratory drilling budgets in the OOC sample.

Approximately 25 simple and multiple regressions were investigated assuming linear, logarithmic and other relationships. Out of these analyses, two models were derived which can be used for predicting exploratory drilling costs. Both a simple model using water depth and a more complex model requiring an estimate of water depth, drilling depth and an estimate for days on station were derived. The simple linear regression model is easy to use requiring an estimate of water depth at the drilling site as the only input. This equation has a moderate variance and therefore a more complex, but more accurate multiple regression model was also developed.

A simple relationship was developed to specify the daily cost of drilling for a given water depth at the drilling site. This simple model indicated a strong correlation between the cost per day of drilling and the water depth. The correlation coefficient indicated that 83.9 percent of the variance in the daily costs for exploratory drilling can be explained by the water depth of the drilling site. The regression equation for this relationship was:

$$Y = (31.57\ X + \$57,836)$$

where Y = cost per day
and X = water depth in feet

This equation indicates fixed cost or start-up costs per day averaging $57,836. The $57,836 is not the sample mean but rather the fixed cost component of the total charges predicted by the model. Water depth multiplied by the coefficient $31.6 specifies the total variable costs for exploratory drilling. Exhibit 4-5 presents this relationship graphically and summarizes the key statistics for this relationship.

Information on the type of drilling rig used was also assessed through the use of dummy variables. Rig classifications which were included in modeling attempts included platforms, semi-submersibles, jackups, and drillships. Using rig type did not improve the models descriptive ability even though various rigs are known to have different daily contract rates.

This resulted primarily because water depth is often the determining factor in the selection of the type of drilling rig. With rig type and water depth highly correlated the only information which is required to predict costs for the Gulf of Mexico is the water depth of the area to be drilled. In sum, the different costs in the day rate for different types of drilling rigs are adequately captured in the variable representing water depth.

Total costs were predicted using more complex multiple regression analyses. This model is a more powerful tool for predicting project costs but requires an estimate to be made of the drilling depth, number of days on station and the water depth. The regression equation for this linear regression model was:

Total costs = ($2,634 x water depth in feet
+ $492 x drilling depth in feet
+ $51,845 x duration of drilling in days)

This model has a corrected coefficient of multiple correlation (R-squared) of 0.7166 indicating that variances in the independent variables explain 71.66 percent of the variance in each projects total cost. All three independent variables are equally significant in their explanatory power. In addition, the three variables all appeared in the equation to be relatively linear. The mean total cost indicated by the regression statistics is $7,933,972 with a standard error of the multiple estimate of $3.26 million. Exhibit 4-6 presents the statistical description of this regression equation.

All line item project budgets were added together to provide a profile of how drilling expenditures were broken out among the various cost components. The same expenditure categories used in Section 3.0 serve as the primary category groups. More detailed expenditures are listed under each of the 18 main categories. Exhibit 4-7 presents a detailed profile of the types of expenditures and their relative distribution for each dollar spent on exploratory drilling. Unlike the information presented in Section 2.0 and 3.0, this information includes both internal company costs and expenditures with contractors. Charges for producer company time are relatively minor compared to total contracting expenditures and were not always traceable to a project. As such, internal producer costs tended to be slightly understated. The following is a summary of the distribution of costs as a percent of exploratory drilling costs:

- Air transportation - 3.95%
- Water and land transportation - 6.48%
- Catering services - 0.09%
- Cement and cementing services - 3.15%
- Contract labor and engineering services - 1.75%
- Contract exploratory drilling - 37.60%
- Drilling fluids, mud logging & chemicals - 2.85%
- Fuel and utilities - 2.85%
- Tubulars - 7.50%
- Logging, wireline and perforation - 8.01%
- Other oil field services & tool rentals - 10.85%

- Other - 6.0%

- Company labor and internal company charges - 2.78%

Additional detail is provided under each of these line item headings in Exhibit 4-7. For example, tubulars are broken out by drive pipe, conductor, production tubing, general tubing, and casing. These profiles represent an average for each dollar spent on exploratory drilling and were derived by averaging the exploratory drilling budgets for the nine participating firms.

Exhibit 4-8 converts these expenditures to projected impacts by applying the impact ratios developed in Section 3.0 to average expenditures per million dollars of exploratory drilling expenditures. For example, for every million dollars spent on exploratory drilling an estimated $136,774 in wages and salaries are paid by contract drillers, $15,354 in wages and salaries are paid by marine transportation firms to their employees, and $18,748 in wages and salaries are paid by well logging, wireline and perforation firms. Similar information is available on the number of person years of employment resulting from every million dollars invested in exploratory drilling. This information provides an easy method for converting exploration drilling expenditures by offshore producers into employment and wage and salary impacts.

4.3 PLATFORM FABRICATION AND INSTALLATION

Field development occurs between the time of discovery of oil and gas in sufficient quantities and oil company investment in production capabilities. A development program includes the design and construction of all facilities, including any connections to existing facilities. Steel-template, pile founded platforms are generally used in oil and gas development offshore in the Gulf. The principal components of these platforms are the jacket, pilings, conductors, and deck sections.

For the most part, platform designs are site specific with every structure being slightly different. The two general factors which influence the design of offshore structures are the functional requirements and anticipated loads. Functional requirements include the use to be made of the platform (drilling, production or drilling and production and crew quarters). Facility requirements are primarily the number of production wells, water depth, and design life.

Basic information on each of these characteristics was obtained from the sample of producers for recently installed platforms. Information provided consisted of:

- Total fabrication and installation costs;

- Water depth;

- Availability of crew quarters;

- Status of on board processing;
- The number of well slots; and
- Total production from the platform.

Number of drilling or well slots indicated the locations from which wells can be drilled and was used as a simplified measure of overall platform size. Costs included all costs associated with the design, fabrication, and installation of each platform. These costs included all equipment and materials and company charges directly traceable to the project. These charges did not include any charges incurred prior to platform installation even if they were traceable to a field. For example exploratory drilling costs were not included in the total platform costs for an individual project.

Platform fabrication and installation costs were found to be a function of several variables. The depth of the water in which the platform was being fabricated and installed is the single most significant indicator of total platform cost. A strong positive relationship between water depth and costs could be documented with the provided data. Platforms in our sample were located in water depths ranging from 20 to 1,000 feet. The number of well slots on a platform also proved to be an important determinant of total costs according to our model results. This was used as a surrogate for the general size of the platform.

Attempts to document a relationship between production volume and platform cost were unsuccessful. It was hoped that production volume could also be used as a measure for size since estimated production is one of the primary estimates made by MMS planners. It is believed that production volume did not correlate with platform cost for two reasons. First, all data was provided for platforms constructed or installed in 1984 and production drilling was still underway on many of the structures in the sample. Thus, new platforms for which the data were provided did not include all the production that would eventually come on line. Second, some platforms received the output from production wells completed without a platform. Thus, a major aspect of the platforms design capability, the processing and pumping of the product from subsea completions, was not included in reported production volumes.

The presence of on board processing was also shown to have a statistically significant impact on platform costs. There did appear to be a correlation between the presence of on board processing and the size of the platform as measured in well slots.

The presence of crews quarters on a platform was an insignificant factor in modeling total platform costs. This may be because crew quarters are a relatively small expense in comparison to a project's total cost.

Approximately fifteen simple and multiple regression equations were evaluated. The one which is most relevant for predicting platform fabrication and installation costs was:

Total Costs = (-$3,457,000
+ $50,195 x water depth in feet
+ $3,134,733 if on board processing
+ $363,850 x the number of well slots)

The corrected coefficient of multiple determination or R squared term for the equation is 0.74, indicating that 74 percent of a platforms total cost is explained by the measures of water depth, well slots and a dummy variable representing the presence/absence of on board processing. Exhibit 4-9 summarizes the statistics for this regression equation.

The results of averaging the individual line items for the 41 project budgets received are presented in Exhibit 4-10. These budgets indicated the following profile for platform construction and installation expenditures in the Gulf:

- Boat, barge marine equipment & transportation - 1.0%
- Contract labor and engineering services - 5.65%
- Pipeline and pipelaying contracting - 14.8%
- Platform installation - 6.22%
- Prime platform equipment and fabrication contract - 61.45%
- Tubulars - 0.11%
- Other expenses and materials - 9.59%
- Company Labor and Charges 0.72%

Additional line item detail is provided in Exhibit 4-10. Using this table it can be estimated that out of the 6.2 percent of total expenditures typically spent on platform installation, 5.17 percent are for the prime installation contract. Other costs associated with platform installation include offshore fabrication, fees for moving bridges, positioning, soil testing and weld inspections.

Exhibit 4-11 converts the expenditure profile for platform fabrication and installation to estimated secondary direct impacts. This is done by applying the impact ratios presented is Section 3.0 to the average distribution of expenditures for platform construction. This procedure reveals that for every million dollars of platform fabrication and installation expenditures, fabrication yards pay $249 thousand in wages and salaries, provide 9.0 person years of employment and make materials and equipment purchases of $154,000. The installation contractors provide wages and salaries of $22,382 and 0.74 person-years of employment for every million dollars spent on total platform construction.

4.4 Development Drilling

A development drilling program is designed to bring the field discovery into production. Drilling budgets for 54 projects were received from producers. Budgets were presented on the basis of individual wells and were not summarized for all wells drilled from a platform or within a field. Data supplied for each development well were:

- Total project costs;
- Water depth;
- Drilling depth;
- Drilling duration in days;
- Type of rig from which the well was drilled; and
- If the well was completed.

Development drilling budgets received were located in water depths of between 10 and 1,000 feet and were conducted from platforms, barges, jackup rigs and semi-submersibles. Twenty five percent of development wells drilled were not completed either because they were dry holes or due to technical problems during drilling.

The costs associated with developmental drilling activity can accurately be predicted with our model. However the only model with substantial explanatory power was complex and required several inputs. In the analysis of the 54 drilling budgets received, total cost was the dependent variable. This includes all costs associated with developmental drilling activity including all purchases, contracts and company charges. Virtually all information supplied by producers in the sample statistically influenced total costs. The variables determining costs were duration of drilling (measured in days), drilling depth, water depth in feet, if the well was completed, and rig type. The completion of a well was included as a dummy variable - that is, using a yes/no proxy. Type of rig used was divided into semi-submersible, jackup, platform, or inland barge. This was accomplished by the use of four separate dummy variables to denote rig type.

The duration of drilling, measured in days, is the most significant measure of total cost. As one would expect, as the number of days of development drilling increases, the total costs also increase. This would be expected since development drilling has high daily operating costs. There were also no indications that significant economies of scale existed when developmental drilling continued for longer durations. This may result because most development drilling took place on platforms for which there are no vessel day rates associated to a development well.

A strong positive relationship also exists between total costs and drilling depth (measured in feet). Again, the equipment and supplies necessary to drill in greater depths increases the costs of developmental drilling at a seemingly constant rate.

Water depth (measured in feet) alone has only minor significance in explaining total costs. Drilling depth is more important, in cost terms than is water depth. This may be explained by the fact that the primary mechanism by which water depth increases overall costs is through the additional cost of constructing and installing a platform. Once the platform is paid for, development drilling costs are not primarily determined by water depth. However, when water depth is used in combination with the other variables, it does increase the explanatory power of the model.

Some development wells in the sample were not completed either because of a dry hole or technical problems. This occurrence has only a minor impact on the total costs of development drilling. While completion intuitively and statistically adds to a well's cost it does not appear to be a large cost consideration.

The type of rig used also has an effect on total costs. Approximately 70 percent of development wells in our sample were conducted from installed platforms. Rig type is incorporated in the proposed expenditure model through three dummy variables (semi-submersible, jackup, platform). The multiple regression equation best predicting total development drilling costs is:

Total Cost = (-$3,801,761
+ $1,604 x water depth in feet
+ $244 x drilling depth in feet
+ $61,591 x drilling days
+ $1,251,040 if completed
- $363,451 if semi sub
+ $1,251,040 if jackup rig
+ 1,636,428 if platform

The high corrected coefficient of multiple determination (also known as the R-squared term) indicates that this model can predict total costs associated with developmental drilling with a high degree of accuracy. The F-ratio of 69.54 also assures us that the model explains much of the variance in the total cost of a development well. In general, this is a good predictive model for estimating the total costs associated with developmental drilling. Exhibit 4-12 summarizes the statistical parameters of the model.

The complexity of this model may make it difficult to utilize for planning purposes. A simpler and only slightly less reliable model was also developed. In this case, the only inputs required to determine development well costs are estimated drilling or reservoir depth and the number of drilling days. Exhibit 4-13 summarizes the regression statistics for this simplified model of development drilling costs. Using a simplified approach, development drilling costs can be estimated

with the following model:

Total Cost = (-$1,910,429
+ $168 x drilling depth in feet
+ $71,420 x days)

All producer project budgets were added together to provide a profile of how development drilling expenditures were broken out among the various cost components. Exhibit 4-14 presents a detailed profile of the types of expenditures and their relative distribution for each dollar spent on development drilling. This information includes both internal company costs and expenditures with contractors. The following is a summary of the distribution of costs as a percent of exploratory drilling costs:

- Water and land transportation - 7.5%
- Contract labor and engineering - 2.5%
- Cement and cementing services - 3.1%
- Prime development drilling contract - 27.8%
- Drilling fluids, mud logging & chemicals - 6.9%
- Fuel and utilities - 2.6%
- Tubulars - 13.1%
- Logging, wireline and perforation - 5.5%
- Other oil field services & tool rentals - 19.7%
- Company labor and charges - 1.3%
- "All other charges" 8.6%
- Catering Services 0.4%

Additional detail is provided under each of these line item headings in Exhibit 4-14. For example, well logging is broken out by coring, drill stem tests, logging services, acidizing and perforation. These profiles represent an average for each dollar spent on development drilling and were derived by averaging 55 drilling budgets for the nine participating firms.

Exhibit 4-15 converts these expenditures to projected impacts by applying the impact ratios developed in Section 3.0 to average expenditures per million dollars of development drilling expenditures. For example, for every million dollars spent on development drilling an estimated $101,011 in wages and salaries are paid by contract drillers, $17,749 in wages and salaries are paid by marine transportation firms to their employees, and $12,794 in wages and salaries are paid by well logging, wireline and

perforation firms. Similar information is available on the number of person years of employment resulting from every million dollars invested in exploratory drilling.

4.5 Pipeline Construction

The most important determinant of the total cost of a pipeline is pipeline length. However, for most of the shorter lengths of pipeline construction, those under approximately 15,000 feet, the data indicated that there is a general fixed cost. Relatively short pipelines had very similar constructions costs regardless of their diameter or length. The actual cost of many short pipes range around the fixed costs point for a pipeline construction job, meaning that the cost is comprised of operating and start-up costs and the variable costs of the pipeline itself is not the primary cost determinant. However, over the whole range of pipeline lengths, the simple regression equation correlating the length of the pipeline with the cost of the pipeline indicated:

$$\text{Total Cost} = (\$78.111X + \$94,373)$$
where X = pipeline length
and \$94,373 = fixed costs

This equation has a correlation coefficient of 0.771 making it a good explanatory and a good predictive model for aggregated costs. These figures indicate average start-up costs of \$94,000 and variable costs or cost per foot of pipeline length of about \$78. Exhibit 4-16 presents the relationship between pipeline length and total cost for construction jobs in our sample.

Water depth in which the pipeline was being laid showed no significant impact on pipeline construction costs and was, therefore, not included in the regression. This might be expected since basically the same equipment might be used in most intermediate water depths. Pipelaying in very deep water is known to affect cost. However, no pipeline construction budgets in our sample were for water depths in excess of 500 feet. A variable indicating if a pipeline was carrying oil or gas also had no effect on total costs.

For relatively long pipelines, those over about 10 miles in length, the pipe diameter had a major impact on total costs. The larger pipelines appear to increase in cost at an increasing rate, while simultaneously smaller pipelines increase in cost at a decreasing rate for pipelines of a longer length. Large pipelines would include those with diameters greater than approximately 12 inches, while small pipelines, would include those with diameters less than 12 inches. This analysis suggests pipe diameter becomes an important factor at greater lengths. This may result because the costs of materials becomes a larger component of total costs with larger diameter pipelines and simultaneously the fixed start up costs become less relevant. Since the shorter pipeline costs have a larger fixed cost component, diameter plays a minor role in their total cost. Further analysis indicated that diameter is not a significant variable over the range of all pipeline lengths. Regressing diameter and

length on total costs yields approximately the same explanatory power as does regressing pipeline length alone on total costs. The multiple regression equation explaining pipeline costs is:

Total Cost = (-$1,496,030
+ $59.7 x length in feet
+ $257,872 x diameter in inches)

Exhibit 4-17 summarizes the regression statistics for this relationship. The negative Y-intercept term would indicate that the linear relationship does not hold for small or short pipeline. The multiple regression model is thus more appropriate for pipelines over approximately 10 miles in length. Since both the simple and the multiple regression are approximately equal in their significance level, they could be readily substituted depending on pipeline length and the availability of information.

The pipeline construction budgets for the 33 examples supplied by the OOC study participants were averaged as a mechanism to estimate the distribution of pipeline costs. This information is presented in Exhibit 4-18. Information presented in this table indicates, for instance, that 57 percent of pipeline costs are associated with the prime contract, 19.7 percent of costs represent the line materials and ten percent of total costs represent expenditures for contact labor and engineering services. Additional detail reveals budget item information such as the route and hazards survey represented 1.9 percent of costs and corrosion systems and anodes made up 1.4 percent of total pipeline expenditures.

The information in Exhibit 4-19 was converted to estimated impacts per million dollars of pipeline expenditures. These estimates indicate that for every million dollars of pipeline expenditures there are $119,174 in wages and salaries paid to pipeline contractor employees. In addition, a pipeline expenditure of $1 million will result in 7.77 person-years of employment with the prime pipeline contractors. Total wages and salaries paid by the pipe suppliers are estimated at $29,238 and purchases of outside materials are estimated at $235,043 per million in pipeline costs.

4.6 Production Operations and Maintenance

Operations, production and maintenance budgets were provided for 40 platforms or groups of related platforms for 1984. These data included all producer company costs and all expenditures for contract labor, maintenance services, transportation and material purchased. In the various relationships investigated between production volume and operating costs there did not appear to be a significant relationship.

This may have resulted because platforms which served as cost centers were not always closely tied to the volume of product they produced. For example some platform complexes are fed by unprocessed product from other platforms and some platforms process and pump product which they do not actually produce. There are even platforms which served as cost centers

but which did not actually produce product and simply handled oil or gas from an other area. For these reasons it was difficult to correlate platform operating costs strictly against the volume of oil or gas it produced.

Production costs appeared to be randomly clustered around an average production cost of $6.52 per barrel equivalent unit of production. As such it may be appropriate to simply use an average production cost of $6.52 per barrel equivalent measure of production. The platform operations budgets for the 40 examples supplied by the OOC study participants were averaged to estimate the distribution of operation and maintenance costs. This information is presented in Exhibit 4-20.

Information presented in this table indicates that 43 percent of platform operations and maintenance expenses were internal company charges. Other major charges associated with field operations were:

- Boat and marine transportation 6.4%
- Contract Labor 22.0%
- Fuel and Utilities 2.3%
- Well logging and perforation 16.3%
- Materials and equipment rentals 7.2%

5.0 SUMMARY AND SYNTHESIS OF STUDY RESULTS AND METHODOLOGY

5.1 Summary of Results

To assess the socioeconomic impacts of oil and gas development required the estimation of the various components of economic impacts. Total economic impacts in turn drive socioeconomic measures such as population and associated demographic impacts. Relative to this study, these economic impacts are:

- The direct effect is traditionally considered the initial demand for the product. In this case, it is the actual purchase of oil and gas from the offshore producers in the Gulf of Mexico. For the purpose of socioeconomic impact analysis the initial demand for oil and gas is treated as a given. This effect was beyond the scope of this study and as such is not addressed in this report.

- The direct primary effect is the employment, wages and salaries associated with positions with the offshore oil and gas producers and processors. In short, these effects are the wages and salaries received by the employees of the oil and gas producers associated with their activities in the Gulf of Mexico region. The primary producers are the actual lease holders or operators which explore, develop, produce and subsequently process oil and gas. This information was obtained through several surveys of the nine members making up the OOC Socioeconomic Subcommittee. These effects were estimated as follows:

  - $8.75 billion in expenditures for the purchased goods and services;

  - $853 million paid in wages and salaries to oil company employees; and

  - 23,935 person-years of employment with oil companies.

- The secondary direct effect results from the purchase of inputs by the primary producers from the various businesses which supply them. For example, the purchase of an offshore platform or the purchase of crew boat transportation services represent a secondary direct effect. This information was obtained through surveys of the OOC subcommittee and discussions with 50 offshore contractor and service companies. These effects were estimated as follows:

- $2.58 billion in wages and salaries to employees of the contract and supply companies;

- $3.89 billion in expenditures for goods and services with other companies; and

- 97,400 person-years of employment with contract and supply companies.

- Secondary direct effect associated with the handling, refining and processing of offshore oil and gas. Some processing and handling of offshore oil and gas is conducted by the offshore processors. These impacts are captured in the above noted effects. Offshore producers do not however, perform all the processing or any of the actual delivery of the product to end users. Additional secondary impacts therefore occur at the refineries and gas processing plants which transport, store, process or refine the oil and gas which originated offshore. These effects were estimated as follows:

  - $637 million in wages and salaries to employees of oil refining and gas processing plants; and

  - 21,572 person-years of employment with gas processing plants and oil refineries.

- Indirect effects are the activities which result from the purchase of goods and services by the direct suppliers of the offshore producers. These indirect impacts extend throughout the economy as each supplier makes purchases from other suppliers. These effects are not included in the direct effects assessed in this study.

- Induced effects result from the purchase of goods and services resulting from the wages paid by the primary, direct, and indirectly affected businesses. Induced household purchases have a component which reflects the additional indirect and induced effects of expenditures by households. This is known as the multiplier effect. These effects are not included in the direct effects assessed in this study.

Only the primary direct, secondary direct effects and secondary direct effects of refining and processing were included within the scope of this study. Exhibit 5-1 depicts these various impacts and presents a summary of the project results for each.

Exhibit 5-2 summarizes the estimated total direct and secondary direct employment by state, directly resulting for offshore oil and gas activities in 1984. There were an estimated 142,860 person years of employment directly associated with Gulf of Mexico offshore oil and gas operations in 1984. These employment impacts consist of the following:

- Producer headquarters personnel - 9,433 employees;
- Producer staging area personnel - 4,540 employees;
- Producer personnel located on platforms - 9,224 employees;
- Producer personnel stationed offshore on vessels or locations which are designated on an as needed basis- 705 employees;
- Gas processing plant personnel - 11,006 employees;
- Oil refinery personnel - 10,556 employees; and
- Contractors and suppliers to the offshore producers- 97,386 employees.

Similar data are summarized in Exhibit 5-3 by county, for each county/parish located in a Gulf Coast state. In reviewing the information in Exhibit 5-3 it should be noted that producer employment is based on residence location and that processing and refining impacts are based on place of work.

Of the total employment impacts producer headquarters personnel make up 6.6 percent. Producer staging area personnel make up 3.2 percent, producer personnel stationed on platforms make up 6.4 percent, producer personnel stationed offshore on vessels make up 0.4 percent, gas processing plant personnel make up 7.7 percent, oil refinery personnel 7.4 percent, and contractors and suppliers to the offshore producers 68.1 percent.

Exhibit 5-4 summarizes the estimated direct payroll effects resulting from offshore oil and gas activities. In 1984 there were an estimated $4.08 billion in wages and salaries paid by offshore producers and the businesses directly associated with offshore oil and gas operations. These payroll effects breakdown into the following:

- Oil and gas producers and operator personnel - $853 million in wages and salaries;
- Gas processing plant personnel - $279 million in wages and salaries;
- Oil refinery personnel - $357 million in wages and salaries; and

- Contractors and suppliers to the offshore producers- $2,587 million in wages and salaries.

Similar payroll data is summarized in Exhibit 5-5 by county, for each county/parish located in a Gulf Coast state.

5.1.1 Summary of Direct Producer Impact

Study results indicated that 23,936 jobs at production companies were directly the result of offshore oil and gas leasing in the Gulf of Mexico in 1984. This estimate was derived by factoring and scaling a sample of 12,319 producer employee records. These positions resulted in a total

- 1,524 employees - Lafayette Parish; and
- 1,489 employees - St. Tammany Parish.

All payroll and employment information was sorted by job description, employee work location, employee residence location, employee staging site, and offshore work site. These data were analyzed by county, work site and offshore leasing area.

5.1.2 Summary of Expenditure Impacts

The many contract firms utilized by the offshore producers and the firms which directly supply goods and services to the producers also incurred direct economic impacts attributable to offshore oil and gas leasing. It is estimated that the offshore oil and gas producers were responsible for $8.75 billion in expenditures in 1984. The nine OOC producers participating in this study were responsible for $4.4 billion in purchases from suppliers and contractors. The estimated 1984 producer purchases, expenditures, and contracts for offshore activities in the Gulf of Mexico resulted in an estimated $2.59 billion in wages and salaries to the employees of contractors and other general businesses. These contractors and other general businesses also had an employment impact of 97,500 full-time equivalent positions. It was estimated that 28,955 of these positions are located primarily offshore, 20,085 have an offshore component, and 48,347 are located exclusively on land. The major employment impacts with the offshore oil and gas contractor industries in the Gulf of Mexico are as follows:

- Boat, barge and marine equipment - 6,074 employees;
- Contract labor and engineering - 19,005 employees;
- Contract exploratory drilling - 7,748 employees;
- Contract development drilling - 9,026 employees;
- Platform and equipment fabrication - 7,170 employees; and
- Other oil field services and tool rentals - 13,656 employees.

The expenditures by producers, in turn result in purchases by the contract and support firms of $3.9 billion. These expenditures included purchases of raw materials, operating expenses, capital purchases, and subcontracts with other offshore support industries. These expenditures are significant since many are made locally and result in subsequent indirect and induced economic impacts. Estimating these indirect and induced effects is the topic of an independent modeling effort by the Minerals Management Service. Highlights of these expenditures made by the contractors and suppliers to the offshore oil and gas producers are:

- Air transportation - $264 million;
- Boat, barge and marine transportation - $506 million;
- Catering services - $76 million;
- Cement and cementing services - $178 million;
- Contract labor and engineering services - $1.3 billion;
- Contract exploratory drilling - $717 million;
- Contract development drilling - $835 million;
- Diving - $28 million;
- Drilling fluids, mud logging and chemicals - $389 million;
- Fuel and utilities - $289 million;
- Pipeline and pipelaying contracting - $190 million;
- Platform fabrication - $489 million;
- Platform installation - $118 million;
- Production enhancement services - $227 million;
- Tubular (drilling, casing and other pipe) - $630 million;
- Seismic and geophysical services - $280 million;
- Well logging, wireline and perforation services - $478 million;
- Field operating expenses, other oil field services; tool rental - $1 billion; and
- "Other" purchases and expenditures - $656 million.

5.1.3 Summary of Processing, Refining and Handling Impacts

Total 1984 refinery capacity was 784 million barrels within Louisiana and 1,436 million barrels within Texas. When this was adjusted to reflect unused capacity and account only for product refined from offshore sources, it was estimated that Louisiana refineries processed 452 million barrels of offshore Gulf oil and Texas refineries processed 47 million barrels of offshore Gulf oil in 1984.

Within the region there were an estimated 10,566 person-years of employment generated at oil refineries as a result of offshore oil. Of this total 9,054 were estimated to be in Louisiana and 1,512 were in Texas. It was estimated that refineries within Louisiana generated an estimated $306 million in wages and salaries as a result of processing offshore oil in 1984. Texas refineries generated an estimated $51 million in wages and salaries as a result of offshore oil refined in the state.

Actual 1984 gas plant processing throughput in Louisiana was 8.4 billion cubic feet and 3.9 billion cubic feet in Texas in 1984. When this was adjusted to account for gas processed from non-offshore sources, it was estimated that Louisiana gas processing plants handled 5.4 billion cubic feet of offshore gas and Texas gas processing plants handled 1.07 billion cubic feet of offshore gas.

Within the region there were an estimated 11,006 person-years of employment generated at gas processing plants as a result of offshore oil activities. Of this total, 5,650 were estimated to be in Louisiana and 5,355 were in Texas. Within Texas there were over 100 counties with significant gas processing impacts.

It was estimated that gas processing plants in Louisiana generated $137 million in wages and salaries as a result of processing gas which originated offshore in 1984. Texas processing plants generated an estimated $142 million in wages and salaries as a result of offshore gas processed in the state.

It should be noted the employment to gas processed ratio for Texas is significantly higher than that of Louisiana. The Census Bureau data used to derive this estimate indicate that a unit of gas processed in Texas has a much greater employment and payroll impact than the same unit of gas processed in Louisiana. This is believed to result from the fact that many of the gas processing and distribution companies are headquartered in Texas. Thus the employment to gas processing impact ratios for Texas reflects additional gas processing activities such as storage, distribution and managerial activities which are not found as extensively in Louisiana.

5.1.4 Summary of Producer Activity Budget Data

The nine OOC member firms making up the Socioeconomic Subcommittee supplied itemized budget summaries for the six major types of activities conducted in offshore oil exploration, development and production.

These budgets were analyzed to develop linear regression models for converting physical activity measures, such number of platforms, into estimated economic activity impacts. The following models were developed for estimating the expenditures associated with basic physical or descriptive characteristics of offshore oil activities in the Gulf of Mexico.

Geophysical surveying:

Y = ($745.730X + $38,407.00)
where Y = total survey costs
and X = survey miles covered

or

Y =($22,307.90X - $19,166.40)
where Y = total survey cost
and X = survey duration (days)

Exploratory and delineation drilling:

Y = ($31.57X + $57,836)
where Y = cost per day
and X = water depth in feet

or

Total cost = ($2,634 x water depth in feet)
+ $492 x drilling depth in feet
+ $51,845 x duration of drilling in days)

Platform construction and installation:

Total Cost = (-$3,457,000
+ $50,195 x water depth in feet
+ $3,134,733 if on board processing
+ $363,850 x the number of well slots)

Development Drilling:

Total Cost = (-$3,801,761
+ $1,604 x water depth in feet
+ $244 x drilling depth in feet
+ $61,591 x drilling days
+ $1,251,040 if completed
- $363,451 if semi sub
+ $1,251,040 if jackup rig
+ 1,636,428 if platform

or

Total Cost = ($1,910,429
+ $168 x drilling depth in feet
+ $71,420 x days)

Pipelaying:

Total Cost = ($78.111X + $94,373)
where X = pipeline length
and $94,373 = fixed costs

or

Total Cost = (-$1,496,030
+ $59.7 length in feet
+ $257,872 x diameter in inches)

Production, operations and maintenance:

Average Operation and Maintenance Cost:
$6.52 per barrel equivalent unit of energy

5.2 Synthesis of Methodology

This subsection discusses the strengths and weaknesses of each of the methodologies used in the development of the report. These discussions are organized by direct producer impacts, secondary producer expenditure impacts, secondary producer processing and refining impacts and the analysis of producer activity budgets.

When using any of the data relating to the direct primary effects or the secondary direct effects it must be kept in mind that all information contained in the report reflect the industry structure during 1984. Offshore Gulf of Mexico production during the study period was 375.8 million barrels of oil and 5,417 million cubic feet of gas. This period was viewed as a relatively depressed period for the industry when viewed within the context of the previous three to five years.

The information contained in the analysis of producer activity budgets on the other hand, are based on the costs of providing a specific product or service. These costs are closely tied to the competitive environment and utilization rates within the offshore contract and service businesses. Given that 1984 was a slack or depressed year for the offshore industry the unit prices specified by the predictive model can be expected to understate costs during a period of high activity levels. These prices can also be expected to overstate the costs of undertaking a specific operation should declining oil and gas prices result in reduced exploration and development contracting in the Gulf.

Estimates of place of work-place of residence patterns are based on employment data for December 31, 1985. This information reflects the general employment patterns of the employees of the offshore producers. These patters are determined primarily by the relative desirability of offshore oil and gas related jobs relative to other opportunities in the regions economy. As such these patterns reflect the fact that oil and gas employment is relatively desirable compared to alternative

employment. As long as the relative desirability of oil and gas jobs remain unchanged these relationships should remain relatively intact.

5.2.1 Assumptions of Direct Producer Impacts Methodology

Survey Period for Producer Employee Records

All annual information is for 1984. Point specific data such as residence county/parish were for December 31, 1984. These data were reported exactly how they appeared on personnel records for each employee. As such, the actual records were highly reliable and a perfect match with the designated study period.

Geographic Areas Designated for Producer Employee Records

Data provided by all producers were exclusively for offshore operations in the Gulf of Mexico. Economic activity associated with onshore oil and gas operations and non Gulf of Mexico operations has been excluded from all information in this section. Data were all exclusively for the Gulf of Mexico and offshore activities. No modification of the data was required to adjust or exclude economic activity from other geographic areas or other non-offshore oil and gas activities. For the most part, the operating divisions of the OOC subcommittee members coincided with the study objectives to include only data for offshore personnel in the Gulf of Mexico. Some personnel had shared responsibilities. This included both personnel with onshore and offshore job requirements and offshore Gulf of Mexico and other offshore responsibilities. Each personnel record was thus coded to reflect the percent of their responsibilities associated with Gulf of Mexico offshore activities. State marshlands and interior lakes under lease were not included in these State water areas. The economic activity associated with marine-type operations in interior lakes or non-coastal marshlands were not included in any of data used to derive the estimates in this document.

Analysis of Employee Records

All producer expenditure and personnel estimates were generated by tabulation of the original full data set of 50,000 employee records. Most of these personnel records were for fractional employees which subsequently were rounded to the nearest whole number in all exhibit subtotals and totals. Totals therefore do not represent averages and are highly accurate. Because fractional employees were rounded to the nearest whole person, subtotals and subsubtotals which contain only several person-years of employment should be viewed with caution. For example, in comparing a county with one producer employee to a county with two producer employees, it should be remembered that the actual data may have indicated that one county had 1.4 person-years of employment compared to 1.6 person-years of employment for the other county. This is only a problem however with subtotals containing a very small number of persons and does not apply to payroll data which was rounded to the nearest dollar. The most general exhibits or totals carry the highest degree of precision.

Definition of Wages and Salaries

All estimates of the direct impacts of offshore producers include information on both the number of employees and the total wages, salaries and bonuses they received. As such, the wage and salary data are highly reliable and contain all earnings with the exception of stock option plans.

Descriptive Data on Producer Employees

The information extracted from the personnel records for the producers included: job description, residence location, onshore work location (if applicable), offshore work location (if applicable), staging site (if applicable), and corporate division, as well as wage and salary information. These data were very specific in the personnel records and required standardization and the aggregation of many of the descriptive elements. As such, the descriptive variables on which the personnel records were sorted are highly reliable.

Effect of Corporate Mergers and Industry Structure on Data

During the study period three of the OOC Socioeconomic Subcommittee companies were involved in mergers. This did not affect the study results or the analytical approach. In all cases, the combined or modified companies were included in all analyses as they existed in 1984. The integration of the merged companies offshore operations and accounting systems was not completed at the time the data were submitted by the various firms. Many fields are explored and developed under joint venture agreements in which several firms share both the expenses and revenues. Expenses and revenues are shared only through an accounting allocation and individual fields are physically operated by the field operator. All data provided by the producers were exclusively for operations in which they were the field operator. Data for activities in which an operator only had a financial interest were not provided in the data submitted by that producer. Fortunately, production volumes in all Federal and State lease records are carried under the name of the field operator. Thus, all analyses were done using data from the field operator and production levels specified in terms of the field operator.

Ability to Differentiate Between Activities in Federal and State Waters

The data obtained from producers sought to differentiate between activities and expenditures in the Federal OCS and various State waters. None of the nine participating producers was able to track physical activities, internal expenses or contract purchases by operations in Federal and State waters. Further, no internal company data were available on which to allocate wages and salaries or expenditures between Federal and State waters. All nine OOC firms participating in the study used functional or spacial delineations of their operations which did not differentiate between activities in the Federal OCS and State leases.

This resulted in study results not being able to differentiate between the economic impacts specifically for Federal or State waters. This is believed not to be a major shortcoming since State waters represent a relatively small proportion of offshore production and activity in the Gulf region. As such, total economic impacts may be used as a surrogate for Federal OCS impacts with the understanding that they are slight over estimates. State waters represented only 5.5 percent of offshore gas production, 10.3 percent of offshore oil production and 7 percent of total offshore energy production.

Use of Person-Years as a Measure of Employment

All employment information is standardized in person-years of employment. This was necessary because producer personnel work in multiple offshore areas, shared responsibilities between the Gulf and other regions, shared responsibilities between onshore and offshore activities and many residence zip codes straddled county/parish boundaries. As such, results slightly underestimate the total number of persons receiving some employment or payroll benefit from the offshore oil and gas industry.

Determination of County/Parish of Residence

The distribution of employment and wages to employee county/parish of residence, work location, staging site and offshore lease area are based on employee assignments and residence location on December 31, 1984. This was believed not to be a significant factor and the residence information is highly reliable. One introduced source of potential error resulted because the county/parish of residence for producer employees was not directly available from the employment records maintained by producers. Employee residence was specified in terms of each employee's home zip code as carried on employer records for tax reporting purposes. Residence zip codes could not be easily converted to county of residence since approximately one third of zip codes in Gulf of Mexico states were located in two or three counties/parishes. A Bureau of the Census program was used for determining county/parish of residence from individual zip codes. This program was based on 1980 census data and included changes in zip code boundaries through 1983. This program converted each zip code to the unique county/parish specified by the Federal Information Processing Standards (known as FIPS county codes) and indicated the percent of the population in that zip code which was located in each county/parish. Thus, for zip codes with residences in more than one county/parish multiple fractional personnel entries were generated. When dealing with an individual personnel record this process resulted in an error factor. However, when run for all producer employees this was not believed to introduce a significant error.

Scaling of Results to Reflect Universe

The sample of offshore producers provided by the Offshore Operators Committee represented a relatively large proportion of offshore activity in the Gulf of Mexico. A standardized measure of economic, physical or production activity was required to adjust the OOC Socioeconomic

Subcommittee provided data to account for the offshore operations of firms not in the sample. Numerous activity measures were examined and MMS and State lease production records were identified as the only information source adequate for this task. Barrel equivalent units of production were identified as the best information on which to scale study results. Offshore production was viewed as a good measure of activity on which to scale study results because it was: available by offshore operator, consistent and reliable, comparable data were available for both State and Federal waters, available by lease area, and could be obtained for the same period for which company data were available. In addition, both oil and gas activities are of major importance in the Gulf and other information sources only covered one aspect of this activity.

The selection of a scaling system did introduce the potential for error. Alternative measures of activity ranged from no more than 57 percent to a low of 44.3 percent. The energy production index (Exhibit 1-11) represented both the average and mid point between all available alternative measures. Assuming a worst case, the energy equivalent measurement differs from any of the alternatives by several percentage points. It is therefore possible that the scaled results represent an over or understatement on the order of magnitude of plus or minus 10 percent.

Onshore employment was scaled using the ratio of Gulf-wide production associated with the OOC Socioeconomic Subcommittee to total production. The sample of firms participating in the study were responsible for 661 million out of 1,319 million barrel equivalent units of production. This represented slightly more than 50 percent of total combined oil and gas production. Onshore employment was scaled by multiplying each personnel record by 1.9937. Thus, records representing half a person-year were modified to represent one person year and records representing one person year were increased to represent almost two person years.

Offshore producer activities were scaled by lease area or several lease areas rather than by the regional average. The ratio of combined oil and gas production by the OOC firms in the sample was again used (Exhibit 1-11). Scaling of study results required scaling personnel records for: areas in which OOC participants were responsible for all production, scaling by lease area and scaling by combining several lease areas.

To the degree that production does not correlate with economic activity, this scaling procedure may have biased results. As previously stated the scaled results may represent an over or understatement on the order of magnitude of plus or minus 10 percent. For this reason all results of the study are also presented in their unscaled form.

Geographic Bias Due to Sample Selection

Survey results for the State of Texas appear low. A strong contributing factor to this problem resulted from the designation of the OOC survey participants which were all major producers headquartered in Louisiana.

In addition, the study participants also appeared to be slightly over represented with respect to oil versus gas production (see Exhibit 1-8 to 1-11). A greater percent of the activity off the Texas Coast results from gas production compared to oil production. These factors are believed to have combined to overemphasize the economic activity off Louisiana and Mississippi and under-represent Texas-based activities.

On the other hand several additional factors support the conclusion that Texas impacts are relatively small when compared to Louisiana. First, the study results indicated that many Texas oil fields are being serviced out of staging areas in West Louisiana. Second, some volume of offshore Texas oil and gas enters pipelines which land product in Louisiana. Third, Texas may have a greater proportion of the economic impacts associated with contract and service companies since many of these firms are subsidiaries of the major oil field service companies which are for the most part located in Texas. The geographic distribution of contract and support companies was not included in the producer estimates of employment and payroll by county. Finally, the results of the survey of offshore employees were scaled by lease area. Underestimation of offshore employment were corrected by scaling the results by lease areas. Onshore employment estimates were not scaled by lease area however and as such can be expected to under-represent Texas to a greater degree. This under-representation of Texas impacts does not exist with respect to the gas processing and oil refining impacts.

Total Texas offshore energy production represented approximately 17 percent of total Gulf of Mexico production in 1984. Survey results indicated that Texas residents represented only about half this proportion of total economic activity. Actual results may actually be between these two figures. Total Texas figures should therefore be viewed with caution although they are appropriate for determining relative factors such as major staging location and employee residences relative to work sites.

Applicability of Data Exclusively to Offshore Producers

This information is exclusively for personnel employed by the offshore producers. All employees and activity expenditures associated with contractor work or purchased goods are excluded from these estimates of economic impact. Work performed by contractors was captured through a different estimation process.

If a producer operates company-owned helicopters or seismic exploration vessels and only uses a contractor for the overflow, impacts primarily show up as wages and salaries to the producer company employees. Purchases of air transportation or seismic work from an outside source were documented independently and are identified as the secondary direct impacts. The distribution of employment and wages to employee county/parish of residence, work locations, staging site and offshore lease area are based on employee assignments and residence location on December 31, 1984. Producer personnel departments indicated that the information provided in these data are consistent with records from other

times during the year and that seasonal employment is not significant with offshore producers. This resulted because a parameter of this study methodology was that virtually all data had to be provided exclusively from the nine firms making up the OOC Socioeconomic Subcommittee. As such, many alternative methods of collecting information or a larger scale survey of the contracting industry were specifically precluded under this contract. Contacts with other offshore producers were also specifically precluded under this contract.

5.2.2 Synthesis of Expenditure Impacts Methodology

Data were collected on the total 1984 purchases and expenditures by the nine study participants. These data included all purchases of goods and services and excluded taxes of all types, offshore lease payments and royalty payments to MMS or States. The following is a list of expenditure categories utilized for the collection and analysis of all producer expenditure information:

- Air transportation;
- Boat, barge and marine transportation and rental;
- Catering;
- Cement, cementing services and cementing equipment;
- Contract labor and engineering services;
- Exploratory drilling;
- Development drilling;
- Diving equipment and services;
- Drilling fluids, mud logging and chemical;
- Fuel and utilities;
- Pipe and pipeline contracting;
- Platform installation;
- Platform and equipment fabrication;
- Production enhancement and well reworking;
- Tubulars;
- Seismic and geophysical exploration services;
- Well logging, wireline, perforation, testing and acidizing;
- Other field services and tool rentals; and
- All "other" and expenditures not classified.

The data provided by the producer on their expenditures were highly reliable and were taken directly from their accounting records for the year 1984. The three potential weaknesses with the information provided in this format were:

- The offshore producers could not provide 1984 expenditure data organized by SIC Code. Producers tracked costs using an internal cost accounting system based on functional or operational areas.

- A significant volume of expenditures and contracts did not fall in an expense category and had to be classified as "other".

- Expenditure results required scaling and thus were subject to the same potential errors associated with scaling personnel records.

A mechanism was developed for translating expenditures by the primary offshore producers into employment and wages and salaries. This was done through the application of key economic impact ratios to the data for producer expenditures. These ratios were developed with the cooperation of approximately 50 offshore contractors. Relatively small errors were believed to exist in these impact ratios. The information supplied by the contract and support firms were:

- For 1984. Most ratios were for calendar year 1984. Some contractors only had the required ratios for their fiscal year 1984.

- Specific to the Gulf of Mexico Region. Many contract and service firms had significant offshore operations in other geographic regions. Data were developed exclusively for Gulf of Mexico operations.

- Applicable only to offshore operations. Many of the contract and service firms had parallel activities which encompassed onshore oil and gas operations. For example, firms providing drilling mud and chemical services provided identical services to onshore operations. Data were again developed exclusively for offshore operations.

The specific types of information supplied by the contractor companies were as follows:

- Wages and salaries paid as a percent of 1984 revenues;

- The 1984 employment to revenue ratio (or revenues per employee);

- Total 1984 payroll and number of employees (or average payroll per employee);

- The percent of 1984 revenues purchasing goods and services from other firms; and

- Percent of company employees working offshore.

The impact ratios provided by the various firms were very similar and in many cases virtually identical. These ratios tracked very well for firms providing the same service. The error introduced by these ratios is believed to be on the order of plus or minus five to ten percent.

The most significant shortcoming of the study results occur because the expenditure impact data could not be broken out by physical location by any of the offshore operators. A sampling of the zip codes to which producer checks were mailed was investigated as a mechanism for estimating the geographical distribution of the expenditure or contractor impacts. A preliminary review of some of these data and discussions with producer accounting departments indicated that most checks were mailed to a centralized accounting office at corporate headquarters which was located at a different location from where the work was performed. This approach was discounted since it would have produced the misleading results in which all impacts would be allocated to the locations of the accounting departments of the offshore contract and service firms.

Numerous public and private data sources which could have been applicable for allocating contractor impacts between the various coastal counties/parishes were also considered. The only promising data source for this task was the Bureau of the Census, County Business Patterns data series. The following factors contributed to the decision not to use the Bureau of the Census data as a mechanism to allocate the contractor impacts to the various counties and parishes.

(1) the primary problem with this approach is that SIC Group 138 includes "all" oil and gas field services regardless of whether they are located on land or offshore. The Census Bureau data does not differentiate between onshore and offshore oil and gas activity and SIC code type information is not separated by offshore and onshore oil and gas activities. Louisiana and Texas both have substantial onshore oil and gas exploration and production.

(2) Disclosure problems greatly detracted from the utility of the Census data. Disclosure problems are substantial since about half of all counties have employment specified as a range and no payroll data are presented. Unfortunately the disclosure problem is further complicated by the fact that 40 percent of total employment and payroll was classified as "statewide". This category is made up of firms with numerous locations statewide, operations split between numerous counties and large companies located in a county for which even a range of employment data can not be provided.

(3) This information is only available for SIC Industry Group 138 "Oil and Gas Field Services". Four digit information would have been broken out by 1381-drilling, 1382-exploration services, and 1389-all other field services. Such four digit information is only available at the state level. The use of such a broad indicator was only adequate for large and geographically diversified businesses such as contract drilling. It clearly was not appropriate for use with specialized businesses, such as exploration services or pipeline contractors, which operate out of only a limited number of specific locations. The use of SIC group 138 was too general a measure to allocate offshore related impacts.

(4) Not all of our contract and support businesses fall into SIC

Industry Group 138. For example platform fabrication, fuel/utilities, platform installation, and air transportation companies are typically classified as oil field services under the SIC classification system. This would not represent a problem if they fell into narrowly defined industrial sectors. Unfortunately they were classified in broad categories which contain numerous activities unrelated to offshore oil and gas exploration and development. For example, platform fabrication operations are classified as ship building and repair (SIC 373) and fabricated metal products (SIC 34) and utilities are classified as electrical services (SIC 4911). These groups consist predominantly of business with no link to offshore oil and gas exploration and development. Thus using this information to allocate the corresponding expenditure impacts would have resulted in a substantial portion of the offshore related expenditures to non-coastal areas.

Such detailed information on geographic distribution of contractor impacts would a more extensive study which included an extensive survey of the businesses making up the contract and support industry. An in depth survey of the contractors and supply companies to the offshore oil and gas industry in the Gulf was specifically precluded under this contract.

5.2.3 Synthesis of Processing and Handling Impacts Methodology

Additional impacts occur from the handling, storage, processing and refining of oil and gas which originates offshore in the Gulf of Mexico. Some preliminary processing of oil and gas occurs offshore on the offshore platforms or near the location the product makes landfall. This "processing" consists primarily of the separation of raw oil and gas from other materials. The payroll and employment impacts due to this preliminary processing, handling and transporting of oil and gas were previously captured in the activities of the offshore operators.

Additional impacts occur however from the handling and processing of the offshore oil and gas. The offshore operators were not able to provide data on the impacts for activities after they sold the oil and gas to onshore refiners or gas processors. In addition many of the offshore operators transferred title of the oil and gas produced offshore to their parent companies, which subsequently were responsible for processing the oil and gas and distributing it to the end users.

The estimation of oil and gas handling, refining and processing impacts at the county level required the development of a unique methodology since both oil and gas produced offshore is mixed with oil produced onshore. For the most part onshore and offshore oil and gas enter the regions transportation system. The introduction of the offshore oil and gas into a regional system results in the product being combined and processed at numerous refineries throughout the Gulf of Mexico Region. For the most part there are not unique refineries and processing facilities for offshore and onshore produced oil. Therefore all refineries and gas processing plants within the region probably process some portion of oil and gas which originates offshore. The determination

of county level refinery production from a specific oil or gas source is further complicated by the fact that the flow of refinery and gas processing inputs is a highly volatile process which responds rapidly to changing conditions such as supply and demand for finished products, the quality and availability of unprocessed oil and gas, relative efficiencies of the various processing plants and corporate decisions to utilize various facilities.

A mechanism was developed to estimate the effects of the transportation and processing of the offshore product after it had left the facilities of the offshore operators since it was not available directly from the OOC offshore producers participating in the study. Information on these impacts were to be estimated at the county/parish level.

Actual utilization information was not available and refinery capacity thus has to be used as a surrogate. A mechanism was therefore required to adjust refinery capacity to reflect actual throughput of oil. This was accomplished by using the annual national 1984 utilization rate for oil refineries. The utilization rate was applied to each county's 1984 operating capacity to derive an estimated measure of actual refinery operations.

Refineries or gas plants typically process product which contains a mixture of product from offshore fields, onshore fields and some imports. The estimate of county level oil or gas processed or refined required further modification to account for that component of oil refining or gas processing which related to offshore production. By using the ratio of offshore production to total production refined or processed for each state, offshore production was estimated relative to total production.

A mechanism for converting estimated county level data for offshore oil refinery throughput and gas processing throughput was also required. To derive the employment impact due to oil refining and gas processing, a statewide ratio of the average person-years of employment per thousand barrels of oil refined or cubic feet of gas processed was derived. This was multiplied by the estimated offshore total refinery or gas processing plant throughput for each county.

The assumptions relating to this approach follow:

- Offshore oil and gas from the Gulf of Mexico was refined exclusively in the region. This appears a reasonable assumption since Gulf oil is not transported to other regions of the county for processing. Further was assumed that offshore oil from the Gulf was processed in the state immediately adjacent to where it was produced. For example it was necessary to assume that gas produced off Louisiana was landed in Louisiana and subsequently processed in the state. In effect this means that oil or gas was not shipped to other states such as Alabama or Oklahoma for processing.

- All gas plants or refineries within a state have the same employment and payroll impacts per unit of product processed. In effect this approach assumes that all gas plants and refineries in the region have the same labor to product efficiencies and have the same rates of pay.

- The proportion of offshore oil to total oil refined was equal during 1984 for all gas plants or refineries in the two states. Since oil and gas from offshore enters the main pipelines in the region and is distributed throughout the area with other oil and gas to be refined, this appears reasonable. No mechanism exists for differentiating which oil leaving a pipeline originated offshore. This approach may tend to underestimate refining and gas processing impacts in coastal areas and slightly overestimate impacts in interior counties since the product may tend to be refined at the nearer locations.

- The estimates derived by this approach produce estimates of payroll and employment by the location of the gas plant or oil refinery. Plant employees commuting from other counties/parishes have their employment assigned to the county in which the plant is located. Data are not generated by place of residence. Data for producers are generated by place of residence.

5.2.4 Synthesis of Producer Activity Budgets Methodology

Actual project budgets used to convert physical measures of activity were primarily for 1984 but did include a limited number of projects from 1983 and early 1982. This was required to obtain an adequate sample size and because many large projects required more than one year for completion or do not fall precisely within a calendar year. The individual project budgets submitted by the nine OOC Subcommittee members provided itemized expenditures to the degree they could be broken down. These data were used for the following two purposes:

- The development of general rules of thumb for determining project costs and expenditures for projects in which the basic physical characteristics were known or could be estimated. For example, a simple model was developed which converts water depth, platform size (as measured in number of well slots) and if a platform was to have on board processing, into an estimate of platform design construction and installation costs.

- The development of distribution profiles which indicate the basic types of line item expenditures and costs associated with a unit of expenditure in each of the six major cost categories.

The individual project cost models were determined through the use of descriptive statistics and regression techniques. For geophysical surveying, exploratory drilling, development drilling, platform fabrication/installation and pipeline construction, multiple or single variable linear regression equations were developed to predict total project costs. The statistics generated for each model were: correlation coefficient, standard error of the estimate, t-statistic, coefficient of multiple determination, standard error of multiple estimate and F-ratio. In many cases the sample sizes were relatively small (30 to 50 data points) and the confidence intervals associated with the linear regression equations may limit their applicability when very precise project costs are required.

The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.