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THE PROPOSED WASTE ISOLATION PILOT PROJECT (WIPP) AND IMPACTS IN THE STATE OF NEW MEXICO: A SOCIO-ECONOMIC ANALYSIS

Working Papers

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April 1981

New Mexico Energy Research and Development Program

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TABLE OF CONTENTS

PREFACE

In the process of preparing a socio-economic study of WIPP-related impacts in the State of New Mexico*, the authors considered a wide range of potential socio-economic impacts. The state of the art for deriving quantitative measures for many of these impacts, however, is at a relatively infant stage. While methods and data for measuring such things as increases in crime rates and local inflation are primitive at this point in time, considerable time was spent by the authors in investigating these methods inasmuch as it seemed highly probable that the socio-economic study would have to be updated if, and when, the WIPP was ultimately approved**.

This report represents a collection of working papers which describe the methods examined by the authors in their efforts to quantify some of the more important impacts which might be associated with the WIPP. Methods used in the study for estimating population and employment effects are sketched in Working Paper A, along with a description of the author's efforts to derive statistical estimates for changes in baseline labor force participation rates. Diversification impacts are considered in Working Paper C, and a statistical approach to measuring impacts on municipal, county, and services is described in Working Papers B and D. Local inflation and crime effects are described in Working Papers E and F, and the compensation issue is treated in Working Paper G.

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*Resource Economics Program, University of New Mexico, March, 1981.

**As explained in the work cited above, the WIPP was approved by the DOE on January 23, 1981.

The bulk of statistical methods described in these Working Papers was not used in the socio-economic study, primarily due to the lack of credible data required for this use. The intended purpose for presenting these papers is solely that of suggesting analytical techniques for impact measurements which might be useful for future studies of this kind when more appropriate data might be available.

WORKING PAPER A: POPULATION-EMPLOYMENT IMPACTS FROM THE WIPP

A. Overview.

A plethora of reports and publications describing and analyzing the socio-economic impacts of large scale projects have been produced in the 1970's. Two reasons explain this: the first is the federally mandated requirement of socio-economic analysis as part of environmental impact statements and the second is the identification and popularization of the "boomtown" phenomena and its associated economic and social costs and benefits. Studies of existing boomtowns indicate that the experiences are varied and the costs and benefits are difficult to quantify and evaluate. This makes forecasting socio-economic impacts a formidable and uncertain task.

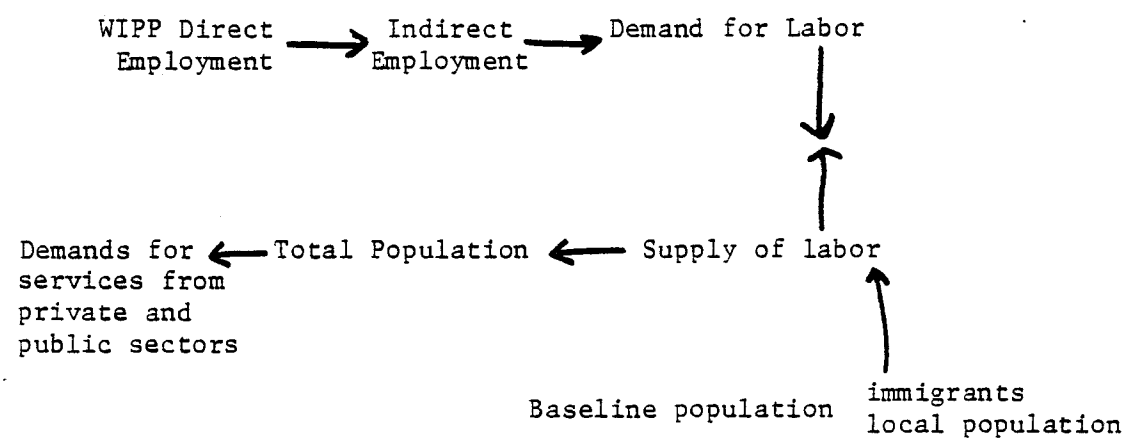
The WIPP project, if constructed, will undoubtedly bring about changes in the socio-economic structure in Eddy and Lea counties because of its large size relative to the existing level of economic activity in this area. The UNM study team has chosen to characterize the WIPP project for the purposes of its socio-economic impact analyses into two phases: construction which includes the testing phase, taking place over six years and assumed for the purposes of this study to have begun in 1980 and the operation phase, assumed to begin in 1987. Because of its rapid startup, peak and decline, we assume the construction phase most closely resembles a construction oriented boomtown whereas the operation phase in which expenditures and employment are constant resembles an external generator of economic activity which is long lived such as a military or government installation or private sector operation. This distinction, we believe, calls for two distinct methodologies to portray the possible socio-economic impacts. We assume that the construction phase effects will resemble other

large scale construction and mining projects undertaken in remote locations or in relatively isolated rural areas. In particular we assume that five New Mexico counties which experienced rapid growth in construction and mining employment and associated economic activity can serve as models for this behavior. We chose to introduce some unique and innovative methodologies based on these data in order to characterize how WIPP may affect Eddy and Lea counties during the construction phase.

Because the operations phase is long lived, we elect to utilize the conventional methodology of input/output analysis to characterize the direct and indirect economic effects. The methodology has been employed in thousands of regional and areawide studies and it is best suited for situations in which the economy can be assumed to be stable. Stability occurs when demand and supply are in equilibrium and no unusual immigration or outmigration is occuring.

Because Eddy and Lea counties are rural and possess little industry, direct employment in WIPP and the indirect employment impacts generated in services are the major sources of socio-economic impacts. Therefore we concentrate on these employment impacts and how they in turn affect families,

The simple flow diagram shown below shows how we proceed:



Direct WIPP employment is derived from information contained in the D.O.E.'s Final Environmental Impact Statement (FEIS). Indirect employment during the construction phase is estimated from past behavior in New Mexico growth counties and during the operations phase from an input/output methodology. The total of direct plus indirect employment represents a demand for labor which is met by a labor supply from the local population and its future growth (called Baseline Population) and from immigrants and commuters. Immigrants who reside in the vicinity of WIPP add to the population and commuters demand certain services and temporary housing.

B. Direct WIPP Employment.

Direct WIPP Employment for the construction and operations phase are taken directly from the FEIS (p. 9-47). The estimated number of full time WIPP jobs from this procedure in the Eddy and Lea County areas are shown in Table A.1.

C. WIPP Induced Indirect Employment.

When economic activity expands in a geographic area, expenditures made to support the activity inevitably create secondary effects. As stated previously, the bulk of these effects will be created by WIPP employees consumption which in turn creates requirements for service oriented employment. The standard method (input/output) to estimate indirect effects including indirect employment is to trace how WIPP expenditures are made and how this affects the local economy. Quantitative estimates of these flows are based on detailed studies of past data gathered from a myriad of sources. In most cases input/output coefficients (representing the proportion of dollars flowing from one sector e.g. paper products to another e.g. natural gas) are determined from studies for the

TABLE A.1

DIRECT WIPP EMPLOYMENT
BY YEARS

Year	Above Ground Construction	Below Ground Construction	Management and Design	Total
A. Construction Phase				
1980	4	56	5	65
1981	68	162	52	282
1982	415	355	152	922
1983	551	119	281	951
1984	79	9	208	296
1985	---	---	269	269
1986	---	---	417	417

B. Operations Phase	General Operation	Security And Remote Control	Underground	Total
	256	44	140	440

Source: FEIS, Table 9-29, p. 9-47.

entire U.S. economy. Subsequently less detailed data from smaller geographic areas are used to modify coefficients based on additional data in order to represent localized economics.

Using the Input/Output methodology to forecast direct and indirect dollar flows requires two critical assumptions. The first is that the structure of the economy does not change over time. Because the coefficients represent the economic structure and are based on past data, this means that technology and economic relationships are frozen. The second key assumption is that relative prices, wages and interest rates stay constant. Should inflation or deflation occur, all prices increase or decrease by the same percentage so that their relationships remain constant. Taken together these two assumptions imply that supply equals demand in every sector of the economy and that this equilibrium is not destabilized through time.

We believe these assumptions limit the ability of the input/output methodology to forecast indirect effects accurately when a construction (or other) project is initiated and completed in a short time and when it represents a significant proportion of employment and economic activity in a region. In such instances commodities and labor must be imported. This disrupts the local economy and increases demand, thus placing pressure on local resources and on prices. Consequently we employ this methodology only for the operations phase. For the construction phase (1980-1986) we develop an alternative approach.

Selection of the Five County Data Base. Eddy, Lea, San Juan, Valencia and McKinley counties were chosen as being representative of New Mexico areas which have experienced rapid growth which was engendered by changes in employment in the construction and mining sectors. These employment

categories explain much of the growth in New Mexico in the 1970's and most closely characterize direct WIPP employment. Prior to the 1970's all five counties experienced slow and even negative growth. Migration from San Juan county was greater than natural growth so that total population was declining as was true in Eddy county and McKinley and Valencia counties experienced net outmigration of 2% of the population annually.*

Non-agricultural employment over the 1970-1977 period grew 54% in McKinley County, 97% in San Juan County, 24% in Eddy County and 59% in Valencia county and mining employment grew 103%, 97%, 24% and 170% respectively. McKinley county displayed the most rapid growth in construction employment at 105%. From 1970 through 1978 energy related construction and mining caused population to grow at 4.9% annually in San Juan County, the fastest in the state, McKinley at 4% and Valencia at 3.8%. Eddy and Lea counties experienced both slower and more eratic growth rates because of instability in the potash industry and other factors. However these two counties are included in the data base because they experienced rapid employment growth at the end of the sample period (1971-1978) and these are the counties which will be affected by WIPP. This employment growth resulted in a 1970-1977 population growth of 12.6% in Eddy County, 7.4% in Lea County, 50.8% in San Juan County, 42.4% in McKinley County and 36.1% in Valencia County. However it is interesting to note that the more rapid growth in employment than in overall population did not result in a dramatic fall in unemployment rates. This is clearly revealed in the following unemployment data for the five growth counties.

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*Lynn Wombold and John Temple, "Population Estimates and Projections: 1970-2000 Counties and Wastewater Facility Planning Area" Bureau of Business and Economic Research, University of New Mexico: Albuquerque, 1979.

Unemployment Rates in Five
New Mexico Growth Counties 1970-1978

	San Juan	Valencia	McKinley	Eddy	Lea
1970		6.8	8.5	7.6	5.7
1971	11.0	7.8	8.5	8.4	6.0
1972	11.0	7.4	7.9	7.2	5.2
1973	10.7	8.0	7.7	6.6	4.6
1974	10.7	8.8	7.2	6.4	4.6
1975	12.2	9.6	7.4	6.7	4.7
1976	10.3	8.8	7.6	6.7	4.3
1977	7.5	7.4	7.0	5.3	3.4
1978	6.4	5.6	5.9	4.3	3.7

Source: New Mexico Employment Security Commission - Civilian Labor Force, Table A

The phenomena of simultaneous rising employment and unemployment is caused by two factors -- immigrants entering the area in search for jobs and a higher participation rate among the residents of the area. We endeavor to incorporate this behavior into scenarios of WIPP induced changes in labor markets and population.

Employment growth in the five New Mexico counties we have identified as experiencing above normal expansion from 1971 to 1978 was caused by mining and heavy construction (e.g. electric power plants) developments. This growth engendered indirect growth of employment in service sectors of the economy (e.g. retail and wholesale trade; government etc.). We analyze the relationships among these sectors by statistically estimating the growth in service employment (defined as employment in government, transportation, utilities, trade, finance and other service sectors) with respect to growing employment in mining and construction. The resulting

quantitative statistical relationship, called a multiple regression estimate, is shown below:

Change in Service Employment (by workplace)	= 324.61 + 1.038 (6.2)	Change in Mining Employment (by workplace)	+ 2.542 (15.1)	Change in Construction Employment (by workplace)

$\bar{R}^2 = .90$

The numbers in front of mining and construction employment are regression coefficients and can be interpreted as multipliers. For example, if mining employment increases by one person, this implies that employment in the service sector increases by 1.037 persons. The numbers in parenthesis underneath the regression coefficients are t statistics. They are a measure of the reliability of the estimated regression coefficient. Generally a t statistic greater than 2.0 means that the estimated regression coefficient is significantly different from zero in a statistical sense and it is reliable. The $\bar{R}^2$ statistic measures how accurately the explanatory variables, those on the right hand side of the equation which in our case are mining and construction employment, explain or predict the dependent variable, service employment. An $\bar{R}^2$ of 1.0 means that <u>all</u> variation in service employment is explained by the equation. The $\bar{R}^2$ for this equation of .90 means that 90% of the variation in service employment is explained.

In order to use this estimated relationship to predict WIPP induced service employment, the equation is transferred into changes in employment by subtracting one year from the next year to obtain year to year changes. This eliminates the constant term and is shown below:

Change in Service Employment	= 1.037	Change in Mining Employment	+ 2.542	Change in Construction Employment

WIPP Above Ground Construction employment and Construction and Management employment are classified as construction employment and Below Ground Employment is classified as mining employment. Estimates in Table A.1 are converted to year to year changes, placed in the equation, and changes in indirect (service) employment are estimated for 1980 through 1986. The result of this process is shown in Table A.2. When these estimates and year to year changes in direct WIPP employment are added together, the result is total WIPP induced changes in employment (Column 7 in Table A.2). This column is our estimate for the demand for labor due to the direct and indirect effects of WIPP.

The estimates of indirect employment during the operation phase (1987 onwards) is derived from the input/output methodology. A set of input/output tables and coefficients contained in the FEIS are constructed in a way which reveals the direct and indirect effects of WIPP expenditures. The coefficient for local household income represents the percentage of expenditures on direct and indirect labor for each of the three operations job categories. Dividing this, which represents total direct and indirect effects, by the comparable coefficient for direct labor which represent the proportion of expenditures going to WIPP employees, gives an estimate of how many secondary jobs are created for each WIPP job in the three operations categories: 1.488, 1.565 and 1.364 for several operations, security and underground, respectively. Multiplying this by the number of direct WIPP employees (Table A.1) gives indirect employment.

D. Labor Supply.

Our estimate of total WIPP induced changes in employment measures the demand for labor. The people who fill these jobs and those who are unemployed

TABLE A.2

ESTIMATES FOR DIRECT AND INDIRECT EMPLOYMENT

ATTRIBUTABLE TO THE WIPP

YEAR	DIRECT EMPLOYMENT[1/]	CHANGE IN DIRECT EMPLOYMENT	INDIRECT EMPLOYMENT[2/]	CHANGE IN INDIRECT EMPLOYMENT	TOTAL WIPP-RELATED EMPLOYMENT	CHANGE IN TOTAL EMPLOYMENT
1980	65	65	81	81	146	146
1981	282	217	473	392	755	609
1982	922	640	1,609	1,336	2,531	1,776
1983	951	29	2,038	429	2,989	458
1984	296	-655	539	-1,499	835	-2,154
1985	269	-27	484	-55	753	-82
1986	417	148	860	376	1,277	524
1987 - Operations Phase	440	23	641	-219	1,081	-196

1/ Table A.1

2/ Calculated with the equation given in text: Change in Service Employment = 1.037 (change in underground construction jobs) + 2.542 (change in all other WIPP employment). For the operations phase, implied multipliers (FEIS, Tables L-1 and L-2) for general operations, security/remote control and underground (Table A.1) are 1.488, 1.565 and 1.364, respectively.

constitute the supply of labor. However, as increased economic activity is often attended by changes in labor force participation rates, changes in the supply of labor (employed plus unemployed) due to the WIPP must take into consideration any accompanying changes in labor force participation rates.

As a part of this study, an effort was made to more formally estimate changes in labor force participation rates in the following manner. The labor participation rate is defined as the total work force divided by the population and the work force is made up of the employed and those actively seeking employment, the unemployed. Based on analysis of the labor participation rate in the five New Mexico growth counties, we statistically relate the participation rate to the participation rate in the previous year and to the percentage growth of employment. It is this latter variable which quantifies how the availability of jobs induces those from the resident population to join the labor force. The specific multiple regression equation is:

$$\text{Labor Participation Rate} = -.0175 + \underset{(39.8)}{1.030}\ \text{Labor Participation Rate in Previous Year} + \underset{(9.7)}{.305}\ \frac{\text{Change in Employment}}{\text{Level of Employment}}$$

$$\bar{R}^2 = .98$$

The regression coefficient of 1.03 for the participation rate in the previous year indicates positive growth trend. Growth occurred in the participation rate nationwide and in these rapidly growing counties. The regression coefficient for the percentage growth in employment indicates that growing economic activity and employment opportunities encourage people to enter the labor force. The regression coefficients are

statistically significant (t values, in parenthesis, greater than 2.0) and virtually all (98%) variation in participation rates is explained by the regression equation.

This estimation technique was not used in the study, primarily due to data problems. This is to say that our historical data for employment levels are not adequate for the model given above for the following reason. Historical employment changes will consist of two effects. First, increased labor force participation for local residents (the measure of interest here) plus in-migrants. Unfortunately, there are no data available which allow for separating these effects, in which case estimates demonstrated above should be expected to result in upward biases in estimates for participation rates, the high R^2 notwithstanding.

WORKING PAPER B: IMPACTS ON MUNICIPAL AND COUNTY SERVICES

It has often been argued that rapidly growing population and economic activity associated with energy and natural resource development creates requirements for services provided by local units of government which both exceed those associated with "normal" growth and which are different in structure. Furthermore, it is often the case that tax revenues produced by the rapidly growing population and economic activity are insufficient to fund the services produced by the public sector which are demanded by "above normal" growth.*

The preferred way to approach the issue as to project-related pressures on local governments in a specific region (Eddy and Lea counties in this case) is to first ascertain the capabilities of the existing local government structure in each service category (e.g., education, roads, police and fire protection, government administration, etc.). The next step is to estimate the demand imposed by anticipated "above normal" rates of growth and the governmental revenues which such growth generates. The reason that it is necessary to determine the capacity of existing government to provide services is that a critical determinant of the costs of providing additional services is whether new capital intensive facilities need to be built or whether the existing structure with only the addition of employees and operation costs is sufficient. If existing capital (roads, buildings, sewer plants, etc.) are adequate, incremental costs due to growth are relatively modest and can be estimated from past experience. Should substantial capital investment be required such as new schools, major roads and sewer systems,

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*For example, see J. S. Gilmore, "Boomtowns May Hinder Energy Development", Science, [February, 1976].

materials and so forth the costs of accommodating growth increase dramatically. Furthermore, capital projects require long range planning, complex financing and often lengthy construction. Should growth occur at a more rapid pace than anticipated or which local government can absorb, the level and quality of services from existing institutions will diminish, to the detriment of new and old residents alike. Rapid growth may impose a second cost on current residents. If the government revenues engendered by new economic activity and population are inadequate to pay for the additional investment and costs of operations, existing residents may in effect be subsidizing growth.

The task of estimating the capacity of governments to deliver various services and the incremental costs and revenues engendered by "above normal" growth is complex and subject to wide discretion. A primary cause for this difficulty is that little is known about how people evaluate government services because virtually all such services are either provided "free", at no direct cost to the consumer, or are priced arbitrarily and consumers are compelled by force of law to consume the service. Examples of "free" services include public roads, parks, police protection and a host of other services which either by custom or by their very nature, because it is either costly or impossible to prevent people from consuming them (called public goods), are provided at zero direct cost to the consumer. Examples of services where the consumer "pays" and is compelled to consume are city run utilities, garbage collection, building permits, etc. However, these fees and user charges are frequently not equal to the cost of providing the service or to the consumer's evaluation of that service. A third category is those public services which are consumed voluntarily but are not priced in accord with the cost of providing the service such as fares

on public transportation, municipal zoo and museum admission, etc. These facts make it impossible to ascertain how much people are willing to pay for public sector services and therefore make it difficult to determine what is the "proper" level of service. This difficulty is compounded by the realization that police and fire protection and all other services are not homogeneous but rather vary enormously in quality as measured by a large number of characteristics. In short it is difficult to determine precisely what the demand for services is and to compare the level of services provided among different communities.

The problems with measuring the costs of providing additional services are significant because of the measurement of quality and level of service considerations but somewhat more manageable than estimating the demand for services. The additional revenues created by growth are also difficult but not impossible to ascertain, of course changes in the structure of taxes, i.e., tax rates and tax bases, add additional complications.

Taken together these difficulties account for the fact that studies made of "boomtowns" and energy impacted areas yield a large range of conclusions and recommendations. The bottom line of these conclusions range from finding growth is not self financing to finding the converse. However, a growing number of studies conclude that the primary problem is that when substantial capital investment is required, the time when expenditures are necessary is in advance of the time that growth creates additional government revenues. The problem is then one of timing finance and sources of capital rather than one of net costs of growth.

The Investment Decision

The key determinant of investment decisions whether they are made in the public or private sector is their ability to pay for themselves and yield an

acceptable rate of return (private sector) or a benefit to cost ratio greater than 1.0 (public sector). Investments by definition produce services for more than one year. Investment in buildings can last for well over one hundred years. Therefore, it is uneconomic to make an investment whose useful service life exceeds its required (demanded) services. Whenever the situation arises in which demand for services exceeds supply and it is uneconomic to invest, several expedients are available. The first is leasing. The second is to allow for a degradation in the quality and responsiveness of service--in other words, congestion. This situation may occur during the peak construction years associated with the WIPP. However, even this situation is unlikely. What is more probable is that the advent of WIPP will advance slightly the date at which future investments will have to be made. This occurs because the most capital intensive services provided by cities in the two county area possess excess capacity at present.

This effect can best be seen graphically. In Figure B.1, the horizontal axis depicts time and the vertical axis depicts the services from capital stock required by a growing population. The upward sloping line (PP^1) depicts the services required by the baseline population. The advent of WIPP alters the growth path by shifting it upwards (WW^1). In the early years of construction activity (1982-1983) construction activity and employment is at its peak and consequently produces a hump in required demands. The hump subsides during the construction phase and operation phase (1987 onwards) so that the growth rate is equivalent to what it would have been in the absence of WIPP but the path is shifted upwards.

Local government services such as water and saver utilities possess excess capacity which would be sufficient in most cases to provide the baseline population until the year 2000. The ultimate capacity of one

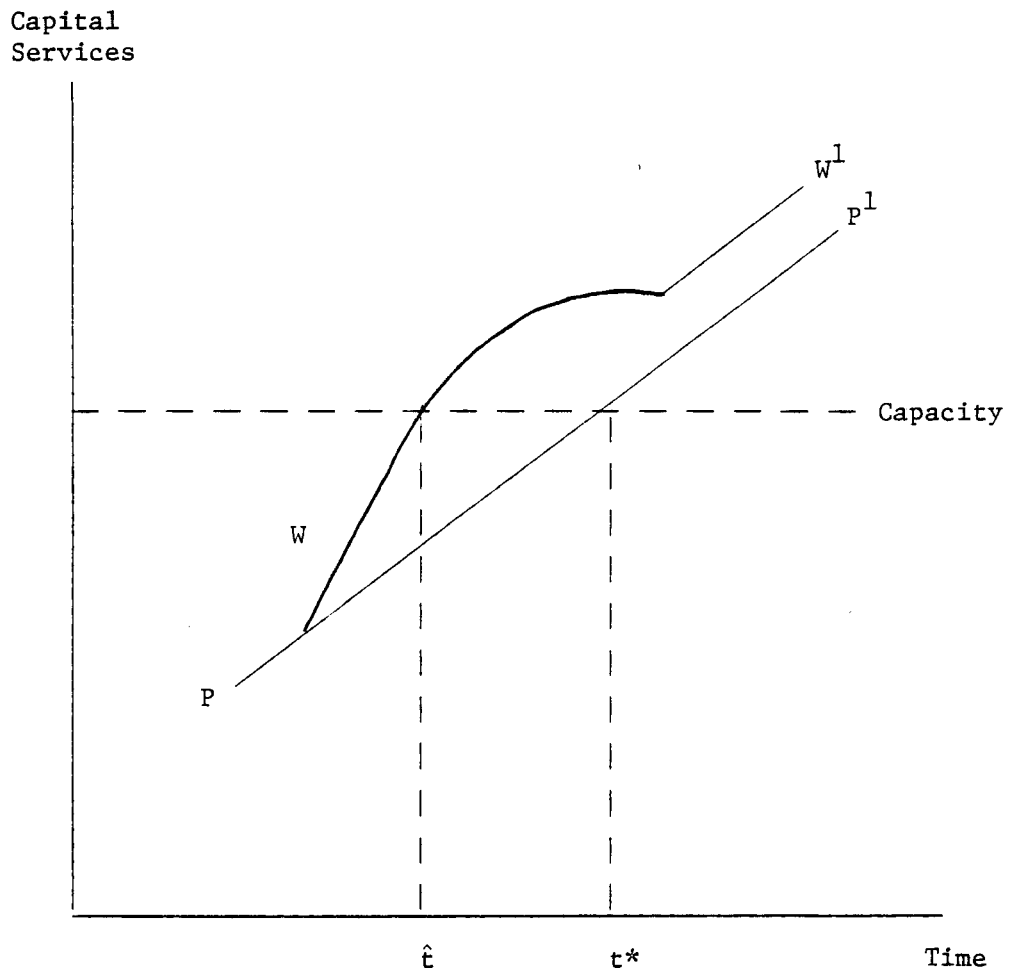

FIGURE B.1

TIMING OF CAPITAL SERVICES REQUIREMENTS
WITH AND WITHOUT WIPP

such service is depicted in Figure B.1 as "capacity" which becomes fully utilized at some future year, denoted by t* (the point where capacity and baseline growth intersect). Should population and service requirement growth be altered because of WIPP, the capacity constraint will be reached at an earlier date ($\hat{t}$ in the diagram). Whichever situation holds, a new investment must be undertaken in order to increase capacity and provide services. Consequently the cost which is attributable to the direct and indirect impacts of WIPP is not the entire cost for augmenting capacity, but only that portion due to early replacement (the difference between $\hat{t}$ and t*). The cost of this time difference is the additional interest which would have to be paid for the dollars invested. The cost today is the present value of the interest paid for this additional time. Because virtually all of the capital intensive government supplied services now possess sufficient capacity to accommodate the construction phase and operation phase of WIPP in addition to baseline population growth, the capacity constraint date is far off. As a result we have determined in view of the many uncertainties, calculating the present value of additional interest costs for WIPP is impossible. Also it is likely that these costs are not large when measured in present value terms. Therefore, we concentrate on estimating costs which would be more immediate -- the operation and maintenance cost of increased service levels and the costs of short-lived capital investment.

Methods for Estimating Government Costs and Revenues Attributable to Growth.

There are two widely used techniques in which to approach the question of growth induced changes in government costs and revenues: (1) rely on

past behavior and (2) query government officials regarding future requirements should a specific amount of growth occur. In the former technique the implicit assumption is that the past sheds light on future needs. Past data from government budgets are analyzed for per capita expenditures and revenues in order to estimate future incremental costs and revenues. The advantage of this approach is that data is readily available and that detailed analysis is possible.

There are two significant disadvantages with this technique. The first is that government budgets are organized for the convenience of legislators and bureaucrats. Although detailed data is available, it is based on standard government accounting practices. The accounting categories frequently do not coincide with a specific government provided service but are oriented to the inputs purchased by a unit of government. For example the general administration and wage payment categories provide no direct service. Administration provides a framework wherein an organizational structure is supported. This category then should be parceled out to all separate services, however, the quantification of this process is by necessity arbitrary. Furthermore standard government accounting fails to distinguish separate capital and operating costs and capital expenditures often are not depreciated or amortized over their lifetimes. Frequently capital and operating revenues or expenditures are lumped together which makes it impossible to separate these components. This is an important factor because capital expenditures do not occur in smooth increments from year to year but are lumpy. Failure to distinguish between capital and operational items distorts estimates of per capita revenues and expenditures.

The second major problem is that state and local governments are compelled by laws in virtually all states to present balanced budgets. The

fundamental relationship is that government revenues including grants and other sources of funds equal expenditures. Although deficits or surplus are prevalent, their existence is usually obscured by various accounting practices so that the budget appears to be balanced. Because local governments may only spend what they expect to take in, the analysis of past budgets may not reveal when a local government is hard pressed to supply even minimal and basic levels of service. Alternatively it is difficult to tell if a jurisdiction providing services in excess of what voters would be willing to pay had they the option of accepting or rejecting them.

The second technique involves querying local officials as to how government services would have to be expanded should a specified amount of growth takes place. A related technique is to base "needs" on standards of service established by professional associations, government agencies and other organizations which define standard levels of need such as the number of police per 1000 persons, etc. The difficulty with this approach is that voters in various localities possess different preferences which implies that a national or other standard may exceed or fall short of the preferences and capabilities in an individual jurisdiction. The advantage of the interview approach is that critical bottlenecks can be identified from those who should be most knowledgeable, the local official, before they occur.

Analyzing Revenues and Expenditures of Local Government.

The principal source of revenues to county and municipal governments in New Mexico consists of property taxes, intergovernmental transfers such as general revenue sharing and specific grant programs and local shares of state collected taxes such as the gross receipts tax, motor vehicle taxes and taxes on the production of natural resources.

The 1977-78 fiscal year General Fund and Special Revenue sources for Eddy and Lea county budgets are shown in Table B.1. It is notable that the largest source of general fund revenues are from the county share of general property taxes and their share of specific property and production taxes levied on the output of oil and natural gas. The most significant revenue decision county commissioners make concerns the property tax rate. The amount of local discretion is severely limited and revenues beyond those implied by the maximum property tax rate must come from increases in assessed value of real property. This depends on revaluing existing properties to their current market value and appraising new construction accurately when it is added to the tax rolls.

One way to place these revenue sources in perspective is by comparing the five rapid growth counties. The sources of funds are broken into general (the General Fund) and special revenues in Table B.2 which shows per capita revenues. It is apparent that, although the individual funds display wide disparities, per capita revenues are similar.

Expenditures for Eddy and Lea counties in the fiscal year 1977-78 from general and special funds are displayed in Table B.3. It is apparent that these counties spend most of their income on roads, administration, law enforcement and fixed changes which consist of interest and principal payments on outstanding debt.

Municipal revenues and expenditures are more diverse than those for counties because of the wider variety of services provided. Revenues for the municipalities of Carlsbad, Farmington (included as an example of an energy impacted rapid growth city), Hobbs and Loving to general and special funds are shown in Table B.4. Although there are many sources of funds, the major ones are the municipality's share of gross receipts taxes, grants

TABLE B.1

REVENUE FOR EDDY AND LEA COUNTIES FISCAL 1977-78

GENERAL FUND RESOURCES

	Eddy	Lea
Property taxes	$ 813,990	$ 846,663
Oil and Gas production	829,904	1,424,637
Oil and Gas equipment	161,984	269,292
Liquor licenses	1,750	9,600
Penalty and Interest	10,000	10,000
Merchandise license	5,000	1,550
Gasoline tax	25,000	1,200
Cigarette tax	3,500	2,500
Motor vehicle	30,000	37,000
County fees	48,150	56,300
Interest on investments	85,000	40,000
Rents and Royalities	1,800	300
Care of prisoners	22,500	12,000
Xerox	1,000	500
Services to other agencies		9,240
In lieu of taxes act	897,386	
Village of Loving	5,000	
General Fund Total:	$2,941,964	$2,720,782

TABLE B.1 (Continued)

Special Revenue Funds Resources (1977-78)

	Eddy	Lea
Recreation Fund		
Cigarette tax	$ 1,500	$ 1,200
Revenue Sharing Fund		
Federal Allotment	850,453	830,371
Interest on Investment	10,000	
County Road		
Motor Vehicle road	300,000	320,000
Sub-marginal land	1,500	
Farm and Range improvement		
Taylor grazing act	15,000	9,000
Hospital claims		
Recoveries	5,000	
Fire district		
State fire allotment	92,815	22,500
Hacienda de Esperanza		
LEAA grant	21,872	
Matching fund	2,430	
Title XX	21,313	
Matching fund	7,521	
HSSD funds	5,000	
BOR		
Grant	21,889	
Avalon Alacran (watershed)		
Special tax levy	6,000	
Artesia Eagle Draw Flood		
Special tax levy	25,000	
Airport		
Sales		55,000
FAA grant		475,000
Special Fund Total:	$1,387,293	$1,713,071

Source: Eddy and Lea County Budget 1977-78.

TABLE B.2

COUNTY REVENUE SOURCES FOR SELECTED COUNTIES (1977-78)

	Gen. Fund	County Road Fund	Farm & Range	Recreation	Hosp. Claims	Fire Dist.	Revenue Sharing Grant	Anti-Recession Grant	Other
Eddy	$2,972,129	$301,500	$15,000	$1,500	$5,000	$92,815	$860,453	$ 0	$111,025
Lea	2,720,782	320,000	9,000	1,200	0	22,500	830,371	0	530,000
McKinley	1,112,777	183,000	10,000	3,250	0	23,440	295,857	9,215	176,541
San Juan	2,014,158	305,000	20,000	4,000	0	57,190	983,500	103,065	20,471
Valencia	1,676,174	377,000	11,000	14,250	0	96,000	453,644	32,778	0

	Total Revenue	Population (1978)	Per Capita Total Rev.	Total Rev.(Exc. Rev. Sharing)	Per Capita
Eddy	$4,395,422	46,900	92.95	$3,498,969	74.60
Lea	4,433,853	54,000	82.11	3,603,482	66.73
McKinley	1,814,080	56,600	32.05	1,518,223	26.82
San Juan	3,507,384	74,800	46.89	2,523,884	33.74
Valencia	2,660,846	54,100	49.18	2,207,202	40.79

Source: Eddy, Lea, McKinley, San Juan and Valencia County Budget 1977-78.

TABLE B.3

EXPENDITURES FROM GENERAL AND SPECIAL FUNDS
FOR EDDY AND LEA COUNTIES FISCAL 1977-78

General Fund Expenditures

	Eddy	Lea
Elections	$ 23,750	$ 25,000
Data Processing	32,232	
Administration	232,908	153,425
Ordinance enforcement	16,693	0
Maintenance of buildings & grounds	215,938	511,960
Recording & Filing	119,053	117,852
Property assessments	150,702	152,927
Collections	82,050	79,212
Law enforcement	374,016	487,986
Fixed charges	450,321	320,533

Source: Eddy and Lea County Budget 1977-78.

TABLE B.4

GENERAL FUND EXPENDITURES (1977-78)
(Includes Personal Services and Operating Expenses)

	Eddy	Lea
Elections	$ 23,750	$ 25,000
Data Processing	32,232	
Administration	232,908	153,425
Ordinance Enforcement	16,693	0
Maintenance of Buildings & Grounds	215,938	511,960
Recording & Filing	119,053	117,852
Property Assessments	150,702	152,927
Collections	82,050	79,212
Law enforcement	374,016	487,986
Fixed Charges	450,321	320,533

SPECIAL FUND EXPENDITURES

County Road Fund Expenditures		
Personal services	510,060	447,576
Operating expenses	369,000	606,967
Capital outlay		150,000
Farm & Range Improvement Expenditures		
Predatory Animal Control	8,000	6,167
Conservancy Soil & Water	3,000	15,000
Recreation		
Maintenance	6,000	
Supplies	2,000	8,000
Regional Library	750	700
Municipal Library	23,750	17,500
Senior Citizens		10,000
County Indigent Hospital Claims		
Indigents	35,000	60,000
Admin. Costs		150
Fire District		
Equipment repair	8,500	23,200
Maintenance	6,780	11,570
Capital Outlay	47,855	39,225
Insurance	400	9,600
Convention/School Expense	1,500	6,500

	Eddy	Lea
Revenue Sharing		
Capital Outlay	180,720	81,085
Maintenance		
Capital Outlay	13,050	
Operating Expense	62,500	
Public Safety		
Capital Outlay		45,995
Recording & Filing		
Capital Outlay	2,394	
Assessments		
Capital Outlay	8,200	
Environmental Protection		
Capital Outlay		60,000
Law Enforcement		
Capital Outlay	57,710	
Road		
Capital Outlay	176,109	354,821
Operating Expense	152,000	200,000
Airport		
Capital Outlay	66,000	
Airport Fund Expenditures		
Personal services	98,252	
Operating expense	216,275	
Capital Outlay	504,500	
Anti-recession Expenditures		
Salaries		25,768
Hacienda de Esperanza		
Personal services		22,953
Capital Outlay	8,296	
Operating expenses		26,887
Bureau of Reclamation		
Capital Outlay		1,000
Operating expense		2,250

	Eddy	Lea
Avalon Alacran Watershed		
Salaries		10,000
Loan & Interest		1,714
Easement R/W		5,000
Artesia Eagle Draw Flood		
Easement R/W		107,911
Operating expense		14,500
Loan & Interest		13,599

Source: Eddy and Lea County Budget 1977-78.

and various fees and user charges for city run utilities and other fee operations.

The State of New Mexico collects the gross receipts tax and distributes 1/4% of the base 4% tax to qualifying municipalities. Furthermore municipalities are granted the option of invoking an additional 1/4% or 1/2% tax rate upon approval by referendum. Carlsbad invoked the 4 1/2% overall rate in July of 1979 whereas Hobbs and Loving remained at the 4% level. Consequently Carlsbad's gross receipts tax revenues have taken a substantial jump beyond those shown in Table B.5 for fiscal year 1977-78. In July of 1977 Farmington had invoked a 1/4% tax increase. Being a marketing center for the area explains its large ($4.4 million) gross receipts tax revenue in Table B.5.

Because the New Mexico Gross Receipts tax is broadbased and covers virtually all final transactions, including personal services and new construction, increased economic activity and personal income show up immediately as greater tax revenues. This would be true of WIPP related payrolls for Hobbs and Carlsbad because we forecast that there will be relatively few long distance commuters who would spend their incomes elsewhere and because no competing retail trade centers are nearby. Since Loving is small and lacks commercial centers it is unlikely that its revenue from the gross receipts tax would increase as rapidly as local population and income. It should also be pointed out that both Hobbs and Loving may in the future invoke the 1/2% tax rate.

Although the property tax is not a major source of revenue to municipal government, it is to county governments. Valuations of real property subject to the property tax and associated taxes on oil and gas production are shown in Table B.6 for Carlsbad, Farmington, Hobbs and Loving. State

TABLE B.5

REVENUE FOR CARLSBAD, FARMINGTON, HOBBS AND LOVING - FISCAL 1977-78

GENERAL FUND RESOURCES	Carlsbad	Farmington	Hobbs	Loving
Property Taxes	$ 84,065	$ 120,000	$ 100,000	$ 2,265
Franchise Tax	145,000	161,000	180,000	5,100
Occupation Tax	90,000	75,000	13,000	1,500
Lodgers Tax 75%		60,000		
Street Tax	1,000			
Oil & Gas Production			15,000	
Oil & Gas Equipment			4,500	
Liquor Licenses	37,000	27,000	16,875	1,000
Building Permits	34,000	70,000	10,000	
Dog Licenses	700	100	500	150
Paving Cuts	100	15,000	4,000	
Business Licenses		7,000		
Bicycle Licenses		100	500	
Sewer Inspection	1,600			
Oil & Gas Ordinance	6,000			
Gasoline Tax	190,000	280,000	197,000	5,600
Auto Licenses	3,500	110,000	78,000	
Cigarette Tax	80,000	85,000	108,000	2,000
Gross Receipts Tax	1,675,000	4,400,000	2,600,910	14,500
Sale of Maps & Publications	300		100	
Printing & Copying	800		600	
Campground	7,000			
Beach Concession	1,000			
Ambulance Calls	50,000			
Parking Meters & Fees		35,000		
Street, Sidewalk Repairs	200		100	
Pound Fees	500	10,000	2,500	
County Rural Fire Services	35,000		62,500	9,000
County Ambulance Services	35,000		6,250	
County Library	13,000		5,625	
Recreation	15,000			
Senior Citizen	10,000			
Extraterntorial Inspection	15,000			
Beach Rides	8,000			

	Carlsbad	Farmington	Hobbs	Loving
Special Police Services		3,500	7,000	
Court Fines	135,000	185,000	135,000	2,100
Library Fees	1,600	11,000	5,000	
Interest on Investments	5,000	70,000	65,000	
Rents & Royalities	30,000	15,000		180
Insurance Recoveries		5,000	6,500	
Sale of Materials & Supplies	100		4,000	
Civic Center	20,000	50,000		
Misc. Damage Recoveries		2,000		
Care of Prisoners		2,000		
Irrigation		5,500		
Interdepartmental Labor		15,000		
MOC Revenue		30,000		
Electric Maintenance Revenue		50,000		
Plumbing Inspection		8,000		
Plancheck Revenue		20,000		
Print Shop		3,000		
Sale of Unclaimed Property		40,000	500	
Other (Utility Construction)			50,000	
GRANTS	3,000	3,200	53,278	963
User Charges				
Cleaning & Removing Charges			3,000	
Motor Vehicle Admin. & Fees			4,800	
Ambulance			25,000	
Recreation Receipts			10,000	
Vector Control			1,000	
Drivers License Dist.			32,000	3,800
SPECIAL REVENUE FUNDS RESOURCES				
State Fire Allotment	30,313		19,250	15,938
Other		28,750	1,000	
Cigarette Tax	35,000	45,000	57,000	900
Other		25,000	2,500	
Revenue Bond Interest (Transfer)			4,175	

Special Revenue cont.	Carlsbad	Farmington	Hobbs	Loving
Revenue Bond Principal Fund (Transfer)			15,000	
Lodgers Tax	50,000	16,667		
Other		600		
Revenue Bond Interest Fund/General			8,079	
Revenue Sharing Fund Federal				
Allotment	149,236	264,182	207,957	19,045
Interest on Investment		5,818	5,100	
State Allotment	114,000			
General Fund Transfer	10,000			
In Kind	56,000			
Anti-Recession Fund Grant	12,000			
State Park--Admissions	60,000			
--Post Cards	5,000			
--State Appropriation	85,000			
General Obligation Interest & Sinking Fund				
Property Tax	90,744	41,325		
Interest on Investment		1,000	5,250	
Revenue Bond Principal Fund				
Interest on Investment			500	
Transfers			45,000	
General Obligation on Principal Fund				
Property Tax		130,000		
Interest on Investment			6,000	
Delinquent Property Tax		6,000		
Solid Waste Disposal Fund				
Refuse Removal Charges	390,000		562,714	11,918
Transfer	85,000			5,100
Cemetery Fund				
Burial Permits			500	
Lot Sales			16,000	40
Interest on Investments	1,000			
Golf Fund				
Greens Fees and Memberships	32,329		72,320	
Rentals			255	
Transfers	50,000		77,652	
Airport Fund				
Private Contributions	7,000			
Tie-down Fees	1,500			
Rental	7,000		4,500	
Other (County)	35,000	130,000		
Transfer	35,000			

Special Revenue cont.	Carlsbad	Farmington	Hobbs	Loving
Street Improvement Fund				
Motor Vehicle Fees	45,000			
Federal-Urban Funds	1,100,000			
County	285,000			
Community Development	70,000			
Downtown Parking				
Parking Collection and Fines	10,320			
Insurance Fund				
Recoveries	10,000			
Transfers	90,000			
Capital Improvement & Equipment Purchase Fund				
Transfer	75,000			
Community Development				
H. U. D.	600,000			
Water & Sewer/Utilities				
Sales or Service	1,850,000		840,000	58,000
Connection Charges	20,000		20,000	225
Penalty				120
Other	250,000			600
Gross Receipts Tax	60,000		33,000	2,465
Gas & Oil				2,800
Sale of Electric Energy		8,944,000		
Miscellaneous Revenue Electricity		170,000		
Misc. Rev. Cath. Prot.		45,540		
Misc. Rev. Cath. Prot.		64,000		
Misc. Rev. Elect. Aztec		10,926		
Sale of Water		1,440,000		
Water Tap Fees		125,000		
Misc. Rev. W & S		2,000		
Main. Ext. Fees--Water		230,000	8,000	
Sewer Service Charge & Sales		410,000	275,000	13,900
Sewer Tap Fees		5,000		
Main Ext. Fees--Sewer		80,000	4,000	
Interest		160,000	23,000	
Sales Tax Revenue		360,000		
Industrial Disposal			204,000	

Special Revenue cont.	Carlsbad	Farmington	Hobbs	Loving
Water Ext. Revenue Bond Interest				
Transfers			26,668	
Water Ext. Revenue Bond Principal				
Transfers			180,000	
Joint Utility Construction Fund				
Interest on Investments			4,000	
Water Trunk Extensions			3,000	
Water Trunk Connections			500	
Sewer Trunk Extensions			2,000	
Transfers			100,000	
Bonds			700,000	
Wastewater Construction Fund				
Interest			25,000	
EIA/EPA			3,701,687	
Community Development Construction				
Block Grant			92,500	
Handball Court Construction			49,266	
Urban Systems Construction Fund				
22% of Total Cost			115,500	
Fed. m-1018			409,500	
Industrial Park Construction Fund				
Bond			208,573	
Econ. Development Administration			376,123	
4 Corners Regional Commission			75,000	
EIA			945,000	
Title III Older Americans Act				
Grant			33,555	
Transfers			6,511	

Source: Carlsbad, Hobbs, Loving and Farmington Cities Budget 1977-78.

TABLE B.6

PROPERTY TAX VALUATION FOR CARLSBAD, FARMINGTON, HOBBS AND LOVING - FISCAL 1977-78

	Carlsbad	Farmington	Hobbs	Loving
Locally Assessed	$ 35,659,530	$ 52,869,015	$ 42,271,783	$ 884,770
State Assessed	4,847,125	6,495,381	4,542,212	148,784
Oil and Gas Production	1,065,755	222,225	5,918,034	0
Oil and Gas Equipment	192,695	42,043	1,079,448	0
Operating Tax Rate	.002,225	.002,225	.002,225	.002,225
Total Valuation	41,765,105	59,628,664	53,811,477	1,033,554
Tax Revenue	84,065	122,645	109,683	2,265

Source: Carlsbad, Hobbs, Loving and Farmington Cities Budget 1977-78.

assessed properties consist of mines and other large scale installations which encompass more than one jurisdiction such as railroads and utility distribution networks. Oil and gas production and equipment are subject to the property tax and generate significant revenues for counties and municipalities in producing regions as seen in Table B.7. WIPP facilities would not be subject to property taxes although in lieu payments by the Federal government might be negotiated to cover certain potential tax losses and expenditure requirements.

Budgeted expenditures for the fiscal year 1977-78 for Carlsbad, Farmington, Hobbs and Loving are shown in Table B.8 from general and special funds. A perusal of numerous entries makes it clear that the major expenditure categories are for public works and utilities, including city streets, police and fire protection and administration. It is also apparent from this and other tables that operating and capital budgets are sometimes separate and are sometimes merged together. This factor makes it difficult to separate out those components of capital and operating expenditures. Despite the difficulties inherent in separating capital and operating budgets the UNM study team analyzed the budgets from fiscal year 1976 through 1978 for capital and operating expenditures and computed these on a per capita basis along with revenues from taxes, grants and fees. The results are shown in Table B.9. Several things are discernable from these data. The first is that revenues climbed steadily in current dollar terms although grants and bond sales in Farmington account for the large shift in fiscal 1977. This is also true of per capita operating expenditures, particularly for Farmington which is used as an example of a growth boomtown. However, per capita outlays reveal an erratic course because of the nature of investment. Projects such as sewers, water supply buildings and streets require large

TABLE B.7

PROPERTY TAX VALUATION FOR CARLSBAD, FARMINGTON, HOBBS AND LOVING

FISCAL 1977-78

	Carlsbad	Farmington	Hobbs	Loving
Locally Assessed	$35,659,530	$52,869,015	$42,271,783	$ 884,770
State Assessed	4,847,125	6,495,381	4,542,212	148,784
Oil and Gas Production	1,065,755	222,225	5,918,034	0
Oil and Gas Equipment	192,695	42,043	1,079,448	0
Operating Tax Rate	.002,225	.002,225	.002,225	.002,225
Total Valuation	41,765,105	59,628,664	53,811,477	1,003,554
Tax Revenue	84,065	122,645	109,683	2,265

Source: Carlsbad, Hobbs, Loving and Farmington Cities Budget 1977-78.

TABLE B.8

1977-78

Fund	BUDGETED FUND REVENUES				BUDGETED FUND EXPENDITURES			
	Carlsbad	Farmington	Hobbs	Loving	Carlsbad	Farmington	Hobbs	Loving
General	2,733,465	5,973,400	3,812,038	48,158	2,669,164	6,290,600	4,082,013	51,854
Fire	30,313	28,750	20,250	15,938	46,087	10,000	94,890	15,938
Recreation	35,000	70,000	59,500	900	0	0	96,209	1,205
Lodgers Tax Fund 100%	50,000	17,267			25,000	25,000		
Revenue Sharing	149,236	270,000	182,627	19,045	186,545	270,000	326,200	27,160
Anti-recession	12,000				12,000			
Park Improvement	170,000				180,000			
State Park	150,000				150,000			
G. O. Int. and Sink.	90,744	178,325	6,000		91,644	171,325	130,250	
Sales Tax Revenue Bond Principal and Interest			500		14,160	53,079		
Solid Waste Fund	390,000		562,714	11,918	475,000		580,314	17,018
Cemetery Fund	46,000		16,500	40	55,000		68,657	178
Golf Fund	32,329		62,725		82,329	151,928		
Airport Fund	50,500	130,000	4,500		87,057	120,814	7,600	
Bond Fund (Int. & Sink)/Recreation					21,975			
Bond Reserve								
CETA Fund								
Street Improvement Fund	1,500,000				1,592,123			
Downtown Parking	10,320				10,320			
Water and Sewer	2,180,000		1,407,000	78,110	1,856,524		1,123,719	73,245
Insurance Fund	10,000				100,000			
Capital Improvement	0				75,000			
Community Development	600,000		92,500		600,000		92,500	
Sanitation		512,758				512,758		
Utility Operating		12,046,466				11,802,353		
L.C.A.A.		0				1,605		
Sales Tax						366,945		
Grant Construction		0				193,658		
Water Ext. Prin. & Int.			1,000				26,668	
Recreation Facilities Bond Prin. & Int.							19,175	
Joint Utility Const. Fund			709,500				934,500	
Waste Water Const.			3,762,687				4,367,544	
Urban Systems Const. Fund			525,000				525,000	
Title III, Older Americans			33,555				39,275	
Handball Construction							49,266	
Industrial Park Construction			754,196				754,196	
TOTAL	8,239,907	19,226,966	11,976,792		8,329,928	19,765,058	13,702,803	

Source: Carlsbad, Hobbs, Loving and Farmington Cities Budget 1977-78.

TABLE B.9

PER CAPITA REVENUES, OPERATING EXPENDITURES, AND CAPITAL OUTLAY
IN CARLSBAD, FARMINGTON, HOBBS AND LOVING - FISCAL 1975-78

	Per Capita Revenues			Per Capita Operating Expenditures			Per Capita Capital Outlay		
	1975-76	1976-77	1977-78	1975-76	1976-77	1977-78	1975-76	1976-77	1977-78
Carlsbad	207.38	209.31	295.34	35.67	42.09	43.58	36.33	27.07	98.09
Farmington	506.54	407.89	534.08	260.47	306.31	473.68	210.84	103.93	43.12
Hobbs	200.01	236.69	366.82	152.80	160.61	173.32	73.53	18.82	202.08
Loving	108.94	100.00	116.07	14.00	17.96	21.04	20.45	12.93	15.70

Source: Carlsbad, Hobbs, Loving and Farmington Cities Budget 1977-78.

chunks of capital and thus the pattern of capital expenditures over time is lumpy. Furthermore the wide divergencies in type and level of services provided by local government accounts for the differences (on the order of a factor of ten) between per capita revenues and per capita operating expenditures among these five communities.

The only legitimate way to find the annual cost of capital costs (expenditures which provide services for more than one year) is to inventory the existing capital stock in each community and assign appropriate rates of depreciation to each item. The sum of annual depreciation would then measure the annual cost of capital. An alternative technique, which the UNM task force investigated and attempted to apply, is to define the useable life of each capital project and expenditure at the date when the expenditure was made. An historical analysis of these data would indicate the approximate annual cost of capital. However, the attempts to implement this technique were bogged down due to data limitations and the restricted utility of the final estimate. However, no such problems are encountered in comparing the annual per capita operating expenditures for general government, police, fire, parks and recreation, water, sewer and garbage, streets and roads, library and airport. While these expenditures invariably show an upward trend over time in each community, they are remarkably different among communities. This is accounted for by the observations made at the beginning of this section that it is difficult to measure the level and quality of public services. Consequently the per capita dollar measures simply indicate how much each community decided to allocate in supporting various services. However, the literature strongly suggests that the per capita costs of these and other services such as education for "typical" communities decline as the population increases up to a city

size of 100,000 to 400,000 persons. As communities increase beyond this size, per capita expenditures rise rapidly. This observation is borne out for Loving as their general government, fire, and water, sewer and sanitation operating expenses are generally higher than in Carlsbad and Hobbs. It is also apparent that their streets and roads were primarily county maintained or not maintained at all.

This detailed examination of county and municipal budgets regrettably has not yielded information regarding the capacity of existing institutions to accommodate growth and the incremental costs and tax revenues engendered by "normal" or "above normal" growth which has occurred in the past or is likely to occur in the future. This conclusion coincides with the statements made at the beginning of this section to the effect that governments' accounting budgets are not readily broken down into capital and operating cost expenditures and that the level, quality and "requirements" for government services are difficult to discern or to define. Despite these limitations we have projected the WIPP induced requirements for municipal government expenditures reported in the DEIS and computed from the UNM highest and lowest population scenarios (See Table B.10 for Carlsbad, B.11 for Hobbs and B.12 for Loving.

Statistical Analysis of Local Government Finances.

An alternative method of analyzing the effect of growth on local governments is to trace through the data starting with how economic activity affects tax revenues to local government and in turn how revenues affect expenditures by means of a statistical methodology. We have done this by hypothesizing that the most important determinant of local government revenues (excluding grants from state and federal government) is the level of employment. We further hypothesize that once revenues are collected, they

TABLE B.10

COST FOR MUNICIPAL SERVICES WITH WIPP:

PRELIMINARY ESTIMATES*

($1,000)

CARLSBAD

YEAR	DEIS (1977 Dollars)	HIGH (1979 Dollars)	LOW (1979 Dollars)
1980-81	---	83.9	54.5
1981-82	236	342.7	163.9
1982-83	474	788.4	246.5
1983-84	554	785.0	194.0
1984-85	400	304.7	109.3
1985-86	260	297.9	109.3
1986-87	233	258.8	83.4
1987	---	271.9	124.8

*Per capita expenditure in parentheses in 1979 dollars: Carlsbad $262.20

Costs are operation and maintenance costs and equipment capital costs, buildings, streets and roads, utility.

Excludes: county government
education
private hospital facilities

TABLE B.11

COST FOR MUNICIPAL SERVICES WITH WIPP:

PRELIMINARY ESTIMATES*

($1,000)

HOBBS

YEAR	DEIS (1977 Dollars)	HIGH (1979 Dollars)	LOW (1979 Dollars)
1980-81	---	45.2	15.7
1981-82	80	184.0	47.1
1982-83	170	423.2	65.9
1983-84	200	404.9	51.0
1984-85	145	163.6	26.7
1985-86	95	160.0	26.7
1986-87	84	138.8	19.1
1987	---	144.8	31.1

*Per capita expenditure in parentheses in 1979 dollars: Hobbs $261.40

Costs are operation and maintenance costs and equipment capital costs buildings, streets and roads, utility.

Excludes: county government
education
private hospital facilities

TABLE B.12

COST FOR MUNICIPAL SERVICES WITH WIPP:

PRELIMINARY ESTIMATES*

($1,000)

LOVING

YEAR	DEIS (1977 Dollars)	HIGH (1979 Dollars)	LOW (1979 Dollars)
1980-81	---	7.7	1.9
1981-82	---	31.3	5.6
1982-83	---	71.9	8.4
1983-84	---	68.8	6.7
1984-85	---	25.1	3.7
1985-86	---	24.5	3.7
1986-87	---	20.9	2.9
1987	---	22.2	4.2

*Per capita expenditure in parentheses in 1979 dollars: Loving $154.90

Costs are operation and maintenance costs and equipment capital costs
Buildings, streets and roads, utility

Excludes: county government
education
private hospital facilities

will be spent. Furthermore, intergovernmental grants and lumpy capital expenditures mean that local governments may spend more than they collect from local revenue sources. While spending financed by grants, bond sales and other non-local sources of revenue are possible and encouraged by state and federal governments, they are risky. Grants such as general revenue sharing may be terminated and the annual cost of capital and its operation and maintenance must (barring external aid) at some point be supported by taxes and fees paid by the people to whom the services are available.

We analyzed the budgets of the five New Mexico growth counties in order to test these two hypotheses. Because each county has a different number of municipalities of widely varying sizes, we computed local sources of tax revenue and local government expenditures for all the local governments (municipal and county but excluding school districts) in each county. School districts were not included because the state of New Mexico and federal grants provide most of their operating funds. Bonds financed by local property taxes and intergovernmental grants fund capital expenditures. The state funding formula for schools districts is based on the number of students and the overall size of the district. Consequently tax collections from the school districts have little bearing on the funds available or quality of instruction, although districts in oil and gas producing regions do collect certain special revenues. Because school finance is almost completely independent of local tax revenues, school districts are not included in this analysis.

The first hypothesized relationship is between local employment and local sources (county wide) of tax revenue:

Local Tax Revenue	= 7,613,300 +	950.44 (10.1)	Employment by Residence

$$R^{-2} = .75$$

The statistical relationship is strong as indicated by the 75% explained variance for tax revenues and the t statistic of 10.1 for the regression coefficient. The regression coefficient indicates that on the average each additional person employed, directly and indirectly, generates $950.44 per year in tax revenues. The second hypothesis is that local government spends these tax revenues plus tax sources of funds such as grants and capital from bond sales. This hypothesis is confirmed by the regression shown below:

Local Government Expenditures	= 331,030. +	1.31 (18.2)	Tax Revenue to Local Government

$$\overset{-2}{R} = .91$$

The R^2 (.91) and t statistic (18.2) indicate that this relationship is statistically strong. The interpretation of the regression coefficient is that for every dollar of new tax revenue received by local governments, $1.31 is spent on operating and capital expenditures. This confirms the hypothesis and indicates that grants and bond sales are critical to county and municipal governments.

These results suggest that substantial amounts of revenue may be available to local governments in both counties and, of more importance, this revenue appears to be sufficient to maintain the standards of per capita operational and capital spending in the fiscal year 1978.

This conclusion can be deduced by first computing the number of persons per worker in the WIPP related labor force. Recall that the labor participation rate among the resident population in Eddy and Lea county is forecast as growing in Scenario I and returning to its original level by 1987 (.4614). It remains at .4614 in Scenario II. The participation rate for in-migrants is assumed to be .55. Persons per family is the inverse of the overall participation rate. For the sake of simplicity, we assume the overall participation rate to equal .46 which implies an average of 2.2 persons per worker in the general population. This further implies, based on the regression equations described above, that each additional worker generates $432.00 in tax revenues $\frac{\$950.44}{2.2}$. The per capita revenues (excluding general revenue sharing) for Eddy and Lea counties were shown in Table B.8. Total per capita expenditure for Eddy county is $216.27 and $478.87 in Lea county. However, the total for Lea county is abnormal because of the extremely high capital expenditures by Hobbs in 1978. A more representative level of spending for Lea county would be closer to $350.00 per capita. If one places confidence in these statistical estimates, there appears to be little basis for concern that county and municipal governments would experience severe financial impacts caused by the advent of the WIPP project because tax revenues exceed expenditures (based on 1978 data). Unfortunately, this assertion may not be true for the community of Loving because of its limited tax base and lack of commercial activity which generates gross receipts tax revenues. These data and techniques are insufficient to state the magnitude of their financial difficulties other than to state that there may be a potential problem.

WORKING PAPER C: DIVERSIFICATION

A relevant question in the context of the WIPP concerns the extent to which diversification might occur in the Eddy and Lea counties' economies. The answer is not immediately apparent. The WIPP project itself would represent one of the larger employers in Eddy and Lea counties. This factor would appear to reduce diversification. However, secondary economic impacts occur which may represent diversification and it is unthinkable that, once built and operating, the WIPP would be shut down, barring a serious technical problem which would necessitate the removal and transfer of the nuclear waste. Therefore, the direct impact of WIPP would increase diversification because it is a new industry; this may be true of the indirect impacts also.

The construction phase and operations phase will most likely affect diversification differently. During the construction phase WIPP employment is concentrated in construction workers and miners (underground construction). Many of these employees will be on the job for a short time (3 years to a few months) and, therefore, will create transitory effects on diversification. Moreover, the construction phase itself lasts five years followed by a two year testing phase after which the operation phase occurs. Although some diversification will occur, the characteristics of this work force and their effect on the local economy may create temporary disruptions. We attempt to quantify some potential disruptions shortly. However, the operation phase employment is constant and this stability will allow the local economy to achieve equilibrium. Increased diversification may accompany this stabilization.

Measuring Diversification.

Although diversification is discussed in the professional literature, it lacks a standardized measuring tool. However, there are a number of ways in which to go about quantifying it. The most obvious involves the measurement of output in goods and services among various affected industries. While theoretically attractive, this option is not always available because of data limitations. A related measure would observe changes in employment patterns among industries and firms. These data are available so this measure is operational. Given the hypothesis that diversification increases the productivity of labor, equilibrium wages would be higher. We utilized these measures and hypotheses about diversification to evaluate past economic activity in the five New Mexico growth county sample. This information was used to evaluate the direct and indirect effects of the WIPP on diversification during the construction phase and the operations phase.

The effects of economic growth on diversification were tested in Eddy, Lea, McKinley, San Juan and Valencia counties in 1977, 1978, and 1979. Specifically, we considered the percentage distribution of employment among industries, average weekly wages and the number of firms reporting to the New Mexico Employment Security Commission in the industry categories of manufacturing, mining, contract construction, transportation and public utilities, wholesale and retail trade, finance, insurance and real estate, and services. Data in Table C.1 fails to suggest evidence of diversification. One would expect to see employment distribution shifting into sectors which represent greater economic complexity and interdependence, but no such pattern was observed. There are two apparent reasons. The first is that few industrial classifications were reported. These broad definitions leave room for a good deal of diversification which could take place within each

TABLE C.1

County Patterns in Employment, Wages and Number of Firms by Industry

	1977			1978			1979		
	% of Total Employment	Average Weekly Wage	# of Firms	% of Total Employment	Average Weekly Wage	# of Firms	% of Total Employment	Average Weekly Wage	# of Firms
Eddy County									
Manufacturing	7.6%	$275.	36	6.9	$285.	29	7.1	$296.	
Mining	27.5	280.	66	26.8	302.	63	27.3	335.	
Contract Construction	9.1	214.	110	7.6	222.	108	8.2	233.	
Transportation & Public Utilities	7.8	212.	64	8.2	242.	63	7.9	268.	
Wholesale & Retail	24.6	330.	417	26.1	335.	399	25.2	370.	
Finance, Insurance & Real Estate	3.7	182.	82	3.9	181.	80	4.1	209.	
Services	19.7	118.	295	20.5	127.	290	20.2	138.	
Lea County									
Manufacturing	6.1	$230.	54	5.7	$232.	57	5.3	$277.	
Mining	31.7	268.	139	31.2	296.	145	32.3	327.	
Contract Construction	6.8	198.	92	7.0	200.	128	6.7	234.	
Transportation & Public Utilities	12.1	260.	71	12.2	301.	73	11.9	317.	
Wholesale & Retail	26.3	358.	569	27.5	380.	555	26.5	422.	
Finance, Insurance & Real Estate	4.4	170.	98	4.8	194.	96	4.3	207.	
Services	12.6	168.	327	11.6	179.	300	13.0	181.	
McKinley County									
Manufacturing	7.8	$162.	25	6.2	$184.	22	6.4	$218.	
Mining	30.0	335.	7	30.2	364.	8	33.4	418.	
Contract Construction	5.2	256.	49	6.2	258.	49	6.5	351.	
Transportation & Public Utilities	7.3	210.	35	6.1	244.	31	6.4	266.	
Wholesale & Retail	25.4	328.	406	23.2	360.	404	24.8	390.	
Finance, Insurance & Real Estate	2.3	166.	47	2.1	177.	46	2.4	198.	
Services	22.0	123.	211	26.0	141.	192	20.1	163.	

TABLE C.1 (Continued)

County Patterns in Employment, Wages and Number of Firms by Industry

	1977			1978			1979		
	% of Total Employment	Average Weekly Wage	# of Firms	% of Total Employment	Average Weekly Wage	# of Firms	% of Total Employment	Average Weekly Wage	# of Firms
				San Juan County					
Manufacturing	4.9%	$209.	43	5.6	$234.	41	6.3	$260.	
Mining	11.2	312.	74	11.4	380.	76	12.9	390.	
Contract Construction	20.4	302.	183	18.4	357.	163	16.5	352.	
Transportation & Public Utilities	12.3	315.	60	12.3	327.	64	13.9	358.	
Wholesale & Retail	23.0	352.	558	21.3	390.	559	22.4	439.	
Finance, Insurance & Real Estate	3.2	154.	66	3.1	176.	99	3.2	185.	
Services	25.0	128.	226	27.9	136.	325	24.8	148.	
				Valencia County					
Manufacturing	3.3	$157.	19	3.2	$209	35	3.4	$182	
Mining	29.1	317.	27	28.4	379.	27	28.2	408	
Contract Construction	8.4	203.	73	10.4	213.	111	12.3	274.	
Transportation & Public Utilities	10.9	227.	36	10.5	257.	34	9.7	262.	
Wholesale & Retail	28.2	267.	164	27.4	308.	295	26.4	344.	
Finance, Insurance & Real Estate	5.4	143.	44	5.3	164.	46	4.8	173.	
Services	14.7	110.	156	14.8	129.	158	15.2	140.	

Source: New Mexico Employment Security Commission

* Number of firms reporting in 1979 not available.

industrial category. The second is that the agricultural sector is unreported. One would expect this category to shrink in importance as economic development takes place. Regrettably, the data on the number of firms provided no evidence that diversification was occurring in terms of an increase in the number of firms over time. Furthermore, wage growth (measured in current dollars) paralleled inflation and left little support for the contention that rapid real growth in personal incomes had occurred. However, a comparison across counties indicated some important differences and potential for future diversification. The percentage of employment services was relatively low in Lea County, suggesting that future economic growth might increase such services. This was also true for Valencia County, perhaps due to its proximity to Albuquerque and Gallup (McKinley County). These results indicated the inherent difficulty both in measuring diversification at any one point in time or in detecting a change over time.

WIPP Engendered Diversification in Eddy and Lea Counties.

As the evidence from the five New Mexico growth counties revealed little, it is therefore difficult to use past experience to forecast diversification which might be engendered by the WIPP in Eddy and Lea counties. However, the exercise provided an outline for analyzing what may happen. The direct and indirect employment effects of the WIPP are reported below:

Year	WIPP Direct Employment	WIPP Induced Direct and Indirect Employment
1980	68	155
1981	302	826
1982	939	2,796
1983	968	3,252
1984	299	1,030
1985	258	897
1986	360	1,258
1987	438	634

Predicted WIPP indirect employment occurs in the transportation, utilities, trade, finance and other service industries as well as in government. However, the methodology developed in estimating total indirect employment does not permit decomposing these into separate industries. Thus it is impossible to estimate how the WIPP affects the distribution of employment and service sector economic activity. However, the UNM task force investigated a method to estimate effects on sales in the retail trade sector created by the WIPP which yielded changes in employment and the number of establishments. Therefore, analyzing WIPP induced changes in retail trade reveals possible diversification and destablization effects during the construction phase.

Retail trade is a function of the population of an area and their income and wealth. The per capita incomes of Eddy and Lea County have grown (1972 to 1977) somewhat faster than for the State as a whole as revealed in Table C.2. However, the percentage of income spent on retail sales has fallen in these counties as well as throughout the nation (see Table C.3). The effect of these changes in income, spending patterns and population in Eddy and Lea counties in 1967, 1972 and 1977 on the number of retail establishments, their total sales, payroll and employment are shown in Table C.4. Our inventory of private sector establishments for Carlsbad, Hobbs and Loving (Tables 50, 51 and 52, respectively in Chapter V) as of January, 1980 provides a breakdown of the number of retail establishments shown in Table C.4. Although these data reveal what has occurred in the recent past and provide insight into the capacity of existing institutions in the private sector, they fail to reveal how WIPP may cause changes in retail trade patterns.

TABLE C.2

PER CAPITA PERSONAL INCOME
(residence adjusted)

	1972	1977
New Mexico	$3,596	$5,846
Eddy County	3,442	6,089
Lea County	3,643	6,811

Source: New Mexico Statistical Abstract 1979-80.

TABLE C.3

PERCENTAGE OF PERSONAL INCOME SPENT ON RETAIL SALES IN 1972, 1977

	1972	1977
New Mexico	62%	58%
Eddy County	56%	49%
Carlsbad	67%	60%
Lea County	58%	53%
Hobbs	68%	62%

Source: New Mexico Statistical Abstract 1979-80.

TABLE C.4

RETAIL TRADE STATISTICS IN PLACES OF 2,500 OR MORE--NEW MEXICO COUNTIES

	1967				1972				1977			
	Establishments	Total Sales ($1,000)	Yearly Payroll ($1,000)	Paid Employees[1] ($1,000)	Establishments	Total Sales ($1,000)	Yearly Payroll ($1,000)	Paid Employees[1] ($1,000)	Establishments	Total Sales ($1,000)	Yearly Payroll ($1,000)	Paid Employees ($1,000)
STATE	9,358	$1,358,764	$150,644	43,737	11,242	$2,300,272	$251,571	57,336	11,604	$4,021,781	$458,909	74,211
EDDY COUNTY	500	$ 62,589	$ 6,736	2,147	454	$ 79,773	$ 8,040	2,136	473	138,378	15,474	2,454
Artesia	161	21,639	2,083	649	148	23,886	2,338	621	152	40,305	4,019	636
Carlsbad	303	38,438	4,325	1,410	281	53,265	5,304	1,446	302	97,225	11,398	1,800
Remainder of County	36	2,512	328	88	25	2,622	398	69	19	848	57	18
LEA COUNTY	610	$ 78,383	$ 8,796	2,571	614	$ 106,104	$ 10,646	2,718	584	189,948	21,242	3,395
Eunice	44	3,208	291	108	32	3,098	255	102	30	5,111	512	120
Hobbs	329	53,810	6,323	1,765	345	69,210	7,196	1,768	363	135,099	16,009	2,388
Jal	32	3,524	320	134	43	4,109	330	98	31	5,009	448	100
Lovington	125	13,704	1,371	408	123	18,498	1,723	449	127	31,628	3,034	533
Remainder of County	80	4,137	491	156	71	11,189	1,142	301	33	13,101	1,239	254

[1] Number of employees for week including March 12.

Source: U.S. Department of Commerce, Bureau of the Census, Census of Business, Retail Trade, New Mexico 1967 and 1972

We investigated this question by means of statistically analyzing past changes (in 1971, 1972 and 1977) in retail trade patterns in the five New Mexico growth county sample. We hypothesized that mining and large scale construction projects cause retail trade patterns to change because of the transient nature of a portion of this work force and the responses of the private business sector. More specifically, we conjectured that the amount spent on consumer durable goods would fall and the amount spent on all other consumer goods and services (non-durables less eating and drinking) would rise.

Multiple regression technique involves simultaneously statistically testing an hypothesis and estimating a linear relationship. The percentage of the labor force employed in construction and mining was used as a variable to predict retail trade for eating and drinking establishments, consumer durables and other consumer expenditures (non-durables). The regression equation for dollars spent on eating and drinking is shown below:

$$\text{Retail \$ at Eating and Drinking Establishments} = -1{,}619{,}100. + \underset{(1.4)}{139{,}420}\ \frac{\text{Mining Employment}}{\text{Total Employment}} + \underset{(3.6)}{567{,}300}\ \frac{\text{Construction Employment}}{\text{Total Employment}}$$

$$\bar{R}^2 = .55$$

The estimated relationship indicated that if the percentage of employment in mining increases by one percent, the amount spent at eating and drinking establishments would increase by slightly over $139,500; for construction employment, the effect is $567,300. The statistical reliability of this

relationship is borderline because the t statistic for mining employment is marginal, and overall only 55% of the variance in dollars spent on eating and drinking is "explained". Furthermore, we must assume that the five counties possess similar economic structures. However, the results do support the hypothesis that construction workers and to a lesser extent miners who move frequently spend more of their income at eating and drinking establishments than others. The second hypothesis was tested in the following form, where consumer durables are defined to include auto sales, furniture, construction equipment, and farm equipment:

$$\frac{\text{Retail \$ on Consumer Durables}}{\text{Total Retail \$}} = 8.14 - \underset{(-2.4)}{.211} \frac{\text{Construction Employment}}{\text{Total Employment}}$$

$$\bar{R}^2 = .55$$

This relationship indicates that a one percent increase in employment in construction is accompanied by a .21% decrease in the percentage of retail sales on consumer durables. This result is acceptable statistically, a t statistic of -2.4, and 35% of the variation in consumer durable spending as a proportion of all retail sales is explained. The result confirmed the anticipated relationship. Although construction workers buy consumer durables, they generally do so where permanent homes are located and in the case of automobiles, where they are able to secure the best deal. The third relationship concerned consumer non-durables (all other retail categories which include apparel, services and grocery stores) and is identical in form to

the first relationship:

$$\text{Retail \$ Spent on Consumer Non-durables} = 3{,}585{,}600 + \underset{(1.6)}{360{,}050.}\ \frac{\text{Mining Employment}}{\text{Total Employment}} + \underset{(3.0)}{1{,}081{,}200}\ \frac{\text{Construction Employment}}{\text{Total Employment}}$$

$$\bar{R}^2 = .45$$

The t statistic on mining employment was again marginal (1.6) but the t indicated a strong significance for construction employment. The relationship explained 45% of the variation in retail sales of non-durables.

These relationships were employed to forecast how WIPP employment in construction and mining (underground construction) affects patterns of retail trade. This necessitates the assumption that the WIPP project will create similar effects to those found in the five growth counties in 1971, 1972, and 1977 for the data on retail sales are only available for those years. The estimated direct employment associated with WIPP was employed to forecast the change in mining and construction employment. The percentage of employment in the construction and mining industry in 1977 (Source: New Mexico Employment Security Commission) was assumed to be constant for employment associated with baseline population. WIPP direct employment in these two industries was added to those associated with baseline employment (the percentage in such industry in 1977 times predicted employment with WIPP) and the sum was divided by projected future employment. The difference between the baseline employment percentages and those associated with the WIPP when multiplied times the

regression coefficients provided an estimate of the changes in retail consumer spending attributable to WIPP. The regression relationship for eating and drinking and consumer non-durables predicted a change in dollars spent. This was converted to a percentage of expenditure on total retail trade by means of dividing by retail sales in these two categories in 1977.* The result of these computations for percentage changes (%Δ) in retail sales patterns are shown in Table C.5. During the construction phase, the percentage of consumer expenditures increased to a cumulative maximum of 9.2% in 1983, when the trend was reversed and the percentage fell for two years. Once the operational phase begins, logic indicates that the estimates in all three categories would point towards a return to "normal" retail expenditure patterns (note that WIPP employees during the operational phase were classified neither as miners nor construction workers). The WIPP construction phase causes the percentage spent on consumer durables to fall throughout the construction phase (note that the regression equation predicted this percentage directly so that each year's estimate is independent and should not be accumulated). Finally the percentage spent on non-durables climbs to a peak in 1983 (an 8.8% cumulative increase), then fell to a near "normal" level by 1987.

These estimates reveal how the WIPP construction phase might alter retail trade patterns and by implication employment and perhaps the number of firms. The University of Wyoming conducted a study of the number of trade and service establishments (retail, wholesale trade, services, etc.) in four areas - two of which experienced rapid growth (McLean and Platte counties)

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* Source: New Mexico Statistical Abstract -- 1979-1980.

TABLE C.5

Forecast WIPP Induced Changes in Retail Sales Patterns

	%Δ Eating & Drinking to Total Eating & Drinking Retail Sales (1977 base)	%Δ Consumer Durable Retail Sales to Total Retail Sales	%Δ Consumer Nondurables to Total Nondurable Retail Sales (1977 base)
1980	0.288%	-1.07%	0.356%
1981	1.563	-1.12	1.723
1982	4.661	-1.39	5.009
1983	1.845	-1.42	1.708
1984	-5.478	-1.18	-5.767
1985	-0.325	-1.17	-0.338
1986	0.929	-1.22	0.966
1987	0.0	0.0	0.0

and two of which were included as control areas (Kimball County and Wheatland) in order to make comparisons. Table C.6 shows the number of trade establishments in 1976 and 1977, and Table C.7 shows the number of service establishments. Our analysis may have explained why no clear differences were discernable. It is possible that rapid growth and an influx of construction workers might create a distortion in retail spending patterns, but it is less likely that it will have much effect on the number of establishments. The reason is two fold. The first is that construction is short-lived so that private industry, as is also the case for government, is unlikely to make significant changes in the capital stock (investment) in order to accommodate a short-lived phenomena. Secondly, the number of establishments is primarily a function of the total population and their income. The composition of the labor force and rapid in-migration is unlikely to have discernable effects, particularly in the long run.

However, once the operations phase begins, a return to normal trade patterns is most probable. There is little reason to believe that WIPP employees during either phase will spend a higher or lower percentage of their income than others. Consequently, the degree of diversification in retail trade might be enhanced as it is in any locality as local and regional income and populations rise. The advent of WIPP might create both and, therefore, one would expect that increased opportunities and choice will occur in the retail sector although some short run distortions might occur during the construction phase.

TABLE C.6

Number of trade establishments in test and control counties: 1976, 1977

County	Number of Establishments		Percentage Change
	1976[1/]	1977[1/]	1976-77
McLean	198	215	+ 9%
Platte	136	145	+ 7
Kimball	134	145	+ 8
Wheatland	58	61	+ 5

1/ University of Wyoming estimates derived from utility lists and telephone listings.

Source: University of Wyoming, Department of Economics.

TABLE C.7

Number of service establishments in test and control counties: 1976,1977

County	Number of Establishments		Percentage Change
	1976[1/]	1977[1/]	1976-77
McLean	129	146	+ 13%
Platte	113	117	+ 4
Kimball	76	91	+ 20
Wheatland	34	40	+ 18

1/ University of Wyoming estimates, derived from utility lists and telephone listings.

Source: Socio-economic Longitudinal Monitoring Project Final Report.

Direct expenditures for the WIPP in Eddy and Lea counties indicate the manner in which trade, industry and agriculture might be affected and how diversification might occur. Combining information on WIPP expenditures from the FEIS together with a direct input/output coefficients (from Adcock and Associates, Inc.) for Eddy and Lea counties results in estimates of direct WIPP expenditures in industrial sectors. The estimated WIPP direct expenditures in Eddy and Lea counties for the construction and operation phase are shown in Table C.8. The sectors which could be affected in order of importance are wholesale trade, business and miscellaneous services, insurance and real estate, utilities and electrical products. The size of the expenditures relative to retail trade and its distribution provides strong evidence that the WIPP project would stimulate diversification. This effect would be magnified due to the secondary effect of these WIPP expenditures on incomes of the local population. The conclusion is the WIPP would create local opportunities and diversification.

TABLE C.8

ANNUAL WIPP EXPENDITURES IN LEA AND EDDY COUNTIES*

($000)

	ABC	BGC	M&D	GABO	S&RH	BLO	Total
1980	$ 51.6	$ 2,692.9	$ 435.4	-	-	-	$ 3,179.9
1981	4,038.0	7,552.3	2,989.9	-	-	-	14,580.2
1982	18,427.1	16,568.1	7,183.5	-	-	-	42,178.7
1983	22,226.6	5,606.9	12,508.1	-	-	-	40,341.6
1984	3,288.5	396.6	8,841.1	-	-	-	12,526.2
1985	-	-	10,758.8**	-	-	-	10,758.8
1986	-	-	15,022.6**	-	-	-	15,022.6
1987 & Thereafter	-	-	-	10,280.6	1,934.2	4,691.8	16,906.6
(Total)	(48,031.8)	(32,816.8)	(57,739.4)	(10,280.6)	(1,934.2)	(4,691.8)	(138,588.0)

*Source: Table A.1 and FEIS P.L-8 and L-9.

**Transition to operation activity.

WORKING PAPER D: IMPACTS ON STATE REVENUE AND EXPENDITURE

The direct and indirect impacts of the WIPP project on the State of New Mexico are greater than the impacts on Lea and Eddy counties for two reasons. The personal incomes which are generated in Eddy and Lea counties create demand for goods and services some of which are supplied by other areas in New Mexico. This is particularly true of wholesale and retail trade and financial services. Furthermore, the direct and indirect purchases for the WIPP project itself and the goods and services which are required for off-site requirements such as transportation, health and safety and the indirect impact of these activities have a substantial impact on state government. During the construction phase these effects are difficult to measure and the means we have employed to do this is through labor markets (employment). During the operation phase the technique of input/output analysis is an appropriate tool to carry out this task.

Once the direct and indirect effects of WIPP activities are estimated, it is no easy task to estimate what their effects will be on the budget of the New Mexico State government. While the present tax structure can be described and analyzed in detail, there is no way of knowing how it may be changed in the future. Furthermore, the complexity of the present tax structure makes it virtually impossible to estimate expected tax yields when employment, total income, and economic activity increase in the State. This problem can be seen from an examination of the major taxes collected by the State (see Table D.1 at the end of this chapter). This contention is also supported by the State's efforts to forecast future tax revenues. Their estimates have erred by wide margins - primarily being underestimates.

The UNM Task Force, therefore, decided to analyze State taxes and expenditures in an analagous manner to the way in which municipal and county budgets were treated in Chapter V - via a statistical approach. All State tax revenues from 1973 through 1978 were regressed on total State non-agricultural employment, a variable which depicts the level of economic activity. The results for all State tax revenues are shown below:

$$\begin{array}{l}\text{State Tax} \\ \text{Revenues} = -818{,}780 + \underset{(14.3)}{361.56}\ \begin{array}{l}(\text{Nonagricultural} \\ \text{Employment})\end{array}\end{array}$$

$$\bar{R}^2 = .98$$

The statistical fit is good (the t-statistic for the regression coefficient of 14.3 is well above the benchmark 1.5 and 98% of the variation in the revenues is "explained"). The regression implies that each additional employed person generates $362 in tax revenue anually both directly through personal income and indirectly through gross receipts tax and other taxable economic activities. However, a major source of revenue for the State is from taxes levied on the extraction of natural resources, severance taxes being the primary source. We also estimated the effect of employment on tax revenue excluding severance taxes:

$$\begin{array}{l}\text{state tax revenues} \\ \text{excluding the severence tax} = 498{,}130 + \underset{(13.5)}{254.85}\ \begin{array}{l}(\text{Nonagricultural} \\ \text{employment})\end{array}\end{array}$$

$$\bar{R}^2 = .97$$

The statistical fit is approximately the same but the regression coefficient and, therefore, implied revenue per employee (non-agricultural) falls to $255 per anum.

Next we estimated the amount spent per dollar of tax revenue. This is an important consideration for, in New Mexico, the State is the primary source of

revenue for school districts and highways. As in the case of local government, the State spends far more than its tax revenues because of grants and transfers from other units of government and, in the case of the State, from revenue generated by the permanent fund (past surpluses invested in financial securities) and the sale and lease of mineral rights and State owned lands (lease and bonus payments). The statistical relationship is estimated for both total tax revenue and tax revenues excluding the serverance tax:

$$\text{state expenditures} = 4{,}751{,}600 + \underset{(21.4)}{1.82}\ (\text{state tax revenue})$$

$$\bar{R}^2 = .99$$

and

$$\text{state expenditures} = -19{,}391{,}000 + \underset{(15.8)}{2.57}\ (\text{state tax revenue excluding severance tax revenues})$$

$$\bar{R}^2 = .98$$

The results are strong statistically; however, the large absolute difference in the regression coefficient reveals the extent to which the State relies on severance tax revenues. The implication that the State spends $1.82 for every $1.00 collected in taxes, while valid, does not lead to the conclusion that deficits are being incurred. Quite the opposite is true for surpluses that have accumulated over the past several years and have accumulated in the permanent fund. What supports the difference between revenues and spending are grants and non-tax sources of revenue.

The primary requirements for State revenues engendered by the WIPP project are grants to county and local governments and funding local school districts and necessary upgrading of highways. Employment and population due directly and indirectly to WIPP are small relative to the baseline population and employment. Because of this small magnitude, there is little reason to expect

that State expenditures for capital items will have to be increased at all and the effect on the operating budget is modest beyond the additional educational expenses.

TABLE D.1

Revenue Source	Collected by:	Deposited in:	Disposition	Rate of Disbursement	Rate of Collection
General Property Tax State Share	County	State general fund	General fund		$2.85 per $1,000.00 of net taxable value
Property tax - special state levy for general obligation bond principal-interest	County	"state general obligation bond"	interest and principal payments		Rate must be sufficient to produce an amount equal to one year's interest on all bonds, plus an amount sufficient to pay the principal of all bonds as they mature.
Individual income tax	State and Federal	*suspense fund-state treasury-balance after credits to state general fund	general fund		N.M. Individual (Personal) Income tax rates
Corporate income tax	State and Federal	*suspense fund and general fund	general fund		5% net income
Banking and Financial corporations tax	State	*suspense fund and general fund	general fund		6% net income banks, financial corporations
Estate tax	State	general fund	general fund		resident estates - amount of the federal credit allowed for state death taxes non-resident - federal credit x $\frac{\text{value of property}}{\text{value of decentents gross estate}}$

*All page citations refer to tables in Index to the Revenue Sources of New Mexico.

TABLE D.1 (Cont.)

Revenue Source	Collected by:	Deposited in:	Disposition	Rate of Disbursement	Rate of Collection
Oil and gas ad valorem production tax	State (oil and gas division)	oil and gas ad valorem tax fund	state and county treasurers	to purposes for which levies made	production tax - certified ad valorem rate of taxing district in which products are severed (levied each month) state rate = state general purposes rate and special levies for general obligation bond retirement
Oil and gas production equipment ad valorem tax	State (oil and gas division	oil and gas ad valorem equipment tax fund	state and county treasurers	to purposes for which levies made	production equipment - rate for the previous calendar year of the taxing district state rate = same as above
Oil and gas severance tax	State (oil and gas division	severance tax fund	severance tax bonding fund		severance tax - 5¢/mcf natural gas, 45¢/bbl oil, 45¢/bbl other hydrocarbons
Natural gas processors tax	State (oil and gas division	natural gas processors tax fund	general fund		45/100% of taxable value (actual price received at plant)
Oil and gas conservation tax	State (oil and gas division	conservation tax fund	general fund oil conservation fund Energy and Minerals Dept.		19/100 of 1% of taxable value (actual sales price less sales to tax exempt entities)
Severence tax on natural resources other than oil and gas	State	severance tax bonding fund			coal - 38¢/ton (metal) 18¢/ton(non-metal) moly.- .125% taxable value Potash - 2.5% taxable value Uranium - Table p. 25 NMSA 1978 other and timber .125%, copper .5%
Resources excise tax	State	general fund	general fund		resources tax - Potash-.5%, Moly-.125% Other-.125% processors tax - Timber .375%, Potash .125% Moly .125%, Other .75%

TABLE D.1 (Cont.)

Revenue Source	Collected by:	Deposited in:	Disposition	Rate of Disbursement	Rate of Collection
Gross receipts tax	State	suspense fund	municipalities counties general fund	1% taxable gross receipts for each municipality is distributed to that municipality. (balance to general fund	3.75%
Compensating tax	State	suspense fund	general fund		3.75% of value
Liquor wholesalers and excise tax	State	general fund	general fund		gross receipts - 5% $2.40/gal > 100 proof, $1.50/gal < 100 proof 8¢/gal beer, 40¢/gal wine
Insurance tax	superintendent of insurance	insurance department suspense fund	fire protection fund (from fire and vehicle insurance) general insurance receipts fund (all other insurance) balance to general fund		2.5% on "gross premiums and membership and policy fees"
Gasoline tax	State		State road fund. State aviation fund. State parks division	5% - state road fund .2% - motor boat fuel tax fund .9¢/gal to municipalities and II class counties by proportion sold in each	7¢/gal
			1)motor transportation division a) counties b) municipalities c) highway debenture funds	.1¢/gal to counties by proportion of sales outside municipalities	
Franchise tax	State Corporation Commission	state treasury	general fund	transfers funds in excess of $25,000.00 to general fund	55¢/1,000.00 of corporations net worth ($10.00/year m.h.)

TABLE D.1 (cont.)

Revenue Source	Collected by:	Deposited in:	Disposition	Rate of Disbursement	Rate of Collection
Liquor license fees	State Department of Alcoholic Beverage Control	general fund			Table. p. 70
Dry cleaning licensing and inspection fee	State dry cleaning board		dry cleaning regulation Act		registration fee - $100.00 + $25.00/year for each plant + $5.00/branch
Pipeline license fees	State (corporation commission)	general fund	general fund		Table p. 105 (natural gas based on H.P. and oil based on miles of pipe diameter)
Liquified petroleum gas fees	State	general fund	general fund		$350.00 / year maximum
Special fuels permit and dealer license fee	State Transportation Department		State road fund		permit - $1.00/year, dealer - $5.00/year
Special fuel tax a	motor transportation division, transportation department		counties municipalities state road fund	6¢ to state road fund .9¢ to municipalities and II class counties proportionate to sales in those areas .1¢ to counties, proportionate to sales outside municipalities	7¢/gal. or flat fee based on vehicle weight
Public utility inspection and supervision fees	Public Service Commission	state treasury	general fund		.5% gross receipts of intrastate business
Utility and carrier inspection and supervision fees	State	state treasury	general fund		1/4 of 1% gross receipts
Horse racing admission tax	state racing commission	general fund	general fund		10¢/person
Horse racing parimutuel tax	State racing commission	general fund	general fund		10¢/person

TABLE D.1 (Cont.)

Revenue Source	Collected by:	Deposited in:	Disposition	Rate of Disbursement	Rate of Collection
Horse racing uncollected winnings tax	State racing commission	general fund	general fund		10¢/person
Cigarette tax	State (sold stamps)		County recreation fund Municipal recreation fund. County general fund Municipal general fund State general fund	9¢ to general fund 1¢ to county and municipal recreation fund 2¢ to county and municipal general fund based on sales within each county and municipality	12¢/pack (20 cigarettes)
Motor vehicle registration fees	motor vehicle division transportation department	motor vehicle suspense fund	state road fund counties municipalities county, municipal and school district governments	6% - of total to state road fund, remainder to: 37.5% of total to state road fund, 37.5% - to counties	motorcycles - $3 & $4 & $2.50 passenger vehicles - $16 (after 5 years - $8) trailers - $10, $5 trucks - based on weight p. 48 buses - $5, $25 mobile homes - $5
Motor vehicle administrative fees	motor vehicle division transportation department	motor vehicle suspence fund	state road fund counties municipalities school district's	same as motor vehicle fees	$10.00/transfer $3.00 vehicle
Vehicle transaction fee	motor vehicle division transportation department	motor vehicle suspence fund	state road fund counties municipalities school district's	50% to S.E.F. 50% to each county, based on mileage of public roads in county	$10.00/transfer $3.00 vehicle
Overweight, Oversize vehicle permits	motor vehicle division transportation department	state road fund			$50.00/day w/police escort $20.00/year - special permit $5.00/single vehicle, or single trip

TABLE D.1 (Cont.)

Revenue Source	Collected by:	Deposited in:	Disposition	Rate of Disbursement	Rate of Collection
Water system or wastewater facility operator certificate fees	State	water system operator and wastewater facility fund	general fund		$25.00 and 10.00/year
District Court docket and other fees	district court clerks	bank accounts	general fund	$13.75 - judicial retirement fund $2.75 - costs for publishing N.M. Compilation $3.50 - bond retirement	$20.00 docket fee
State engineer fees	State	general fund	general fund		Table p. 154
Court of appeals fees and costs	clerk of court	state treasury	general fund		$20.00 docket fee
Credit Union fees	State	state treasury	general fund		examiner fees - $100.00/exam./day
Bank examination and investigation fees	State	state treasury	general fund		$200.00 & seventy-five ten-thousanths of one percent total resources of bank
Collection charges, local gross receipts and sales taxes	State	general fund	general fund		1.2% municipal and county gross receipts
Magistrate costs	State (Magistrates)	general fund	general fund		docket fee - $10.00 jury fee - $15.00
* Investment Income State permanent fund	State	permanent fund	not more than 50% invested at one time	Table p. 213-217	Table p. 213-217
Interest on State funds		general fund	general fund and others by law	Table p. 218-219	Table p. 218-219
Business leases, State lands	State	State land maintenance fund. Beneficiaries for which lands are held			rates set by commissioner of Public lands

TABLE D.1 (Cont.)

Revenue Source	Collected by:	Deposited in:	Disposition	Rate of Disbursement	Rate of Collection
Condemnation payments U.S. Government for state lands	State		beneficiaries state land maintenance fund	rentals less 20% to state lands maintenance royalties to permanent fund of beneficiary	
General mining leases, state lands	State		beneficiaries state land maintenance fund	rentals less 20% to state lands maintenance royalties to permanent fund of beneficiary	p. 225
Grazing leases, state lands	State		beneficiaries state land maintenance fund	rentals less 20% to state lands maintenance less royalties to permanent fund of beneficiary	$.03/acre/5 cows $.22/acre/24 cows or more
Oil and gas leases state lands	State		beneficiaries state land maintenance fund	rentals less 20% to state lands maintenance less royalties to permanent fund of beneficiary	p. 228
Mineral leases state lands	State		beneficiaries state land maintenance fund	rentals less 20% to state lands maintenance less royalties to permanent fund of beneficiary	$100.00 minimum royalties-not less than 5% of value of minerals produced
Rights of way and easement rentals state lands	State		beneficiaries state land maintenance fund	rentals less 20% to state lands maintenance less royalties to permanent fund of beneficiary	set by commissioner
Saline leases state lands	State		beneficiaries (Income, Perm.) state lands maintenance fund	rentals less 20% to state lands maintenance less royalties to permanent fund of beneficiary	royalties not less than 10% of actual sales price

TABLE D.1 (Cont.)

Revenue Source	Collected by:	Deposited in:	Disposition	Rate of Disbursement	Rate of Collection
Sand and gravel leases state lands	State		beneficiaries (Income, Perm.) state lands maintenance fund	rentals less 20% to state lands maintenance less royalties to permanent fund of beneficiary	set by commissioner of public lands
Federal mineral lands leasing act - shared revenue	Federal		Bereau of Mines and Mineral Resources Instructional materials, Instructional materials admin. public school fund	50% to state (state disbursement p. 237)	
Federal public land sales, shared revenue	Federal	common school permanent fund	public schools	50% to state (state disbursement p. 237)	
General revenue sharing. state share	Federal	state treasury	appropriations by state legislature	formula basis 0 (26 USCA6017A, 6687:31 USCA 1221Ct seq.)	
Taylor grazing act Federal Shared revenue	Federal	state treasury	county farm and range improvement fund	To state: 12 1/2% from grazing districts on public lands. 33 1/3% on Indian lands ceded to U.S. for disposition 50% - Public lands outside grazing districts - district to counties in proportion to grazing land to total state grazing land	

TABLE D.1 (Cont.)

Revenue Source	Collected by:	Deposited in:	Disposition	Rate of Disbursement	Rate of Collection
National forest reserves - Federal shared revenue	Federal	state treasury	county road fund county school district	25% to state: + to conties 1/2 to county road fund 1/2 to county school districts based on A.D.M.	
Fines and forfeitures under general laws	county	state treasury	local school districts		
Unemployment compensation penalties and interest	State	employment security commission fund	appropriation by state legislature		$5.00
State land sales	State		beneficiaries state lands maintenance fund	principal to permenant fund of beneficiary. Interest to income fund of beneficiary, less 20% to state lands maintenance fund.	

Source: Index to the Revenue Sources of New Mexico, Sixth Edition, Taxation and Revenue department, State of New Mexico, Santa Fe, New Mexico, 1979.

WORKING PAPER E: INFLATION AT THE LOCAL LEVEL

Inflation occurs when the purchasing power of the dollar decreases, and, for the U.S., the rate of inflation has become both virulent and erratic over the past fifteen years. The standard measures for inflation such as the Consumer Price Index (CPI) and Producers Price Index (PPI) are calculated by the Federal Government and are designed to depict the behavior of the price level for the entire nation. However, these measures apply only to average prices and are disaggregated only for a few large cities. No agency of local, state or Federal government estimates inflation measures for smaller regions. We attempted to measure inflation in "boom town" areas in order to provide insight into what might happen to prices in Eddy and Lea counties as a result of the economic activity caused directly and indirectly by WIPP. One approach taken by the UNM Task Force to measure inflation directly was one of sampling the prices of various commodities and computing a price index. However, collecting information on the prices of commodities in a market basket of goods and services representing consumer purchase as they change over time and computing a weighted index of prices based these data for rapidly growing areas proved to be infeasible. The primary cause of this failure was that supermarkets, retailers, landlords, financial institutions etc. do not maintain records of past prices. After attempts to gather these data proved fruitless, the approach was abandoned.

We pursued a second approach which to our knowledge as never been used previously. Thus its accuracy and consistency is unknown. The advantage with our methodology is that data are available and the underlying logic of the technique is plausible. The approach was to construct time

series data on real (adjusted to remove inflation) wages paid in Eddy, Lea and Valencia counties. Valencia County was chosen as an example of a rapid growth area in which inflation might be expected to be more rapid than for the State or country as a whole and we compare it with estimated inflation in Lea and Eddy counties. The growth in real wages was assumed to equal the real growth in the productivity per worker (the output of goods and services per worker adjusted to remove inflation). Gross receipt tax revenues in New Mexico represent 4% to 4 3/4% (depending on the municipality) of virtually all expenditures on consumption including housing construction but not rent payments. Our approach was to compare gross receipts and therefore transactions measured in current dollars in the selected counties with the increase in production output per worker. Discrepancies between the growth rates of these two quantities were used as a proxy measure of inflation. Another way to describe this process is that the gross receipt calculated from tax revenues is decomposed into the component which represents real consumption (actual goods and services) and the component which represents the growth of prices (inflation).

A critical component of this methodology was the estimation of real wage rates in each of several employment (industry) categories for several years. We attempted this by assuming that real wages increase at the rate of the growth of labor productivity (i.e. rate of real growth in goods and services produced by labor). Notationally, let

W_o^i = wage rate in industry i at time o (the base year)

$\hat{W}_t^i$ = real wage rate in industry i at time t (estimated growth in real wages)

γ_t^i = annual rate of productivity increase in industry i for year t.

The relationship between real wages at time t ($\hat{W}^i_t$) equals an initial wage growing at the rate of productivity increase (assumed to equal the national average) in each year:

$$\hat{W}^i_t = W^i_o(1 + \gamma^i_o)\ (1 + \gamma^i_1)\ \ldots\ (1 + \gamma^i_{t-1}).$$

Next we compute an index of total wage income paid in each year (t for example) to wage income in the base year where wage income equals the real wage rate in each industry times employment,

$$N^t_i = \text{employment in industry i in year t.}$$

Employment data by industry, year and county was available from the New Mexico Employment Security Commission which enabled us to perform this calculation. The index of real wage income each year (t for example with respect to the base year (o) is:

$$\frac{\sum_i \hat{W}^t_i\, N^t_i}{\sum_i W^o_i\, N^o_i}$$

This index of real wages paid in each county in various years was used as a proxy for an index of total output of goods and services because data on employment were available and data on economic output at this level of disaggregation were not. A number of assumptions and caveats were necessary in order to use this index of real wage income over time as an approximation of the change in real output over time. These are; (1) the proportion of household income from wages spent on consumption is constant over time and unaffected by changes in employment and the output mix by occupation and industry; another way of stating this is that the propensity to consume is

insensitive to the occupational mix; (2) the proportion of non-wage (rents, interest and profits) income spent on consumption is constant; (3) the proportion of wage to non-wage income remains constant. Accepting these untested and untestable assumptions (because of data limitations), the index of real wage income equals a yearly index of the output of real goods and service ($\frac{Q_t}{Q_o}$) where Q_t is real output in year t and Q_o is real output in the base year:

$$\frac{Q_t}{Q_o} = \frac{\sum_i \hat{W}_i^t N_i^t}{\sum_i W_i^o N_i^o}$$

Gross receipt tax revenues were in current dollars which reflect inflationary increases in prices as well as increases in the number and real value of transactions. We used the proxy index of growth real output to decompose gross receipts tax data into two components - aggregate price changes and increases in the production of goods and services ($\frac{Q_t}{Q_o}$). In order to make this transformation it was necessary to assume that the ratio of transactions subject to the gross receipts tax to the final output of goods and services remains constant.

The gross receipt tax rate is denoted by T and taxable gross receipts in each year by GR_t, so that gross receipts tax revenue in each year is:

$$\text{gross receipts tax revenue} = T \cdot GR_t$$

This relationship was used to compute gross receipts (gross transactions less nontaxable items such as rental payments) from information on tax revenues collected by county. Furthermore, if we assume that this annual measurement of gross receipts depicts all transactions in the local economy, then the price level (P_t) times output (Q_t) equals the dollar value of all

final goods and services produced in a year:

$$GR_t = P_t Q_t$$

This latter assumption is tenable as long as the basic structure of the local economy remains constant, because these measures are used in an index. Data is available directly for gross receipts (computed from tax revenues) (GR_t) and for output (Q_t) (computed from the index of production), which enables computation of the Price Level (P_t) in the form of an index relative to prices in a base year (P_o):

$$\frac{P_t}{P_o} = \frac{GR_{t/GR_o}}{Q_{t/Q_o}} \quad .$$

This index of local inflation way computed for Valencia, Lea and Eddy counties for 1973 to 1978, and this is reported in Table E.1. The national Consumer Price Index (CPI) is also shown for the same years and the indexes are adjusted so that both are 1.0 in the base year of 1973. The percentage of growth in each index from year to year measures the rate of inflation. The difference in the percentage growth in each year for our index of local inflation and the national Consumer Price Index provides and estimate of local inflation. All three counties possessed an erratic local rate of inflation which exceeded national inflation except in 1976 (and 1977 in Valencia County) when the national average plays catch up. At this time the economy recovered from the 1974-75 recession and prices began to accelerate rapidly.

These data are consistent with a study of two rapidly growing energy production counties and two control counties undertaken by the University of Wyoming (Table E.2 and E.3). There are three comparisons which may be

TABLE E.1

ESTIMATES OF USING THE "GROSS RECEIPTS"

METHODOLOGY COMPARED WITH THE NATIONAL CONSUMER PRICE INDEX (C.P.I.)

PRICE INDEX 1973 = 1.00

	"GROSS RECEIPTS" METHODOLOGY	CPI	NET LOCAL INFLATION
Eddy County			
1973	1.00	1.00	
1974	1.14	1.11	3.0
1975	1.35	1.21	9.4
1976	1.45	1.28	1.6
1977	1.47	1.36	-4.9
1978	1.73	1.47	9.6
Lea County			
1973	1.00	1.00	
1974	1.14	1.11	3.0
1975	1.48	1.21	20.8
1976	1.51	1.28	-3.8
1977	1.62	1.36	1.0
1978	1.80	1.47	3.0
Valencia County			
1973	1.00	1.00	
1974	1.20	1.11	9.0
1975	1.37	1.21	5.2
1976	1.44	1.28	-.7
1977	1.51	1.36	-1.4
1978	1.72	1.47	5.8

TABLE E.2 COMPARISON OF RELATIVE INDICES FOR SELECTED COMMODITY PRICES IN TEST AND CONTROL COUNTIES, 1976

Description	Prices by County			
	McLean	Wheatland	Platte	Kimball
Supermarket Items	102.8	103.1	97.1	97.0
Apparel	95.9	109.6	100.5	94,0
Oersonal Hygiene Items	96.4	113.2	93.3	97.0
Liquor	105.6	94.6	97.9	101.9
Restaurant Meals	85.2	93.7	123.7	97.4
All Goods	96.8	105.6	101.5	96.0
New Housing Cost (sq. ft.)	113.8	91.1	94.3	100.8

Source: University of Wyoming, Department of Economics

TABLE E.3 COMPARISON OF RELATIVE INDICES FOR SELECTED COMMODITY PRICES IN TEST AND CONTROL COUNTIES, 1977

Description	Prices by County			
	McLean	Wheatland	Platte	Kimball
Supermarket Items	100.7	99.5	106.2	93.6
Apparel	96.4	98.5	109.9	95.2
Personal Hygiene Items	113.1	101.8	96.4	88.7
Liquor	92.4	103.3	99.7	104.6
Restaurant Meals	86.9	96.2	118.1	98.8
All Goods	97.0	99.6	106.9	96.4
New Housing Cost (sq. ft.)	97.4	86.9	125.8	89.9

Source: Socio-economic Longitudinal Monitoring Project.

be made for Tables E.2 and E.3: (1) the absolute differences in 1976 or 1977 between the boom counties (dominated by construction of strip mines and minemouth electrical power plants) of McLean and Platte and the control counties of Wheatland and Kimball; (2) the increase in prices in each county from 1976 (Table E.2) to 1977 (Table E.3); and (3) the relative change in prices from 1976 to 1977 among the four counties. At first it is difficult to discern any clear trends. Part of this difficulty is caused by the fact that few commodities were used to compute the cost indices and that no overall price index (which would include rental and owner occupied housing) was calculated. These data do indicate that Platte county (one of the boom areas) has higher prices relative to the control counties. Furthermore, from 1976 to 1977 prices in the control counties of Wheatland fell and remained roughly constant in Kimball county, whereas they increased in the growth county of Platte and remained roughly constant in McLean. The only conclusion which can be drawn is that the boom county of Platte displayed a higher absolute price level and relative increase in price compared to the other three counties.

The prime cause for local inflation is that immigrant workers must be attracted to the site (often in a remote area). The evidence suggests that wages must increase in order to attract construction workers and miners. These workers have more to spend and their immigration increases the local population without increasing associated services and other locally supplied goods and services. Consequently, demand exceeds supply and prices rise. Because the construction project is shortlived, establishments providing goods and services do not grow as rapidly. The resulting excess demand creates strains when supply is not responsive. The most apparent result is increased prices. Based on the estimated index of local inflation for Eddy, Lea and

Valencia counties and the Wyoming study, we assumed that WIPP would engender a peaking pattern. Specifically, we assumed that local inflation would rise above the national rate of inflation by 3% in 1980, 10% in 1981-1983 (the peak years of construction activity), 3% in 1984, 1% in 1985-1986, and return to the national average in 1987. A related question is who is most likely to be adversely affected by local inflation. It is unlikely that immigrant workers would be, because their wages will increase at the rate of local inflation or at a more rapid rate. Consequently, the local population bears the inflationary impact. However, most local businessmen have increased their prices and at least stayed even with inflation. The local population who are well off may travel further to purchase goods and services and these individuals consume less of their income than those less well off. Furthermore, as property owners they see the market value of their home increasing along with local inflation. The result is that inflation most adversely affects those who are poor and those on fixed incomes which fall in purchasing power as inflation continues.

The individuals obviously affected are those receiving welfare and unemployment payments and those who are retired. One way to measure their plight is to compute the increased levels of compensation which would be necessary to maintain their standard of living. This entails multiplying the number of families or individuals receiving fixed incomes by their average income in a base year times the local rate of inflation.

The aged are invariably depicted as living on fixed incomes. However, this is not true for the social security component of that income because social security payments are increased automatically by an amount equal to the Consumer Price Index. This is also true for the blind, disabled and

dependent children who qualify for social security benefits. In December, 1978, there were 883 social security recipients in Eddy county and 667 in Lea county (Source: Supplementary Security Income, State and County Data, Social Security Administration). Although 89% of retired persons 65 years and older receive social security payments, nearly all rely on additional income from private pensions, capital assets and earnings. A 1977 nationwide survey indicated that the median social security income for the aged and $2870 and the median from these sources of income as $1710 per year (Source: Income & Resources of the Aged, US Department of Health, Education and Welfare, Social Security Administration, U.S.G.P.O.; Washingon, D.C., 1980). We assumed that the national median of $1710 per year applies to the aged (65 years and over) in Eddy and Lea counties and that all of this income is in fixed dollars and does not respond to inflation. This is true of virtually all private and state and local government pensions. Although income from captial and earned income for the aged most likely responds to inflation to a limited extent we assumed it to be fixed as the amount was indeterminable. The number of people 65 and older is reported in Table E.4. Multitplying this number times $1710 provides an estimate of fixed income to the aged.

Unemployment benefits are not automatically indexed to the rate of inflation and are relatively fixed. We assumed these payments to be fixed. In 1978 unemployment in Eddy and Lea county averaged 1911 and $738,388 in unemployment benefits were paid out (Source: unpublished data, New Mexico Employment Security Commission). This implies that the average payment per unemployed person was $386,39. Although this number is low. it should be recalled that not all unemployed are eligible for benefits and the dur-

TABLE E.4

EFFECTS OF LOCAL INFLATION ON THE FIXED INCOME POOR IN EDDY AND LEA COUNTIES

	Excess Local Inflation	Estimated* Population Over 65 Years	Estimated Unemployed** Persons	Estimated*** Total income to fixed Income Poor ($000)	Required**** Supplemental Income ($000)
1980	3%	6912	1990	17,447	523
1981	10	6988	2319	17,704	1,770
1982	10	7059	2066	17,728	1,773
1983	10	7131	1759	17,732	1,773
1984	3	7207	2199	18,032	541
1985	1	7324	2296	18,270	183
1986	1	7339	2134	18,233	182
1987	0	7399	1857	18,228	0

*Source: Calculated from U.S. Dept. of Commerce, Bureau of Census, General Social and Economic Characteristic: NM 1970, PC(1) - B33.

**Source: Ibid.

***Column 3 times 1710 plus column 4 times $386.39 plus $4,858,619.

****Column 2 times column 5.

tion of unemployment is generally short. This multiplied times the number of unemployed provides an estimate of fixed payments to the unemployed.

The final identifiable group of fixed income poor are those receiving food stamps and other cash grants under various federal welfare benefit and income support programs. In the Annual Statistical Report - Fiscal Year 1978-1979, New Mexico Department of Human Services, Income Support Division, the total payments for cash and food stamp programs in fiscal 1979 was $4,858,619. We assumed this total payment remained constant over the construction and operation period of WIPP.

The sum of fixed payments to the aged, unemployed, and welfare recipients estimated by the techniques just described for 1980-1987 is shown in Table V.7.4 When this estimate is multiplied by the assumed rate of local inflation, the result is an estimate of the necessary extra payments which would have to be made to those fixed income poor in order to maintian their standard of living (see Table E.4, column 6).

WORKING PAPER F: CRIME AND ECONOMIC DEVELOPMENT

One of the purported undesirable social consequences of rapid growth is high crime rates. For example this is one of the characterizations made by L. S. Gilmore in his description of the hypothetical energy boomtown of "Pistol Shot, U.S.A.".* He and others visualize crime not only as a measure of an undesirable social environment but as an indicator of a wide spectrum of social disruption and imbalances. However, experienced researchers have found it difficult to identify the causes and predictors of crime, particularly in regional and local jurisdictions. The implication is that it is not easy to discern the level of crime which would take place in an area undergoing "normal" growth and development much less one in which "abnormal" growth is disrupting the social structure and giving rise to higher than "normal" crime rates.

The critical variables for predicting crime rates identified by researchers are factors measuring urbanization, such as total population and its density, the age distribution of the population (male teenagers and youths commit the majority of crimes) the distribution of income (unequal distribution and greater levels of income seem to be associated with higher crime rates) and the capabilities of enforcement authorities; more efficient police and more certain and severe sentencing appears to reduce crime. However, these variables are difficult to measure and to forecast; furthermore, the WIPP project is unlikely to change these variables in great magnitude.

In addition to these reservations, the University of Wyoming study** of 36 towns in Western States, including the high growth, presumably energy im-

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* Gilmore (1976).

** Brookshire and d' Arge (1979).

pacted city of Rock Springs, Wyoming, failed to associate high crime with rapid economic development. As a part of this study, crime data were analyzed for the simultaneous effects of population size, population growth, number of law enforcement personnel, per capita income and the percentage growth of per capita income. While the results were weak, the study did suggest a positive correlation between auto theft, large and small larceny, burglary and murder and the growth of population; population growth had no discernable effect on negligent manslaughter, rape, robbery and assault. The Wyoming study also found some correlation between higher income per capita and rates of murder and large larcenies, but per capita income was not associated with other crime categories.

Despite the difficulties encountered in the Wyoming study, as well as other studies reviewed in this work, in what follows we evaluate an indirect measure for the potential impact of WIPP in terms of change in crime rates. In considering population changes attributable to the WIPP, one may hypothesize that, while the number of in-migrants to the two county area may be relatively modest, the induced change in labor participation rates among the existing residents and the potential competition for jobs by residents and immigrant job seekers may result in social disruptions which, in turn, may result in higher crime rates. This hypothesis is tested by considering data drawn from five rapid growth counties in New Mexico. In particular, labor participation rates and unemployment rates in these counties* were regressed against an "Adjusted Crime Index" developed by the New Mexico Criminal Department.**

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*San Juan, McKinley, Valencia, Eddy and Lea Counties.

**New Mexico Criminal Justice Department (1979).

This index is computed for counties and urban areas in New Mexico by means of weighing major criminal offenses in accordance with their seriousness as ascertained by surveys and other research conducted by sociologists. The offenses and weights are:

CATEGORY	WEIGHT
Murder	26
Rape	11
Robbery	5
Assault	4
Burglary	3
Larceny	2
Motor Vehicle Theft	3

Analysis of the five New Mexico county sample revealed that the employment rate had no statistically meaningful effect on the adjusted crime index. However the effect of the labor participation rate for the population fifteen years and older proved statistically significant as revealed in the regression equation shown below:

$$\text{Adjusted Part I Crime Index (per 1000 persons)} = -60.2 + 313.3 \frac{\text{Labor Force}}{\text{Population 15 years and older}}$$

Unfortunately, the participation rate explains but 39% of the variation in the crime rate.

As is the case with earlier studies concerning crime rates and population change cited above, the results given above may be viewed as being little more

than suggestive in terms of the relationship between changes in the labor force and changes in crime indices. However, it may be the case that when, or if, this study is to be updated, more precise data may be available. If this is the case, it may well be possible to generate more refined regression estimates of the type given above. Therefore, in what follows a sketch is provided for the use of such regression results for estimates WIPP-related impacts on crime rates. We emphasize that the following calculations are for this limited, expository purpose and are not intended as meaningful estimates for such impacts.

Suppose, then, that the regression equation given above is to be used to estimate the effect of WIPP-related changes in the labor force on crime; the difference between the estimated labor force for the baseline population and that associated with WIPP is taken from data in Chapter V. These estimated changes in the labor force are used in the regression equation given above in the following manner:

$$\begin{array}{c}\text{Change in}\\ \text{Adjusted Part I}\\ \text{Crime Index}\end{array} = 313.3 \text{ times} \begin{array}{c}\text{Estimated}\\ \text{Change in}\\ \text{The Labor}\\ \text{Participation Rate}\\ \text{for Persons 15 Years}\\ \text{and Older Due to WIPP}\end{array}$$

The result of these calculations are given in Table F.1 for Hobbs, Carlsbad, and the entirety of Lea and Eddy Counties for the Scenario I and Scenario II distribution of in-migrants. In each case, the estimated change in the Labor force participation rate, the induced change in the Crime Index and the percentage change in this index is given. Although changes in the participation rate are small, the resulting impact on crime is significant. In the high employment, high growth years of 1982 and 1983 crime would be predicted to

TABLE F.1

EXAMPLE ESTIMATES FOR WIPP INDUCED CHANGES IN THE ADJUSTED CRIME INDEX

YEAR	SCENARIO I $\Delta\left(\frac{LF}{POP}\right)$	SCENARIO I Δ(Adjusted Crime Index)	SCENARIO I Change as % of Adjusted Index for 1977	SCENARIO II $\Delta\left(\frac{LF}{POP}\right)$	SCENARIO II Δ(Adjusted Crime Index)	SCENARIO II Change as % of Adjusted Index for 1977
			HOBBS			
1980	.0011	.3446	.271	.0015	.47	.37
1981	.0085	2.663	2.08	.0104	3.258	2.55
1982	.0280	8.77	6.85	.0291	9.117	7.12
1983	.0332	10.400	8.16	.0341	10.684	8.35
1984	.0121	3.791	2.96	.0127	3.979	3.11
1985	.0109	3.415	2.67	.0114	3.572	2.79
1986	.0147	4.606	3.60	.0176	5.514	4.31
1987	.0007	.219	.17	.0013	.407	.32
			ALL OF LEA COUNTY			
1980	.0010	.313	.24	.0011	.345	.27
1981	.0091	2.851	2.23	.0101	3.164	2.47
1982	.0313	9.806	7.66	.0344	10.778	8.42
1983	.0377	11.811	9.23	.0379	11.874	9.28
1984	.0135	4.23	3.30	.0137	4.292	3.35
1985	.0123	3.854	3.01	.0125	3.916	3.06
1986	.0173	5.42	4.23	.0182	5.702	4.45
1987	.0032	1.003	.78	.0034	1.065	.83

TABLE F.1 (Continued)

EXAMPLE ESTIMATES FOR WIPP INDUCED CHANGES IN THE ADJUSTED CRIME INDEX

YEAR	SCENARIO I $\Delta\left(\frac{LF}{POP}\right)$	SCENARIO I Δ(Adjusted Crime Index)	SCENARIO I Change as % of Adjusted Index for 1977	SCENARIO II $\Delta\left(\frac{LF}{POP}\right)$	SCENARIO II Δ(Adjusted Crime Index)	SCENARIO II Change as % of Adjusted Index for 1977
			CARLSBAD			
1980	.0022	.689	.56	.0021	.0658	.05
1981	.0124	3.885	3.18	. 0116	3.634	2.98
1982	.0308	9.65	7.91	.0297	9.305	7.63
1983	.0344	10.778	8.83	.0335	10.496	8.60
1984	.0131	4.104	3.36	..0130	4.073	3.34
1985	.0127	3.979	3.26	.0122	3.822	3.13
1986	.0154	4.825	3.95	.0150	4.70	3.85
1987	.0057	1.786	1.46	.0045	1.41	1.16
			ALL OF EDDY COUNTY			
1980	.0014	.439	.36	.0014	.439	.36
1981	.0155	4.856	3.98	.0111	3.478	2.85
1982	.0380	11.905	9.75	.0362	11.341	9.30
1983	.0432	13.535	11.09	.0433	13.566	11.11
1984	.0167	5.232	4.29	.0166	5.201	4.26
1985	.0147	4.606	3.78	.0146	4.574	3.75
1986	.0430	13.472	11.04	.0194	6.078	4.98
1987	.0044	1.379	1.13	.0038	1.191	.98

increase between 7% and 11% depending upon the scenario and area. However, as the construction phase ends and the operation phase begins, this statistical model of criminal activity would predict that crime rates would return to their normal levels. This would be expected given that the WIPP project's permanent work force will be relatively small in size and stable in composition, and, therefore, would not be expected to give rise to the social turbulence generally associated with higher crime rates.

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Valencia	-	1969-1970	&	1977-1978
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WORKING PAPER G: A MODEL FOR COMPENSATION

The amount, coin, recipients, and manner of compensation may provide insights as to the need for compensation. Nevertheless, we would argue that any compensation plans should be included as a central feature of any project plan and/or feasibility analyses. This is desirable not only for consistency and completeness, but also in order to make use of the evaluation and analysis of impacts ascertained in the report. Realizing that adverse impacts may be controllable to an extent by project design, compensation then appears as an alternative to the minimization of impacts. At the ideal, compensation should be employed when such an approach is more efficient than avoiding or further limiting the impact.

In constructing a model for compensation, three distinct lines of effort are required.* First, we need to be able to characterize impacts as to primary interest affected, individuals or groups affected, the timing and severity of the impact and attributability to the project. Second, we must evaluate the feasibility of compensation according to legal bases, implementation problems, economic efficiency considerations, equity considerations, and consistency with project strategy. Third, we need to consider the process of actually effecting compensation. On the basis of these considerations we then can evaluate a basis for operational compensation schemes.

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*Here we expand along the lines of thought developed in "Compensation for the Adverse Effects of Nuclear Waste Management Facilities: Application of an Analytical Framework to Consideration of Eleven Potential Impacts", R. J. Cole and T. R. Smith, Battelle, B-Harc-311-022.

The procedure is then, first, to form a matrix listing effects characterizing impacts as in Table G.1 below.

TABLE G.1: CHARACTERIZATION OF IMPACTS

EFFECTS	PRIMARY INTEREST AFFECTED	INDIVIDUALS OR GROUPS AFFECTED	TIMING OR SEVERITY	ATTRIBUTABILITY
mined salt	environmental	residents or workers in the area	moderate to high, continuing into operation phase	high
future generations	political	area residents	heavy impact, continuing	high
increased housing costs	economic	Property owners, rentors	moderate impact lessening during operation	medium
etc.	...	...	...	...

For the second group of criteria we evaluate impacts as to the desirability of compensation on legal, fairness, etc., grounds. In Table G.2 this is done hypothetically. Notationally, ++ denotes a strong basis for compensation, + a moderate basis for compensation, 0 a balance of pro's and con's, − a moderate basis against compensation, -- a strong basis against compensation, and ? an uncertain basis.

TABLE G.2: BASES FOR COMPENSATION

EFFECT	LEGAL	IMPLEMENTATION	ECONOMIC	EQUITY	PROJECT
mined salt	+	0	++	+	0
future burden	0	--	?	0	--
increased housing costs	+	+	?	?	+
etc.	...	...	...	...	...

At this point is is useful to disgress somewhat on the bases for determining the desirability of compensation with respect to different viewpoints as related in Table G.2.

There may be laws which require DOE, in constructing and operating a waste disposal facility, to provide compensation for some adverse impacts while other laws may prohibit compensation for other impacts. Compensation may also be at the discretion of the sponsor. It may also be necessary to investigate mitigating circumstances. Every identified impact must be evaluated in terms of these criteria.

Over and above the direct costs of compensation, the costs of implementing a compensation scheme must be considered as well. These costs may result from delaying tactics of intervenors (additional interest during construction), administrative costs, political costs, which may adversely effect the sponsoring agencies effectiveness in other areas, etc. In addition one must consider: (i) the costs and likelihood of identifying appropriate recipients; (ii) the

costs involved in misspecifying appropriate compensation amounts; (iii) moral hazard problems in distributing compensation; (iv) the possibility of drawing additional individuals into impacted areas for the purpose of receiving compensation. Again each impact must be analyzed with respect to these considerations, so that a subjective determination of potential implementation costs can be presented.

Economic efficiency requires that a project pass the cost-benefit test (benefits must exceed costs). Specifically it requires that the project maximize benefits net of costs so that all project aspects are undertaken in a cost minimizing, or efficient manner. Surely there is an overlap here with the implementation criteria, and such double counting is not inappropriate, but must be taken into account in the final summation. Basically, though, the point of view taken is that compensation schemes must not result in a net loss of resources. It should be noted, however, that this is in some cases a difficult criterion to apply; e.g., some might argue that, in the case of nuclear waste disposal, the "burden on future generations" is a question of equity, or fairness. Others would argue that this is a question of "intertemporal" economic efficiency. The point here is both central to, yet perplexing for the issue, as questions of efficiency and equity must be separated.

The question of equity, or fairness, is extremely simple in principle, yet extremely difficult to apply. For example, if Mr. A gains $100 at the expense of a $200 loss for Mr. B, (no other gainers or losers involved), then one could quickly say that such a "transaction" does not pass the test of economic efficiency. But, say now, that Mr. A gains $200 while B incurs costs of $100. Clearly we now meet the criteria of efficiency, but what of

equity? Suppose Mr. A is poor and Mr. B very rich.... perhaps. Suppose Mr A is rich and Mr. B is relatively poor.... perhaps not. But suppose again that Mr. A is a solid member of the community and industrious while Mr. B is indigent and incorrigible ... what now? It is clear that value judgements are required.... but value judgements must be made. A number of criteria might be identified: (i) what is the distribution of net gainers resulting from a specific impact; (ii) is there an overlap of benefits and costs; (iii) what is the distribution, and overlap, of benefits and costs after compensation. Fortunately, since a number of individuals are involved in the comparisons to be made, the analysis is simplified somewhat, yet still remains more than non-trivial.

Project strategy considers first, the ability of impacted groups or individuals, as well as interveners, local or state governments, or other organizations, to block or strongly oppose the project on the basis of a particular impact. Thus we must assess the ability of various groups to seriously affect project progress on an effect by effect basis. Then, second, on an effect by effect basis a determination must be made as to whether compensation could neutralize oppositions to the project with respect to a specific impact. Care must be taken here to distinguish between a payment in the form of "something in return" and a payment that might be interpreted as a bribe, as this latter sort of a payment could actually be detrimental to a projects overall feasibility... opposition could be greater with such a payment, or the suggestion of it, than without.

Clearly, the dominant criterion for compensation in a conceptual sense, is the concern for equity. Were there no such concern, there would be no call

for compensation. However, as identified above there are many problems with determining the appropriate amount for the proper recipients of compensation. Moreover, the legal and implementation criteria must be the primary guiding forces in any operational scheme: one must do what is required by law, and refrain from doing what is prohibited; and one must reject what is probabilitively expensive.

While the law is concerned with a "balancing of equities", and thus would seem to reflect the need for equity-based compensation schemes, the law is silent on many issues. Moreover, there is little legislation that speaks to the issue of nuclear waste management; the relevance of the Price-Anderson Act at this time seems to be tenuous. But this is precisely the reason that waste management is so interesting; a commercial operation (shopping center, cardboard box factory, etc.) of the same magnitude would not have experienced the expansive involvement and enormous expense that already attends the WIPP. Nevertheless, when the law fails to speak to the issue of a given impact, and if implementation costs are within bounds, the need for compensation must be ascertained on the secondary (operational) criteria of equity, efficiency, and project strategy. In following this order, a set of necessary conditions for compensation is obtained. If compensation is favored, however, the form of compensation must next be determined.

The form of compensation is closely tied to the manner in which the compensation scheme is to be implemented. In fact implementation considerations may dictate the form of compensation. The recipients of compensation may be identified as individuals, private groups, area residents, area workers, public groups, municipalities, governments, or others. Compensation may be monetary, or non-monetary, either in the form of private or public

goods and services. Monetary compensation can be direct and specific, or take the form of payments in lieu of taxes, or an acceptance tax (as opposed to a severance tax) on waste received. However in many cases non-monetary compensation may be favored as the likelihood of misallocation is lessened. For example, if it is desirable to ensure that a certain type of medical care is available, it may be better to provide the care rather than a sum of money appropriate to purchase the care... there is no guarantee that the funds will be used to purchase medical care. Moreover, the amount of care and, hence, monetary compensation may vary among individuals.*

In determining the form and recipients of compensation we consider an impact for which compensation is favored, observe the affected individuals or group, etc. and then select the form of compensation judged most likely to achieve the desired result. The form of compensation is crucial as too much compensation may be worse than none, and the distribution of compenation should be as close as possible to the distribution of affected individuals.

Finally, once the array of compensation schemes is generated, an administrative decision must be made in order to consolidate the overall scheme. It may be that a single composite compensation scheme is more preferable than a multifaceted one.

An obvious application of such a model of compensation would be in the area of transportation vis-a-vis the safety and precautionary costs identified in Chapter VII. Such an effort was beyond the scope and mandate

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*However, there are well-known abuses in the provision of free medical care as well.

of this project, but could yield interesting results. Unfortunately, at this time it is only possible to speculate as to the nature of results that might be forthcoming.