ARROWHEAD CENTER

LEADING ECONOMIC DEVELOPMENT FOR NEW MEXICO STATE UNIVERSITY

The Economic Impact of Proposed Uranium Mining and Milling Operations in the State of New Mexico

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Executive Summary

This report contains an analysis of the economic impacts of new uranium mining and milling operations in New Mexico. The report was prepared by Arrowhead Center, Inc., a non-profit corporation wholly owned by New Mexico State University, under contract with the law firm of Comeau, Maldegen, Templeman & Indall, LLP of Santa Fe, NM.

The report analyzes the economic impact of certain specific projects proposed to be developed in New Mexico and reported to the law firm of Comeau, Maldegen, Templeman, and Indall, LLP (CMTI) and provided to Arrowhead Center in a aggregate manner. The assumptions and conclusions contained herein reflect only on the projected economic impact of these projects and do not otherwise reflect in any manner the potential economic value of other possible projects not identified for this report. In addition, this report does not attempt to reflect general economic parameters for the industry except as it relates to the projects evaluated herein in the aggregate.

New Mexico was the leading producer of uranium (U_30_8) in the U.S. during the 1950s, 1960s, and 1970s. State production declined dramatically after the late 1970s and, except for small recovery operations, most production ended by the early 1990s, and ceased altogether after 2002.

During the 1990s and early 2000s, uranium prices had fallen far below the cost of production. In 2000, the spot market price of a pound of U_30_8 was as low as $6.00, but by mid-2007 this price had increased to $143. A more meaningful uranium price is the long-term or contract price which in early 2008 has been approximately $90 per pound. At higher prices, uranium mining and milling in New Mexico and elsewhere is again feasible. Section 4 of this report describes the history of the uranium industry in New Mexico in greater detail.

Recent trends in world and national energy markets enhance the prospects for significant uranium industry activity in the state. Three energy market developments are particularly important to the increase in demand for U_30_8. First, dramatic increases in the demand for energy in the developing world, particularly China and India, have changed the nature of world energy markets . There is general agreement among energy analysts that the increases in world energy demand will continue for the next few decades. Second, world-wide concern about climate change and the environmental consequences of increasing energy demand suggest an increase in demand for nuclear generated electricity. Third, depleted stockpiles of fuel for nuclear plants in the U.S. contribute to the renewed interest in uranium mining and milling operations. These trends are described in detail in sections 2 and 3 of this report.

Uranium reserves in New Mexico are estimated by the U.S. Department of Energy to be approximately 341 million pounds of U_30_8 at a production cost of $50 per pound. Estimated reserves at higher production costs would be substantially greater. The state's uranium reserves are a very significant economic resource. At $100 per pound, New Mexico's uranium reserves would be worth $34.1 billion dollars.

New Mexico's uranium ore is located mainly in Cibola and McKinley Counties. Section 6 examines the economic and demographic characteristics of the two counties in detail. The two counties had a combined population in 2007 of 97,320, according to the most recent estimates of the Census Bureau. McKinley County, with a 2007 estimated population of 70,059, had more than twice the population of Cibola County (27,261). The combined population of the two counties decreased since 2000 with a total decrease of 3,073 –a decrease of 3.24 percent over the seven year period. Between 2000 and 2007, McKinley County's population decreased by 6.01 percent while Cibola County's population increased by 5.73 percent.

Both counties have a large Native American population. In 2000, 54.2 percent of the population of the two counties was Native American. In McKinley County Native Americans accounted for 74.7 percent of the population and the corresponding figure for Cibola County was 40.3 percent.

The two counties are poor in comparison to the nation or the state. In 2005, the two counties combined had a per capita income (BEA) of $18,574 (53.9 percent of the national figure and 66.6 percent of state per capita income). There was only a small difference in per capita income in the two counties. McKinley County's 2005 per capita income was $18,435 while Cibola County's per capita income was $18,935 in the same year.

The fiscal implications of renewed uranium mining and milling are examined in an historical context in Section 5. The main focus of this section is to provide background for the estimation of fiscal impacts of the uranium industry. New Mexico imposes a severance tax, a conservation tax, and a resource excise tax on uranium production. In addition, renewed uranium operations will generate state tax revenue through direct, indirect and induced economic activity. These taxes include the personal income tax, the corporate income tax and the gross receipts tax.

The potential economic impact of proposed uranium mining and milling operations is the main focus of this report. Section 7 describes the methodology of economic impact analysis and the economic models available to assess such impacts. The model used in this report is from IMPLAN, Inc.

Three impact scenarios are presented. The base case scenario assumes that approximately 315 million pounds of U_30_8 will be produced in New Mexico during a thirty-year period. Capital expenditures of $2.1 billion dollars would occur between 2008 and 2012. Production of U_30_8 would begin in 2012 and continues until 2042–with lower levels of production occurring in the first and last few years of the production period.

Second, a low impact scenario in which spot and long-term contract price volatility combine to reduce investment and production from the base case is examined. Under this scenario, total production of U_30_8 over roughly three decades amounts to 190 million pounds. Capital expenditures for mines and mills in this scenario is $1.1 billion, slightly more than half of the capital expenditures in the base case.

The third scenario presented is a high case scenario in which the price of U_30_8 increases substantially in real terms and there is no significant price volatility in uranium markets. Under the high price, high production scenario, capital investment increases to nearly $2.5 billion from the $2.1 billion base case. Total production of 400 million pounds of U_30_8 exceeds current estimates of uranium reserves in New Mexico. This scenario assumes that actual state reserves are far larger than reported by EIA.

The high and low case scenarios are presented in Appendix A as an attachment to this report. Appendix A is forthcoming.

The impacts of renewed uranium mining in New Mexico are described in the following summary table

	Measurement	
Scenario Description		
Capital Expenditures	Billions of 2008 $	$2.067
Total Production	Millions lbs of U_30_8	315
Cost of Production	2008 $ per lb of U_30_8	$50
Mine jobs	Per million lbs U_30_8	234
Mill jobs	Per million lbs U_30_8	77
Impacts		
Capital Expenditures		
Direct Output	Billions of 2008 $	$2.067
Total Output	Billions of 2008 $	$3.138
Direct Employment	Jobs	6,921
Total Employment	Jobs	12,586
Direct Labor Income	Billions of 2008 $	$0.376
Total Labor Income	Billions of 2008 $	$0.588
Total Taxes	Billions of 2008 $	$0.046
Production		
Direct Output	Billions of 2008 $	$15.750
Total Output	Billions of 2008 $	$25.978
Direct Employment	Jobs	97,965
Total Employment	Jobs	248,681
Direct Labor Income	Billions of 2008 $	$8.126
Total Labor Income	Billions of 2008 $	$14.197
Total Taxes	Billions of 2008 $	$1.600

Section 1: Introduction

New Mexico is an energy-producing and energy-exporting state. Large known reserves of oil, natural gas, coal, and uranium are located within its borders. Oil, natural gas, and coal production, along with increasing activity in wind, solar, and other alternatives, contribute significantly to overall economic activity in New Mexico. In a typical year, more than 15 percent of the state's Gross Domestic Product can be attributed directly to the energy sector. National and world energy market conditions assure a continuing important role for the energy sector in the state economy.

New Mexico was the leading producer of uranium (U_30_8) in the US during the 1950s, 1960s and 1970s. State production declined dramatically in the early 1980s. All meaningful production ended by 1992. Small recovery operations continued through the 1990s but production ceased altogether after 2002. Uranium market conditions have changed dramatically in the last few years. These changes, described in detail later in the report, are very favorable for long-term, large scale uranium operations in New Mexico.

An assessment of new uranium mining and milling operations in New Mexico is the focus of this report. Several companies are actively involved in the proposed revival of uranium mining and milling operations in the state. In addition, a major uranium enrichment facility is under construction in Lea County by Louisiana Energy Services, a subsidiary of URENCO, at an estimated cost of $1.8 billion. The impact of the uranium enrichment facility is not part of this report.

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The report analyzes the economic impact of certain specific projects proposed to be developed in New Mexico and reported to the law firm of CMTI and provided to Arrowhead Center in a aggregate manner. The assumptions and conclusions contained herein reflect only on the projected economic impact of these projects and do not otherwise reflect in any manner the potential economic value of other possible projects not identified for this report. In addition, this report does not attempt to reflect general economic parameters for the industry except as it relates to the projects evaluated herein in the aggregate.

The new uranium mining and milling operations in New Mexico will occur in Cibola and McKinley Counties, but the economic impacts of this new activity will be felt statewide. In 2006, the two counties combined had a per capita income of just over half of the national figure or about two-thirds of the state figure. Renewed uranium industry activity in the region would, of course, mean significant increases in employment and income in the two counties and additional employment in other parts of the state. A detailed description of the demographic and economic characteristics of Cibola and McKinley Counties can be found in Section 6 of this report.

The potential economic impact of the proposed uranium mining and milling operations is the main focus of this report. By any measure the economic impacts of renewed uranium operations in New Mexico are very large. The Energy Information Administration of the Department of Energy estimates that known reserves in the state are 341 million pounds of U_30_8. In early 2008, the long-term contract price of U_30_8 was approximately $90 per pound. At $90 per pound, the state's uranium reserves are worth roughly $30 billion. A price of $100 per pound is certainly possible and at this price New Mexico's reserves are worth roughly $34 billion. Reserve estimates should always be taken with a grain of salt. It is highly likely that New Mexico's uranium reserves are much larger than 341 million pounds.

Economic impact analysis is a method for estimating the net change in economic activity resulting from new spending in a given geographic area. The main idea behind economic impact analysis is that a new dollar of spending results in more than a dollar of economic activity in the area considered.

Economic impacts are generally measured in terms of changes in output, income, and employment. Output is measured in dollars and can be viewed as the local or regional counterpart of Gross Domestic Product (GDP). Income is also measured in dollars and contains several components –most importantly labor income including wages and salaries and proprietors income. Employment is measured in terms of numbers of jobs. In many impact studies including this one, estimates of changes in state and local taxes as a result of the new economic activity are also presented. Section 7 describes the methodology of economic impact analysis and the economic models available to assess such impacts. The remainder of this introduction summarizes the main results of the analysis. Detailed results appear in Section 8. Three impact scenarios are presented in Section 8. Only the base case scenario, derived from the proposed operations of uranium companies will be discussed in the introduction.

The Base Case:

The base case scenario assumes that approximately 315 million pounds of U_30_8 will be produced in New Mexico during a thirty year period. Capital expenditures of $2.1 billion dollars for the construction of mines and mills will occur between 2008 and 2012. Production of U_30_8 begins in 2012 and continues until 2042–with lower levels of production occurring in the first and last few years of the production period. Actual production could exceed the assumed production levels in the base case scenario and production could extend beyond 2042.

The impacts of the base case are presented here in a series of figures. Detailed tables appear in Section 8. The impacts of the capital expenditures (construction costs) of mines and mills are summarized in Figures 1.1 through 1.4.

As shown in Figure 1.1, the direct expenditure of $2.1 billion on construction (capital expenditures) for mines and mills in the base case results in a total impact on output of $3.1 billion.

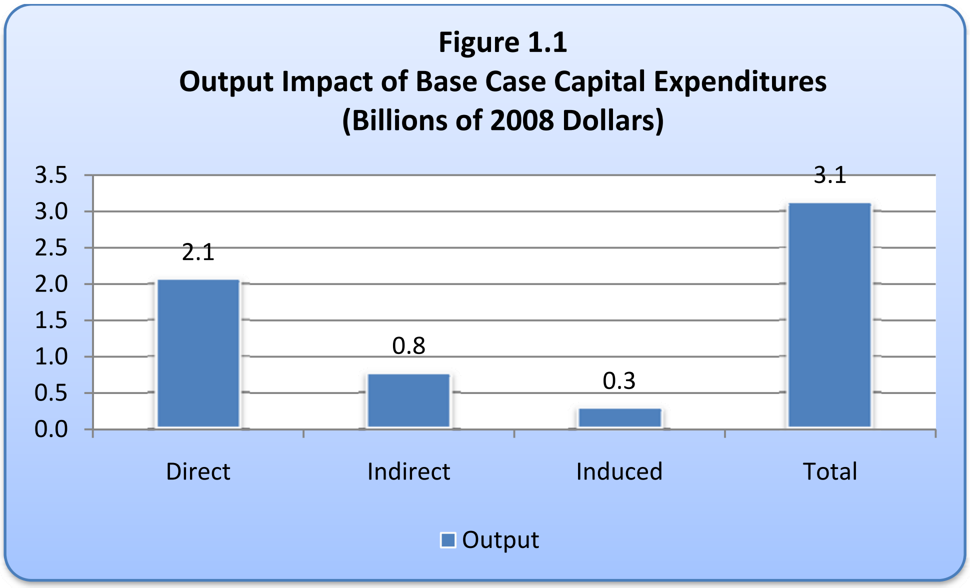


Figure 1.2 displays the employment impact of capital expenditures in the base case. As shown, base case capital expenditures generate 6,921 jobs directly and a total of 12,586 jobs over the five year construction period.

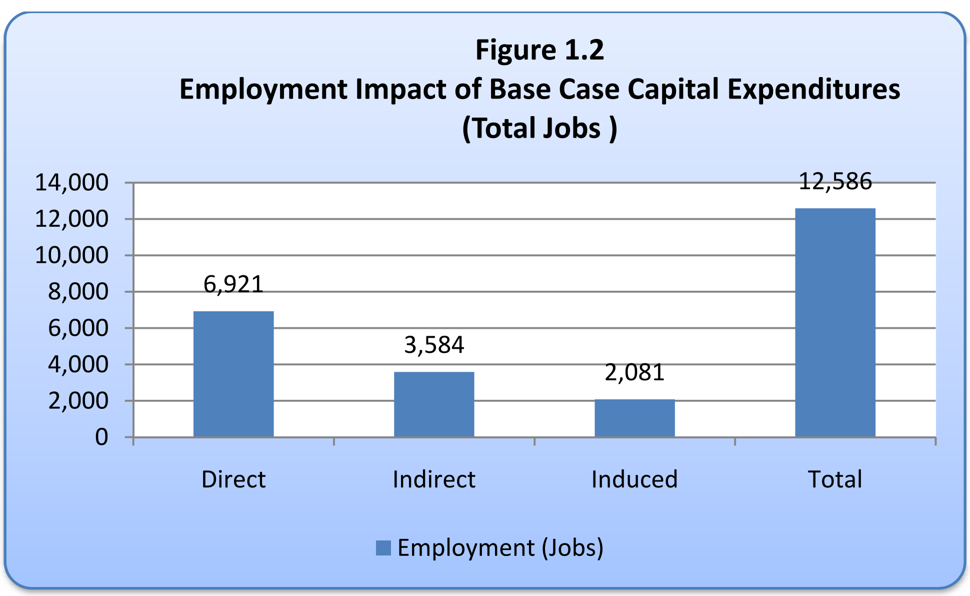


Figure 1.3 displays the labor income generated by capital expenditures in the base case. That is, the jobs shown in Figure 1.2 are expected to generate labor income as shown in Figure 1.3.

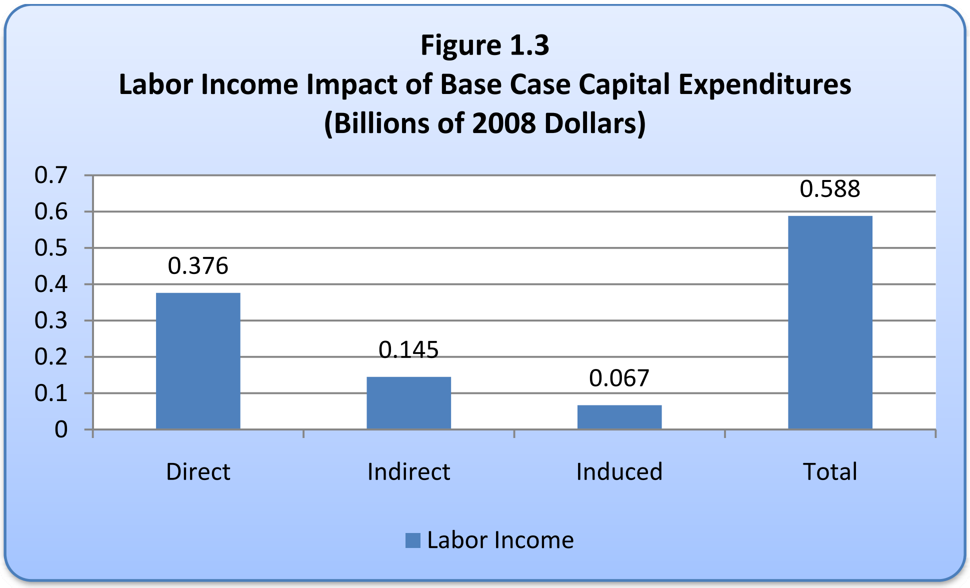
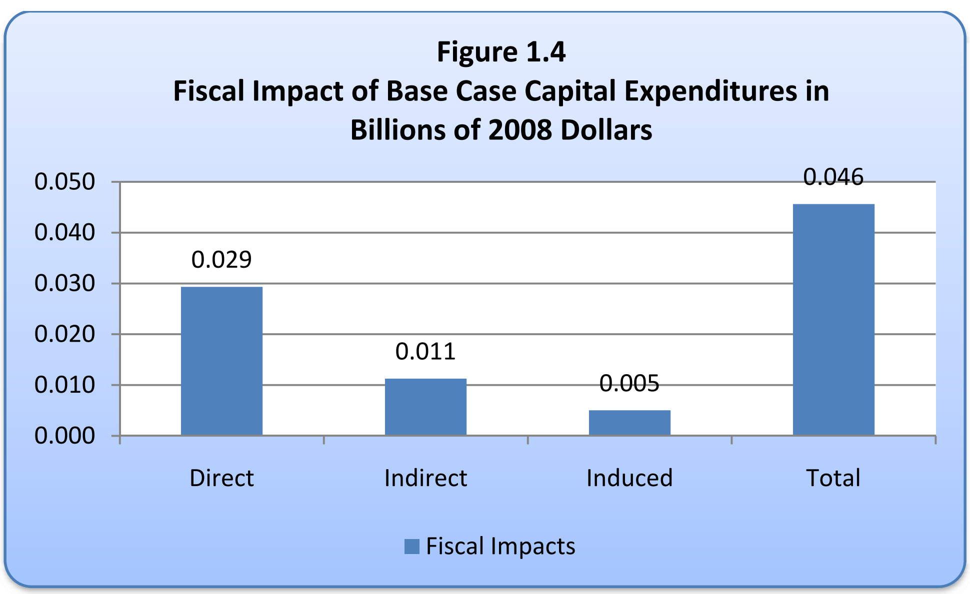


Figure 1.4 displays the fiscal impacts of capital expenditures in the base case. These fiscal impacts include revenue from the Gross Receipts Tax (GRT), the Personal Income Tax (PIT), and the Corporate Income Tax. Total tax revenue generated by the capital expenditures is approximately 46 million dollars (0.046 billion dollars as shown in Figure 1.4).



Base case production in millions of pounds of U_30_8 is shown in Figure 1.5 (same as Figure 8.1 later in this report). Total production in the base case is 315 million pounds of U_30_8 during the 2012 to 2042 time period.

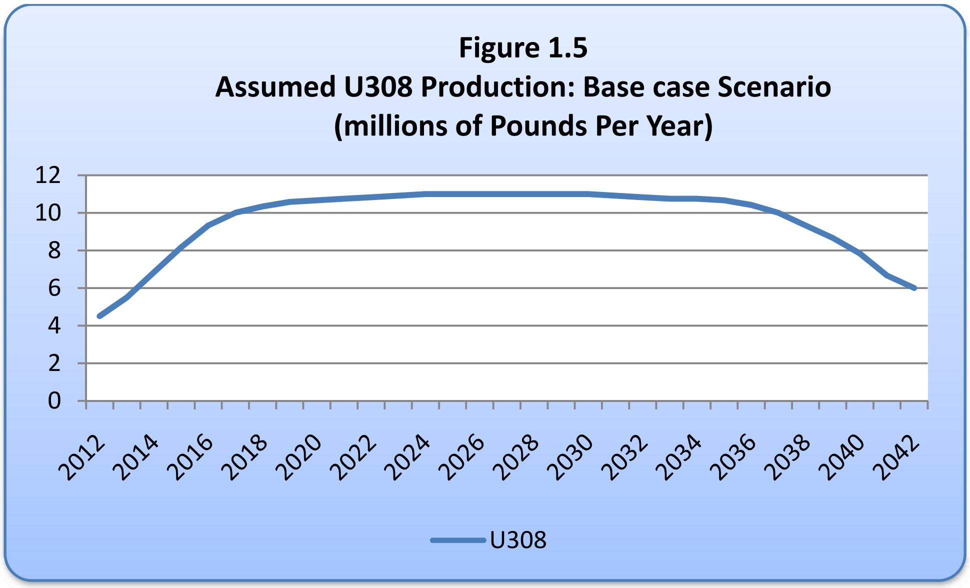


Figure 1.6 displays the output impact of mining and milling operations in the base case. The direct output effect has been calculated at a production cost of $50 per pound (see section 8 for a discussion). Under the base case scenario, mining and milling operations generate $15.1 billion dollars of direct output and a total increase in output of $26.0 billion.

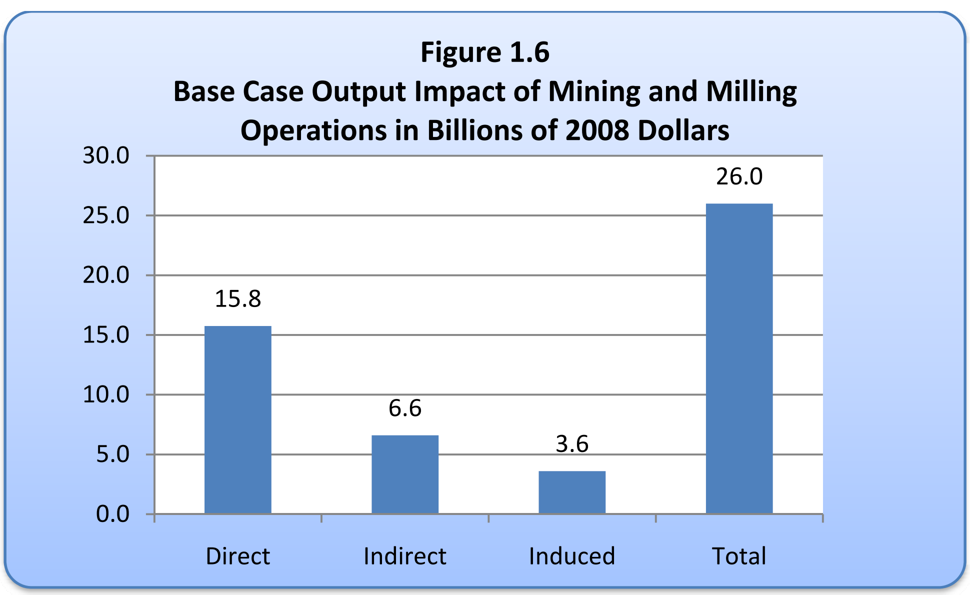


Figure 1.7 displays the employment impacts of mining and milling operations in the base case. The employment impacts are measured in jobs created between 2012 and 2042. The direct employment impact is 97,625 jobs (slightly more than 3,000 jobs per year). The total impact is 248,681 jobs or more than 8,000 jobs per year.

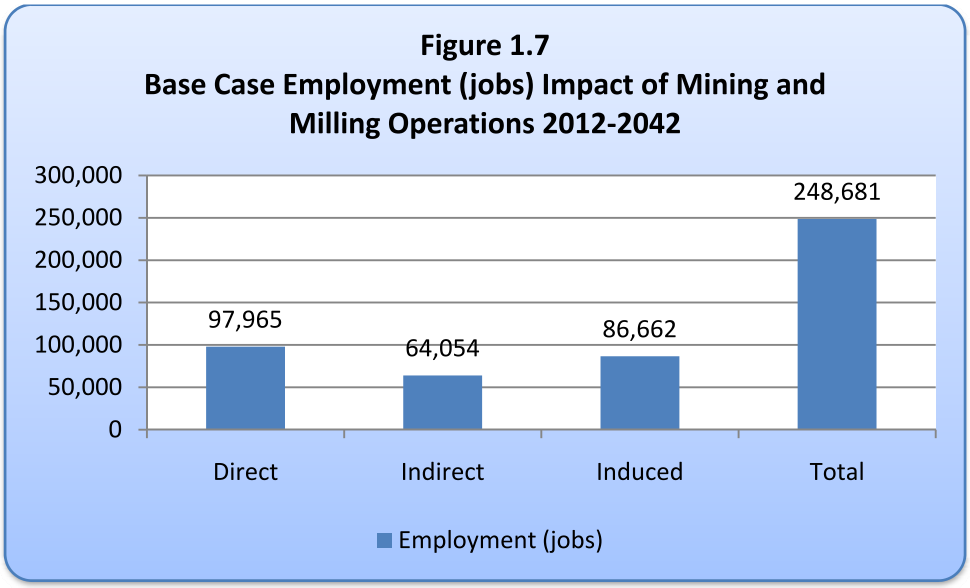
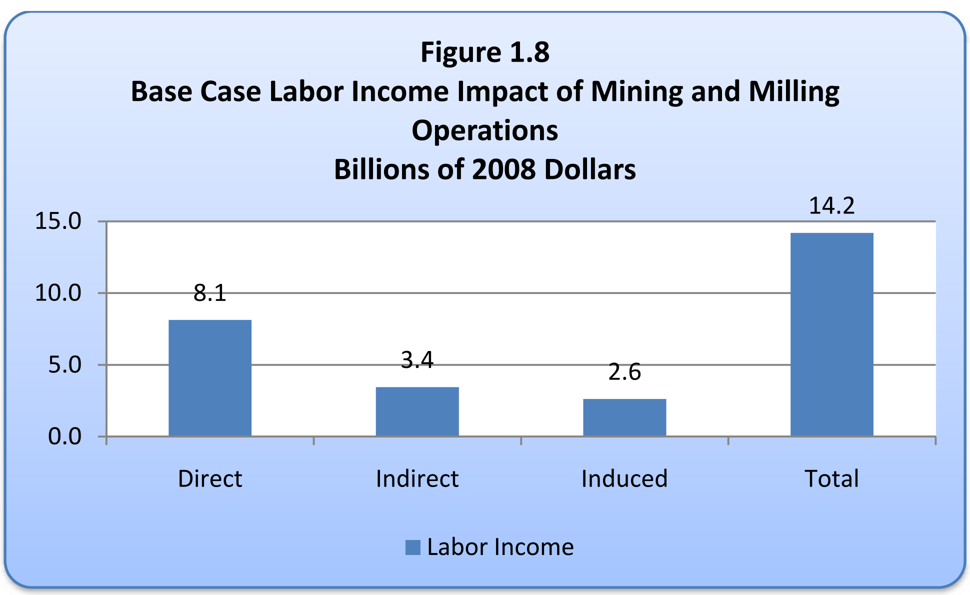


Figure 1.8 displays the labor income generated by the jobs described in Figure 1.7. Direct employment in mining and milling operations generates $8.1 (2008 dollars) and total labor income of $14.2 billion between 2012 and 2042.



The fiscal impacts of mining and milling operations in the base case are shown in Figures 1.9 and 1.10. Figure 1.9 displays Severance Tax, Resource Excise Tax, and Conservation Tax revenue generated by the production of 315 million pounds of U308 between 2012 and 2042 in the base case. These tax revenues have been calculated assuming a selling price of $90 per pound of $U_{3}0_{8}$. The three taxes result in more than $700 million of revenue (0.744 billion) in the base case scenario.

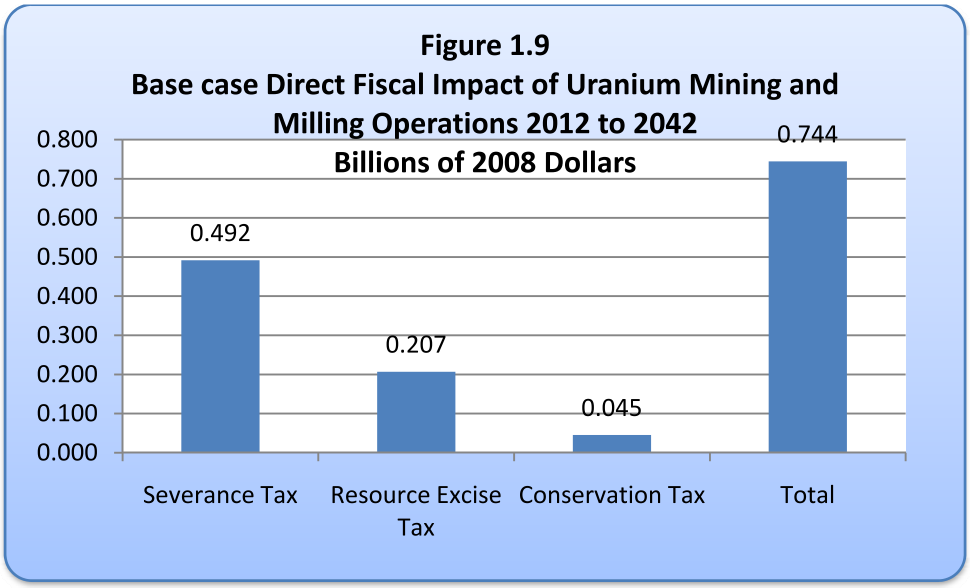


Figure 1.9
Base case Direct Fiscal Impact of Uranium Mining and Milling Operations 2012 to 2042
Billions of 2008 Dollars

Figure 1.10 displays additional fiscal impacts of uranium mining and milling operations in the base case scenario. These impacts include the Personal Income Tax (PIT) paid by the labor income generated in the base case scenario, The corporate income tax paid by uranium mining and milling companies and the Gross Receipts Tax (GRT) which is paid when workers purchase goods and services from the labor income discussed above. More than $1 billion (2008 dollars) of tax revenue is generated during the base case from the PIT, CIT and GRT taxes.

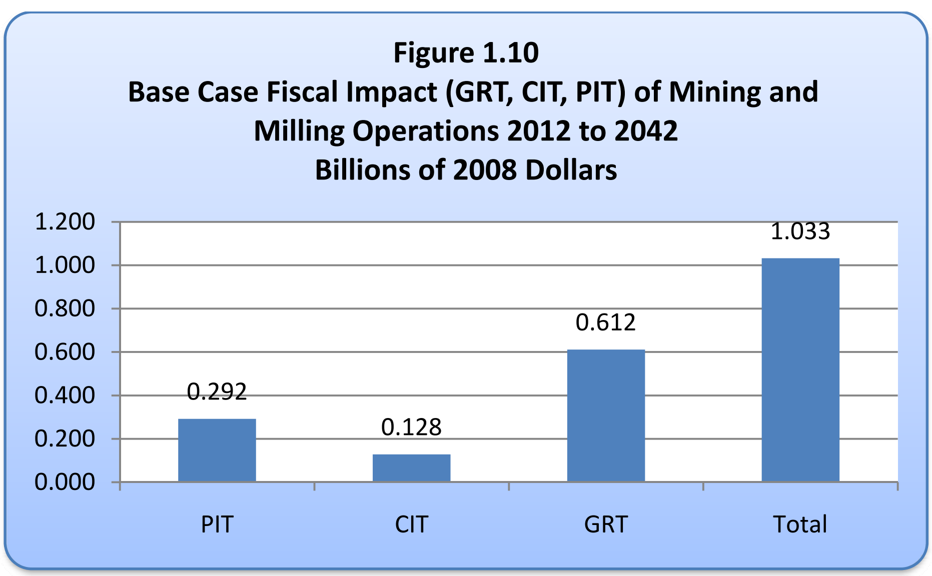


Figure 1.10
Base Case Fiscal Impact (GRT, CIT, PIT) of Mining and Milling Operations 2012 to 2042
Billions of 2008 Dollars

Section 2:

World Energy Markets and the Demand for Uranium

Future uranium mining and milling operations in the United States and New Mexico depend directly on current patterns and future trends in world and national energy markets. The discussion below provides a brief overview of major developments in energy markets that may have a significant impact on uranium mining and milling operations. The discussion is intended as an introduction. More detailed analysis is available from various international agencies (International Energy Agency and the World Energy Council), government (Energy Information Administration of the US Department of Energy) and industry sources (Trade-tech and BP). A short list of recommended readings appears in the box below.

Recommended Reading

A recent, well-written general introduction to energy markets is:

Roy L. Nessarian's *Energy for the 21st Century: A Comprehensive Guide to Conventional and Alternative Sources*. New York: M. E. Sharpe. 2005

A comprehensive guide to current energy developments is:

World Energy Council. 2007. *Survey of World Energy Resources*. Available at: http://www.worldenergy.org/documents/ser2007_final_online_version_1.pdf

For an in-depth look at future energy scenarios including developments in the nuclear power industry you can't do better than:

(a) International Energy Agency. *World Energy Outlook. 2007*. Organization for Economic Cooperation and Development, International Energy Agency (OECD/IEA). Paris, France. www.iea.org or
(b) U.S. Department of Energy, Energy Information Administration (EIA). *Annual Energy Outlook 2008.* Washington, DC: http://www.eia.doe.gov/oiaf/forecasting.html

For data and analysis of the uranium industry, there is no substitute for the 'Red Book'. This series has been published since 1967. The most recent version is:

Organization for Economic Development/Nuclear Energy Agency (OECD/NEA) *Nuclear Development - Forty Years of Uranium Resources, Production and Demand in Perspective - The Red Book Retrospective (2006*).

Global energy markets are a recent phenomenon. Prior to the late 1800s, energy markets were mainly small and local. While there was some international trade in coal and whale oil, energy markets developed on a large scale only in the decades after 1857 when the first commercial oil well was drilled in Titusville, Pennsylvania. Since the late 1800s, the supply and demand for energy products of all types have been conditioned by technological change, geo-politics, economic conditions, and demographic trends in many parts of the world. The difficulty facing energy producers, government officials, and consumers is that many of these changes are almost impossible to anticipate.

Energy production, whether fossil fuel, nuclear, hydroelectric, or wind, is characterized by long lead times and large capital investments. Price volatility in energy markets is perhaps the most serious problem faced by energy producers when making investment decisions. The colorful history of the energy industry is replete with examples of the dangers of price volatility. Predictions during World War I that the world was 'running out of oil' were followed by major discoveries of new reserves and rapidly falling prices. Rapid price increases in oil markets between 1972 and 1974 and again between 1978 and 1980 were followed in the early 1980s by dramatic price decreases that contributed to crises in financial markets in many parts of the world. While there is no reason to expect that energy price volatility is a thing of the past, several major trends indicate a positive outlook for the nuclear power industry and uranium mining and milling operations.

First, the demand for energy in emerging markets in Asia, particularly China and India, is frequently cited as a contributing factor to recent increases in world oil prices. This increase in demand is a consequence of growth in both GDP and population. China's rapid increases in GDP in recent years in combination with the world's largest population (1.3 billion persons) almost certainly mean continued increases in energy demand in China. Even though China has large energy resources of its own, especially coal reserves, China will be the source of major increases in world demand for energy in the coming decades. India, with a population of 1.1 billion persons also has a growing economy and that nation too will contribute to rising demand for energy. The world has never experienced two economies with more than a billion people in each entering world markets in a major way.

Even a cursory examination of major long-term energy outlooks confirms the importance of China and India in world energy markets. The International Energy Agency (IEA) *World Energy Outlook* for 2007 is focused on the impact of China and India on world energy markets. The US Department of Energy (DOE's) International *Energy Outlook* for 2008 also suggests growing Asian demand for energy products through 2030. Even though the picture presented by these two agencies and others is one of substantial increases in world energy demand, the impact of emerging markets in Asia on world energy markets may be under-estimated.

Second, world-wide concerns over environmental issues are likely to place nuclear generation of electricity at the front of medium term solutions.

The Electric Power Research Institute (EPRI) gathered scientists from many disciplines in 2007 to assess future electrical generation that might reduce greenhouse gas emissions by 2030. The unambiguous conclusion of the EPRI scientists was that the only existing technology to meet increased world electricity demand over the next few decades and simultaneously reduce greenhouse gas emissions was a much heavier reliance on nuclear power. According to EPRI (Barker 2007):

"Nuclear power now accounts for 73% of the emission-free generation in the United States and is the only technologically mature, non-emitting source of power that is positioned to deliver large-scale CO2 reduction in the decades ahead. EPRI's PRISM analysis assumes 64 GW of new nuclear by 2030—an ambitious but achievable target, according to Dave Modeen, vice president of the Nuclear Power sector."

In brief, the combined effects of population growth, economic growth, and environmental concerns are very likely to increase world demand for nuclear generation of electricity over the next few decades. Energy supply issues and the demand for uranium will be discussed after the following presentation of basic data on world population, GDP and energy demand.

Population Trends:

In 2005, the world's population was estimated to be 6.5 billion people.[1] The United Nation's medium variant projection is that the world's population will increase to 8.3 billion by 2030 (Table 2.1). Nearly all of the projected population increase of 2.8 billion persons is expected to occur in the developing world (e.g., non-OECD nations). The projected increase in world population between 2005 and 2030 is larger than the current populations of China and India combined. By 2030, the population of India is projected to be larger than that of China. The population of the United States is projected to increase by 67 million persons by 2030 –nearly a quarter of its current population.

Also shown in Table 2.1 are the UN "Low" and "High" variant population projections. Under any of the projection scenarios, substantial increases in world energy demand can be anticipated –even if there were little or no growth in GDP per person.

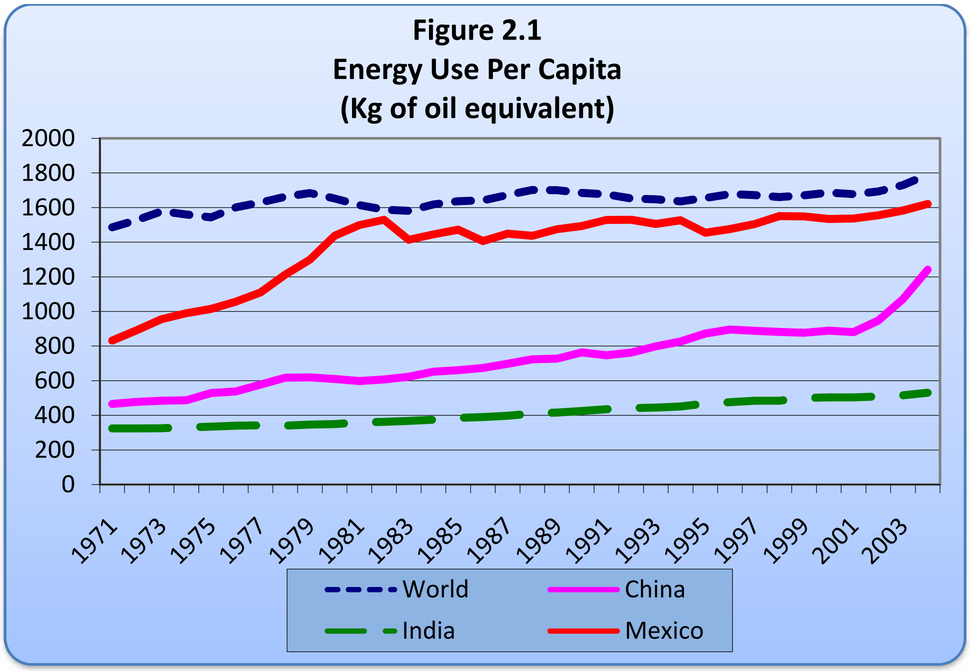
Table 2.1
Projected Population, World and Selected Nations: 2005-2030

Population	Area	2005	2015	2030
Medium Variant	China	1,312.9	1,388.6	1,458.4
Millions of persons	India	1,134.4	1,302.5	1,505.7
	United States	299.8	329.0	366.2
	World	6,514.7	7,295.1	8,317.7
Low Variant	China	1,312.9	1,356.1	1,359.4
Millions of persons	India	1,134.4	1,271.8	1,391.9
	United States	299.8	322.1	341.6
	World	6,514.7	7,127.0	7,727.2
High Variant	China	1,312.9	1,420.1	1,563.2
	India	1,134.4	1.333.3	1,621.5
	United States	299.8	355.9	391.1
	World	6,514.7	7,459.9	8,913.7

Source: United Nations, Population Division. World Population Prospects 2006. http://esa.un.org/unpp/p2k0data.asp

[1] The population data and projections cited here are from: *World Population Prospects: 2006 Revision* produced by the Population Division of the United Nations. The UN projections are widely respected and commonly used as the basis for energy projections (e.g., *International Energy Outlook*, US Department of Energy). The medium variant UN projections assume a decline in the world total fertility rate (TFR) from 2.55 children per woman in 2005 to 2.21children per woman in 2030. The replacement level TFR is 2.08.

On a per capita basis, world energy use has been increasing despite generally rising energy prices. Figure 2.1 displays energy use per capita measured in Kg of oil equivalent from 1971 through 2004 for the world and selected nations. World energy use per capita has increased from 1,486 kg of oil equivalent in 1971 to 1,790 kg of oil equivalent per capita in 2004. The corresponding figures for the US (not shown on the graph) were: 7,672 kg of oil equivalent per person in 1971 and 7,920 kg of oil equivalent in 2004.



Source: World Bank, World Development Indicators, www.worldbank.org

While the increase in per capita energy consumption has been relatively modest, increases in China and Mexico have been particularly large. China's per capita energy use increased from 466 kg per person in 1971 to 1,241 kg per person in 2004 –an increase of 166 percent. There is no reason to suspect that the increase in per capita energy consumption will not continue. Rosen and Houser (2007) argue that the Chinese increases so far have occurred mainly in the industrial sector and that large increases in energy consumption will occur soon when Chinese consumers enter the market in large numbers.

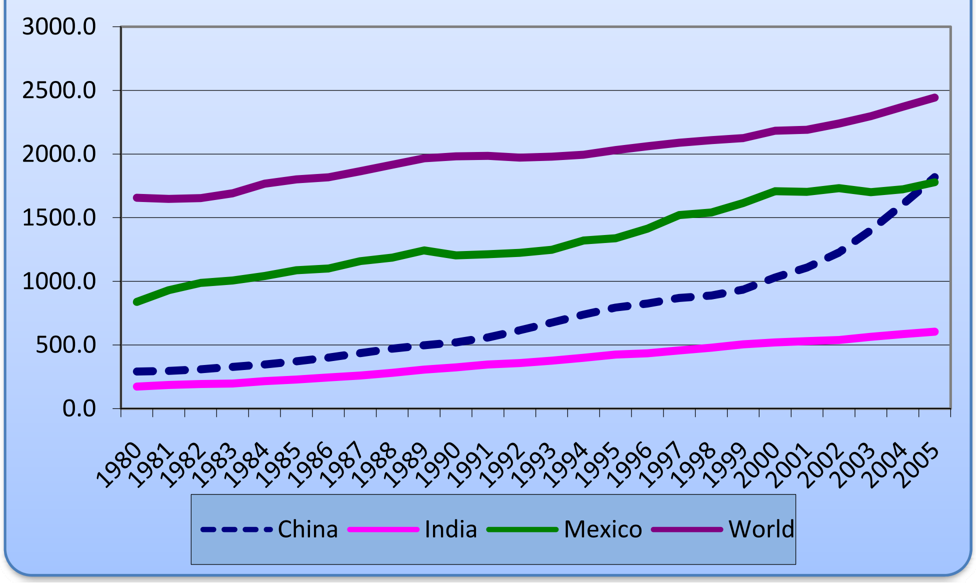
Per capita energy use in India (530 kg of oil equivalent) remains far below that in China (1,242 kg of oil equivalent) and the rest of the world (1,790 kg of oil equivalent). The potential for large increases in per capita energy consumption in India is genuine and India's 1.1 billion people will no doubt have a major influence on world energy markets in coming decades.

Other developing nations will also contribute to an increase in world demand for energy. As an example, Mexico's energy consumption per capita nearly doubled –increasing from 832 kg of oil equivalent in 1971 to 1,621 kg of oil equivalent in 2004. Most of Mexico's increased energy use per person occurred between 1971 and 1981. Mexico's energy use per capita is now near the world average and will probably increase as its economy recovers from the economic instability of the 1980s and 1990s.

The same general pattern can be seen by examining electricity consumption per capita. World electricity consumption per capita increased from 1,567 kwh in 1980 to 2,243 kwh in 2005 (Figure 2.2). China's electricity consumption per capita increased by more than six-fold between 1980 (290 kwh per person) and 2005 (1,818 kwh per person) –and there is no reason to assume that this increase is at an end. India's electricity consumption per person also increased from 173 kwh per person in 1980 to 604 kwh in 2005 –an increase of 249 percent. India's per capita electricity consumption, however, remains substantially below world and Chinese levels.

Although population growth will almost certainly increase the demand for electricity, there is also a huge untapped market potential. The International Energy Agency (WEO 2006, pg. 157) reports that there are still 1.6 billion people –about a quarter of the world's population –without access to electricity.

Figure 2.2
Electricity Consumption Per Capita 1980-2005
Kwh



Sources: (1) Population from World Bank, World Development Indicators. (2) Electricity consumption per capita from International Energy Outlook (EIA). Electricity consumption data for Mexico, the US and the World is net electricity consumption. China and India electricity data represent total generation.

Gross Domestic Product:

Energy demand also depends on economic activity. Gross Domestic Product is the most comprehensive single measure of economic activity. Table 2.2 exhibits GDP in constant (2000) US dollars for the world and selected nations in 2006 with projections to 2030. The projected values of GDP are intended to illustrate broad trends rather than accurate forecasts. The projections are based on the simple assumption that future GDP growth rates are the same as the average annual growth rate between 1996 and 2006. There are several reasons why this projection scenario is not likely to occur. Growth rates rarely remain constant for decades. For example, it is not likely that China's GDP growth rate of

9.2 percent will continue through 2030. Nevertheless, the projection scenarios are probably not worse than more sophisticated assumptions.

In 2006 world GDP was 37.9 trillion dollars. The US economy accounted for 30.1 percent of world GDP in 2006 and about 25 percent of the world's electrical generation capacity.[2] China and India produced 7.4 percent of GDP in 2006 and accounted for about 14 percent of world electricity generation capacity.

At current growth rates, world GDP will more than double by 2030 to 78.8 trillion dollars. The projected growth of world GDP is consistent with other projections including the *International Energy Outlook 2007* (EIA 2007) reference case which projects 2030 world GDP to be 76.9 trillion in constant dollars. World GDP is unlikely to double without a substantial increase in energy demand –including the demand for nuclear generated electricity.

At least three issues should be considered in assessing the projected increase in world energy demand associated with GDP growth. First, there have been substantial decreases in energy intensity (energy use per dollar of GDP). Future improvements in energy intensity may offset some of the increase in energy demand associated with economic growth. Predictions of energy intensity are among the least reliable of any energy sector predictions.

Second, higher per capita income is strongly associated with higher energy use. The projections of population and GDP suggest that world per capita GDP real terms will increase from $5,813 in 2006 to $9,472 in 2030. The projected increase in per capita GDP of 62.9 percent between 2006 and 2030 is strong evidence of a corresponding increase in energy demand.

Third, despite rapid economic growth in other parts of the world in the projection scenario, the United States, a high energy consuming nation, slightly increases its share of world GDP.

Table 2.2
Gross Domestic Product 2006 and Projected GDP 2015 and 2030

	GDP 2006	Average Annual Growth Rate 1996-2006	Projected GDP 2015	Projected GDP 2030
China	2,092.2	9.2	4,619.5	17,295.6
India	703.3	6.6	1,250.2	3,260.9
Mexico	665.6	3.7	923.1	1,591.9
United States	11,411.0	3.3	15,283.6	24,873.1
World	37,866.4	3.1	49,840.4	78,788.3

Source: GDP 2006 World Bank, World Development Indicators, (www.worldbank.org) and author computations for projected values.

Figures shown are in billions of constant (inflation adjusted) 2000 US dollars.

[2] The electrical generation capacity figure is for 2004 from EIA (2007).

World Uranium Demand

World trends and projections of population and economic growth imply significant increases in uranium demand but this outlook should be tempered by considerable uncertainty. First, there is a great deal of uncertainty associated with the projections of world GDP and population. There is even more uncertainty associated with energy and electricity demand. Second, there are no guarantees that increased demand for electricity will result in corresponding increases in nuclear power generation.

There are other reasons to anticipate a substantial increase in the demand for uranium. Since 1990, consumption of U_30_8 by the world's nuclear electric generating plants has been far greater than production (Figure 2.3). Current world production can supply about 60 percent of generation requirements. In 2006 and 2007, the industry used (each year) about 70 million more pounds of U_30_8 than was produced.

Since 1990 the world-wide U_30_8 production deficit is approximately 1.1 billion pounds. The uranium production deficit has been filled from secondary sources including inventories, reprocessing of spent fuel, re-enrichment of uranium tails (uranium left-over from the enrichment process) and from processing weapons grade uranium. As discussed in greater detail below, secondary sources will be inadequate to meet future world uranium requirements.

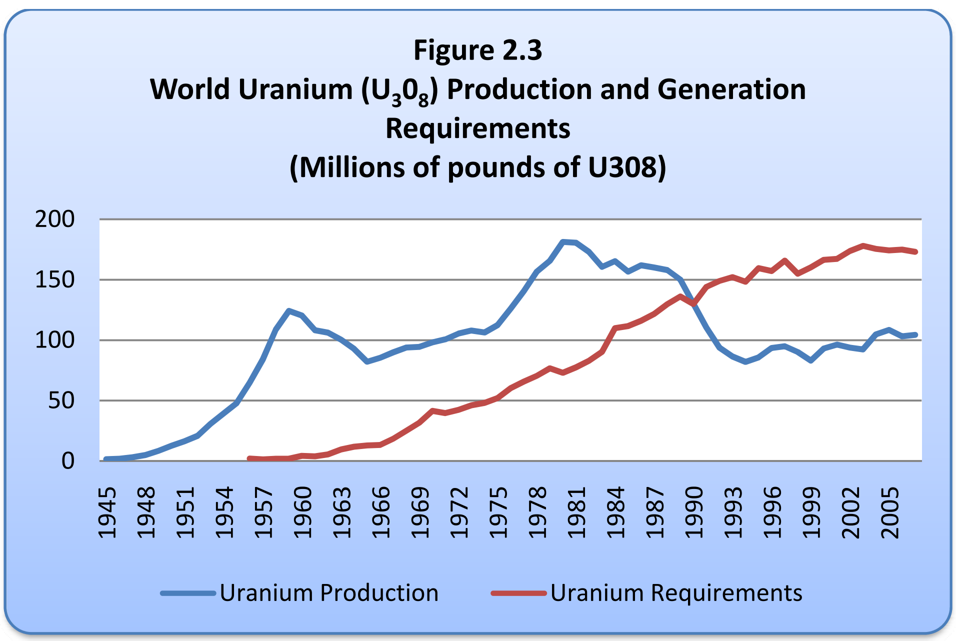


Figure 2.3
World Uranium (U_30_8) Production and Generation Requirements
(Millions of pounds of U308)

Source: Organization for Economic Development/Nuclear Energy Agency (OECD/NEA) *Nuclear Development - Forty Years of Uranium Resources, Production and Demand in Perspective - The Red Book Retrospective (2006*) and author calculations.

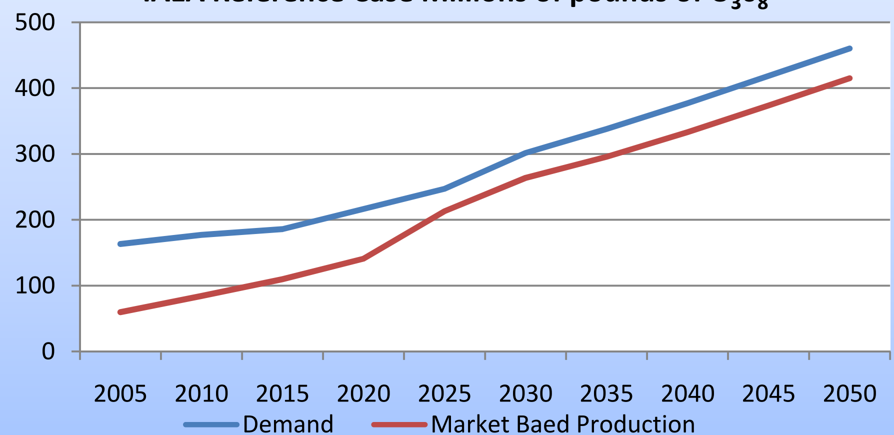
The US Department of Energy/Energy Information Administration (EIA) reports that "The World's nuclear industry operates a total of 443 commercial nuclear generating units with a total capacity of about 364.9 gigawatts." (http://www.eia.doe.gov/ January, 2008). In recent years, electricity generated from nuclear power has been approximately 2.6 Terawatt hours. The World Nuclear Association (http://www.world-nuclear.org/info/reactors.html) reports 2.658 terawatt hours (2,658 billion kilowatt hours) for 2006. Generating 2.6 terawatt hours of electricity requires approximately 175 million pounds of U308 –about 68 million pounds of U_30_8 per terawatt.

In the EIA reference case projections (IEO 2007), world nuclear generating capacity is expected to expand to 481 GW by 2030 and electrical generation to be 3.3 terawatts. Assuming no significant changes in nuclear generating efficiency, the EIA reference case implies a requirement of 217 million pounds of U_30_8 per year by 2030 or roughly a 25 percent increase in uranium demand. In the EIA's high economic growth case, nuclear generation of electricity reaches 3.7 terawatts by 2030 implying a need for approximately 245 million pounds of U_30_8.

Many other projections of nuclear generating capacity, production and uranium requirements are available. The International Atomic Energy Agency in its 2007 *Survey of Energy Resources* provides a range of nuclear generation forecasts ranging from 3.1 to 5.0 terawatts by 2030. The nuclear power industry would need about 335 million pounds of U_30_8 to generate 5.0 terawatts of electricity.

A key feature of all of the forecasts is that market-based production must increase substantially. Existing inventories and secondary sources of uranium are inadequate to meet anticipated generation requirements. Figure 2.4 below displays the IAEA reference case projections of demand (U_30_8 required for generation) and projected market based production required.[3] The gap between the two lines is the amount filled from secondary sources.

Figure 2.4
Uranium Demand and Market Based Production
IAEA Reference Case Millions of pounds of U_30_8



Source: World Energy Council. 2007. *Survey of World Energy Resources*. Table VII, p. 15
Available at: http://www.worldenergy.org/documents/ser2007 final_online version 1.pdf

[3] The term market based production as used by the IAEA is not the same as total world production. Excluded from market based production is production from China and other 'national programs.'

The important feature of Figure 2.4 is that (already decreasing) secondary sources decline significantly after about 2020 and perhaps sooner under alternative scenarios. Declining secondary sources combined with even modest increases in uranium demand for electricity generation, imply substantial increases in world demand for market based production. This scenario suggests that market based production needs to increase from a projected 84 million pounds in 2010 to 264 million pounds in 2030 –nearly a threefold increase.

While healthy skepticism about specific numeric forecasts is appropriate, a powerful argument indicating substantial increases in world uranium demand can be summarized as follows:

- World population and economic growth, particularly in China and India will lead to increases in total and per capita energy and electricity consumption;
- Increasing global concerns about climate change and the environment make nuclear generated electricity an attractive alternative to electricity generated from fossil fuel;
- The large gap between existing production of uranium and the requirements of the nuclear generation of electricity demonstrate the need for increased uranium production;
- Declining supplies of uranium from secondary sources mean that current production must meet a larger part of generation requirements;
- Planned expansion of existing nuclear generating units and the construction of new generating units and;
- Even without expansion, the supply shortfall demonstrates the need for additional uranium production.

There are numerous well-known and widely discussed threats to the increased uranium demand argument. Some of these threats or counter-arguments include:

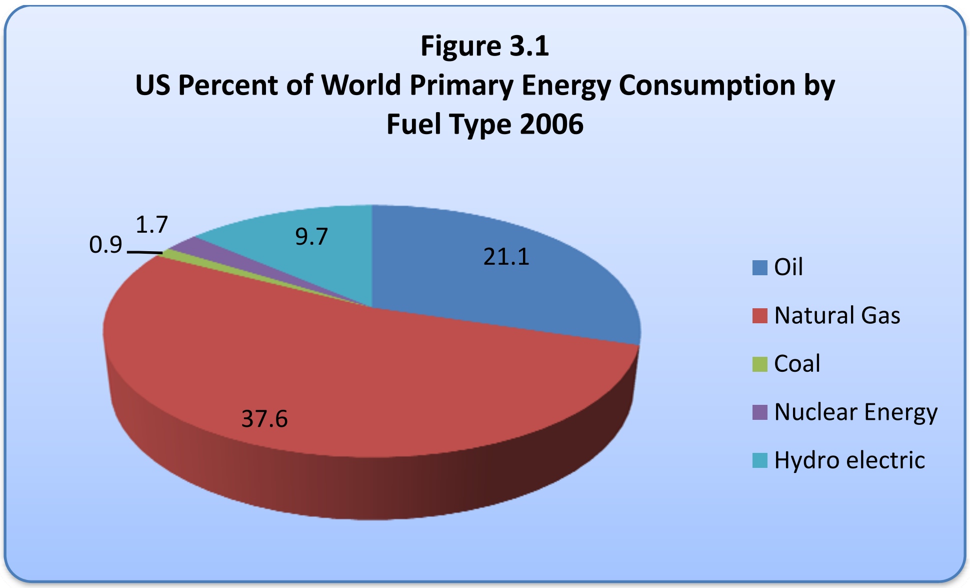
- Extreme price volatility in world uranium markets could pose a serious threat to both producers and consumers of uranium.
- A nuclear accident at a power plant, perhaps more severe than Three Mile Island (1979) or Chernobyl (1982) could make it politically impossible to expand nuclear generation of electricity;
- A serious world-wide economic downturn roughly equivalent to the Great Depression of the 1930s could result in a major reduction in the demand for electricity;
- Major natural disasters or wars could cause long-term disruptions to world population and economic growth;
- Various scenarios could result in major reductions in per capita primary energy and/or electricity consumption;
- Technological advances in alternative (e.g. wind and solar) generating technology could dampen the demand for nuclear generated electricity;
- Technological advances allowing much greater efficiency in the generation of electricity from fossil fuels could disrupt the anticipated increases in the demand for nuclear generated electricity;
- Technological advances in the nuclear generating industry itself could reduce the long-term demand for uranium or;
- Societal and political decisions could dampen the enthusiasm for nuclear power production.

Overall, however, the case for large increases in the demand for uranium over the next few decades appears to be the likely scenario.

Section 3: National (US) Energy Markets and the Demand for Uranium

Primary energy reserves and production

The United States consumed 21.4 percent of the world's primary energy in 2006 including 24.1 percent of world oil production and 29.5 percent of all nuclear energy (Figure 3.1). Per capita primary energy consumption in the US is more than four times the world average[4]. In 2007, on a daily basis, the US consumed 20.7 million barrels of petroleum products (15.7 million barrels of crude oil) including 9.7 million barrels for gasoline, slightly more than 3 million tons of coal, 59 billion cubic feet of natural gas, and 10.6 billion kilowatt hours of electricity. (EIA Short Term Energy Outlook, www.EIA.gov).



Source: BP Statistical Review http://www.bp.com/statisticalreview (March 2008).

Although the US has vast energy resources, imports account for a large portion of total US energy consumption. Table 3.1 displays US imports, exports and reserves of selected energy resources. Reserve data are revised frequently due to changes in technology and prices as well as the addition of new discoveries. A common but often misunderstood phrase in the energy industry is that there is a lot more oil in the ground at $100 per barrel than at $20 per barrel. The reserve data are, however, useful indicators of what is currently known about energy resources.

The US imports negligible amounts coal and is a net exporter of coal. US coal reserves are vast and at current rates of consumption could last for more than two centuries even though the nation generates about half of its electricity from coal.

The US imports nearly two-thirds of its daily consumption of crude oil and this proportion has been increasing in recent years. Known US crude oil reserves have declined from 35.1 million barrels in 1986 to 26.9 billion barrels in 2006 and at current rates of production, oil reserves are sufficient for only 12 years. But a great deal of skepticism regarding oil reserves data is warranted. In the last dozen years the

[4] In 2005, per capita primary energy consumption was 7,893 kg of oil equivalent in the US and 1,796 KG of oil equivalent in the world. Source: World Bank, World Development Indicators. www.worldbank.org.

nation has produced 29.2 billion barrels of crude oil –or an amount only slightly less than the 1996 known reserve figure of 29.8 billion barrels (EIA http://tonto.eia.doe.gov/dnav/pet/hist/mcrfpus1A.htm).

World oil prices well over $100 per barrel in 2008 mean that the US reserve/production ratio receives a great deal of attention in the popular media. The US will spend between $450 and $500 billion importing petroleum and petroleum products in 2008 and this figure is likely to increase if crude oil prices remain above $100 a barrel.

Table 3.1
Selected U.S. Energy Imports, Exports and Reserves

	Coal	Crude Oil	Natural Gas	Uranium
Unit of Measurement	Millions of tons per year	Million Barrels per day	Billion Cubic Feet per Day	Million pounds of U_3O_8 per year
Year	2007	2007	2007	2006
Total	1,128.5	15.4	53.17	66.3
Imports	36.3	10.0	12.61	55.7
Exports	59.2	0.3	2.22	6.3**
Net Exports	22.9	-9.97	-10.39	-49.4
Reserves	246,643 million tons	26.9 billion barrels	209.1 trillion Cubic Feet	890 million pounds
Reserves/Production Ratio***	234	11.9	11.3	198

Source: Except for uranium, Short Term Energy Outlook, Energy Information Administration.
Uranium: Uranium Marketing Annual Report, Energy Information Administration (May 2008).
Reserves data are from BP Statistical report and refer to 2006 year end.
*Total refers to US production plus imports.
**Sales of US origin uranium abroad.
*** The reserves to production (R/P) ratio shows years of reserves remaining at current production levels.

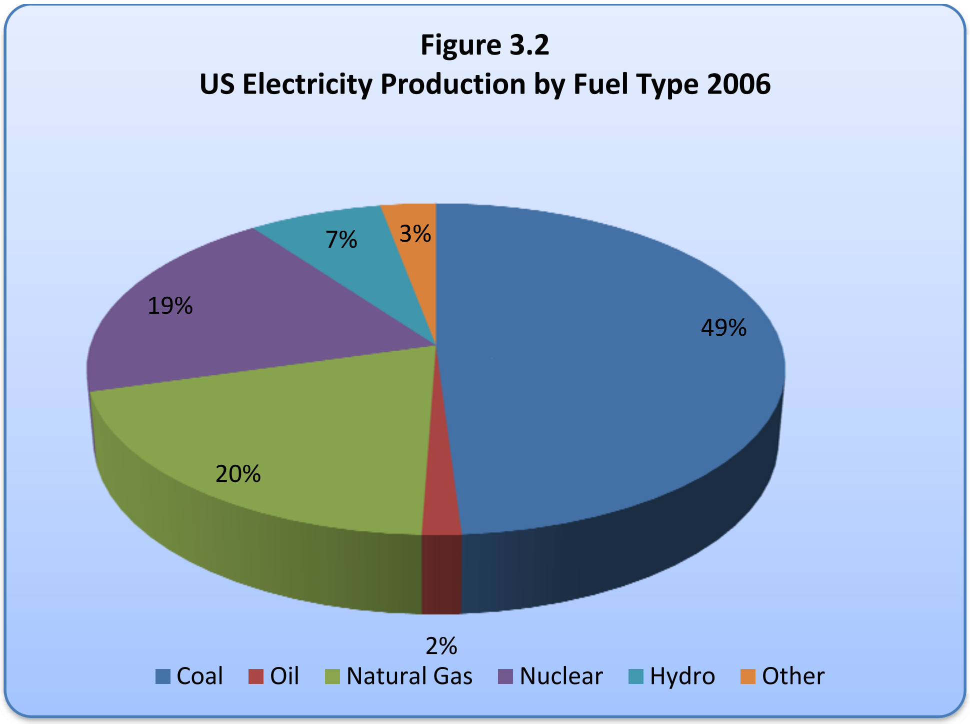
The US imports nearly a quarter (23.7 percent) of its natural gas supplies (Table 3.1). At current rates of production known US reserves of natural gas are sufficient for another 11.3 years. As with oil reserves, this figure should be regarded with skepticism. Known natural gas reserves in the US increased by 20 trillion cubic feet from 1986 to 2006 despite the fact that the US produces more than 20 trillion cubic feet per year.

The US imports about 85 percent of its annual uranium (U_3O_8) requirements of about 65 million pounds per year. U.S. uranium reserves total 890 million pounds (US Department of Energy) at a production cost of $50 per pound. The US has significant uranium reserves that can supply a good portion of domestic reactor needs and could also provide energy security from the current position of importing 85 percent of reactor requirements.

Electricity:

Nearly all uranium consumed in the US is used to produce electricity at the nation's 104 nuclear generating units.

Per capita electricity consumption (13,648 kwh per year in 2005) in the US is more than 5 times the world average.[5] In 2006 total US electricity production was 4,064.7 terawatt hours (EIA: Electric Industry Annual) or about one-fourth of the world's total. [6] Nearly half of the nation's electricity was generated from coal, another 20 percent was generated by natural gas, and nuclear generation accounted for 19 percent (Figure 3.2).



Source: U.S. Department of Energy, Energy Information Administration (DOE/EIA) Electricity Annual available at: http://www.eia.doe.gov/cneaf/electricity/epa/epates.html

Projections of US electricity by fuel type from the EIA suggest that the share of electricity generated by coal will rise from 49 percent to 57 percent by 2030, while the share produced from natural gas will decrease from 19 percent of about 11 percent over the same time period. The share of total US electricity production from nuclear generation remains almost constant over the projection period just under 20 percent (Figure 3.3).). Similar projections of US electricity generation are available from the International Energy Agency (IEA).

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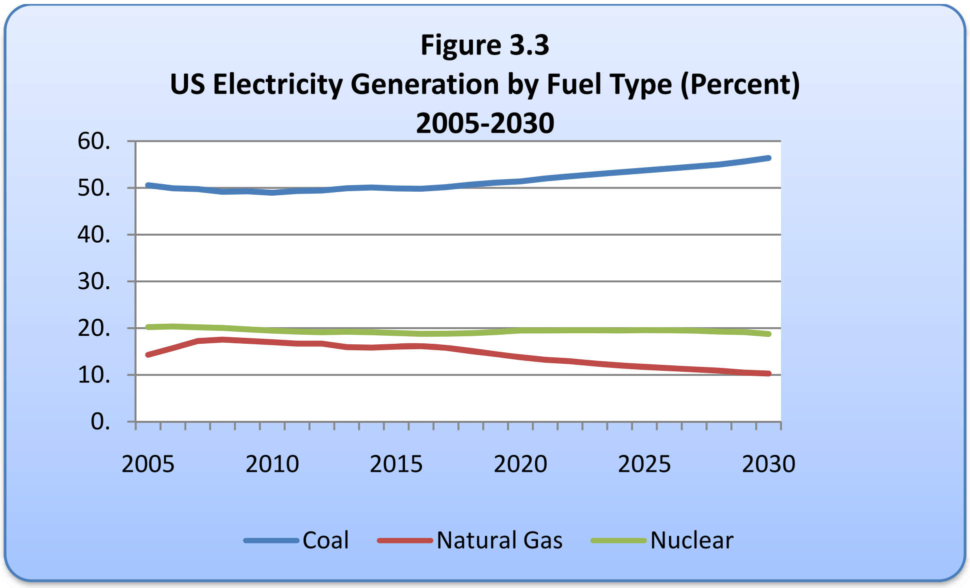
[5] In 2005, per capita electricity consumption in the US was 13,648 kilowatt hours (kwh) compared to the world average of 2,678 kwh. Source: World Bank, World Development Indicators. www.worldbank.org.

[6] That is, US electricity generation was 4,064,702 thousand megawatt hours.



Source: U.S. Department of Energy, Energy Information Administration (DOE/EIA) *Annual Energy Outlook 2008* (Revised March 2008) available at: http://www.eia.doe.gov/oiaf/forecasting.html

The EIA projections indicate that the total amount of electricity generated in the US will increase from 4,022 terawatt hours in 2008 to 4,923 terawatt hours in 2030—an increase of about 1 percent per year. During the same time frame, EIA anticipates that nuclear generation of electricity will increase from 800 terawatts to 917 terawatts –an increase of about 0.6 percent per year. The EIA projections are based on relatively conservative estimates of economic growth and virtually no increase in electricity consumption per capita. If the EIA projections are correct, the nuclear power industry will produce about 15 percent more electricity in 2030 than it will in 2008 and there would be a corresponding increase in the demand for U_3O_8.

Nuclear generation of electricity: an overview

The US has had a commercial nuclear power industry for more than half a century. The first commercial nuclear generating plant in the US (at Shippingport, Pennsylvania) began producing power in 1957[7]. The industry grew slowly. By 1970 there were 20 nuclear generating plants producing 1.4 percent of the nation's electricity. By 1980 there were 71 nuclear generating plants producing 11 percent of the nation's electricity. The number of operable plants in the US peaked in 1990 at 112. In 2007, there were 104 nuclear generating plants producing 19.4 percent of the nation's electricity –a total of about 800 terawatts of electricity (Figures 3.4, 3.5 and 3.6).

[7] The Shippingport nuclear power station was permanently closed in 1982.

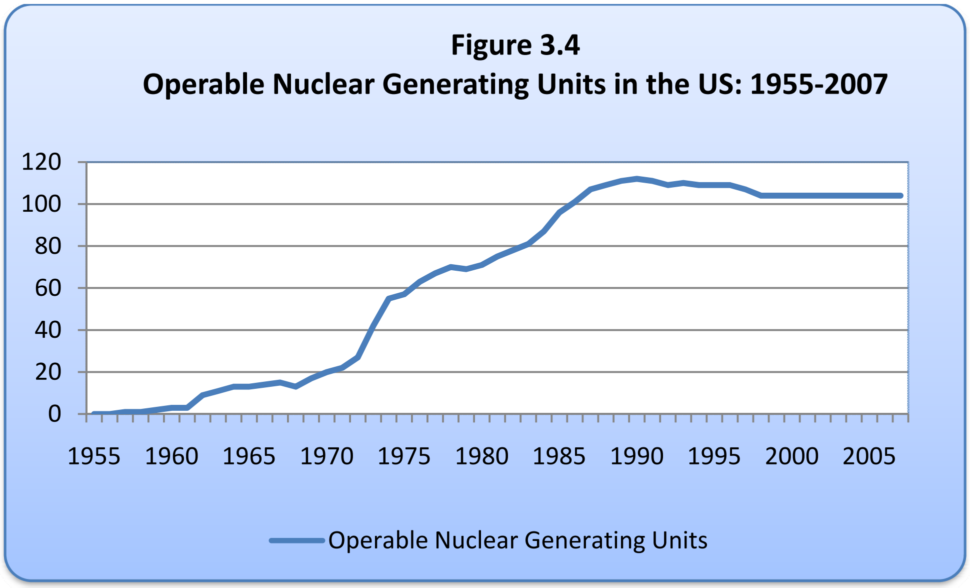


Figure 3.4
Operable Nuclear Generating Units in the US: 1955-2007

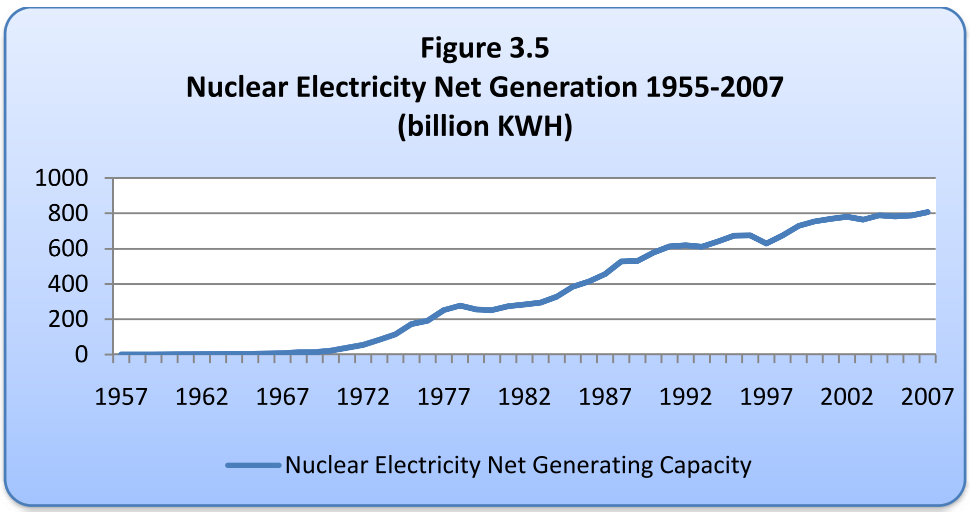


Figure 3.5
Nuclear Electricity Net Generation 1955-2007
(billion KWH)

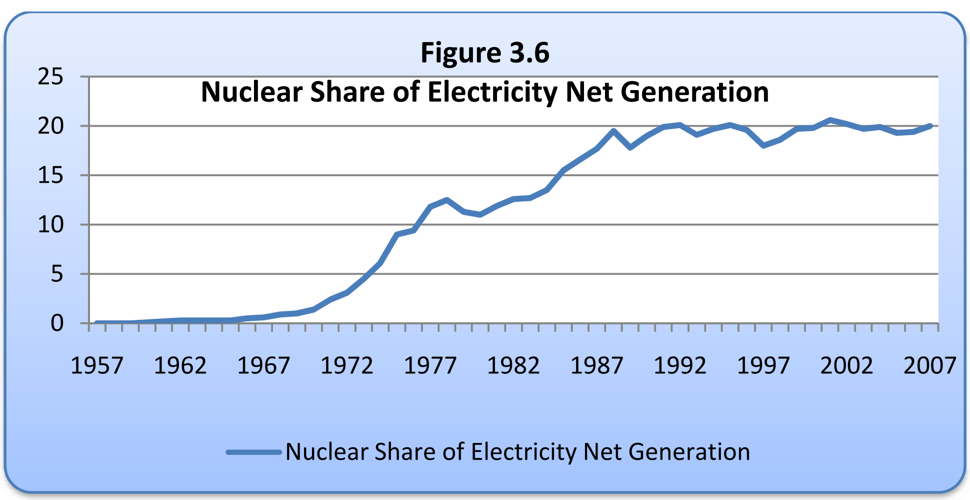
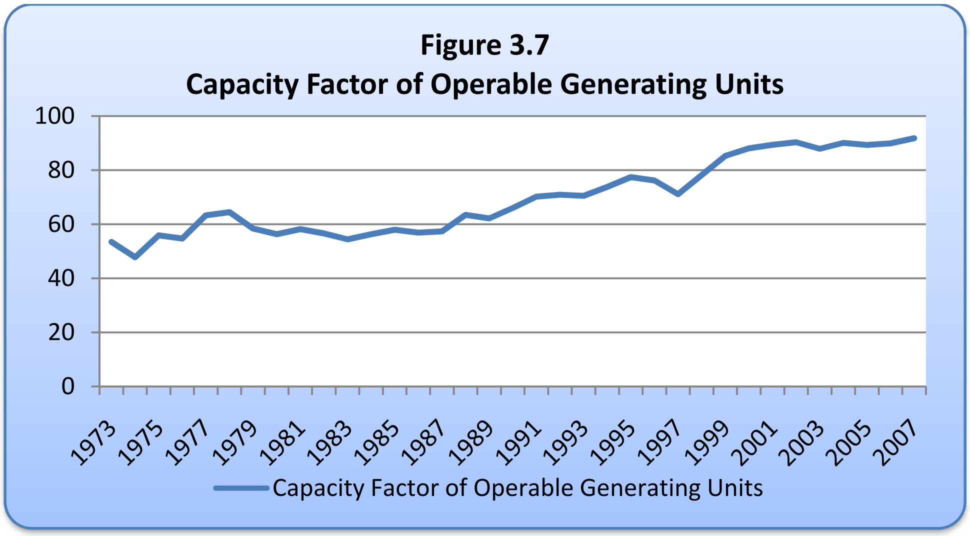


Figure 3.6
Nuclear Share of Electricity Net Generation

The main reason why the nuclear power industry increased its share of total electricity generated in recent years is an increase in its capacity factor[8]. In other words, the nation's nuclear generating plants have been operating more efficiently and have experienced less down-time for maintenance in recent years.



Source of data for Figures 3.4, 3.5, 3.6 and 3.7: U.S. Department of Energy, Energy Information Administration (DOE/EIA) Annual Energy Review,(2007) Tables 9.1 and 9.2

Predicting the number of future nuclear generating plants and their capacity is problematic. There is a long lag between application and actual production of electricity. The Nuclear Regulatory Commission (NRC) publishes a list of potential and actual applications and describes new plants and plant expansions. The applications are for Combined Operating Licenses (COLs) which, if approved, allow the applicant to construct and operate a nuclear generating unit.

Currently (April 2008), the NRC expects 21 applications (9 applications have already been filed) for 34 reactor units between 2007 and 2010. The EIA also publishes a list of anticipated license applications. The most recent NRC and EIA lists of actual and potential nuclear generating units are presented in Appendix A of this section.

The EIA also provides projections of total nuclear generating capacity and generation of electricity in its Annual Energy Outlook series. The following is from the EIA's 2008 annual Energy Outlook (AEO):

" Future nuclear generating capacity in the AEO2008 reference case increases from 100.2 gigawatts in 2006 to 114.9 gigawatts in 2030. The increase includes 17 gigawatts of capacity at newly built nuclear power plants (33 percent more than in the AEO2007 reference case) and 2.7 gigawatts expected from uprates of existing plants, partially offset by 4.5 gigawatts of retirements. "

[8] The EIA defines capacity factor as –the percent of the electrical energy produced by a generating unit for the period of time considered to be the electrical energy that could have been produced at continuous full power operation during the same period.

The EIA projections of generating capacity electrical generation are changed frequently. The 2008 AEO projection of 17 gigawatts of increased capacity by 2030 is slightly more than half of the 34 gigawatts of capacity listed in its status report on applications (see Appendix A). The EIA also anticipates an increase in nuclear generated electricity from 800 billion kwh in 2006 to 917 billion kwh in 2030 (AEO 2008, Table 8).

In short, both EIA and NRC anticipate slow but steady growth of nuclear generation capacity and actual generation of electricity in the US during the next decade and beyond. No credible forecasts show a decline in nuclear generating capacity.

Uranium Demand by the Nuclear Power Industry:

In recent years, the nuclear power industry in the US has purchased about 65 million pounds of U_30_8 to operate the nation's 104 nuclear generating units. US uranium mines and mills produced 4.1 million pounds of U_30_8 in 2006 and 4.5 million pounds in 2007. Depending on the year, another 5 or 6 million pounds of US produced uranium from existing inventories and government stockpiles is sold to the domestic nuclear power industry. As can be seen in Table 3.2, an additional 50 to 55 million pounds of non-US produced uranium is sold to the nuclear power industry each year.

Table 3.2
Uranium Purchased by US Civilian Nuclear Power Industry: Delivery Years 2003: 2006
(millions of pounds of U_30_8)

Country of Origin	2003	2004	2005	2006
Australia	9.326	11.660	9.957	17.052
Canada	17.050	16.468	22.881	13.325
Russia	7.689	10.329	12.959	15.116
Other non-US	12.287	13.303	8.945	10.239
Total Foreign	46.352	51.760	54.742	55.732
US	10.200	12.342	11.007	10.807
Total Purchases	56.552	64.102	65.749	66.539
US Percent of Total	18.0	19.3	16.7	16.2

Source: U.S. Department of Energy, Energy Information Administration (DOE/EIA) 2006 Uranium Market Annual Report (May 2007). http://www.eia.doe.gov/fuelnuclear.html

Future uranium purchases and requirements of the US Nuclear power industry are also reported by EIA in its Annual Uranium Marketing Report. At the end of 2007: (a) unfilled uranium requirements (not under contract) for 2008 through 2017 totaled 264 million pounds of U_3O_8 and (b) contracts for 230 million pounds had been signed for 2008 through 2017 (http://www.eia.doe.gov/cneaf/nuclear/umar/umar.html) . Uranium purchases in 2007 were down significantly (23 percent) from 2006 levels.
If the EIA projections of an increase in nuclear generation of electricity are correct, the implied uranium requirement would increase gradually to 77 million pounds per year by 2030 –a total increase of about 125 million pounds over current consumption levels. Uranium requirements could be as high as 87 million pounds per year if capacity expansion is closer to the 34GW implied by current permits rather than the 17GW assumed in the EIA projection. This would result in a total increase in uranium

requirements of nearly 240 million pounds between 2008 and 2030. In either case, the long term prospect using relatively conservative assumptions is that the US demand for U_3O_8 will increase significantly during the next two decades. How much of the increase in demand will be met by domestic production depends in large part on relative costs of production in the US and other major producers.

Appendix A

Energy Information Administration and Nuclear Regulatory Commission Lists of Potential US reactors

Status of Potential New Commercial Nuclear Reactors in the United States

***Release Date*: December 2007**

***Next Release Date*: June 2008**

Table 1. Potential New Commercial Nuclear Reactor in the United States

Site	Sponsoring Firms	No. of Units	Reactor Design[1]	Potential Capacity (MW)	ESP[2] Application Status	COL[3] Applied For
Bellefonte, AL	NuStart; TVA	2	AP1000	2234	Not sought	Bellefonte[4] Units 3 & 4
Bruneau, ID	AEHI	1	EPR	1600	Not sought	
Callaway, MO	Ameren UE	1	EPR	1600	Not sought	
Calvert Cliffs, MD	UniStar; Constellation	1	EPR	1600	Not sought	Calvert Cliffs[5] Unit 3
Comanche Peak, TX	TXU (Luminant)	2	US-APWR	3400	Not sought	
Grand Gulf, MS	NuStart; Entergy	1	ESBWR	1520	Approved April 2007	
Harris, Shearon, NC	Progress	2	AP1000	2234	Not sought	
Lee, William S. (Cherokee County), SC	Duke	2	AP1000	2234	Not sought	
Levy County, FL	Progress	2	AP1000	2234	Not sought	
Nine Mile Point, NY	UniStar; Constellation	1	EPR	1600	Not sought	
North Anna, VA	Dominion	1	ESBWR	1520	Approved November 2007	North Anna[6] Unit 3
River Bend, LA	Entergy	1	ESBWR	1520	Not sought	
South Texas Project, TX	NRG Energy, South Texas Project	2	ABWR	2700	Not sought	South Texas[7] Units 3 & 4
Summer, Virgil C., SC	Scana; Santee Cooper	2	AP1000	2234	Not sought	
Susquehanna, PA	PPL	1	EPR	1600	Not sought	
Vogtle, GA	Georgia Power; 3 others	2	AP1000	2234	Filed August 2006, Anticipated January 2010	

Sources: Energy Information Administration, Nuclear Regulatory Commission, Nuclear Energy Institute, company filings and press releases.
[1] Reactor designs are defined in the EIA paper "New Commercial Reactor Designs".
[2] ESP is early site permit.
[3] COL is a combined license to build and conditionally operate new commercial nuclear reactors.
[4] Application filed 30 October 2007.
[5] Environmental portion of the filing occurred 13 July 2007.
[6] Application filed 27 November 2007.
[7] Application filed 20 September 2007.

Source: Energy Information Administration.
http://www.eia.doe.gov/cneaf/nuclear/page/nuc_reactors/com_reactors.pdf

Combined License Applications and Subsequent Documentation

A combined license (COL), when issued, is authorization from the NRC to construct and, with conditions, operate a nuclear power plant at a specific site and in accordance with laws and regulations. Prior to issuing a COL, the NRC staff will complete safety and environmental reviews of the combined license applications in accordance with the Atomic Energy Act, NRC regulations, and the National Environmental Policy Act. All stakeholders, most importantly the public, will be given notice as to how and when they may participate in the regulatory process including opportunities to request a hearing on issuance of the license.

Following are the COL applications that have been received to date by the NRC as well as subsequent documentation:

Site Name	Location
Bellefonte Nuclear Site Units 3 and 4	TVA's Bellefonte site near Scottsboro in Jackson County, Alabama
Calvert Cliffs Unit 3	Unistar's Calvert Cliffs site near Lusby in Calvert County, Maryland
Grand Gulf Unit 3	EOI's Grand Gulf site, near Port Gibson in Claiborne County, Mississippi
North Anna Unit 3	Dominion's North Anna sites near Richmond in Louisa County, Virginia
Shearon Harris Units 2 and 3	PE's Harris sites near New Hill in Wake County, North Carolina
South Texas Project Units 3 and 4	STPNOC's South Texas Project sites near Bay City in Matagorda County, Texas
Virgil C. Summer Units 2 and 3	SCE&G's sites near Fairfield County, South Carolina
Vogtle Units 3 and 4	SNC's Vogtle Site near Augusta in Burke County, Georgia
William States Lee III Units 1 and 2	Duke's Lee site near Charlotte in Cherokee County, South Carolina

Expected New Nuclear Power Plant Applications Updated April 23, 2008					
Company *	**Design**	**Date Accepted**	**Site Under Consideration**	**State**	**Existing Op. Plant**
Calendar Year (CY) 2007 Applications					
Duke (52-018/019)	AP1000	2/25/08	William Lee Nuclear Station (2 units)	SC	N
NuStart Energy (52-014/015)	AP1000	1/18/08	Bellefonte (2 units)	AL	N
Dominion (52-017)	ESBWR	1/29/08	North Anna (1 unit)	VA	Y
NRG Energy (52-012/013)	ABWR	11/29/07	South Texas Project (2 units)	TX	Y
2007 TOTAL NUMBER OF APPLICATIONS = 4 TOTAL NUMBER OF UNITS = 7					
Calendar Year (CY) 2008 Applications					
Progress Energy (52-022/023)	AP1000	4/17/08	Harris (2 units)	NC	Y
Progress Energy (756)	AP1000		Levy County (2 units)	FL	N
South Carolina Electric & Gas (743)	AP1000		Summer (2 units)	SC	Y
Southern Nuclear Operating Co. (755)	AP1000		Vogtle (2 units)	GA	Y
Entergy (745)	ESBWR		River Bend (1 unit)	LA	Y
NuStart Energy (52-024)	ESBWR	4/17/08	Grand Gulf (1 unit)	MS	Y
Exelon (761)	ESBWR		Victoria County (2 units)	TX	N
UNISTAR (52-016)	EPR	1/25/08	Calvert Cliffs (1 unit)	MD	Y
PPL Generation (763)	EPR		Berwick (1 unit)	PA	Y
AmerenUE (750)	EPR		Callaway (1 unit)	MO	Y
UNISTAR (759)	EPR		Nine Mile Point (1 unit)	NY	Y
Luminant Power (754)	USAPWR		Comanche Peak (2 units)	TX	Y
Detroit Edison (757)	TBD		Fermi (1 unit)	MI	Y
Amarillo Power (752)	EPR		Vicinity of Amarillo (2 units)	TX	UNK
Alternate Energy Holdings (765)	EPR		Bruneau (1 unit)	ID	N
2008 TOTAL NUMBER OF APPLICATIONS = 15 TOTAL NUMBER OF UNITS = 22					
Calendar Year (CY) 2009 Applications					
Florida Power and Light (763)	AP1000		Turkey Point (2 units)	FL	Y
2009 TOTAL NUMBER OF APPLICATIONS = 1 TOTAL NUMBER OF UNITS = 2					
Calendar Year (CY) 2010 Applications					
Blue Castle Project	TBD		Utah	UT	N
Unannounced	TBD		TBD	TBD	UNK
Unannounced	TBD		TBD	TBD	UNK
2010 TOTAL NUMBER OF APPLICATIONS = 3 TOTAL NUMBER OF UNITS = 3					
2007 – 2010 Total Number of Applications = 23 Total Number of Units = 34					

*Project Numbers/Docket Numbers

Yellow – Acceptance Review Ongoing

Blue – Accepted/Docketed

1

Section 4

The Uranium Industry in New Mexico

Uranium was discovered in New Mexico in the late 19th century but there were few known uses for it until the 1940s (Rautman, 1977, p.1). Major discoveries of uranium in New Mexico occurred between 1950 and 1955 when the large deposits near Ambrosia Lake were found.

New Mexico sold its first uranium to the US Atomic Energy Commission in 1948 but because the ores were processed in Utah, no production for New Mexico was reported until 1953 (Hatchell and Wentz, p. 3). Reasonably consistent New Mexico production data exist only after 1955. New Mexico has produced more uranium (U_30_8) than any other state except Wyoming –which surpassed New Mexico's production in 2007. Between 1955 and 2007 New Mexico U_30_8 production (Table 4.1 and Figure 4.1) totaled 333.6 million pounds or 35.6 percent of all U.S. production.

Figure 4.1
U_3O_8 Production in New Mexico and the US 1955-2006
(Millions of pounds)

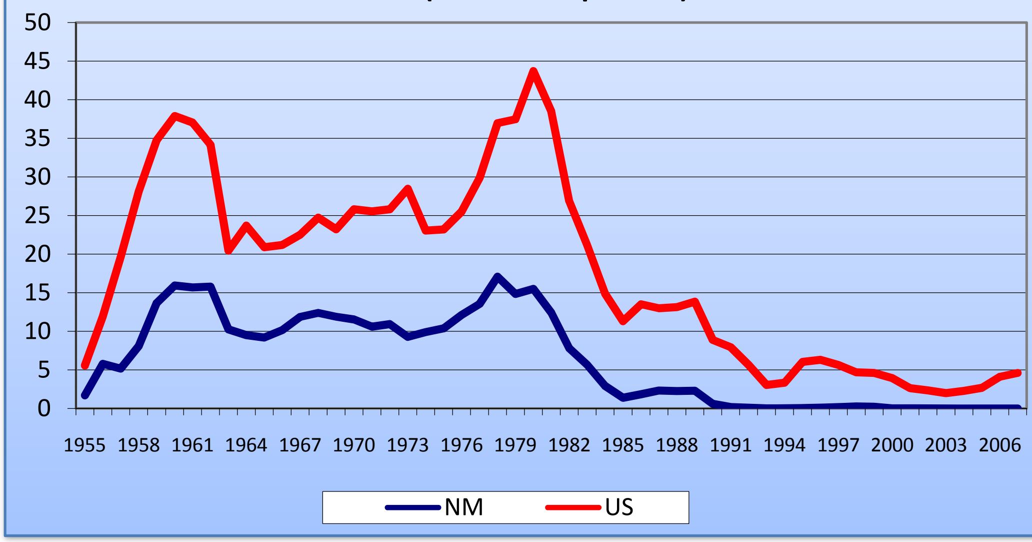


Table 4.1
Uranium (U_3O_8) Production in New Mexico and the United States:
1955-2007
(millions of pounds of U308)

Year	NM	US	Year	NM	US
1955	1.69	5.57	1982	7.81	26.87
1956	5.78	11.92	1983	5.66	21.16
1957	5.17	19.68	1984	2.92	14.88
1958	8.06	28.08	1985	1.38	11.31
1959	13.66	34.76	1986	1.85	13.51
1960	15.93	37.88	1987	2.33	12.99
1961	15.70	37.03	1988	2.26	13.13
1962	15.79	34.17	1989	2.30	13.84
1963	10.26	20.46	1990	0.61	8.89
1964	9.49	23.69	1991	0.18	7.95
1965	9.18	20.88	1992	0.11	5.65
1966	10.15	21.18	1993	0.03	3.06
1967	11.87	22.51	1994	0.04	3.35
1968	12.38	24.74	1995	0.07	6.04
1969	11.89	23.22	1996	0.09	6.32
1970	11.54	25.81	1997	0.22	5.64
1971	10.61	25.55	1998	0.26	4.70
1972	10.93	25.80	1999	0.23	4.61
1973	9.27	28.47	2000	0.02	3.96
1974	9.90	23.06	2001	0.02	2.64
1975	10.38	23.20	2002	0.02	2.34
1976	12.12	25.49	2003	0.00	2.00
1977	13.56	29.88	2004	0.00	2.28
1978	17.08	36.97	2005	0.00	2.69
1979	14.85	37.47	2006	0.00	4.11
1980	15.50	43.70	2007	0.00	4.62
1981	12.41	38.47			

Sources: 1955-1966, U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook, annual volumes. 1966 to 1992, Energy Information Administration, Uranium Industry Annual, 1992 Table 17, p. 38. US 1996 to 2007, Energy Information Administration, Domestic Uranium Production Report, Quarterly 3rd Quarter 2007, issued Feb 15, 2008. NM 1992-2007, New Mexico Energy and Minerals Department, Annual Resources Reports

During the 1940s and the 1950s, nearly all uranium production in New Mexico and elsewhere in the US was sold to the federal government for nuclear weapons with small amounts being consumed by the medical industry and research laboratories. Uranium markets in these early years were tightly controlled by the federal government. Both prices and production were determined by Department of

Defense and later the Atomic Energy Commission. Exploration, drilling, mining, and milling operations were highly subsidized by the federal government during this period (Bureau of Mines, Minerals Yearbooks 1955-1960).

Non-military markets for uranium began to develop after the nation's first nuclear power plant in Shippingport, PA became operational in late 1957. By 1957, there were 757 uranium mines and 19 uranium mills in operation in the US. New Mexico, as in most years, was the largest producer in 1957 and continued in this role in nearly all subsequent years.

By 1958 there were 23 uranium processing mills in the US with six mills located in New Mexico (See Table 4.2). The New Mexico mills were located in Grants and Shiprock and combined had a capacity of 11,075 tons of ore per day and represented more than half (52.6 percent) of the nation's milling capacity. The mills had an estimated capital cost of $62.3 million –a considerable sum in the 1950s equal to approximately $454 million in 2008 dollars. Many of the mills remained operational into the 1970s.

Table 4.2
Forward Cost Uranium Reserves December 2003

State	$30 per pound		$50 per pound	
	Ore (million Tons)	U_3O_8 (million pounds)	Ore (million Tons)	U_3O_8 (million pounds)
Wyoming	41	106	238	363
New Mexico	15	84	102	341
Arizona, Colorado and Utah	8	45	45	123
Texas	4	6	18	23
Other*	6	24	21	40
Total	74	265	424	890

*Other states include California, Idaho, Nebraska, Nevada, North Carolina, Oregon, South Dakota, and Washington.
Source: US Department of Energy, Energy Information Administration, Office of Coal, Nuclear and Alternate Fuels (2004). www.eia.doe.gov.

Uranium production in New Mexico and the nation declined in the 1960s because: (a) more uranium ore was being produced at the mines than mills could process, (b) military procurement of uranium decreased, and (c) the relatively slow development of civilian nuclear power plants. For a fascinating discussion of uranium production in the 1950s and 1960s, read the annual *Minerals Yearbooks* produced by the U.S. Bureau of Mines.

New Mexico's uranium production peaked in 1978 at 17.1 million pounds of U_3O_8. Employment in New Mexico's uranium industry peaked in 1979 at nearly 8,000 employees with a payroll of $165 million (McDonald, 1982, p. 20). The 1979 payroll of $165 million would be approximately $481 million in 2008 dollars. Both production and employment dropped rapidly in the 1980s as national demand for uranium declined after the Three Mile Island incident and further after the Chernobyl accident in the former

Soviet Union. By 1982, New Mexico's U_3O_8 production had decreased to 45 percent of its 1978 peak (Table 4.1). The critical year for the state's uranium industry was 1982. After 1982, the New Mexico uranium industry was not a major factor in the state economy. By 1992 mining operations had essentially ceased and only minor recovery operations continued.

New Mexico has not produced U_3O_8 since December, 2002 when Rio Algom Mining LLC (formerly Quivira) ceased recovery operations in the Lake Ambrosia area. New Mexico's 2002 production of U_3O_8 was 18,491 pounds –slightly more than one percent of its 1978 production. Employment had fallen to only 27 persons with an estimated payroll under one million dollars[9].

The decline of the New Mexico uranium industry was caused by precipitous declines in price. By 2000, U_3O_8 spot prices were only $6.50 per pound. The current resurgence of interest in uranium production in New Mexico and other states is the result of an equally dramatic increase in prices –with U_3O_8 spot prices reaching $143 per pound in mid-2007. Long term (contract) prices are about $90 per pound in early 2008. The prospects for renewed uranium operations in New Mexico are genuine.

New Mexico's uranium reserves are the second largest in the U.S. (Energy Information Administration, http://www.eia.doe.gov/cneaf/nuclear/page/ reserves/ures.html) The EIA has not updated its reserves estimates since the figures below were released in 2004. As with reserve estimates in other industries, commercially viable reserves vary with price. The U_3O_8 prices used for the EIA estimates were $30 and $50 per pound. These prices should be regarded as reference prices only since U_3O_8 spot and contract prices have increased far above these levels. Uranium producers frequently update their own reserve estimates.

The potential for uranium mining and milling operations in New Mexico is very large given these (probably conservative) reserve estimates. At $100 per pound, New Mexico mining and milling operations could directly generate a total of $34 billion over several years or about half of a year's current state gross domestic product. The indirect effects will be assessed later in this report.

[9] The information in this paragraph was reported in: New Mexico Energy and Minerals Department, New Mexico's Natural Resources, 2003, p. 20.

Section 5: Uranium and Taxes in New Mexico: An Overview

This overview provides background material on tax revenue that may be generated by future uranium mining and milling operations. Ultimately, the purpose is to explain the effective tax rates used later in the report to assess the fiscal implications of future uranium mining and milling operations in New Mexico.

New Mexico imposes three direct taxes on uranium production. These taxes are the severance tax, the resource excise tax, and a conservation tax. All three taxes are imposed on the value of U_30_8 produced, but calculations for what is taxable vary among the three.

Future uranium production will also produce tax revenue for New Mexico indirectly. The main indirect taxes associated with the uranium industry include the personal income tax (PIT), corporate income tax (CIT), and gross receipts taxes (GRT) paid by industry employees on goods and services purchased in the state. The PIT, CIT, and GRT account for more than three-quarters of all state tax revenue. The uranium industry itself is exempt from gross receipts taxes because it pays the resource excise tax.

Direct Taxes: The Severance Tax

The severance tax is currently 3.5 percent of 50 percent of the taxable value of U_30_8 produced. Currently, the effective severance tax rate on uranium is 1.75 percent. A summary of severance taxes paid on uranium from 1973 to 1992 is presented in Table 5.1. Severance tax data prior to 1973 are unavailable. After 1992, very little uranium has been produced in New Mexico. Between 1973 and 1992, New Mexico collected slightly more than $82 million in severance taxes on production of 141 million pounds of U_30_8 produced (Table 5.1). During the two decades considered, the severance tax on uranium averaged 58 cents per pound of U_30_8 and was just under 2 percent of its gross value.

Major changes to the severance tax on uranium in New Mexico are presented below (New Mexico Department of Taxation and revenue 2005).

- 1933: New Mexico imposed a severance tax on natural resources. Uranium was not on the specified list of resources to be taxed.
- 1951: Uranium was specifically added to the list of natural resources taxed
- 1957: The severance tax rate on uranium was increased to 0.5 percent from 0.125 percent.
- 1961. The Severance tax rate on uranium and other fissionable materials was raised to 1.0 percent.
- 1972: The taxable value for uranium was set at 50% of the taxpayer's average unit sales price per pound of U_3O_8 during the preceding calendar year, less 50% for hoisting, loading and crushing.
- 1977: A graduated rate table, based on price per pound of U_3O_8 was adopted for uranium. Rates ranged from 1% at prices up to $5 per pound to $3.24 per pound for U_3O_8 with taxable value over $50. Top rate subject to surtax adjusted annually in accordance with the increase in the CPI. Sales under certain existing contracts with no tax pass-through were eligible for a flat 1.25% rate.

- 1980: Step rate table for uranium raised, but with substantial credits phasing out over 3 years. New table provided rates ranging from 2% at prices up to $5 to $3.15 at $40 plus 12.5% for excess over $40.
- 1981: Taxable value of uranium reduced to 60% of sales price for three years, and the rate table adopted in 1980 applied to this computed price. Temporary credits retained.
- 1983: Tax on uranium reduced to 3.5% applicable to 50% of sales value.

Table 5.1:
New Mexico Uranium Severance Tax

Year	**Quantity (lbs of U_3O_8)**	**Avg Price ($/lb)**	**Gross Value ($)**	**Tax Due ($)**	**Severance Tax per Pound**	**Severance Tax per $ gross value**
1973	9,922,639	6.34	62,946,413	131,935	0.01	0.00
1974	10,797,712	6.57	70,971,418	162,179	0.02	0.00
1975	10,852,685	7.11	77,135,835	181,556	0.02	0.00
1976	12,434,876	5.09	63,322,529	259,737	0.02	0.00
1977	12,317,108	14.89	183,377,081	4,414,590	0.36	0.02
1978	16,518,959	25.69	424,369,460	17,960,856	1.09	0.04
1979	15,306,368	24.21	370,502,077	13,354,032	0.87	0.04
1980	14,482,995	25.62	371,017,915	17,215,585	1.19	0.05
1981	9,077,090	31.40	285,028,600	11,090,167	1.22	0.04
1982	7,310,803	31.64	231,286,875	6,302,662	0.86	0.03
1983	4,151,805	30.87	128,172,362	3,575,660	0.86	0.03
1984	1,498,961	38.41	57,568,170	1,007,443	0.67	0.02
1985	2,690,901	30.51	82,108,986	1,436,907	0.53	0.02
1986	4,130,500	21.16	87,419,532	1,528,742	0.37	0.02
1987	3,642,541	22.18	80,790,641	1,413,836	0.39	0.02
1988	2,974,044	23.13	68,096,742	1,191,692	0.40	0.02
1989	2,349,421	15.57	36,580,485	640,256	0.27	0.02
1990	760,122	8.85	6,726,233	117,708	0.15	0.02
1991	330,818	26.34	8,713,731	152,911	0.46	0.02
1992	106,000	20.70	2,194,200	38,399	0.36	0.02
Totals	141,656,348		2,698,329,285	82,176,853		

Sources: Data for 1973-75 quoted in Bill Hatchell and Chris Wentz, *Uranium Resources and Technology: A review of the NM Uranium Industry*, New Mexico Energy and Minerals Department, June 1981, p. 118. Data for 1976-1992 are from the annual reports of the NM Energy and Minerals Department

Direct Taxes: The Resources Excise Tax

The New Mexico Resources excise tax was imposed in 1966 at a rate of .75% of the amount of money or the reasonable value of severed or processed resources (New Mexico Taxation and Revenue Department 2005). Between 1966 and 1972 the value of U_30_8 taxed was set by a court ordered formula. Data for the 1973 through 1992 period are presented in Table 5.2. As with the severance tax, data prior to 1973 are not available. Between 1973 and 1992 New Mexico collected $22 million in resource excise taxes from uranium production. The average resources excise tax collected was 15 cents per pound and about 0.7 cents per dollar of gross value. Given inconsistencies in the data, it is not possible to calculate the resource excise taxes paid on a taxable value basis. There have been no significant changes to the resources excise tax on uranium since its inception in 1966.

Table 5.2:
New Mexico Uranium Resource Excise Tax

Year	Quantity (lbs of U_30_8)	Avg Price ($/lb)	Gross Value ($)	Tax Due ($)	Resource Excise Tax per Pound	Resource Excise Tax per $ gross value
1973	9,922,639		62,946,413	455,597	0.046	0.007
1974	10,797,712		70,971,418	517,797	0.048	0.007
1975	10,852,685		77,135,835	564,002	0.052	0.007
1976	13,043,391	12.54	163,627,799	1,182,967	0.091	0.007
1977	13,827,394	25.00	345,675,642	2,573,715	0.186	0.007
1978	16,649,335	25.28	420,933,093	3,143,628	0.189	0.007
1979	15,881,014	24.32	386,259,346	2,857,763	0.180	0.007
1980	15,341,089	25.20	386,558,451	2,841,245	0.185	0.007
1981	10,468,623	28.86	302,154,452	2,207,810	0.211	0.007
1982	7,725,384	31.25	241,381,702	1,765,643	0.229	0.007
1983	5,354,208	23.61	126,436,706	945,285	0.177	0.007
1984	1,714,465	35.83	61,430,639	451,797	0.264	0.007
1985	2,172,203	36.05	78,317,613	577,873	0.266	0.007
1986	4,484,825	19.74	88,562,340	659,232	0.147	0.007
1987	3,642,542	22.18	80,790,641	549,655	0.151	0.007
1988	2,974,044	23.13	68,096,742	470,470	0.158	0.007
1989	2,349,421	15.57	36,580,485	212,060	0.090	0.006
1990	760,122	8.85	6,726,233	24,355	0.032	0.004
1991	330,818	26.34	8,713,731	65,533	0.198	0.008
1992	106,000	20.70	2,194,200	16,456	0.155	0.007
Totals	148,397,914		3,015,493,481	22,082,883		

Source: Same as Table 1.

Direct Taxes: The Conservation Tax

New Mexico imposed a conservation tax on the oil and gas industry in 1935. The conservation tax was not imposed on the uranium industry until 1975 (Goodwin 2005). The conservation tax rate was 0.18 percent in 1975 and was increased to 0.20 percent in 1977. There have been no significant changes to the conservation tax as it relates to the uranium industry since 1977. Conservation tax data for the uranium industry are displayed in Table 5.3 for 1976 through1992. Between 1976 and 1992 New Mexico's conservation tax amounted to slightly more than $1 million on 112 million pounds of U_30_8 production –or about 1 cent per pound.

Table 5.3
New Mexico Conservation Tax on Uranium

Year	Quantity+B43 (lbs of U3o8)	Avg Price ($/lb)	Gross Value ($)	Tax Due ($)	Conservation Tax per Pound of U308	Conservation Tax per $ gross value
1976	12,646,013	12.54	34,865,763	52,689	0.004	0.002
1977	13,456,005	25.00	76,032,265	119,520	0.009	0.002
1978	16,799,428	25.28	106,733,659	178,117	0.011	0.002
1979	14,869,959	24.32	90,267,080	144,772	0.010	0.002
1980	13,928,413	25.20	89,009,376	149,692	0.011	0.002
1981	8,771,172	28.86	71,592,313	116,486	0.013	0.002
1982	7,725,384	31.25	59,678,591	96,510	0.012	0.002
1983	5,354,208	23.61	31,249,257	40,371	0.008	0.001
1984	1,714,465	35.83	15,185,318	14,955	0.009	0.001
1985	2,172,203	36.05	19,357,717	37,610	0.017	0.002
1986	4,484,825	19.74	21,884,726	38,434	0.009	0.002
1987	3,642,542	22.18	19,971,679	36,361	0.010	0.002
1988	2,974,044	23.13	17,004,798	39,493	0.013	0.002
1989	2,349,421	15.57	9,042,696	21,929	0.009	0.002
1990	760,122	8.85	1,662,934	2,622	0.003	0.002
1991	330,818	26.34	2,154,038	4,222	0.013	0.002
1992	106,000	20.70	542,406	998	0.009	0.002
Totals	112,085,022		666,234,618	1,094,781		

Source: Same as Tables 2 and 3.

A Brief Summary of Direct Taxes on the Uranium Industry:

Table 5.4 provides a brief summary of direct taxes on the uranium industry in New Mexico including an effective tax rate per pound and an effective tax rate per dollar of gross value. The effective tax rates will be used to estimate the fiscal impacts of future uranium mining and milling operations in New Mexico in a later section of this report. The effective tax rates based on historical patterns provide a better estimator of future tax liabilities than actual tax rates.

Table 5.4:
Direct Taxes on U_30_8 production in New Mexico: A Summary

Tax	Total Taxes 1975-1992 ($)	Nominal tax rate	Effective Tax Rate per pound of U308	Effective Tax Rate per $ of U308 production
Severance	82,176,153	3.5 % of gross value	$0.58 per pound of U308	1.75 cents per dollar
Resources Excise Tax	22,082,833	0.75 % of reasonable value	$0.1489 per pound of U308	0.73 cents per dollar
Conservation Tax	1,094,781	0.20 % of taxable value	$0.00976 per pound of U308	0.16 cents per dollar
Totals	105,353,767			

Other Taxes: Personal Income Tax (PIT)

In recent years, the PIT accounted for nearly a quarter (23.8 percent) of the state's total tax revenue (Table 5.5). The renewal of significant uranium operations will affect PIT revenues in two major ways. First, those employed directly by the uranium industry will pay PIT. Second, personal income will increase for employees and proprietors through economic activity generated by the multiplier process.

Table 5.5 Selected New Mexico Taxes 2001-2007								
YEAR	All New Mexico Taxes	GRT	GRT Percent of All Taxes	PIT	PIT percent of all taxes	CIT	CIT percent of all taxes	(GRT+ CIT+PIT) percent of all taxes
	($1,000s)	($1,000s)		($1,000s)		($1,000s)		
2001	4,002,246	2,083,196	52.05	830,006	20.74	190,673	4.76	77.55
2002	3,628,055	1,822,878	50.24	982,891	27.09	124,327	3.43	80.76
2003	3,607,156	1,873,420	51.94	923,113	25.59	101,546	2.82	80.34
2004	4,001,780	2,038,440	50.94	1,007,248	25.17	138,196	3.45	79.56
2005	4,478,321	2,170,521	48.47	1,086,015	24.25	242,462	5.41	78.13
2006	5,110,683	2,387,718	46.72	1,123,954	21.99	377,185	7.38	76.09
2007	5,205,322	2,483,021	47.70	1,149,805	22.09	425,087	8.17	77.96
Averages			49.72		23.85		5.06	78.63
Source: State tax data from U.S. Bureau of the Census http://www.census.gov/govs/statetax/								

Between 2001 and 2007 PIT taxes averaged nearly 2 percent (Table 5.6) of the state's total personal income. This average applied to personal income generated through uranium related activities will be used to estimate PIT impacts. The relationship between personal income and PIT paid has been very stable (Table 5.6).

Table 5.6: New Mexico Personal Income Taxes and Personal Income			
PIT	NM PIT	NM Total Personal Income	PIT per $ of TPI
2001	830,006,000	44,138,165,000	0.01880
2002	982,891,000	44,986,517,000	0.02185
2003	923,113,000	46,650,275,000	0.01979
2004	1,007,248,000	50,707,317,000	0.01986
2005	1,086,015,000	53,714,363,000	0.02022
2006	1,123,954,000	58,131,416,000	0.01933
2007	1,149,805,000	62,001,991,000	0.01854
Averages			0.01977
Sources: PIT data from U.S. Bureau of the Census http://www.census.gov/govs/statetax/ TPI data from U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System http://www.bea.gov			

Other Taxes: Corporate Income Tax (CIT)

Corporate income taxes accounted for 5.06 percent of all New Mexico tax revenues between 2001 and 2007 (Table 5.5). This percentage varies from year to year because of changes in corporate profits associated with the business cycle. Notice, for example, the decreases in CIT that occurred in 2002 and 2003 after the national recession that began in 2001.

New Mexico CIT taxes averaged 0.3 percent of state Gross Domestic Product (GDP) between 2001 and 2006 (Table 5.7). State GDP data for 2007 are not yet available. While the CIT is imposed on net corporate income, CIT as a percent of output provides reasonably accurate estimates of future CIT tax liability without the nearly impossible task of estimating net corporate income.

Table 5.7:
New Mexico Corporate Income Taxes and GDP

Year	CIT	GDP	CIT per $ of GDP
	($1,000s)	($1,000s)	
2001	190,673	51,359,000	0.00371
2002	124,327	52,510,000	0.00237
2003	101,546	57,469,000	0.00177
2004	138,196	63,861,000	0.00216
2005	242,462	69,692,000	0.00348
2006	377,185	75,910,000	0.00497
2007	425,087		
Averages			0.00308

Sources: Tax data same as Table 5. GDP data from U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System http://www.bea.gov

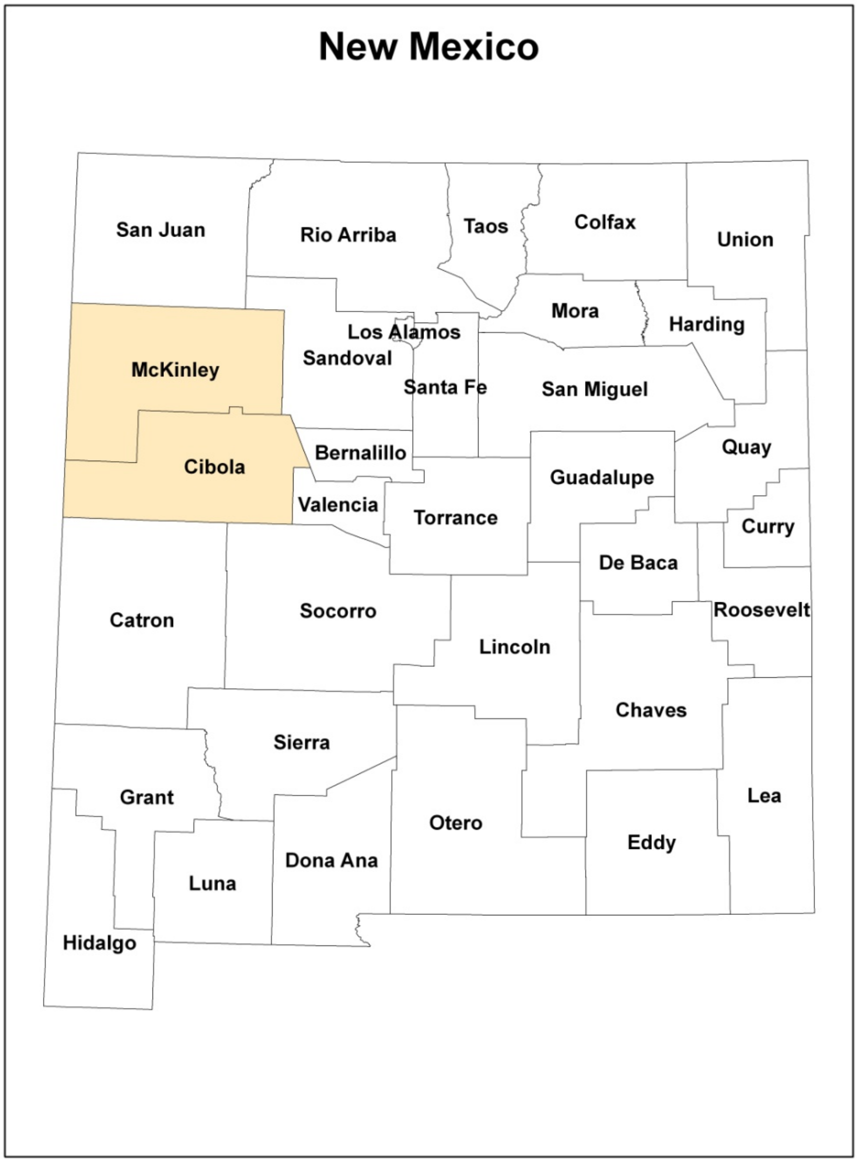
Other Taxes: Gross Receipts Taxes

The Gross Receipts Tax (GRT) accounted for half (49.72 percent) of all state tax revenue between 2001 and 2007 (Table 5.5) –the largest proportion of the major tax categories. The GRT is paid by businesses but ultimately it is consumer purchases that generate GRT revenue. Consumer purchases depend mainly on personal income.

Between 2001 and 2007 GRT averaged 4.1 percent of total personal income (TPI) in New Mexico and 4.6 percent of disposable (after taxes and other deductions) personal income (Table 5.8). Disposable Personal Income averages about 90 percent of TPI and this relationship is so stable that only GRT as a percent of TPI is needed to estimate future tax liabilities. The relationship between GRT and TPI is also very stable (Table 5.8).

Table 5.8 New Mexico Gross Receipts Tax, Total Personal Income and Disposable Personal Income: 2001-2007						
Year	**GRT**	**New Mexico Total Personal Income (dollars)**	**Gross Receipts Tax per dollar of Total Personal Income**	**NM Disposable Personal Income**	**Disposable Personal Income as percent of Total Personal Income**	**Gross Receipts Tax per dollar of Total Disposable Personal Income**
	($1,000s)	**($1,000s)**		**($1,000s)**		
2001	2,083,196	44,138,165	0.04720	39,387,776	89.24	0.05289
2002	1,822,878	44,986,517	0.04052	40,631,267	90.32	0.04486
2003	1,873,420	46,650,275	0.04016	42,492,810	91.09	0.04409
2004	2,038,440	50,707,317	0.04020	45,555,433	89.84	0.04475
2005	2,170,521	53,714,363	0.04041	49,044,032	91.31	0.04426
2006	2,387,718	58,131,416	0.04107	52,501,413	90.32	0.04548
2007	2,483,021	62,001,991	0.04005	55,895,150	90.15	0.04442
Averages			0.04137			
Source: U.S. Bureau of the Census and US Department of Commerce, Bureau of Economic Analysis						

Section 6: Cibola and McKinley Counties



Introduction

This section examines the socioeconomic characteristics of Cibola and McKinley Counties, New Mexico. For both counties, the demography, income, and labor market characteristics are examined in some detail. The demographic analysis includes population size, rates of growth, race and ethnic composition, and the age-sex structure of the population.

The two counties had a combined population in 2007 of 97,320 according to the most recent estimates of the Census Bureau. McKinley County with a 2007 estimated population of 70,059 had more than twice the population of Cibola County (27,261). The combined population of the two counties decreased since 2000 with a total decrease of 3,073 –a decrease of 3.24 percent over the seven year period. Between 2000 and 2007 McKinley County's population decreased by 6.01 percent while Cibola County's population increased by 5.73 percent.

Both counties have a large Native American population. In 2000, 54.2 percent of the population of the two counties was Native American. In McKinley County, Native Americans accounted for 74.7 percent of the population and the corresponding figure for Cibola County was 40.3 percent.

The two counties are poor in comparison to the nation or the state. In 2005, the two counties combined had a per capita income (BEA) of $18,574 (53.9 percent of the national figure and 66.6 percent of state per capita income). There was only a small difference in per capita income in the two counties. McKinley County's 2005 per capita income was $18,435 while Cibola County's per capita income was $18,935 in the same year.

A note on data sources:

The most comprehensive and reliable counts of population and data on the social and economic characteristics of the population are those from the decennial censuses of population and housing conducted in years ending in zero by the U.S. Bureau of the Census.

Annual population estimates used here are from the Census Bureau's estimates program and the U.S. Department of Commerce, Bureau of Economic Analysis (BEA) Regional Economic Information System.

Ultimately, the BEA population estimates are derived from the Census estimates but occasionally differ slightly from the most recently released Census estimates. The BEA population estimates are used because (a) they are the same population figures used in the computation of per capita income –also provided by BEA and (b) the BEA population figures from 1969 on are more easily accessible than the Census Bureau estimates.

In recent years, the American Community Survey (ACS) conducted by the Bureau of the Census provides detailed demographic, income, and housing data for selected geographic areas. By 2010, the ACS is scheduled to replace the long form of the decennial census –the source of detailed social and economic characteristics of the population. Currently, the ACS reports data for all states but only some counties and communities. The ACS data sets released as of early 2008 (the 2006 data) includes data for the State of New Mexico and McKinley County, but does not include data for Cibola County.

All race and ethnicity data collected by the Census Bureau now reflect self-identification. Multiple race categories are permitted by the Census Bureau. The Census Bureau recognizes five racial categories (white, black, Native American, Asian and Pacific Islander, and Other). However, a total of 57 different racial categories can be found in Census data when multiple racial categories have been reported. Persons of two or more races reported below have been included in the "other racial category. Persons of Hispanic origin may be of any racial group.

There are two main sources of labor force data for sub-state areas. The U.S. Bureau of the Census provides labor force data in both its decennial census and in the American Community Survey. The decennial census has the largest sample size (the labor force data along with other social and economic characteristics of the population are collected from a sample of about 20 percent of all households). The Bureau of Labor Statistics of the US Department of Labor provides sub-state area labor force data as part of its Local Area Unemployment Statistics (LAUS) program working in cooperation with each state level department of labor. In New Mexico, the department of labor is now known as Workforce Solutions.

The two sources of labor force data (Census and BLS) are frequently inconsistent at the sub-state level. The sample sizes, estimation methods, timing, and purposes are vastly different. The two sources should be regarded as providing useful but different labor market information. In this report data on the labor force and labor force participation are from the Census Bureau while longer data series on employment and unemployment are from BLS.

Income data are also available from two sources. For annual data, the estimates of per capita personal income from the Bureau of Economic Analysis are used and respected. The denominator in the BEA per capita income figure is a population estimate provided by the Census Bureau. In a very meaningful sense, the annual estimates of per capita income can be no better than the annual population estimates. The inter-censal population estimates are benchmarked against census data once a decade. This means that earlier population estimates are revised –sometimes substantially revised.

Alternatives to the BEA annual income estimates are available in census years (years ending in zero) and will soon be available through the American Community Survey on an annual basis. The Census and ACS data provide a broad range of income measures including household income, family income, per capita income, and information on the distribution of income.

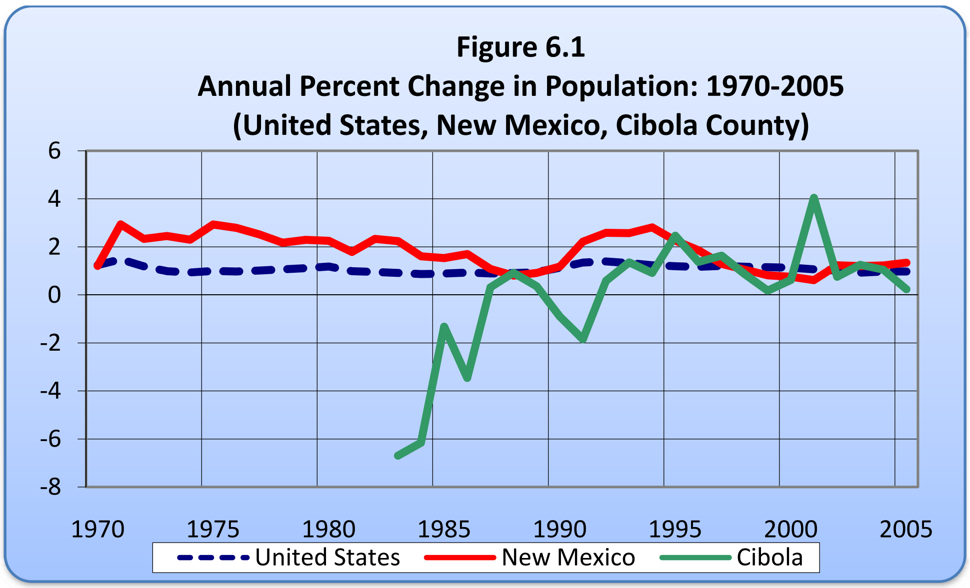
The BEA and Census income data are not comparable in any meaningful fashion. Both sources of income data provide useful information but they are simply not the same. Per capita income for the US for the year 2000 reported by BEA was $29,843 while per capita income reported for the US in the 2000 census was $21,587 –a difference of nearly $8,000 per person. Neither figure is wrong. The BEA and Census income data are based on vastly different concepts of income and data collection methods.

Cibola County, New Mexico:

Cibola County was formed in 1982 from a portion of Valencia County. Data for Cibola County was not reported separately in the 1980 Census of Population and Housing. Population, employment and income estimates are available from 1982.

Cibola County is located in central western New Mexico and contains 4,539 square miles, or 3.74 percent of the land area in New Mexico. The population of Cibola County in 2007 was 27,261 (1.38 percent of the state total). Cibola County ranked seventeenth among New Mexico's counties. The city of Grants, with a population estimated by the U.S. Census Bureau to be 9,036 in 2005, contained 32.7 percent of Cibola County's(2005) population. Between 2000 and 2007, Cibola County's population increased by 6.51 percent, while New Mexico's population increased by 8.19 percent and the nation's population increased by 6.88 percent.

Annual percent changes in Cibola County's population are presented in Figure 6.1. The population estimates indicate that Cibola County's population growth rate was generally lower than in the nation or state during the 1980s and early 1990s. From 1995 to 2007, Cibola County's population growth rate has been at or near state and national growth rates. Not too much significance should be attached to the sharp increase in Cibola County's population growth rate in 2002.



Cibola County: Components of Population Change 2000-2007.

Cibola County's population is estimated by the Census Bureau to have grown by 1,886 persons between 2000 and 2007. More than two thirds (69.5 percent) of Cibola County's population change was through natural increase (the excess of births over deaths). While thirty percent of Cibola County's 2000-2006 population change was reported to be from net migration, the annual net migration estimates are the most volatile components of change. Between 2005 and 2006, for example, the Census Bureau estimated that Cibola County experienced net out-migration of 309 persons (Table 6.1).

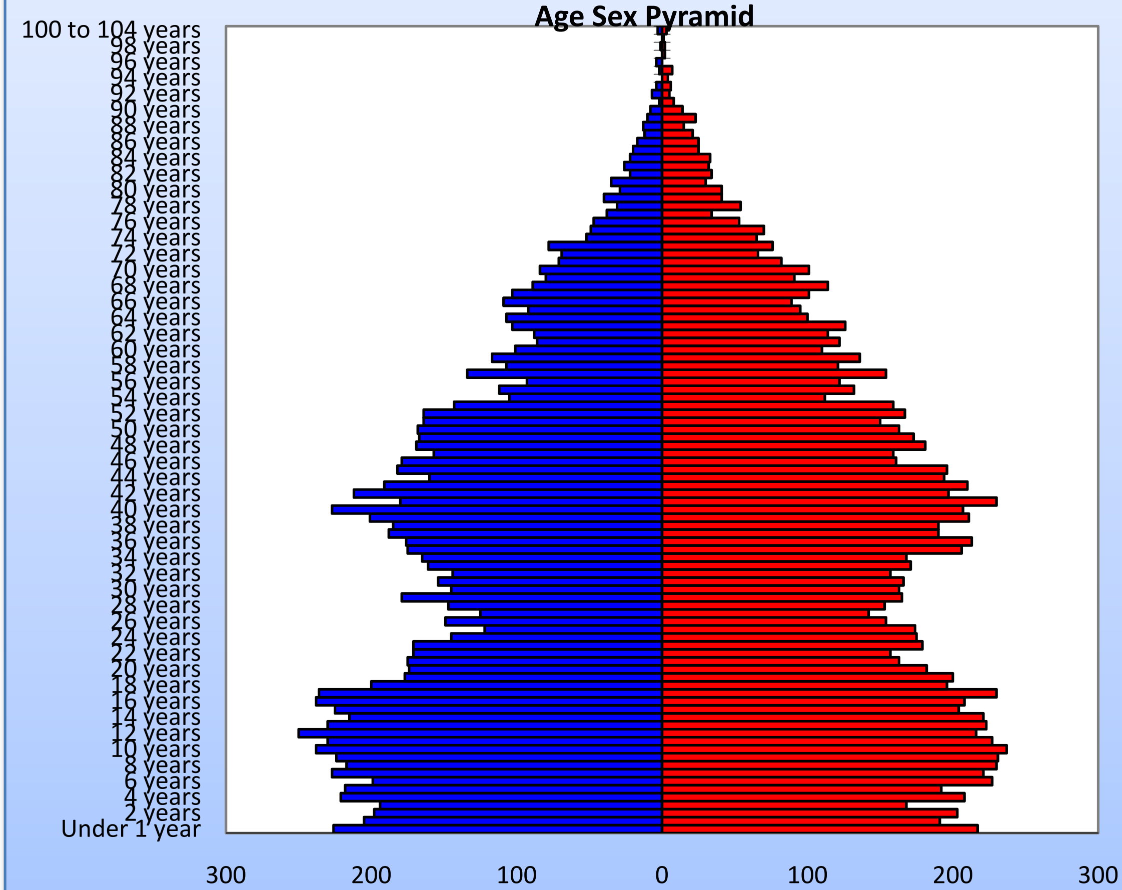
Table 6.1 Components of Population Change: Cibola County, NM 2000-2007 and 2006-2007		
	2000 to 2007	2006-2007
Population Change	1,666	208
Natural Increase	1,550	207
Births	3,050	437
Deaths	1,500	230
Net Migration	219	-1
Net International	87	11
Net Internal	132	-12

Cibola County: Age and Sex Distribution

Cibola County's median age (33.1 years) in 2000 is slightly below that of the state (34.6) and nation (35.3). Median age differs for males (32.2 years) and females (34.0 years). The median age for Native Americans in Cibola County was 26.5 years, while the median age for Whites was 41.0 years.

A single year of age population pyramid for Cibola County from the 2000 Census is displayed in Figure 6.2. The figure suggests that there will be large numbers of current residents entering the labor market and that this same cohort will be entering the high fertility ages over the next decade and beyond. Given the economic impact of the planned uranium mining and milling operations, it is reasonable to expect that many of those entering the labor force and the high fertility years will stay in the area. This suggests that the population of Cibola County may increase substantially after the projects are underway.

Figure 6.2
Cibola County, New Mexico Census 2000
Age Sex Pyramid



Source: Office of Policy Analysis, Arrowhead Center, New Mexico State University

Population projections for Cibola County are available from the Bureau of Business and Economic Research at the University of New Mexico (UNM-BBER) (http://www.unm.edu/~bber/demo/table1.htm). The most recent set of UNM-BBER projections were released in August 2002 and revised in April 2004. The UNM-BBER projections are shown in Table 6.2 The UNM-BBER projections indicate only modest growth in Cibola County's population between 2000 and 2030 (17.7 percent over the 30 year period). The UNM-BBER projections are best viewed as capturing the demographic trends of the region in the late 1990s.

The UNM-BBER projections do not reflect the most recent Census Bureau estimates. The Census Bureau's estimate of Cibola County's population in 2005 (27,598) exceeds the UNM projection for 2005 (26,753) by 845 persons. If Cibola County were to grow by 1.0 percent per year from 2005 to 2030, it would have a population of slightly more than 35,000.

Table: 6.2 UNM-BBER Projections of the Population of Cibola County		
	Total Population	Percent Change
2000	25,683	n.a
2005	26,753	4.17
2010	27,681	3.49
2015	28,479	2.88
2020	29,157	2.38
2025	29,372	0.74
2030	30,231	2.92

Cibola County, NM Race and Ethnicity

The racial and ethnic composition of the population of Cibola County, NM along with comparisons for the US and New Mexico are displayed in Tables 6.3 (1990) and 6.4 (2000). Native Americans accounted for 38.5 percent of the total population in 1990 and this figure had increased to 40.3 percent by 2000.

Between 1990 and 2000, Cibola County's total population increased by 1,801 persons with the growth of the Native American population (1,164) accounting for 64.6 percent of the total increase.

Table 6.3
Race and Ethnicity: United States, New Mexico, Cibola County, New Mexico 1990

	Total	White	White Non-Hispanic	Black	Native American	Other*	Hispanic**
United States	248,709,873	199,686,070	188,128,296	29,986,060	1,959,234	17,078,509	22,354,059
(Percent)	100.0	80.3	75.6	12.1	0.8	6.9	9.0
New Mexico	1,515,069	1,146,028	764,164	30,210	134,355	204,476	579,224
(Percent)	100.0	75.6	50.4	2.0	8.9	13.5	38.2
Cibola County	23,794	13,899	6,491	191	9,155	549	8,109
(Percent)	100.0	58.4	27.3	0.8	38.5	2.3	34.1

*Other includes persons of two or more races **Hispanic persons may be of any racial group.
Source: U.S. Bureau of the Census, 1990 Census of Population and Housing, http://factfinder.census.gov/

Table 6.4
Race and Ethnicity: United States, New Mexico, Cibola County, New Mexico 2000

	Total	White	White Non-Hispanic	Black	Native American	Other*	Hispanic**
United States	281,421,906	211,460,626	194,552,774	34,658,190	2,475,956	32,827,134	35,305,818
(Percent)	100.0	75.1	69.1	12.3	0.9	11.7	12.5
New Mexico	1,819,046	1,214,253	813,495	34,343	173,483	396,967	765,386
(Percent)	100.0	66.8	44.7	1.9	9.5	21.8	42.1
Cibola County	25,595	10,138	6,325	246	10,319	4,892	8,555
(Percent)	100.0	39.6	24.7	1.0	40.3	19.1	33.4

*Other includes persons of two or more races **Hispanic persons may be of any racial group.
Source: U.S. Bureau of the Census, 2000 Census of Population and Housing, http://factfinder.census.gov/

Cibola County: Educational Attainment:

Data from the 2000 Census (Table 6.5) indicate that 75.0 percent of the population 25 years old and older were high school graduates, while the national figure was 80.4 percent and the state figure was 78.9 percent.

Table 6.5
Educational Attainment of the Population 25 Years Old and Older: U.S., New Mexico, and Cibola County, NM

	United States		New Mexico		Cibola County, NM	
	Number	Percent	Number	Percent	Number	Percent
Population 25 Years Old and Older	182,211,639	100	1,134,801	100	15,273	100.0
Less than 9th Grade	13,755,477	7.5	104,985	9.3	1,420	9.3
9th to 12 grade, no diploma	21,960,148	12.1	134,996	11.9	2,392	15.7
High school graduate	52,168,981	28.6	301,746	26.6	5,585	36.6
Some College no degree	38,351,595	21	259,924	22.9	3,173	20.8
Associate Degree	11,512,833	6.3	67,001	5.9	868	5.7
Bachelor's degree	28,317,792	15.5	154,372	13.6	1,124	7.4
Graduate or Professional Degree	16,144,813	8.9	111,777	9.8	711	4.7
Percent High School Graduate	80.4	(X)	78.9	(X)	75.0	
Percent Bachelor's Degree or Higher	24.4	(X)	23.5	(X)	12.0	
Source: U.S. Bureau of the Census, 2000 Census of Population and Housing, Demographic Profiles, Table DP3.						

Cibola County: Housing Characteristics

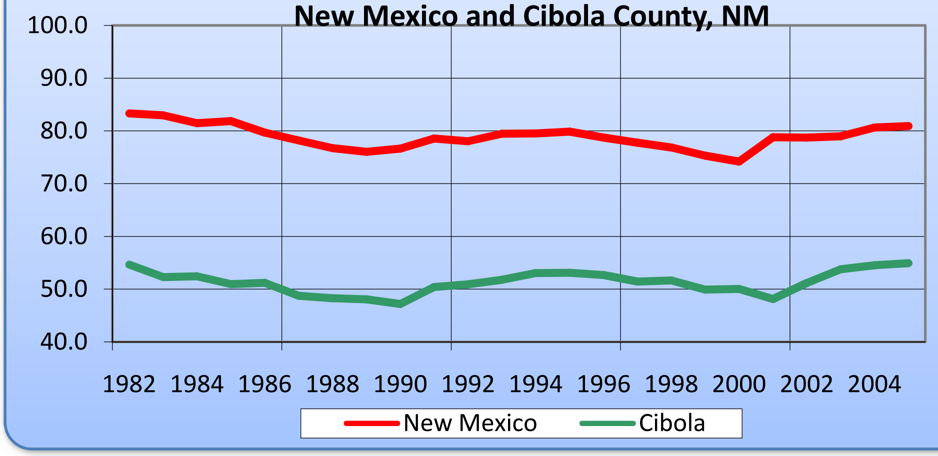
Cibola County's housing characteristics, as reported in the 2000 Census reflect the relative poverty of the region (Table 6.6). The median value of owner occupied housing units was slightly more than half (52.3 percent) of the national figure and the state median (57.9 percent). The percent of occupied housing units lacking complete plumbing facilities (5.5 percent) and complete kitchen facilities (4.4 percent) exceed state and national averages.

Table 6.6 Housing Characteristics 2000 Census						
	United States		New Mexico		Cibola County	
	Number	Percent	Number	Percent	Number	Percent
Total Housing Units	115,904,641	100.0	780,579	100.0	10,328	100.0
Occupied Housing Units	105,480,101	91.0	677,971	86.9	8,327	80.6
Lacking Complete plumbing facilities	670,986	0.6	11,905	1.8	454	5.5
Lacking Complete Kitchen Facilities	715,535	0.7	10,884	1.6	367	4.4
No Telephone Service	2,570,705	2.4	38,963	5.7	978	11.7
Median Value (Owner Occupied)	119,600		108,100		$62,600	
Median Rent (Renter Occupied)	602		503		$355	
Source: U.S. Bureau of the Census, 2000 Census of Popualtion and Housing, Demographic Profile, DP4.						

Cibola County: Economic Characteristics

Per capita income in Cibola County has been less than 60 percent of the national average since 1982. Per capita personal income in Cibola County in 2005 was $18,935 (Figure 6.3). Cibola County ranked twenty-ninth in the state in terms of per capita income. Cibola County's 2005 per capita income was 67.9 percent of the corresponding state figure ($27,889), and 54.9 percent of the national average ($34,471). Despite having a relatively low per capita income, the growth rate of per capita income in Cibola County in the 2000 to 2005 time period (26.8 percent) has been slightly higher than that of New Mexico (26.0 percent) and has been substantially higher than the nation's per capita income growth rate (15.5 percent).

Figure 6.3
Per Capita Income as Percent of US Per Capita Income: 1982-2005
New Mexico and Cibola County, NM



Household and family incomes in Cibola County are also low compared to national and state figures as reported in the 2000 Census. As shown in Table 6.7 below, median household income in Cibola County was 66.1 percent of the national figure and median family income was 61.4 percent of the national figure. The poverty rate in Cibola County (21.5 percent of families) is high compared to the nation (9.2 percent of families).

Table 6.7
Selected Income and Poverty Data for Cibola County, New Mexico and the United States: 2000

	Cibola County, NM	New Mexico	United States
Median Household Income	$27,774	$34,133	$41,994
Percent of US	66.1	81.3	100.0
Median Family Income	$30,714	$39,425	$50,046
Percent of US	61.4	78.8	100.0
Families Below Poverty Level	1,365	68,178	6,620,945
Percent of Families	21.5	14.5	9.2

Source: U.S. Bureau of the Census, 2000 Census of Population and Housing, Profile of Selected Economic Characteristics, Table DP3.

Cibola County: Labor Force Characteristics

Compared to the nation or the state, Cibola County has low labor force participation rates (53.0 percent) and a high unemployment rate (11.5 percent as reported in the 2000 Census (Table 6.8).

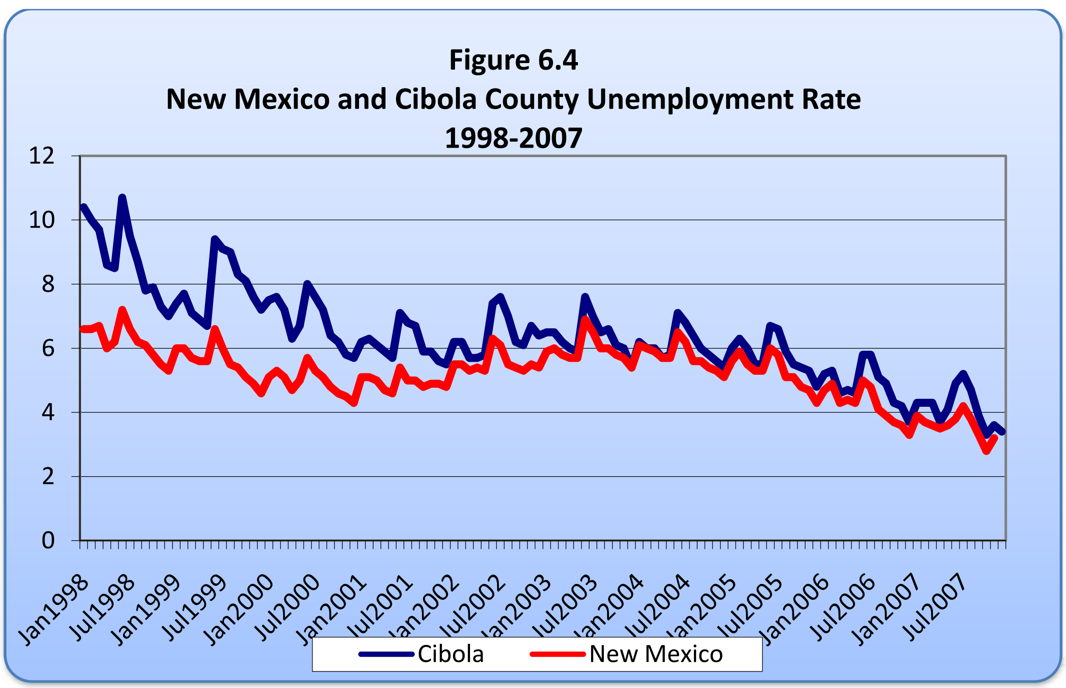
Table 6.8
Employment Status of the Population 16 years old and older

	United States		New Mexico		Cibola County, NM	
	Number	Percent	Number	Percent	Number	Percent
Population 16 years +	217,168,077	100.0	1,369,176	100.0	18,579	100.0
In Labor Force	138,820,935	63.9	834,632	61.0	9,848	53.0
Civilian Labor Force	137,668,798	63.4	823,440	60.1	9,832	52.9
Employed	129,721,512	59.7	763,116	55.7	8,703	46.8
Unemployed	7,947,286	3.7	60,324	4.4	1,129	6.1
Percent	5.8		7.3		11.5	
Armed Forces	1,152,137	0.5	11,192	0.8	16	0.0
Not in Labor Force	78,347,142	36.1	534,544	39.0	8,731	47.0

Source: U.S. Bureau of the census, 2000 Census of Population and Housing

Monthly unemployment data for the most recently available ten year period are displayed in Figure 6.4 below for Cibola County and the State of New Mexico. The unemployment rate in Cibola County is highly correlated (simple correlation coefficient = 0.802) with the state unemployment rate.

The unemployment rate for Cibola County has been consistently higher than the state unemployment rate. However, the gap has been narrowing (Figure 6.4). Between Jan 1998 and December 2002, Cibola County's average monthly unemployment rate was 7.23 percent –more than two percentage points higher than the average unemployment rate for the state (5.45 percent). From Jan 2003 to December 2007, Cibola County's unemployment rate averaged 5.48 percent –only slightly higher than the state average of 4.99 percent.



Source: U.S. Department of Labor, Bureau of Labor Statistics, (www.bls.gov)

The Economic Structure of Cibola County

Cibola County's employment base is small. In recent years, employment has been slightly above 10,000 total jobs (Table 6.9). In 2006, the public sector (federal, state, and local) accounted for 38.2 percent of total employment. Public sector employment in the County was early 3 times the national figure of 13.5 percent and much higher than the state (19.5 percent) or neighboring McKinley County (26.4 percent). Further, public sector employment accounted for 46.4 percent of all wage and salary employment in the county in 2006.

The trade sector (wholesale and retail) was responsible for 12.2 percent of total employment – somewhat less than the state figure of 13.5 percent. Employment in the agricultural sector (including both farm proprietors and wage and salary workers) accounted for 3.94 percent of total employment in the county –about the same as the state-wide figure.

Mining employment in Cibola County was withheld to avoid disclosure in 2005 and 2006, but was reported to be 102 jobs in 2002 and 106 jobs in 2004 or about 1 percent of total employment. The mining sector was once the most important industry in Cibola County. In 1981 uranium mining accounted for 41 percent of all jobs in Cibola County (McDonald, 1982, p. 17). A large scale renewal of uranium mining and milling operations in Cibola County and neighboring McKinley County would change the employment structure and economic base of Cibola County more significantly than any event in the last twenty-five years.

Table 6.9 Employment in Cibola County, NM 2005 and 2006				
Sector	2005	Percent	2006	Percent
Total employment	10,586	100.00	10,861	100.00
Wage and salary employment	8,760	82.75	8,945	82.36
Proprietors employment	1,826	17.25	1,916	17.64
Farm proprietors employment	208	1.96	207	1.91
Nonfarm proprietors employment 2/	1,618	15.28	1,709	15.74
Farm employment	222	2.10	220	2.03
Nonfarm employment	10,364	97.90	10,641	97.97
Private employment	6,231	58.86	6,489	59.75
Forestry, fishing, related activities, and other	(D)		(D)	
Mining	(D)		(D)	
Utilities	172	1.62	198	1.82
Construction	348	3.29	369	3.40
Manufacturing	436	4.12	394	3.63
Wholesale trade	168	1.59	176	1.62
Retail trade	1,164	11.00	1,144	10.53
Transportation and warehousing	191	1.80	190	1.75
Information	63	0.60	80	0.74
Finance and insurance	116	1.10	121	1.11
Real estate and rental and leasing	220	2.08	237	2.18
Professional and technical services	(D)		(D)	
Management of companies and enterprises	(D)		(D)	
Administrative and waste services	656	6.20	630	5.80
Educational services	(D)		(D)	
Health care and social assistance	(D)		(D)	
Arts, entertainment, and recreation	99	0.94	102	0.94
Accommodation and food services	597	5.64	685	6.31
Other services, except public administration	424	4.01	432	3.98
Government and government enterprises	4,133	39.04	4,152	38.23
Federal, civilian	386	3.65	362	3.33
Military	75	0.71	72	0.66
State and local	3,672	34.69	3,718	34.23
State government	657	6.21	664	6.11
Local government	3,015	28.48	3,054	28.12
Source: Regional Economic Information System, Bureau of Economic Analysis				

McKinley County, New Mexico:

Demography: size and change in population

McKinley County is located in west central New Mexico and contains 5,449 square miles or 4.5 percent of the land area of New Mexico. The population of McKinley County in 2007 was 70,059 (3.56 percent of the state total). McKinley County ranked seventh in population among New Mexico's counties. The City of Gallup, with a population estimated by the U.S. Census Bureau to be 19,357 in 2005, contained 26.9 percent of McKinley County's (2005) population.

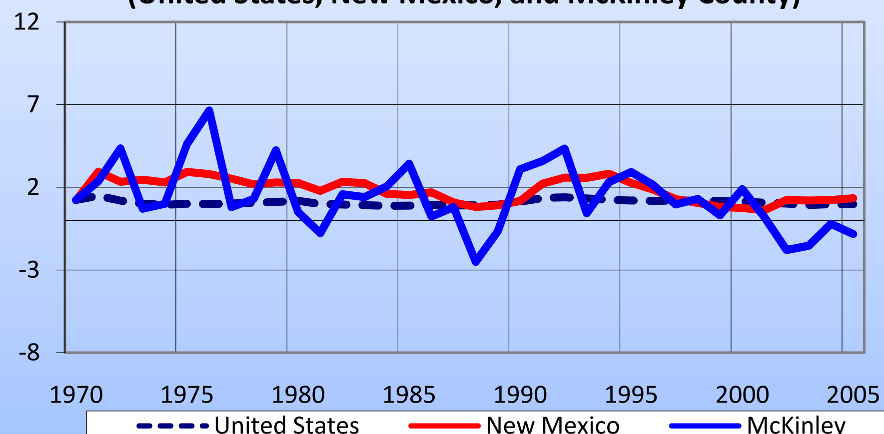
During the uranium related boom of the 1970s, McKinley County's population increased more rapidly than the population of the state or the nation (Table 6.10 and Figure 6.5). During the 1980s, McKinley County's population continued to increase but at a rate that was only slightly more than half of the state population growth rate. During the 1990s, McKinley County's population growth rate of 22.0 percent was again higher than the state or national averages. From 2000 to 2007, McKinley County's population decreased by 6.07 percent.

Table 6.10
Percent Change in Population: McKinley County, NM, New Mexico and the United States: Selected Time Periods.

	McKinley	NM	US
1970-80 %	29.65	27.97	11.49
1980-1990%	8.82	16.20	9.86
1990-2000%	22.02	19.72	13.06
2000-2007%	-6.07	8.19	6.88

Source: 1970 -2000 data from U.S. Department of Commerce, Bureau of Economic Analysis; 200-2007 data from U.S. Bureau of the Census, population estimates.

Figure 6.5
Annual Percent Change in Population: 1970-2005
(United States, New Mexico, and McKinley County)



McKinley County: Components of Population Change: 2000-2006

McKinley County is one of sixteen counties in New Mexico exhibiting a decrease in total population from 2000 to 2007 in the most recent estimates of the U.S. Bureau of the Census. Table 6.11 summarizes the components of population change reported by the Census Bureau. Between 2000 and 2007, McKinley County was reported to have lost 4,739 persons or 6.34 percent of its total population. During this period the county gained 6,425 persons due to natural increase (the excess of births over deaths). Given the age and sex distribution of the population (see below), substantial increases in population due to natural increase can be expected to continue. The county experienced net out-migration of 11,051 persons according to the estimates. With large increases in economic activity associated with the planned uranium mining and milling operations, net-out-migration from McKinley County may be reduced substantially or even reversed. In brief, the proposed mining and milling operations have the potential to significantly alter recent population trends in McKinley County.

Table 6.11
Components of Population Change:
McKinley County, NM 2000-2007 and 2006-2007

	2000 to 2007	2006 to 2007
Population Change	-4,739	-442
Natural Increase	6,245	909
Births	9,862	1,402
Deaths	3,437	493
Net Migration	-11,051	-1,367
Net International	313	42
Net Internal	-11,364	-1,409

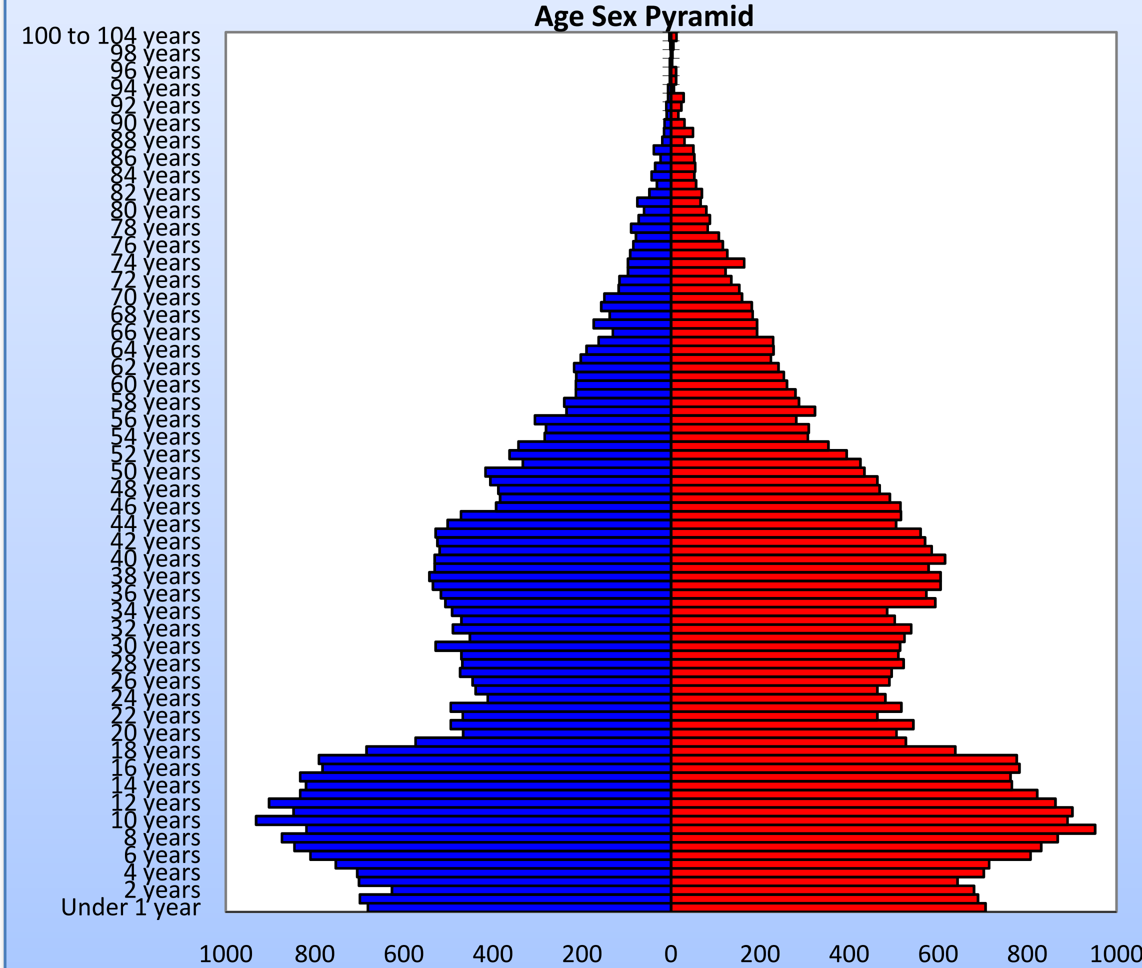
Source: U.S. Bureau of the Census, Population Estimates, Table 5: Estimates of the Components of Population Change for Counties of New Mexico: July 1, 2006 to July 1, 2007, Released March 2008.

McKinley County, NM Age and Sex Distribution:

McKinley County's median age (26.9 years) in 2000 remains significantly below that of the state (34.6) and nation (35.3). Median age differs substantially for males (25.5 years) and females (28.1 years). The median age for Native Americans in McKinley County was 24.0 years, while the median age for Whites was 40.6 years.

A single year of age population pyramid for McKinley County from the 2000 Census is displayed in Figure 6.6. The figure suggests that there will be large numbers of current residents entering the labor market and that this same cohort will be entering the high fertility ages over the next decade and beyond. Given the economic impact of the planned uranium mining and milling operations, it is reasonable to expect that many of those entering the labor force and the high fertility years will stay in the area. This suggests that the population of McKinley County may increase substantially after the uranium projects are underway. This would be a dramatic reversal over the 2000-2007 years in which the county's population experienced a decline (see above).

Figure 6.6
McKinley County, New Mexico Census 2000
Age Sex Pyramid



Source: Office of Policy Analysis, Arrowhead Center, New Mexico State University

Population Projections

Population projections for McKinley County are available from the Bureau of Business and Economic Research at the University of New Mexico (UNM-BBER) (http://www.unm.edu/~bber/demo/table1.htm). The most recent set of UNM-BBER projections were released in August 2002 and revised in April 2004. The UNM-BBER projections are shown in Table 6.12. The UNM-BBER projections indicate substantial growth in McKinley County's population between 2000 and 2030. The UNM-BBER projections are best viewed as capturing the demographic trends of the region in the late 1990s. The UNM-BBER projections do not reflect the recent Census Bureau estimates of large numbers of out-migrants from McKinley County. Capturing the estimated net out-migration would not have been possible when the UNM-BBER projections were prepared.

Table: 6.12 UNM-BBER Projections of the Population of McKinley County		
	Total Population	Percent Change
2000	75,072	n.a.
2005	81,484	8.54
2010	88,163	8.20
2015	95,044	7.80
2020	101,750	7.06
2025	108,316	6.45
2030	114,854	6.04

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McKinley County, NM Race and Ethnicity

The racial and ethnic composition of the population of McKinley County, NM along with comparisons for the US and New Mexico are displayed in Tables 6.13, 6.14 and 6.15 for 1990, 2000 and 2006 Native Americans accounted for 71.8 percent of the total population in 1990 and this figure had increased to 74.7 percent by 2000. The 2006 ACS estimates for McKinley County show a slight decrease in the percent of Native Americans (73.9 percent) but the data may not be comparable to the census counts of 1990 and 2000.

Between 1990 and 2000, McKinley County's total population increased by 14,112 persons with the growth of the Native American population (12,322) accounting for 87.3 percent of the total increase. The 2006 ACS estimates show decreases in both the total population and the Native American population from the 2000 Census.

Table 6.13
Race and Ethnicity: United States, New Mexico, McKinley County, New Mexico 1990

	Total	White	White Non-Hispanic	Black	Native American	Other*	Hispanic**
United States	248,709,873	199,686,070	188,128,296	29,986,060	1,959,234	17,078,509	22,354,059
Percent	100.0	80.3	75.6	12.1	0.8	6.9	9.0
New Mexico	1,515,069	1,146,028	764,164	30,210	134,355	204,476	579,224
Percent	100.0	75.6	50.4	2.0	8.9	13.5	38.2
McKinley Cnty	60,686	13,295	9,614	295	43,570	3,526	7,764
Percent	100.0	21.9	15.8	0.5	71.8	5.8	12.8

*Other includes persons of two or more races **Hispanic persons may be of any racial group.
Source: U.S. Bureau of the Census, 1990 Census of Population and Housing, http://factfinder.census.gov/

Table 6.14 Race and Ethnicity: United States, New Mexico, McKinley County, New Mexico 2000							
	Total	White	White Non-Hispanic	Black	Native American	Other*	Hispanic**
United States	281,421,906	211,460,626	194,552,774	34,658,190	2,475,956	32,827,134	35,305,818
Percent	100.0	75.1	69.1	12.3	0.9	11.7	12.5
New Mexico	1,819,046	1,214,253	813,495	34,343	173,483	396,967	765,386
Percent	100.0	66.8	44.7	1.9	9.5	21.8	42.1
McKinley Cnty	74,798	12,257	8,902	296	55,892	6,353	9,276
Percent	100.0	16.4	11.9	0.4	74.7	8.5	12.4
*Other includes persons of two or more races **Hispanic persons may be of any racial group. Source: U.S. Bureau of the Census, 2000 Census of Population and Housing, http://factfinder.census.gov/							

Table 6.15 Race and Ethnicity: United States, New Mexico, McKinley County, New Mexico 2006							
	Total	White	White Non-Hispanic	Black	Native American	Other*	Hispanic**
United States	299,398,485	221,331,507	198,176,991	37,051,483	2,369,431	38,646,064	44,252,278
Percent	100.0	73.9	66.2	12.4	0.8	12.9	14.8
New Mexico	1,954,599	1,325,762	828,965	39,654	189,152	400,031	860,687
Percent	100.0	67.8	42.4	2.0	9.7	20.5	44.0
McKinley Cnty	71,875	14,599	n.a.	784	53,114	3,378	9,337
Percent	100.0	20.3		1.1	73.9	4.7	13.0
*Other includes persons of two or more races							
**Hispanic persons may be of any racial group.							
Source: U.S. Bureau of the Census, American Community Survey, http://factfinder.census.gov/							

McKinley County: Educational characteristics

Educational attainment is a key factor in explaining both labor force participation and income variation among individuals and geographic regions. At the county level in New Mexico, the simple correlation between the percent of the population 25 years old and older who had graduated from high school and per capita income in 2000 was 0.771 (Source: author computations). The income measure used does not matter a great deal. The simple correlation between (a) high school completion and median family income is 0.767, (b) between high school completion and median household income is 0.790, (c) between high school completion and mean household income is 0.7237 and (d) between high school completion and Census money income is 0.827. What does this high correlation between education and income mean? The correlation implies that about 60 percent of the variation in income levels between counties in New Mexico can be accounted for by differences in education.

A recent Census Bureau tabulation indicates that at the national level the mean earnings of those with a bachelor's degree in 2006 ($56,788) was 2.7 times the mean earnings of those who did not complete high school ($20,873)[10].

Data from the 2000 Census (Table 6.16) indicate that 65.2 percent of the population 25 years old and older were high school graduates, while the national figure was 80.4 percent and the state figure was 78.9 percent.

Table 6.16
Educational Attainment of the Population 25 Years Old and Older: U.S., New Mexico, and McKinley County, NM

	United States		New Mexico		McKinley County, NM	
	Number	Percent	Number	Percent	Number	Percent
Population 25 Years Old and Older	182,211,639	100	1,134,801	100	38,988	100.0
Less than 9th Grade	13,755,477	7.5	104,985	9.3	6,182	15.9
9th to 12 grade, no diploma	21,960,148	12.1	134,996	11.9	7,396	19.0
High school graduate	52,168,981	28.6	301,746	26.6	10,858	27.8
Some College no degree	38,351,595	21	259,924	22.9	7,616	19.5
Associate Degree	11,512,833	6.3	67,001	5.9	2,274	5.8
Bachelor's degree	28,317,792	15.5	154,372	13.6	2,585	6.6
Graduate or Professional Degree	16,144,813	8.9	111,777	9.8	2,077	5.3
Percent High School Graduate		80.4		78.9		65.2
Percent Bachelor's Degree or Higher		24.4		23.5		12.0

Source: U.S. Bureau of the Census, 2000 Census of Population and Housing, Demographic Profiles, Table DP3.

McKinley County: Housing Characteristics

Housing characteristics in McKinley County reflect the relatively low income levels and poverty of the region (Table 6.17). As reported in the 2000 Census, the median value of owner occupied housing units ($57,000) was less than half (47.7 percent) of the national figure and only slightly more than half of the

[10] Source: Current Population Survey: Table A-3. Mean Earnings of Workers 18 Years and Over, by Educational Attainment, Race, Hispanic Origin, and Sex: 1975 to 2006
http://www.census.gov/population/socdemo/education/cps2007/tabA-3.xls

state median (52.7 percent). Occupied housing units lacking complete plumbing facilities (18.2 percent) and complete kitchen facilities (15.3 percent) are far higher than state or national figures.

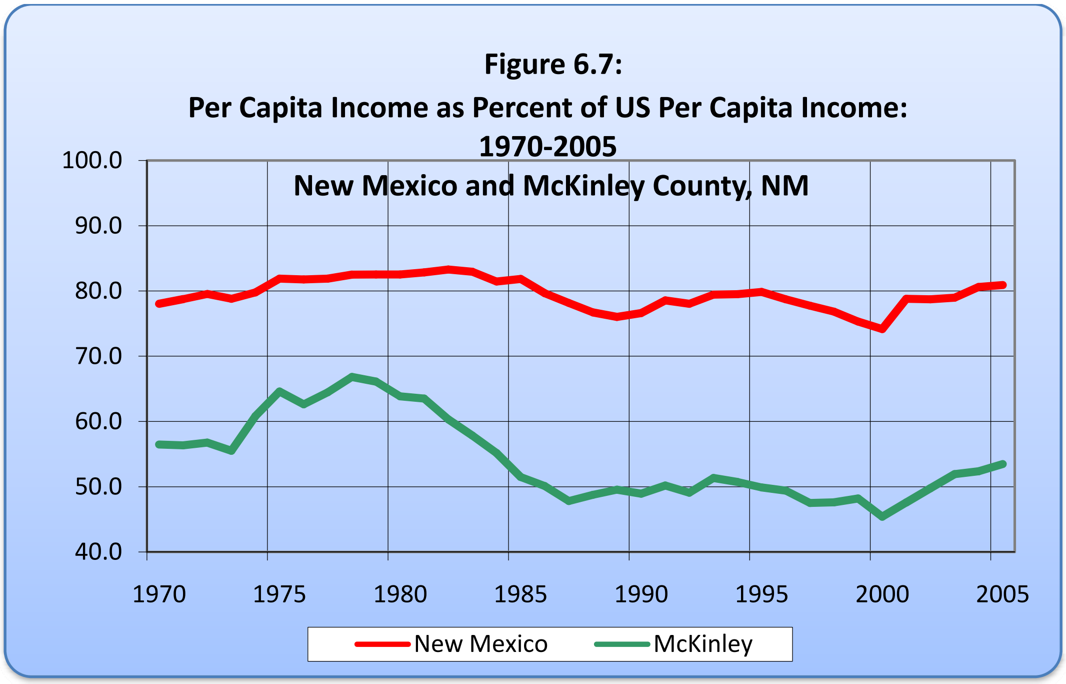
Table 6.17						
Housing Characteristics 2000 Census						
	United States		New Mexico		McKinley County, NM	
	Number	Percent	Number	Percent	Number	Percent
Total Housing Units	115,904,641	100.0	780,579	100.0	26,718	100.0
Occupied Housing Units	105,480,101	91.0	677,971	86.9	21,476	80.4
Lacking Complete Plumbing Facilities	670,986	0.6	11,905	1.8	3,917	18.2
Lacking Complete Kitchen Facilities	715,535	0.7	10,884	1.6	3,280	15.3
No Telephone Service	2,570,705	2.4	38,963	5.7	6,795	31.6
Median Value (Owner Occupied)	119,600		108,100		57,000	
Median Rent (Renter Occupied)	602		503		374	
Souorce: U.S. Bureau of the Census, 2000 Census of Population and Housing, Demographic Profile, DP4.						

McKinley County: Economic Characteristics

Income and Poverty:

Whether measured in terms of per capita income, household income, family income, or by poverty rates, McKinley County is a relatively poor county compared to either the nation or the state.

In 2005, the most recent year for which data are available, McKinley County's per capita income of $18,435 was 53.5 percent of the nation's per capita income of $34,471 and 66.1 percent of New Mexico's per capita income of $27,889, (BEA REIS). McKinley County's per capita income as a percent of US per capita income peaked in 1978 (during the previous uranium related boom) at 66.8 percent and has been as low as 47.5 percent of US per capita income as recently as 2000 (Figure 6.7). Modest increases in McKinley County's per capita income relative to the nation since 2000 reflect small decreases in population rather than increases in total income.



Household and family incomes in McKinley County are also low compared to national and state figures as reported in the 2000 Census. As shown in Table 6.18 below, median household income in McKinley County was 59.5 percent of the national figure and median family income was 57.6 percent of the national figure. Poverty rates in McKinley County (31.9 percent of families) are high compared to the nation (9.2 percent of families).

Table 6.18
Selected Income and Poverty Data: McKinley County, New Mexico and the United States: 2000

	McKinley County, NM	New Mexico	United States
Median Household Income	$25,005	$34,133	$41,994
Percent of US	59.5	81.3	100.0
Median Family Income	$28,806	$39,425	$50,046
Percent of US	57.6	78.8	100.0
Families Below Poverty Level	5,303	68,178	6,620,945
Percent of Families	31.9	14.5	9.2

Source: U.S. Bureau of the Census, 2000 Census of Population and Housing, Profile of Selected Economic Characteristics, Table DP3.

Labor force and employment:

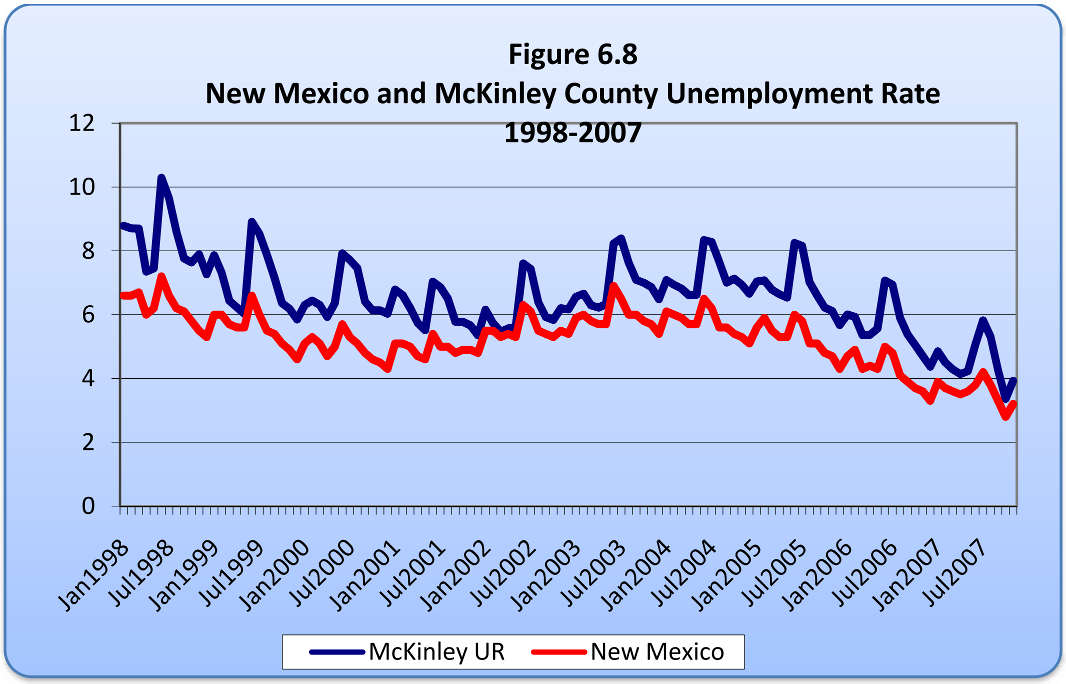
Compared to the nation or the state, McKinley County has low labor force participation rates (53.4 percent) and a high unemployment rate (17.2 percent) as reported in the 2000 Census (Table 6.19). By 2006, the labor force participation rate decreased to 50.0 percent and the unemployment rate dropped to 10.5 percent.

Table 6.19
Employment Status of the Population 16 years old and older

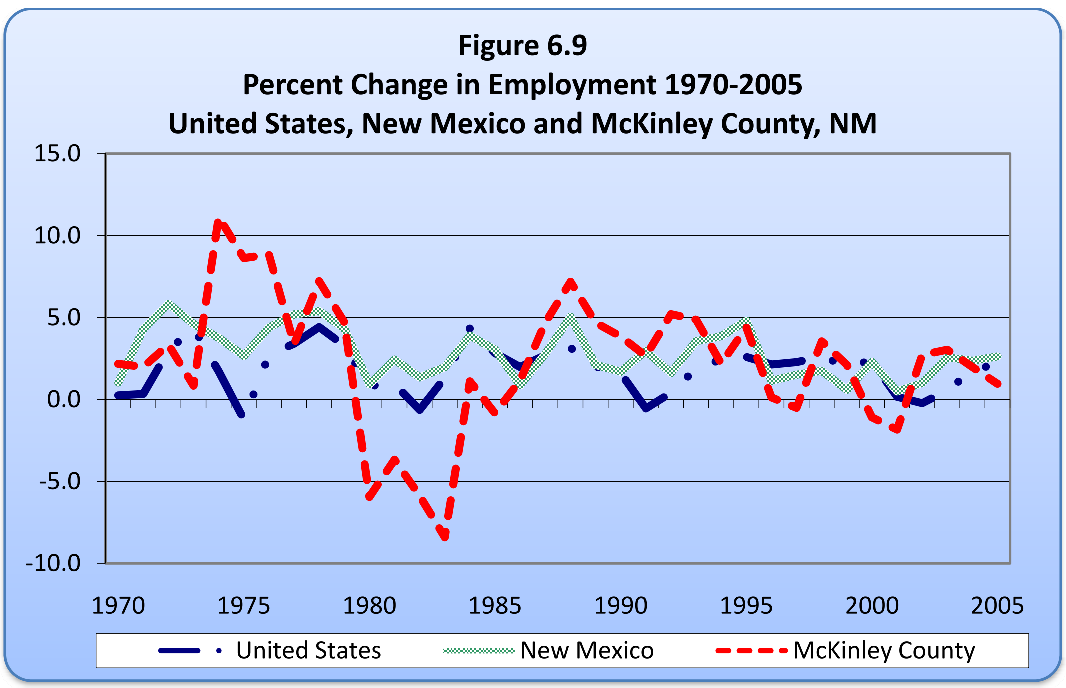
	United States		New Mexico		McKinley County, NM	
	Number	Percent	Number	Percent	Number	Percent
Population 16 years +	217,168,077	100.0	1,369,176	100.0	49,620	100.0
In Labor Force	138,820,935	63.9	834,632	61.0	26,498	53.4
Civilian Labor Force	137,668,798	63.4	823,440	60.1	26,487	53.4
Employed	129,721,512	59.7	763,116	55.7	21,940	44.2
Unemployed	7,947,286	3.7	60,324	4.4	4,547	9.2
Percent	5.8		7.3		17.2	
Armed Forces	1,152,137	0.5	11,192	0.8	11	0.0
Not in Labor Force	78,347,142	36.1	534,544	39.0	23,122	46.6

Source: U.S. Bureau of the census, 2000 Census of Population and Housing

Monthly unemployment data for the most recently available ten year period are displayed in Figure 6.8 below for McKinley County and the State of New Mexico. The unemployment rate for McKinley County has been consistently higher than the state unemployment rate. It is also apparent that the unemployment rate in McKinley County is highly correlated (simple correlation coefficient – 0.883) with the state unemployment rate. It is likely that the direct and indirect impacts of uranium mining and milling operations would reduce the unemployment rate in McKinley County.



Source: Bureau of Labor Statistics (BLS), Local Area Unemployment Statistics (LAUS). Data are not seasonally adjusted.



Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Local Area Personal Income, Table CA25.

The Economic Base of McKinley County:

The structure of industry within a region is an important determinant of the impact of new economic activity such as uranium mining and milling. The currently low levels of per capita income and high poverty rates in McKinley County are also a reflection of the structure of industry in the area. The distribution of public and private sector employment in McKinley County is displayed in Figure 6.10 and Figure 6.11. Public sector employment accounts for more than a quarter of the county's total employment.

Figure 6.10
Private and Public Sector Wage and Salary Employment: Mckinley County, NM 2005

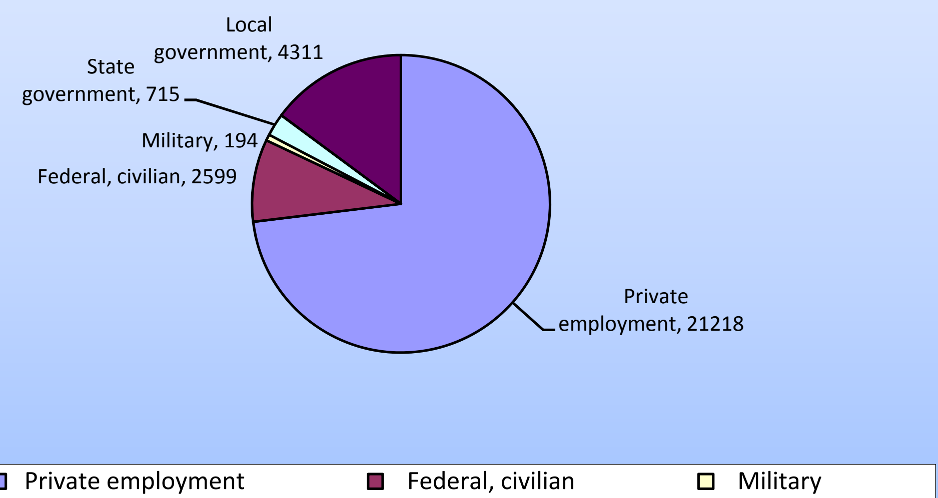
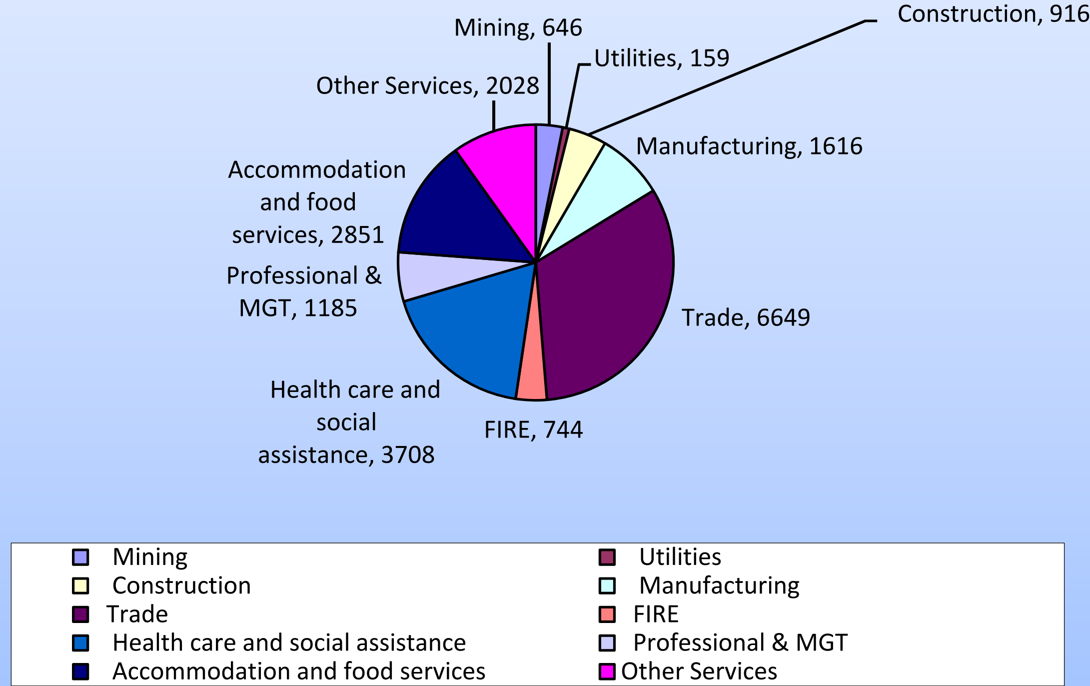


Figure 6.11
Private Sector Wage and Salary Employment:
Mckinley County, NM 2005



Nearly three-fourths (71.8 percent) of total employment in McKinley County is concentrated in four sectors (Table 6.20) in 2006. Government (federal, state, and local) employment accounted for 26.4 percent of total employment; the trade sector (wholesale and retail) accounted for 23.5 percent of total employment; non-governmental health care and social assistance accounted for 12.5 percent of total employment; and the accommodations and food sector accounted for another 9.4 percent of total employment.

The size of industries in a region does not tell the whole story. Economic base theory suggests that economic development depends on industries that export goods and services out of the region (basic industries), as opposed to those businesses whose services remain local (non-basic). Basic activities—often said to include mining, agriculture, tourism, and manufacturing, among other sectors—promote economic growth by bringing jobs and income into the local economy. Non-basic activities do not drive the economy in the same way that basic activities do. Non-basic activities serve local residents and provide support for basic industries. Examples of non-basic industries typically include activities such as health care, finance, and real estate. Basic and non-basic industries are often identified by calculating a simple statistic called the location quotient (LQ).

Identifying Basic Industries: The Location Quotient

A common means of identifying local basic activity is through the use of location quotients (LQs). LQs are calculated as a single industry's percent of total local employment divided by that industry's percent of total state or national employment. For example, an LQ for a single New Mexico industry may be calculated as follows:

LQ = (Employment in industry j in NM / total employment in NM)

Divided by

(Employment in industry j in US / total employment in US)

The LQ serves to illustrate the relative importance of that sector locally as compared to the state or national economy.

Table 6.20 Employment by Sector in New Mexico and McKinley Counties (2006)				
	New Mexico		McKinley	
Total employment	1,099,401	100	29,756	100.0
Wage and salary employment	878,157	79.9	23,540	79.1
Proprietors employment	221,244	20.1	6,216	20.9
Farm proprietors employment	17,094	1.6	252	0.8
Nonfarm proprietors employment 2/	204,150	18.6	5,964	20.0
Farm employment	24,319	2.2	286	1.0
Nonfarm employment	1,075,082	97.8	29,470	99.0
Private employment	860,556	78.3	21,622	72.7
Forestry, fishing, related activities, and other 3/	6,995	0.6	(D)	
Mining	22,903	2.1	(D)	
Utilities	4,149	0.4	170	0.6
Construction	80,317	7.3	1,117	3.8
Manufacturing	43,272	3.9	1,478	5.0
Wholesale trade	30,112	2.7	3,328	11.2
Retail trade	118,923	10.8	3,662	12.3
Transportation and warehousing	26,406	2.4	732	2.5
Information	18,867	1.7	241	0.8
Finance and insurance	32,847	3.0	446	1.5
Real estate and rental and leasing	41,672	3.8	264	0.9
Professional and technical services	76,459	7.0	442	1.5
Management of companies and enterprises	6,299	0.6	49	0.2
Administrative and waste services	58,035	5.3	447	1.5
Educational services	16,213	1.5	526	1.8
Health care and social assistance	112,315	10.2	3,729	12.5
Arts, entertainment, and recreation	22,757	2.1	135	0.5
Accommodation and food services	84,396	7.7	2,789	9.4
Other services, except public administration	57,619	5.2	1,415	4.8
Government and government enterprises	214,526	19.5	7,848	26.4
Federal, civilian	30,554	2.8	2,602	8.7
Military	15,764	1.4	188	0.6
State and local	168,208	15.3	5,058	17.0
State government	63,870	5.8	711	2.4
Local government	104,338	9.5	4,347	14.6
Source: Regional Economic Information System, U.S. Department of Commerce, Bureau of Economic Analysis, www.bea.gov.				

Table 6.21 McKinley County Location Quotients (2006)		
Industry	US Based	NM Based
Total employment	1.00	1.00
Wage and salary employment	0.98	0.99
Proprietors employment	1.06	1.04
Farm proprietors employment	0.71	0.54
Nonfarm proprietors employment 2/	1.08	1.08
Farm employment	0.60	0.43
Nonfarm employment	1.01	1.01
Private employment	0.86	0.93
Forestry, fishing, related activities, and other		
Mining		
Utilities	1.78	1.51
Construction	0.58	0.51
Manufacturing	0.60	1.26
Wholesale trade	3.05	4.08
Retail trade	1.14	1.14
Transportation and warehousing	0.76	1.02
Information	0.40	0.47
Finance and insurance	0.32	0.50
Real estate and rental and leasing	0.21	0.23
Professional and technical services	0.23	0.21
Management of companies and enterprises	0.16	0.29
Administrative and waste services	0.25	0.28
Educational services	0.85	1.20
Health care and social assistance	1.27	1.23
Arts, entertainment, and recreation	0.22	0.22
Accommodation and food services	1.40	1.22
Other services, except public administration	0.84	0.91
Government and government enterprises	1.96	1.35
Federal, civilian	5.60	3.15
Military	0.55	0.44
State and local	1.58	1.11
State government	0.83	0.41
Local government	1.86	1.54
Source: Author computations from BEA employment data.		

Although there are no fixed rules for identifying basic industries, the LQs in Table 6.21 indicate that basic (export) industries in McKinley County include the following:[11]

- Federal Civilian Employment
- Health care and social assistance and
- Accommodation and food services
- Wholesale and retail trade
- Utilities

In each of these sectors, the LQs are considerably above 1.0 using either the state or nation as a basis of comparison. The local government sector which also has LQs above 1.0 has not been included as a basic sector because it mainly provides services to local residents.

The economic base approach leads to a description of McKinley County as a regional provider of tourism, trade, health care, and government services. There is another important basic industry in the county that is not apparent from the employment data. McKinley County produced 10.5 million tons of coal in 2006 (EIA Coal Report, 2007) at two surface mines operated by two companies (Lee Ranch Coal Company and The Pittsburgh and Midway Coal Mining Company).

Employment data for the coal mining industry in McKinley County are no longer released by government sources to avoid disclosing company specific data. The last year for which mining employment data were reported in McKinley County was 2002 when 718 jobs were reported. Given 2006 coal production, coal mining employment in McKinley County can be estimated at approximately 600 for the year.[12] Since the demand for coal is mainly a derived demand from the electric power industry, a good case can be made for including coal mining as a basic industry in McKinley County. The addition of renewed uranium mining and milling operations in the region will increase the importance of mining as a basic industry in the county.

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[11] Economic base studies of both McKinley and Cibola Counties based on data from 2001 to 2005 are available on the Arrowhead Center website: http://arrowheadcenter.nmsu.edu/policy/baseStudies.php

[12] An estimate of coal mining employment in the county can be made from productivity data provided in the Energy Information Administration's *Annual Coal Report* 2007 available on the web at: http://www.eia.doe.gov/cneaf/coal/page/acr/acr_sum.html. Worker productivity at surface mines in New Mexico was reported to be 8.85 tons per hour. At this productivity level, about 600 full-time jobs were needed in McKinley County coal mining operations.

Section 7:
Method:

Economic impact analysis is an attempt to measure the net change in economic activity in a given geographic area that results from new spending in the economy. The general idea behind economic impact analysis is that a new dollar spent in a local area results in more than one dollar in economic activity in the area.

Economic impacts are generally measured in terms of changes in output, income, and employment. Output is measured in dollars and can be viewed as the local or regional counterpart of Gross Domestic Product (GDP). Income is also measured in dollars and contains several components –most importantly labor income including both wages and salaries and proprietors income. Employment is measured in terms of numbers of jobs. In many impact studies including this one, estimates of changes in state and local taxes as a result of the new economic activity are also presented.

In most economic impact studies, three types of impacts are estimated: direct, indirect and induced. A hypothetical example of each type of impact can be given by considering what happens when a new mining operation (e.g., a mill) is opened. In this example, only the construction phase of a hypothetical new mill that will cost $300 million will be considered. It is assumed that the $300 million investment in the mill is from outside the local area.

The direct effect of the new mill is the $300 million that will be spent on construction. The $300 million spent on construction can be placed into several categories as illustrated in Figure 7.1. In this highly simplified diagram, the expenditures in the five categories sum to the total cost (new spending) of the mill.

The process, however, is far from complete. Consider, for example, the $90 million in materials supplied by the building materials industry to the project. In order to supply these direct inputs to the project, the building materials industry purchases many additional inputs. Some of these inputs are obvious and include such items as concrete, steel, and other materials. Some of the inputs are not so obvious. The building materials industry may also purchase accounting services, consume electricity, and expand its storage facilities in order to get the job done. These inputs purchased by the building materials industry will, in turn, generate additional expenditures by the firms or industries that supplied them. This process is illustrated in Figure 2 below. The sum of these expenditures are known as indirect effects.

Finally, if the workers are local residents (even temporarily), additional spending by households will be generated by the project. The additional household spending is known as an induced effect.

Figure 7.1: Direct Effects Illustrated

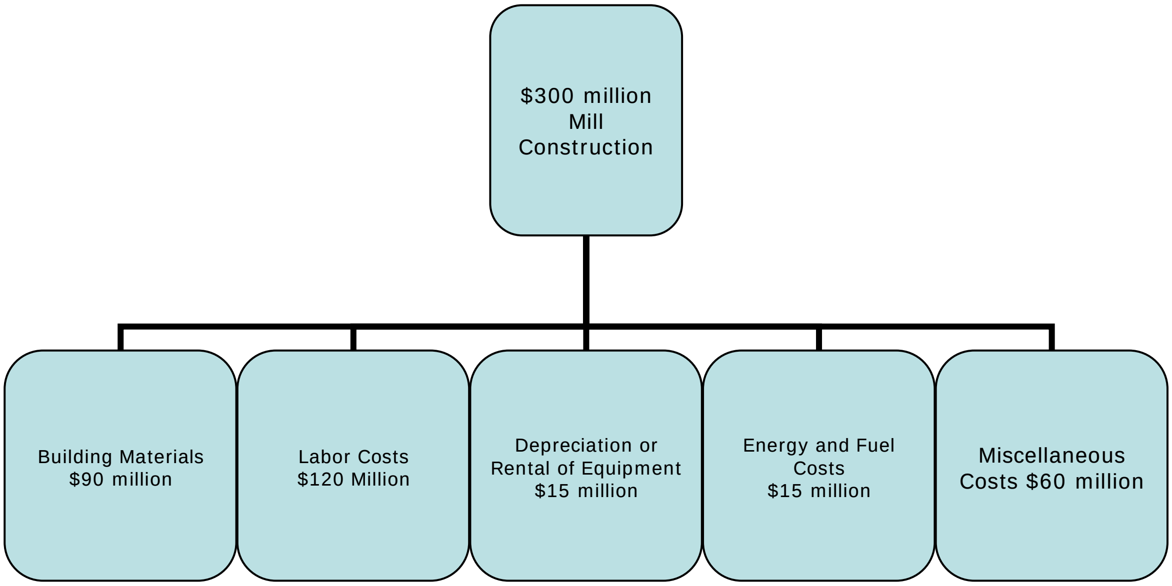
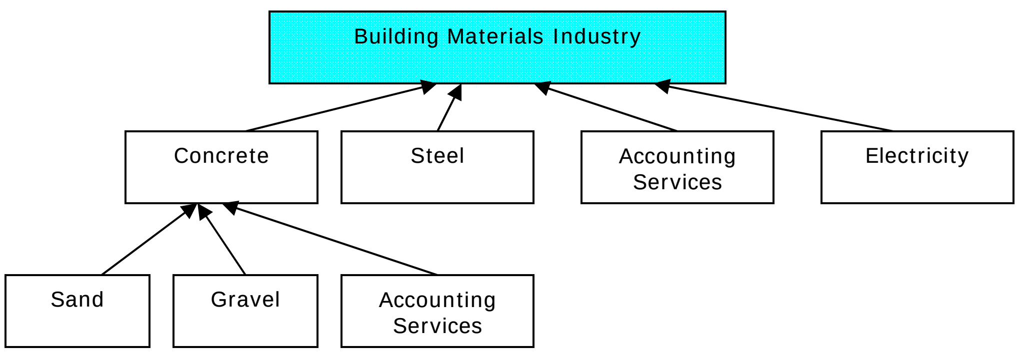


Figure 7.2: Indirect Effects Illustrated



This all sounds simple enough. There are only three basic ideas. First, a new dollar of spending (the direct effect) in a given area will generate more than a single dollar's worth of new economic activity in that area. Second, all industries purchase inputs from other industries (the indirect effects). Third, households will spend additional income generated from the new economic activity (induced effects).

There are three main areas of concern in estimating local economic impacts. First, the new spending must, in fact, be new to the geographic area being considered. In the example above, the $300 million investment in the mill is assumed to be from outside the area. Second, the size of the local economy matters. To the extent that the direct inputs are imported from other areas, new spending doesn't do much for the local economy. In general, the smaller the local economy under consideration, the more likely it is for firms operating locally to obtain inputs from outside the area. Third, supply constraints in the local economy are important. All three areas of concern will be addressed appropriately in the discussion of results.

Given knowledge of a pattern of new spending, the direct, indirect, and induced effects of that spending can be calculated.

The three most commonly used modeling systems to perform the calculations are: RIMS II, REMI, and IMPLAN. The RIMS (regional input-output modeling system) system is produced by the U.S. Department of Commerce, Bureau of Economic Analysis (http://www.bea.gov/regional/rims/index.cfm). The REMI models are produced privately produced and customized to user specified geography by REMI (Regional Economic Models, Inc. http://www.remi.com/). The IMPLAN model was originally developed for the U.S. Forest Service but for many years it has been maintained and sold by the Minnesota Implan Group (http://www.implan.com/).

Each modeling system has well known advantages and disadvantages (reference here). The model used to produce the estimates in this report is IMPLAN PRO II with the latest (2006) data and structural matrices available.

Section 8: Economic Impacts

The potential economic impacts of renewed uranium mining and milling operations in New Mexico are very large whether measured by output, income, employment, or fiscal impact. Three possible scenarios and corresponding impacts are presented below. The scenarios were developed based on industry input and reasonable assumptions concerning possible future developments in world and national uranium markets

THE BASE CASE SCENARIO

The base case impact scenario was derived from industry provided data. The base case reflects actual anticipated projections from companies planning uranium operations in Cibola and McKinley Counties. The base case may understate future uranium operations in New Mexico to the extent that not all potential projects have been included in this report. Trends and projections of world and national energy markets discussed in Sections 2 and 3 of this report provide strong evidence that the base case scenario is a genuine possibility. Recent volatility in the spot price of uranium does not change substantially the long-term supply and demand outlook.

The economic impacts are presented in two parts. The impacts of capital expenditures for the construction of new mines and mills are presented separately from the impacts of mining and milling operations. In the base case, capital expenditures of $2.1 billion occur over a five year period (2008-2012) and include the construction of fifteen mines and three mills. The mines and mills include underground and in situ leach recovery techniques. No open pit mines are anticipated in New Mexico and there are no open pit mines currently in operation anywhere in the US.

As with any large capital expenditure program, the construction time period could change due to permitting and licensing delays or as the result of changing market conditions. In the industry supplied data some construction activities extend beyond the five year period considered here. Changes in the timing of construction activities should not result in substantially different impact estimates in real terms, expressed in 2008 inflation adjusted dollars. The nominal value of the capital expenditures could increase significantly if current trends in the cost of construction and building supplies continue. Ultimately, significantly increased construction costs could alter planned capital expenditures by reducing the expected return on some projects.

Direct employment for the base case during the construction phase for mines was estimated from aggregated industry input data after eliminating extreme high and low observations. The estimate used for mine construction, was 4.0 workers (jobs) for each million dollars of capital expenditures. This figure is less than the typical construction labor requirement provided in IMPLAN or RIMS. For example, IMPLAN Sector 29 (mine support activities) has a direct employment figure of 5.2 jobs per million dollars of expenditures. IMPLAN Sector 41 (Other Construction) indicates 11.1 jobs per million dollars of expenditures.

Direct employment for the base case construction phase for mills was estimated from the input data as 2.5 workers per million dollars of expenditures from the industry input data. This employment-to-expenditure ratio, as with the comparable figure for mines, is lower than most impact models provide.

The estimated output, employment, and income impacts of the capital expenditures are presented in Tables 8.1a, 8.1b, and 8.1c. Dollar figures are expressed in billions of 2008 dollars. The figures are easy to translate into millions. For example, the estimated direct output for mills in Table 8.1a, $0.897 billion can also be read as $897 million.

Table 8.1a
Base Case Uranium Industry Impacts:
Capital Expenditures Only, Statewide

	Output (Billions of 2008 dollars)			
	Direct	Indirect	Induced	Total
Mills	0.897	0.310	0.138	1.345
Mines	1.169	0.466	0.158	1.793
Total	2.067	0.776	0.296	3.138

Table 8.1b
Base Case Uranium Industry Impacts:
Capital Expenditures Only, Statewide

	Employment (Total jobs during five year construction period)			
	Direct	Indirect	Induced	Total
Mills	2,243	525	199	2,967
Mines	4,678	3,059	1,882	9,619
Total	6,921	3,584	2,081	12,586

Table 8.1c
Base Case Uranium Industry Impacts:
Capital Expenditures Only, Statewide

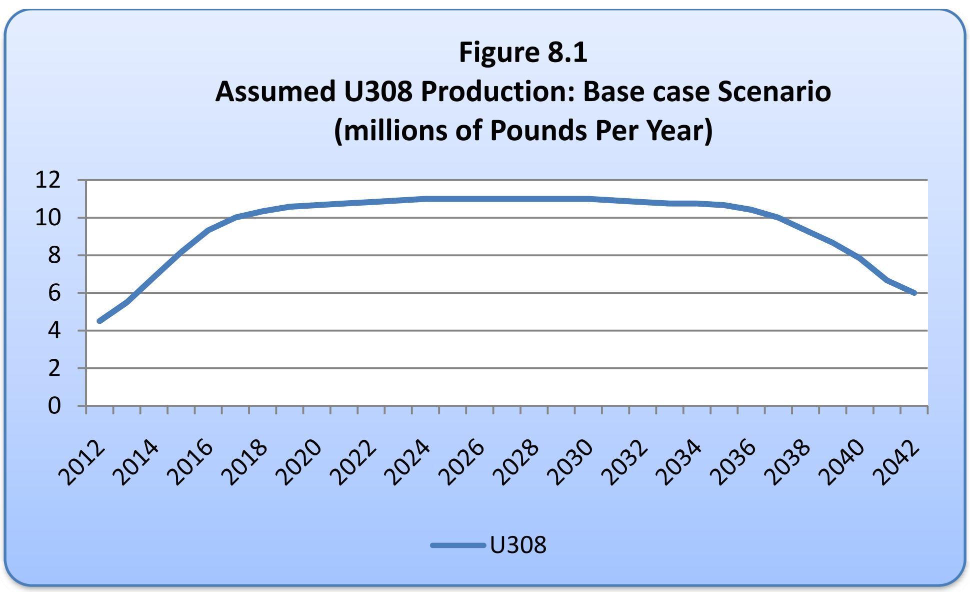
	Labor Income (Billions of 2008 dollars)			
	Direct	Indirect	Induced	Total
Mills	0.095	0.023	0.006	0.125
Mines	0.280	0.122	0.061	0.464
Total	0.376	0.145	0.067	0.588

The Base Case: Impact of Mine and Mill Operations

Uranium mining and milling operations in the base case are assumed to take place beginning in 2012 and ending by 2042. This time horizon does not mean that each mine and mill is expected to operate continuously for thirty years. Some mines may produce for only nine or ten years. The selected time horizon reflects the fact that the investment in mines and mills is a long term business decision.

Based on industry provided data, total production was estimated to be 315 million pounds of U_30_8. This estimate reflects currently known plans. Additional operations and production in the currently in the pre-planning stage are not considered. This figure (315 million pounds of U_30_8 production) is less than the 341 million pounds of reserves in the state as estimated by the Energy Information Administration (EIA) in 2003 at a forward cost of $50 per pound. It is highly likely that the five year old EIA reserve estimates understate the total uranium reserves in New Mexico.

Production in the base case begins at 5 million pounds of U_30_8 in 2012 and increases to a maximum production level of 12 million pounds per year in the early 2020s as illustrated in Figure 8.1. The assumed scenario reflects the fact that production rarely begins at full capacity of either mines or mills and that production from a finite resource base is likely to decline towards the end of its useful life. Any number of factors could extend New Mexico production far beyond the assumed time-line. These include increased knowledge of the region's geology gained through mining and further exploration, changes in technology that make lower grade deposits economically viable, and changes in market conditions that may convert previously uneconomic ore deposits into viable reserves. The key assumption, however, is total production and not the time-line illustrated in Figure 8.1.



Cost of Production:

Another important variable in economic impact analysis is the cost of production. Most uranium companies are reluctant to divulge mining and milling costs of production.[13] An average cost of production in 2008 dollars is required to adequately assess the impact of uranium industry operations in New Mexico. However, individual project cost data are typically proprietary.

Production costs (mining, hauling, and milling) of U_30_8 are mine and mill specific. The depth of the mine, the characteristics of the ore, the mining method, distance from the mill and the company conducting the mining and/or milling operations are among the factors that affect production costs.

Providing such an estimate is complicated by the fact that there have been no uranium mining or milling operations in New Mexico in recent years. All meaningful New Mexico uranium mining and milling operations ceased in the early 1980s. With the exception of recovery operations, the state's mining and milling of uranium ended in 1992.

The base case cost of production for this report was assumed to be $50 per pound of U_30_8 in 2008 dollars. This figure was derived from various industry and historical sources. The $50 per pound figure is consistent with the detailed uranium costs estimated in 1984 by the New Mexico Energy and Minerals Department (NM EMD, 1984 P. 46) after adjustment for inflation (Table 8.2). However, it should be made clear that this assumed cost does not reflect the actual costs of any of the projects evaluated in the aggregate in this report.

Table 8.2
Cost of production 1984 and 2008.

1984 EMD Operating Cost estimates				2008 Inflation Adjusted Operating Costs		
Operating costs	Low	Best	High	Low	Best	High
Mining	14.35	16.89	19.42	25.73	30.28	34.82
Hauling	0.56	0.60	0.63	1.00	1.08	1.13
Milling	4.59	5.40	6.21	8.23	9.68	11.13
Environmental	1.15	1.35	1.56	2.06	2.42	2.80
Total	20.65	23.24	27.82	35.02	43.46	49.88

Source: New Mexico Energy and Minerals Department, Annual Resources Report, 1984, p. 46 and author calculations.

The GDP price deflator was used to adjust the 1984 cost estimates in Table 8.1 to 2008 dollars. The price deflator for GDP is available at: http://www.bea.gov/national/nipaweb/TableView.asp#Mid. In

[13] An exception to the relative secrecy concerning cost of production data seems to be open pit mining operations in Africa (Nimibia, Zambia, and South Africa) and Australia. Uranium companies in these areas report operating costs from under $7 to $30 per pound. The operating cost figures from open pit mines were not considered in the development of the cost estimates used here because there are no planned open pit operations in New Mexico.

1984 the price deflator was 67.664. In the first quarter of 2008 the price deflator was 121.337 or 1.793 times the 1984 index value. The high figure in Table 8.1 is preferred because of recent (first quarter 2008) and anticipated increases in the cost of chemicals and energy that are not yet fully reflected in the GDP deflator.

The $50 per pound of U_30_8 cost of production estimate is also consistent with a 1977 study (Buddecke 1977) conducted for the New Mexico Bureau of Mines and Minerals, the predecessor agency to the New Mexico Energy and Minerals Department. The 1977 study indicated a cost of production –excluding mine development costs—of $15 per pound of U_30_8. Adjusted for inflation using the GDP deflator, the 1977 figure implies a 2008 cost of production of $42.57. However, the 1977 production cost estimate was for a specific ore grade that may or may not be appropriate for future operations.

A recent scoping study (RPA, October 2007) of potential uranium mining and milling operations near Lake Elliot, Ontario, Canada lends additional support to the $50 per pound production cost estimate. The study was conducted by Scott Wilson RPA, an engineering firm in late 2007. The proposed uranium operations near Lake Elliot and in New Mexico share many characteristics. As in New Mexico, the Lake Elliot site is not a new discovery. Uranium was discovered in the Lake Elliot area in 1953 and production began shortly after discovery. In both New Mexico and Lake Elliot, future uranium operations benefit greatly from a wealth of historical exploration and mining data. In both areas some new exploration drilling is required. In both areas, future uranium operations will involve underground and in situ leach (ISL) techniques. No open pit mining operations are anticipated in either location. Preliminary work such as planning and permitting has already begun in both areas.

The Lake Elliot study indicates an average operating cost of US $55.51 per pound of U_30_8 over the 18 year life of the project.

Various cost models for uranium and other mining operations are available. These include the Cost Estimating System (CES) developed originally by the US Bureau of Mines and now maintained by Western Mine Engineering –a division of Infomine (www.**westernmine**.com). Detailed cost models for individual mines in spreadsheet form are also available from www.minecost.com. A comprehensive set of models for uranium milling capital and operating costs was prepared by Alva Kuestermeyer (1984). These models are particularly interesting because they produce estimates by state, mill type and mill capacity. Adjusted for inflation, the Kuestermeyer cost estimates for New Mexico mills are generally consistent with the inflation adjusted operating costs of mills reported in the 1984 NM Energy and Minerals Department estimates in Table 8.1 for mills in the 2,000 to 4,000 tons per day category. Unfortunately, the Kuestermeyer models do not include mining costs.

A mine feasibility calculator that produces cost estimates based on ore concentration and other characteristics is available at: http://www.wise-uranium.org/nfcmf.html. This cost calculator provides several standard examples of mines in different locations. The default example (as of March 2008) indicated a total operating cost of $52.21 per pound of U_30_8.

In brief, current and historic data as well as various cost models suggest that $50 per pound of U_30_8 is an appropriate base case estimate of the cost of production.

Direct Employment in the Base Case:

The economic impact analysis of uranium operations also requires an estimate of direct employment in the mines and mills. As with production cost, mining and milling employment per million pounds of U_30_8 varies greatly depending on characteristics of the ore deposit, location, mining method, and managerial efficiency. Direct employment in mining and milling operations was derived from historical data and the aggregated data provided as input. The two sources are remarkably consistent on mine employment. Employment in US uranium mining and milling operations from 1970 to 1980 are displayed in Table 8.3. During the 1970's, the uranium industry was at its peak production and employment levels. Production and employment began falling rapidly after 1980. By the early 1990s, there were only a few hundred jobs in uranium mining and this has remained the case through 2007 –a year in which there were only 375 uranium mining jobs in the nation. For the base case impact scenario mining employment of 234 jobs per million pounds of U_30_8 will be used. This figure is almost identical to the weighted average of 235 jobs per million pounds of U_30_8 in the industry supplied data –after the removal of one outlier.

Table 8.3
Production of U_30_8 and Employment in Uranium Mines and Mills in the United States: 1970 to 1980

	Production Millions of lbs of U308	Mine Workers	Mill Workers	Mine and Mill Workers	Mine Workers per million pounds of U308	Mill Workers per million pounds of U308	Mine and Mill Workers per million pounds of U308
1970	25.81	4,428	1,676	6,104	172	65	236
1971	25.55	4,218	1,649	5,867	165	65	230
1972	25.80	3,721	1,530	5,251	144	59	204
1973	28.47	3,516	1,522	5,038	123	53	177
1974	23.06	3,928	1,688	5,616	170	73	244
1975	23.20	5,386	2,237	7,623	232	96	329
1976	25.49	7,092	2,727	9,819	278	107	385
1977	29.88	10,615	2,448	13,063	355	82	437
1978	36.97	12,071	3,053	15,124	327	83	409
1979	37.47	12,755	3,236	15,991	340	86	427
1980	43.70	11,768	3,251	15,019	269	74	344
Average 1970-1980	29.58	7,227	2,274	9,501	234	77	311

Source: Energy Information Administration, Uranium Industry Annual, 1993, Table 21 and author computations.

Mill Employment: The historical (1970-1980) average of 77 mill workers per million pounds of U_30_8 was used for direct employment in the base case. This approach was selected because the aggregated data provided as input exhibit a very high degree of variability in mill workers per million pounds of U_30_8

produced.[14] Variability in estimated mill employment per million pounds of U_30_8 should not be considered unusual.

A very detailed cost study by Kuestermeyer (1984) provides a range of estimates for a mill with capacity of 2,000 tons per day between 62 and 83 workers and for a 4,000 tons per day mill between 98 and 136 workers depending on mill type.

Data from three uranium mills in Saskatchewan, Canada also exhibit great variability in employment per million pounds of U_30_8 produced. In large part, the variation in employment in the Canadian mills depends on the grade of ore processed.

The McClean Lake uranium mill is described in a fact sheet prepared by the owners (AREVA/CAMECO) as "the newest and most technologically advanced uranium mill in the world." In 2006, the McClean Lake mill produced 1.8 million pounds of U_30_8 using 385 (300 AREVA and 85 long term contract employees) or 213 employees per million pounds of U_30_8. Production in 2006 at Rabbit Lake was described as milling low grade ore. In 2005, the McLean Lake Mill produced 5.4 million pounds of U_30_8 using higher grade ore than in its 2006 production. In 2005 approximately 71.3 employees per million pounds of U_30_8 were required at McLean Lake. As of July 2007, AREVA reported 415 employees at McLean Lake, but 2007 production figures are not yet available.

The Key Lake uranium mill also owned jointly by AREVA and CAMECO is described in a company brochure as the world's largest high-grade uranium mill. In 2006 the Key Lake Mill produced at its full capacity of 18.7 million pounds of U_30_8 using only 370 direct employees (320 CAMECO employees and 50 long-term contract employees). The reported production and employment data indicate that only 19.8 employees were required for each million pounds of U_30_8 produced.

The Rabbit Lake Mill, also owned and operated by CAMECO produced 5.1 million pounds of U_30_8 in 2006 with 305 employees (220 CAMECO employees and 185 long-term contract employees). The Rabbit Lake mill processes ore from five different ore bodies of varying grades. In 2006, the Rabbit Lake Mill required 59.8 employees per million pounds of U_30_8.

Even with variability in mill employment, the 1970-1980 average of 77 workers per million pounds of U_30_8 is a reasonable estimate for the base case. The low case estimate described below will be based on 50 workers per million pounds of U_30_8.

A brief summary is in order. The base case assumes: (1) total production from 2012 to 2042 of 315 million pounds of U_30_8, (2) an average cost of production of $50 (2008 dollars) per pound, (3) 234 mine workers per million pounds of production, and (4) 77 mill workers per million pounds of production.

Table 8.4 contains a summary of the output, employment and income impacts of the base case for all years. Dollar figures are measured as millions of 2008 dollars. The total impact on output including direct, indirect, and induced effects is nearly $26 billion dollars. Direct employment in uranium mines and mills is estimated to be 97,965 –more than 3,000 jobs per year on average. Each worker produces nearly $161,000 of output and generates labor income of nearly $83,000. The total number of jobs

[14] The aggregated data were provided in terms mill capacity measured as tons of ore per day and mill workers required. These figures were converted to millions of pounds of U_30_8 at capacity.

including indirect and induced employment is nearly 250,000 or about 8,300 jobs per year. Compared to New Mexico's total employment of 908,000 (April 2008), the employment generated by uranium operations would be slightly less than one percent of all jobs in the state.

Tables 8.5 through 8.9 provide the estimated impacts of the base case in greater detail. Fiscal impacts are shown separately in Table 8.10.

Table 8.4
Summary of Base Case Mining and Milling Impacts

	Direct	Indirect	Induced	Total
Output	\$15.750	\$6.575	\$3.653	\$25.978
Employment	97,965	64,054	86,662	248,681
Labor Income	\$8.126	\$3.446	\$2.625	\$14.197

Output and Labor Income in billions of 2008 dollars.
Employment in Jobs
Assumed total production of 315 million pounds of U_3O_8
Assumed Cost of Production: \$50 per pound

Table 8.5 Base Case Output Impacts by Year						
Year	U_3O_8 Production million pounds	Production Cost per pound	Output (millions of 2008$)			
			Direct	Indirect	Induced	Total
2012	5.02	$50	$251	$105	$58	$414
2013	5.52	$50	$276	$115	$64	$455
2014	7.19	$50	$360	$150	$83	$593
2015	8.53	$50	$427	$178	$99	$704
2016	9.45	$50	$473	$197	$110	$779
2017	10.12	$50	$506	$211	$117	$835
2018	10.46	$50	$523	$218	$121	$862
2019	10.62	$50	$531	$222	$123	$876
2020	10.71	$50	$535	$223	$124	$883
2021	10.79	$50	$539	$225	$125	$890
2022	10.96	$50	$548	$229	$127	$904
2023	11.12	$50	$556	$232	$129	$917
2024	11.29	$50	$565	$236	$131	$931
2025	11.46	$50	$573	$239	$133	$945
2026	11.71	$50	$586	$244	$136	$966
2027	11.96	$50	$598	$250	$139	$986
2028	12.04	$50	$602	$251	$140	$993
2029	12.04	$50	$602	$251	$140	$993
2030	12.04	$50	$602	$251	$140	$993
2031	11.96	$50	$598	$250	$139	$986
2032	11.79	$50	$590	$246	$137	$973
2033	11.54	$50	$577	$241	$134	$952
2034	11.38	$50	$569	$237	$132	$938
2035	11.21	$50	$560	$234	$130	$924
2036	11.04	$50	$552	$230	$128	$911
2037	10.79	$50	$539	$225	$125	$890
2038	10.37	$50	$519	$217	$120	$855
2039	9.70	$50	$485	$203	$113	$800
2040	8.70	$50	$435	$182	$101	$717
2041	7.44	$50	$372	$155	$86	$614
2042	6.02	$50	$301	$126	$70	$497
Totals Billions of Dollars)	315		$15.750	$6.575	$3.653	$25.978

Table 8.6 Base Case Employment Impacts (Statewide)									
Year	U_3O_8 Production million pounds	Mine Employment (Jobs)				Mill Employment (Jobs)			
		Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2012	5.02	1,174	768	1,039	2,981	386	253	342	981
2013	5.52	1,292	845	1,143	3,279	425	278	376	1,079
2014	7.19	1,683	1,101	1,489	4,273	554	362	490	1,406
2015	8.53	1,996	1,305	1,766	5,068	657	430	581	1,668
2016	9.45	2,212	1,446	1,957	5,614	728	476	644	1,847
2017	10.12	2,368	1,548	2,095	6,012	779	510	689	1,978
2018	10.46	2,447	1,600	2,164	6,211	805	526	712	2,044
2019	10.62	2,486	1,625	2,199	6,310	818	535	724	2,076
2020	10.71	2,505	1,638	2,216	6,360	824	539	729	2,093
2021	10.79	2,525	1,651	2,234	6,409	831	543	735	2,109
2022	10.96	2,564	1,676	2,268	6,509	844	552	746	2,142
2023	11.12	2,603	1,702	2,303	6,608	857	560	758	2,174
2024	11.29	2,642	1,728	2,337	6,707	869	569	769	2,207
2025	11.46	2,681	1,753	2,372	6,807	882	577	781	2,240
2026	11.71	2,740	1,792	2,424	6,956	902	590	798	2,289
2027	11.96	2,799	1,830	2,476	7,105	921	602	815	2,338
2028	12.04	2,818	1,843	2,493	7,155	927	606	820	2,354
2029	12.04	2,818	1,843	2,493	7,155	927	606	820	2,354
2030	12.04	2,818	1,843	2,493	7,155	927	606	820	2,354
2031	11.96	2,799	1,830	2,476	7,105	921	602	815	2,338
2032	11.79	2,760	1,804	2,441	7,005	908	594	803	2,305
2033	11.54	2,701	1,766	2,389	6,856	889	581	786	2,256
2034	11.38	2,662	1,740	2,355	6,757	876	573	775	2,223
2035	11.21	2,623	1,715	2,320	6,658	863	564	763	2,191
2036	11.04	2,584	1,689	2,285	6,558	850	556	752	2,158
2037	10.79	2,525	1,651	2,234	6,409	831	543	735	2,109
2038	10.37	2,427	1,587	2,147	6,161	799	522	706	2,027
2039	9.70	2,270	1,485	2,008	5,763	747	488	661	1,896
2040	8.70	2,036	1,331	1,801	5,167	670	438	593	1,700
2041	7.44	1,742	1,139	1,541	4,422	573	375	507	1,455
2042	6.02	1,409	921	1,247	3,577	464	303	410	1,177
Totals	315	73,710	48,195	65,205	187,111	24,255	15,859	21,456	61,571

Table 8.7 Base case Employment Impacts Statewide (Mine and Mill Employment Combined					
Year	U_3O_8 Production million pounds	Mine and Mill Employment			
		Direct	Indirect	Induced	Total
2012	5.02	1,561	1,021	1,381	3,962
2013	5.52	1,717	1,123	1,519	4,358
2014	7.19	2,237	1,463	1,979	5,679
2015	8.53	2,653	1,735	2,347	6,735
2016	9.45	2,939	1,922	2,600	7,462
2017	10.12	3,148	2,058	2,784	7,990
2018	10.46	3,252	2,126	2,876	8,254
2019	10.62	3,304	2,160	2,922	8,386
2020	10.71	3,330	2,177	2,945	8,452
2021	10.79	3,356	2,194	2,969	8,518
2022	10.96	3,408	2,228	3,015	8,650
2023	11.12	3,460	2,262	3,061	8,782
2024	11.29	3,512	2,296	3,107	8,914
2025	11.46	3,564	2,330	3,153	9,047
2026	11.71	3,642	2,381	3,222	9,245
2027	11.96	3,720	2,432	3,291	9,443
2028	12.04	3,746	2,449	3,314	9,509
2029	12.04	3,746	2,449	3,314	9,509
2030	12.04	3,746	2,449	3,314	9,509
2031	11.96	3,720	2,432	3,291	9,443
2032	11.79	3,668	2,398	3,245	9,311
2033	11.54	3,590	2,347	3,176	9,113
2034	11.38	3,538	2,313	3,130	8,981
2035	11.21	3,486	2,279	3,084	8,848
2036	11.04	3,434	2,245	3,038	8,716
2037	10.79	3,356	2,194	2,969	8,518
2038	10.37	3,226	2,109	2,853	8,188
2039	9.70	3,018	1,973	2,669	7,660
2040	8.70	2,705	1,769	2,393	6,867
2041	7.44	2,315	1,514	2,048	5,877
2042	6.02	1,873	1,225	1,657	4,754
Totals	315	97,965	64,054	86,662	248,681

Table 8.8 Base Case Statewide Impacts Labor Income					
Year	U_3O_8 Production million pounds	Labor Income (Millions of 2008 Dollars)			
		Direct	Indirect	Induced	Total
2012	5.02	129	55	42	226
2013	5.52	142	60	46	249
2014	7.19	186	79	60	324
2015	8.53	220	93	71	385
2016	9.45	244	103	79	426
2017	10.12	261	111	84	456
2018	10.46	270	114	87	471
2019	10.62	274	116	89	479
2020	10.71	276	117	89	483
2021	10.79	278	118	90	486
2022	10.96	283	120	91	494
2023	11.12	287	122	93	501
2024	11.29	291	124	94	509
2025	11.46	296	125	95	516
2026	11.71	302	128	98	528
2027	11.96	309	131	100	539
2028	12.04	311	132	100	543
2029	12.04	311	132	100	543
2030	12.04	311	132	100	543
2031	11.96	309	131	100	539
2032	11.79	304	129	98	532
2033	11.54	298	126	96	520
2034	11.38	293	124	95	513
2035	11.21	289	123	93	505
2036	11.04	285	121	92	498
2037	10.79	278	118	90	486
2038	10.37	268	113	86	467
2039	9.70	250	106	81	437
2040	8.70	224	95	72	392
2041	7.44	192	81	62	336
2042	6.02	155	66	50	271
Totals	315	8,126	3,446	2,625	14,197

Fiscal Impacts:

The fiscal impacts of capital expenditures in the base case are displayed in Table 8.9.

Table 8.9
Base Case Statewide Fiscal Impacts
Capital Expenditures

	Personal Income Tax (millions of 2008 $)			
	Direct	Indirect	Induced	Total
Mines	1.184	0.452	1.266	8.927
Mills	5.542	2.420	1.203	9.165
Total	7.425	2.873	1.330	11.628
	Corporate Income Tax (millions of 2008 $)			
Mines	2.763	0.955	0.424	4.143
Mills	3.602	1.434	0.487	5.522
Total	6.365	2.389	0.911	9.665
	Gross Receipts Tax (millions of 2008 $)			
Mines	3.941	0.947	0.265	5.153
Mills	11.596	5.065	2.518	19.179
Total	15.538	6.011	2.783	24.332
Grand Total	29.328	11.273	5.024	45.626

The severance tax, resources excise tax, and conservation taxes are imposed on the taxable value of uranium production. Table 8.10 displays these estimated taxes on uranium in the base case. The estimates shown here are based on long term (contract) price of $90 per pound of U_30_8 and historical effective tax rates. Direct taxes will be larger at higher prices for U_30_8. The effective tax rates differ from actual tax rates because of various exclusions and deductions from taxable value. The effective tax rates were explained in greater detail in Section 6.

In addition, Tables 8.11 through 8.13 display estimated corporate income taxes, personal income taxes, and gross receipts taxes in the base case. The tax categories considered here account for nearly 80 percent of total state revenue in most years. The estimates above do not include property taxes. Additional taxes not considered here include motor vehicle taxes, alcohol taxes, tobacco taxes, licensing taxes, and other miscellaneous taxes.

Table 8.10 Fiscal Impacts of Mining and Milling Operations in the Base Case					
Year	U_3O_8 Production million pounds	Severance Tax	Resources Excise Tax	Conservation Tax	Total Direct Taxes
2012	5.02	7.9	3.3	0.7	11.9
2013	5.52	8.7	3.6	0.8	13.1
2014	7.19	11.3	4.7	1.0	17.1
2015	8.53	13.4	5.6	1.2	20.3
2016	9.45	14.9	6.2	1.4	22.5
2017	10.12	15.9	6.6	1.5	24.0
2018	10.46	16.5	6.9	1.5	24.8
2019	10.62	16.7	7.0	1.5	25.2
2020	10.71	16.9	7.0	1.5	25.4
2021	10.79	17.0	7.1	1.6	25.6
2022	10.96	17.3	7.2	1.6	26.0
2023	11.12	17.5	7.3	1.6	26.4
2024	11.29	17.8	7.4	1.6	26.8
2025	11.46	18.0	7.5	1.7	27.2
2026	11.71	18.4	7.7	1.7	27.8
2027	11.96	18.8	7.9	1.7	28.4
2028	12.04	19.0	7.9	1.7	28.6
2029	12.04	19.0	7.9	1.7	28.6
2030	12.04	19.0	7.9	1.7	28.6
2031	11.96	18.8	7.9	1.7	28.4
2032	11.79	18.6	7.7	1.7	28.0
2033	11.54	18.2	7.6	1.7	27.4
2034	11.38	17.9	7.5	1.6	27.0
2035	11.21	17.7	7.4	1.6	26.6
2036	11.04	17.4	7.3	1.6	26.2
2037	10.79	17.0	7.1	1.6	25.6
2038	10.37	16.3	6.8	1.5	24.6
2039	9.70	15.3	6.4	1.4	23.1
2040	8.70	13.7	5.7	1.3	20.7
2041	7.44	11.7	4.9	1.1	17.7
2042	6.02	5.3	4.0	0.9	10.1
Totals	315	491.9	207.0	45.4	744.2

Table 8.11 Base Case Fiscal Impacts, Statewide Corporate Income Tax				
Year	Direct	Indirect	Induced	Total
	Millions of 2008 Dollars			
2012	1.4	0.3	0.2	1.3
2013	1.5	0.4	0.2	1.4
2014	2.0	0.5	0.3	1.8
2015	2.4	0.5	0.3	2.2
2016	2.6	0.6	0.3	2.4
2017	2.8	0.7	0.4	2.6
2018	2.9	0.7	0.4	2.7
2019	2.9	0.7	0.4	2.7
2020	3.0	0.7	0.4	2.7
2021	3.0	0.7	0.4	2.7
2022	3.0	0.7	0.4	2.8
2023	3.1	0.7	0.4	2.8
2024	3.1	0.7	0.4	2.9
2025	3.2	0.7	0.4	2.9
2026	3.2	0.8	0.4	3.0
2027	3.3	0.8	0.4	3.0
2028	3.3	0.8	0.4	3.1
2029	3.3	0.8	0.4	3.1
2030	3.3	0.8	0.4	3.1
2031	3.3	0.8	0.4	3.0
2032	3.3	0.8	0.4	3.0
2033	3.2	0.7	0.4	2.9
2034	3.2	0.7	0.4	2.9
2035	3.1	0.7	0.4	2.8
2036	3.1	0.7	0.4	2.8
2037	3.0	0.7	0.4	2.7
2038	2.9	0.7	0.4	2.6
2039	2.7	0.6	0.3	2.5
2040	2.4	0.6	0.3	2.2
2041	2.1	0.5	0.3	1.9
2042	1.7	0.4	0.2	1.5
Totals	87.3	20.3	11.2	118.8

Table 8.12 Base Case Fiscal Impacts, Statewide Gross Receipts Tax				
Year	Direct	Indirect	Induced	Total
	Millions of 2008 Dollars			
2012	5.4	2.3	1.7	9.4
2013	5.9	2.5	1.9	10.3
2014	7.7	3.3	2.5	13.4
2015	9.1	3.9	2.9	15.9
2016	10.1	4.3	3.3	17.6
2017	10.8	4.6	3.5	18.9
2018	11.2	4.7	3.6	19.5
2019	11.3	4.8	3.7	19.8
2020	11.4	4.8	3.7	20.0
2021	11.5	4.9	3.7	20.1
2022	11.7	5.0	3.8	20.4
2023	11.9	5.0	3.8	20.7
2024	12.1	5.1	3.9	21.1
2025	12.2	5.2	4.0	21.4
2026	12.5	5.3	4.0	21.8
2027	12.8	5.4	4.1	22.3
2028	12.9	5.5	4.2	22.5
2029	12.9	5.5	4.2	22.5
2030	12.9	5.5	4.2	22.5
2031	12.8	5.4	4.1	22.3
2032	12.6	5.3	4.1	22.0
2033	12.3	5.2	4.0	21.5
2034	12.1	5.1	3.9	21.2
2035	12.0	5.1	3.9	20.9
2036	11.8	5.0	3.8	20.6
2037	11.5	4.9	3.7	20.1
2038	11.1	4.7	3.6	19.3
2039	10.4	4.4	3.3	18.1
2040	9.3	3.9	3.0	16.2
2041	7.9	3.4	2.6	13.9
2042	6.4	2.7	2.1	11.2
Totals	336.2	142.6	108.6	587.3

Table 8.13 Base Case Fiscal Impacts Personal Income Tax, Statewide				
Year	Direct	Indirect	Induced	Total
	Millions of 2008 Dollars			
2012	2.6	1.1	0.8	4.5
2013	2.8	1.2	0.9	4.9
2014	3.7	1.6	1.2	6.4
2015	4.4	1.8	1.4	7.6
2016	4.8	2.0	1.6	8.4
2017	5.2	2.2	1.7	9.0
2018	5.3	2.3	1.7	9.3
2019	5.4	2.3	1.8	9.5
2020	5.5	2.3	1.8	9.5
2021	5.5	2.3	1.8	9.6
2022	5.6	2.4	1.8	9.8
2023	5.7	2.4	1.8	9.9
2024	5.8	2.4	1.9	10.1
2025	5.8	2.5	1.9	10.2
2026	6.0	2.5	1.9	10.4
2027	6.1	2.6	2.0	10.7
2028	6.1	2.6	2.0	10.7
2029	6.1	2.6	2.0	10.7
2030	6.1	2.6	2.0	10.7
2031	6.1	2.6	2.0	10.7
2032	6.0	2.6	1.9	10.5
2033	5.9	2.5	1.9	10.3
2034	5.8	2.5	1.9	10.1
2035	5.7	2.4	1.8	10.0
2036	5.6	2.4	1.8	9.8
2037	5.5	2.3	1.8	9.6
2038	5.3	2.2	1.7	9.2
2039	4.9	2.1	1.6	8.6
2040	4.4	1.9	1.4	7.8
2041	3.8	1.6	1.2	6.6
2042	3.1	1.3	1.0	5.4
Totals	160.7	68.1	51.9	280.7

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