OCS Study
MMS 87-0040

Analysis of Indicators for Socioeconomic Impacts Due to OCS Oil and Gas Activities in the Gulf of Mexico Year II

Volume I

MMS U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Regional Office

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Volume I

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Minerals Management Service
Gulf of Mexico OCS Regional Office

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ABSTRACT

The socioeconomic assessment program developed for the Minerals Management Service (MMS) of the U.S. Department of the Interior to calculate Outer Continental Shelf (OCS) oil and gas related impacts for economic areas along the Gulf of Mexico (GOM) is called the Socio-economic Assessment Model (SAM). SAM is based on the needs and requirements of MMS. These needs and requirements include 1) exclusive use of nonsurvey information; 2) industry detail at the three- and four-digit Standard Industrial Classification (SIC) level; 3) socioeconomic assessments at the multicounty/parish level; 4) assessment measures that include industry output, income, employment, and population; 5) full editing and information updating capabilities; and 6) full use on the MMS Perkin-Elmer 3500 computer system.

To meet MMS needs and requirements, a nonsurvey regional input-output model (I/O) was selected as the basic analytical structure for SAM. In brief, SAM contains four components or modules--Data Base component, Input-Output component, Demographic component, and Output component. The Data Base component contains all the files used in model development and impact assessment; the Input-Output component generates industry output, income, and employment effects for the Coastal Areas; the Demographic component, which is linked to Input-Output component, calculates population effects at the MMS Coastal Area level that are consistent with the estimated employment effects; and the Output component summarizes, in tabular form, the estimated socioeconomic effects (i.e., the industry, income, employment, and population effects) for reporting purposes.

SAM is operational on the MMS Perkin-Elmer 3500 computer system. SAM contains commands that permit the analyst to 1) update the data files in the Data Base component, 2) modify or change any of the regionalization techniques, and 3) write macros for routine price and/or regionalization procedures. SAM is a user friendly program that is interactive with full editing capabilities; it contains adequate commands to permit the analyst to experiment with alternative approaches available in the literature for constructing nonsurvey regional input-output models.

Finally, as part of the study project, SAM was used to estimate socioeconomic impacts at the Coastal Area level for the period 1981 through 1984. These impacts are reported in "Information Collection Log - II.B.2. and 3.," and "Introductory Training" (January 26, 1987) and Volume I of the Draft Final Report.

Executive Summary

I. Introduction

Since the oil embargo days of the early-70s, fluctuating levels of exploration and development of oil and gas fields on the Outer Continental Shelf (OCS) of the Gulf of Mexico (GOM) have created unstable conditions in GOM coastal economies, particularly those economies that largely depend on oil and gas activities. The erratic nature of impacts from OCS activity was investigated for the Minerals Management Service (MMS) of the U.S. Department of the Interior in a project entitled "Analysis of Indicators for Socioeconomic Impacts Due to OCS Oil and Gas Activities in the Gulf of Mexico, Year II." The primary purpose of this project was the development of a program that MMS personnel can use on their Perkin-Elmer 3500 computer system to regularly conduct socioeconomic impact assessments associated with known or simulated changes in OCS oil and gas activities in the Gulf of Mexico. This program is called the Socioeconomic Assessment Model (SAM).

SAM is based on the needs and requirements of MMS. These needs and requirements include 1) exclusive use of nonsurvey information; 2) industry detail at the three- and four-digit Standard Industrial Classification (SIC) level; 3) socioeconomic assessments at the multicounty/parish level; 4) assessment measures that include industry output, income, employment, and population; 5) full editing and information updating capabilities; and 6) full use on the MMS Perkin-Elmer 3500 computer system. See Volume I of the Final Report for an extended discussion of MMS objectives and conditions.

To meet MMS needs and requirements, a nonsurvey regional input-output model (I/O) was selected as the basic analytical structure for SAM. In brief, SAM contains four components or modules, as indicated in Figure One. The SAM program with documentation for the MMS Perkin-Elmer 3500 system is given in Appendix A of Volume II of the Final Report. The input-output component generates industry output, income, and employment effects for the MMS Coastal Areas. To estimate population effects at the MMS Coastal Area level the I/O component is linked with a Demographic component. A Data Base component and an Output component complete the SAM system (see Figure One).

II. Socioeconomic Assessment Model (SAM)

II.A. MMS Coastal Areas

MMS stated several conditions or requirements for the development and formulation of a socioeconomic impact assessment model. One of these requirements was the need for socioeconomic assessments at the multicounty/parish level. To this end, MMS identified ten study areas,

called Coastal Areas, that include 74 counties/parishes from Dade County, Florida to Cameron County, Texas. These Coastal Areas were selected by MMS because they contain the major share of the GOM oil and gas related activities. Along with the counties and parishes bordering the Gulf of Mexico, inland counties and parishes were included where offshore oil and gas support centers are known to exist (such as Lafayette, Louisiana); where offshore related petroleum industries are established (such as the Mississippi River region in south Louisiana); and where coastal Standard Metropolitan Statistical Areas (SMSAs) include inland counties/parishes (such as the Houston SMSA counties in Texas). The counties/parishes that comprise the ten Coastal Areas are indicated in Volumes I and II of the Final Report.

II.B. Model Development

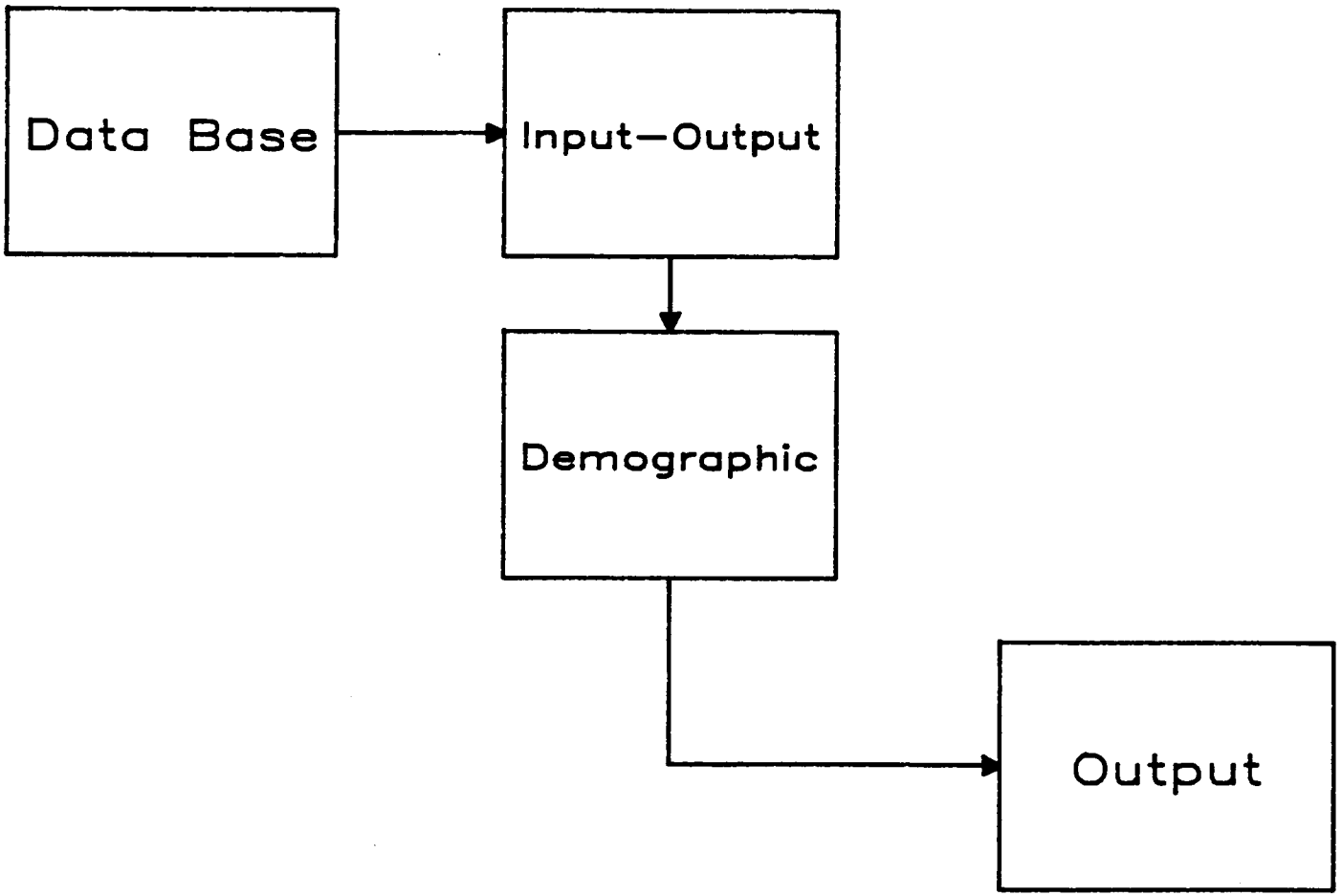
Other conditions and requirements stated by MMS included 1) industry detail at the three- and four-digit Standard Industrial Classification (SIC) level; 2) exclusive use of nonsurvey information; 3) full editing and information updating capabilities; and 4) full use on the MMS Perkin-Elmer 3500 computer system.

Both econometric and regional input-output models were considered and evaluated as potential methods for measuring secondary or indirect socioeconomic impacts for the ten MMS Coastal Areas. However, the MMS requirements of multicounty/parish level assessments and industry detail at the three- and four-digit SIC level essentially precluded the use of econometric models, largely because the development of an econometric model for an area requires a time series data base that spans a relatively long series of years. Time series data on industry outputs, employment, incomes, and so forth simply do not exist at the four-digit level, especially at the county/parish level. Moreover, aggregate econometric models seldom consider production as anything but aggregates of final outputs. Interindustry transactions are typically aggregated until they disappear. Interindustry detail, however, is a necessary requisite to the estimation of indirect effects at an industry level, especially at the three- and four-digit SIC industry level.

In light of the stated requirements and needs of MMS, an input-output model was selected as the basis or understructure for the MMS Socioeconomic Assessment Model (SAM), with 1983 as the base year for the 1981-84 study period.

In brief, SAM contains four components or modules, as indicated in Figure One. The Input-Output component generates industry output, income and employment effects for the Coastal Areas. To estimate population effects at the Coastal Area level the Input-Output component is linked to a Demographic component. A Data Base component and an Output component complete the four basic modules or components of SAM (see Figure One). Since I/O analysis provides the understructure of SAM, most of the discussion will focus on the formulation and development of the I/O component.

Figure One
The SAM Model



Basic to the construction of input-output models is the accounting of all economic activity as sectors. One hundred and sixteen (116) sectors were used to classify regional economic activity for the MMS project. The formulation of the 116 industries featured the Coastal Areas' businesses that are most linked to OCS oil and gas activity in the Gulf of Mexico. These 116 sectors, which are listed in Volumes I and II of the Final Report, represent an aggregation of the 537 industries/commodities named in the 1977 National Use and Make tables of the Bureau of Economic Analysis of the U.S. Department of Commerce. The National Use and Make tables were used to develop the regional interindustry relationships

Nonsurvey based regional input-output models for U.S. regions are typically based on national input-output coefficients. Techniques are then employed to adjust these national coefficients to reflect the region's production input coefficients. Data sources used in the MMS project to adjust the national coefficients to represent interindustry relationships for the MMS Coastal Areas included 1) the 1977 National Use and Make tables at the 537 industry/commodity level; 2) County Business Patterns employment and payroll information, published by the U.S. Department of Commerce, Bureau of the Census; and 3) producer and consumer price index information, published by the U.S. Department of Labor, Bureau of Labor Statistics, 4) gross farm marketing information from the 1982 Census of Agriculture, and 5) construction cost information from the 1985 Statistical Abstract.

The construction of the nonsurvey regional input-output models for the ten MMS Coastal Areas essentially involved six steps. These steps included:

1. The price updating of the 1977 national Use table to reflect 1983 relative prices--(the national Make table does not need to be price updated, if an industry-based technology assumption is followed in the derivation of an industry-by-industry input-output model);

2. The removal of competitive imports from the national Use table;

3. The adjustment for industry mix on the basis of the particular industry composition of each of the MMS Coastal Areas--(this adjustment procedure is necessary for the derivation of the weighted average input coefficients for the 116 MMS sectors, which are aggregates of the 537 industries represented in the national tables);

4. The final derivation of sector-by-sector input-output models for each of the ten Coastal Areas--(the derivation of the regional I/O models was based on the assumption of industry-based technology); and

5. The regionalization of the sector-by-sector relationships to reflect regional input relationships. (the simple location quotient technique was used to regionalize the input relations).

6. The inclusion of three household rows and, correspondingly three household columns to account for the three labor classes identified in the MMS Coastal Areas; that is, local, commuter, and relocator.

To estimate socioeconomic impacts that include the "induced-by" effects associated with household incomes and expenditures, a household element, as just noted in Step Six, was added to the input-output component of SAM. More specifically, three household rows and, correspondingly, three household columns were added to the input-output models. The choice of three household sectors reflects the composition of employment associated with GOM oil and gas activities. Information collected by MMS indicated that three worker classes are involved in GOM oil and gas activities: local, relocator, and commuter. Tables presented in Volumes I and II of the Final Report indicate that the average percentage of workers relocating to a Coastal Area ranges from 10 percent for the Offshore group to 30 percent for Onshore Operations, Construction, and the so-called Type 2 group. On the other hand, these same tables show that commuters are found only in the Offshore group, with 40 percent of the total workforce commuting, on average, to these jobs. The concentration of commuters in offshore jobs is not surprising. Because offshore workers often work shifts lasting one, two, or even three weeks with leave periods of similar length, many of them find it feasible to commute on a continuing basis from residences outside a Study Area.

It can reasonably be assumed that significant differences exist in the way workers from the different classes spend their incomes within a Coastal Area. These differences were taken into consideration in the derivation of the total socioeconomic impacts that included the induced-by effects. For example, the way in which commuter expenditure patterns were handled was to assume that commuters do not purchase any goods or services from a Coastal Area. This assumption is not entirely correct, but it would be even more incorrect to assume that the local expenditures patterns for commuters and local residents are identical. Because of the lack of suitable worker expenditure information by worker class, it seemed reasonable to use a restrictive assumption concerning worker expenditures, which no doubt understates the induced-by effects and, hence, understates the total socioeconomic effects. Given the file editing capabilities of SAM, MMS personnel can correct this problem in the event that more refined demographic statistics become available. In summary, the nonsurvey input-output models for each of the ten MMS Coastal Areas contain 116 producing sectors and three household sectors for a total of 119 endogenous sectors.

In the SAM program, the I/O Leontief inverse, which generates the standard industry output multipliers, is linked with income and employment parameters to convert industry output effects to income and

employment effects. The employment measures are then linked with the Demographic component (see Figure One) to convert estimated employment changes to changes in population. Population changes occur as a result of workers relocating to a Coastal Area. Hence, the proportion of total employment that represents relocators is used to generate estimates of population change. The estimates of population change are then disaggregated by age class. In summary, socioeconomic impact measures for the MMS Coastal Areas include industry output, household income, employment and population. The measures are based on nonsurvey regional input-output models, where the standard industry output estimates from an I/O analysis are converted to income, employment, and population estimates on the basis of appropriate income, employment, and population parameters that are contained in SAM.

III. Application and Results

III.A. Direct Effects

The Minerals Management Service developed measures of the direct economic effects associated with oil and gas activity in the Gulf of Mexico for the period 1981 through 1984. These direct effects measure the extent of oil and gas exploration and development in the Gulf of Mexico. More specifically, MMS identified so-called direct activity levels that include the exploration for oil and gas fields and the development of these fields for production purposes. The direct activity levels were disaggregated on the basis of 1) the Gulf of Mexico area (i.e., Western GOM, Central GOM, and Eastern GOM); 2) the lease sales by year; 3) the type of SIC-level industry involved in the exploration/development of oil and gas fields in the GOM; and 4) the Coastal Area location of the industries involved in the exploration/development of the oil and gas fields. This disaggregation procedure generated many tables of direct activity levels or direct effects, which will not be included here. What will be included here is only a sample of the MMS measured direct effects or impacts. Along with the sample will be tables containing the total socioeconomic impact estimates associated with these direct impacts, where these total socioeconomic impacts were estimated using SAM.

Table E-1 below contains MMS measures of direct impacts for the years 1983 and 1984 that are associated with GOM lease sales through only 1982. In other words, exploration and development activity associated with lease sales after 1982 are not included in these selected direct impact measures. As Table E-1 indicates, MMS identified three sectors involved in the exploration and development of GOM oil and gas fields due to these lease sales. These three sectors, which make-up three of the 116 sectors of the Coastal Area I/O models, are: Crude Petroleum, Natural Gas & Solid Mineral Exploration (I/O No. 15), New Petroleum & Natural Gas Well Drilling (I/O No. 14), and Maintenance & Repair of Petroleum & Natural Gas Wells (I/O No. 19). (See Appendix C of Volume III for an identification of the particular SIC codes associated with the above I/O sector numbers, such as I/O No. 15.) Total socioeconomic impacts, measured in terms of industry output,

TABLE E-1

DIRECT ECONOMIC IMPACTS
OF GOM OCS LEASE SALES THRU 1982
BY PRIMARY SECTOR
FOR SELECTED COASTAL AREAS
FOR 1983 AND 1984
($000,000)

I/O Sector Description	C4	C3	W2
1983			
Crude Petro. & Nat. Gas Explor.	164.00	481.00	642.00
Well Drilling	117.00	392.00	211.00
Maint. & Repair of Wells	20.00	66.00	28.00
1984			
Crude Petro. & Nat. Gas Explor.	150.00	439.00	612.00
Well Drilling	92.00	307.00	176.00
Maint. & Repair of Wells	15.00	48.00	22.00

Source: Derived by MMS personnel.

income, employment and population, are given in Table E-2 for the selected Coastal Areas: W2, C2, and C4 (see Volume I for a definition of the county/parish make-up of these Coastal Areas).

III.B. Indirect Effects

Tables E-1 and E-2 underscore the fact that the exploration and development of oil and gas fields in the Gulf of Mexico is directly and indirectly a major source of revenue and employment for many businesses and workers along the coast. Keep in mind, however, that the figures shown in Table 1 reflect only the amount of exploration and development activity associated with lease sales through 1982. The total socioeconomic figures of Table E-2 would be much higher if the MMS direct impact figures included exploration/development activity associated with lease sales after 1982. Note also the actual decline in economic activity that occurred between 1983 and 1984. For Coastal Area C3 the decline in employment between 1983 and 1984 was 4,716. For 1983, GOM exploration and development activity supported directly and indirectly 19,236 workers in Coastal Area C3. Since GOM oil and gas exploration/development activity declined between 1983 and 1984, employment declined by 4,716 workers to a 1984 support level of 24,520 workers. Of the three Study Areas selected for Table E-2, the figures show that Coastal Area C4 experienced the largest actual and, also, the largest percentage decline in employment for the 1983-84 period. Coastal Area W2, which includes Houston, Texas experienced the smallest percentage decline in employment, with a 8.6 percent decline. See Volume I of the Final Report for additional figures on Coastal Area socioeconomic assessments.

IV. Summary

As a condition or requirement of MMS, SAM is operational on the MMS Perkin-Elmer 3500 computer system. The primary objective of the MMS project was to develop an analytical program that could be used by MMS personnel to conduct future socioeconomic impact estimates associated with GOM oil and gas activities. This program had to be operational on the MMS Perkin-Elmer system, and also, it had to contain commands that would permit the analyst to 1) update any of the data files including the use of the most current national Use and Make tables, and 2) modify or change any of the regionalization techniques. It also had to include a macro capability so that the analyst can write macros for routine price and/or regionalization procedures. Currently, SAM contains several prepared macros that price update the national Use table, regionalize the national coefficients, convert industry output estimates to income, employment and population estimates, and produce tables for publication purposes where the analyst can select the type of impact (i.e., industry output, income, etc.) and the level of detail (i.e., detail at the 116 sector level or summary results by general category). These macros simply represent the various individual commands available in SAM that have been linked together to perform a certain task. Users of SAM can either modify these macros or write new macros. SAM is a user friendly program that is interactive with full editing capabilities

TABLE E-2

SOCIOECONOMIC IMPACTS RELATED TO
GOM OIL AND GAS ACTIVITIES
FROM OCS LEASE SALES THRU 1982
FOR SELECTED MMS COASTAL AREAS
FOR 1983 AND 1984

Socioeconomic Measure	1983	1984	Change from 1983 to 1984
	Coastal Area C4		
Industry Gross Output ($1,000)	558,839	474,037	[84,802]
Income ($1,000)	172,909	147,429	[25,480]
Employment	13,501	11,682	[1,819]
Population	8,447	7,362	[1,085]
	Coastal Area C3		
Industry Gross Output ($1,000)	1,927,218	1,615,099	[312,119]
Income ($1,000)	520,019	498,364	[21,655]
Employment	29,236	24,520	[4,716]
Population	17,027	14,373	[2,654]
	Coastal Area W2		
Industry Gross Output ($1,000)	1,760,257	1,606,154	[154,103]
Income ($1,000)	540,233	494,750	[45,483]
Employment	24,370	22,270	[2,100]
Population	14,702	13,488	[1,214]

Source: Derived from Table E-2 using the MMS SAM program.

and adequate commands to permit the analyst to experiment with alternative approaches available in the literature for constructing nonsurvey regional input-output models. As a final word, SAM contains a subroutine that aggregates three- and four-digit County Business Pattern data to the 537 industry classes that are currently used in the 1977 national Use and Make tables.

Several important assumptions provide the under-structure of SAM. The use of national input coefficients to determine regional level input relationships, the use of simple location quotients to adjust regional technical input coefficients for regional trade patterns, and the use of very aggregate demographic parameters to calculate population estimates involve some major assumptions. More technical assumptions, such as the assumption of proportional input-output relationships, average input coefficients, no substitution of production factors, no significant excess capacity at the industry level, etc. also make-up the understructure of SAM. In short, SAM is obviously a surrogate of the actual socioeconomic conditions of the 1981-84 study period.

I. Introduction

A. Objectives

The Request for Proposal Number 3275 by the Minerals Management Service of the U.S. Department of the Interior noted the following:

> "Since the first Outer Continental Shelf (OCS) oil and gas lease sale in 1954, the Gulf of Mexico (GOM) has become the most developed OCS region in the United States and the world. This position is certain to continue in the near future. Despite this history, however, there are still important questions which require information collection, analysis, and presentation. One area of such need is the extent of socioeconomic impact of federal OCS oil and gas activity on the U.S. coastal (onshore) region, particularly relating to income, employment, and population.
>
> Generally, this fifteen (15) month study is designed to provide data on the indirect economic impacts of federal GOM OCS oil and gas activity. These indirect effects will include all economic effects on an annual basis that are related to or expected from annual direct expenditures on GOM OCS oil and gas exploration, development, and transportation in Federal waters. The specific indirect economic parameters to be addressed shall include, as a minimum, population, employment, and income. The Contractor shall provide these estimates of indirect impacts for both existing and forecasted direct oil and gas activities. Also, the Contractor must provide a tool for continued indirect effect estimation by MMS, which will be used in future environmental impact statement (EIS) analyses."

Thus, from a long-term perspective, the main objective of the Year II socioeconomic impact study was to develop a computer model that MMS personnel will use to conduct socioeconomic impact assessments associated with known or assumed changes in the OCS oil and gas industries of the GOM. The capability of MMS to monitor the socioeconomic impacts associated with the oil and gas industries is very important because of the likelihood of continued boom-bust conditions within the energy sector in the future.

The second objective was to estimate the indirect socioeconomic impacts referenced above by using the computer model developed for the study. The objective would allow the computer model to be tested in addition to making available useful data on OCS indirect economic impacts from the early 1980's.

B. Scope of the Study

The onshore geographic areas encompassed by the Year II study

include the Eastern, Central, and Western GOM Coastal Analysis Areas. Each of these three Coastal Analysis Areas are composed of several Coastal Areas which are in turn composed of several counties. Ten Coastal Areas and 74 counties in total are covered. A listing of the Coastal Analysis Areas, Coastal Areas, and constituent counties is given below.

Eastern GOM Coastal Analysis Area - this area includes 25 Florida counties grouped into four Coastal Areas:

Coastal Area E-1 - Bay, Escambia, Okloosa, Santa Rosa, Walton;

Coastal Area E-2 - Dixie, Franklin, Gulf, Jefferson, Levy, Taylor, Wakula;

Coastal Area E-3 - Charlotte, Citrus, Collier, De Sota, Hernando, Hillsborough, Lee, Manatee, Pasco, Pinellas, Sarasota;

Coastal Area E-4 - Dade, Monroe.

Central GOM Coastal Analysis Area - this area includes 26 parishes and six counties in Louisiana, Mississippi, and Alabama grouped into four Coastal Areas:

Coastal Area C-1 - (all are Louisiana parishes) Calcasieu, Cameron, Iberia, Lafayette, Vermillion;

Coastal Area C-2 - (all are Louisiana parishes) Ascension, East Baton Rouge, Lafouche, Livingston, St. Charles, St. James, St. John the Baptist, St. Mary, Terrebonne, West Baton Rouge;

Coastal Area C-3 - (all are Louisiana parishes) Jefferson, Orleans, Plaquemines, St. Bernard, St.Tammany;

Coastal Area C-4 - (Mississippi counties) Hancock, Harrison, Jackson, Stone;
(Alabama counties) Baldwin, Mobile.

Western GOM Coastal Analysis Area - this area includes 23 Texas counties grouped into two Coastal Areas:

Coastal Area W-1 - Aransas, Calhoun, Cameron, Jackson, Kenedy, Kleberg, Nueces, Refugio, San Patrico, Victoria, Willacy;

Coastal Area W-2 - Brazoria, Chambers, Fort Bend, Galveston, Hardin, Harris, Jefferson, Liberty, Matagorda, Montgomery, Orange, Waller.

The above Coastal Areas cover all the GOM coastal counties from the U.S. border with Mexico to Dade County in Florida. Also included are selected inland counties (or parishes) where (1) significant support activities for OCS oil and gas development are known to exist; or (2) the county (or counties) are members of a Standard Metropolitan Statistical Area that contains at least one coastal county. An example of a county satisfying the first inclusion criterion is Lafayette Parish in Louisiana while under the second criterion, Montgomery County in Texas is a convenient example.

The estimates of impacts upon income, employment, and population from OCS activity have been prepared so as to apply to the geographic level of the ten Coastal Areas outlined above. Both direct and indirect impacts from oil and gas activity in each of the ten Coastal Areas have been estimated or were provided in part by MMS for analysis. The impact estimates are further broken down within each Coastal Area according to various industry classifications of interest to MMS. Four years are spanned by the impact estimates: 1981-1984. The estimates are available in a sequence of tables found in a later section of the report.

C. Methods and Approach

A number of methods are available for measuring socioeconomic impacts. Most common among these are econometric models (i.e., simultaneous equations models) and input-output models (i.e., interindustry analysis). Other methods exist, such as community base studies (or, export base analysis) and power series approximations, but these other methods are basically limited forms of input-output models.

Econometric models and input-output models are both applicable in varying degree for measuring secondary or indirect socioeconomic impacts in small geographical regions, such as the multicounty Coastal Areas of the Year II study. However, it is quite evident that the econometric approach is precluded because of certain needs or requirements set forth by MMS. Some of the more important requirements by MMS include (1) multicounty level assessments (i.e., individual assessments from the ten multicounty Coastal Areas defined above); and (2) industry detail at up to the four-digit S.I.C. code level, whenever appropriate. These two requirements alone preclude the development of econometric models of the regions, largely because the development of such models for the areas requires a data base that spans a relatively long period of years. Time series data on industry outputs, employment, incomes, and so forth simply do not exist at the four-digit industrial level, especially for multicounty areas. Moreover, aggregate econometric models seldom consider production as anything but aggregates of final outputs. Interindustry transactions are typically aggregated until they disappear. Production of commodities which are to be used in the making of other commodities is, however, a major part of economic activity. Most important, interindustry detail is a necessary requisite to the estimation of indirect effects at an industry level, especially at the

three- and four-digit S.I.C. level. In light of the requirements and needs of MMS, the modeling technique that is the basis of the Socioeconomic Assessment Model (SAM) for MMS use is the regional input-output model. An extensive description and evaluation of the various methodologies for measuring socioeconomic impacts comprises the next major section of this report.

Regional input-output models provide a means of quantifying indirect effects or impacts, since the basic feature of input-output models is the accounting of interindustry transactions among the producing sectors. Two broad approaches can be taken to construct such models, the survey and nonsurvey techniques. The former approach is prohibitively expensive for geographic areas of reasonable size. Thus, the nonsurvey approach was employed for the Year II study.

While the input-output framework can identify and measure total economic impacts associated with changes in industrial activity, it cannot directly estimate demographic fluctuations that also result from the industrial activity changes. Migration and other population characteristics will obviously react to economic change.

The input-output model is augmented by a demographic component that converts employment impacts to migration and population changes. This combination of an input-output model and demographic component is repeated in each of the ten Coastal Areas. The combinations of input-output models and demographic components across all the Coastal Areas comprises the full Socioeconomic Assessment Model (SAM). From the point of view of the user, SAM is simply a single computer program. The SAM system contains a number of options which the user can invoke to move from input-output modeling, to economic impact assessment, and finally, to population and migration estimations in each of the ten Coastal Areas. Operation of the SAM system is fully documented in Volume II of this report.

D. Organization

Chapter II of this volume contains a review of regional impact analysis techniques, with primary focus upon econometric, input-output, and economic base models. Chapter III gives an overview of the SAM system that has been put in place on the Perkin-Elmer computer at the MMS offices in New Orleans. Chapter IV is composed of selected estimates of socioeconomic impacts on two Coastal Areas as computed by the SAM system using MMS supplied direct impacts. This information is designed to give the reader an overview of the capabilities of the SAM system.

The bulk of the final report is represented by Volume II, the technical volume that describes operation and maintenance of the SAM system on the Perkin-Elmer computer.

II. Methodology Evaluation

A. Introduction

Two basic ingredients go into the calculation of indirect economic effects. The first is the estimation of the direct effects. For the socioeconomic impact study, Minerals Management Service (MMS) has provided estimates of the direct oil and gas activities located in the Outer Continential Shelf (OCS) of the Gulf of Mexico (GOM). One scenario, called the Baseline condition, will be based on existing oil and gas activities in the Federal GOM OCS areas and future expected conditions without continued MMS GOM OCS lease sales. Other scenarios will consist of a particular set of leasing, exploration, and/or development conditions by MMS OCS planning area (i.e., Eastern, Central, Western). Factors that are being considered in the development of scenarios are oil and gas prices, resource potential, and other variables that affect industry interest in GOM OCS oil and gas resources.

MMS is defining these scenarios in terms of changes in industry outputs within the OCS GOM oil and gas activities. As already noted, these estimates of output changes are the so-called direct economic effects. So-called indirect impacts can then be calculated on the basis of the direct effects.

The second basic ingredient is the development of a regional analytical model for measuring the indirect economic effects. A number of methods are available for measuring indirect economic impacts. For discussion purposes, these methods are being categorized as econometric models, input-output models, and economic base models. The remainder of this report provides an extensive evaluation of econometric and input-output models for small area economies. Only a brief discussion is devoted to economic base models, because it is assumed that economic base models do not provide sufficient industry detail to meet MMS requirements.

MMS has specified that the impact model must provide indirect economic impacts on income, employment, and population, at a minimum, for multicounty areas. In addition, MMS has specified that the model must be capable of providing industry detail at the three and four digit S.I.C. code level, whenever appropriate. Finally, the model must be constructed entirely from secondary data sources that are consistent across time and space.

The following regional models are evaluated in light of these MMS requirements.

B. Econometric Modeling

Initially inspired by an eminent national forecaster, econometric

modeling as a tool for regional analysis has been widely applied in the last fifteen years.[1] Regional econometric models--systems of econometrically estimated simultaneous equations which depict an area's economic structure--have been developed for census regions, states, and substate entities. The specialized endeavor at the substate level has become commonly referred to as "small area regional econometric modeling." Indeed, the latter is somewhat misleading. In application, these "small" areas include Philadelphia[2], Los Angeles[3], Chicago[4], Detroit[5], Boston[6], Pittsburgh[7], Phoenix and San Francisco[8], Milwaukee[9], Buffalo[10], and Cleveland.[11]

As Latham, Lewis, and Landon correctly point out, many of the early efforts in this field are based on "small" regions (e.g., Philadelphia and Los Angeles MSAs) which in fact exceed most states when measured by

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[1]Klein, L.R. 1969. The specification of regional econometric models. Papers, Regional Science Association, 23, pp. 105-115.

[2]Glickman, N.J. 1971. An econometric forecasting model for the Philadelphia region. Journal of regional science, 11, pp. 15-32.

[3]Hall, O.P. and Licari, J.A. 1974. Building small region econometric models: extension of Glickman's structure to Los Angeles. Journal of regional science, 14, pp. 337-353.

[4]Duobinis, S.F. 1981. An econometric model of the Chicago standard metropolitan statistical area. Journal of regional science, 21, pp. 293-320.

[5]Mattila, J.M. 1973. A metropolitan income determination model and the estimation of metropolitan income multipliers. Journal of regional science, 13, pp. 1-16.

[6]Engle, R.F. 1980. An exploratory policy-oriented econometric model of a metropolitan area: Boston. Quantitative economics and development: essays in memory of Ta-Chung Liu, L. Klein et.al. (eds.). [New York, NY]: Academic Press, pp. 123-156.

[7]Pittsburgh Modeling Project. 1985. Modeling economic activity in the Pittsburgh region. [Pittsburgh, PA]: Department of Economics, University of Pittsburgh.

[8]Taylor C., Denzau, A. and Oaxaca, R. 1979. Local labor market econometric forecasting models. U.S. Department of Labor, Final Report, Contract 20-04-76-55.

[9]Rubin, B.M. and Erickson, R.A. 1980. Specification and performance improvements in regional econometric forecasting models: a model for the Milwaukee metropolitan area. Journal of regional science, 20, pp. 11-36.

economic and demographic size.[12] These researchers present a model of Delaware, labeling the half-million-population state a "truly small" region. Econometric models of similarly sized regions include those for Mobile, Alabama[13], Tucson, Arizona and Springfield-Chicopee-Holyoke, Massachusetts.[14]

Many substate regions of interest are well below the "truly small" half-million population in size. It is clear from the advertising of some subscription forecasting services that econometric models of areas near or under 150,000 population do exist. These proprietary models are not generally available for review. Small areas appearing in the published literature are typically part of a larger multiregional system. Shapiro and Fulton's complete Michigan system includes the small MSAs in the state such as Battle Creek, Jackson, and Muskegon as well as the numerous medium and large metropolitan areas of Michigan.[15] Similarly, Ballard and Glickman's twelve-county model of the Delaware Valley includes two relatively small counties (Salem County, New Jersey and Cecil County, Maryland) although the system is dominated by large metropolitan counties since the region is composed of the Philadelphia, Wilmington and Trenton MSAs.[16] Perryman's model of the Interstate 35 corridor in Texas contains submodels for two small MSAs (Waco and

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[10]Crow, R.T. 1973. A nationally linked regional econometric model. Journal of regional science, 13, pp. 187-204.

[11]Loxley, C. and McCarthy, M. 1976. An econometric forecasting model of the Cleveland metropolitan area. Case Western Reserve University Research Program in Industrial Economics, Working Paper No. 71.

[12]Latham, W.R., Lewis, K.A. and Landon, J.H. 1979. Regional econometric models: specification and simulation of a quarterly alternative for small regions. Journal of regional science, 19, pp. 1-14.

[13]Chang, S. 1979. An econometric forecasting model based on regional economic system data: the case of Mobile, Alabama. Journal of regional science, 19, pp. 437-447.

[14]Taylor C., Denzau, A. and Oaxaca, R. 1979. Local labor market econometric forecasting models. U.S. Department of Labor, Final Report, Contract 20-04-76-55.

[15]Shapiro, H.T. and Fulton, G. 1985. A regional econometric forecasting system. [Ann Arbor, MI]: University of Michigan Press.

[16]Ballard, K. and Glickman, N.G. 1977. A multiregional econometric forecasting system: a model for the Delaware Valley. Journal of regional science, 17, pp. 161-177.

Temple/Kileen) and one nonmetropolitan county (Hill).[17] In a recursive econometric model which constrains substate estimates to a predetermined national total, Harris' MRMI[18] Model contains submodels for all the counties in the United States.[18] Similarly, Olsen et al.'s top-down MULTIREGION Model estimates all 173 BEA regions.[19]

Somewhat different from these examples is the single area econometric model of the Southeastern Utah Economic Development District.[20] This endeavor was undertaken as part of a larger study to examine the effectiveness of "small area" econometric modeling techniques (developed for typically large metropolitan areas) in application to an unambiguously small economic entity. The four county Southeastern Utah EDD is huge in land area compared with many "small areas" modeled, 17,500 square miles, but it is demographically and economically small and nonmetropolitan (approximately 45,000 in population).

While the literature does not contain as many examples as one would like of some types of models (e.g., the "unambiguously small" as opposed to the "truly small"), there is nonetheless a sufficient collection of substate econometric modeling efforts to allow a review of the usefulness of this technique for impact analysis.

C. Structural Stability

By the nature of the statistical procedures they utilize, single area regional econometric models necessarily presume a constant underlying economic structure and estimate average historical relationships for this structure. Structural shift can be tested for econometrically but if it is too recent in occurrence, there may be insufficient data to estimate a relationship restricted to the current pertinent period. Sometimes specific structure-shifting events are so clear the researcher is aware ahead of time that historical relationships have been invalidated--e.g., the 1973 Arab oil embargo and

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[17] Perryman, M.R. 1987. Econometric models and sub-models of a growth corridor characterized by differential performance patterns. Modeling and simulation, 17, (forthcoming).

[18] Harris, C.C. 1980. New developments and new extensions of the multiregional, multi-industry forecasting system. Journal of regional science, 20, pp. 159-171.

[19] Olsen R. et al. 1977. MULTIREGION: A simulation-forecasting model of BEA economic area population and employment. [Oak Ridge, TN]: Oak Ridge National Laboratory.

[20] Taylor C., Denzau, A. and Oaxaca, R. 1979. Local labor market econometric forecasting models. U.S. Department of Labor, Final Report, Contract 20-04-76-55.

its impact on energy sectors or the deregulation of many financial industry sectors in the 1970s and its impact on financial institution behavior. If a region's economy is substantially concentrated in an industry known to have undergone abrupt discontinuous change, the wisdom of attempting econometric estimation of the regional structure is highly questionable.

However, more relevant for a broad range of substate areas, is the extent to which general intertemporal multisector structural change (which occurs continually and not necessarily documented in a single specific event) cumulates over time. Does its magnitude tend to invalidate the current applicability of parameters which are in part derived from behavior fifteen to twenty years previously? Two recent studies, based on different regional analysis techniques, both suggest that intertemporal structural instability of the parameters is a problem inherent in methodologies utilizing data spanning decades. Charney and Taylor explicitly decompose the forecast errors of a typical annual state econometric model.[21] Total error is expressed as the additive sum of (1) regression estimation error, (2) structural stability error, (3) reverberative error, and (4) exogenous variable error. The first error is that derived from the imperfect fit of regression estimates; the second is that resulting from the fact that the historically estimated parameters do not depict the structure of the forecast horizon; the third is error resulting from the endogenous simultaneity of the system (if A determines B and A is forecast incorrectly, then error may be imparted to the forecast for B); and the fourth is error-induced because incorrect national forecasts (exogenous to the regional system) are used to drive the area model. The research estimated that 35 to 40 percent of the total error was structural stability error--the historically econometrically estimated parameters did not accurately reflect structure in the forecast horizon.

Using traditional economic export base theory, Shahidsaless, Gillis, and Shaffer examine the stability between decades of multiplier relationships in a large set of U.S. nonmetropolitan counties (264).[22] Five of the six multiplier relationships estimated exhibited statistically significant inter-decade instability.

These studies present a dilemma for standard econometric modeling of small areas. Econometric techniques cannot reliably discern economic relationships for a small set of data. Ten annual data points are generally insufficient and the above studies question the pertinence of

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[21] Charney, A.H. and Taylor, C.A. 1984. Decomposition of ex ante state model forecasting errors. Journal of regional science, 24, pp. 229-248.

[22] Shahidsaless, S., Gillis, W. and Shaffer, R. 1983. Community characteristics and employment multipliers in nonmetropolitan counties, 1950-1970. Land economics, 59, pp. 84-93.

augmenting the annual data set with information from fifteen or twenty years previous to the period of interest. Two alternatives can be suggested. One is to restrict the historical span of estimation, but utilize data with higher periodicity--quarterly data over a ten year period provides forty data points for estimation. Below the MSA level, however, reliable quarterly data are virtually non-existent and even for metropolitan regions, are highly limited in scope. A second possibility is to combine short spans of annual data from numerous regions and utilize pooled cross-section time series econometric estimation techniques. Again the data collection problem is much larger than implied by the typical annual single area model. This approach requires assembling spatially consistent data from a set of regions similar to the one of interest. Furthermore, the method is econometrically controversial and there is no assurance that the estimated structure, which is an average of the regions in the data set, will depict the particular region of interest with accuracy.

D. Data Availability and Consistency

Virtually every small area regional econometric modeler laments the lack of reliable consistent time series data. It is further generally recognized that data problems increase exponentially with (1) reduction in the size of the area of interest (state to MSA to county); (2) increase in desired periodicity (quarterly or monthly data being far less available than annual); and (3) increase in required sectoral detail.

Successful econometric modeling of the aggregate U.S. economy has been achieved as a result of the existence at the national level of detailed, consistent, and lengthy historical data on output, prices (input and output), employment (numbers of employees and hours), income, labor market conditions, demographic structure, exports, and imports. Data bases for virtually all subnational areas are severely deficient by comparison.

With the exception of agricultural and mining sectors, output data at the subnational level are non-existent. With the exception of CPI and some manufacturing average hourly earnings data for some large metropolitan areas, regional price data are non-existent. All states have data on labor force and unemployment rate at the state and MSA level, but these are highly aggregated (no demographic or industrial disaggregation) and not generally available over an extended historical period at the county level. Furthermore, for many areas the existing historical series are discontinuous. The switch from the "handbook" or "30-step" method to CPS-survey in the 1970s generated abrupt changes in reported labor force and unemployment rate data in many areas. For example, Arizona's measured unemployment rate increased two to three percentage points with the methodological change. Similarly, the wealth of annual demographic detail available for the nation as a whole typically is available for subnational regions only in decennial census years or over much more limited annual time periods.

Admittedly, some heroic efforts have been made at subnational data "derivation" in an effort to fill some of these huge gaps. Among these is the well-known Kendrick and Jaycox[23] method for estimating subnational product data, a method later supplemented by Weber[24]. Taylor, Denzau, and Oaxaca developed a program to generate annual intercensus data on age/sex population distributions for substate regions.[25] Fuchs, Michael, and Scott have attempted systematic development of state price indices.[26] However, it is impossible to escape the fact that basic data do not exist and in all cases highly tenuous assumptions are needed to create these data. The econometric modeling need for time series data exacerbates the problem--what might be done for a point in time is difficult to expand over time because of intertemporal inconsistencies in the data being used to derive historical year to year changes. A poignant summary of the general situation is provided by Bolton's observation on the data used in the Harris County (Texas)-specific model, "Many of the data are created by multiple assumptions about unobserved relationships."[27]

More often then not the problems become overwhelming, resulting in either use of a very crude "proxy" variable for the specific economic measure called for (e.g., use of average annual earnings per employee in place of a true labor cost schedule or the assumption that regional prices equal national prices) or adoption of a particular arbitrary functional form because algebraically it conveniently eliminates need for a non-existent variable in estimation. For example, Isserman, et al.[28] note that the widespread use of CES production functions to derive labor demand undoubtedly results from the fact pointed out by Ratajczak that these particular functional forms permit expression of labor

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[23]Kendrick, J.W. and Jaycox, C.M. 1965. The concept and estimation of gross state product. Southern economic journal, 32, pp. 152-168.

[24]Weber, R.E. 1979. A synthesis of methods proposed for estimating gross state product. Journal of regional science, 19, pp. 217-230.

[25]Taylor C., Denzau, A. and Oaxaca, R. 1979. Local labor market econometric forecasting models. U.S. Department of Labor, Final Report, Contract 20-04-76-55.

[26]Fuchs, V.R., Michael, R.T. and Scott, S.R. 1979. A state price index. NBER Working Paper No. 320.

[27]Bolton, R. 1985. Regional econometric models. Journal of regional science, 25, pp. 495-520.

[28]Isserman, A.M., Gerking, S., Schubert, U., and Taylor, C.A. 1986. Regional labor market and migration analysis. Handbook on Regional and Urban Economics, E. Mills and P. Nijkamp (eds.). [Amsterdam, The Netherlands]: North-Holland.

utilization independent of capital stock and hence obviate the need for non-existent regional capital stock data.[29]

Casual review suggests problems of time series data availability are less severe in the area of income and employment. Reasonably consistent annual personal income data have been provided by BEA at the county level since 1965. The apparent solidity of this series results in its virtual universal use in U.S. regional econometric modeling. However, as typically applied, the series is at best an approximation of the desired economic measure. BEA income data is used in regional modeling as though it measured resident "money available to spend on goods and services." However, the series does not adjust for taxes except personal social security payments (i.e., it does not measure disposable personal income), includes some money not available for current personal expenditure, and excludes other available transfers. Illustrative of the latter two is the BEA treatment of pension funds. Employer payments to private pension plans and imputed interest on these funds are attributed as current income to the area of the employing firm. Clearly these funds are not available for personal expenditure to the persons and regions they are allocated. They effectively become available when received as annuities by retirees and are spent in the region of retirement. The empirical estimation problems resulting from this method of treating private pensions can be substantial when areas with large retirement populations are under consideration, e.g., the southern Florida coastal counties.

Annual employment data are also reasonably available for subnational regions (BEA and/or County Business Patterns). Problems arise, however, if consistent industrially detailed data are needed. Much of the information is not disclosed for smaller areas. Estimates can sometimes be made from ancillary information (e.g., size distribution of firms), but this is extremely laborious when attempted for more than one or two years. Furthermore, for time series estimation, little can be done (except aggregate sectors) to cope with discontinuities arising from changes in Standard Industrial Code classifications. In small regions, continual firm reclassifications (without changes in SIC code definitions) can present almost insurmountable time series consistency problems. For example, a number of Florida counties are heavily impacted by missile development. Large defense contracting firms have been switched back and forth between a manufacturing sector and service sector depending upon stage of contract (SIC 3761, a manufacturing sector, while the missile is being assembled and SIC 7379, a service sector, while the missile is being tested). In a recent study, Taylor tediously straightened out the inconsistency for just two points in time in order to provide a realistic picture of

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[29] Ratajczak, D. 1974. Data limitations and alternative methodology in estimating regional econometric models. The review of regional studies, 4, pp. 51-64.

employment detail at the MSA level in Florida.[30] It would be extremely time-consuming to attempt the effort over sufficient periods to create consistent detailed time series data.

All of the problems discussed thus far are amplified if development of a quarterly time series data base is undertaken as opposed to an annual one. Many of the data available annually are not compiled quarterly at the substate level (income, total population, employment data cited above, etc.). Once again a sequence of assumptions are needed to impose quarterly patterns on the annual data. Taylor, Denzau, and Oaxaca detail techniques for developing quarterly income and population figures for the Tucson, Arizona MSA.[31] This particular effort attempts to utilize supplementary available quarterly series in the process (e.g., the quarterly pattern of wage disbursements as indicated by employer unemployment insurance (202) reports are used to distribute annual wage earnings over quarters and survey data on the seasonal timing of moves to Tucson in conjunction with hard data on quarterly births and deaths are used to generate quarterly population figures). Such approaches, while perhaps imparting as much integrity as possible to the process, are costly, time-consuming, and often use data sets not generally available across all substate regions. Furthermore, supplementary quarterly data may not exist for all variables of interest. For example, for many substate regions, the only available three or four digit detailed employment data are the annual figures in County Business Patterns. Some three digit monthly or quarterly data may be reported in 1202 or 790 state series which could be used to impute seasonality at the county level. However, typically much larger categorizations (two digit or combinations of two digit) characterize these state series of higher periodicity and the use of broad category seasonality to impute specific industry seasonality is generally not valid.

The alternative to these attempts is some form of mathematical interpolation.[32] It must be recognized that while apparently more data points are created, no more new information is contained in the quarterly data set than existed in the original annual series when this approach is used.

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[30]Taylor, C. 1985. Five-year employment share shifts: the changing MSA industrial distribution of jobs. The Flordia outlook. [Gainesville, FL]: Bureau of Economic and Business Research, University of Florida, 9, pp. 19-30.

[31]Taylor C., Denzau, A. and Oaxaca, R. 1979. Local labor market econometric forecasting models. U.S. Department of Labor, Final Report, Contract 20-04-76-55.

[32]Schmidt, J.R. 1986. A general framework for interpolation, distribution, and extrapolation of a time series by related series. Regional econometric modeling. M.R. Perryman and J.R. Schmidt (eds.). [Boston, MA]: Kluwer-Nijhoff.

The problem is further compounded if the annual data set is already synthetically created (e.g., the regional output or disaggregated population data cited above). The process of constructing a greater number of temporal data points often imposes more layers of dubious assumptions on an already questionable set of assumptions which went into generating the annual series.

The data problems inherent in substate regional econometric modeling have been emphasized because they are central to the evaluation of these models as tools for impact analysis. The previous section documented problems of structural stability in regional econometric models. Implicitly, quarterly models were perhaps an alternative to this problem since potentially they can be estimated on a shorter historical period. Realistically, such quarterly models either have to be highly aggregated and/or perched atop a mountain of artificially created time series data. In either case, the validity of the implied impacts are questionable.

The problems of insufficient consistent time series data at the regional level often are manifested in econometric estimation using relatively few time periods and a large number of "proxy" variables. This approach has serious implications for the plausibility of the estimated economic relationships as discussed below.

E. Specification and Estimation

The first step in model specification is consideration of the purpose of the model. Chipman's[33] clear theoretical exposition that aggregate analysis can be misleading with respect to multiplier impacts has been verified in specific regional studies.[34] Sectoral detail is virtually essential in a model to be used for impact analysis. While it is self-evident that such detail is needed if specific sector impacts are to be quantified, it is important to recognize that this detail is also needed even if only aggregated impacts are of concern (effect on total income or total employment).

Besides the problem of collecting sectorally detailed historical data discussed above, it is almost impossible to econometrically estimate detailed intersectoral relationships in a regional time series context. Theoretically, one can specify that production or employment in one sector is a function of production or employment in each of all other sectors, but if highly detailed industrial disaggregations are used, there are insufficient degrees of freedom to estimate the

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[33]Chipman, J.S. 1950. The multisector multiplier. Econometrica, 18, pp. 355-374.

[34]Mattila, J.M. 1973. A metropolitan income determination model and the estimation of metropolitan income multipliers. Journal of regional science, 13, pp. 1-16.

equation. Even if such degrees of freedom existed, the resulting parameter estimates would be exceedingly imprecise and probably highly illogical because of the inevitable multicollinearity of the independent variables. At best, strictly econometric models include only a few very aggregated intersectoral production linkages with the apparent existence of some such linkages and neglect of others being random and arbitrary. This is a well recognized shortcoming of regional econometric models and certainly has less severe consequences for pure aggregated forecasting (a major use of the models) than impact analysis. It is worth noting that the problem has led some regional econometricians to develop hybrid models which replace imprecise and incomplete econometric structures with an input-output table or derivative therefrom.[35]

A second problem of specification and estimation particular to impact analysis is isolation of local and non-local impacts on production, employment, and sales. This separation is critical if internal multiplier processes are not to be overstated. For example, in a tourist-impacted area, if restaurant and bar sales are specified to be a function solely of local income, often the historical statistical fit using ordinary least squares estimation is not poor both because the trade sector is an important determinant of local income and because local income is often correlated historically with national income determining the tourist component. However, the estimated coefficient on local income is biased upwards both because of the simultaneity in determination of local income and local trade sales (simultaneous equations bias) and because of the failure to allow for impacts of income outside the area on local restaurant and bar sales (bias from the specification error of omitting a pertinent independent variable). An exogenous increase in local income would imply a greater impact on local sales (and hence a greater multiplier impact) on the local economy than in fact exists.

If a large number of observations were available, the simultaneous equations bias could be mitigated by use of an appropriate econometric estimation technique which yields consistent estimates, but this asymptotic property of consistency may have little relevance for actual estimator performance in small samples. Indeed, as discussed above, regional econometric modelers almost invariably are working with very small samples of data. The small sample simultaneous equations bias is an unavoidable statistical problem.

The problem of failing to specify export-base components of the local economy can theoretically be corrected. However, in implementation, the same difficulties arise as with estimating intersectoral linkages. Apparent level of export activity is critically affected by sectoral aggregation, so again a level of detail often

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[35] Treyz, G.I., Friedlaender, A.F. and Stevens, B.H. 1980. The employment sector of a regional economic policy simulation model. Review of economics and statistics, 62, pp. 63-73.

difficult to achieve in regional econometric data bases is needed.[36] Furthermore, historical correlation between local and national economic activities renders it difficult to obtain precise estimates of local and export induced activity with econometric techniques.

In order to achieve plausible results, it is almost essential to separate the data prior to estimation into local and export components. Such separation is difficult for an entire series of data. The Mathur-Rosen econometric technique utilizes the available time-series data to estimate a single "average" separation.[37,38]

The equations for location quotient and minimum requirements can theoretically be applied on a year by year basis to generate time series data. Cyclical variability of employment shares and differential impacts of cycles regionally and nationally can result in erratic series with strings of zeros in the export data set using location quotients. Minimum requirements was used by Anderson, et.al., to generate time series data on export and local serving trade employment in Arizona.[39] While state aggregate results appeared reasonable, many more problems were encountered in applying the technique to generate time series at the substate level. Problems of the minimum not staying minimum forced the authors to eventually compare very disparate counties (rural agricultural and mining counties, large urban counties, and Indian reservation counties).

Taylor and Charney used combined pooled cross-section time series analysis and sporadic survey data to disaggregate Arizona, Phoenix, and Tucson restaurant and bar sales into local and export components.[40] However, the procedure is not immediately applicable to other sectors, utilizes not generally available state-specific survey data, and is extemely cumbersome and tedious to update.

The questionable quality of much of the time series substate data

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[36]Isserman, A.M. 1980. Estimating export activity in a regional economy: a theoretical and empirical analysis of alternative methods. International regional science review, 5, pp. 155-184.

[37]Mathur, V. and Rosen, H. 1974. Regional employment multipliers: a new approach. Land economics, 50, pp. 93-96.

[38]Rosen, H. and Mathur, V. 1973. An econometric technique versus traditional techniques for obtaining regional employment multipliers. Environment and planning, 5, pp. 273-282.

[39]Anderson, J., Beckhelm, T.L., Chalmers, J.A. and Hogan, T.A. 1974. Atom 2: Part I of Final Report. Four Corners Regional Commission.

[40]Taylor, C. and Charney, A.H. 1981. Development of compatibile State-SMSA econometric models. National Science Foundation, Final Report, Grant No. DAR-7909489.

in conjunction with typically small numbers of observations and discontinuous, lumpy change in smaller regions can readily result in implausible estimated economic relationships. The absurdities have generally been removed by the time of final model presentation, but all econometric modelers of small areas are aware of the problem. For example, Taylor, Denzau, and Oaxaca point out that the first specification and estimation of construction employment in the Southeastern Utah EDD yielded an outrageously high wage elasticity in excess of 9![41] Rubin and Erickson discuss the forecasting problems encountered in an original specification of the Milwaukee model when some estimated elasticities were unreasonably high.[42]

F. Verification

While an array of summary statistics accompany a small area econometric model, these measure single equation and individual parameter statistical significance. There are no parametric tests for formal verification of the entire model. Econometric model validation is generally a sequence of non-parametric descriptive summaries of how the model seems to be working. Even some of the commonly accepted performance descriptors are difficult to calculate for small area models, in particular, an out-of-sample model test. While such a test would appear essential for model verification, in practice it, of course, requires that some of the data be held back from use in estimation. This may be difficult given already limited data sets. Further compounding the problem is Charney and Taylor's finding that the usual "couple of years" out-of-sample test may be insufficient for indicating model performance since the results of the single test depend critically upon the particular "couple of years" comprising the test period.[43]

It is generally recognized in econometric modeling that validation is in part a function of model purpose and a model for which forecasting properties have been examined is not necessarily tested for impact analysis. In a forecasting context, historical data correlations

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[41]Taylor C., Denzau, A. and Oaxaca, R. 1979. Local labor market econometric forecasting models. U.S. Department of Labor, Final Report, Contract 20-04-76-55.

[42]Rubin, B.M. and Erickson, R.A. 1980. Specification and performance improvements in regional econometric forecasting models: a model for the Milwaukee metropolitan area. Journal of regional science, 20, pp. 11-36.

[43]Charney, A.H. and Taylor, C.A. 1984. Decomposition of ex ante state model forecasting errors. Journal of regional science, 24, pp. 229-248.

(both in-sample and out-of-sample) can mask unreasonable parameter estimates, but the latter will generate implausible effects in an impact analysis context. In addition, criteria of forecasting accuracy can conflict with criteria of impact analysis accuracy. For example, the detail essential for impact evaluation may reduce average forecasting accuracy.[44]

It is not possible to explicitly "verify" an econometric model for impact analysis. Some shocks to the system can be tried out and their effects simulated, but then the only verification is "Do the results look reasonable?" The interactions in a small area econometric model are not derived from a verified framework. Furthermore, there is not a well developed comprehensive theoretical literature which implies empirical results that may be used as a standard for plausability.

G. Regional Input-Output Modeling

Input-output analysis, a name given to interindustry analysis by Wassily Leontief in the late 1930s is concerned with the identification and measurement of the various economic interdependencies of the producing and consuming units within an economy.[45] In 1973, Professor Leontief received the Nobel Prize in Economic Science for his pioneering work in input-output analysis.

There has been an enormous amount of input-output activity at the regional level during the last several decades. Two bibliographies of regional work are Bourque and Cox [46]and Giarratani, Maddy, and Socher.[47] More recent applications are noted in such journals as the Journal of Regional Science, International Regional Science Review, Annals of Regional Science, Regional Science Perspectives, and Growth and Change, to name a few. In addition, many regional input-output models are being constructed and applied by state and local governments. Examples of

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[44]Taylor, C. 1982. Econometric modeling of urban and other substate areas: an analysis of alternative methodologies. Regional science and urban economics, 12, pp. 425-448.

[45]Leontief, W. 1936. Quantitative input-output relations in the economic system of the United States. Review of economics and statistics, 18, pp. 105-125.

[46]Bourque, P.J. and Cox, M. 1970. An inventory of regional input-output studies in the United States. [Seattle, WA]: Graduate School of Business, University of Washington.

[47]Giarratrani, F., Maddy, J.D., and Socher, C.F. 1976. Regional and interegional input-output analysis: an annotated bibliography. [Morgantown, W. Va.]: West Virginia University Library.

these works are State of California,[48] Ogallala Region for Kansas[49], State of Nebraska[50], and Stern for the Houston and Galveston MSA.[51] The intent of this listing is to note that a considerable amount of activity has occured in regional input-output modeling. This activity is continuing, but nearly all recent work in regional input-output modeling is being based on nonsurvey methods.[52]

To the nonspecialist, an input-output model may appear as simply several very large tables that contain a great amount of data. This description, while basically accurate as to the visual characterization of the model, fails to note that these numbers represent transactions among economic units (sectors), indicating flows of goods, services, and money. In brief, an input-output model (i.e., the input-output tables) indicates where different industries, governments, and consumers purchase goods and services and where producers, in turn, sell their goods and services. As described by Emerson and Lamphear:

> "The main theme of (input-output anlaysis)...is economic interdependence. In a highly specialized economy such as that which characterizes the United States and its geographic components, several stages of production are involved in delivering a product or service to the ultimate consumer. Since numerous industries sell the majority of their output to other industries rather than to final markets, this intermediate production demand represents a sizeable portion of the total activity of an economy. Nationally, for instance, interindustry transactions represent more than 50 percent of total dollar-value of transactions. Thus the activity of one industry may depend upon the activities of several other industries. These are the interrelationships that are captured in an input-output investigation."[53]

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[48]California, State of. 1980. Measuring economic impacts--the application of input-output analysis to California water resources problems. Bulletin 210. [Sacramento, CA]: Department of Water Resources.

[49]Emerson, M.J. 1982. Ogallala aquifer study in Kansas. [Topeka, KS]: Kansas Water Office.

[50]Nebraska, State of. 1984. Nebraska input-output model. [Lincoln, NE]: Natural Resources Commission. (unpublished).

[51]Stern, L.H. 1983. Houston-Galveston regional input-output study for 1979. [Houston, TX]: Rice Center.

[52]Morrison, W.I. and Smith, P. 1974. Nonsurvey input-output techniques at the small area level: an evaluation. Journal of regional science, 14, no. 1, pp. 1-14.

[53]Emerson, M.J. and Lamphear, F.C. 1975. Urban-Regional economics: structure and change. [Boston, MA]: Allyn and Bacon, pp. 24.

The usual set of tables that make-up a regional input-output model are (1) the transactions table, (2) the direct requirements table, and (3) the total requirements table.

The transactions table is a system of economic accounts, similar to business accounts with certain accounting principles and rules. Its single most important feature is the systematic classification of interindustry transactions. In brief, a transactions table is a descriptive picture of the various transactions among industries in an economy for some specified accounting period.

The interindustry accounting framework of the input-output transactions table incorporates an important "double counting" feature, where the producing sectors' outputs are recorded as sales to producing sectors and as purchases by producing sectors; hence, the name input-output analysis. With input-output analysis, the internal markets of the economy are brought into view, which is important for assessing economic impacts.

The direct requirements table is derived from the transactions table. This derivation involves dividing each producing sector's purchases, which are identified by reading down its column within the transactions table, by its total gross outlay. The derivation of direct requirements, as just noted, means that the input coefficients of a direct requirements table represent average relationships. Thus, average relationships are assumed whenever an input-output model is used to measure total economic effects. Moreover, the direct requirements coefficients of a regional input-output model are trade coefficients rather than technical input coefficients. Regional technical input coefficients indicate the total amount of a particular input that is required to produce one dollar of industry output. Regional input coefficients are adjusted for trade, meaning that these coefficients reflect only those inputs being supplied by producers located within the region.

The total requirements table (or, the Leontief inverse) is derived from the direct requirements table. This table provides the economic information for the computation of industry specific multipliers, which can be measured in terms of industry output, employment, or income.

Several key assumptions are involved in the derivation and interpretation of the total requirements table. The validity of these assumptions needs to be carefully considered when applying input-output analysis to regional economies, particularly when applied to small area economies.

H. Assumptions and Coefficient Stability

Most applications of input-output models are by way of the various sector multipliers that are derived from the total requirements table. Several important assumptions are involved in the analytical derivation

of the total requirements table, and for the proper use of sector multipliers these assumptions should be known.

First, it is important to recall from an earlier discussion that the direct requirement coefficients, or input coefficients, are average relationships. Next, it is assumed that the relationship between input and output is proportional. Therefore, if the quantity of each input is doubled, the output is also doubled. Finally, it is assumed that there is no substitution of production factors. It should be further noted that at the regional level, the input coefficients are not the same as technical input coefficients. Because of the substantial amount of trade with other regions, regional input coefficients are, in fact, trade coefficients. That is, for any column in the direct requirements table, each input coefficient shows only the amount of each input the producing sector purchased from the region in order to produce one dollar of output. An additional amount of inputs may have been purchased from outside the region. The amount of the input purchased within the region plus any additional amount purchased outside the region per dollar of output is the technical input coefficient for that input. But the assumption of "no substitution" means that regional input sources are not substitutable for "outside" input sources, and vice versa, which may not be a reasonable assumption for small area economies. Generally speaking, a small area, for example a county, is likely to show a greater variation in its trade pattern over time than will a multistate region.

It is most likely that the above assumptions are violated, at least to some degree, in input-output application, particularly for small area economies. Several reasons can be cited why these assumptions may not hold. Some have already been cited. Miller and Blair provide specific reasons as to why technology may not remain fixed in an input-output framework.[54]

1. There is a technological change itself, whereby new techniques of production are introduced in a sector (e.g., replacement of some human labor with capital to carry out production).

2. If there is a large increase in demand for the products of a particular sector, output will increase (subject, of course, to capacity constraints), and the producer may experience economies of scale. (Conventional input-output analysis does not allow for economies of scale in production.)

3. New products are invented (e.g., plastics) which means that (a) there may be an entirely new sector--row and column--in a sufficiently disaggregated table or at least the product

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[54] Miller, R.E. and Blair, P.D. 1985. Input-Output analysis: foundations and extensions. [Englewood Cliffs, NJ]: Prentice-Hall, Inc.

mix will change in an existing sector if the new product is classified there, and/or (b) it may be used to replace an older product as an input to production in other sectors (e.g., plastic bottles rather than glass for soft drinks).

4. Relative prices do change, and this may cause substitution among inputs in a production process.

Moreover, as noted earlier, the regional input coefficients are not technical input coefficients. They represent, in fact, "from/to" or trade coefficients. Thus, regional input coefficients may change as interregional trade patterns shift over time.

For these reasons, a region's input coefficients can change over time. The real question, however, is an empirical one, i.e., how quickly and how dramatically do these input coefficients change, and more importantly, how much difference does this make in actual application of a regional input-output model to regional economies? Unfortunately, answers to these questions are uncertain because there are no true or correct figures with which to compare the results. First of all, the great expense of constructing survey-based regional input-output models at sufficient time intervals prohibits the establishment of a series of industry-specific input coefficients for analysis purposes. Furthermore, even if a series of survey-based regional input-output models did exist, with identical sector descriptions, accounting principles and rules, etc., the input coefficients in these models would represent only estimates of actual input coefficients. In short, these input coefficients would have been obtained from samples, and therefore, they would be subject to sampling error. It is for these reasons that any analysis of changes in input coefficients over time is quite limited.

Three survey-based input-output tables for the state of Washington, for 1963, 1967, and 1972, have been used in a number of studies of changes in input coefficients at the regional level. As one might expect, results of the examination of the regional input coefficients for the Washington tables are not conclusive. The results do suggest, however, that overall predictions from "old" regional tables may work quite well. But one needs to be aware that individual sectoral outputs can be badly forecasted.[55] Emerson examined Kansas survey-based tables for 1965 and 1970.[56] Like the Washington study results, the Kansas

[55]Conway, R.S., Jr. 1977. The stability of regional input-output multipliers. Environment and planning, A9, no. 2, pp. 197-214.

[56]Emerson, M.J. 1976. Interregional trade effects in static and dynamic input-output models. Advances in input-output analysis. K. Polenske and J.V. Skolka (eds.). Proceedings of the sixth international conference on input-output techniques. Vienna, April 22-26, 1974. [Cambridge, MA]: Ballinger, pp. 263-277.

results are also not conclusive. However, one conclusion in the Kansas study was that where changes in input coefficients did occur, these changes did not seem to be acute.

The assumptions of proportional input-output relationships, average input coefficients, and no substitution of production factors can be reduced to a single basic assumption of fixed factor proportions for a final comment concerning the validity of regional input coefficients.

The validity of the more general assumption of fixed factor proportions is related to the degree of industry aggregation used in the construction of the input-output transactions table. Industry aggregation, as used here, refers to the grouping of producing units, for example, establishments, into producing industries or sectors. At one extreme, complete aggregation of all producing units would result in an input-output transactions table with one producing sector only. The sector row of the transactions table would show the distribution of final output to households, government, investment, and export. The sector column would show the way in which factor payments were distributed among wages, rent, depreciation, taxes, and profits. Such a table would not show interindustry transactions, and hence interindustry relations. At the other extreme, each producing unit of the region would be shown in the input-output transactions table as a separate producing sector. The number of rows and columns in the producing portion of the transactions table would equal the number of producing units in the region. It is true that this detailed input-output transactions table would give a complete picture of interindustry relations, but it would produce confusion by its sheer complexity. Obviously, neither extreme is used in the construction of an input-output transactions table. Therefore, the first step in model construction is to determine the degree of aggregation which will make the best use of obtainable statistical information, on the one hand, and render validity to the assumption of fixed factor proportions on the other. While the availability and quality of data, along with industry aggregation, affect the accuracy of the results, it is the intent here to concentrate on the association between the validity of the assumptions and the degree of industry aggregation. To this end, the discussion will focus on the major conditions that need to be satisfied to render validity to the basic assumption of fixed factor proportions.

One condition is that the substitution of one input factor for another must be negligible. A very fine classification of industry groups may result in closely substitutable produced inputs being put into different industry categories. If input substitution occurs, because of, say, a price change, the interindustry relations after the substitution would differ from the industry relations before the price change. This possibility can be largely avoided by classifying closely substitutable inputs in the same industry category.

A second condition is that no significant excess capacity exists in the industry group. This is an important condition because with excess capacity or very large inventories of some inputs it may be possible for

output to be increased without proportional increases in these inputs. A larger degree of industry aggregation would mean that excess stocks of inputs by some establishments would tend to be cancelled out by depleted stocks of other establishments.

A problem similar, but not identical, to excess stocks is input indivisibilities. An indivisible input is one where a unit of input suffices over a range of output, thus disproving the fixed factor proportions assumption. Sufficient industry aggregation will minimize this problem as some establishments in the industry group will purchase indivisible inputs to expand production while others will be able to expand output without an increase in such inputs. Thus the average input requirements for the industry group will tend to be more proportional to the increase in output if a large number of establishments are in the same industry group.

A fourth condition, changes in technology, must not occur. Obviously, this is an unrealistic condition, but again the broader the industry classification, the more likely it is that the effects of different technologies will cancel out.

The fifth condition is that constant returns to scale exist for the industry group. This is a realistic condition because aggregation will tend to average out internal differences of economies of scale. Within the industry group, some establishments may be enjoying internal economies of scale; that is, lower average production costs with higher levels of output. The assumption of fixed factor proportions is not valid in this case. But other producers of the same industry group may be experiencing internal diseconomies of scale; that is, higher average production costs with higher levels of output. An aggregation of establishments with reversed average cost schedules would tend to cause a cancellation; and hence, the average cost schedule for the industry group would approximate the fixed input-output relationship that is assumed in input-output analysis.

I. Data Requirements and Data Availability

The construction of a regional input-output transactions table requires a substantial amount of data on industry sales and purchases, or from/to information. Unlike econometric models, this information is required for only a single time period. However, this information is (1) extensive, because from/to information must be developed for all the producing sectors identified in the model, and (2) expensive, because such information is not available at the local level for public use. Therefore, from/to information must be obtained from either industry surveys or generated from nonsurvey techniques.

Survey based models were popular in the early 1960s, when state and Federal agencies provided generous funding to underwrite input-output surveys. Today, with restricted funding for regional economic modeling, a full survey approach is unthinkable. As a result, recent work in

regional input-output modeling has focused on limited survey techniques and nonsurvey techniques. Since the MMS requirements specify the use of existing economic information, the discussion that follows is devoted to nonsurvey techniques.

As implied, nonsurvey techniques rely entirely on secondary data sources. For the U.S., nonsurvey based regional input-output models are usually based on national input-output coefficients. Techniques are then employed to adjust these national coefficients to reflect regional coefficients. The fundamental assumption of all the methods used here is that the national technical relationships hold good at the regional level and that the regional trade coefficients differ from the national technical coefficients to the extent that goods and services are imported from other regions.

Three principal approaches have been used to adjust national input coefficients to reflect regional input coefficients. These are the commodity balance (or, supply-demand pool) method, the location quotient technique (with its many variants), and the iterative procedure. Examples of purely nonsurvey techniques to generate regional input-output models are provided by Schaffer and Chu[57], Round[58], Morrison and Smith[59], and Cartwright, et al.[60]

The supply-demand pool method estimates regional input coefficients from national coefficients on the basis of the relative availability of local goods and services for production purposes; hence, the name--supply-demand pool method. National technical coefficients are taken as the first approximation to regional coefficients. Regional output by sector (or industry) is found by multiplying each of these coefficients by the appropriate actual regional output of that sector (and similarly for final demand sectors, but using the national final demand input proportions) and summing. These sums represent the total demands (where total demand is equal to intermediate demand plus final demand) by commodity. Note that these total demands by commodity reflect national sector input requirements, meaning that national technology is applied

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[57]Schaffer, W. and Chu, K. 1969. Nonsurvey techniques for constructing regional interindustry models. Papers, Regional Science Association, 23, pp. 83-101.

[58]Round, J.I. 1972. Regional input-output models in the U.K.: a reappraisal of some techniques. Regional studies, 6, no. 1, pp. 1-9.

[59]Morrison, W.I. and Smith, P. 1974. Nonsurvey input-output techniques at the small area level: an evaluation. Journal of regional science, 14, no. 1, pp. 1-14.

[60]Cartwright, J., Beemiller, R., and Gusteley, R. 1981. RIMSII: regional input-output modeling system. Estimation, evaluation and application of a disaggregated regional impact model. Washington, D.C.: U.S. Department of Commerce, Bureau of Economic Analysis.

to the region. For each commodity, the region's total final demand (requirement) is subtracted from the region's supply (output). If this balance is positive (or zero) for any commodity, the national coefficients are maintained as estimates of the region's input coefficients. In other words, the region does not have to import the commodity to meet its final demand requirements. However, if the balance is negative, the national coefficients must be adjusted downward, since the region's supply is inadequate to meet its final demand requirements. The national coefficients are adjusted downward on the basis of the imbalance between the region's supply of the commodity and the total demand for the commodity. The amount of the imbalance between regional supply and demand by commodity/service is uniformly proportioned across all intermediate and final demand sectors (that is, uniformly proportioned across the commodity row). This procedure yields regional input coefficients that are less than their national counterparts by the amount of imports (or trade).

The location quotient method is similar to the supply-demand pool method in that national input coefficients are taken as the first approximation to regional coefficients. However, the location quotient method does not involve the "pooling" of total regional demand/supply by commodity. Instead, ratios are developed that measure relative concentrations of industry activity. The concept of relative concentration can best be explained by examining one of the location quotient techniques, such as the Simple Location Quotient (SLQ), where industry activity will be measured in terms of employment. Let ER and ER_i denote region R's total employment and sector i employment, respectively. In like fashion, let EN and EN_i represent the nation's total employment and sector i employment, respectively. Therefore, SLQ_i for sector i is defined as:

$$SLQ_i = (ER_i / ER) / (EN_i / EN) .$$

The interpretation of the SLQ measure is as follows. If SLQ_i is greater than one, it can be said that sector i is more concentrated in region R than in the nation. Moreover, it can be said that region R specializes in the output of sector i, and, hence, exports some of its output to the rest of the nation and the world. On the other hand, if SLQ_i is less than one, it can be said that sector i is less concentrated in region R than in the nation, and therefore, the region imports products from a sector i that is located outside the region. Applying this interpretation to sector input coefficients leads to the following rules. If sector i is less concentrated in the region than in the nation ($SLQ_i < 1$), it is viewed as less capable of satisfying total regional demand for its output, and the national input coefficients need to be adjusted downward. More specifically, the national input coefficients recorded in the row for sector i are multiplied times the SLQ_i to yield regional input coefficients. The regional input coefficients will be smaller than the national input coefficients, since the SLQ_i is less than one. On the other hand, if sector i is more highly concentrated in the region than in the nation ($SLQ_i > 1$), then it is assumed that the national sector input coefficients will apply to the

region, and the regional "surplus" produced by sector i will be exported to the rest of the nation and the world.

As noted earlier, there are several variants to the location quotient technique, such as the Purchases-Only Location Quotients (PLQ) and the Cross-Industry Quotients (CIQ). The PLQ technique for sector i in region R relates regional to national ability to supply sector i inputs, but only to those sectors that use i as an input. The CIQ technique allows for differing modifiers within a given row of the national input coefficients table; that is, it allows for differing cell-by-cell adjustments within the table rather than uniform adjustments along each row of the table. The cell-by-cell adjustment procedure considers the relative importance of both supplying sector i and buying sector j in the region and in the nation. The idea is that if the output of regional sector i relative to the national output of i is larger than the output of regional sector j relative to the national output of sector j (that is, $CIQ_{ij} > 1$), then all of j's needs of input i can be supplied from within the region. Similarly, if sector i at the regional level is relatively smaller than sector j at the regional level ($CIQ_{ij} < 1$), then it is assumed that some of j's needs for i inputs will have to be imported.

The iterative procedure also uses the national input coefficients as the first approximation for the region's table of input coefficients. The national column coefficients for sector j are multiplied times the total activity of sector j for the region, where sector j represents both producing sectors and final demand sectors. The result is a regional transactions table based on national input coefficients. By definition, row sums of a transactions table represent sector outputs. Several of the row sums of the generated regional transactions table will likely exceed actual regional outputs, indicating a situation where the region's supply of a commodity(ies) is inadequate to meet the total requirement (demand) for that commodity(ies). Through an iterative procedure that first adjusts across all rows and then down all columns, the generated regional transactions are adjusted until the row sums of the adjusted transactions table are equal to the corresponding regional sector outputs. At this point, the transactions table is in balance, in an accounting sense. The direct requirements table is then derived from the balanced transactions table to yield the table of regional input coefficients.

An important empirical question is how accurate are these nonsurvey techniques for generating regional from/to information for regional input-output models? Since, as noted earlier, there is no "true" regional input-output model to compare nonsurvey results, the question remains statistically unanswered and, therefore, is left to judgement. It has been shown in empirical studies that in general the simple location quotient method is the best of the various location quotient techniques and is also generally better than the supply-demand pool approaches.[61,62] An overriding problem in assessing the performance of any method, whether nonsurvey, part survey, or full survey, is the assessment of errors and the actual measurement of differences between

techniques. Stevens and Trainer[63], Jensen[64], and Jensen and MacDonald have all discussed the general nature of errors and error generation in regional input-output analysis.[65] While these studies help place the performance of mechanical methods and adjustment techniques within the context of the overall performance of a regional input-output model, the specific problem still remains; that is, an "error-free" standard or base for comparison.

Stevens and Trainer note that the following points should be considered when constructing a nonsurvey regional input-output model:[66]

1. The most detailed set of technological coefficients available should be used. For example, if the U.S. input-output coefficients are used as the reference economy, these coefficients should come from the expanded 537 sector Use and Make tables.

2. The household purchase coefficients should be adjusted from those appearing in the table and adapted to those appropriate for the region under study. For most large MSAs, Consumer Expenditure Study data from the U.S. Department of Commerce can be used.

The Simple Location Quotient technique was used in the MMS Year II study to adjust national coefficients to regional coefficients for the ten MMS Coastal Areas. The SLQ technique was chosen for its simplicity

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[61]Morrison, W.I. and Smith, P. 1974. Nonsurvey input-output techniques at the small area level: an evaluation. Journal of regional science, 14, no. 1, pp. 1-14.

[62]Sawyer, C. and Miller, R.E. 1983. Experiments in regionalization of a national input-output table. Environment and planning A15, no. 11, pp. 1501-1520.

[63]Stevens, B.H. and Trainer, G.A. 1980. Error generation in regional input-output analysis and its implications for nonsurvey models. Economic impact analysis: methodology and applications, Saul Pletter (ed.). [Boston, MA]: Martin Nijhoff, pp. 68-84.

[64]Jensen, R.C. 1980. The concept of accuracy in regional input-output models. International regional science review, 5, no. 2, pp. 139-154.

[65]Jensen, R.C. and Macdonald, S. 1982. Technique and technology in regional input-output. Annals of regional science, 16, no. 2, pp. 27-45.

[66]Stevens, B.H. and Trainer, G.A. 1980. Error generation in regional input-output analysis and its implications for nonsurvey models. Economic impact analysis: methodology and applications, Saul Pletter (ed.). [Boston, MA]: Martin Nijhoff, pp. 68-84.

and for its reliability. It is important to note, however, that SAM provides the analyst commands for all the techniques currently in use to adjust national input coefficients to yield regional input coefficients. These commands and techniques are discussed in the Commands section of Volume II of this final report.

J. Short-Cut Methods

All of the nonsurvey methods outlined so far are geared toward the construction of regional input-output models. However, attention has turned more recently towards a different category of methods which focuses on the derivation of regional sectoral multipliers in situations where no complete regional input-output table exists. Obviously, at least some regional sector (from/to) information is required to compute these multipliers. The spirit of the approach is similar to nonsurvey input-output methods; that is, to circumvent the costly construction of a survey regional input-output table. Research on this topic is still quite active.[67]

K. Economic Base Models

Economic base models provide a third way to develop regional multipliers for regional economic impact assessment purposes. The general intent in the use of economic base analysis is to provide a very general (aggregate) impact multiplier at a low cost. Industry specific regional multipliers, by contrast, are typically developed from regional input-output models. In view of this, the following discussion of economic base studies will be brief.

Economic base models are developed on the premise that regional economic growth is dependent on the growth of so-called basic industries. Growth in the basic industries, in turn, leads to growth in other (dependent) industries and, therefore, overall regional growth is the result. Industries dependent on the basic industries are referred to as the nonbasic industries. Thus the region's industries are classified either as basic industries or nonbasic industries, depending on the extent to which each industry is serving markets outside the area.

Tiebout noted that economic base analysis recognizes that industries may sell a portion of their total product to local or regional markets and the rest to markets located outside the region.[68]

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[67] Harrigan, F.J. 1982. The estimation of input-output type output multipliers when no input-output model exists: a comment. Journal of regional science, 22, no. 3, pp. 375-381.

[68] Tiebout, C.M. 1962. The community economic base study. [New York, NY]: Committee for Economic Development, pp. 13-56.

Therefore, for some industries, a portion of output is basic, and the remaining portion is nonbasic. Other industries may be entirely basic or entirely nonbasic.

The dichotomy between basic and nonbasic activity forms the basis for developing economic base multipliers. Employment or income data are the most frequently used units of measurement, since these data are usually readily available for broad industry groups at the regional level.

In order to operationalize the model, however, it is necessary to determine how much of the region's total employment or income is devoted to basic and nonbasic activities. In light of the lack of export data at the regional level, industry exports, which identify the region's basic activities, must be estimated. The usual procedure is to use simple location quotients to estimate exports and, in turn, to delineate a region's economic activities in terms of basic and nonbasic activities.

Economic base studies can provide adequate answers to general questions regarding economic impact. If the questions being raised in an economic impact analysis concern highly aggregative variables such as total employment, if the forecast or impact period is short-range, if answers are to be provided in six months or less, and if the research budget is quite limited, then there is no question that an economic base model should be used. The virtue of an economic base model is its ease of implementation at a low cost. While there is considerable variation in the model formulation, data necessary for implementation of the model is modest and is available in published sources.

The fundamental criticism of economic base models is the lack of industry detail. The same estimated total change is produced no matter which industry transmits the initial change. Refinements in the economic base model are possible which incorporate industry detail to yield industry specific multipliers. These refinements, however, add to the complexity of the model and thereby add considerably to its cost of construction. In general, input-output models provide more detailed impact estimates than the export base model and share many of that model's basic assumptions.

L. Conclusions

Parameter estimates and the associated multiplier estimates from an econometric model are not limited to a single time period. In contrast, the input coefficients of a regional input-output model, which are used to derive the industry multipliers, are limited to a single time period. Impact multipliers based on a single time period may not reflect true interindustry relationships. Frequent updates in input-output models may be necessary because of the single time period problem.

The development of econometric models requires a time series of

data that spans many years. Some important variables for model construction include earnings, employment, output, sales, imports, and exports at the industry level. Complete data records for these variables and others usually do not exist for small area economies and certainly do not exist for a span of years. Data inadequacies alone preclude the development of econometric models for small area economies that can meet the MMS requirements set forth in the introductory section of this report.

The construction of regional input-output models requires basically the same kinds of data as noted for econometric modeling. There is one important difference, however. Data for input-output modeling can be limited to a single accounting period. With data requirements limited to a single accounting period, industry surveys have been used to obtain important information not found in published data sources. As noted earlier, many of the earlier regional input-output models were constructed on the basis of full (or limited) survey information. Surveys are quite expensive, however, and in recent years much of the work in regional input-output models has been based on mechanical means to generate information on regional trade patterns that can be linked to national input coefficients to yield regional input coefficients. These nonsurvey models are obviously surrogates of actual regional input-output models. The question is how accurate are these surrogate models for impact assessment purposes? This question remains largely unanswered, although a considerable amount of study has been devoted to it. At least one conclusion can be drawn from these studies. There is no solid evidence against the use of nonsurvey regional input-output models for impact assessment purposes.

III. The Socioeconomic Assessment Model

A. Components of the Model

The socioeconomic assessment model (SAM) consists of the four components as portrayed in Figure One:

1. A data base;
2. A sequence of ten nonsurvey regional input-output (I/O) models for the MMS Coastal Areas;
3. A demographic module;
4. An output and table generating module.

Each of these components will be briefly discussed in this chapter. Full documentation and instructions concerning operation of the components is available in Volume II of this report.

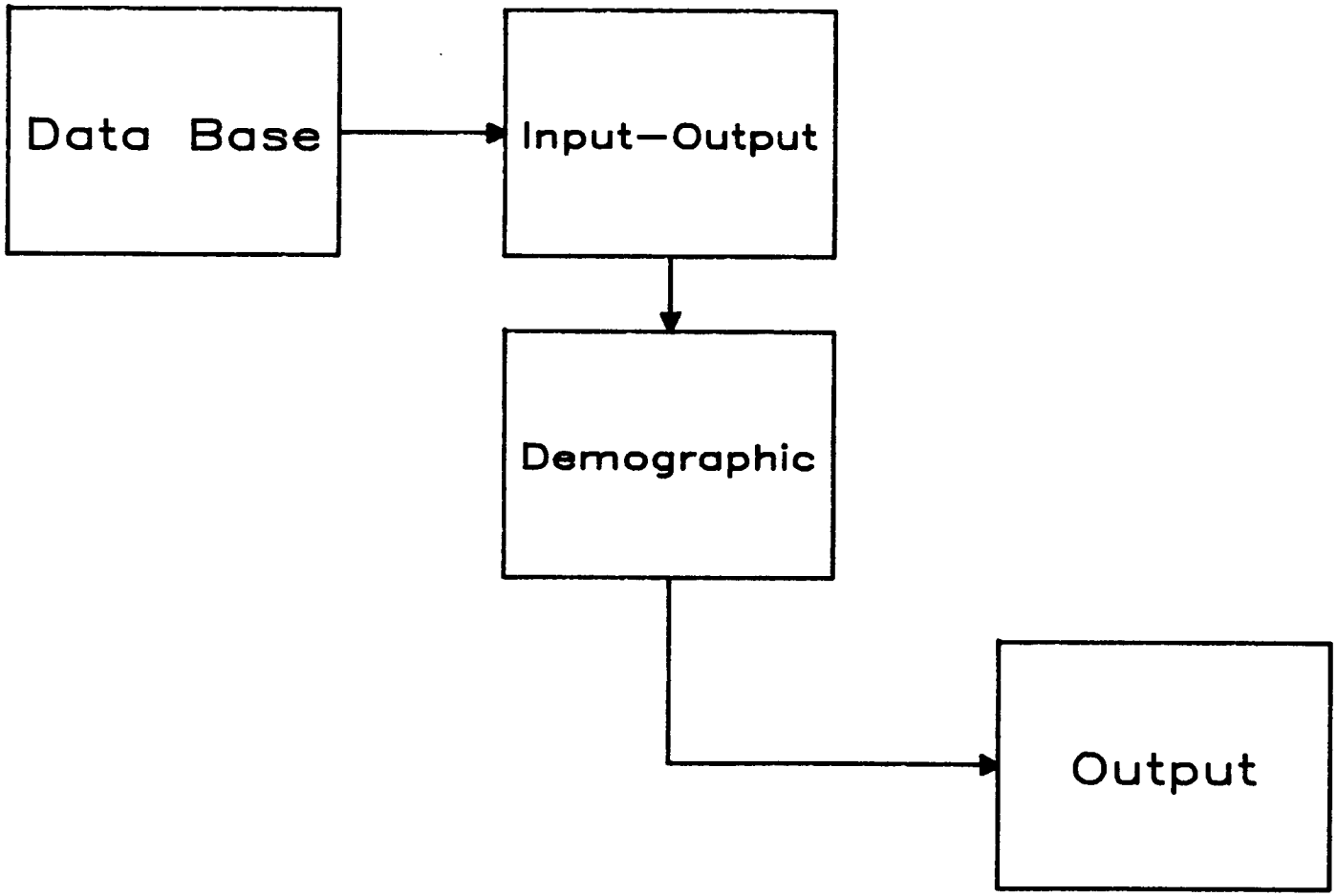
The data base of SAM consists of several types of data items including:

1. The 1977 national Use and Make Tables from the United States I/O Tables;
2. Employment and wage information at the county level from the County Business Patterns data set;
3. Producer and consumer price indices;
4. Employment, wage, and farm marketings information from the Census of Agriculture;
5. Unpublished employment and earnings information from the Bureau of Economic Analysis, U.S. Department of Commerce;
6. Demographic and occupation data from the Year I Study of the OCS Gulf of Mexico region.

B. Nonsurvey Regional Input-Output Models

The first computational component of SAM consists of a set of ten regional I/O models for the Coastal Areas. This set of models make it possible to identify and measure the socioeconomic impacts associated with OCS oil and gas development in the Gulf of Mexico. The measurement of socioeconomic impacts is based on the derivation of so-called industry (sector) output multipliers from the regional I/O models. An industry output multiplier for an industry is defined as the total value of production in all industries of the region's economy that is

Figure One
The SAM Model



necessary to satisfy a dollar's worth of final demand for that industry's output. For example, an output multiplier of 2.2 for an industry in Coastal Area W-2 means that $2.20 of total value of production (impact) is generated by a one dollar change in the final demand for the industry in W-2. Assuming a proportional relationship between a change in industry final demand and the corresponding change in the total value of production, an industry output multiplier can be used to estimate the total economic impact for any dollar amount of change in industry final demand. Thus, industry output multipliers can be used to measure the total economic impact associated with any postulated or known change in industry final demand. The change in final can be either positive or negative and, as a result, the associated total economic impact is positive or negative.

Construction of the respective nonsurvey regional I/O models was accomplished by the following steps:

1. The 1977 national Use table of the U.S. I/O model was price updated to reflect 1984 relative prices;

2. Competitive imports were removed from the national Use table;

3. The national I/O sectors were aggregated into 116 sectors and an adjustment for the industry mix in each respective Coastal Area was made during the aggregation. Each Coastal Area model is based on the same 116 sectors.

4. The direct requirements tables for the respective Coastal Areas were created;

5. The direct requirements tables were adjusted by sectoral location quotients to reflect trade patterns existing in the respective Coastal Areas;

6. Three household rows and columns were added to the regionalized direct requirements tables to account for three labor classes of interest to MMS: resident, commuter, and relocator.

In-depth descriptions of each of the above steps are available in Volume II of the report. Subsequent to the completion of these steps, total requirements tables for each Coastal Area were generated as the Leontief inverse of the corresponding direct requirements tables. After the total requirements tables were generated, output multipliers derived from the tables were used to generate estimates of impacts upon output, income, and employment from expenditure data supplied by MMS. These impact estimates appear in Chapter IV of this volume.

The strategy of creating nonsurvey regional I/O models from national I/O tables depends upon having sectoral economic activity measures in the regions and at the national level. Specifically, these

measures are necessary for the completion of steps three and five in the above procedural outline. Employment was chosen as the sectoral economic activity measure for the regionalization process. The County Business Patterns data on employment was relied upon in this regard since it extends to the four-digit SIC level. Several of the 116 sectors in SAM match individual four-digit SIC sectors. Although the County Business Patterns data is extensive in its industry coverage, there are instances of nondisclosure when the number of firms at the county level in the sector is small and disclosure would jeopardize confidentiality of firm data. In such cases, the number of firms in employee size ranges is given in lieu of the exact number of employees in the sector. An initial estimate of the undisclosed number of employees is provided by summing the products of the number of firms and the midpoints of the respective ranges. However, there is no guarantee that the sum of employment values (that may be a mixture of known and estimated values) of four-digit SIC sectors within a three-digit SIC "parent" industry will equal the employment value of the three-digit sector. A balancing algorithm is present in the SAM system which enforces the adding up constraints throughout all digit levels of the SIC sectors. Nondisclosed wage totals for sectors were also estimated and forced to satisfy the adding up constraint. Once the employment and wage values of all SIC sectors present in a given Coastal Area have been obtained, the application of the previously outlined regionalization process for the national I/O model is pursued.

Agricultural sectors (having SIC codes below 0700) and the railroad sector (SIC 4100 and attendant three- and four-digit sectors) are not represented in the County Business Patterns data due to lack of coverage by the Social Security system, upon whose records the data is based. Employment and wage values for the former sectors at the Coastal Area level were obtained from the Census of Agriculture while values for the railroad sector were obtained from unpublished data maintained by the Bureau of Economic Analysis.

As noted above, 116 industries were chosen for the framework of the regional I/O models. These industries were created by aggregating the 537 industries of the national I/O table. The aggregation procedure maintained the three- and four-digit SIC detail provided by the national I/O table for the oil and gas industries, as well as for industries closely related to oil and gas. Other national I/O industries were aggregated to roughly the one- and two-digit SIC level.

The aggregation procedure involved three basic steps. First, industries directly related to the MMS scenarios (see Chapter IV) for oil and gas activities were identified. These industries are called primary industries. Second, industries that directly and indirectly support the primary industries were identified. From this list, a final set of significant supporting industries was determined. These industries are called the supportive industries. Finally, the remaining industries from the national I/O tables were aggregated into one- and two-digit SIC categories and referred to as universal industries. Thus, the regional I/O models for the Coastal Areas include three classes of

industries: primary, supportive, and universal.

The primary industries fall into four categories: mining, new construction, maintenance and repair, and manufacturing. Specific sector members of the categories are given in Table 1.

Supportive industries were identified on the basis of information contained in the national Use table. The table records the amount of input (by commodity) required (or purchased) by each industry in order

TABLE 1

PRIMARY INDUSTRIES

1. Mining

   -- Crude Petroleum and Natural Gas Mining (I/O No. 8.0000)

2. New Construction

   -- New Petroleum and Natural Gas Well Drilling (I/O No. 11.0601)

   -- New Petroleum, Natural Gas and Solid Mineral Exploration (I/O No. 11.0602)

3. Maintenance and Repair

   -- Maintenance and Repair of Gas Utility Facilities (I/O No. 12.0207)

   -- Maintenance and Repair of Petroleum Pipelines (I/O No. 12.0208)

   -- Maintenance and Repair of Petroleum and Natural Gas Wells (I/O No. 12.0215)

4. Manufacturing

   -- Petroleum Refining (I/O No. 31.0101)

Note: I/O numbers represent the I/O code numbers used in the 1977 national I/O study by the Bureau of Economic Analysis of the U.S. Department of Commerce.

for that industry to produce its output. This information provided a way to identify the important suppliers of inputs for production purposes to the oil and gas industries. Since suppliers of inputs to the oil and gas industries also require inputs for production purposes, the list of important supportive industries was expanded to include all important indirect suppliers.

Two criteria were used to identify important supportive industries:

1. Firms supplying three percent or more of an industry's total input requirements are major suppliers;

2. Firms supplying from one-half to three percent of an industry's total input requirements are general suppliers.

The above criteria produced two types of supportive industry groups. The first group, based on the first criterion, consisted of industries that are major suppliers of inputs to other industries' outputs. The second type, based on the second criterion, consisted of industries that are general suppliers to many industries. General suppliers were included since they can have an important effect on the overall economy. Thus, both types of suppliers; that is, the major suppliers and the general suppliers, were considered in the identification of supportive suppliers.

Using information in the national Use table, suppliers that satisfied the above criteria were identified for each of the seven primary industries. For each major supplier, the above criteria were once again applied to identify "second round" major and general suppliers. This identification process, using the above criteria, was repeated for the third round, fourth round, and so on. In fact, this round-by-round process of identifying suppliers was continued until all major and general suppliers were identified. The complete list contained 79 major suppliers and 233 general suppliers.

Next, the complete list of 312 suppliers was subdivided into a list of major suppliers and a list of general suppliers. Each list was then reduced to include only the significant suppliers associated directly and indirectly with the seven primary industries noted earlier. The reduction process was based on the following criteria:

3. From the descending rank order of the actual frequency distribution for major suppliers, the significant major suppliers are found in quartiles one through three.

4. From the descending rank order of the actual frequency distribution for general suppliers, the significant general suppliers are found in only quartile one.

Application of the above criteria required the construction of a

simple frequency distribution (in descending order) for each list of supportive industries. The individual frequency distributions reflected the number of times each industry was identified as an important supplier. As examples, Wholesale Trade (I/O 69.0100) was identified 53 times as a major supplier. Banking (I/O 70.0100) was identified 27 times as a general supplier.

From the individual frequency distributions for the major and general supportive industries, the above criteria were applied to produce the eventual list of significant supportive industries. However, some adjustments were made to this list. For example, an industry that served as both an important major and general supplier but did not strictly satisfy the above criteria was included in the final list. Also, Commercial Fishing and related processing sectors were added to the final list since these activities are basic to coastal economies. Table 2 contains the final list of significant supportive industries.

TABLE 2

SUPPORTIVE INDUSTRIES

1.	3.0001	Forestry Products
2.	*3.0002	Commercial Fishing
3.	4.0001	Agricultural, Forestry, & Fishery Services
4.	5.0000	Iron & Ferroalloy Ores Mining
5.	6.0200	Nonferrous Metal Ores Mining, Except Copper
6.	7.0000	Coal Mining
7.	9.0001	Dimension, Crushed & Broken Stone Mining and Quarrying
8.	*14.0700	Canned & Cured Sea Foods
9..	*14.1200	Fresh or Frozen Packaged Fish
10.	20.0100	Logging Camps & Logging Contractors
11.	20.0200	Sawmills & Planing Mills, General
12.	25.0000	Paperboard Containers and Boxes
13.	27.0100	Industrial Inorganic & Organic Chemicals
14.	30.0000	Paints & Allied Products
15.	36.1200	Ready-mixed Concrete
16.	37.0101	Blast Furnaces & Steel Mills
17.	37.0102	Electrometallurgical Products
18.	37.0105	Steel Pipes & Tubes
19.	37.0200	Iron & Steel Foundries
20.	38.0800	Aluminum Rolling & Drawing
21.	38.1000	Nonferrous Wire Drawing & Insulating
22.	40.0400	Fabricated Structural Metal
23.	40.0600	Fabricated Plate Work (Boiler Shops)
24.	40.0700	Sheet Metal Work
25.	41.0100	Screw Machine Products & Bolts, Nuts,

SUPPORTIVE INDUSTRIES

		Rivets, & Washers
26.	42.0402	Metal Coating & Allied Services
27.	42.0500	Miscellaneous Fabricated Wire Products
28.	42.0800	Pipe, Valves, & Pipe Fittings
29.	45.0300	Oil Field Machinery
30.	61.0100	Ship Building & Repairing
31.	65.0100	Railroads & Related Services
32.	65.0300	Motor Freight Transportation & Warehousing
33.	65.0400	Water Transportation
34.	65.0600	Pipe Lines, Except Natural Gas
35.	66.0000	Communications, Except Radio and TV
36.	68.0100	Electric Services (Utilities)
37.	68.0200	Gas Production & Distribution (Utilities)
38.	69.0100	Wholesale Trade
39.	69.0200	Retail Trade
40.	70.0100	Banking
41.	70.0400	Insurance Carriers
42.	72.0100	Hotels & Lodging Places
43.	73.0101	Miscellaneous Repair Shops
44.	73.0104	Computer & Data Processing Services
45.	73.0105	Management & Consulting Services, Testing & Research Labs
46.	73.0107	Equipment Rental & Leasing Services
47.	73.0200	Advertising
48.	73.0301	Legal Services
49.	73.0303	Accounting, Auditing & Bookkeeping, & Misc. Services, N.E.C.
50.	74.0000	Eating & Drinking Places

*These industries, while not part of the oil and gas industrial complex, were included in the final list of significant supportive industries because of their importance to coastal economies.

Industries that were not part of the primary or supportive industries were aggregated into a class termed universal industries. Basically, the aggregation procedure followed the classification system used by the U.S. Bureau of Economic Analysis to aggregate their 537 industries to an 85 industry/commodity level. This process resulted in 59 universal industries, bringing the total number of industries (sectors) for the MMS study to 116. A complete list of the 116 sectors is given in Table 3.

TABLE 3

MMS I/O SECTORS

1. Livestock & Livestock Products
2. Other Agricultural Products
3. Forestry Products**
4. Commercial Fishing**
5. Agricultural, Forestry, & Fishery Services**
6. Iron & Ferroally Ores Mining**
7. Nonferrous Metal Ores Mining, Except Copper**
8. Coal Mining**
9. Crude Petroleum & Natural Gas*
10. Dimension, Crushed & Broken Stone Mining and Quarrying**
11. Other Stone & Clay Mining and Quarrying
12. Chemical & Fertilizer Mineral Mining
13. New Petroleum Pipelines
14. New Petroleum & Natural Gas Well Drilling*
15. New Petroleum, Natural Gas, & Solid Mineral Exploration*
16. Other New Construction
17. Maintenance & Repair of Gas Utility Facilities*
18. Maintenance & Repair Of Petroleum Pipelines*
19. Maintenance & Repair of Petroleum & Natural Gas Wells*
20. Other Maintenance & Repair Construction
21. Ordnance & Accessories
22. Canned & Cured Sea Food**
23. Fresh & Frozen Packaged Fish**
24. Other Food & Kindred Products
25. Tobacco Manufacturers
26. Textiles & Apparels
27. Logging Camps & Logging Contractors**
28. Sawmills & planing Mills, Generals
29. Other Lumber & Wood Products
30. Furniture & Fixtures
31. Paper & Allied Products, Except Containers
32. Paperboard Containers & Boxes**
33. Printing and Publishing
34. Industrial Inorganic & Organic Chemicals**
35. Other Chemicals & Selected Chemical Products
36. Plastics & Synthetic Materials
37. Drugs, Cleaning & Toilet Preparations
38. Paints & Allied Products**
39. Petroleum Refining*
40. Petroleum Products
41. Rubber & Misc. Plastics Products
42. Leather, Footwear & Other Leather Products

MMS I/O SECTORS

43. Glass & Glass Products
44. Ready-mix Concrete**
45. Other Stone & Clay Products
46. Blast Furnaces & Steel Mills**
47. Electrometallurgical Products**
48. Steel Pipes & Tubes**
49. Iron & Steel Foundries**
50. Other Primary Iron & Steel Manufacturing
51. Aluminum Rolling & Drawing**
52. Nonferrous Wire Drawing & Insulating**
53. Other Primary Nonferrous Metals Manufacturing
54. Metal Containers
55. Fabricated Structural Steel**
56. Fabricated Plate Work (Boiler Shops)**
57. Sheet Metal Work**
58. Other Heating, Plumbing & Fabricated Structural Metal Products
59. Screw Machine Products & Bolts, Nuts, Rivets, & Washers**
60. Other Screw Machine Products and Stampings
61. Metal Coating & Allied Services*
62. Misc. Fabricated Wire Products**
63. Pipe, Valves, & Pipe Fittings**
64. Other Fabricated Metal Products
65. Engines & Turbines
66. Farm & Garden Machinery
67. Oil Field Machinery**
68. Construction & Mining Machinery, Except Oil Field Machinery
69. Materials Handling Machinery & Equipment
70. Metalworking Machinery & Equipment
71. Special Industry Machinery & Equipment
72. General Industrial Machinery & Equipment
73. Miscellaneous Machinery, Except Electrical
74. Office, Computing, & Accounting Machines
75. Service Industry Machines
76. Electrical Industrial Equipment & Apparatus
77. Household Appliances
78. Electric Lighting & Wiring Equipment
79. Radio, TV, & Communication Equipment
80. Electronic Components & Accessories
81. Miscellaneous Electrical Machinery & Supplies
82. Ship Building & Repairing**
83. Other Transportation Equipment
84. Scientific, Photographic & Medical Equipment
85. Miscellaneous Manufacturing
86. Railroads & Related Services**
87. Motor Freight Transportation & Warehousing**
88. Water Transportation**

MMS I/O SECTORS

89. Pipe Lines, Except Natural Gas**
90. Other Transportation & Warehousing
91. Communications, Except Radio & TV**
92. Radio & TV Broadcasting
93. Electric Services (Utilities)**
94. Gas Production & Distribution (Utilities)**
95. Gas, Water, & Sanitary Services
96. Wholesale Trade**
97. Retail Trade**
98. Banking**
99. Insurance Carriers**
100. Other Finance & Insurance
101. Real Estate & Rental
102. Hotels & Lodging Places**
103. Personal & Repair Services, Except Auto
104. Miscellaneous Repair Shops**
105. Computer & Data Processing Services**
106. Management, Consulting, Testing, & Research Lab. Services**
107. Equipment Rental & Leasing Services**
108. Advertising**
109. Legal Services**
110. Accounting, Auditing & Bookkeeping & Miscellaneous Services**
111. Other Business Services
112. Eating & Drinking Places**
113. Automotive Repair & Services
114. Amusements
115. Health, Educational, & Social Services & Nonprofit Organizations
116. Other Industry

Source: Resource Economics and Management Analysis, Inc., Information Collection Log - II.A., 1986.

Note: Industries that are marked with one asterisk are primary industries. Industries marked with two asterisks indicate a supportive industry.

C. The Demographic Component

Of special importance to the Year II study was the magnitude of population change resulting from OCS oil and gas activities and the age and sex composition of the population.

In the SAM system (Figure One), a demographic component is linked to the regional I/O models to convert employment estimates from the I/O models to population estimates. It is important to note that the demographic component is not actually a full demographic model, but

instead, is a numeric filter that makes use of employment estimates from the I/O models and certain available demographic statistics for the respective Coastal Areas that are reported in Tables 4, 7, and 8. These statistics will be briefly noted below but the technical details of the operation of the demographic components is given in Volume II.

Before turning to the demographic statistics, it is important to define worker types, which is used in organizing the demographic tables. Worker types refer to certain industrial (sector) categories contained in the I/O models for the Coastal Areas. Recall that these models contain 116 producing sectors plus three employee sectors based on worker class. Based on the available demographic statistics for the Year II study, these 116 producing sectors were classified into the following worker types. These worker types are not to be confused with the earlier defined worker classes (origins) of local, commuter, and relocator.

Direct Employment
- On/Off Shore Operations
  - I/O 17; Maintenance & Repair of Gas Utility Facilities
  - I/O 18; Maintenance & Repair of Petroleum Pipelines
  - I/O 19; Maintenance & Repair of Petroleum & Natural Gas Wells
  - I/O 39; Petroleum Refining
  - I/O 89; Pipeline, except Natural Gas
- On/Off Shore Construction
  - I/O 13; New Petroleum Pipelines
  - I/O 14; New Petroleum & Natural Gas Well Drilling
  - I/O 15; New Petroleum, Natural Gas & Solid Mineral

Indirect Employment
- Type 1: (agriculture, forestry, fisheries, mining, construction, manufacturing, and transportation)
  - I/O Sectors: 1-12; 16; 20-38; 40-85
- Type 2: (wholesale and retail trade, finance, insurance, real estate, services, and public administration)
  - I/O Sectors: 86-88; 90-116

The SAM system provides demographic impact estimates in terms of the above four categories of workers. In contrast, Tables 4, 7, and 8 contain certain demographic statistics for five worker types, two of which match the Types 1 and 2 under indirect employment. The remaining three worker types present in the table sequence had to be collapsed into the two direct employment categories above: On/Off Shore Operations and On/Off Shore Construction. The collapse was necessitated by the absence of a breakdown of the input-output sectors into offshore and onshore components. Standard values of the offshore worker type of Tables 4, 7, and 8 were assigned to the On/Off Shore Construction category while standard values of the onshore operations type were assigned to the On/Off Shore Operations category. This particular

TABLE 4

MMS DEMOGRAPHIC MODEL STANDARD VALUES AND SUGGESTED RANGES FOR USER ALTERATION, WORKER ORIGIN

Worker Type (1)	Worker Origin		
	Local (2)	Commuter (3)	Relocator (4)
Offshore Standard	.5	.4	.1
(Range)	(.2-.8)	(.2-.7)	(.05-.3)
Onshore Operations Standard	.7	-	.3
(Range)	(.4-.9)	-	(.1-.6)
Onshore Construction Standard	.7	-	.3
(Range)	(.3-.9)	-	(.1-.4)
Secondary			
Type 1 Standard	.8	-	.2
(Range)	(.6-.9)	-	(.1-.4)
Type 2 Standard	.7	-	.3
(Range)	(.5-.9)	-	(.1-.5)

Source: Centaur Associates, Inc., Indicators of the direct economic impacts direct economic impacts due to oil and gas development in the Gulf of Mexico, Volume II/Exhibits and data.

assignment of the standard values may be altered by the user of SAM, as described in Volume II of this report.

Support for the coefficients of Table 4 comes from information from all sites where the Year I study reported 50 or more offshore workers.[1] Inspection of Table 5 indicates that considerable variability in the percentage of commuters existed among sites. The percentage of commuters averaged 52 percent but ranged from a low of 21 percent to values exceeding 70 percent. A word of caution is in order in interpreting Table 5, however, because of certain assumptions embodied

[1]Centaur Associates, Inc. 1986. Indicators of the direct economic impacts due to oil and gas development in the Gulf of Mexico. Minerals Management Service 86-0015.

TABLE 5

WORKERS BY PLACE OF RESIDENCE BY OFFSHORE STAGING AREA LOCATION, GULF OF MEXICO
(Major Offshore Sites Only)

Staging Area (1)	Offshore Workers			
	Total (2)	Within Area (3)	Commuters (4)	Percent Commuters (5)
Buras	122	96	26	21.3
Cameron	681	318	363	53.3
Freeport	386	102	284	73.6
Galveston	96	64	32	33.3
Grand Chenier	81	42	39	48.1
Grand Isle	778	277	501	64.4
Houma	501	133	368	73.4
Intracoastal City	799	351	448	56.1
Lake Charles	71	*	*	*
Leesville	318	105	213	67.0
Morgan City	2,736	1,470	1,266	46.3
Venice	1,018	664	354	34.8
TOTAL	7,587	3,622	3,894	52.4

* - Estimation procedure would result in an estimate of commuting workers exceeding 100 percent of the work force.

Source: Table 6 and Centaur Associates, Inc., Indicators of the direct economic impacts due to oil and gas development in the Gulf of Mexico, Volume II/Exhibits and data; Exhibit 2-26.

in the estimation procedures. Because of the structure of the Year I report, producer employment for a specific staging area was much more readily allocated to places of residence than was offshore employment. To circumvent this problem, the offshore employment for each staging area was first estimated, where these estimates are given in the last column of Table 6. Then, Exhibit 2-26 of the Year I report was used as the basis for estimating the total number of commuters for each staging areas, which are reported in column 5 of Table 5. Since all commuters were assumed to be offshore workers, estimates of offshore commuters may contain a modest upward bias. Any such bias should be offset, however, by an opposite bias for the onshore workers.

In examining a specific development scenario and Coastal Area, an analyst might well decide to specify alternative values for the origin coefficients for offshore workers. Considerations to be weighed in determining such values include local labor market conditions and skill levels of local workers. Generally, the higher the local unemployment rate, the larger the pool of unemployed persons, and the greater the similarity of the new jobs to those with which area residents are familiar, the higher will be the rate of local hiring. Other factors to consider include the perceived permanency of the new jobs and the availability of affordable accommodations near the staging area(s). When jobs are perceived as quite temporary or when housing is scarce, more workers may elect to commute rather than relocate to the job site.

While the Year I report was quite helpful in identifying the extent of commuting, it was less useful in suggesting appropriate values for local hiring versus relocation. The Year I worker data indicated the current residence of each worker but did not provide information concerning residential history. Therefore, estimates of local hiring and relocation were based on data reflecting experiences with similar projects in the Gulf Coast states or with OCS development in other areas.[2] The Year I data base had similar limitations in addressing worker demographic profiles because it contained no information on worker's ages, marital status, number of dependents, or other demographic attributes.

Worker origin coefficients for other worker types were developed from a variety of sources which reflected recent experiences with similar types of projects in the Gulf Coast states, or in analogous

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[2]Murdock, S.H., S.S. Hwang, R.R. Hamm, and F.L. Leistritz. 1986. Project-related inmigration: Empirical evidence and policy implications. Paper presented at Conference on speculative migration and community impacts. St. Johns, Newfoundland: Memorial University.

House, J.D. 1985. The challenge of oil: NewFoundland's quest for controlled development. Social and economic studies series, No. 30. [St. Johns, Newfoundland]: Memorial University of Newfoundland, Institute of Social and Economic Research.

TABLE 6

WORKERS BY OFFSHORE AND ONSHORE STATUS BY OFFSHORE STAGING AREA LOCATION, GULF OF MEXICO

Staging Area (1)	Total Employment (2)	Onshore Employment (3)	Offshore Employment (4)
Abbeville	98	98	0
Amelia	5	5	0
Baton Rouge	97	94	3
Baytown	30	30	0
Biloxi	6	6	0
Buras	148	26	122
Cameron	769	88	681
Cocodrie	13	13	0
Corpus Christi	17	14	3
Dallas	2	2	0
Dulac	17	17	0
Galveston	136	40	96
Grand Chenier	83	2	81
Grand Isle	894	116	778
Houma	531	30	501
Houston	301	301	0
Intracoastal City	819	20	799
La Habra Area	2	2	0
Lafayette	1,284	1,258	26
Lake Charles	219	148	71
Leesville	535	217	318
Mobile Area	8	4	4
Morgan City	3,569	833	2,736
New Orleans	10,203	10,203	0
Pensacola	6	6	0
Rodessa	18	18	0
Sabine Pass	81	81	0
Sulphur	4	4	0
Venice	1,384	371	1,018

Source: Centaur Associates, Inc., Indicators of the direct economic impacts due to oil and gas development in the Gulf of Mexico, Volume II/Exhibits and data; Exhibits 2-26 and 2-30.

areas.[3] The coefficients for onshore construction reflect the findings of Dunning in his survey of 51 construction projects of the Corps of Engineers, many of which were located in the Gulf Coast states.[4] Coefficients for onshore operations reflect the fact that onshore work is often attractive to local workers and that many Gulf Coast areas have a relatively large labor force with skills and experience appropriate for work in oil and gas development. In general, slack labor market conditions, a large and skilled labor force, and scenarios specifying a low level of development would suggest using a higher local hiring rate than the standard. Conversely, if the labor market is tight and the labor pool small relative to the scale of the project, a lower rate than the standard would be appropriate.

Standard values and suggested ranges for key worker demographic attributes are summarized in Tables 7 and 8. Several key sources in addition to the Dunning work were used in estimating these coefficients.[5]

One item in Table 7 warrants special explanation. The "multiple jobholder adjustment factor" reflects the assumption that about one-half of the inmigrating (relocating) secondary worker households will have two employed adults. While it is recognized that some of the households of relocating offshore, onshore operations, and onshore construction workers will also have two employed adults, a multiple jobholder adjustment factor is not applied to these worker types. The logic behind the decision not to employ an adjustment factor for these workers is that the number of relocating spouses who may be available for employment is often approximately offset by the number of locally hired construction and operations workers who represent jobs that have been vacated and must be refilled.

As noted above, the details of converting employment impacts from OCS activity into demographic impacts is deferred to Volume II of this report.

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[3]Halstead, J.M. and F.L. Leistritz. 1984. Energy development and labor market dynamics: A study of seven western counties. Western journal of agricultural economics, 9, pp. 357-369.

[4]Dunning, C.M. 1981. Report of survey of Corps of Engineers construction work force. Research Report 81-R05. U.S. Army Corps of Engineers.

[5]Halstead, J.M. and F.L. Leistritz. 1984. Energy development and labor market dynamics: A study of seven western counties. Western journal of agricultural economics, 9, pp. 357-369.

Murdock, S.H., S.S. Hwang, R.R. Hamm, and F.L. Leistritz. 1986. Project-related inmigration: Empirical evidence and policy implications. Paper presented at Conference on speculative migration and community impacts. St. Johns, Newfoundland: Memorial University.

TABLE 7

MMS DEMOGRAPHIC MODEL STANDARD VALUES AND SUGGESTED RANGES FOR USER ALTERATION, WORKER DEMOGRAPHIC ATTRIBUTES

Item (1)	Worker Type: Offshore Standard Value (Range) (2)	Onshore Operations Standard Value (Range) (3)	Onshore Construction Standard Value (Range) (4)	Secondary Type I Standard Value (Range) (5)	Secondary Type 2 Standard Value (Range) (6)
Percent of relocating workers who are male	.9 (.8-.95)	.8 (.75-.9)	.9 (.8-.95)	.6 (.5-.65)	.6 (.5-.65)
Percent of relocating workers who are married	.7 (.6-.8)	.8 (.7-.9)	.7 (.6-.8)	.7 (.6-.8)	.7 (.6-.8)
Percent of relocating workers with children	.6 (.5-.7)	.7 (.6-.8)	.6 (.5-.7)	.6 (.5-.7)	.6 (.5-.7)
Average number of children per relocating worker with children	1.2 (1.0-1.3)	1.4 (1.1-1.6)	1.3 (1.1-1.5)	1.4 (1.1-1.6)	1.4 (1.1-1.6)
Multiple jobholder adjustment factor	NA	NA	NA	1.5 (1.4-1.6)	1.5 (1.4-1.6)

NA - Not available

Source: Dunning (1981); Holstead and Leistritz (1984); and Murdock, et al (1986).

TABLE 8

MMS DEMOGRAPHIC - SUGGESTED STANDARD VALUES
FOR AGE DISTRIBUTION BY WORKER TYPE

Item (1)	Worker Type: Offshore (2)	Onshore Operations (3)	Onshore Construction (4)	Secondary Type 1 (5)	Secondary Type 2 (6)
Age distribution of male inmigrants:					
20-24	24%	20%	24%	25%	25%
25-34	41	53	41	50	50
35-44	16	17	16	18	18
45-64	19	10	19	7	7
Age distribution of female inmigrants:					
20-24	24%	20%	24%	25%	25%
25-34	41	53	41	50	50
35-44	16	17	16	18	18
45-64	19	10	19	7	7
Age distribution of children:					
0- 5	35%	39%	35%	40%	40%
5-11	36	35	36	36	36
12-14	11	13	11	12	12
15-17	11	9	11	10	10
18-19	4	3	4	1	1
20-24	3	1	3	1	1

Source: Dunning (1981); Halstead and Leistritz (1984); and Murdock, et al (1986).

D. Output Component

The final component in the SAM system controls the printing of the results obtained from the computational components of the system. Examples of the formats which are available from the system will be given in the following chapter where sets of sample impacts estimates are reported. Specific instructions concerning the output component are available in Volume II.

IV. Socioeconomic Impact Estimates

A. MMS Baseline and Scenario Conditions

One of the objectives of the Year II study was to construct estimates of indirect impacts upon income, employment, and population based upon sets of economic activity levels prepared by MMS. Two such sets of activity levels were prepared and they will be referred to as the "Baseline" set and "Scenario" set of conditions, respectively, in what follows. The Baseline consists of estimates of direct economic impacts (expenditures or output) from OCS activity in three key industries: Crude Petroleum and Natural Gas (MMS Sector 9); New Petroleum and Natural Gas Well Drilling (MMS Sector 14); and Maintenance and Repair of Petroleum and Natural Gas Wells (MMS Sector 19). Four years of impacts, 1981-1984, under the condition of no lease sales after 1982 are contained in the Baseline. The impacts of each year were further cross-classified by MMS into offshore GOM Coastal Analysis Area (Western, Central, Eastern) and the constituent Coastal Areas (W-1, W-2, C-1, C-2, C-3, C-4, E-1, E-2, E-3, E-4). This cross-classification allows the onshore destinations of the impacts taking place in the respective offshore Analysis Areas to be identified. Table 9 gives the Baseline direct impact estimates pertaining to the entire Gulf of Mexico OCS area.

The Scenario conditions consist of estimates of direct economic impact under the condition of including lease sales after 1982. Industry coverage and the cross-classification by offshore GOM Coastal Analysis Area and constituent onshore Coastal Areas are the same under the Scenario as under the Baseline. Table 10 contains the direct impact estimates under the Scenario for 1983 and 1984, the only years in which the Scenario and Baseline definitions differ. Once again, only the direct impacts pertaining to the entire Gulf of Mexico OCS area are given.

Several items are determined by the SAM system from these two sets of direct economic impacts. Indirect economic impacts caused by the interactions of the directly impacted industries and the other sectors of the Coastal Areas economies can be calculated. The sum of the indirect and direct economic impacts is the total economic impact for the respective Coastal Areas. From the total economic impacts, items that can subsequently be determined include the accompanying impacts upon employment, income (wages), and population. The latter item is provided through the demographic component of SAM while the various economic impacts flow from the regional input-output models contained in SAM.

The total economic impacts expressed in terms of output (expenditure), employment, and income (wages) can be broken down and allocated among each of the 116 industrial sectors contained in the SAM system. To provide such detailed information would create a voluminous document in light of the degree of cross-classification (year, GOM

TABLE 9

DIRECT ECONOMIC IMPACTS, BY PRIMARY SECTOR AND BY STUDY AREA FOR THE TOTAL GOM FOR THE PERIOD 1981 - 1984; WITH NO SALES AFTER 1982
($000,000)

Primary Sector	W1	W2	C1	C2	C3	C4	E1	E2	E3	E4
1981										
Crude Petro. & Nat. Gas	60.00	939.00	722.00	1957.00	745.00	239.00	86.00	27.60	42.00	13.00
Well Drilling	14.00	224.00	319.00	695.00	418.00	123.00	43.00	10.50	18.00	4.98
Maint. & Repair of Wells	2.00	31.00	53.00	111.00	73.00	21.00	7.00	1.31	2.00	0.62
1982										
Crude Petro. & Nat. Gas	40.00	622.00	478.00	1303.00	497.00	166.00	80.00	42.50	52.00	20.00
Well Drilling	14.00	217.00	304.00	669.00	399.00	118.00	44.00	13.00	20.00	6.12
Maint. & Repair of Wells	2.00	29.00	49.00	103.00	67.00	20.00	7.00	1.65	3.00	0.78
1983										
Crude Petro. & Nat. Gas	41.00	642.00	470.00	1314.00	481.00	164.00	93.00	57.30	66.00	27.00
Well Drilling	13.00	211.00	299.00	655.00	392.00	117.00	44.00	14.00	21.00	6.60
Maint. & Repair of Wells	2.00	28.00	48.00	111.00	66.00	20.00	7.00	1.91	3.00	0.90
1984										
Crude Petro. & Nat. Gas	39.00	612.00	435.00	1234.00	439.00	150.00	91.00	59.90	68.00	28.20
Well Drilling	11.00	176.00	236.00	526.00	307.00	92.00	40.00	16.50	22.00	7.77
Maint. & Repair of Wells	1.00	22.00	36.00	91.00	48.00	15.00	6.00	2.40	3.00	1.13

Source: Minerals Management Service

TABLE 10

DIRECT ECONOMIC IMPACTS, BY PRIMARY SECTOR AND BY STUDY AREA
FOR THE TOTAL GOM FOR THE PERIOD 1981 - 1984; WITH
SALES AFTER 1982 INCLUDED
($000,000)

Primary Sector	W1	W2	C1	C2	C3	C4	E1	E2	E3	E4
1983										
Crude Petro. & Nat. Gas	44.00	688.00	528.00	1463.00	562.00	203.00	160.00	123.00	133.00	58.00
Well Drilling	17.00	243.00	350.00	787.00	454.00	139.00	71.00	36.60	45.00	17.20
Maint. & Repair of Wells	2.00	34.00	54.00	116.00	75.00	22.00	11.00	4.78	6.00	2.25
1984										
Crude Petro. & Nat. Gas	42.00	662.00	541.00	1460.00	592.00	213.00	166.00	127.00	137.00	59.80
Well Drilling	17.00	259.00	303.00	707.00	382.00	119.00	68.00	40.10	47.00	18.90
Maint. & Repair of Wells	2.00	32.00	44.00	99.00	58.00	18.00	10.00	5.52	7.00	2.60

Source: Minerals Management Service

Areas, Coastal Areas, Baseline, Scenario) available in the direct impact information. Thus, impacts will be presented only with respect to the direct impact estimates pertaining to the entire Gulf of Mexico region (i.e., the three offshore GOM areas of direct impact origin are combined). Further, impacts in full sectoral detail will be presented in tabular format only for 1984. For the prior years of 1981-1983, the total economic impacts will be given for four categories of industrial sectors that are created from the full set of 116 sectors. These categories are:

On/Off Shore Operations;

On/Off Shore Construction;

Type I Industries;

Type II Industries.

The category of On/Off Shore Operations consists of the following industries from the Primary Industry group of Table 1:

17. Maintenance & Repair of Gas Utility Facilities;

18. Maintenance & Repair of Petroleum Pipelines;

19. Maintenance & Repair of Petroleum & Natural Gas Wells;

39. Petroleum Refining;

89. Pipe Lines, Except Natural Gas.

The category of On/Off Shore Construction consists of the following industries from the Primary Industry group of Table 1:

13. New Petroleum Pipelines;

14. New Petroleum & Natural Gas Well Drilling;

15. New Petroleum, Natural Gas, & Solid Mineral Exploration.

The category of Type I industries consists of industries numbered 1 through 95 in Table 3, with the exclusion of the industries noted above. Type II industries consist of industries numbered 96 through 116 in Table 3. Recall that the estimates of direct economic effects are limited to the New Petroleum & Natural Gas & Solid Mineral Exploration and New Petroleum & Natural Gas Well Drilling in the On/Off Shore Construction category and the Maintenance & Repair of Petroleum & Natural Gas Wells in the On/Off Shore Operations category.

B. Impact Results and Interpretation

For interpreting the study results, impact estimates for only Coastal Areas W-2 and C-3 and for only the years 1981 and 1984 will be presented. The discussion will emphasize the indirect socioeconomic impacts, since an understanding of the direct impacts is more straightforward. This discussion can then be applied by the reader to the impact results for any of the ten Coastal Areas. Deliverable Five under the present contract contains the complete set of impact tables for all ten Coastal Areas for the Baseline and Scenario conditions for the study period, 1981 through 1984. The deliverable is entitled "Information Collection Log-II.B.2 and 3, and Introductory Training", and carries the date of January 26, 1987.

All indirect impact estimates are based on estimates of direct impacts, which were developed by MMS. As noted earlier, direct impact estimates were made for both a Baseline condition and a Scenario condition. Direct impact estimates for the Baseline condition are given in Table 9, and the direct impact estimates for the Scenario condition are given in Table 10. The following discussion will focus only on the Coastal Areas of W-2 and C-3 and will compare only 1981 impact estimates under the Baseline condition with 1984 impact estimates under the Scenario condition. Certainly, other comparisons can be made, such as a 1981-1984 comparison under the Baseline condition, or a comparison of the 1984 Baseline impact results with the 1984 Scenario impact results. The particular comparison chosen for discussion is not important. What is important is that the interpretation of the impact results being presented here can be applied to any Coastal Area and any comparison.

Information contained in Tables 9 and 10 shows that with the exception of the Florida Coastal Areas of E-1 through E-4, OCS/GOM oil and gas exploration and development activity declined quite substantially during the study period of 1981 through 1984. Measured in 1984 prices, the level of activity for, say, the Crude Petroleum and Natural Gas sector in Coastal Area C-3 declined from $745,000,000 in 1981 (Table 9) to $592,000,000 in 1984 (Table 10), which represents about a 21 percent reduction. This reduction reflects the overall decline in oil and gas exploration and development activity in the Gulf of Mexico, especially in the Western and Central GOM Coastal Analysis Areas. The sharpest decline in the estimated total direct economic activity associated with OCS/GOM oil and gas exploration and development activity occurred in Coastal Area C-2, with a total reduction of $497,000,000 for the 1981-84 period, which represents about an 18 percent reduction from the 1981 level. (The 1981 level of total direct activity was $2,763,000,000, which is the total for the three Primary sectors--Crude Petroleum and Natural Gas; Well Drilling; and Maintenance and Repair of Wells--from Table 9. The estimated total direct impact for 1984 is $2,266,000,000, which is the sum for the direct effects for the same three sectors reported in Table 10.)

Based on estimates of direct impacts, the Florida Coastal Areas of E-1 through E-4 showed an increase in total direct economic activity for

the period 1981 through 1984, as indicated in Tables 9 and 10. The E-2 and E-4 Areas of Florida showed more than a three-fold increase in the total direct economic impact for the 1981-84 period. For example, the total direct economic for the E-2 Coastal Area jumped from $39,410,000 in 1981 to an estimated $172,620,000 for 1984. This magnitude of increase for the Florida Coastal Areas reflects, in large part, a general increase in oil and gas exploration and development in the Eastern GOM Coastal Analysis Area, where it was assumed in making the direct impact estimates that much of the OCS/GOM activity in the Eastern GOM Coastal Analysis Area would involve businesses from the Florida Coastal Areas. It is important to note, however, that even though the direct impact estimates for the Florida Coastal Areas showed substantial increases for the 1981-84 period, the 1984 estimated impact levels were still well below estimated 1984 levels for other Coastal Areas, with the exception of the W-1 Coastal Area of Texas.

The exploration and development of oil and gas fields in the Gulf of Mexico are directly a major source of revenue and employment for many oil and gas related businesses along the coast. Other businesses are also indirectly affected by OCS/GOM oil and gas activity. These indirect effects are called indirect impacts, which can be measured by the development and application of appropriate regional input-output models. To this end, regional input-output models were developed for each of the ten MMS Coastal Areas; and on the basis of these models, indirect socioeconomic impact estimates were calculated for industry output, income, employment, and population.

Before discussing the indirect impact estimates for the Coastal Areas of W-2 and C-3, it is important to review the definition of impacts as used in this study. Basically, the impact estimates represent shares of socioeconomic activity. The estimated direct economic impacts, as presented in Tables 9 and 10, represent shares of total economic activity or output for the industries in question. For example, the estimated direct impact of $745,000,000, noted earlier for the Crude Petroleum and Natural Gas sector in C-3 represents only a share of the total output for this sector in 1981. Most likely, this sector was selling some of its services to onshore oil and gas exploration and development activities. This means, then, that all indirect impact estimates, which are based on the corresponding direct impact estimates, are to be interpreted as shares of total activity. For example, if an indirect impact estimate shows that 200 jobs in the Eating Establishment sector existed as a result of OCS/GOM oil and gas activity, then these 200 jobs or employees represent only a share or fraction of the total employment in this sector. Thus, impact estimates represent shares of total socioeconomic activity. Viewing socioeconomic impacts as fractions or shares will undoubtedly be troublesome, particularly when the concept is applied to population impacts.

Tables 11.1.1.3 and 12.4.1.3 record the estimated direct, indirect, and total industry output impacts for Coastal Area W-2 for the 1981 Baseline condition and the 1984 Scenario condition, respectively. Similarly, tables 11.1.2.3 and 12.4.2.3 record the estimated direct,

indirect, and total industry output impacts for Coastal Area C-3 for the 1981 Baseline condition and the 1984 Scenario condition, respectively. The reader is referred to Deliverable Five, which was referenced earlier, for the different indirect impact estimates for other MMS Coastal Areas. Recall that all impact estimates are in terms of 1984 prices.

Table 11.1.1.3 shows that the estimated total industry output impact for Coastal Area W-2 for the 1981 Baseline condition was $2,345,608,000 ($108,868,000 + 1,163,000,000 + 469,283,000 + 604,457,000 = $2,345,608,000). The estimated impact for Coastal Area W-2 for the 1984 Scenario condition was $1,923,362,000 ($95,498,000 + 921,000,000 + 401,992,000 + 504,872,000 = $1,923,362,000), as indicated in Table 12.4.1.3. Included in these totals are $1,073,740,000 and $906,864,000 of estimated indirect industry output impacts for the respective years, 1981 and 1984. Therefore, the share of indirect industry output impact declined by $166,876,000 for Coastal Area W-2 during the study period. A similar situation occurred in Coastal Area C-3. The estimated 1981 Baseline indirect industry output impact for C-3 was $1,170,067,000 (Table 11.1.2.3). The estimated 1984 Scenario indirect industry output impact for C-3 was $990,906,000 (Table 11.4.2.3), for a $179,161,000 decline in the share of indirect industry output impact.

The decline in the share or fraction of total indirect industry output impact for the W-2 and C-3 Coastal Areas means a corresponding decline in the share of employment directly and indirectly associated with OCS/GOM oil and gas activity during the study period, 1981-84. Estimates of the 1981 Baseline and 1984 Scenario condition impacts for employment for Coastal area W-2 are given in Tables 11.1.1.4 and 12.4.1.4, respectively. Comparable estimates for Coastal Area C-3 are given in Tables 11.1.2.4 and 12.4.2.4. For Coastal Area W-2, the total estimated employment associated directly and indirectly with OCS/GOM oil and gas exploration and development activity declined, as a share, from 32,601 jobs in 1981 to 26,562 jobs in 1984. Similar estimates for Coastal Area C-3 show a decline in the share from 37,868 jobs in 1981 to 31,739 jobs in 1984. The reduction in the fraction or share of jobs supported directly and indirectly by OCS/GOM oil and gas activities will lead to unemployment in and ,ultimately, migration from the Coastal Areas if other economic activities unrelated to oil and gas activity are not expanding to absorb the surplus labor. Most likely, other economic activities will not be able to absorb the entire labor surplus and, consequently, out migration and population loss will occur.

Population impacts associated with OCS/GOM oil and gas activity were calculated for the ten MMS Coastal Areas. The estimated population impacts for Coastal Areas W-2 and C-3 are reported here for the 1981 Baseline condition and the 1984 Scenario condition. Estimates for other Coastal Areas may be obtained from Deliverable Five. The 1981 Baseline and the 1984 Scenario population impacts for W-2 are given in Tables 11.1.1.2 and 12.4.2.2, respectively. Similarly, the 1981 Baseline and the 1984 Scenario population impacts for C-3 are given in Tables 11.1.2.2 and 12.4.2.2, respectively. Note in the tables that the population impact estimates are based on in-migrant workers. A decline

in the population impact estimates for the years 1981 and 1984 for a Coastal Area, such as C-3, means simply that fewer in-migrant workers were employed in OCS/GOM oil and gas related activities in 1984 than in 1981. Thus, there was a population impact due to the change in the share of in-migrant workers directly and indirectly employed in OCS/GOM oil and gas activities. Again, care must be exercised in interpreting these employment impacts. A change in the population impact for any Coastal Area during the study period does not mean that there was a one-to-one loss in population from the Area. For example, the population impact for Coastal Area C-3 declined from 22,285 in 1981 (Table 11.1.2.2) to 18,661 for 1984 (Table 12.4.2.2). Keep in mind that these population impact estimates represent shares of the total populations of the respective Coastal Areas. Therefore, any change in the population impact estimate during the study period, such as the estimated decline of 3,624 (22,285 - 18,661 = 3,624) for Coastal Area C-3 represents only a change in the share of population directly and indirect associated with the change in in-migrant worker employment in OCS/GOM oil and gas activities during the same study period. Most likely, any change in the population share during the study period, as defined and measured here, for any Coastal Area resulted in a loss of population from the Area. This is mere speculation, however, since the study did not include an analysis of the relocation of unemployed workers.

C. Tables of Impact Estimates

Most of the tables presented here for Coastal Areas W-2 and C-3 were not mentioned in the previous section. In fact, only 12 of the following 52 tables were mentioned. Therefore, some identification of the remaining tables is in order.

The use of 1) a four-year study period, 1981-84; 2) Baseline and Scenario conditions; and 3) four different measures of socioeconomic activity--industry output, income, employment, and income--to develop socioeconomic impacts for the MMS Coastal Areas resulted in 26 different tables for each of the Coastal Areas. Therefore, there are 52 tables presented here for the Coastal Areas of W-2 and C-3.

In light of the many different tables that were developed for this study, a four-field number system was chosen to identify each table. The format of the numbering system is:

Table A.B.C.D

where:

A - Direct Impact
- 11. Baseline conditions
- 12. Scenario conditions

B - Impact Period
- 1. 1981

2. 1982
3. 1983
4. 1984

C - Onshore Coastal Area
1. W-2
2. C-3

D - Type of Impact Table
1. Complete industry detail of output, employment, and income
2. Population by industry category
3. Output by industry category
4. Employment by industry category
5. Income (wages) by industry category.

As an illustration of the numbering system, Table 11.3.1.4 contains the estimated employment impacts within Coastal Area W-2 due to the 1983 Baseline conditions for the GOM.

As noted earlier, only the impact estimate tables for Coastal Areas W-2 and C-3 are given below. Including the tables for all the Coastal Areas would create a voluminous document whose bulk would be inconsistent with the size constraints of this report. Coastal Areas W-2 and C-3 contain the Houston and New Orleans metropolitan areas, respectively, and are the obvious candidates for inclusion. Deliverable Five, which was referenced earlier, contains complete sets of tables for each of the ten Coastal Areas.

D. Limited Survey of Firms

In an attempt to compare survey based data on interindustry activity with the nonsurvey results from the SAM system, a limited survey of firms was conducted. Ten industries located in two of the Coastal Areas, W-2 and E-3, were selected so as to represent a full range of economic activity, including mining, construction, manufacturing, transportation, and services. The ten were:

1. New Petroleum, Natural Gas and Solid Mineral Exploration (MMS Sector 15);

2. New Petroleum and Natural Gas Well Drilling (MMS Sector 14);

3. Fresh & Frozen Packaged Fish (MMS Sector 23);

4. Inorganic & Organic Industrial Chemicals (MMS Sector 34);

5. Ready-mix Concrete (MMS Sector 44)

6. Fabricated Structural Steel (MMS Sector 55);

TABLE 11.1.1.2

BASELINE FOR GULF OF MEXICO; 1981
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION W2

POPULATION	PRIMARY		SECONDARY	
	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	13.	696.	161.	545.
25-34	23.	1845.	322.	1091.
35-44	9.	592.	116.	393.
45-64	10.	348.	45.	153.
TOTAL	55.	3481.	644.	2182.
AGE DISTRIBUTION OF FEMALES				
20-24	8.	540.	140.	473.
25-34	15.	1430.	279.	945.
35-44	6.	459.	100.	340.
45-64	7.	270.	39.	132.
TOTAL	35.	2698.	558.	1891.
AGE DISTRIBUTION OF CHILDERN				
0- 5	15.	1663.	361.	1222.
6-11	16.	1492.	325.	1100.
12-14	5.	554.	108.	367.
15-17	5.	384.	90.	305.
18-19	2.	128.	9.	31.
20-24	1.	43.	9.	31.
TOTAL	44.	4264.	902.	3054.
POPULATION CHANGE TOTAL	134.	10442.	2104.	7127.

TABLE 11.1.1.3

BASELINE FOR GULF OF MEXICO; 1981
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA W2
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	31000.	1163000.	0.	0.
INDIRECT	77868.	0.	469283.	604457.
TOTAL	108868.	1163000.	469283.	604457.

TABLE 11.1.1.4

BASELINE FOR GULF OF MEXICO; 1981
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	305.	10152.	4294.	8484.
COMMUTING	244.	0.	0.	0.
RELOCATING	61.	4351.	1074.	3636.
TOTAL	610.	14503.	5368.	12120.

TABLE 11.1.1.5

BASELINE FOR GULF OF MEXICO; 1981
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	8666.	274634.	98268.	135610.
COMMUTING	6933.	0.	0.	0.
RELOCATING	1733.	117700.	24567.	58118.
TOTAL	17333.	392335.	122835.	193728.

TABLE 11.1.2.2

BASELINE FOR GULF OF MEXICO; 1981
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION C3

	PRIMARY		SECONDARY	
POPULATION	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	30.	631.	185.	773.
25-34	51.	1672.	371.	1545.
35-44	20.	536.	134.	556.
45-64	23.	315.	52.	216.
TOTAL	123.	3155.	742.	3091.
AGE DISTRIBUTION OF FEMALES				
20-24	19.	489.	161.	670.
25-34	33.	1296.	322.	1339.
35-44	13.	416.	116.	482.
45-64	15.	244.	45.	188.
TOTAL	79.	2445.	643.	2679.
AGE DISTRIBUTION OF CHILDERN				
0- 5	35.	1507.	415.	1731.
6-11	36.	1353.	374.	1558.
12-14	11.	502.	125.	519.
15-17	11.	348.	104.	433.
18-19	4.	116.	10.	43.
20-24	3.	39.	10.	43.
TOTAL	99.	3864.	1039.	4327.
POPULATION CHANGE TOTAL	301.	9464.	2424.	10096.

TABLE 11.1.2.3

BASELINE FOR GULF OF MEXICO; 1981
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA C3
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	73000.	1163000.	0.	0.
INDIRECT	79510.	0.	467557.	702510.
TOTAL	152510.	1163000.	467557.	702510.

TABLE 11.1.2.4

BASELINE FOR GULF OF MEXICO; 1981
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	685.	9201.	4946.	12019.
COMMUTING	548.	0.	0.	0.
RELOCATING	137.	3943.	1237.	5151.
TOTAL	1370.	13144.	6183.	17171.

TABLE 11.1.2.5

BASELINE FOR GULF OF MEXICO; 1981
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	16944.	258747.	105365.	166364.
COMMUTING	13556.	0.	0.	0.
RELOCATING	3389.	110892.	26341.	71299.
TOTAL	33889.	369639.	131706.	237663.

TABLE 11.2.1.2

BASELINE FOR GULF OF MEXICO; 1982
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION W2

POPULATION	PRIMARY		SECONDARY	
	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	12.	493.	125.	410.
25-34	20.	1306.	249.	821.
35-44	8.	419.	90.	295.
45-64	9.	246.	35.	115.
TOTAL	48.	2465.	498.	1641.
AGE DISTRIBUTION OF FEMALES				
20-24	7.	382.	108.	356.
25-34	13.	1012.	216.	711.
35-44	5.	325.	78.	256.
45-64	6.	191.	30.	100.
TOTAL	31.	1910.	432.	1422.
AGE DISTRIBUTION OF CHILDERN				
0- 5	14.	1177.	279.	919.
6-11	14.	1057.	251.	827.
12-14	4.	392.	84.	276.
15-17	4.	272.	70.	230.
18-19	2.	91.	7.	23.
20-24	1.	30.	7.	23.
TOTAL	39.	3019.	697.	2298.
POPULATION CHANGE TOTAL	118.	7394.	1627.	5361.

TABLE 11.2.1.3

BASELINE FOR GULF OF MEXICO; 1982
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA W2
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	29000.	839000.	0.	0.
INDIRECT	57549.	0.	359931.	454831.
TOTAL	86549.	839000.	359931.	454831.

TABLE 11.2.1.4

BASELINE FOR GULF OF MEXICO; 1982
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	269.	7188.	3321.	6383.
COMMUTING	215.	0.	0.	0.
RELOCATING	54.	3081.	830.	2735.
TOTAL	538.	10269.	4151.	9118.

TABLE 11.2.1.5

BASELINE FOR GULF OF MEXICO; 1982
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	7596.	193587.	76049.	102464.
COMMUTING	6077.	0.	0.	0.
RELOCATING	1519.	82966.	19012.	43913.
TOTAL	15192.	276553.	95062.	146377.

TABLE 11.2.2.2

BASELINE FOR GULF OF MEXICO; 1982
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION C3

POPULATION	PRIMARY		SECONDARY	
	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	27.	470.	152.	624.
25-34	46.	1245.	305.	1247.
35-44	18.	399.	110.	449.
45-64	21.	235.	43.	175.
TOTAL	111.	2349.	610.	2494.
AGE DISTRIBUTION OF FEMALES				
20-24	17.	364.	132.	540.
25-34	29.	965.	264.	1081.
35-44	11.	309.	95.	389.
45-64	14.	182.	37.	151.
TOTAL	72.	1820.	529.	2162.
AGE DISTRIBUTION OF CHILDERN				
0- 5	31.	1122.	342.	1397.
6-11	32.	1007.	307.	1257.
12-14	10.	374.	102.	419.
15-17	10.	259.	85.	349.
18-19	4.	86.	9.	35.
20-24	3.	29.	9.	35.
TOTAL	89.	2877.	854.	3492.
POPULATION CHANGE TOTAL	271.	7047.	1993.	8148.

TABLE 11.2.2.3

BASELINE FOR GULF OF MEXICO; 1982
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA C3
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	67000.	896000.	0.	0.
INDIRECT	62845.	0.	382224.	566725.
TOTAL	129845.	896000.	382224.	566725.

TABLE 11.2.2.4

BASELINE FOR GULF OF MEXICO; 1982
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	617.	6851.	4067.	9700.
COMMUTING	494.	0.	0.	0.
RELOCATING	123.	2936.	1017.	4157.
TOTAL	1234.	9787.	5083.	13857.

TABLE 11.2.2.5

BASELINE FOR GULF OF MEXICO; 1982
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	15211.	193041.	86687.	134654.
COMMUTING	12169.	0.	0.	0.
RELOCATING	3042.	82732.	21672.	57709.
TOTAL	30422.	275773.	108358.	192363.

TABLE 11.3.1.2

BASELINE FOR GULF OF MEXICO; 1983
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION W2

POPULATION	PRIMARY		SECONDARY	
	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	11.	503.	125.	414.
25-34	19.	1332.	250.	828.
35-44	8.	427.	90.	298.
45-64	9.	251.	35.	116.
TOTAL	47.	2514.	500.	1656.
AGE DISTRIBUTION OF FEMALES				
20-24	7.	390.	108.	359.
25-34	12.	1033.	217.	718.
35-44	5.	331.	78.	258.
45-64	6.	195.	30.	100.
TOTAL	30.	1948.	434.	1435.
AGE DISTRIBUTION OF CHILDERN				
0- 5	13.	1201.	280.	927.
6-11	14.	1078.	252.	835.
12-14	4.	400.	84.	278.
15-17	4.	277.	70.	232.
18-19	2.	92.	7.	23.
20-24	1.	31.	7.	23.
TOTAL	38.	3079.	701.	2319.
POPULATION CHANGE TOTAL	116.	7541.	1635.	5410.

TABLE 11.3.1.3

BASELINE FOR GULF OF MEXICO; 1983
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA W2
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	28000.	853000.	0.	0.
INDIRECT	58243.	0.	362060.	458954.
TOTAL	86243.	853000.	362060.	458954.

TABLE 11.3.1.4

BASELINE FOR GULF OF MEXICO; 1983
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	263.	7332.	3336.	6441.
COMMUTING	210.	0.	0.	0.
RELOCATING	53.	3142.	834.	2760.
TOTAL	525.	10474.	4170.	9201.

TABLE 11.3.1.5

BASELINE FOR GULF OF MEXICO; 1983
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	7424.	197605.	76390.	103323.
COMMUTING	5939.	0.	0.	0.
RELOCATING	1485.	84688.	19098.	44281.
TOTAL	14848.	282293.	95488.	147604.

TABLE 11.3.2.2

BASELINE FOR GULF OF MEXICO; 1983
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION C3

POPULATION	PRIMARY		SECONDARY	
	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	26.	457.	149.	609.
25-34	45.	1211.	298.	1218.
35-44	17.	388.	107.	438.
45-64	21.	229.	42.	171.
TOTAL	109.	2285.	596.	2436.
AGE DISTRIBUTION OF FEMALES				
20-24	17.	354.	129.	528.
25-34	29.	939.	258.	1055.
35-44	11.	301.	93.	380.
45-64	13.	177.	36.	148.
TOTAL	70.	1771.	517.	2111.
AGE DISTRIBUTION OF CHILDERN				
0- 5	31.	1092.	334.	1364.
6-11	31.	980.	300.	1228.
12-14	10.	364.	100.	409.
15-17	10.	252.	83.	341.
18-19	3.	84.	8.	34.
20-24	3.	28.	8.	34.
TOTAL	87.	2799.	835.	3410.
POPULATION CHANGE TOTAL	267.	6856.	1947.	7957.

TABLE 11.3.2.3

BASELINE FOR GULF OF MEXICO; 1983
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA C3
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	66000.	873000.	0.	0.
INDIRECT	61321.	0.	373464.	553433.
TOTAL	127321.	873000.	373464.	553433.

TABLE 11.3.2.4

BASELINE FOR GULF OF MEXICO; 1983
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	607.	6665.	3974.	9472.
COMMUTING	486.	0.	0.	0.
RELOCATING	121.	2857.	994.	4060.
TOTAL	1214.	9522.	4968.	13532.

TABLE 11.3.2.5

BASELINE FOR GULF OF MEXICO; 1983
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	14964.	187821.	84720.	131513.
COMMUTING	11971.	0.	0.	0.
RELOCATING	2993.	80495.	21180.	56363.
TOTAL	29928.	268315.	105900.	187876.

TABLE 11.4.1.1

BASELINE FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA W2

PRIMARY SECTORS

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
13 NEW PETROLEUM PIPELINES	0.	0.	0.	0.
14 NEW PETRO & NG WELL DRILL	176000.	176000.	1698.	42749.
15 NEW PETRO & NG EXPLORE	612000.	612000.	8044.	220247.
17 MAINT OF GAS UTIL FACILIT	0.	151.	2.	56.
18 MAINT OF PETRO & NG PIPEL	0.	116.	2.	46.
19 MAINT OF PETRO & NG WELLS	22000.	24101.	345.	9410.
39 PETROLEUM REFINING	0.	48906.	74.	2486.
89 PIPE LINES, EXCEPT NG	0.	1931.	5.	167.
PRIMARY TOTALS	810000.	863204.	10171.	275160.

TABLE 11.4.1.1 (CONTINUED)

BASELINE FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA W2

SECONDARY SECTORS - TYPE I INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
1 LIVESTOCK & L.S. PRODUCTS	0.	116.	3.	9.
2 OTHER AGRICULTURAL PRODUC	0.	624.	22.	57.
3 FORESTY PRODUCTS	0.	19.	0.	1.
4 COMMERICAL FISHING	0.	107.	2.	25.
5 AGRICULTURAL, FORESTRY &	0.	574.	19.	244.
6 IRON & FERROALLY ORES MIN	0.	0.	0.	0.
7 NONFERROUS METAL ORES MIN	0.	41.	1.	15.
8 COAL MINING	0.	66.	1.	23.
9 CRUDE PETROLEUM & NATURAL	0.	40473.	85.	3001.
10 DIMENSION, CRUSHED & BROK	0.	56.	1.	17.
11 OTHER STONE & CLAY MINING	0.	621.	9.	194.
12 CHEMICAL & FERTILIZER MIN	0.	215.	2.	43.
16 OTHER NEW CONSTRUCTION	0.	0.	0.	0.
20 OTHER MAINTENANCE & REPAI	0.	13708.	274.	6056.
21 ORDNANCE & ACCESSORIES	0.	0.	0.	0.
22 CANNED & CURED SEA FOOD	0.	0.	0.	0.
23 FRESH & FROZEN PACKAGED F	0.	221.	3.	41.
24 OTHER FOOD & KINDRED PROD	0.	17380.	171.	3736.
25 TOBACCO MANUFACTURES	0.	0.	0.	0.
26 TEXTILES & APPARELS	0.	298.	7.	92.
27 LOGGING CAMPUS & LOGGING	0.	21.	0.	4.
28 SAWMILLS & PLANING MILLS,	0.	51.	1.	14.
29 OTHER LUMBER & WOOD PRODU	0.	1351.	20.	363.
30 FURNITURE & FIXTURES	0.	515.	10.	175.
31 PAPER & ALLIED PRODUCTS,	0.	2351.	23.	616.
32 PAPERBOARD CONTAINERS &	0.	396.	4.	96.
33 PRINTING & PUBLISHING	0.	6530.	138.	2495.
34 INDUSTRIAL INORGANIC & OR	0.	9250.	51.	1749.
35 OTHER CHEMICALS & SELECTE	0.	3309.	18.	466.
36 PLASTICS & SYNTHETIC MAT	0.	1873.	11.	373.
37 DRUGS, CLEANING & TOILET	0.	1885.	20.	419.
38 PAINTS & ALLIED PRODUCTS	0.	3209.	26.	612.
40 PETROLEUM PRODUCTS	0.	3601.	21.	462.
41 RUBBER & MISC. PLASTICS P	0.	5247.	44.	1475.
42 LEATHER, FOOTWEAR & OTHER	0.	24.	1.	7.
43 GLASS & GLASS PRODUCTS	0.	386.	8.	150.
44 READY-MIX CONCRETE	0.	3893.	42.	983.
45 OTHER STONE & CLAY PRODUC	0.	4569.	81.	1498.
46 BLAST FURNACES & STEEL MI	0.	19781.	237.	6397.
47 ELETROMETALLURGICAL PRODU	0.	0.	0.	0.
48 STEEL PIPES & TUBES	0.	2105.	21.	539.
49 IRON & STEEL FOUNDARIES	0.	387.	9.	160.
50 OTHER PRIMARY IRON & STEE	0.	3813.	62.	1218.
51 ALUMINUM ROLLING & DRAWIN	0.	0.	0.	0.
52 NONFERROUS WIRE DRAWING &	0.	113.	1.	23.
53 OTHER PRIMARY NONFERROUS	0.	847.	8.	219.

TABLE 11.4.1.1 (CONTINUED)

BASELINE FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA W2

SECONDARY SECTORS - TYPE I

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
54 METAL CONTAINERS	0.	1688.	18.	465.
55 FABRICATED STRUCTURAL STE	0.	9725.	153.	3219.
56 FABRICATED PLATE WORK (BO	0.	1027.	16.	355.
57 SHEET METAL WORK	0.	1525.	21.	451.
58 OTHER HEATING, PLUMBING &	0.	8048.	123.	2265.
59 SCREW MACHINE PRODUCTS &	0.	396.	8.	148.
60 OTHER SCREW MACHINE PRODU	0.	142.	3.	50.
61 METAL COATING & ALLIED SE	0.	434.	7.	133.
62 MISC. FABRICATED WIRE PRO	0.	681.	12.	241.
63 PIPE, VALVES, & PIPE FITT	0.	6093.	76.	1778.
64 OTHER FABRICATED METAL PR	0.	806.	15.	286.
65 ENGINES & TURBINES	0.	894.	13.	244.
66 FARM & GARDEN MACHINERY	0.	4.	0.	1.
67 OIL FIELD MACHINERY	0.	10002.	123.	3038.
68 CONSTRUCTION & MINING MAC	0.	128.	1.	39.
69 MATERIALS HANDLING MACHIN	0.	230.	3.	77.
70 METALWORKING MACHINERY &	0.	389.	8.	160.
71 SPECIAL INDUSTRY MACHINER	0.	89.	2.	34.
72 GENERAL INDUSTRIAL MACHIN	0.	2714.	39.	914.
73 MISC. MACHINERY, EXCEPT E	0.	134.	2.	68.
74 OFFICE, COMPUTING, & ACCO	0.	489.	8.	179.
75 SERVICE INDUSTRY MACHINES	0.	88.	1.	25.
76 ELECTRICAL INDUSTRIAL EQU	0.	1078.	18.	426.
77 HOUSEHOLD APPLIANCES	0.	67.	1.	16.
78 ELECTRIC LIGHTING & WIRIN	0.	1589.	24.	486.
79 RADIO, TV, & COMMUNICATIO	0.	1938.	39.	1008.
80 ELECTRONIC COMPONENTS & A	0.	315.	5.	131.
81 MISC. ELECTRICAL MACHINER	0.	748.	11.	292.
82 SHIPBUILDING & REPAIR	0.	328.	8.	184.
83 OTHER TRANSPORTATION EQUI	0.	1213.	20.	401.
84 SCIENTIFIC, PHOTOGRAPHIC	0.	1112.	20.	467.
85 MISC. MANUFACTURING	0.	1179.	23.	400.
86 RAILROADS & RELATED SERVI	0.	6630.	88.	3140.
87 MOTOR FREIGHT TRANSPORTAT	0.	32396.	684.	13750.
88 WATER TRANSPORTATION	0.	6512.	62.	1364.
90 OTHER TRANSPORTATION & WA	0.	15545.	281.	6128.
91 COMMUNICATIONS, EXCEPT RA	0.	12778.	187.	4595.
92 RADIO & TV BROADCASTING	0.	989.	12.	332.
93 ELECTRIC SERVICES (UTILIT	0.	17091.	79.	2102.
94 GAS PRODUCTION & DISTRIBU	0.	27711.	67.	2021.
95 GAS, WATER, & SANITARY SE	0.	1414.	13.	331.
SECONDARY TYPE 1	0.	326382.	3748.	85813.

TABLE 11.4.1.1 (CONTINUED)

BASELINE FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA W2

SECONDARY SECTORS - TYPE II

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
96 WHOLESALE TRADE	0.	50377.	805.	19394.
97 RETAIL TRADE	0.	55548.	2015.	25371.
98 BANKING	0.	16513.	274.	6627.
99 INSURANCE CARRIERS	0.	16679.	209.	4351.
100 OTHER FINANCE & INS	0.	12178.	241.	6605.
101 REAL ESTATE & RENTAL	0.	85542.	217.	3977.
102 HOTELS & LODGING	0.	3672.	139.	1317.
103 PERSONAL & REPAIR SERV	0.	10337.	351.	3820.
104 MISC. REPAIR SHOPS	0.	4857.	70.	1369.
105 COMPUTER & DATA PROC	0.	6915.	105.	2952.
106 MANGAGEMENT & CONSULT	0.	5267.	107.	2415.
107 EQUIP RENT & LEASE	0.	23869.	271.	5427.
108 ADVERTISING	0.	1361.	23.	520.
109 LEGAL SERVICES	0.	5140.	60.	1791.
110 ACCOUNTING, AUDITING	0.	4169.	67.	1511.
111 OTHER BUSINESS SERV	0.	13181.	375.	6789.
112 EATING & DRINKING	0.	23597.	1090.	7681.
113 AUTOMOTIVE REPAIR	0.	22102.	367.	5469.
114 AMUSEMENTS	0.	4477.	124.	1414.
115 HEALTH, EDUCATIONAL	0.	35550.	1144.	18765.
116 OTHER INDUSTRY	0.	15238.	296.	6210.
SECONDARY TYPE 2	0.	416568.	8351.	133777.

TABLE 11.4.1.2

BASELINE FOR GULF OF MEXICO; 1984
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION W2

POPULATION	PRIMARY		SECONDARY	
	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	9.	468.	112.	376.
25-34	16.	1239.	225.	752.
35-44	6.	397.	81.	271.
45-64	7.	234.	31.	105.
TOTAL	39.	2338.	450.	1503.
AGE DISTRIBUTION OF FEMALES				
20-24	6.	362.	97.	326.
25-34	10.	960.	195.	651.
35-44	4.	308.	70.	235.
45-64	5.	181.	27.	91.
TOTAL	25.	1812.	390.	1303.
AGE DISTRIBUTION OF CHILDERN				
0- 5	11.	1117.	252.	842.
6-11	11.	1002.	227.	758.
12-14	3.	372.	76.	253.
15-17	3.	258.	63.	210.
18-19	1.	86.	6.	21.
20-24	1.	29.	6.	21.
TOTAL	31.	2864.	630.	2105.
POPULATION CHANGE TOTAL	94.	7014.	1469.	4911.

TABLE 11.4.1.3

BASELINE FOR GULF OF MEXICO; 1984
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA W2
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	22000.	788000.	0.	0.
INDIRECT	53204.	0.	326382.	416568.
TOTAL	75204.	788000.	326382.	416568.

TABLE 11.4.1.4

BASELINE FOR GULF OF MEXICO; 1984
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	214.	6819.	2999.	5846.
COMMUTING	171.	0.	0.	0.
RELOCATING	43.	2923.	750.	2505.
TOTAL	429.	9742.	3748.	8351.

TABLE 11.4.1.5

BASELINE FOR GULF OF MEXICO; 1984
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	6082.	184097.	68650.	93644.
COMMUTING	4866.	0.	0.	0.
RELOCATING	1216.	78899.	17163.	40133.
TOTAL	12165.	262995.	85813.	133777.

TABLE 11.4.2.1

BASELINE FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA C3

PRIMARY SECTORS

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
13 NEW PETROLEUM PIPELINES	0.	0.	0.	0.
14 NEW PETRO & NG WELL DRILL	307000.	307000.	2603.	74567.
15 NEW PETRO & NG EXPLORE	439000.	439000.	5657.	157987.
17 MAINT OF GAS UTIL FACILIT	0.	107.	2.	40.
18 MAINT OF PETRO & NG PIPEL	0.	97.	2.	38.
19 MAINT OF PETRO & NG WELLS	48000.	49952.	812.	19503.
39 PETROLEUM REFINING	0.	47693.	75.	2424.
89 PIPE LINES, EXCEPT NG	0.	1610.	9.	225.
PRIMARY TOTALS	794000.	845458.	9159.	254784.

TABLE 11.4.2.1 (CONTINUED)

BASELINE FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA C3

SECONDARY SECTORS - TYPE I INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
1 LIVESTOCK & L.S. PRODUCTS	0.	28.	1.	2.
2 OTHER AGRICULTURAL PRODUC	0.	52.	8.	18.
3 FORESTY PRODUCTS	0.	4.	0.	0.
4 COMMERICAL FISHING	0.	445.	3.	106.
5 AGRICULTURAL, FORESTRY &	0.	190.	6.	71.
6 IRON & FERROALLY ORES MIN	0.	0.	0.	0.
7 NONFERROUS METAL ORES MIN	0.	0.	0.	0.
8 COAL MINING	0.	0.	0.	0.
9 CRUDE PETROLEUM & NATURAL	0.	37607.	89.	2788.
10 DIMENSION, CRUSHED & BROK	0.	0.	0.	0.
11 OTHER STONE & CLAY MINING	0.	1120.	12.	332.
12 CHEMICAL & FERTILIZER MIN	0.	524.	3.	105.
16 OTHER NEW CONSTRUCTION	0.	0.	0.	0.
20 OTHER MAINTENANCE & REPAI	0.	13659.	286.	6080.
21 ORDNANCE & ACCESSORIES	0.	0.	0.	0.
22 CANNED & CURED SEA FOOD	0.	258.	2.	50.
23 FRESH & FROZEN PACKAGED F	0.	697.	13.	128.
24 OTHER FOOD & KINDRED PROD	0.	31358.	366.	6790.
25 TOBACCO MANUFACTURES	0.	0.	0.	0.
26 TEXTILES & APPARELS	0.	2361.	64.	786.
27 LOGGING CAMPUS & LOGGING	0.	2.	0.	0.
28 SAWMILLS & PLANING MILLS,	0.	9.	0.	3.
29 OTHER LUMBER & WOOD PRODU	0.	354.	5.	98.
30 FURNITURE & FIXTURES	0.	294.	6.	95.
31 PAPER & ALLIED PRODUCTS,	0.	1338.	21.	384.
32 PAPERBOARD CONTAINERS &	0.	678.	9.	165.
33 PRINTING & PUBLISHING	0.	5207.	106.	1943.
34 INDUSTRIAL INORGANIC & OR	0.	3056.	24.	578.
35 OTHER CHEMICALS & SELECTE	0.	4141.	23.	456.
36 PLASTICS & SYNTHETIC MAT	0.	53.	0.	11.
37 DRUGS, CLEANING & TOILET	0.	1513.	14.	250.
38 PAINTS & ALLIED PRODUCTS	0.	1386.	13.	264.
40 PETROLEUM PRODUCTS	0.	3218.	15.	396.
41 RUBBER & MISC. PLASTICS P	0.	695.	13.	208.
42 LEATHER, FOOTWEAR & OTHER	0.	29.	0.	9.
43 GLASS & GLASS PRODUCTS	0.	314.	4.	124.
44 READY-MIX CONCRETE	0.	3787.	42.	956.
45 OTHER STONE & CLAY PRODUC	0.	9142.	110.	2467.
46 BLAST FURNACES & STEEL MI	0.	0.	0.	0.
47 ELETROMETALLURGICAL PRODU	0.	0.	0.	0.
48 STEEL PIPES & TUBES	0.	34.	0.	9.
49 IRON & STEEL FOUNDARIES	0.	164.	3.	68.
50 OTHER PRIMARY IRON & STEE	0.	1183.	16.	348.
51 ALUMINUM ROLLING & DRAWIN	0.	0.	0.	0.
52 NONFERROUS WIRE DRAWING &	0.	0.	0.	0.
53 OTHER PRIMARY NONFERROUS	0.	768.	4.	108.

TABLE 11.4.2.1 (CONTINUED)

BASELINE FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA C3

SECONDARY SECTORS - TYPE I

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
54 METAL CONTAINERS	0.	2346.	34.	730.
55 FABRICATED STRUCTURAL STE	0.	12564.	188.	4158.
56 FABRICATED PLATE WORK (BO	0.	260.	5.	90.
57 SHEET METAL WORK	0.	1138.	19.	337.
58 OTHER HEATING, PLUMBING &	0.	1878.	29.	512.
59 SCREW MACHINE PRODUCTS &	0.	1.	0.	0.
60 OTHER SCREW MACHINE PRODU	0.	5.	0.	2.
61 METAL COATING & ALLIED SE	0.	322.	4.	99.
62 MISC. FABRICATED WIRE PRO	0.	360.	6.	128.
63 PIPE, VALVES, & PIPE FITT	0.	2041.	25.	595.
64 OTHER FABRICATED METAL PR	0.	260.	5.	100.
65 ENGINES & TURBINES	0.	0.	0.	0.
66 FARM & GARDEN MACHINERY	0.	0.	0.	0.
67 OIL FIELD MACHINERY	0.	13977.	169.	4246.
68 CONSTRUCTION & MINING MAC	0.	50.	1.	15.
69 MATERIALS HANDLING MACHIN	0.	123.	2.	40.
70 METALWORKING MACHINERY &	0.	4.	0.	2.
71 SPECIAL INDUSTRY MACHINER	0.	101.	2.	39.
72 GENERAL INDUSTRIAL MACHIN	0.	500.	18.	177.
73 MISC. MACHINERY, EXCEPT E	0.	4.	0.	2.
74 OFFICE, COMPUTING, & ACCO	0.	195.	3.	71.
75 SERVICE INDUSTRY MACHINES	0.	325.	4.	107.
76 ELECTRICAL INDUSTRIAL EQU	0.	1461.	23.	569.
77 HOUSEHOLD APPLIANCES	0.	0.	0.	0.
78 ELECTRIC LIGHTING & WIRIN	0.	357.	5.	119.
79 RADIO, TV, & COMMUNICATIO	0.	5.	0.	2.
80 ELECTRONIC COMPONENTS & A	0.	16.	0.	6.
81 MISC. ELECTRICAL MACHINER	0.	39.	1.	15.
82 SHIPBUILDING & REPAIR	0.	381.	10.	213.
83 OTHER TRANSPORTATION EQUI	0.	19054.	417.	9157.
84 SCIENTIFIC, PHOTOGRAPHIC	0.	554.	10.	224.
85 MISC. MANUFACTURING	0.	1668.	33.	563.
86 RAILROADS & RELATED SERVI	0.	7893.	104.	3738.
87 MOTOR FREIGHT TRANSPORTAT	0.	40979.	926.	17393.
88 WATER TRANSPORTATION	0.	6469.	61.	1355.
90 OTHER TRANSPORTATION & WA	0.	16841.	344.	6981.
91 COMMUNICATIONS, EXCEPT RA	0.	15425.	220.	5546.
92 RADIO & TV BROADCASTING	0.	1398.	20.	469.
93 ELECTRIC SERVICES (UTILIT	0.	13340.	64.	1641.
94 GAS PRODUCTION & DISTRIBU	0.	19524.	54.	1424.
95 GAS, WATER, & SANITARY SE	0.	1504.	17.	365.
SECONDARY TYPE 1	0.	309032.	4103.	87426.

TABLE 11.4.2.1 (CONTINUED)

BASELINE FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA C3

SECONDARY SECTORS - TYPE II

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
96 WHOLESALE TRADE	0.	53725.	1031.	20683.
97 RETAIL TRADE	0.	62653.	2602.	28616.
98 BANKING	0.	15899.	352.	6381.
99 INSURANCE CARRIERS	0.	27647.	379.	7212.
100 OTHER FINANCE & INS	0.	16932.	432.	9249.
101 REAL ESTATE & RENTAL	0.	76690.	252.	3565.
102 HOTELS & LODGING	0.	4920.	193.	1765.
103 PERSONAL & REPAIR SERV	0.	10838.	425.	3930.
104 MISC. REPAIR SHOPS	0.	5115.	82.	1442.
105 COMPUTER & DATA PROC	0.	5805.	115.	2478.
106 MANGAGEMENT & CONSULT	0.	5394.	131.	2473.
107 EQUIP RENT & LEASE	0.	22029.	255.	5009.
108 ADVERTISING	0.	1533.	31.	586.
109 LEGAL SERVICES	0.	5943.	76.	2071.
110 ACCOUNTING, AUDITING	0.	4465.	77.	1619.
111 OTHER BUSINESS SERV	0.	17534.	732.	9421.
112 EATING & DRINKING	0.	28679.	1434.	9335.
113 AUTOMOTIVE REPAIR	0.	23805.	449.	5780.
114 AMUSEMENTS	0.	6168.	185.	1786.
115 HEALTH, EDUCATIONAL	0.	48842.	1712.	26234.
116 OTHER INDUSTRY	0.	15992.	310.	6518.
SECONDARY TYPE 2	0.	460609.	11258.	156153.

TABLE 11.4.2.2

BASELINE FOR GULF OF MEXICO; 1984
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION C3

	PRIMARY		SECONDARY	
POPULATION	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	19.	396.	123.	507.
25-34	33.	1051.	246.	1013.
35-44	13.	337.	89.	365.
45-64	15.	198.	34.	142.
TOTAL	81.	1982.	492.	2026.
AGE DISTRIBUTION OF FEMALES				
20-24	13.	307.	107.	439.
25-34	21.	814.	213.	878.
35-44	8.	261.	77.	316.
45-64	10.	154.	30.	123.
TOTAL	52.	1536.	427.	1756.
AGE DISTRIBUTION OF CHILDERN				
0- 5	23.	947.	276.	1135.
6-11	23.	850.	248.	1021.
12-14	7.	316.	83.	340.
15-17	7.	219.	69.	284.
18-19	3.	73.	7.	28.
20-24	2.	24.	7.	28.
TOTAL	65.	2428.	689.	2837.
POPULATION CHANGE TOTAL	198.	5947.	1608.	6620.

TABLE 11.4.2.3

BASELINE FOR GULF OF MEXICO; 1984
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA C3
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	48000.	746000.	0.	0.
INDIRECT	51458.	0.	309032.	460609.
TOTAL	99458.	746000.	309032.	460609.

TABLE 11.4.2.4

BASELINE FOR GULF OF MEXICO; 1984
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	449.	5782.	3282.	7881.
COMMUTING	360.	0.	0.	0.
RELOCATING	90.	2478.	821.	3377.
TOTAL	899.	8260.	4103.	11258.

TABLE 11.4.2.5

BASELINE FOR GULF OF MEXICO; 1984
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	11115.	162788.	69940.	109307.
COMMUTING	8892.	0.	0.	0.
RELOCATING	2223.	69766.	17485.	46846.
TOTAL	22230.	232555.	87426.	156153.

TABLE 12.3.1.2

SCENARIO FOR GULF OF MEXICO; 1983
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION W2

POPULATION	PRIMARY		SECONDARY	
	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	14.	557.	144.	471.
25-34	23.	1475.	288.	942.
35-44	9.	473.	104.	339.
45-64	11.	278.	40.	132.
TOTAL	56.	2784.	576.	1884.
AGE DISTRIBUTION OF FEMALES				
20-24	9.	432.	125.	408.
25-34	15.	1143.	250.	816.
35-44	6.	367.	90.	294.
45-64	7.	216.	35.	114.
TOTAL	36.	2158.	499.	1633.
AGE DISTRIBUTION OF CHILDERN				
0- 5	16.	1330.	323.	1055.
6-11	16.	1194.	290.	950.
12-14	5.	443.	97.	317.
15-17	5.	307.	81.	264.
18-19	2.	102.	8.	26.
20-24	1.	34.	8.	26.
TOTAL	45.	3410.	807.	2638.
POPULATION CHANGE TOTAL	138.	8352.	1882.	6155.

TABLE 12.3.1.3

SCENARIO FOR GULF OF MEXICO; 1983
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA W2
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	34000.	953000.	0.	0.
INDIRECT	65733.	0.	415414.	522179.
TOTAL	99733.	953000.	415414.	522179.

TABLE 12.3.1.4

SCENARIO FOR GULF OF MEXICO; 1983
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	314.	8120.	3841.	7327.
COMMUTING	251.	0.	0.	0.
RELOCATING	63.	3480.	960.	3140.
TOTAL	627.	11600.	4802.	10467.

TABLE 12.3.1.5

SCENARIO FOR GULF OF MEXICO; 1983
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	8848.	218374.	87992.	117773.
COMMUTING	7079.	0.	0.	0.
RELOCATING	1770.	93589.	21998.	50474.
TOTAL	17696.	311963.	109991.	168247.

TABLE 12.3.2.2

SCENARIO FOR GULF OF MEXICO; 1983
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION C3

POPULATION	PRIMARY		SECONDARY	
	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	30.	532.	173.	707.
25-34	51.	1411.	346.	1413.
35-44	20.	453.	124.	509.
45-64	24.	266.	48.	198.
TOTAL	124.	2662.	692.	2827.
AGE DISTRIBUTION OF FEMALES				
20-24	19.	413.	150.	612.
25-34	33.	1093.	300.	1225.
35-44	13.	351.	108.	441.
45-64	15.	206.	42.	171.
TOTAL	80.	2063.	599.	2450.
AGE DISTRIBUTION OF CHILDERN				
0- 5	35.	1272.	387.	1583.
6-11	36.	1141.	349.	1425.
12-14	11.	424.	116.	475.
15-17	11.	293.	97.	396.
18-19	4.	98.	10.	40.
20-24	3.	33.	10.	40.
TOTAL	100.	3261.	968.	3958.
POPULATION CHANGE TOTAL	304.	7986.	2259.	9234.

TABLE 12.3.2.3

SCENARIO FOR GULF OF MEXICO; 1983
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA C3
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	75000.	1016000.	0.	0.
INDIRECT	71198.	0.	433303.	642335.
TOTAL	146198.	1016000.	433303.	642335.

TABLE 12.3.2.4

SCENARIO FOR GULF OF MEXICO; 1983
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	692.	7764.	4611.	10993.
COMMUTING	553.	0.	0.	0.
RELOCATING	138.	3327.	1153.	4711.
TOTAL	1383.	11091.	5763.	15705.

TABLE 12.3.2.5

SCENARIO FOR GULF OF MEXICO; 1983
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	17056.	218767.	98288.	152629.
COMMUTING	13645.	0.	0.	0.
RELOCATING	3411.	93757.	24572.	65412.
TOTAL	34112.	312525.	122860.	218042.

TABLE 12.4.4.1

SCENARIO FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA W2

PRIMARY SECTORS

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
13 NEW PETROLEUM PIPELINES	0.	0.	0.	0.
14 NEW PETRO & NG WELL DRILL	259000.	259000.	2499.	62909.
15 NEW PETRO & NG EXPLORE	662000.	662000.	8701.	238241.
17 MAINT OF GAS UTIL FACILIT	0.	184.	3.	69.
18 MAINT OF PETRO & NG PIPEL	0.	139.	2.	55.
19 MAINT OF PETRO & NG WELLS	32000.	34517.	494.	13476.
39 PETROLEUM REFINING	0.	58352.	88.	2966.
89 PIPE LINES, EXCEPT NG	0.	2307.	7.	200.
PRIMARY TOTALS	953000.	1016498.	11794.	317914.

TABLE 12.4.1.1 (CONTINUED)

SCENARIO FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA W2

SECONDARY SECTORS - TYPE I INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
1 LIVESTOCK & L.S. PRODUCTS	0.	139.	4.	10.
2 OTHER AGRICULTURAL PRODUC	0.	749.	27.	68.
3 FORESTY PRODUCTS	0.	23.	0.	2.
4 COMMERICAL FISHING	0.	128.	2.	30.
5 AGRICULTURAL, FORESTRY &	0.	693.	23.	294.
6 IRON & FERROALLY ORES MIN	0.	0.	0.	0.
7 NONFERROUS METAL ORES MIN	0.	51.	1.	18.
8 COAL MINING	0.	83.	1.	29.
9 CRUDE PETROLEUM & NATURAL	0.	48492.	101.	3595.
10 DIMENSION, CRUSHED & BROK	0.	72.	1.	22.
11 OTHER STONE & CLAY MINING	0.	800.	11.	250.
12 CHEMICAL & FERTILIZER MIN	0.	272.	2.	54.
16 OTHER NEW CONSTRUCTION	0.	0.	0.	0.
20 OTHER MAINTENANCE & REPAI	0.	16645.	333.	7353.
21 ORDNANCE & ACCESSORIES	0.	0.	0.	0.
22 CANNED & CURED SEA FOOD	0.	0.	0.	0.
23 FRESH & FROZEN PACKAGED F	0.	265.	4.	49.
24 OTHER FOOD & KINDRED PROD	0.	20834.	205.	4478.
25 TOBACCO MANUFACTURES	0.	0.	0.	0.
26 TEXTILES & APPARELS	0.	355.	8.	109.
27 LOGGING CAMPUS & LOGGING	0.	25.	0.	5.
28 SAWMILLS & PLANING MILLS,	0.	63.	1.	17.
29 OTHER LUMBER & WOOD PRODU	0.	1573.	24.	423.
30 FURNITURE & FIXTURES	0.	618.	11.	210.
31 PAPER & ALLIED PRODUCTS,	0.	2834.	28.	743.
32 PAPERBOARD CONTAINERS &	0.	477.	5.	116.
33 PRINTING & PUBLISHING	0.	7886.	166.	3013.
34 INDUSTRIAL INORGANIC & OR	0.	11339.	62.	2144.
35 OTHER CHEMICALS & SELECTE	0.	4381.	24.	616.
36 PLASTICS & SYNTHETIC MAT	0.	2244.	13.	447.
37 DRUGS, CLEANING & TOILET	0.	2269.	24.	504.
38 PAINTS & ALLIED PRODUCTS	0.	3632.	29.	693.
40 PETROLEUM PRODUCTS	0.	4145.	24.	532.
41 RUBBER & MISC. PLASTICS P	0.	6171.	52.	1735.
42 LEATHER, FOOTWEAR & OTHER	0.	29.	1.	8.
43 GLASS & GLASS PRODUCTS	0.	457.	9.	178.
44 READY-MIX CONCRETE	0.	4585.	50.	1158.
45 OTHER STONE & CLAY PRODUC	0.	6274.	111.	2058.
46 BLAST FURNACES & STEEL MI	0.	26403.	316.	8539.
47 ELETROMETALLURGICAL PRODU	0.	0.	0.	0.
48 STEEL PIPES & TUBES	0.	2804.	28.	718.
49 IRON & STEEL FOUNDARIES	0.	495.	11.	205.
50 OTHER PRIMARY IRON & STEE	0.	5029.	81.	1607.
51 ALUMINUM ROLLING & DRAWIN	0.	0.	0.	0.
52 NONFERROUS WIRE DRAWING &	0.	141.	1.	29.
53 OTHER PRIMARY NONFERROUS	0.	1045.	10.	270.

TABLE 12.4.1.1 (CONTINUED)

SCENARIO FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA W2

SECONDARY SECTORS - TYPE I

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
54 METAL CONTAINERS	0.	2028.	22.	558.
55 FABRICATED STRUCTURAL STE	0.	12538.	197.	4150.
56 FABRICATED PLATE WORK (BO	0.	1406.	21.	486.
57 SHEET METAL WORK	0.	1838.	25.	544.
58 OTHER HEATING, PLUMBING &	0.	8913.	137.	2508.
59 SCREW MACHINE PRODUCTS &	0.	502.	10.	188.
60 OTHER SCREW MACHINE PRODU	0.	175.	4.	61.
61 METAL COATING & ALLIED SE	0.	547.	9.	168.
62 MISC. FABRICATED WIRE PRO	0.	872.	15.	309.
63 PIPE, VALVES, & PIPE FITT	0.	7380.	92.	2153.
64 OTHER FABRICATED METAL PR	0.	984.	18.	349.
65 ENGINES & TURBINES	0.	1114.	16.	304.
66 FARM & GARDEN MACHINERY	0.	5.	0.	2.
67 OIL FIELD MACHINERY	0.	13360.	164.	4058.
68 CONSTRUCTION & MINING MAC	0.	162.	2.	49.
69 MATERIALS HANDLING MACHIN	0.	318.	5.	106.
70 METALWORKING MACHINERY &	0.	478.	9.	196.
71 SPECIAL INDUSTRY MACHINER	0.	110.	2.	42.
72 GENERAL INDUSTRIAL MACHIN	0.	3752.	54.	1264.
73 MISC. MACHINERY, EXCEPT E	0.	164.	3.	83.
74 OFFICE, COMPUTING, & ACCO	0.	606.	11.	222.
75 SERVICE INDUSTRY MACHINES	0.	108.	1.	31.
76 ELECTRICAL INDUSTRIAL EQU	0.	1317.	22.	521.
77 HOUSEHOLD APPLIANCES	0.	80.	1.	20.
78 ELECTRIC LIGHTING & WIRIN	0.	1791.	27.	548.
79 RADIO, TV, & COMMUNICATIO	0.	2202.	44.	1146.
80 ELECTRONIC COMPONENTS & A	0.	376.	6.	156.
81 MISC. ELECTRICAL MACHINER	0.	896.	13.	350.
82 SHIPBUILDING & REPAIR	0.	404.	10.	226.
83 OTHER TRANSPORTATION EQUI	0.	1460.	24.	483.
84 SCIENTIFIC, PHOTOGRAPHIC	0.	1339.	24.	562.
85 MISC. MANUFACTURING	0.	1414.	27.	480.
86 RAILROADS & RELATED SERVI	0.	8429.	112.	3991.
87 MOTOR FREIGHT TRANSPORTAT	0.	40887.	864.	17354.
88 WATER TRANSPORTATION	0.	7844.	75.	1643.
90 OTHER TRANSPORTATION & WA	0.	19015.	344.	7496.
91 COMMUNICATIONS, EXCEPT RA	0.	15447.	226.	5554.
92 RADIO & TV BROADCASTING	0.	1194.	15.	401.
93 ELECTRIC SERVICES (UTILIT	0.	20552.	95.	2528.
94 GAS PRODUCTION & DISTRIBU	0.	33752.	81.	2462.
95 GAS, WATER, & SANITARY SE	0.	1710.	16.	401.
SECONDARY TYPE 1	0.	401992.	4648.	106486.

TABLE 12.4.1.1 (CONTINUED)

SCENARIO FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA W2

SECONDARY SECTORS - TYPE II

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
96 WHOLESALE TRADE	0.	61476.	982.	23667.
97 RETAIL TRADE	0.	66318.	2405.	30290.
98 BANKING	0.	19689.	327.	7902.
99 INSURANCE CARRIERS	0.	21447.	269.	5595.
100 OTHER FINANCE & INS	0.	15215.	302.	8252.
101 REAL ESTATE & RENTAL	0.	102656.	260.	4772.
102 HOTELS & LODGING	0.	4461.	169.	1600.
103 PERSONAL & REPAIR SERV	0.	12398.	421.	4582.
104 MISC. REPAIR SHOPS	0.	5914.	86.	1667.
105 COMPUTER & DATA PROC	0.	8954.	136.	3822.
106 MANGAGEMENT & CONSULT	0.	6830.	139.	3131.
107 EQUIP RENT & LEASE	0.	27701.	315.	6299.
108 ADVERTISING	0.	1644.	28.	628.
109 LEGAL SERVICES	0.	6195.	72.	2159.
110 ACCOUNTING, AUDITING	0.	5048.	81.	1830.
111 OTHER BUSINESS SERV	0.	17372.	495.	8948.
112 EATING & DRINKING	0.	28379.	1311.	9238.
113 AUTOMOTIVE REPAIR	0.	26772.	445.	6625.
114 AMUSEMENTS	0.	5371.	149.	1697.
115 HEALTH, EDUCATIONAL	0.	42613.	1371.	22493.
116 OTHER INDUSTRY	0.	18419.	357.	7507.
SECONDARY TYPE 2	0.	504872.	10120.	162704.

TABLE 12.4.1.2

SCENARIO FOR GULF OF MEXICO; 1984
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION W2

POPULATION	PRIMARY		SECONDARY	
	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	13.	538.	139.	455.
25-34	22.	1425.	279.	911.
35-44	9.	457.	100.	328.
45-64	10.	269.	39.	128.
TOTAL	53.	2688.	558.	1822.
AGE DISTRIBUTION OF FEMALES				
20-24	8.	417.	121.	395.
25-34	14.	1104.	242.	789.
35-44	6.	354.	87.	284.
45-64	7.	208.	34.	111.
TOTAL	34.	2083.	483.	1579.
AGE DISTRIBUTION OF CHILDERN				
0- 5	15.	1284.	312.	1020.
6-11	15.	1152.	281.	918.
12-14	5.	428.	94.	306.
15-17	5.	296.	78.	255.
18-19	2.	99.	8.	26.
20-24	1.	33.	8.	26.
TOTAL	43.	3293.	781.	2550.
POPULATION CHANGE TOTAL	131.	8064.	1822.	5950.

TABLE 12.4.1.3

SCENARIO FOR GULF OF MEXICO; 1984
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA W2
(IN THOUSANDS OF DOLLARS)

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	32000.	921000.	0.	0.
INDIRECT	63498.	0.	401992.	504872.
TOTAL	95498.	921000.	401992.	504872.

TABLE 12.4.1.4

SCENARIO FOR GULF OF MEXICO; 1984
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	297.	7840.	3719.	7084.
COMMUTING	238.	0.	0.	0.
RELOCATING	59.	3360.	930.	3036.
TOTAL	594.	11200.	4648.	10120.

TABLE 12.4.1.5

SCENARIO FOR GULF OF MEXICO; 1984
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA W2

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	8383.	210804.	85189.	113893.
COMMUTING	6706.	0.	0.	0.
RELOCATING	1677.	90345.	21297.	48811.
TOTAL	16765.	301149.	106486.	162704.

TABLE 12.4.2.1

SCENARIO FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA C3

PRIMARY SECTORS

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
13 NEW PETROLEUM PIPELINES	0.	0.	0.	0.
14 NEW PETRO & NG WELL DRILL	382000.	382000.	3239.	92784.
15 NEW PETRO & NG EXPLORE	592000.	592000.	7629.	213049.
17 MAINT OF GAS UTIL FACILIT	0.	137.	2.	51.
18 MAINT OF PETRO & NG PIPEL	0.	125.	2.	50.
19 MAINT OF PETRO & NG WELLS	58000.	60525.	984.	23631.
39 PETROLEUM REFINING	0.	61760.	97.	3139.
89 PIPE LINES, EXCEPT NG	0.	2084.	11.	291.
PRIMARY TOTALS	1032000.	1098631.	11964.	332994.

TABLE 12.4.2.1 (CONTINUED)

SCENARIO FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA C3

SECONDARY SECTORS - TYPE I INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
1 LIVESTOCK & L.S. PRODUCTS	0.	36.	1.	3.
2 OTHER AGRICULTURAL PRODUC	0.	67.	11.	23.
3 FORESTY PRODUCTS	0.	6.	0.	0.
4 COMMERICAL FISHING	0.	575.	4.	137.
5 AGRICULTURAL, FORESTRY &	0.	245.	8.	92.
6 IRON & FERROALLY ORES MIN	0.	0.	0.	0.
7 NONFERROUS METAL ORES MIN	0.	0.	0.	0.
8 COAL MINING	0.	0.	0.	0.
9 CRUDE PETROLEUM & NATURAL	0.	48650.	116.	3607.
10 DIMENSION, CRUSHED & BROK	0.	0.	0.	0.
11 OTHER STONE & CLAY MINING	0.	1413.	15.	418.
12 CHEMICAL & FERTILIZER MIN	0.	664.	4.	132.
16 OTHER NEW CONSTRUCTION	0.	0.	0.	0.
20 OTHER MAINTENANCE & REPAI	0.	17609.	368.	7838.
21 ORDNANCE & ACCESSORIES	0.	0.	0.	0.
22 CANNED & CURED SEA FOOD	0.	334.	2.	65.
23 FRESH & FROZEN PACKAGED F	0.	900.	17.	166.
24 OTHER FOOD & KINDRED PROD	0.	40534.	473.	8777.
25 TOBACCO MANUFACTURES	0.	0.	0.	0.
26 TEXTILES & APPARELS	0.	3056.	83.	1017.
27 LOGGING CAMPUS & LOGGING	0.	2.	0.	0.
28 SAWMILLS & PLANING MILLS,	0.	12.	0.	3.
29 OTHER LUMBER & WOOD PRODU	0.	461.	7.	127.
30 FURNITURE & FIXTURES	0.	380.	8.	122.
31 PAPER & ALLIED PRODUCTS,	0.	1727.	27.	495.
32 PAPERBOARD CONTAINERS &	0.	875.	12.	213.
33 PRINTING & PUBLISHING	0.	6721.	137.	2508.
34 INDUSTRIAL INORGANIC & OR	0.	3918.	30.	741.
35 OTHER CHEMICALS & SELECTE	0.	5229.	29.	576.
36 PLASTICS & SYNTHETIC MAT	0.	68.	1.	14.
37 DRUGS, CLEANING & TOILET	0.	1954.	18.	323.
38 PAINTS & ALLIED PRODUCTS	0.	1828.	17.	349.
40 PETROLEUM PRODUCTS	0.	4215.	20.	519.
41 RUBBER & MISC. PLASTICS P	0.	903.	16.	271.
42 LEATHER, FOOTWEAR & OTHER	0.	38.	1.	12.
43 GLASS & GLASS PRODUCTS	0.	406.	5.	160.
44 READY-MIX CONCRETE	0.	4917.	54.	1242.
45 OTHER STONE & CLAY PRODUC	0.	11431.	137.	3085.
46 BLAST FURNACES & STEEL MI	0.	0.	0.	0.
47 ELETROMETALLURGICAL PRODU	0.	0.	0.	0.
48 STEEL PIPES & TUBES	0.	43.	1.	11.
49 IRON & STEEL FOUNDARIES	0.	209.	4.	86.
50 OTHER PRIMARY IRON & STEE	0.	1496.	20.	440.
51 ALUMINUM ROLLING & DRAWIN	0.	0.	0.	0.
52 NONFERROUS WIRE DRAWING &	0.	0.	0.	0.
53 OTHER PRIMARY NONFERROUS	0.	988.	5.	139.

TABLE 12.4.2.1 (CONTINUED)

SCENARIO FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA C3

SECONDARY SECTORS - TYPE I

INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
54 METAL CONTAINERS	0.	3034.	44.	944.
55 FABRICATED STRUCTURAL STE	0.	15964.	239.	5283.
56 FABRICATED PLATE WORK (BO	0.	326.	6.	113.
57 SHEET METAL WORK	0.	1454.	24.	430.
58 OTHER HEATING, PLUMBING &	0.	2503.	38.	682.
59 SCREW MACHINE PRODUCTS &	0.	1.	0.	1.
60 OTHER SCREW MACHINE PRODU	0.	7.	0.	2.
61 METAL COATING & ALLIED SE	0.	411.	6.	126.
62 MISC. FABRICATED WIRE PRO	0.	457.	7.	162.
63 PIPE, VALVES, & PIPE FITT	0.	2630.	32.	767.
64 OTHER FABRICATED METAL PR	0.	334.	6.	129.
65 ENGINES & TURBINES	0.	0.	0.	0.
66 FARM & GARDEN MACHINERY	0.	0.	0.	0.
67 OIL FIELD MACHINERY	0.	17628.	213.	5354.
68 CONSTRUCTION & MINING MAC	0.	63.	1.	20.
69 MATERIALS HANDLING MACHIN	0.	152.	2.	50.
70 METALWORKING MACHINERY &	0.	5.	0.	2.
71 SPECIAL INDUSTRY MACHINER	0.	130.	2.	50.
72 GENERAL INDUSTRIAL MACHIN	0.	626.	22.	222.
73 MISC. MACHINERY, EXCEPT E	0.	5.	0.	3.
74 OFFICE, COMPUTING, & ACCO	0.	250.	4.	91.
75 SERVICE INDUSTRY MACHINES	0.	419.	5.	138.
76 ELECTRICAL INDUSTRIAL EQU	0.	1880.	30.	731.
77 HOUSEHOLD APPLIANCES	0.	0.	0.	0.
78 ELECTRIC LIGHTING & WIRIN	0.	472.	7.	157.
79 RADIO, TV, & COMMUNICATIO	0.	7.	0.	3.
80 ELECTRONIC COMPONENTS & A	0.	20.	0.	8.
81 MISC. ELECTRICAL MACHINER	0.	51.	1.	20.
82 SHIPBUILDING & REPAIR	0.	489.	13.	274.
83 OTHER TRANSPORTATION EQUI	0.	24609.	538.	11826.
84 SCIENTIFIC, PHOTOGRAPHIC	0.	715.	13.	289.
85 MISC. MANUFACTURING	0.	2157.	43.	728.
86 RAILROADS & RELATED SERVI	0.	10051.	132.	4760.
87 MOTOR FREIGHT TRANSPORTAT	0.	52326.	1183.	22209.
88 WATER TRANSPORTATION	0.	8366.	79.	1752.
90 OTHER TRANSPORTATION & WA	0.	21663.	442.	8979.
91 COMMUNICATIONS, EXCEPT RA	0.	19900.	284.	7155.
92 RADIO & TV BROADCASTING	0.	1804.	26.	606.
93 ELECTRIC SERVICES (UTILIT	0.	17243.	83.	2121.
94 GAS PRODUCTION & DISTRIBU	0.	25141.	70.	1834.
95 GAS, WATER, & SANITARY SE	0.	1940.	21.	471.
SECONDARY TYPE 1	0.	397143.	5266.	112204.

TABLE 12.4.2.1 (CONTINUED)

SCENARIO FOR GULF OF MEXICO; 1984
COMPLETE INDUSTRY DETAIL BY DOLLARS AND EMPLOYMENT
COASTAL AREA C3

SECONDARY SECTORS - TYPE II

	INPUT/OUTPUT SECTORS	INITIAL IMPACTS ($000)	TOTAL ECONOMIC IMPACTS OUTPUT ($000)	EMPLOYMENT	INCOME ($000)
96	WHOLESALE TRADE	0.	69160.	1328.	26625.
97	RETAIL TRADE	0.	81081.	3367.	37033.
98	BANKING	0.	20593.	456.	8265.
99	INSURANCE CARRIERS	0.	35150.	482.	9170.
100	OTHER FINANCE & INS	0.	21640.	552.	11821.
101	REAL ESTATE & RENTAL	0.	99097.	325.	4607.
102	HOTELS & LODGING	0.	6335.	249.	2273.
103	PERSONAL & REPAIR SERV	0.	14008.	549.	5079.
104	MISC. REPAIR SHOPS	0.	6591.	106.	1858.
105	COMPUTER & DATA PROC	0.	7373.	146.	3147.
106	MANGAGEMENT & CONSULT	0.	6848.	167.	3140.
107	EQUIP RENT & LEASE	0.	28808.	333.	6550.
108	ADVERTISING	0.	1979.	40.	756.
109	LEGAL SERVICES	0.	7671.	99.	2673.
110	ACCOUNTING, AUDITING	0.	5760.	100.	2088.
111	OTHER BUSINESS SERV	0.	22193.	927.	11924.
112	EATING & DRINKING	0.	37043.	1852.	12058.
113	AUTOMOTIVE REPAIR	0.	30701.	579.	7455.
114	AMUSEMENTS	0.	7971.	239.	2308.
115	HEALTH, EDUCATIONAL	0.	63130.	2213.	33909.
116	OTHER INDUSTRY	0.	20631.	400.	8408.
	SECONDARY TYPE 2	0.	593763.	14510.	201146.

TABLE 12.4.2.2

SCENARIO FOR GULF OF MEXICO; 1984
POPULATION IMPACT DUE TO
IN-MIGRANT EMPLOYMENT
FOR COASTAL REGION C3

	PRIMARY		SECONDARY	
POPULATION	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
AGE DISTRIBUTION OF MALES				
20-24	24.	522.	158.	653.
25-34	40.	1382.	316.	1306.
35-44	16.	443.	114.	470.
45-64	19.	261.	44.	183.
TOTAL	99.	2608.	632.	2612.
AGE DISTRIBUTION OF FEMALES				
20-24	15.	404.	137.	566.
25-34	26.	1071.	274.	1132.
35-44	10.	344.	99.	407.
45-64	12.	202.	38.	158.
TOTAL	64.	2021.	548.	2264.
AGE DISTRIBUTION OF CHILDERN				
0- 5	28.	1246.	354.	1463.
6-11	28.	1118.	319.	1316.
12-14	9.	415.	106.	439.
15-17	9.	288.	88.	366.
18-19	3.	96.	9.	37.
20-24	2.	32.	9.	37.
TOTAL	79.	3195.	885.	3657.
POPULATION CHANGE TOTAL	241.	7824.	2064.	8532.

TABLE 12.4.2.3

SCENARIO FOR GULF OF MEXICO; 1984
DIRECT & INDIRECT ECONOMIC IMPACT BY INDUSTRY GROUP
FOR COASTAL AREA C3
IN THOUSANDS OF DOLLARS

	PRIMARY		SECONDARY	
TYPE OF IMPACT	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
DIRECT	58000.	974000.	0.	0.
INDIRECT	66631.	0.	397143.	593763.
TOTAL	124631.	974000.	397143.	593763.

TABLE 12.4.2.4

SCENARIO FOR GULF OF MEXICO; 1984
EMPLOYMENT BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	548.	7607.	4213.	10157.
COMMUTING	438.	0.	0.	0.
RELOCATING	110.	3260.	1053.	4353.
TOTAL	1096.	10867.	5266.	14510.

TABLE 12.4.2.5

SCENARIO FOR GULF OF MEXICO; 1984
INCOME BY INDUSTRY GROUPS SUMMARY
FOR COASTAL AREA C3

	PRIMARY		SECONDARY	
WORK FORCE	ON/OFF SHORE OPERATION	ON/OFF SHORE CONSTRUCTION	TYPE I	TYPE II
LOCAL	13581.	214083.	89763.	140803.
COMMUTING	10865.	0.	0.	0.
RELOCATING	2716.	91750.	22441.	60344.
TOTAL	27161.	305833.	112204.	201146.

7. Shipbuilding & Repairing (MMS Sector 82);

8. Motor Freight Transportation & Warehousing (MMS Sector 87);

9. Electric Services (Utilities) (MMS Sector 93)

10. Gas Production & Distribution (Utilities) (MMS Sector 94)

Detailed questionnaires concerning firm expense categories, revenue categories, and employment data were constructed. The questionnaires are given in full in Deliverable Three, "Information Collection Log - II.A" of the contract.

Guidelines on questionnaire usage from the Office of Management and Budget restricted the number of questionnaires to nine for each of the ten industries. Five pertaining to each industry were sent to firms in Coastal Area W-2 and the remaining four in each industry were sent to firms in Coastal Area E-3.

The number of responses received was seven, a very disappointing response rate. Those questionnaires that were returned contained data that was very sketchy and of questionable value for comparison purposes with the SAM results. No further efforts were made in regards to the survey of firms.

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