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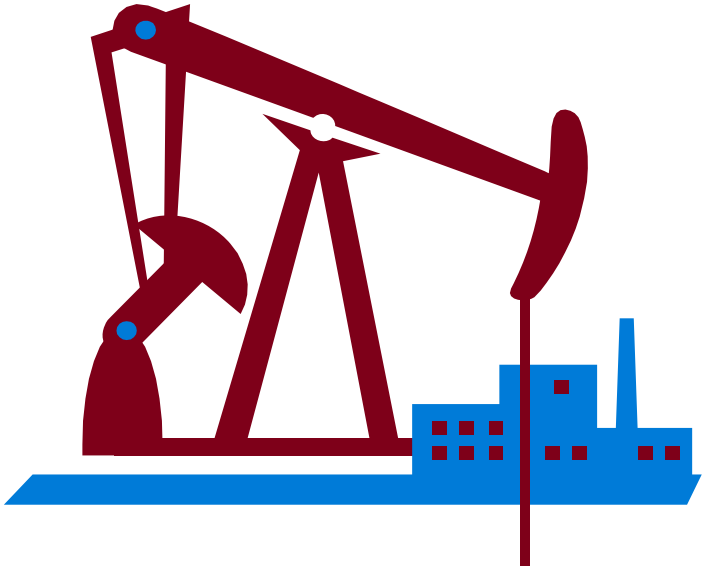
Petroleum Industry's Economic Contribution to North Dakota in 2009



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Executive Summary

The purpose of this study was to estimate the economic contribution of crude oil and natural gas exploration, extraction, transportation, and processing in North Dakota in 2009. Expenditures made in North Dakota by oil companies represented the direct impacts of the industry. Secondary economic impacts result from the spending and respending of the direct impacts and were estimated using the North Dakota Input-Output Model.

Surveys were used to collect production, expenditure, and employment data for the petroleum industry in North Dakota. Oil operators (i.e., firms that own or operate oil wells) in the state were surveyed to obtain information on in-state expenses for oil and gas exploration, expenses for oil and gas extraction/production, general business expenditures, employment, oil and gas output, and leasing and drilling activity. A similar survey was conducted for firms engaged in pipeline transportation and processing of crude oil and natural gas in North Dakota. A third survey was conducted of firms providing services, inputs, and equipment in the oil fields. A fourth survey of leasing/brokerage firms was used to develop estimates of private lease bonuses paid to in-state mineral owners.

The survey of oil operators produced financial data on about 43 percent of North Dakota's oil and natural gas production in 2009. Secondary data, obtained from government agencies, was combined with survey data to estimate royalties, lease bonuses, and severance taxes.

Total in-state expenditures in 2009 for oil and gas exploration (e.g., seismic testing, well drilling) were estimated from survey data and statewide drilling statistics. A total of 522 wells were drilled in 2009. Average expense per well for oil operators was estimated at $4.7 million. The combination of in-state expenses for exploration and lease bonuses resulted in $2.803 billion in direct impacts in 2009. The secondary economic impacts associated with exploration activities were estimated at $4.728 billion. The in-state gross business volume (direct and secondary impacts) of exploration activities was estimated at $7.531 billion in 2009.

Estimates of oil and gas extraction/production expenses, general business expenses for oil operators, private and public mineral royalties, and state severance taxes were derived from survey data and secondary information obtained from various government agencies. The state had 4,190 producing wells (average monthly) which combined for nearly 80 million barrels of oil and 92 million mcf of natural gas in 2009. Total direct impacts for oil and gas production were estimated at $1.8 billion in 2009. Total secondary economic impacts associated with production activities were estimated at $2.456 billion. The in-state gross business volume of oil and gas extraction/production was estimated at $4.255 billion in 2009.

In-state expenditures for transportation expenses for crude oil, pipeline operation expenses, natural gas processing, and crude oil refining were estimated to have a direct impact in North Dakota of $310.8 million in 2009. Total secondary economic impacts associated with processing and transporting crude oil and natural gas were estimated at $566

million. Processing and transporting crude oil and natural gas generated a gross business volume of $877 million in 2009.

Industry-wide direct and secondary economic impacts from the petroleum industry were estimated at $4.9 billion and $7.7 billion, respectively. The gross business volume for the entire industry in North Dakota in 2009 was estimated at $12.663 billion.

Additional measures of the petroleum industry's economic importance to the state include direct employment for 18,328 full-time jobs, economy-wide personal income of $4.9 billion, statewide retail sales of $3.3 billion, direct contributions to local and state government tax revenues of $822 million, indirect contribution of $188 million in state government general tax collections, and secondary employment of 46,800 full-time equivalent jobs.

Comparing various production statistics between previous studies revealed that the number of producing wells, oil and gas production, and drilling activities all increased in the state. Oil and natural gas prices between the three studies were highest in 2007 with average crude oil prices being similar between 2005 and 2009. From 2005 to 2009, expenditures for exploration (i.e., well drilling and leasing mineral rights) in the state increased nearly 482 percent in real terms (i.e., correcting for inflation). By comparison, expenditures for oil and natural gas production over the same period paralleled changes in oil and gas output and were estimated to increase by 83 percent in real terms. Processing and transportation activities also showed substantial growth over the period due to increased processing and transportation volumes and expansion of processing and pipeline capacity. Economic activity associated with the processing segment of the industry increased in real terms by 117 percent from 2005 to 2009. Overall, the gross business volume (i.e., direct and secondary economic effects) of the industry was estimated to nearly triple in size in real terms from $4.231 billion in 2005 to $12.663 billion in 2009.

While this study is a snapshot in time, results from this study would suggest that recent increases in exploration, processing and pipeline capacity and output, and increases in crude oil and natural gas production, have translated into substantial increases in gross business volume for the state. The economic size of the industry has grown in recent years to become one of the most important basic-sector activities in the state. The industry provides substantial governmental revenues through traditional tax collections, royalty revenue, lease bonuses, and severance taxes. In addition to public sector revenues, the petroleum industry continues to act as a solidifying force in the North Dakota economy through an expansion of industry-based employment and indirectly through bolstered secondary economic activity involving nearly all sectors of the economy.

The sheer size of the industry in 2009 suggests that much of North Dakota's recent economic vitality can be linked to the expansion of petroleum exploration, production, and processing in the state. Current activity levels in the petroleum industry clearly make it one of the key forces in the North Dakota economy.

Petroleum Industry's Economic Contribution to North Dakota in 2009

Dean A. Bangsund and F. Larry Leistritz*

Introduction

North Dakota's largest basic sector industries, which include agriculture, manufacturing, and energy, provide much of the economic stimuli for the state's economy. These large industries are generally comprised of distinct sectors or economic groups. For example, agriculture in North Dakota is often considered a combination of crop production and livestock. The energy industry in North Dakota is also comprised of several distinct sectors that are commonly treated as separate activities. North Dakota's energy industries can be conveniently separated into the activities that produce and distribute electricity, coal, petroleum, and renewable fuels.

While separating the energy industry into similar activities is relatively straight forward, identifying the economic players within those sectors is less clear. In the case of electricity generation, a handful of firms and generating facilities exist within the state. The same situation exists with coal production–a handful of companies operate at a limited number of locations. However, the industrial organization associated with oil and natural gas production is very different. Rather than having a handful of firms and a limited number of site-specific facilities and locations, the petroleum industry involves hundreds of firms and a multitude of facilities spread out over the western third of North Dakota.

North Dakota has been a top-10 oil-producing state for over a decade. To those familiar with North Dakota's economy, the petroleum sector has always been an important part of the state's economic base. Recent upswings in oil production became prevalent in the 2000s. In 2006 during the beginning of the latest oil boom, the first comprehensive economic assessment of the petroleum industry in the state was conducted (Bangsund and Leistritz 2007). Another assessment was conducted two years later (Bangsund and Leistritz 2009). Since that time, North Dakota has witnessed an unprecedented increase in oil production. As of 2010, North Dakota ranked fourth in oil production behind Alaska, Texas, and California (U.S. Department of Energy 2010).

The oil boom that started in the mid 2000s has continued to garner local, state, and national headlines. No longer is the rapid development of the oil patch in North Dakota a phenomenon only visible to those working in the industry or living in western North Dakota. The economic value of the rapidly expanding petroleum industry is difficult to follow as the industry has grown and expanded beyond historical precedents. However, as the state continues to adjust to an ever expanding petroleum sector, policymakers, legislators, and business leaders would benefit from an understanding of the economic effects of the industry.

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Determining the economic contribution of a given industry quantifies its importance to state and local economies. Not only can the economic impacts to the state and local economies be measured, but the effects on specific economic sectors and related industries also can be identified. Also, economic studies can demonstrate the susceptibility of the North Dakota economy to fluctuations in factors affecting petroleum exploration and production, demonstrate the economic dependence of the state on natural resource-based industries, and indicate the economic impacts that could result from potential changes in policies which affect the petroleum industry.

Objectives

The purpose of this report is to estimate the economic contribution (direct and secondary effects) of the petroleum industry to the economy of North Dakota. Specific objectives include:

1) estimate the economic size of petroleum exploration, extraction, and processing sectors, and

2) provide estimates of industry-wide employment, tax revenues, and other key economic measures.

Background

The industrial organization of the petroleum industry in the United States is often divided into upstream and downstream components. The upstream components of the petroleum industry generally include exploration, development, and production of crude oil and natural gas. The downstream components include transportation, processing, distribution, marketing, and retail delivery of petroleum products.

Industry Organization

The petroleum industry in North Dakota consists of both upstream and downstream components. For this study, the petroleum industry was defined to only include in-state exploration, extraction/production, transportation, and processing of crude oil and natural gas. Exploration can be generally thought of as the process of finding mineral resources. Extraction or production is the process of developing and recovering mineral resources. Transportation components of the industry, in this study, were limited to the movement of oil and gas from wells to collection points, and then on to processing facilities located either in-state or out-of-state. Petroleum processing in North Dakota included refining of crude oil and natural gas processing. The distribution, marketing, and retail sale of processed petroleum products (e.g., diesel, gasoline, kerosene, motor oil, lubricants, propane, natural gas) were not included.

The exploration and extraction phases of the petroleum industry are not organized like other industries in the state. Firms that own producing wells (oil operators) contract much of the work of exploration and extraction of oil and gas to other firms that specialize in various aspects of those processes. As a result, much of the expenditures incurred in the state for oil and gas production start with the oil operator but flow through the various firms engaged in providing support and service within the oil fields. While oil operators represent a mix of small to large firms, a majority of the prominent oil operators in North Dakota also have operations in other states. For many oil operators, their operations in North Dakota do not represent the majority of their oil and gas revenues. As a result of having operations and/or headquarters in other states, net revenues from North Dakota oil and gas production may leave the state for a variety of reasons. However, North Dakota is still the beneficiary of exploration and discovery expenses from firms that may have minimal operations in the state.

Oil and gas wells typically have three types of economic interests. These players are often referred to as royalty interests, owner/operator interests, and working interests. Royalty interests receive a share of the value of a well's output but do not share in the expenses associated with the well. Owner and working interests share, based on various percentages or arrangements, the remaining revenues and all of the expenses of a well. The well owner or operator is generally responsible or in charge of all operations. The owner arranges to have work completed for most of the necessary activities associated with the well, and charges working interests for their share of the expenses. As a result of these typical arrangements, the total number of firms receiving revenues and incurring expenses from oil and gas wells in North Dakota is unknown. However, the number of oil operators (firms that own or operate wells) is known.

For various reasons, the magnitude of economic effects of oil and gas production are not necessarily equivalent to the market value (i.e., price times quantity) of oil and gas produced. Exploration and extraction technologies use specialized inputs and services, many of which are not available in North Dakota and must be purchased from out-of-state sources. Many oil operators have operations and/or are headquartered in other states, and revenues for some firms may leave the state to be used for projects elsewhere. The same situation may exist where firms use resources obtained from out-of-state operations for oil and gas exploration in the state. In addition, oil operators headquartered out-of-state often have minimal general business expenses in the state. Similarly, firms that only have working interests in producing wells may or may not have physical operations in the state. All of these factors make it very problematic to base economic importance of the petroleum industry solely on the value of oil and gas production.

Production Statistics

Oil and gas production is limited to the western third of North Dakota (Figure 1). While crude oil has been produced in 19 western counties, 17 counties are currently producing crude oil (North Dakota Industrial Commission 2010). Of the 17 counties producing oil, production is concentrated in Billings, Dunn, Bowman, McKenzie, Mountrail and Williams Counties. Those counties accounted for 90 percent of state oil production in

2009 (North Dakota Industrial Commission 2010). Production in key counties has fluctuated over the last 50 years as new oil deposits are found and developed in various locations in the state (Figure 2). Since 2002, major increases in oil production have occurred in Bowman, McKenzie, Dunn, and Mountrail Counties.

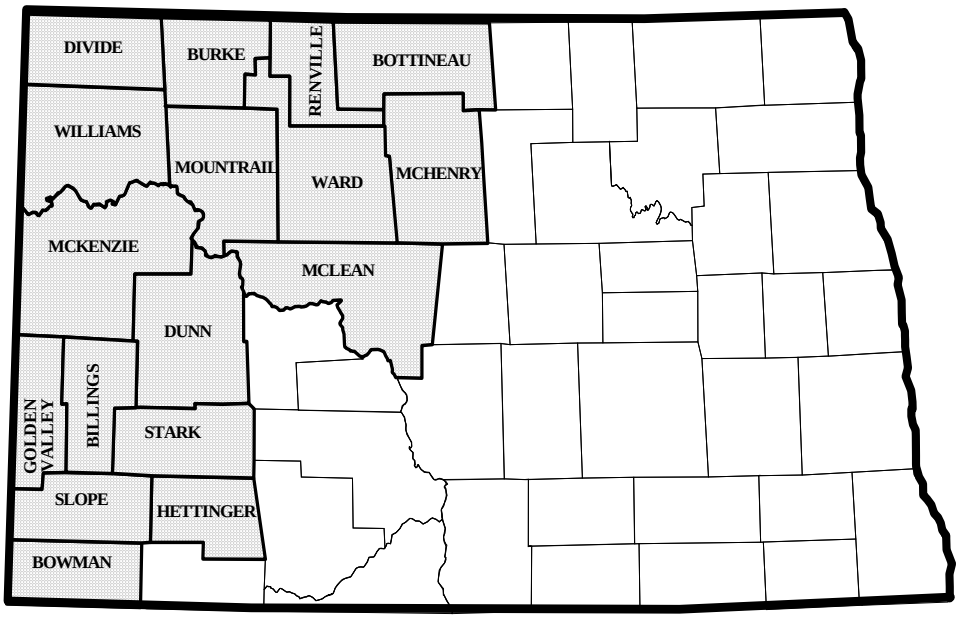


Figure 1. Oil Producing Counties, North Dakota

Nationally, North Dakota is ninth among all oil producing states based on cumulative crude oil production from 1981 through 2009 (Figure 3) (U.S. Department of Energy 2010). Based on crude oil production in 2009, North Dakota ranked fourth nationally among oil producing states. North Dakota accounted for about 5.8 percent of domestic crude oil (excluding federal off-shore) production in 2009.

North Dakota is less of a factor in domestic natural gas production. From 1981 through 2008, North Dakota accounted for only 0.33 percent of national production and was ranked 20th among all states (U.S. Department of Energy 2010). North Dakota was ranked 21st in natural gas production in 2008.

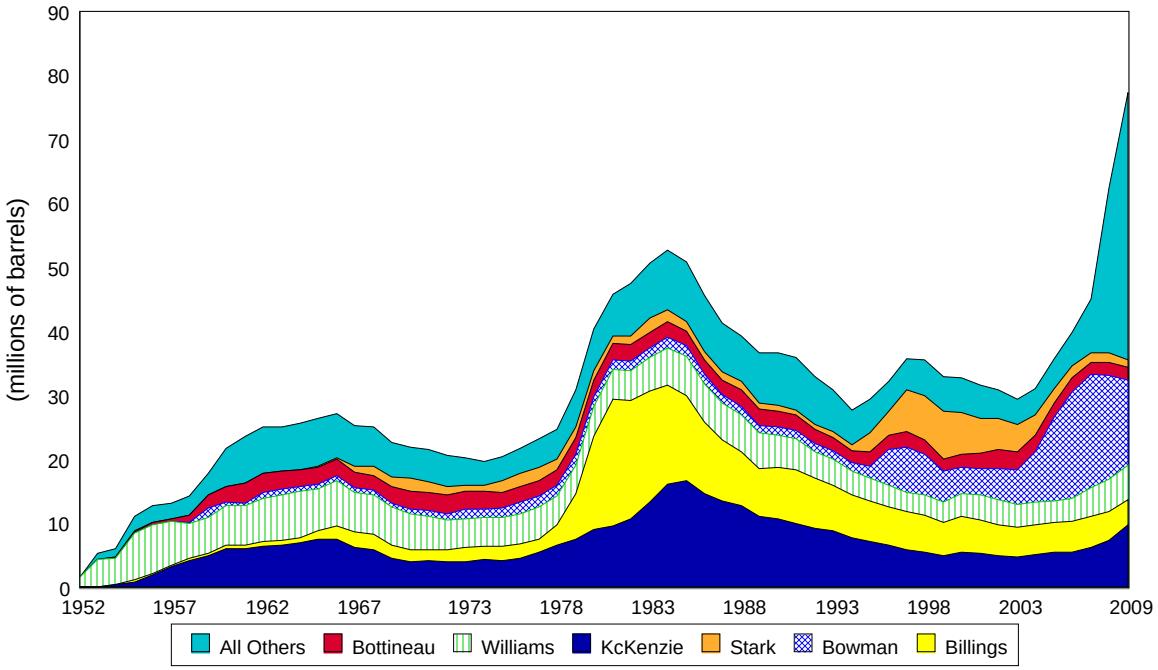


Figure 2. Historic Oil Production, Key Counties, North Dakota, 1952 through 2009
Source: North Dakota Industrial Commission (2010).

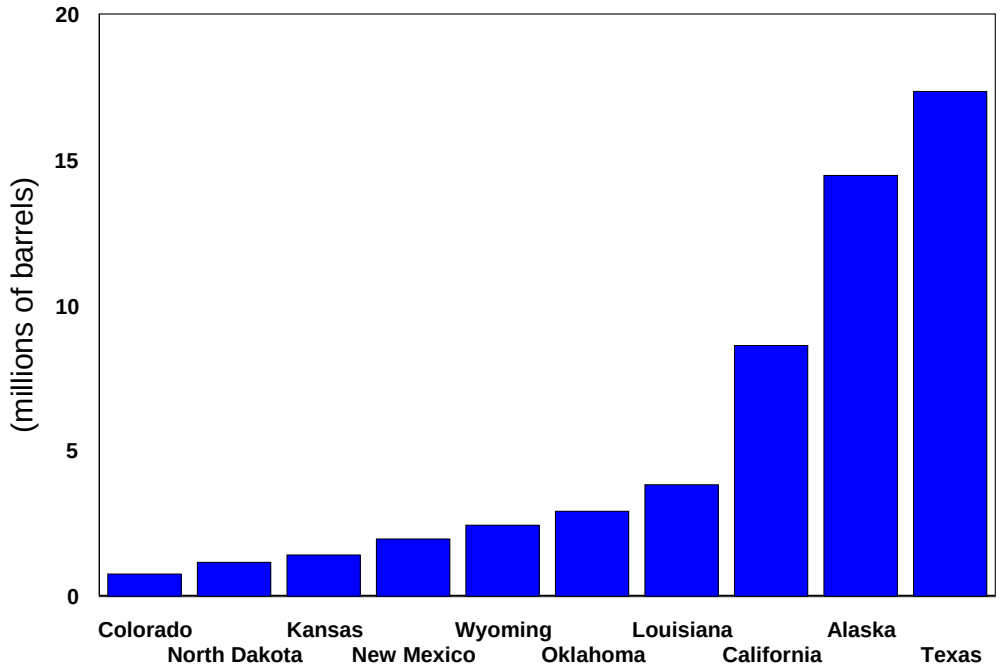


Figure 3. Top States in Cumulative On-Shore Crude Oil Production, United States, 1981 through 2009
Source: U.S. Department of Energy (2010).

Oil production in North Dakota has fluctuated substantially since commercial production began in the early 1950s (Figure 4). Overall, there have been four periods of rapid growth in oil production in North Dakota. The first period was from 1951 through 1962, the second period occurred from 1974 to 1984, the third period from 1994 to 1997, and the current period which began in 2003. After historic highs in 1984, overall oil production in the state declined rapidly for 10 years. Since 1994, oil production in the state has seen two periods of expansion and one period of declining production. Crude oil production in the state is currently rapidly increasing, and crude oil production has set all-time annual production records in 2008 and 2009.

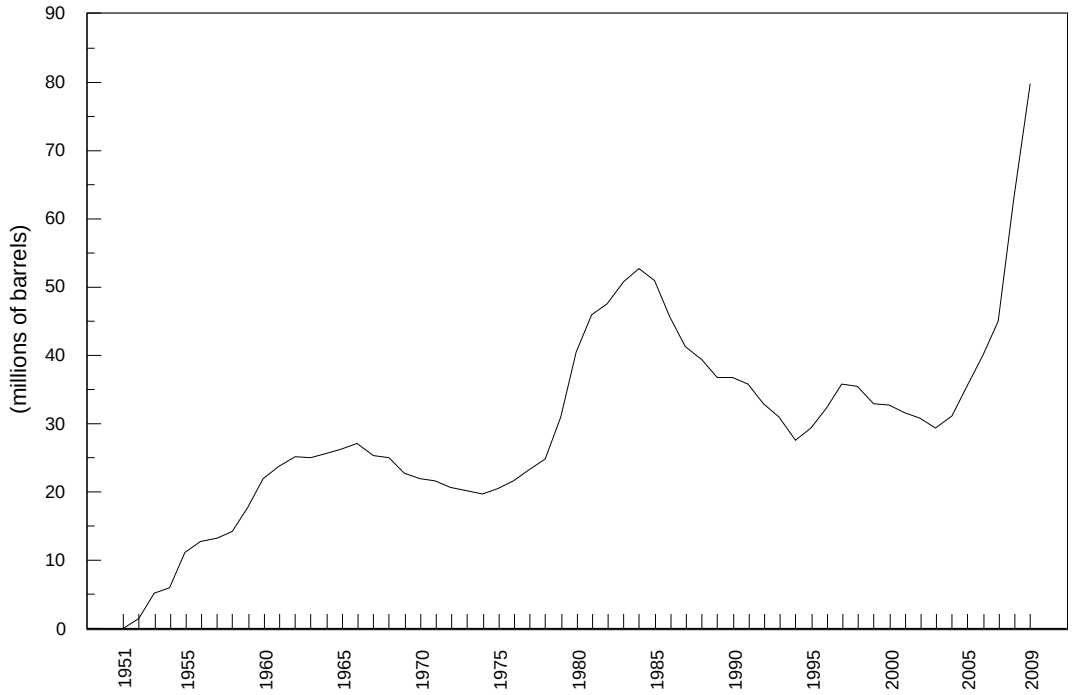


Figure 4. Crude Oil Production, North Dakota, 1951 through 2009
Source: North Dakota Industrial Commission (2010).

The annual value of oil production in North Dakota was estimated using monthly average price and production data from the North Dakota Industrial Commission (2010). The overall value of oil production in North Dakota, in nominal terms, has generally paralleled oil production despite price fluctuations over time (Figure 5). Nominal oil prices were converted to real dollars (2009) using the Gross Domestic Product-Implicit Price Deflator (U.S. Department of Commerce 2010). In real terms, from 1980 to 2000 the value of crude oil production in North Dakota largely declined (Figure 6). However, in both real terms and nominal terms, the value of crude oil production in the state has increased substantially since 2000 (Figure 6).

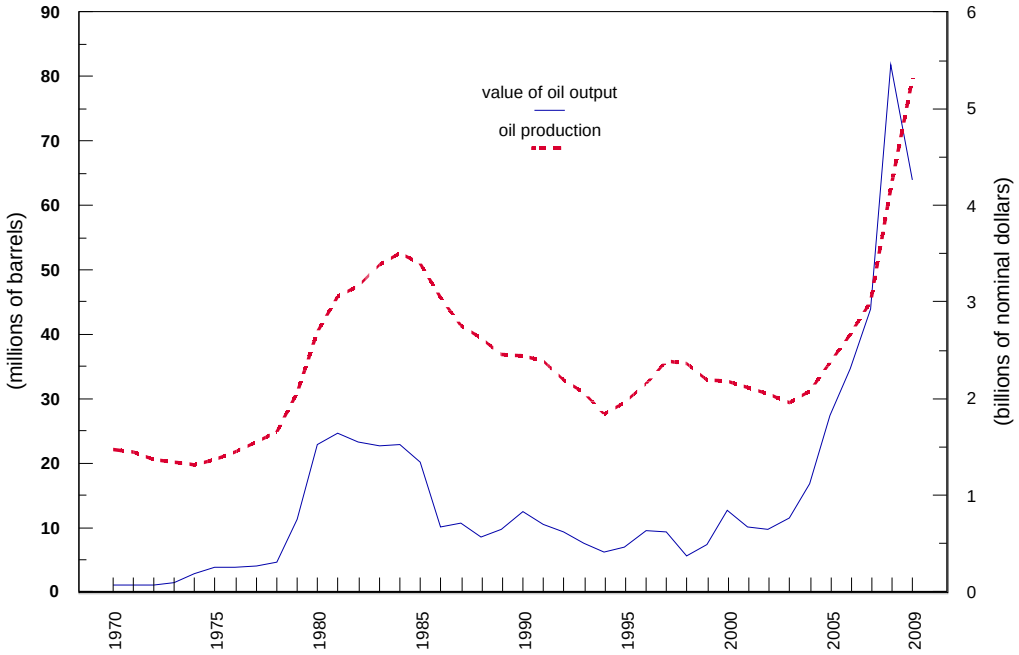


Figure 5. Production and Market Value of Crude Oil, North Dakota, 1970 through 2009
Source: North Dakota Industrial Commission (2010).

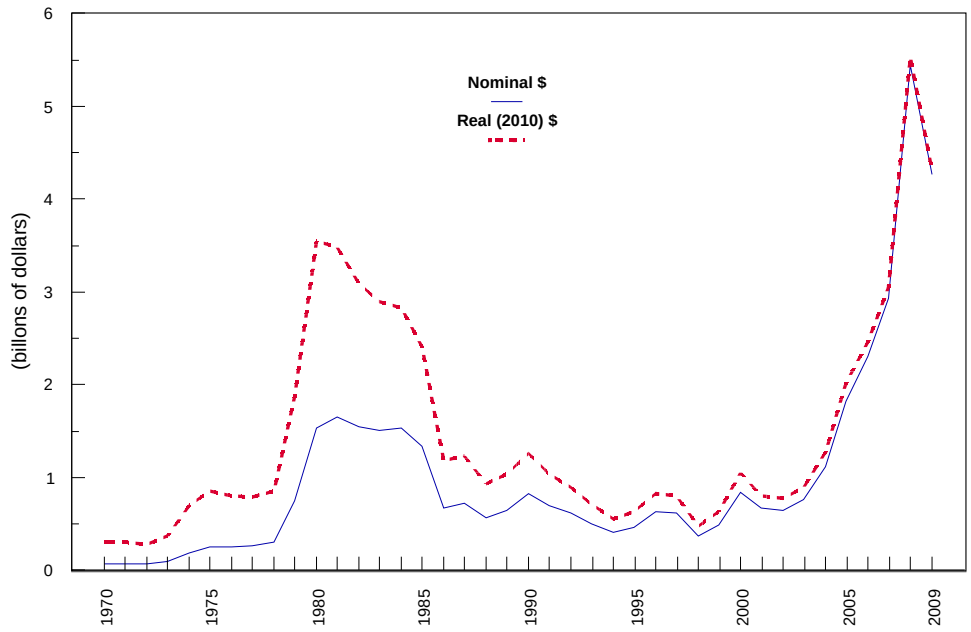


Figure 6. Value of Crude Oil Production in Nominal and Real Dollars, North Dakota, 1970 through 2009

Procedures

An economic contribution analysis, as defined in this study, represents an estimate of all relevant in-state expenditures and returns associated with an industry. The economic contribution approach to estimating economic activity has been used for several other industries in North Dakota (Bangsund and Leistritz 1995a, 1995b, 1998, 1999, 2004, 2005; Coon and Leistritz 2010a).

Data Collection

Due to the complexities of how the oil and gas industry is structured, and that in-state effects (i.e., first round spending or direct impacts) from oil and gas production in any given year may not equal the market value of oil and gas production, an expenditure-based approach to measuring the economic size of the petroleum industry was used in this study. In this approach, a sample of firms active in the petroleum industry in North Dakota were asked to provide estimates of the amount of expenditures made to entities (i.e., individuals, firms, and governments) in North Dakota. Four separate survey efforts were conducted for the study and provided the basis for most of the economic data needed to complete the study.

Oil Operators

Firms that own or operate oil wells in the state were surveyed to obtain information on expenses for oil and gas exploration and extraction/production, general business expenses in the state, employment, physical measures of oil and gas production, and leasing and drilling activity (Appendix A). The North Dakota Petroleum Council provided names and addresses for 84 oil operators in the state. The survey process started with sending cover letters and a questionnaire to each firm on the mailing list. A second mailing was conducted for all firms that had not responded[1] to the first mailing. After two mailings, dissemination of survey materials and solicitation of industry cooperation was deferred to the study sponsor.

The combination of two mailings and personal contacts of oil operators conducted by the study sponsor resulted in useable information from 13 firms. The firms' production from owned/operated wells represented about 43 percent of the state's 2009 production of crude oil and natural gas (Table 1).

[1]Firms with non-deliverable addresses, those who responded with completed questionnaires, and those who indicated they would not or could not participate were excluded in the second mailing.

Table 1. Basic Production Statistics from Survey of Oil Operators, North Dakota, 2009

Number of firms responding with useful information	13
Number of wells owned or operated in North Dakota (13 firms)	2,105
Crude oil production in 2009 in North Dakota (13 firms)	34,480,312 barrels[a]
Natural gas production in 2009 in North Dakota (13 firms)	51,011,755 mcf[a]
Number of oil wells drilled in 2009 with financials (10 firms)	234

[a] Output from wells operated or owned. Does not include production from working interests.

Pipelines and Processors

Another survey was conducted for firms engaged in pipeline transportation of crude oil and unprocessed natural gas produced in North Dakota and for firms involved with processing of crude oil and natural gas in North Dakota. The survey was used to obtain estimates of the amount and type of expenditures made in North Dakota and in-state employment by those firms (Appendix B). A mailing list of 11 firms operating pipelines, gas processing plants, and oil refineries were provided by the North Dakota Petroleum Council. The firms on the mailing list received two mailings, with some firms being contacted numerous times by industry representatives. A total of six firms provided useable information. While representative data for industry activities in this segment of the industry was obtained through the survey, a breakout of survey data for crude oil pipelines, natural gas processing plants and pipelines, and crude oil refineries is not possible due to confidentiality reasons. Firms operating pipelines for the transport of refined or processed petroleum products were not included in the study.

Service and Support

A third survey was used to obtain information from firms that provide service and support to oil operators in the state. The survey solicited information on the type and extent of involvement in the petroleum industry, in-state expenditures, and employment in North Dakota (Appendix C). The mailing list was obtained from lists of contractors or vendor lists provided by firms responding to the oil operator survey and from a list of oil servicing firms provided by the North Dakota Petroleum Council. Oil operators were asked to provide lists of firms with whom they contract for the provision of various exploration, extraction/production, and transportation services in North Dakota. The vender or contractor lists provided by the oil operators and the list of service firms provided by the North Dakota Petroleum Council were processed to remove the names of oil operators, government offices/agencies, pipeline firms, and processors, as well as firms without complete addresses. A total of 500 firms were randomly selected from a final list of 887 firms. Undeliverable addresses were present on 42 of the 500 firms. One mailing resulted in 81 firms responding, with 72 firms providing useable information

Leasing and Brokerage

A survey of companies providing leasing services to petroleum sector firms was conducted to obtain information on oil leasing activities in North Dakota. A questionnaire was developed to obtain information necessary to estimate the amount of lease bonuses on private land paid to North Dakota entities (Appendix D). The study sponsor distributed the questionnaire to six firms. The survey resulted in obtaining useable financial information from three firms. Lease bonuses for government mineral ownership were obtained by contacting the respective federal and state agencies in the state.

Estimation Techniques

The survey of oil operators, survey of processors/pipeline operators, and survey of oil firms providing services and contract work in the oil fields provided data for two critical aspects of the study. First, data from the oil operator and processor surveys were used to set the level of spending in North Dakota. In other words, the data were used to determine the magnitude of spending within the state. Second, data from both current surveys and the survey of oil service firms were used to determine the type and distribution of spending among various sectors of the North Dakota economy.

The survey of oil operators provided financial data on about 45 percent of all oil and gas production in the state in 2009. In addition, survey respondents provided information on exploration expenses, wells drilled, and leasing data. Benchmark expenses for extraction/production, transportation, and operational expenses (e.g., general administrative costs) were estimated per barrel of oil equivalent (BOE). Total state production in 2009, expressed in BOE, was then used with survey estimates of in-state expenditures per BOE to generate state-level estimates for production, transportation, and administrative spending. In-state employment by oil operators was estimated in a similar manner. Benchmark expenses for exploration were estimated on a per-well drilled basis and were used with data on the number of wells drilled in North Dakota in 2009. Data from the survey of oil lease/brokerage firms were used with data from the North Dakota State Land Department to estimate in-state bonus payments for private leases. Other economic components of the petroleum industry's direct impacts, such as severance taxes, public lease bonuses, and royalty revenues represented a combination of survey data, state-level statistics, and information obtained from various state and federal governmental agencies.

The survey of service and support firms for oil and gas production in North Dakota provided estimates of in-state spending by various types of expenses (e.g., salaries/wages, utilities, office supplies, business services) (Appendix C). The percentage of spending in various categories by firms responding to the survey was used to allocate state-level expenditures for exploration and extraction to various economic sectors of the North Dakota Input-Output Model. The amount of spending was determined using data from the survey of oil operators, while the survey of service and support firms provided insights on how those dollars impacted various sectors of the North Dakota economy.

Input-Output Analysis

Economic activity from a project, program, policy, or activity can be categorized into direct and secondary impacts. Direct impacts are those changes in output, employment, or income that represent the initial or first-round effects of the project, program, policy, or activity. Secondary impacts (sometimes further categorized into indirect and induced effects) result from subsequent rounds of spending and respending within the economy. This process of spending and respending is sometimes termed the multiplier process, and the resultant secondary effects are sometimes referred to as multiplier effects (Leistritz and Murdock 1981).

Input-output (I-O) analysis is an economic tool that traces linkages among sectors of an economy and calculates the total business activity resulting from a direct impact in a basic sector (Coon et al. 1985). The North Dakota I-O Model has 17 economic sectors, is closed with respect to households (households are included in the model), and was developed from primary (survey) data from firms and households in North Dakota. Empirical testing has shown the North Dakota Input-Output Model is sufficiently accurate in estimating gross business volume, personal income, retail activity, and gross receipts in major economic sectors in North Dakota (Coon and Leistritz 2010b).

Economic Impacts

The economic contribution of the petroleum industry was primarily based on estimates of in-state expenditures from exploration, extraction, transportation, and processing of crude oil and natural gas. Estimates of in-state expenditures were combined with estimates of oil and gas royalties, state severance taxes, and lease bonuses to determine total direct impacts. Subsequently, the direct impacts were applied to the North Dakota Input-Output Model to estimate the secondary impacts. Secondary impacts result from the respending of direct impacts within the economy. The following section is divided into five major parts: (1) direct impacts, (2) secondary impacts, (3) employment, (4) tax revenue, and (5) total economic impacts.

Direct Impacts

From an economic perspective, direct impacts are those changes in economic output, employment, or income that represent the initial or first-round effects of a project, program, or activity. The direct impacts from the petroleum industry in North Dakota included expenditures for (1) oil and gas exploration, (2) oil and gas extraction/production, (3) transportation of crude oil and unprocessed gas, and (4) processing crude oil and natural gas. Direct impacts also included various revenue streams originating from either oil and gas exploration, such as lease bonuses, or oil and gas production, such as severance taxes and royalty payments. The following sections describe these direct economic impacts.

Exploration

The economic effects of exploration come from expenditures within North Dakota for a variety of activities that involve searching and discovering viable oil and gas resources. Exploration was defined to include, but not limited to, seismic testing, geological research, lease expenses, other environmental research, land survey work, excavation, road building, construction of drill site, construction and delivery of electricity, pipeline development, and all other activities associated with drilling oil and/or gas wells (Appendix A).

Estimates of total in-state expenditures in 2009 for exploration were derived from the survey of oil operators and used with drilling statistics from the North Dakota Industrial Commission (2010). In-state expenditures for exploration and drilling were estimated at about $4.7 million per well drilled. The petroleum industry drilled 522 wells in North Dakota in 2009, yielding about $2.4 billion in direct impacts. Lease bonuses retained or paid to in-state entities were estimated at $357.5 million in 2009, which included $103.2 million for state leases, $48.1 million for federal leases (Office of Natural Resources Revenue 2010, U.S. Forest Service 2010), and about $206.2 million for private mineral leases. The $48 million in federal lease bonuses represented the portion of those leases that were returned to North Dakota. Total payments for oil leases tied to private land in North Dakota were estimated at $350.6 million; however, data from the survey of lease/brokerage firms suggest that about 54.4 percent ($206.2 million) was paid to mineral owners residing in the state.

The combination of exploration expenses and lease bonuses resulted in $2.803 billion in direct impacts in 2009 (Table 2). In-state expenditures for general exploration and drilling were allocated to various economic sectors of the North Dakota Input-Output Model using information from the survey of service and support firms (Table 2). State and federal lease bonuses were allocated to the *Government* sector and private lease bonuses were allocated to the *Households* sector.

Extraction/Production

The economic effects of extraction come from expenditures within North Dakota for a variety of activities that involve bringing crude oil and natural gas from underground formations to the earth's surface. Extraction/production was defined to include, but not limited to, all activities associated with the removal of crude oil and natural gas from the ground, and maintenance and periodic inspections of equipment used to extract oil and gas, and other production related activities, such as well work overs, well idling, shutdown, and abandonment activities (Appendix A). Also included in this segment of the industry are the general business expenditures incurred by oil operators in North Dakota. Examples of these expenditures include, but are not limited to, office rent, office supplies, wages and salaries, communications, public utilities, business and professional services, insurance, and interest expenses (Appendix A). Royalty revenues, both private and public, were included as direct impacts in the extraction/production segment of the petroleum industry. Collections from state severance taxes, which include the gross production tax and extraction tax, also were included in the direct impacts.

Table 2. Direct Impacts from General Exploration, Drilling Activities, and Lease Bonuses, North Dakota, 2009

Economic Sector	In-state Expenditures (000s $)
Communications and Public Utilities	65,324
Retail Trade	631,165
Finance, Insurance, and Real Estate	125,040
Business and Personal Services	81,254
Professional and Social Services	40,295
Households (personal income)	1,613,602
Government	246,038
Total	2,802,718

Estimates of total in-state expenditures in 2009 for extraction/production and general business expenses were derived from the survey of oil operators and estimated on a BOE basis. North Dakota produced 79,706,495 barrels of oil and 92,491,011 mcf of natural gas in 2009. Those volumes of oil and gas production resulted in an estimated $598 million for in-state expenditures for extraction/production and $386 million for general business expenses. State oil and gas royalties were about $56.2 million (North Dakota State Land Department 2010). Total federal royalties returned to North Dakota were about $13 million (Office of Natural Resources Revenue 2010, U.S. Forest Service 2010).

Private royalties were based on data obtained from the survey of lease/brokerage firms and on production data obtained from the survey of oil operators. Total royalties reported by oil operators were estimated at 16.6 percent and 16.7 percent of well output for oil and gas, respectively. Private royalties were estimated by subtracting state and gross federal royalties from estimated total royalties. Private royalties (i.e., both in-state and out-of-state mineral owners) from oil and gas production in North Dakota in 2009 were estimated at $648.8 million. In-state payments of private royalties were estimated by applying the percentage of in-state versus out-of-state mineral owners (54.4 percent) to the estimated total private royalties ($648.8 million). In-state private royalties in 2009 were estimated at $353 million.

Total collections from the gross production tax and extraction tax in calendar year 2009 were about $202.8 million and $190.2 million, respectively (North Dakota Office of State Tax Commissioner 2010). Those tax collections were included in the extraction/production segment of the petroleum industry.

Total direct impacts in the extraction/production segment of the petroleum industry in North Dakota in 2009 were estimated at $1.8 billion (Table 3). Data from the survey of firms providing oil field services was used to allocate the in-state expenditures for oil production to various sectors of the North Dakota Input-Output Model. Direct impacts for general business expenses for oil operators, royalties, and state severance taxes were also allocated to various sectors of the North Dakota Input-Output Model (Table 3).

Table 3. Direct Impacts from Oil and Gas Extraction and Production Activities, North Dakota, 2009

Economic Sector	In-state Expenditures (000s $)
Construction	50,288
Transportation	323
Communications and Public Utilities	19,602
Agricultural Processing and Miscellaneous Manufacturing	57,395
Retail Trade	195,808
Finance, Insurance, and Real Estate	65,006
Business and Personal Services	35,711
Professional and Social Services	11,174
Households (personal income)	805,578
Government	558,478
Total	1,799,363

Processing

The processing segment of the petroleum industry included transportation of crude oil and natural gas by truck and pipeline to collection points and processing centers, natural gas processing, and crude oil refining. In-state transportation expenses paid by oil operators were estimated on a BOE equivalent. Those expenses were extrapolated based on state production statistics. Estimates of in-state expenditures for natural gas pipeline operation, crude oil pipeline operation, natural gas processing, and crude oil refining were obtained from the survey of processors. Results from the survey of processors were combined with state statistics to estimate state-level expenditures.

Direct impacts included $69.2 million in transportation expenses paid to in-state entities by oil operators. Processing activities, which included pipeline transportation of unprocessed natural gas and crude oil, natural gas processing, and crude oil refining were estimated to have in-state expenditures of $241.6 million. Evaluation of expenditure data obtained from firms responding to the survey revealed in-state spending for infrastructure expansion within the state. Those one-time expenditures were included in industry totals, but were not extrapolated. Total direct impacts of $310.8 million were allocated to the North Dakota Input-Output Model (Table 4). To avoid double counting of potential impacts, in-state purchases of crude oil and unprocessed natural gas by processors were excluded in the study.

Table 4. Direct Impacts from Oil and Gas Processing, North Dakota, 2009

Economic Sector	In-state Expenditures (000s $)
Construction	50,426
Transportation	74,282
Communications and Public Utilities	47,530
Agricultural Processing and Miscellaneous Manufacturing	12,036
Retail Trade	7,533
Finance, Insurance, and Real Estate	10,773
Business and Personal Services	33,560
Professional and Social Services	1,851
Households (personal income)	55,599
Government	17,251
Total	310,841

Total Direct Impacts

Direct impacts are defined as the initial or first-round effects of project, program, or activity. The petroleum industry in North Dakota was divided into several segments or components for purposes of reporting study results. Total direct impacts for the petroleum industry included in-state expenditures for oil and gas exploration, oil and gas

extraction/production, transportation of crude oil and unprocessed gas, and processing crude oil and natural gas, as well as lease bonuses, severance taxes, and royalty payments.

Total direct impacts from the petroleum industry in North Dakota in 2009 were estimated at $4.913 billion (Table 5). Exploration accounted for 57 percent of the industry's direct impacts and was the largest segment of the industry. Extraction/production accounted for nearly 37 percent of all direct impacts. Processing and pipeline transportation accounted for the remaining 6 percent of the industry's direct impacts.

Expenditures and revenues which constitute the petroleum industry's direct impacts were allocated to various economic sectors of the North Dakota Input-Output Model. The sectors of the North Dakota economy that received the greatest direct impacts were *households* (economy-wide personal income) ($2.47 billion), *government* (tax collections and public royalties) ($822 million), *retail trade* ($834 million), *business and personal services* ($150 million), and *finance, insurance, and real estate* ($201 million) (Table 5).

Table 5. Total Direct Impacts, Petroleum Industry, North Dakota, 2009

	Industry Component			
Economic Sector	Exploration	Extraction	Processing	Totals
	---------- 000s $ ----------			
Construction		50,288	50,426	100,714
Transportation		323	74,282	74,605
Communications and Public Utilities	65,324	19,602	47,530	132,456
Agricultural Processing and Miscellaneous Manufacturing		57,395	12,036	69,431
Retail Trade	631,165	195,808	7,533	834,506
Finance, Insurance, and Real Estate	125,040	65,006	10,773	200,819
Business and Personal Services	81,254	35,711	33,560	150,525
Professional and Social Services	40,295	11,174	1,851	53,320
Households (personal income)	1,613,602	805,578	55,599	2,474,779
Government	246,038	558,478	17,251	821,767
Total	2,802,718	1,799,363	310,841	4,912,922

Secondary Impacts

Secondary economic impacts result from subsequent rounds of spending and respending within an economy. Input-output (I-O) analysis traces linkages (i.e., the amount of spending and respending) among sectors of an economy and calculates the total business activity resulting from a direct impact in a basic sector (Coon et al. 1985). An economic sector is a group of similar economic units (e.g., communications and public utilities, retail trade, construction).

This process of spending and respending can be explained by using an example. A single dollar from an in-state wheat producer (*Households* sector) may be spent for a loaf of bread at the local store (*Retail Trade* sector); the store uses part of that dollar to pay for the next shipment of bread (*Transportation* and *Agricultural Processing* sectors) and part to pay the store employee (*Households* sector) who shelved or sold the bread; the bread supplier uses part of that dollar to pay for the grain used to make the bread *(Agriculture-Crops* sector) ... and so on (Hamm et al. 1993).

Secondary economic impacts were estimated separately for exploration, production, and processing components of the petroleum industry. Results from the North Dakota Input-Output Model revealed that secondary economic impacts from exploration in North Dakota in 2009 would be about $4.7 billion (Table 6). The $1.8 billion in direct impacts for oil and gas extraction (production) activities produced an estimated $2.5 billion in secondary economic impacts. Finally, the transportation and processing segment of the petroleum industry was responsible for $566 million in secondary economic impacts. Total secondary economic impacts from all components of the petroleum industry were estimated at $7.7 billion. Across all three major components of the petroleum industry, considerable secondary impacts were generated in the *retail trade* ($2.5 billion), *households* (economy-wide personal income) ($2.4 billion), *finance, insurance, and real estate* ($558 million), *communications and public utilities* ($385 million), and *government* ($381 million) sectors (Table 6).

Table 6. Total Secondary Impacts, Petroleum Industry, North Dakota, 2009

Economic Sector	Industry Component			
	Exploration	Extraction	Processing	Totals
	---------- 000s $ ----------			
Construction	188,575	94,460	18,110	301,145
Transportation	25,315	12,371	3,051	40,737
Communications and Public Utilities	240,487	118,641	26,594	385,722
Agricultural Processing and Miscellaneous Manufacturing	109,564	92,267	17,425	219,256
Retail Trade	1,550,623	785,371	156,391	2,492,385
Finance, Insurance, and Real Estate	347,292	175,456	35,329	558,077
Business and Personal Services	127,682	64,930	13,267	205,879
Professional and Social Services	197,688	98,849	17,425	313,962
Households (personal income)	1,448,412	730,913	209,119	2,388,444
Government	228,894	114,648	37,726	381,268
Other sectors[a]	263,311	167,771	31,906	462,988
Total	4,727,843	2,455,677	566,343	7,749,863

[a] Includes various agricultural and mining sectors.

Employment

The petroleum industry is responsible for creating and supporting direct and secondary employment. Direct employment is a measure of the number of full-time jobs within an industry. Secondary jobs are an estimate of employment outside of an industry, but employment that is created from the industry's economy-wide economic activity.

Direct Employment

Direct employment is a term used to describe jobs that are considered to be a part of an industry. For example, workers operating an oil drilling rig would represent direct employment in the petroleum industry. Similarly, someone who works at a natural gas

processing plant or crude oil refinery would be considered direct employment in the petroleum industry.

While employment figures are frequently reported by various governmental agencies and are broken into a hierarchy of categories (e.g., North American Industry Classification System), deriving specific estimates of employment for large basic-sector industries can be problematic. Much of the problem arises in defining the type of job, and attributing to which industry(s) created that employment. For example, the process of drilling an oil well typically requires developing a road and a drilling site; work that requires heavy construction with earth moving or excavating equipment. Most oil companies will contract that work to local firms that specialize in heavy construction or excavating. The individuals performing the road building and preparation of the drill site are likely to be employed with some type of construction firm, and as a result, those jobs are typically classified and reported by government agencies as construction. Government agencies (e.g., Bureau of the Census, Bureau of Labor Statistics) that track employment often base the classification of those jobs on the type of activities that generate the most revenue for a firm (primary activities). In this example, the primary activity for this firm is likely to be construction, even if the revenues for the construction firm are derived from road building and drill site preparation for an oil firm. However, in the case of assigning which basic-sector industry created that employment, it may be more accurate to suggest those jobs exist as a result of the petroleum industry rather than the construction industry. Yet, in other cases, the level of oil well drilling activity may be insufficient to sustain employment in heavy construction for an entire year. Those situations result in seasonal or part-time job creation. The challenge is to measure or estimate the total number of full-time jobs created and sustained by the petroleum industry, even if those jobs appear to be part of another industry or are only created for part of a year.

Three independent estimates of employment are presented is this report (Table 7). An estimate of employment in the industry was generated from the survey data collected from oil operators, service and support firms, and processors. Another estimate was provided by Job Service North Dakota and represented employment based on North American Industry Classification System (NAICS) listings. A final estimate was generated from data obtained from North Dakota Workforce Safety and Insurance.

Survey Data

Estimates of direct employment were generated from the survey of oil operators and processors, and from key parameters obtained from the survey of service and support firms. The survey of oil operators and processors specifically asked for the number of full-time jobs in North Dakota (Appendices A and B). Employment figures from the survey of oil operators were extrapolated to state totals based on a BOE basis, while employment data from the survey of processors was extrapolated based on state-level statistics for those operations (e.g., processing volumes). Thus, estimating full-time employment by oil operators, pipeline firms, and processors in North Dakota was relatively straightforward.

Oil operators (firms owning or operating wells) contract much of the work of exploration and production of oil and gas to firms that specialize in various aspects of the those processes. While some of the work in the oil fields is performed by firms located in other states, much of the work is performed by firms located in close proximity to production. One of the difficulties of estimating employment in the service and support capacities is determining those jobs that are fully supported versus those jobs that are only partially supported by the petroleum industry. An additional complexity is to only attribute full-time employment to the petroleum activities located in North Dakota. For many firms located in the oil producing region of North Dakota, the obvious possibility is that some employment by those firms could be partially or wholly supported by petroleum activities in Montana, Canada, or possibly in other states.

The questionnaire used in the service and support survey was designed to address the degree of job support from the petroleum industry and the level of job support attributable to only petroleum activities in North Dakota (Appendix C). Total state employment for work in the oil field was then estimated based dividing estimates of total spending by oil operators by the gross revenue per FTE from the survey data.

Employment in North Dakota by oil operators in 2009 was estimated at 1,668 full-time equivalent (FTE) positions. Employment in the processing segment of the industry, which included some pipeline employment, was estimated at 748 FTE jobs. Total employment in the oil field for contract work, which includes exploration and production segments of the industry, was estimated at 15,911 FTE jobs. The petroleum industry[2], as defined and evaluated in this study, was estimated to create and support 18,328 FTE positions in North Dakota in 2009 (Table 7).

[2] The petroleum industry in this study did not include employment associated with transportation of processed petroleum products, marketing, or retail sales. In many cases, those downstream components of the industry generate substantial employment.

Table 7. Estimates of Direct Employment, North Dakota Petroleum Sector, 2003 Through 2009

Source	Estimates of Direct Employment in Petroleum Sector[a]						
	2009	2008	2007	2006	2005	2004	2003
NDSU Survey Data[b]	18,328	na	11,812	na	5,051	na	na
Job Service North Dakota							
Statewide NAICS code 211 (oil and gas extraction)	704	544	432	427	474	445	443
Statewide NAICS code 213 (support activities for mining)[c]	4,608	4,651	3,103	2,688	2,090	1,605	1,334
Total	5,312	5,195	3,535	3,115	2,564	2,050	1,777
Regional NAICS code 21 (extraction and support activities)[d]	5,554	5,369	3,756	3,374	2,811	2,281	1,989
Regional NAICS code 23 (construction)[d]	4,278	4,045	3,679	3,391	2,466	2,975	2,743
Regional NAICS code 31-33 (manufacturing)[d]	2,948	3,002	2,843	2,765	2,587	2,515	2,478
Regional NAICS code 42 (wholesale trade)[d]	4,581	4,347	4,226	4,136	4,000	3,881	3,797
Regional NAICS code 48-49 (transportation)[d]	2,511	2,304	1,813	1,637	1,497	1,454	1,412
Total	19,872	19,067	16,317	15,303	13,361	13,106	12,419
Workforce Safety and Insurance[e]							
Oil and Gas Operations (WSI code 1320)	2,622	2,100	1,496	1,063	957	1,003	na
Oil Refining-Synthetic Fuels Mfg (WSI code 4740)	1,076	1,018	988	954	896	821	na
Oil and Gas Development-Drilling (WSI code 6203)	4,867	4,256	2,914	2,000	1,738	1,175	na
Oil and Gas Well Suppliers/Equip. Dealers (WSI code 6204)	954	640	423	316	254	186	na
Oil Well Trucking (WSI code 6205)	2,076	1,565	908	672	492	337	na
Oil Well Servicing (WSI code 6206)	2,977	2,747	1,780	1,487	1,266	1,043	na
Oil and Gas Instrument Logging (WSI code 6208)	263	226	171	113	104	87	na

- continued -

Table 7. Continued

Source	Estimates of Direct Employment in Petroleum Sector[a] 2009	2008	2007	2006	2005	2004	2003
Workforce Safety and Insurance[e] (continued)							
Geologists and Scouts (WSI code 8605)	177	168	154	153	23	30	na
Professional and Business Representatives (WSI code 8747)	1,481	1,107	943	896	796	780	na
Clerical Office Employees (WSI code 8805)	1,933	2,017	1,912	1,970	1,820	1,838	na
Total	18,426	15,844	11,689	9,624	8,346	7,300	na

na=not available.

[a] Petroleum sector defined to include exploration, production, processing, and transportation of crude oil and unprocessed natural gas. Does not include distribution from processors to retail markets or sale of petroleum products in retail outlets.

[b] Industry-wide employment, including estimates for employment in manufacturing, construction, wholesale trade, transportation, and self-employed individuals. Based on data collected from surveys of oil operators, processing firms, pipeline companies, and businesses that provide products and technical services in the petroleum industry in North Dakota.

[c] Support activities for mining include drilling oil and gas wells, support activities for oil and gas operations, support activities for coal mining, support activities for metal mining, and support activities for nonmetallic minerals mining.

[d] Regional assessment included Adams, Billings, Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, Hettinger, McHenry, McKenzie, Mountrail, Pierce, Renville, Slope, Stark, Ward, and Williams Counties. Contained within NAICS codes 31-33 would be employment for crude oil and natural gas processing activities. Contained within NAICS codes 48-49 would be employment for crude oil and natural gas pipelines, as well as trucking jobs for a number of oil development and production activities. Construction would include employment for oil and gas pipeline and related structures, road building, and well site development. Wholesale trade would include employment for the distribution of some oil and gas production related equipment. The percentage of employment in the manufacturing, construction, wholesale trade, and transportation sectors that can be considered part of the petroleum industry in the selected counties is unknown. Employment estimates do not include sole proprietors or self-employed individuals.

[e] Represents a head count of employees (not full-time equivalent jobs) for fiscal years. Some duplication of employee counts exists in the data. Employee counts for the Professional and Business Representatives and Clerical Office Employees categories represent a strong connection to companies working in the petroleum sector. Employee counts in all categories only include sole proprietors and self-employed individuals who voluntarily opt to participate in workers' compensation system.

Sources: Jobs Service North Dakota (2010, 2009, 2008, 2007, 2006, 2005, 2004) and Workforce Safety Insurance (2010).

Job Service North Dakota

Job Service North Dakota reports employment and wages/salaries by county, multi-county region, and for the state using the North American Industry Classification System (NAICS). The NAICS is a federal standard for measuring, collecting, and reporting business activity in the United States. The classification system consists of specific codes, aggregated into 20 broad industry groupings (e.g., Utilities, Construction, Education, Health Care, Finance and Insurance, Manufacturing, Wholesale Trade).

While each broad industry grouping contains numerous specific industry/business activities, Job Service North Dakota reports employment and wage information for only the largest aggregated categories in the NAICS. The NAICS starts with various broad categories of employment by industry or sector, and then continues to refine those categories into ever more specific and detailed categories. For example, code 21 is for All Mining, Quarrying, and Oil and Gas Extraction. Code 21 is further defined to include code 211 (oil and gas extraction), 212 (mining), and 213 (support activities for mining). Within code 211 there are specific codes for oil and gas extraction (2111), which is further broken into code 211111 (crude petroleum and natural gas extraction) and 211112 (natural gas liquid extraction). Similarly, code 213 (support activities for mining) is further broken into codes 213111 (drilling oil and gas wells), 213112 (support activities for oil and gas operations), 213113 (support activities for coal mining), 213114 (support activities for metal mining), and 213115 (support activities for nonmetallic minerals mining). Therefore, the broader the industrial code the less specific employment estimates will be for any particular business activity.

To avoid combining employment from other industries (e.g., code 21 includes oil and gas production and coal mining), the use of NAICS either requires using less aggregated codes (e.g., code 2111) or requires counting employment from geographic areas that are known to only contain the industries in question (e.g., McKenzie County has oil and gas production but not coal mining). Since Job Service North Dakota generally reports employment using broader categories of the NAICS, one strategy to estimate employment for the petroleum sector would be to add up employment from selected geographic areas in the state that have petroleum sector activities but do not have coal sector activities. This strategy is possible because the petroleum industry generally operates in different counties than the coal industry. However, specific rules govern the disclosure of employment data and county-level estimates of employment are often omitted to avoid violating disclosure rules. Therefore, only using county-level data will underestimate employment in the petroleum sector due to reporting omissions for some counties.

An additional concern with using aggregated NAICS codes is that a number of specific business activities which are part of the petroleum industry are contained in the NAICS codes for other industries. For example, code 23 (construction) contains oil and gas pipeline and related structures construction (code 23712). Other examples include codes 31 through 33 (manufacturing) which include codes 324110 (petroleum refineries), 324191 (petroleum lubricating oil and grease manufacturing), and 324199 (all other petroleum and coal products manufacturing). The same situation also exists for codes 48 and 49 (transportation and warehousing), which include all of the activities associated with crude oil

and unprocessed natural gas pipelines. Of course, each of these aggregated NAICS codes contain employment that would be classified as being part of the petroleum sector but is not listed specifically within the category. For example, some manufacturing and metal fabrication is petroleum sector based but would not be listed with a separate NAICS code. Similarly, employment transporting fracing water and crude oil by truck is currently measured as transportation employment but represents petroleum sector employment. Another example would include classification of construction employment that is used to build private roads and drill sites. Those petroleum sector jobs would not be listed separately from overall employment in those other industries.

Job Service North Dakota does not track sole proprietors or self-employed individuals. Therefore, the number of jobs reported by industry code will not contain employment by self-employed individuals.

Job Service North Dakota can provide several estimates of employment in the petroleum sector in North Dakota. The first figure would be a statewide estimate of employment using NAICS codes 211 (oil and gas extraction) and 213 (support activities for mining) (Table 7). The other would be a regional summary of jobs using code 21 (all mining, quarrying, and oil and gas extraction)[3]. Another employment estimate would actually represent a regional summation of jobs in both the petroleum sector-specific code 21 and employment in related industries of manufacturing (codes 31-33), construction (code 23), wholesale trade (code 42), and transportation (code 48-49). However, not all employment in manufacturing, construction, wholesale trade, or transportation in the oil producing regions of North Dakota would qualify as petroleum sector employment. As such, actual petroleum sector employment would be expected to be less than the summation of regional employment in those industries.

Workforce Safety and Insurance

Workforce Safety and Insurance (WSI) manages and regulates the workers' compensation system in North Dakota. As part of that system, WSI tracks employees in North Dakota. Workforce Safety and Insurance uses a classification system for defining employment that consists of 142 different categories based on the type of work activity performed. Several of those categories are specific to various activities in the petroleum sector. The classifications directly attributable to the petroleum sector include Oil and Gas Operations (code 1320), Oil Refining - Synthetic Fuels Manufacturing (code 4740), Oil and Gas Development - Drilling (code 6203), Oil and Gas Well Suppliers or Equipment Dealers (code 6204), Oil Well Trucking (code 6205), Oil Well Servicing (code 6206), Oil and Gas Instrument Logging (6208), Geologists and Scouts (code 8605). Some petroleum sector employment can be traced through Professional and Business Representatives (code 8747) and Clerical Office Employees (code 8805). Other employment classifications contain

[3]Employment by more detailed NAICS codes were not available for multi-county employment estimates by Job Service North Dakota.

petroleum sector employees but are not distinguished or credited as being part of the petroleum sector.

Workforce Safety and Insurance does not provide measures of full-time employment but rather tracts the number of employees by job classification. The subtle difference between tracking a job versus an employee is that if an employee has more than one employer during the year that individual is counted twice. Further, if an employee works at any time during the year that individual is included within the WSI data even if the position or duration of work was temporary. Therefore, the head-count data from WSI can include temporary work and can include duplications from those who worked for more than one employer during the year.

The WSI data has some employees placed in job classifications that are not attributable to the petroleum sector, even if those activities occur within the petroleum sector. Examples of those classifications include Street and Road Construction (code 6042), Sewer-Water-Gas-Pipeline Construction (code 6301), and Trucking and Hauling - Interstate and Intrastate (code 7215). Further, employment that would remain unmeasured would include employees performing repairs, consulting, or other professional functions within the petroleum industry as those positions fall within other employment codes. WSI information also does not count self-employed or sole proprietors, unless they are required to report to WSI or voluntarily contribute to the workers' compensation system.

Based on WSI data, the petroleum sector had over 18,400 employees working in the petroleum sector during fiscal year 2009 (Table 7). The greatest number of employees was found in oil drilling activities (4,897 individuals), oil well servicing activities (2,977), oil and gas operations (2,622 individuals), well trucking (2,076 individuals), and clerical staff (1,933 individuals). Those categories collectively accounted for 79 percent of the workers in the petroleum sector in North Dakota in fiscal year 2009.

Workforce Safety and Insurance employee data were obtained back to fiscal year 2004, which represents an approximate beginning period for the current oil boom in the state (Table 7). From FY2004 to FY2009, the number of employees working in the petroleum sector increased by 152 percent. A regional analysis of employment in the core activities of the petroleum sector (NAICS codes 211 and 213) by Job Service North Dakota showed similar levels of employment change over the period; a 144 percent increase from 2004 to 2009 (Table 7). By comparison, overall production of crude oil in the state has increased by 156 percent from 2004 to 2009. It would appear that direct employment in the petroleum sector has increased proportionally to changes in overall oil production over the period.

Secondary Employment

Secondary employment is a term used to describe jobs that are created and supported by the volume of business activity generated by an industry, but does not include jobs that are part of the industry. Direct employment and secondary employment are two distinctly different measures. Productivity ratios[4] were used to obtain estimates of secondary employment in various sectors of the North Dakota economy. The petroleum industry in North Dakota was estimated to generate an additional $7.7 billion in secondary business activity, which was sufficient to support 46,800 FTE jobs.

Government Revenues

Governmental revenues, usually based on tax collections, are another important measure of the economic impact of an industry on an economy. The petroleum industry in North Dakota, specifically oil and gas production, is responsible for substantial amounts of state and local government revenues. One distinction is that unlike many other industries in North Dakota, severance taxes (taxes placed on the value of oil and gas removed from the ground) collect money based on gross revenues produced by the industry. In contrast, taxation for most other industries is more traditional and usually limited to real property and net income. Another distinction that makes the petroleum industry different from other industries in the state is that governments can hold oil and gas leases and receive royalties from the value of oil and gas production. Of course, the petroleum industry also generates revenues from traditional sources, such as personal income, corporate income, sales and use, and property tax collections.

Severance taxes, sales and use taxes, personal income taxes, corporate income taxes, property taxes, royalties, lease bonuses, charitable donations, and licenses, fees, and permits combined for $821.8 million in government revenues that were directly attributable to the petroleum industry in North Dakota in 2009 (Table 8). Exploration, extraction/production, and processing segments of the industry were responsible for about 30, 68, and 2 percent, respectively, of the total government revenues from the petroleum industry in North Dakota.

Severance taxes accounted for nearly half (48 percent) of all government revenues from the petroleum industry in North Dakota in 2009. The second largest source was the most common general taxes (i.e., property, personal income, sales and use, and corporate income) at 23 percent, followed by royalties at 18 percent. The remainder of government revenues represented lease bonuses, permits/fees/licenses, and miscellaneous revenues.

In addition to the government revenues that were included as direct impacts, collections from personal income and sales and use taxes were estimated based on the

[4] A measure of the amount of business activity needed in an economic sector to support one full-time job.

secondary economic activity generated by the petroleum industry. Secondary economic impacts in the *Retail Trade* sector were used to estimate revenue from sales and use taxes. Economic activity in the *Households* sector (which represents economy-wide personal income) was used to estimate personal income tax collections. Total collections of personal income and sales and use taxes arising from secondary economic activity were estimated at $188 million (Table 8).

Government revenues included in the direct impacts represent revenues to county governments, tribal governments, and the state government. The amount of government revenues flowing to local, state, and tribal governments was estimated to help identify the relative split in industry revenues. North Dakota Office of Tax Commissioner (2010) estimated that in the fiscal years 2008 and 2009, local governments (i.e., counties, cities, school districts) received distributions of state severance taxes totaling over $85 million. Total collections from state severance taxes in fiscal years 2008 and 2009 were estimated at nearly $815 million. Over the 2007-2009 biennium, local governments' share of severance taxes was just over 10 percent of total collections. In calendar year 2009, total distributions to county governments were estimated at $46 million, which would be 11.7 percent of all severance taxes collected in calendar year 2009 (North Dakota Office of State Treasurer 2010). Over the same period, distributions of the state severance taxes to tribal governments were estimated at $2.8 million.

However, time periods for distributions and collections do not match. Distributions lag collections, and therefore dividing distributions by collections in the same period is not a true representation of the actual percentage of revenues that local governments can expect to receive from collections over any given period. Unfortunately, data to synchronize distributions from the time periods when collections were made was not readily available.

Data from the U.S. Forest Service (2010) indicated that distributions of royalties and lease bonuses to local governments in North Dakota totaled $8.4 million in 2009. Total distributions of royalties and lease bonuses from federal minerals to local and state governments in North Dakota were estimated at $53 million (Office of Natural Resources Revenue 2010). Federal mineral royalties returned to local governments through the U.S. Forest Service primarily represent revenues from acquired minerals. The Office of Natural Resources Revenue (ONRR) re-distributes both revenues from federal acquired minerals and public domain minerals. However, the ONRR does not breakout mineral revenue re-distributions by type of mineral ownership nor do they distinguish between local or state governments. They do not re-distribute federal mineral royalties to tribal governments.

The rules for distribution of revenues from public domain minerals are different than those for acquired minerals. If the $8.4 million in mineral revenues that flow through the U.S. Forest Service represent all of the re-distributed mineral revenues from acquired mineral royalties returning to North Dakota, then the majority of the $53 million in overall re-distributions from ONRR to North Dakota would likely represent revenues from public domain minerals. If so, then the majority of the federal mineral royalties re-distributed by the ONRR would go to the state government according to rules governing the re-distribution of

mineral royalties from public domain minerals. Given the information available, local governments were estimated to have received at least $8.4 million of the $53 million in federal mineral royalties distributed to North Dakota.

Local governments would be expected to collect property taxes for use by county and city governments and school districts. Collections of property tax revenue attributable to the petroleum industry were estimated at $86.5 million.

Overall, local governments were estimated to receive $86.5 million in property taxes, $8.4 million in federal mineral re-distributions, and $46 million in re-distributions from state severance taxes. Excluding licenses, permits, fees, and charitable donations, approximately 17.5 percent of all government revenues estimated for the petroleum industry were received by local governments. Data to estimate the split in revenues for state and local governments for permits, fees, and licenses and for undetermined taxes was unavailable.

Table 8. State and Local Government Revenues Attributable to the Petroleum Industry, North Dakota, 2009

Revenue Type	Revenue included as part of direct impacts	Revenue estimated from secondary economic impacts
	---------- 000s $ ----------	
Sales and Use Taxes	22,946	115,397
Property Taxes	86,499	not applicable
Personal Income Tax	6,361	72,948
Corporate Income Tax	3,585	not available
Royalties	69,547	not applicable
Severance Taxes	392,971	not applicable
Lease Bonuses	151,320	not applicable
Licenses, Permits, Fees	15,609	not available
Charitable Donations	455	not available
Undetermined Taxes[a]	72,474	not applicable
Total	821,767	188,345

[a] Represents general in-state taxes paid to local and state government that were not specifically identified by survey respondents.

Total Economic Impacts

The total economic effect of an industry on a local, state, or regional economy can be measured by estimating the total amount of business activity generated by that industry. Total business activity, sometimes called gross business volume, is generally defined as a combination of direct and secondary economic impacts. Direct impacts are those changes in output, employment, or income that represent the initial or first-round effects of a project, program, policy, or activity. Secondary impacts (sometimes further categorized into indirect and induced effects) result from subsequent rounds of spending and respending within an economy. This process of spending and respending is sometimes termed the multiplier process, and the resultant secondary effects are sometimes referred to as multiplier effects. Further, additional economic measures, such as personal income, tax revenue, and employment, are often used to measure the relative size of an industry.

The petroleum industry in North Dakota was defined to include exploration, extraction/production, transportation, and processing of crude oil and natural gas. Direct impacts were based on in-state expenditures, private and public royalties, taxes, and lease bonuses. Direct impacts were allocated to various sectors of the North Dakota Input-Output Model to generate estimates of the secondary economic impacts.

The direct impact of exploration in 2009 was estimated at $2.8 billion. Total secondary economic impacts associated with exploration activities were estimated at $4.7 billion. The in-state gross business volume of exploration activities was estimated at $7.53 billion in 2009 (Table 9).

The direct impact of extraction/production in 2009 was estimated at $1.8 billion. Total secondary economic impacts associated with extraction and production activities were estimated at $2.46 billion. The in-state gross business volume of oil and gas extraction was estimated at $4.26 billion in 2009 (Table 9).

The processing component of the petroleum industry was estimated to have a direct impact in North Dakota of $310.8 million. Total secondary economic impacts associated with processing and transporting crude oil and natural gas were estimated at $566 million. The in-state gross business volume of processing and transporting crude oil and natural gas was estimated at $877 million in 2009 (Table 9).

Industry-wide direct impacts from the petroleum industry were estimated at $4.913 billion in 2009. Total secondary economic impacts associated with the industry were estimated at $7.75 billion. The gross business volume for the petroleum industry in North Dakota in 2009 was estimated at $12.663 billion (Table 9).

Additional measures of the petroleum industry's economic importance to the state include direct employment for 18,328 full-time jobs, economy-wide personal income of $4.86 billion, statewide retail sales of $3.3 billion, direct contributions to local and state government revenues of $822 million, indirect contribution of $188 million in state

government tax collections, and secondary employment of 46,800 full-time equivalent jobs. For every dollar spent in the state by the petroleum industry, another $1.58 in additional business activity was generated.

Some very generic or average impact figures can be produced for basic oil and gas production statistics. Based on a gross business volume of $12.66 billion for the petroleum industry, total economic effects in North Dakota would be about $133 per BOE, or if impacts were only evaluated for crude oil production, total effects would be nearly $159 per barrel. Based on active wells in the state, the overall economic effect (direct and secondary impacts from all segments of the industry) per well (averaged for all producing wells) would be about $3 million annually.

Table 9. Total (Direct and Secondary) Economic Impacts, Petroleum Industry, North Dakota, 2009

	Industry Component			
Economic Sector	Exploration	Extraction	Processing	Totals
	---------- 000s $ ----------			
Construction	188,575	144,748	68,536	401,859
Transportation	25,315	12,694	77,333	115,342
Communications and Public Utilities	305,811	138,243	74,124	518,178
Agricultural Processing and Miscellaneous Manufacturing	109,564	149,662	29,461	288,687
Retail Trade	2,181,788	981,179	163,924	3,326,891
Finance, Insurance, and Real Estate	472,332	240,462	46,102	758,896
Business and Personal Services	208,936	100,641	46,827	356,404
Professional and Social Services	237,983	110,023	19,276	367,282
Households (personal income)	3,062,014	1,536,491	264,718	4,863,223
Government	474,932	673,126	54,977	1,203,035
Other sectors[a]	263,311	167,771	31,906	462,988
Gross Business Volume	7,530,561	4,255,040	877,184	12,662,785

[a] Includes various agricultural and mining sectors.

Comparison of Previous Industry Assessments

The first comprehensive economic evaluation of the petroleum industry in North Dakota was conducted in 2006 and was reflective of conditions present in the industry in calendar year 2005 (Bangsund and Leistritz 2007). A second assessment was conducted two years later and was reflective of conditions present in the industry during calendar year 2007 (Bangsund and Leistritz 2009). The results reported in this study were based on conditions present in the industry in calendar year 2009.

Comparing various production statistics between 2005 and 2007 revealed that the industry increased the number of producing wells, increased oil and gas production, and increased drilling activities in the state (Table 10). Nominal oil and gas prices in 2005 and 2007 were adjusted for inflation using the Gross Domestic Product-Implicit Price Deflator. Crude oil prices over the 2005 to 2009 period were similar in beginning and end of the period, but both were generally lower than prices received in 2007. Prices received for natural gas have decreased substantially over the 2005 to 2009 period. Oil production has increased over 120 percent from 35 million barrels to nearly 80 million barrels over the period. Gas production jumped from around 58 million mcf in 2005 to over 92 million mcf in 2009. In addition to increases in oil and gas production, exploration activities in the state continued to increase as the number of wells drilled in the state went from 240 in 2005 to 522 in 2009 (Table 10).

Methods and data sources between the three studies were largely unchanged, although starting in the 2007 study, a separate survey of lease/brokerage firms was initiated. The survey of lease/brokerage firms was conducted to help generate estimates of lease bonuses on private land in North Dakota. By comparison, lease bonuses on private land in 2005 were based on information obtained from the survey of oil operators and data on well drilling activity. Firms providing oil field services were not surveyed in the 2007 study, but those firms were surveyed in the 2005 and 2009 studies.

Table 10. Oil and Gas Production Statistics, North Dakota, 2005, 2007, and 2009

Measures of Industry Output	Calendar Year 2005	Calendar Year 2007	Calendar Year 2009	Percent Change 2005 - 2009	Percent Change 2007 - 2009
Crude oil (barrels)	35,659,583	45,057,874	79,706,495	123.5	76.9
Natural gas produced (mcf)	57,970,459	70,799,663	92,491,011	59.5	30.6
Natural gas sold (mcf)	50,695,691	55,094,857	65,077,431	28.4	18.1
Number of operating/active wells (monthly avg)	3,391	3,759	4,190	23.6	11.5
Number of wells drilled	240	336	522	117.5	55.4
Average annual price per barrel of crude oil in North Dakota*	$51.41 nominal $55.65 real	$65.10 nominal $66.75 real	$54.03 nominal $54.03 real	5.1 -2.9	-17.0 -19.1
Average annual price per mcf of natural gas in North Dakota*	$8.57 nominal $9.28 real	$6.69 nominal $6.86 real	$3.75 nominal $3.75 real	-56.3 -59.6	-43.9 -45.3

* Nominal dollars adjusted to real (2009) dollars using the Gross Domestic Product-Implicit Price Deflator.
Source: Oil and Gas Division, North Dakota Industrial Commission (2010).

In 2005, the survey of oil operators resulted in obtaining information from 17 firms representing about 19 percent of oil and gas production in the state (Table 11). In 2007, the survey of oil operators obtained information from 14 firms representing about 34 percent of oil and gas production (i.e., BOE) in the state. In 2009, 13 firms provided useable information representing about 43 percent of state production. Overall, firms responding to the survey have shown a trend in representing an increasing share of state production (Table 11). The survey of processors in the three studies resulted in nearly identical survey participation by industry representatives (data not presented).

Table 11. Summary of Oil Operator Surveys, North Dakota, 2005, 2007, and 2009

Description	2005	2007	2009
Number of firms surveyed (first mailing)	135	140	84
Number of firms responding with useful information (2 or more mailings)	19	14	13
Number of wells owned/operated by survey respondents	1,633	1,897	2,105
Share of state totals	49%	50%	50%
Crude oil production by survey respondents	8,062,219	13,503,595	34,480,312
Share of state totals	23%	30%	43%
Natural gas production by survey respondents	10,289,325	34,360,934	51,011,755
Share of state totals	18%	48%	54%
Barrel of Oil Equivalent (BOE)	9,777,106	19,230,418	42,982,271
Share of state totals	22%	34%	45%
Number of wells drilled by survey respondents	75	126	274
Share of state totals	29%	37%	52%

Several notable changes were observed with oil and gas exploration between 2005 and 2009 (Table 12). The number of wells drilled increased from 240 in 2005 to 522 in 2009. The average cost to drill a well in the state increased in real terms from $1.6 million in 2005 to nearly $4.7 million in 2009. The result of both an increase in the number of wells drilled and the change in the cost to drill wells increased exploration expenditures in the state by about 482 percent from 2005 to 2009. The gross business volume (direct and secondary economic effects) associated with exploration went from around $1.3 billion in 2005 to about $7.5 billion in 2009. The amount of direct expenditures for only exploration activities in 2007 and 2009 exceeded the sum of direct expenditures for all other segments (i.e., production, processing, and transportation) of the industry (see Tables 12 and 13).

Table 12. Comparison of Economic Estimates, Exploration Component of Petroleum Industry, North Dakota, 2005, 2007, and 2009

Category	2005*	2007*	2009	Percent Change 2005 - 2009	Percent Change 2007 - 2009
Number of wells drilled in the state	240	336	522	117	55
	---------- 000s $ ----------				
Average cost per well drilled	1,637	4,382	4,684	186	6.9
Lease bonuses					
Net federal and state	18,559	9,147	151,320	715	1,554
Private**	70,411	93,834	206,187	193	120
Direct Impacts					
Well Drilling	392,865	1,472,467	2,445,211	522	66
Lease Bonuses	88,970	102,981	357,507	302	247
Total Direct	481,835	1,575,000	2,802,718	482	78
Secondary Impacts	839,000	2,791,000	4,728,000	464	69
Gross Business Volume	1,321,000	4,366,000	7,531,000	470	73

* Nominal 2005 and 2007 dollars adjusted for inflation using Gross Domestic Product-Implicit Price Deflator and reflect 2009-equivalent dollars.

** Estimation techniques for private lease bonuses in North Dakota differed between the 2005 study and the 2007 and 2009 studies. Private lease bonuses were not adjusted for in-state mineral ownership in the 2005 study, and were based primarily on data obtained from the survey of oil operators. Private lease bonuses represented only payments to in-state mineral owners in the 2007 and 2009 studies and were based primarily on a survey of oil lease/brokerage firms.

Changes in oil and gas production have implications on the gross business volume of the industry in the state. Based on the reported expenses associated with oil and gas production, volume of production has a greater effect than the expenses per unit of output (i.e., in-state expenditures per BOE) (Table 13). Also, increases in the overall royalty rates have contributed to increased royalty payments, which were considered a direct impact in the estimation of gross business volume. Likewise, collections of severance taxes, also

Table 13. Comparison of Economic Estimates, Oil and Gas Extraction/Production Component of Petroleum Industry, North Dakota, 2005, 2007, and 2009

Category	2005*	2007*	2009	Percent Change 2005 - 2009	Percent Change 2007 - 2009
Oil and gas production (BOE terms)	45,321,000	56,858,000	95,122,000	110	67
Production and General Business Expense per BOE	$13.12	$15.75	$11.07	-15.6	-29.7
Royalties**					
Oil	13.0	14.9	16.6	27.0	11.0
Gas	13.3	14.2	16.7	25.7	17.4
	---------- 000s $ ----------				
Direct Impacts					
Production Expenditures	329,500	452,700	598,000	82	32
General Business Expenses	236,300	371,700	386,100	63	3.9
Royalties					
Net federal and state	40,500	56,800	69,200	71	22
Private***					
Total	213,200	378,600	648,800	204	71
In-state	na	203,700	353,100	na	73
Total Royalties	253,800	260,600	422,300	66	62
Severance Taxes	165,100	256,700	393,000	138	53
Total Direct Impacts	985,000	1,342,000	1,799,000	83	34
Secondary Impacts	1,525,000	2,006,000	2,456,000	61	22
Gross Business Volume	2,509,000	3,348,000	4,255,000	70	27

* Nominal 2005 and 2007 dollars adjusted for inflation using Gross Domestic Product-Implicit Price Deflator and reflect 2009-equivalent dollars.

** Average percentage of production. Data obtained from oil operator survey and based only on owned/operated wells.

*** Direct comparisons between the 2005 and later studies are difficult. Private royalties in the 2005 study were not adjusted for in-state versus out-of-state mineral ownership. As such, private royalties in 2005 represented a gross measure of payments. Total payments of private royalties in 2007 and 2009 were adjusted for in-state mineral ownership. Applying an in-state mineral ownership ratio of 54.4 percent to the gross private royalty payment estimated in 2005 and comparing to the 2009 private in-state royalty payments shows that in-state payments increased by 204 percent from 2005 to 2009 ($353.1 million in 2009 to $116.1 million [$213.2 million gross payment x 54.4 percent in-state ownership] in 2005 in real terms).

considered a direct impact, increased substantially, reflecting an increase in the overall value of oil and gas production in the state. From 2005 to 2009, total direct expenditures for oil and gas production increased by about 83 percent. As expected, the gross business volume from oil production also increased by a similar percentage over the period (Table 13).

The processing sector of the petroleum industry also showed substantial increase in expenditures over the 2005 to 2009 period (Table 14). Some of the increase came from expansion of pipeline capacity and expansion of natural gas processing capacity in the state. Some change in expenditures was a result of greater processing volumes and pipeline shipments. The other change came from a substantial increase in transportation expenses reported by oil operators. Overall, the change in direct expenditures in this segment of the industry reflected an increase in processing/transporting volumes, one-time construction expenditures associated infrastructure expansion, and an increase in transportation expenses. The gross business volume for the processing and transportation component of the petroleum industry increased by about 119 percent from 2005 through 2009 (Table 14).

Table 14. Comparison of Economic Estimates, Processing Component of Petroleum Industry, North Dakota, 2005, 2007, and 2009

				Percent Change	
Category	2005*	2007*	2009	2005 - 2009	2007 - 2009
	---------- 000s $ ----------				
Direct Impacts					
Transportation	28,900	71,100	69,200	140	-3
Processing and Pipeline Activities	114,500	197,300	241,600	111	23
Total Direct Impacts	143,400	268,400	310,800	117	16
Secondary Impacts	257,800	456,800	566,300	120	24
Gross Business Volume	401,200	725,200	877,200	119	21

* Nominal 2005 and 2007 dollars adjusted for inflation using Gross Domestic Product-Implicit Price Deflator and reflect 2009-equivalent dollars.

Some of the most closely monitored measures of the petroleum industry are estimates of government revenues. Government revenues attributable to the petroleum industry stem from collections of property, sales and use, personal income, and corporate income taxes. Other direct revenue sources include royalties on oil and gas production and lease bonus payments. The largest single source of government revenue in the state has been from severance taxes. Overall, not all sources of government revenues changed in equal proportion

over the period; however, collectively governmental revenues from the petroleum industry increased by over $285 million or 80 percent in real terms over the period (Table 15).

Table 15. Estimates of State and Local Government Revenues Generated by Petroleum Industry, North Dakota, 2005, 2007, and 2009

State and Local Government Revenues	2005*	2007*	2009	Percent Change 2005 - 2009	Percent Change 2007 - 2009
	---------- 000s $ ----------				
Included as Direct Impacts					
Sales and Use, Property, and Income taxes	41,600	106,300	119,400	198	12
Royalties**	41,200	57,200	69,500	69	22
Severance Taxes	165,100	256,700	393,000	138	53
Lease Bonuses (net federal and state)	18,600	9,100	151,300	715	1,554
Licenses, Fees, Permits, Donations, and undetermined taxes	39,400	103,800	88,500	126	-15
Totals	304,000	533,100	821,800	170	54
Estimated from Secondary Economic Activity					
Sales and Use	38,800	75,900	115,400	198	52
Personal Income	21,300	47,100	72,900	243	55
Direct and Secondary Estimates of State and Local Government Revenues	364,000	656,100	1,010,100	178	54

* Nominal 2005 and 2007 dollars adjusted for inflation using Gross Domestic Product-Implicit Price Deflator and reflect 2009-equivalent dollars.

** Net federal and state royalties from oil and gas production, and included royalties from processing activities returned to North Dakota entities by the U.S. Department of Interior, Office of Natural Resources Revenue (2010).

Employment in the industry also showed substantial change from 2005 through 2009. While employment has increased in all segments of the industry, the greatest increase in employment has been observed by the firms provide service and support in the oil patch (Table 16). These firms provide construction, drilling, transportation, repairs, well maintenance, and a host of other service-based operations in the oil patch. Overall, total direct employment within the industry was estimated to increase by nearly 13,300 FTE jobs from 2005 to 2009 (Table 16). Compared to the 2005 and 2007 studies, this study provided two additional estimates of employment in the petroleum sector using data obtained from Job Service North Dakota and North Dakota Workforce Safety and Insurance. Estimates of

employment from Job Service North Dakota and North Dakota Workforce Safety and Insurance showed changes in industry employment that were similar in magnitude to estimates generated from survey data (see Table 7).

Table 16. Direct and Secondary Employment, Petroleum Industry, North Dakota, 2005, 2007, and 2009

				Percent Change	
Category	2005	2007	2009	2005 - 2009	2007 - 2009
Direct Employment					
Oil Operators	1,118	1,402	1,668	49	19
Service and Support	3,463	9,831	15,911	360	62
Processing and Pipelines	471	579	748	59	29
Totals	5,051	11,812	18,328	263	55
Secondary Employment	20,650	38,500	46,800	127	22

All segments of the industry showed substantial gains in direct and secondary economic impacts (Table 17). The causes for those increases varied by segment of the industry. In exploration, the increase in drilling activity combined with an increase in the cost per well resulted in substantial changes in gross business volume. Gross business volume associated with extraction/production were largely similar to changes in oil and gas production. Average oil and gas prices, after correcting for inflation, decreased over the period for natural gas but oil prices showed less change between the studies. An increase in transportation expenses, expansions of industry infrastructure (i.e., gas plants and pipeline capacities), and increased processing volumes all contributed to an increase in the gross business volume for the processing/transportation segment of the industry.

The petroleum industry in North Dakota showed real growth in each of the three studies. The exploration segment of the industry increased in real terms by over 482 percent, and was the primary reason for the magnitude of the increases in the industry's gross business volume. In real terms, direct impacts from exploration in 2009 was greater than the entire industry's direct impacts in 2005. The difference in gross business volume for exploration in 2005 and 2009 was nearly $6.2 billion. The gross business volume for extraction/production segment of the industry increased by $1.7 billion or by 70 percent. Economic activity associated with the processing and transportation segment of the industry increased by over $476 million. The gross business volume for the entire industry tripled over the period from $4.2 billion in 2005 to $12.7 billion in 2009 (Table 17). Other notable increases included direct employment expanding by 263 percent and government revenues rising by 178 percent.

Table 17. Key Economic Values, Petroleum Industry, North Dakota, 2005, 2007, and 2009

Category	2005*	2007*	2009	Percent Change 2005 - 2009	Percent Change 2007 - 2009
	---------- 000s $ ----------				
Direct Impacts					
Exploration	481,800	1,575,400	2,802,700	482	78
Extraction/Production	984,600	1,341,700	1,799,400	83	34
Processing/Transp.	143,400	268,400	310,800	117	16
All Segments	1,609,800	3,185,500	4,912,900	205	54
Secondary Impacts					
Exploration	838,900	2,790,700	4,727,800	464	69
Extraction/Production	1,524,600	2,006,100	2,455,700	61	22
Processing/Transp.	257,800	456,800	566,300	120	24
All Segments	2,621,200	5,253,600	7,749,900	196	48
Gross Business Volume					
Exploration	1,321,000	4,366,000	7,530,600	470	73
Extraction/Production	2,509,000	3,348,000	4,255,000	70	27
Processing/Transp.	401,000	725,000	877,200	119	21
All Segments	4,231,000	8,439,000	12,662,800	199	50
Governmental Revenues	364,000	656,000	1,010,100	178	54
Industry-wide Employment	5,051	11,812	18,328	263	55

* Nominal 2005 and 2007 dollars adjusted for inflation using Gross Domestic Product-Implicit Price Deflator and reflect 2009-equivalent dollars.

Summary

The purpose of this study was to estimate the economic contribution of the petroleum industry in North Dakota in 2009. The petroleum industry was defined to include exploration, extraction/production, transportation, and processing of crude oil and natural gas. Exploration is the process of finding mineral resources while extraction/production is the process of recovering mineral resources. Transportation was limited to the movement of oil and gas from wells to collection points, and then onto processing facilities located either in-state or out-of-state. Petroleum processing in North Dakota included refining of crude oil and natural gas processing.

Due to the complexities of how the oil and gas industry is structured, and that in-state effects (i.e., first round spending or direct impacts) from the petroleum industry in any given year may not equal the market value of oil and gas production, an expenditure-based approach to measuring the economic size of the petroleum industry was used in this study. In this approach, only money spent in North Dakota by companies involved in the petroleum sector was included in the study and represented the direct impacts of the industry. In addition to in-state expenditures for exploration, production, and processing activities, private and public royalties, lease bonuses, and severance taxes were also included as direct impacts. Secondary economic impacts result from the spending and respending of the direct impacts and were estimated using the North Dakota Input-Output Model.

Three separate surveys were used to collect production, expenditure, and employment data for the petroleum industry in North Dakota. Firms that own or operate oil wells in the state were surveyed to obtain information on in-state expenses for oil and gas exploration, oil and gas extraction/production, general business expenses, employment, oil and gas production, and drilling activity. A similar survey was conducted for firms engaged in pipeline transportation of crude oil and unprocessed natural gas and included firms involved with processing of crude oil and natural gas in North Dakota. A third survey involved lease/brokerage firms and was used to obtain information on leasing activity in the state.

The survey of oil operators produced financial data on about 43 percent of North Dakota's oil and gas production in 2009. Also, financial data was collected on pipeline transportation, gas processing, and crude oil refining. The survey of lease/brokerage firms obtained information on leasing activity on private lands in the state. Secondary data, obtained from government agencies, was combined with survey data to estimate royalties, lease bonuses, and severance taxes.

Estimates of total in-state expenditures in 2009 for oil and gas exploration were derived from the survey of oil operators and used with drilling statistics from the North Dakota Department of Mineral Resources. The combination of in-state expenses for exploration and lease bonuses resulted in $2.8 billion in direct impacts in 2009. Average expense per well drilled was estimated at $4.7 million, and 522 wells were drilled in the state in 2009. The secondary economic impacts associated with exploration activities were

estimated at $4.7 billion. The in-state gross business volume of exploration activities was estimated at $7.5 billion in 2009 (Figure 7).

Estimates of oil and gas extraction/production expenses, general business expenses for oil operators, private and public royalties, and state severance taxes were derived from survey data and secondary information obtained from various government agencies. The state averaged 4,190 producing wells per month in 2009 that produced nearly 80 million barrels of oil and over 92 million mcf of natural gas. Total direct impacts for oil and gas production were estimated at $1.8 billion in 2009. Total secondary economic impacts associated with oil and gas production were estimated at $2.5 billion. The in-state gross business volume of oil and gas extraction/production was estimated at $4.3 billion in 2009 (Figure 7).

The processing component of the petroleum industry was estimated to have a direct impact in North Dakota of $311 million. Total secondary economic impacts associated with processing and transporting crude oil and natural gas were estimated at $566 million. The in-state gross business volume of processing and transporting crude oil and natural gas was estimated at $877 million in 2009 (Figure 7).

Industry-wide direct impacts from the petroleum industry were estimated at $4.9 billion in 2009. Total secondary economic impacts associated with the industry were estimated at $7.7 billion. The gross business volume for the petroleum industry in North Dakota in 2009 was estimated at $12.7 billion (Figure 7).

Additional measures of the petroleum industry's economic importance to the state include direct employment for 18,328 full-time jobs, economy-wide personal income of $4.9 billion, statewide retail sales of $3.3 billion, direct contributions to local and state government revenues of $822 million, indirect contribution of $188 million in state government tax collections, and secondary employment of 46,800 full-time equivalent jobs. For every dollar spent in the state by the petroleum industry, another $1.58 in additional business activity was generated.

A number of comparisons to information collected and estimated for 2005 and 2007 was made to similar figures for 2009. While energy prices were not directly used in the study to generate estimates of industry activity, prices directly influence some measures of industry output, such tax collections and royalties. Oil prices increased from 2005 to 2007 in real terms by 20 percent to around $65 per barrel, but decreased to 2005 levels in 2009. Prices in 2009 remained well below the extreme price spikes observed in 2008. Gas prices, both in nominal and real terms, decreased by 56 percent from 2005 to 2009. Oil production increased from 35 million barrels to nearly 80 million barrels over the period. Gas production jumped from around 58 million mcf in 2005 to over 92 million mcf in 2009. In addition to increases in oil and gas production, exploration activities continued to increase as the number of wells drilled in the state went from 240 in 2005 to 522 in 2009.

North Dakota Petroleum Industry

Key Segments of the Industry

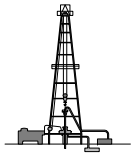
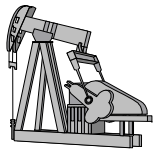
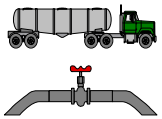
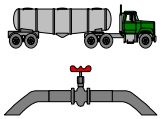
	Exploration	Extraction	Transportation	Processing	Distribution	Retail
	drilling and locating oil reserves 	bringing oil and gas to the surface 	moving oil and gas from pumps to processing centers 	oil refining and natural gas processing 	moving products from processors to retail markets 	selling petroleum products to end users
Direct Impacts	$2.803 billion	$1.799 billion	$310.8 million		not included	
Secondary Impacts	$4.729 billion	$1.956 billion	$445 million			
Gross Business Volume	$7.531 billion	$3.264 billion	$707 million			
Direct Employment	17,580 full-time equivalent jobs		748 full-time equivalent jobs			
Secondary Employment	46,800 full-time equivalent jobs					
Direct Government Revenues	$246 million	$485 million	$17 million			

Figure 7. Economic Effects of Key Segments of the North Dakota Petroleum Industry, 2009

All segments of the industry showed substantial gains in direct and secondary economic impacts over the period. In exploration, the increase in drilling activity combined with an increase in the cost per well resulted in substantial changes in gross business volume. Changes in gross business volume associated with extraction/production were largely similar to changes in oil and gas production. An increase in transportation expenses, expansions of industry infrastructure (i.e., gas plants and pipeline capacities), and increased processing volumes all contributed to an increase in the gross business volume for the processing/transportation segment of the industry.

The exploration segment of the industry increased in real terms by over 482 percent from 2005 to 2009, and had the greatest effect on the growth in the overall gross business volume for the entire industry. In real terms, direct impacts from exploration in 2009 would represent over 90 percent of the entire industry's direct impacts in 2007. The difference in gross business volume for exploration from 2005 to 2009 was nearly $6.2 billion. The gross business volume for extraction/production segment of the industry increased by $1.7 billion or by 70 percent. Economic activity associated with the processing and transportation segment of the industry increased by $476 million over the period. The gross business volume for the entire industry increased by nearly 200 percent in real terms over the period from $4.2 billion in 2005 to $12.7 billion in 2009 (Table 16). Other notable increases included direct employment expanding by 263 percent and government revenues rising by 178 percent.

Conclusions

Changes in energy prices, drilling activity, and oil and gas production in North Dakota have made the petroleum industry the one of largest single basic-sector industries in the state. Comparisons of the industry's economic importance in 2009 with previous estimates from 2005 and 2007 reveal the industry has nearly tripled its economic size in five years (i.e., 2005 to 2009). While some of that increase can be directly attributable to an increase in the number of producing wells, which has led to increased oil and gas production, the primary reason for the substantial increase has been due to expenditures for oil drilling/exploration activities.

The economic contribution of the petroleum industry was tied to activity and factors present in the industry in 2009. It is important to remember that the figures presented in this report represent a snapshot in time, and will not necessarily reflect the future economic impact of the industry. The economic importance of the industry will increase and decrease with changes in a host of factors that affect petroleum exploration, extraction/production, and processing levels. The fact that the economic importance of the industry is subject to change was readily apparent when comparisons were made between economic output in 2005, 2007, and 2009. The gross business volume associated with exploration increased by over 470 percent in real terms over the period. A combination of a substantial increase in the number of oil wells drilled and a nearly three-fold increase in the cost per well drilled were the reasons for the change. Other comparisons between 2005, 2007, and 2009 reveal that changes in impacts from oil and gas extraction/production more closely mirrored changes in output, while increases in economic activity associated with the processing sector of the industry were tied

to both increases in state oil and gas production, but also to expanded capacity of the industry's infrastructure, and increased transportation activity.

Few other basic-sector industries in North Dakota, outside of various agricultural industries and the lignite industry, have had similar comprehensive assessments of their economic importance. The figures reported in this study are substantial, and comparisons to other basic-sector industries may be helpful in placing results from this study in context. The wheat industry and the coal industry are two examples of basic-sector industries that have had economic assessments performed to measure their economic contribution to North Dakota's economy. From 2001 through 2003, the production, transportation, handling, and processing of wheat in North Dakota was estimated to produce a gross business volume of $4.2 billion (in 2009 dollars) annually. In 2009, the coal industry in North Dakota was estimated to generate nearly $3 billion in gross business volume (Coon and Leistritz 2010a). Estimates of the gross business volume for the petroleum industry were $4.2 billion in real terms in 2005, nearly $8.4 billion in 2007, and $12.7 billion in 2009. Direct employment figures for the wheat industry would not be comparable to those in this study; however, direct employment in the coal industry was estimated at 4,087 FTE positions, compared to 18,328 FTE jobs in the petroleum industry in 2009.

Regardless of the economic measure used, the petroleum industry is one of the largest basic-sector industries in North Dakota. Considering that the industry's direct impacts (i.e., first round of spending) are concentrated geographically in the western portion of the state, the economic health of western North Dakota is perhaps tied more to the petroleum industry than any other single industry. Yet, despite the strong influence of the petroleum industry in western North Dakota, the magnitude of the contributions to both the state and local governments and the shear volume of secondary economic effects in nearly all sectors of the North Dakota economy would suggest that the economic effects of the industry are felt statewide. Current activity levels in the petroleum industry clearly make it one of the key forces in the North Dakota economy.

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APPENDIX A

Questionnaire, Oil Operators, North Dakota, 2009

Contribution of the Petroleum Industry to the North Dakota Economy

Survey of Oil Operators

Department of Agribusiness and Applied Economics
North Dakota State University
and
North Dakota Petroleum Council

Instructions and Guidelines for Filling Out the Questionnaire

Data provided from this survey will be used to help estimate the economic contribution of the oil industry to the North Dakota economy. The goal is to determine how much money the oil industry spends in North Dakota. All expenditure data will be synthesized in a manner that only industry-wide totals will be reported. In no way will any information presented in the study identify or be reflective of any single firm or operation.

The following is a list of general guidelines for the questionnaire.

1. Use information from 2009 or your most recently completed fiscal year.

2. Expenditures should be expressed in U.S. dollars.

3. If the actual amount of the expenditure is not easily determined or is not readily known, please provide an estimate of the expense.

4. For contractor expenditures (Part II of this questionnaire), please include all expenditures made for services provided in North Dakota, even if the office or headquarters of the contractor or service provider is not located in North Dakota.

5. For general expenditures for day-to-day operations (Part III of the questionnaire), include only how much your company paid out to entities in North Dakota.

6. If you cannot identify whether an expenditure was made in North Dakota or in another state, indicate this on the form.

7. Definitions for some expenditure items and their corresponding Standard Industrial Classification (SIC) code listing are included to help in determining allocation of expenditures.

6. Please complete the survey by **May 27th** and mail the questionnaire in the return envelope.

7. If you have questions, please contact:

Dean Bangsund
701-231-7471
E-mail: d.bangsund@ndsu.edu

or

Larry Leistritz
701-231-7455
E-mail: f.leistritz@ndsu.edu
Department of Agribusiness and Applied Economics
North Dakota State University
Fargo, ND 58105-5636

Part I - - General Information

Business Name: _____

Mailing Address: _____

Contact Person: _____

The following questions pertain only to wells for which your company is the operator.

Number of producing oil wells in ND in 2009 for which your company was the operator _____

	Oil	Gas
Total production from your operated wells in 2009	_____ bbls	_____ mcf
Operator interest share of production	_____ %	_____ %
All royalty interest share of production	_____ %	_____ %
Remaining working interest share of production	_____ %	_____ %

Total number of employees working in North Dakota: _____ (Full-time equivalents)

Number of jobs (FTE's) above dedicated to exploration/drilling	_____
Number of jobs (FTE's) above dedicated to general production/extraction	_____

Part II. Payments made to **Contractors**, **Sub-contractors**, and **Consultants**

The following instructions pertain to **Part II** of the Questionnaire.

1) Only report contracted expenses for wells in North Dakota for which your company serves as the operator even if your company's stake in those wells is small. Do not include expenses for wells for which your company only has a working interest share–those expenses will be reported by other oil operators.

2) Please include the total cost for the contracted service for those wells. The total cost will include your company's share of the costs as well as the costs billed to the working interest holders on the well.

3) Please indicate expenses for producing wells, wells currently being drilled, and wells that were drilled, but never used.

4) Only include contracted expenses for the last year.

5) Please include all expenditures made for services provided in North Dakota, even if the office or headquarters of the contractor or service provider is not located in North Dakota.

Part II. **Type of Contracting Work Performed**	**Payments for work done in North Dakota**
General Exploration Examples of services include lease brokerage costs (lease arrangements and landowner negotiations), landman expenses, environmental services, seismic testing and geological research	$
Drilling Activities (Capital Investments) Examples of services include land survey work, excavation, road building, construction of drill site, other drill site preparations such as providing electricity, setting up storage facilities, etc., erecting derrick, mudding operations, spudding operations, wellbore casing, case perforation, logging, fracing services, wellhead placement, pipeline development and construction, and any other services provided that are associated with drilling activities This category of expenses should include all phases of drilling for both primary wells and secondary/tertiary/EOR injection wells	$
Oil and Gas Extraction and Production (Operating Expenses) Examples of services include pump, well, and storage tank maintenance and servicing; daily & weekly well visits for tank switching, periodic inspections, general monitoring, and other activities; well stimulations; well work overs; well idling, shutdown, and/or abandonment activities	$
Transportation Include expenses for truck transportation of oil from well site to pipeline collection points (terminal) and expenses for truck transportation of other products and by-products from well site to secondary locations, also include all charges for transportation of gas and oil by pipeline until products are sold to a purchaser or buyer	$
Any other services or activities provided by contracted arrangements not listed above: _____ (please specify) _____ (please specify) _____ (please specify) _____ (please specify)	 $ _____ $ _____ $ _____ $ _____

Part III. The following expenses relate to your company's general business operations in North Dakota and should represent expenses paid only to North Dakota entities. These expenses should not include any payments made to oil industry contractors or consultants associated with exploration or extraction. Please refer to the accompanying sheet for definitions and clarification of what expenses should be included in the expenditure categories.

If your company had no expenses in a particular category, please enter zero.

General Business Expenses	Expenses paid to North Dakota entities
Building and equipment leases (e.g., office space, vehicles)	$
Business and personal services	$
Professional and social services	$
Communications	$
Construction	$
Public utilities	$
Employee wages and salaries	$
Employee benefits (retirement, health insurance, etc.)	$
Payroll taxes (FICA, etc.)	$
Insurance	$
Interest, finance, and banking expenses	$
Oil and gas royalties	S
Retail trade	$
Wholesale trade	$
Research and development	$
North Dakota taxes:	
Property	$
Income	$
Sales and use	$
Transportation (note: pipeline expenses should be reported in Part II)	$
Any miscellaneous payments to working interests	$
Any miscellaneous payments to royalty interests	$
Other expenses (please specify).	$

Definitions for Expenditure Categories–Part III of Questionnaire

The following definitions are derived from Standard Industrial Classification Manual (SIC codes) and have been provided to assist in allocating expenses into common categories. If needed, please refer to the following web site for additional examples of the expenses included in each category: http://www.osha.gov/pls/imis/sic_manual.html Each category has several Major Group numbers, which contain additional detail on the type of activities in each category.

Construction: Includes expenses for construction projects, such as construction (including new work, additions, alterations, remodeling, and repairs) of residential, industrial, public, office, warehouse, and other buildings and structures. (Major Groups 15, 16, and 17)

Transportation: Includes expenses for railroad, motor freight, water transportation, air transportation, and other transportation to include packing and crating services, and rental of transportation equipment. (Major Groups 40, 41, 42, 43, 44, 45, 46, and 47)

Communications: Includes expenditures for telephone, telegraph, radio, television, satellite services, Internet transactions, and other communication services. (Major Group 48)

Public Utilities: Includes expenses for natural gas, electricity, water supply, and sanitary (sewer & garbage) services. (Major Group 49)

Wholesale Trade: Expenses paid to establishments primarily engaged in selling merchandise to retailers; to industrial, commercial, institutional, or professional users; or to other wholesalers, or acting as agents in buying merchandise for or selling merchandise to such persons or companies. (Major Groups 50 and 51)

Retail Trade: Includes expenses for building materials, hardware, food, general merchandise, office supplies, automobile fuel, computers, eating and drinking establishments, work uniforms, and most other business and office-related supplies. (Major Groups 52, 53, 54, 55, 56, 57, 58, and 59)

Finance, Insurance, and Real Estate: Includes expenses for loan service, interest on loans, investment counseling, insurance, real estate transactions, brokerage fees, and any other financial service expenditures. (Major Groups 60, 61, 62, 63, 64, 65, 66, and 67)

Business and Personal Services: Examples of business and personal services include expenses for advertising, collection services, photocopying/duplication/printing services, equipment rental, computer services, computer software, security services, tax preparation, automotive/equipment/miscellaneous repairs, entertainment, janitorial services, and overnight lodging. (Major Groups 70, 72, 73, 75, 76, 78, 79, and 87)

Professional and Social Services: Includes expenses for health/pharmaceutical, medical, legal, educational, research and development, child care, vocational training, and other professional services. (Major Groups 80, 81, 82, 83, 84, 86, 88, and 89)

Part IV. Leasing and Drilling Activity in North Dakota. Please summarize your company's lease expenditures and drilling activities over the past year. Lease expenditures and drilling activities should be for North Dakota operations only.

Leasing	**2009**
Total lease expenditures ($)	
Private leases	
State leases	
Federal leases	
Total acres leased	
Private land	
State land	
Federal land	
Drilling	**2009**
Overall number of wells drilled	
Number of wells drilled that were plugged (dry holes)	
Number of wells drilled that went into production (completed as a producer)	

Part V. **List of Contractors/Venders**. Please provide the name and mailing address of all companies that your firm has contracted with over the last year to perform work in the oil fields in North Dakota. Please include all companies even if they do not have a North Dakota address. If a computer listing is not available, please use the following space to provide the information.

Name of Company Address (street, city, state, zip)

Please add sheets or attach printouts as needed.

Thank You for completing this questionnaire!

Please return the questionnaire in the postpaid envelope.

If you would like a copy of the study results mailed to you, make sure you have provided a mailing address in Part I of the questionnaire. Otherwise, you may contact Edie Watts in the Department of Agribusiness and Applied Economics at North Dakota State University for more information on our departmental reports. Phone (701)231-7441, fax (701)231-7400, email: ndsu.agribusiness@ndsu.edu or visit our departmental listing of research reports on the internet at

http://ageconsearch.umn.edu/

Study results should be available at the end of 2010.

APPENDIX B

Questionnaire, Processors, North Dakota, 2007

Contribution of the Petroleum Industry to the North Dakota Economy

Survey of Processors

Department of Agribusiness and Applied Economics
North Dakota State University
and
North Dakota Petroleum Council

Instructions and Guidelines for Filling Out the Questionnaire

Data provided from this survey will be used to help estimate the economic contribution of the oil industry to the North Dakota economy. The goal is to determine how much money the oil industry spends in North Dakota. All expenditure data will be synthesized in a manner that only industry-wide totals will be reported. In no way will any information presented in the study identify or be reflective of any single firm or operation.

The following is a list of general guidelines for the questionnaire.

1. Use information from your most recently completed fiscal year.

2. Expenditures should be expressed in U.S. dollars.

3. If the actual amount of the expenditure is not easily determined or is not readily known, please provide an estimate of the expense.

4. Only include expenditures made to businesses, governments, or individuals in North Dakota.

5. If you cannot identify whether an expenditure was made in North Dakota or in another state, indicate this on the form.

6. Definitions for some expenditure items and their corresponding Standard Industrial Classification (SIC) code listing are included to help in determining allocation of expenditures.

7. We would prefer to have the questionnaire completed and returned by **September 2, 2010**.

. If you have questions, please contact:

Dean Bangsund
701-231-7471
E-mail: d.bangsund@ndsu.edu
or
Larry Leistritz
701-231-7455
E-mail: f.leistritz@ndsu.edu
Department of Agribusiness and Applied Economics
North Dakota State University
Fargo, ND 58105-5636

Part I - - General Information

Business Name: _____

Mailing Address: _____

Contact Person: _____

Total MCF of gas processed in the last year for operations and facilities located in North Dakota (if applicable) _____

Percent of gas processed that was from North Dakota sources _____

Percent of gas processed that was from sources in other states _____

Percent of gas processed that was from Canadian sources _____

Total MCF of gas transported in the last year for operations and facilities located in North Dakota (if applicable) _____

Percent of gas transported that was from North Dakota sources _____

Percent of gas transported that was from sources in other states _____

Percent of gas transported that was from Canadian sources _____

Number of employees in North Dakota (full-time equivalents) in 2009 _____

Annual Expenses. The following expenditures should represent expenses paid only to North Dakota entities. Please refer to the accompanying sheet for definitions and clarification of what expenses should be included in the expenditure categories.

Operating Expenses in Calendar Year 2009	Expenses paid to North Dakota entities
Building and equipment leases (e.g., office space, vehicles)	$
Business and personal services	$
Professional and social services	$
Communications	$
Construction	$
Public Utilities	$
Employee wages and salaries	$
Employee benefits (retirement, health insurance, etc.)	$
Payroll taxes (FICA, etc.)	$
Insurance	$
Interest, finance, and banking expenses	$
Purchases of gas (from ND sources)	$
Transportation	$
Retail Trade	$
Research and Development	$
North Dakota Taxes	$
Property	$
Income	$
Sales and Use	$
Other expenses (please specify)	$
	$
	$

Definitions for Expenditure Categories

The following definitions are derived from the Standard Industrial Classification Manual (SIC codes) and have been provided to assist in allocating expenses into common categories. If needed, please refer to the following web site for additional examples of the expenses included in each category: http://www.osha.gov/pls/imis/sic_manual.html Each category has several Major Group numbers, which contain additional detail on the type of activities in each category.

Construction: Includes expenses for construction projects, such as construction (including new work, additions, alterations, remodeling, and repairs) of residential, industrial, public, office, warehouse, and other buildings and structures. (Major Groups 15, 16, and 17)

Transportation: Includes expenses for railroad, motor freight, water transportation, air transportation, pipeline transportation of petroleum, and other transportation to include packing and crating services, and rental of transportation equipment. (Major Groups 40, 41, 42, 43, 44, 45, 46, and 47)

Communications: Includes expenditures for telephone, telegraph, radio, television, satellite services, Internet transactions, and other communication services. (Major Group 48)

Public Utilities: Includes expenses for natural gas, electricity, water supply, and sanitary (sewer & garbage) services. (Major Group 49)

Wholesale Trade: Expenses paid to establishments primarily engaged in selling merchandise to retailers; to industrial, commercial, institutional, or professional users; or to other wholesalers, or acting as agents in buying merchandise for or selling merchandise to such persons or companies. (Major Groups 50 and 51)

Retail Trade: Includes expenses for building materials, hardware, food, general merchandise, office supplies, automobile fuel, computers, eating and drinking establishments, work uniforms, and most other business and office-related supplies. (Major Groups 52, 53, 54, 55, 56, 57, 58, and 59)

Finance, Insurance, and Real Estate: Includes expenses for loan service, interest on loans, investment counseling, insurance, real estate transactions, brokerage fees, and any other financial service expenditures. (Major Groups 60, 61, 62, 63, 64, 65, 66, and 67)

Business and Personal Services: Examples of business and personal services include expenses for advertising, collection services, photocopying/duplication/printing services, equipment rental, computer services, computer software, security services, tax preparation, automotive/equipment/miscellaneous repairs, entertainment, janitorial services, and overnight lodging. (Major Groups 70, 72, 73, 75, 76, 78, 79, and 87)

Professional and Social Services: Includes expenses for health/pharmaceutical, medical, legal, educational, research and development, child care, vocational training, and other professional services. (Major Groups 80, 81, 82, 83, 84, 86, 88, and 89)

Thank You for completing this questionnaire!

Please return the questionnaire in the postpaid envelope.

If you would like a copy of the study results mailed to you, make sure you have provided a mailing address in Part I of the questionnaire. Otherwise, you may contact Edie Watts in the Department of Agribusiness and Applied Economics at North Dakota State University for more information on our departmental reports. Phone 701-231 7441, fax 701-231-7400, email: ndsu.agribusiness@ndsu.edu or visit our departmental listing of research reports on the internet at http://agecon.lib.umn.edu

Study results should be available in the fall of 2010.

APPENDIX C

Questionnaire, Service and Support Firms, North Dakota, 2009

Contribution of the Petroleum Industry to the North Dakota Economy

Survey of Firms Providing Service and Support in the North Dakota Petroleum Industry

Department of Agribusiness and Applied Economics
North Dakota State University
and
North Dakota Petroleum Council

Instructions and Guidelines for Filling Out the Questionnaire

Data provided from this survey will be used to help estimate the economic contribution of the oil industry to the North Dakota economy. The goal is to determine how much money the oil industry spends in North Dakota. All expenditure data will be synthesized in a manner that only industry-wide totals will be reported. In no way will any information presented in the study identify or be reflective of any single firm or operation.

The following is a list of general guidelines for the questionnaire.

1. Use information for activities in 2009.

3. If you are unsure of a specific figure please use your best estimate. Remember, your best estimate is going to be better than our best guess!!

4. When answering questions pertaining to spending patterns, please remember that we are only interested in information on expenditures made to businesses, governments, or individuals in North Dakota.

5. If you cannot determine if a particular expense was incurred in North Dakota or if the expense was made to another company or individual in a different state, please indicate this on the form.

6. Please return the questionnaire by Aug 31, 2010.

7. If you have questions, please contact:

Dean Bangsund
701-231-7471
E-mail: d.bangsund@ndsu.edu

or

Larry Leistritz
701-231-7455
E-mail: f.leistriz@ndsu.edu
Department of Agribusiness and Applied Economics
North Dakota State University
Fargo, ND 58105-5636

Part I - - General Information

Business Name: _____

Mailing Address: _____

Contact Person: _____

General Questions About Your Company

1) Did your company work directly in the areas of oil and/or gas exploration and/or extraction in North Dakota at any time in 2009? Yes ___ No ___

2) Did your company provide any services, products, inputs, equipment, consultation, or conduct work in any other capacity for firms that were active in oil and/or gas exploration and/or extraction activities in North Dakota in 2009? Yes ___ No ___

If you answered "No" to both questions.	**If you answered "Yes" to either question.**
 Please stop here Mail back the questionnaire in the pre-paid envelope **Thank You.**	Please continue with the questionnaire. 

What percent of your company's overall business comes from the petroleum industry?

a) 1 to 20%
b) 21 to 40 %
c) 41 to 60%
d) 61 to 80%
e) 81 to 100%

Of the revenues your company receives from work in the petroleum industry, what percent of those revenues come from activities in North Dakota?

a) 1 to 20%
b) 21 to 40 %
c) 41 to 60%
d) 61 to 80%
e) 81 to 100%

How many total employees does your business have? _____ full-time equivalents

How many employees work in North Dakota? _____ full-time equivalents

(For part-time, seasonal, or temporary workers, please estimate how many full-time equivalents their jobs would account for. E.g., 4 part-time workers employed for 3 months each would equal 1 full-time job).

Part II. Spending Patterns in North Dakota

The next two sections ask for information on your company's spending patterns in North Dakota.

Section One–Expenditures as a Percentage of Revenues

Please Note:

It is important for our study that we be able to distinguish the difference between revenues earned in North Dakota versus expenditures made in North Dakota. This holds for both firms headquartered out-of-state and firms that are headquartered in North Dakota.

When answering the following question, we want you to think about only your business activities in North Dakota and how much your company spends (expenses and costs) in the state relative to your gross revenues from North Dakota sources.

Please estimate (make an educated guess if needed) what percent of your company's gross revenues associated with the petroleum industry in North Dakota are spent in North Dakota.

_____ percent

Section Two--Expenditure Patterns in North Dakota

Please think about your company's cost of doing business in North Dakota. We would like you to estimate (or guess if needed) the approximate level of business expenses your company had in 2009.

General estimates for these figures are sufficient (e.g., $2,000 in supplies, $100,000 in services).

Types of Expenditures in North Dakota	**Expenditures in North Dakota in 2009**
Wages and Salaries	
Office expense *(e.g., computers, software, photocopying, paper, postage, other supplies, office rent/lease, office equipment, subscriptions for magazines and periodicals)*	
Interest and Insurance *(examples include bank expenses, loan interest, liability and casualty premiums)*	
Communications and Utilities *(examples include phone, Internet, electricity, water, natural gas, sewer, garbage, etc)*	
Supplies and Equipment *(examples include vehicles, industrial equipment, specialized machinery, fuel, lubricants, tires, tools, hardware, building materials, replacement parts, and miscellaneous inputs)*	
Services *(examples include repairs and maintenance, tax preparation, construction work, legal, meals, lodging, snow removal, shipping and transportation, and any miscellaneous business service)*	
North Dakota Taxes	
Property taxes	
Other taxes (*income, unemployment)*	
Licenses, Permits, and Government Fees	
Other Expenses (*please specify the expense*)	

Thank You for completing this questionnaire!

Please return the questionnaire in the postpaid envelope.

If you would like a copy of the study results mailed to you, make sure you have provided a mailing address in Part I of the questionnaire. Otherwise, you may contact Edie Watts in the Department of Agribusiness and Applied Economics at North Dakota State University for more information on our departmental reports. Phone 701-231 7441, fax 701-231-7400, email: ndsu.agribusiness@ndsu.edu or visit our departmental listing of research reports on the internet at http://agecon.lib.umn.edu

Study results should be available in the winter of 2010.

APPENDIX D

Questionnaire, Leasing/Brokerage Firms, North Dakota, 2009

Contribution of the Petroleum Industry to the North Dakota Economy

Department of Agribusiness and Applied Economics
North Dakota State University
and
North Dakota Petroleum Council

Confidential Survey of Oil Leasing Firms

Company _____
Contact Person _____

Total bonus payments paid out for oil leases in North Dakota in 2009 $_____

Of the total above, what percentage went to:
%_____ In-state residents (North Dakota addresses only)
%_____ Federal agencies
%_____ ND State agencies

Total net lease acres made by your firm in North Dakota in 2009 _____

Of the total above, what percentage was represented by:
%_____ Private acreage
%_____ Federal acreage
%_____ State acreage

Thank you for completing this questionnaire. The material you provide is kept strictly confidential and will be averaged with data from other firms.

Please mail your completed questionnaire to:

Dean Bangsund
Dept of Agribusiness and Applied Economics
North Dakota State University
NDSU Dept 7610
PO Box 6050
Fargo, ND 58108-6050

Please call or e-mail Dean Bangsund, NDSU, for any questions regarding this survey or the study of the Petroleum Industry in North Dakota.
Ph. 701-231-7471
E-mail: d.bangsund@ndsu.edu