

THE ECONOMIES OF MESA COUNTY
AND GARFIELD, MOFFAT, RIO BLANCO,
AND ROUTT COUNTIES, COLORADO

by

John R. McKean
Joseph C. Weber
Ray K. Ericson

April 1981

COLORADO WATER RESOURCES



RESEARCH INSTITUTE

Colorado State University
Fort Collins, Colorado

Technical Report No. 35

THE ECONOMIES OF MESA COUNTY AND GARFIELD, MOFFAT,
RIO BLANCO, AND ROUTT COUNTIES, COLORADO

DESCRIPTION AND ANALYSIS

By

John R. McKean, Joseph C. Weber
and Ray K. Ericson

Submitted to

U.S. Department of Interior
Bureau of Land Management
Colorado State Office
Denver, Colorado 80202

April 1981

The work upon which this report is based was supported by funds provided by the U.S. Department of Interior, Bureau of Land Management, under Contract No. Y4-553-CT1-1088.

Contents of this publication do not necessarily reflect the views and policies of the Bureau of Land Management, U.S. Department of Interior, nor does mention of trade names or commercial products constitute their endorsement or recommendation for use by the U.S. Government.

TABLE OF CONTENTS

<u>Chapter</u>		<u>Page</u>
1	INTRODUCTION.....	1
	THE REGION UNDER STUDY.....	1
	MESA COUNTY.....	2
	GARFIELD, MOFFAT, RIO BLANCO AND ROUTT COUNTIES.....	9
	STATEMENT OF THE PROBLEM.....	19
	THE METHOD USED TO ESTIMATE REGIONAL IMPACTS.....	19
	OUTLINE OF THE REPORT.....	25
2	THE METHODOLOGY OF THE STUDY.....	29
	INTRODUCTION.....	29
	PROCEDURES FOLLOWED.....	30
	DEFINITION OF THE REGION.....	30
	SECTOR DELINEATIONS.....	30
	QUESTIONNAIRE DESIGN AND USE.....	36
	SELECTION OF THE BASE YEAR.....	38
	CONDUCT OF THE SURVEY.....	38
	PROCESSING THE DATA.....	38
	DATA SOURCES BY SECTOR.....	40
3	ANALYSIS OF THE REGION'S ECONOMIES.....	57
	INTRODUCTION.....	57
	THE TRANSACTIONS AMONG SECTORS TABLE.....	57
	DIRECT PRODUCTION REQUIREMENTS.....	61
	DIRECT PLUS INDIRECT IMPACTS.....	62
	BUSINESS MULTIPLIERS.....	64
	INCOME MULTIPLIERS.....	66
	EMPLOYMENT ANALYSIS.....	68
4	REGIONAL WATER REQUIREMENTS.....	74
	INTRODUCTION.....	74
	WATER USE ANALYSIS.....	74
	APPENDICES.....	84
	APPENDIX A — SECTOR IDENTIFICATION, MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND ROUTT COUNTIES MODEL.....	85

TABLE OF CONTENTS
(Continued)

APPENDICES	<u>Page</u>
APPENDIX B — INPUT-OUTPUT TABLES FOR MESA COUNTY AND GARFIELD, MOFFAT, RIO BLANCO, AND ROUTT COUNTIES MODEL.....	90
B-1 MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND ROUTT COUNTIES MODEL, TRANSACTIONS AMONG SECTORS, 1980.....	91
B-2 MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND ROUTT COUNTIES MODEL, DIRECT REQUIREMENTS PER DOLLAR OF OUTPUT, 1980.....	100
B-3 MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND ROUTT COUNTIES MODEL, DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR OF OUTPUT DELIVERED TO FINAL DEMAND, 1980 (Households in Processing Sector).....	108
B-4 MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND ROUTT COUNTIES MODEL, DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR OF OUTPUT DELIVERED TO FINAL DEMAND, 1980 (Households in Final Demand).....	114
APPENDIX C — SURVEY FORMS USED FOR THE NORTHWEST COLORADO INTERINDUSTRY STUDIES.....	120
APPENDIX D — CRITIQUE OF DATA SOURCES.....	127

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1-1	Population by County, 1930-1980.....	2
1-2	Mesa County Agricultural Production, 1980.....	3
1-3	Mesa County Mineral Production, 1980.....	4
1-4	Mesa County Coal Reserve Base.....	7
1-5	Mesa County Oil and Gas Production, 1980.....	8
1-6	Four-County Agricultural Production, 1980.....	10
1-7	Four-County Mineral Production, 1980.....	12
1-8	Four-County Coal Reserve Base, 1980.....	14
1-9	Four-County Coal Production, 1980.....	16
1-10	Four-County Oil and Gas Production, 1980.....	17
1-11	Percent Change in Population, 1970-1980.....	19
3-1	Business Activity Multipliers Mesa County and Garfield, Moffat, Rio Blanco, Routt Counties, Colorado by Sector, 1980.....	65
3-2	Income Multipliers Mesa County and Garfield, Moffat, Rio Blanco, Routt Counties, Colorado by Sector, 1980.....	67
3-3	Total Employment and Employment Coefficients, Mesa County and Four-County Region, by Sector, 1980.....	70
3-4	Direct Plus Indirect Requirements Per Thousand Dollars Delivered to Final Demand and Per Added Worker Hired, Mesa County and Four-County Region, by Sector, 1980.....	71
4-1	Withdrawal and Consumptive Use Requirements by Sector, Mesa County and Four-County Region.....	76

LIST OF TABLES
(Continued)

<u>Table</u>		<u>Page</u>
4-2	Total Water Use by Sector, Mesa County and Four-County Region, 1980.....	78
4-3	Direct Plus Indirect Water Requirements Mesa County and Four-County Region, 1980.....	81

CHAPTER 1

INTRODUCTION

The purpose of this report is to provide a description and analysis of two regional economies in northwest Colorado. The intent of the researchers is to provide policy makers with specific information contributing to the decision-making and planning processes and to provide a planning tool having the capability of analyzing a number of alternative development scenarios in the study regions.

THE REGION UNDER STUDY

The two study areas consist of five counties in northwest Colorado: Mesa County and Garfield, Moffat, Rio Blanco and Routt counties. These counties encompass an area of approximately 16,633 square miles and account for some 16 percent of the total land area of Colorado. About 58.5 percent of the region's total land area is owned by the federal government, 38.9 percent is private and 2.6 percent is state or local government owned. The region's 1980 population is estimated at 136,876 inhabitants.

The population of the region makes up about 4.74 percent of the state total. Table 1-1 shows population in the study counties from 1930-80.

The region's major exports are in the sectors: coal, other mining, oil and gas production, or electricity (which is generated from local coal deposits). Agricultural production, which is mainly

Table 1-1
Population by County, 1930-1980

County	1930	1940	1950	1960	1970	1980
Mesa	25,908	33,791	38,974	50,715	54,374	81,530
Garfield	9,975	10,560	11,625	12,017	14,821	22,514
Moffat	4,861	5,086	5,946	7,061	6,525	13,133
Rio Blanco	2,980	2,943	4,719	5,150	4,842	6,255
Routt	9,352	10,525	8,940	5,900	6,592	13,404
Four-County	27,168	29,114	31,230	30,128	32,780	55,306
Five-County	53,076	62,905	70,204	80,843	87,154	136,836

livestock, also contributes to the region's exports. Big game hunting, fishing, and winter (ski) recreation are also important in the region. The regional economy is characterized by a small base in light manufacturing. However, the region imports nearly all finished consumer products, heavy industry products, and most ingredient materials.

MESA COUNTY

Mesa County contains 3,334 square miles, or approximately 3.2 percent of Colorado's total area. Within the county, federal government holdings account for 70 percent of the acreage, private holdings account for 26 percent, and state holdings amount to 4 percent.¹ The county's 1980 population was 81,530 inhabitants, or approximately 2.8 percent of the state total.²

The region's economy has historically depended on three sectors: agriculture, tourism, and mining. Agricultural production is primarily based on livestock as can be seen from the figures listed below:

Table 1-2

Mesa County Agricultural Production, 1980³

County	Winter Wheat (bushels)	Hay (tons)	Corn (bushels)	Total Value Crops 1979 (\$)	Cattle (# of head)	Stock Sheep (# of head)
Mesa	10,700	33,700	1,356,000	18,455,900	70,500	44,000
State Total	107,200,000	1,500,000	89,680,000	1,017,514,000	2,975,000	510,000
% of State	negligible	2.2%	1.5%	1.8%	2.4%	8.6%

The major cash crop grown in Mesa County is corn, however it only accounts for 1.5 percent of the state total production. The region produces nearly 9 percent of Colorado's sheep and around 2 percent of Colorado's cattle. Although the dominant agricultural land use is grazing, both irrigated and dry crop land is also found in Mesa County; the 1979 value for the crops in the county only comprised 1.8 percent of the total state value.

Natural features like the Colorado National Monument west of Grand Junction, and the more than 200 lakes in Grand Mesa, Monti, and Uncompahgre National forests, draw large numbers of tourists and hunters to the area. It is difficult to quantify the employment due to tourism because many of the services supplied to tourists also serve the local populous.

Mesa County is rich in mineral resources which include oil, gas, coal, uranium, vanadium, and sand and gravel. The 1980 production figures for the county are listed below.

Table 1-3
Mesa County Mineral Production, 1980⁴
(in thousands of dollars)

County	Minerals					
	Petroleum	Gas	Coal	Uranium	Vanadium	Sand and Gravel
Mesa	17	3,361	15,488	1,336	64	4,996
State Total	616,593	260,856	379,703	30,230	5,987	88,359
% of State	negligible	1.3%	4.1%	4.4%	1.6%	5.6%

Due to the large amount of natural resources available, mineral production has been a significant factor in the area's economy since the early 1900s. About 1 percent of Colorado's mining employment occurs in Mesa County. Mesa County is located within the Colorado Plateau physiographic province, which can be described as an uplifted area containing either gently folded, or nearly horizontal layers sliced by streams, some of which are entrenched in canyons.⁵ Examples of this would be the Book Cliffs which rise over 4,000 feet above the Grand River Valley, and the spectacular plateau of the Grand Mesa. Mesa County is bounded on the northwest by the Grand River Valley, on the northeast by Battlement Mesa, on the east by Grand Mesa, and on the south by the Uncompahgre Plateau. Elevations range between 4,360 feet in the Colorado River Valley to 10,000 feet on the northeastern portion of Grand Mesa.⁶ The Colorado River, and its major tributary, the Gunnison River, along with the Dolores River, form the major drainages in Mesa County. Colorado National Monument, west of Grand Junction, is noted for its unusually colorful and spectacular erosion forms in sandstone, including spires, cliffs, columns, and massive ramparts.⁷

The study area has a semi-arid steppe climate typical of a high plains, mid-latitude region; it is characterized by low relative humidity, little precipitation, and abundant sunshine. Precipitation in the area ranges from around 9 inches in the lower elevations up to around 25 inches at higher elevations; 15 to 16 inches per year is about average.⁸ Approximately half the precipitation occurs as snow and another third of it can be attributed to summer thunderstorms; the rest occurs as rainfall throughout the year. Temperatures can vary from extreme cold in the winter (-40° F) to extreme heat in the summer

(100° F). The average winter mean temperature is in the low to mid-20s, generally ranging between 4° F at night to 36° F during the day. The average summer mean temperature is in the mid-60s, generally ranging from 44° F at night to 88° F during the day. The prevailing winds are from the west-southwest at about 3 to 5 miles per hour. Wind speed and direction are influenced by local topography; localized weather is often a result of topographic influence around peaks, saddles, ridges, or in canyons. Winds of up to 100 miles per hour can be caused by sharp cold fronts in the winter, or by thunderstorms during the spring and early summer.

The vegetation in Mesa County is dominated by sagebrush; sagebrush and a sparse understory of various bunchgrasses commonly develop where soil moisture is the limiting factor.⁹ Where water is more abundant, snowberry, serviceberry, cattails, cottonwoods, scattered junipers, Gambel's oak, and other plants will grow along with the sagebrush. On high, moist, or north-facing slopes, where there is enough water for trees, stands of aspen are present. Along with the aspen, mixed conifer stands, composed of spruce, subalpine fir, lodgepole pine, and Douglas fir, can be found at higher elevations.

A limited amount of coal reserves is found within the study area; it is estimated that 1.9 percent of the deep coal reserves found in Colorado (12.465 billion short tons) lie in the Mesa County area. Heat values for Mesa County's coals at 11,790 Btu/lb are better than the state average of 11,160 Btu/lb. The coal reserves are summarized below:

Table 1-4

Mesa County Coal Reserve Base¹⁰

County	Deep Millions of Short Tons	Strip Millions of Short Tons	Total Millions of Short Tons	S Percent	Ash Percent	H ₂ O Percent	Heat Content (Btu/lb)
Mesa	238.34	0	238.34	0.6	8.9	8.1	11,790
State Total	12,465.5	3,791.1	16,256.6				
% of State	1.9%	0	1.5%				

Mesa County has one coal region located within it, the Unita Region; the Unita Region coal fields occur on the moderately to steeply dipping flanks of the Piceance Basin, which is a southwestern extension of the Unita Basin of Utah.¹¹ Two coal fields are of importance in the study area, the Book Cliffs field and the Grand Mesa field. The Book Cliffs field is located on the southwest rim of the Piceance Basin; the bituminous coals found within the field are generally flat-lying, but can be complexly tilted and faulted locally. The coals occur in the Mesaverde group of the Mount Garfield Formation. The total resource of coal in place in the Book Cliffs field up to a depth of 6,000 feet is estimated to be 7,193 million tons.¹² The Grand Mesa field is southeast of Grand Junction and also contains coals of the Mesaverde group in the Mount Garfield Formation. These coals are of slightly lower rank than those of the Book Cliffs field and grade from bituminous to subbituminous. The Grand Mesa field total coal resources in place to 6,000 feet deep are estimated to be 8,655 million tons, with 9 percent of that being bituminous and the rest subbituminous.¹³

Mesa County produced 765,596 tons of coal in 1980; this is 4.1 percent of Colorado's total production.

The presence of oil and natural gas is closely tied to the location of large structural basins like the one found in Mesa county. Although Colorado's oil and gas concentrations can occur in either structural or stratigraphic traps, historically the majority of western slope fields have been in structural traps located on the crests of anticlines. An example of this would be the Bar X anticline located on the Colorado-Utah border; it produced 99 percent of Mesa County's oil production in 1980, and 16 percent of its gas production.¹⁴ A summary of the 1980 oil and gas production for Mesa County is listed below:

Table 1-5
Mesa County Oil and Gas Production, 1980¹⁵

County	Number of Producing Wells	Oil Production (Bbls)	Gas Production (MCF)
Mesa	66	822	2,618,435
State Total	6,696	29,801,524	191,805,615
% of State	1%	negligible	1.4%

As can be seen from the table, Mesa County produces only 1.4 percent of Colorado's gas production.

Mesa County produced 4.4 percent of Colorado's uranium in 1980 and 1.6 percent of the state's vanadium. Uranium and vanadium occur together in the Uravan Mineral Belt, part of which is located in the southwestern corner of Mesa County. These low grade deposits were formed by migrating uranium-bearing solutions that altered the original host rock (sandstone); they are termed "roll front" deposits because the uranium is concentrated along the C-shaped interface between the oxidized and reduced portions of the sandstone.

Although the Colorado Plateau province contains the largest U_3O_8 reserves in the nation (378,000 tons) the uncertain future of the nuclear industry in the U.S. has caused cutbacks in exploration and development of uranium resources.¹⁶ Vanadium, used in steel alloys, has traditionally been considered a by-product in uranium production, however, in the past several years the value of vanadium has been 1 1/2 to 2 times as high as that of uranium.¹⁷ For many of the Uravan Mineral Belt mines, the presence of vanadium has made the "uranium ore" economically feasible to extract.

In addition to the fossil fuels, Mesa County also produced 5.6 percent of Colorado's sand and gravel.

There has been a 50 percent increase in population in Mesa County from 1970 to 1980; a significant portion of the growth can probably be attributed to the development in the mining sector.¹⁸

GARFIELD, MOFFAT, RIO BLANCO AND ROUTT COUNTIES

These four counties comprise an area of 13,256 square miles, or approximately 13 percent of Colorado's total area. Within the four counties, federal government holdings account for 55 percent of the acreage, private holdings account for 42 percent and state holdings amount to 3 percent.¹⁹ The region's 1980 population was 55,306 inhabitants, or approximately 2 percent of the state total.²⁰

The region's economy has historically depended on three sectors: agriculture, tourism and mining. Agricultural production is primarily based on livestock, as can be seen from the figures listed below:

Table 1-6
Four-County Agricultural Production, 1980²¹

County	Winter Wheat (bushels)	Hay (tons)	Total Value Crops 1979 (\$)	Cattle (#)	Stock Sheep (#)
Garfield	48,600	34,900	6,540,200	35,000	20,000
Moffat	543,000	24,000	5,251,000	34,000	123,000
Rio Blanco	155,200	21,200	3,080,500	30,000	35,000
Routt	332,800	47,100	5,632,500	30,000	21,500
Four-County Total	1,079,600	127,200	20,504,200	129,000	199,500
State Total	107,200,000	1,500,000	1,017,514,000	2,975,000	510,000
% of State	1%	8.5%	2%	4.3%	39.1%

The major cash crop grown in the area is wheat, most of that being grown in Moffat and Routt counties; however, it only accounts for 1 percent of the total state production. The region does contain almost 40 percent of Colorado's sheep, with Moffat County alone having 24.1 percent of the sheep stock. Although the dominant agricultural land use is grazing, both irrigated and dry crop land are also found in each of the counties; the 1979 value for the crops in the region only comprised 2 percent of the state total value.

Natural features like Moffat County's Dinosaur National Monument, Routt County's popular Steamboat Springs winter resort, Garfield County's Glenwood Springs and Glenwood Canyon along the Colorado River, draw large numbers of tourists to the area. It is difficult to quantify the employment due to tourism because many of the services supplied to tourists also serve the local populous.

The four-county region is very rich in mineral resources including oil, gas, coal, uranium, oil shale, volcanic scoria, limestone and sand and gravel. The 1980 production figures for the counties are listed below. Due to the large amount of natural resources available, mineral production has been a significant factor in the area's economy since the early 1900s. About 12.4 percent of Colorado's mining employment occurs in the four-county area.

The four-county study area is located within both the Wyoming Basin and Colorado Plateau physiographic provinces. The Colorado Plateau encompasses the southwestern portion of the study area; it is described as an uplifted area which contains either gently folded or nearly horizontal layers sliced by streams, some of which are deeply entrenched in canyons. The rest of the study area is within the Wyoming Basin province which is characterized by plateau areas underlain by relatively soft sedimentary rocks, isolated mountain ranges, and bordering steep mountain slopes.²² The four-county area is bounded on the east by the Park Range, which forms part of the Continental Divide, and on the south by the Colorado River. Elevations range from 4,700 feet to over 13,000 at the mountain peaks; elevations for the predominant plateau areas of the Wyoming Basin province generally range between 6,600 and 7,600 feet. Dinosaur National Monument, located in western Moffat County, is a unique geologic feature in that it contains the Nation's richest deposits of dinosaur fossils.

The study area has a semi-arid steppe climate typical of a high plains, mid-latitude region; it is characterized by low relative humidity, little precipitation, and abundant sunshine. Precipitation in the area ranges from about 9 inches in the lower elevations

Table 1-7

Four-County Mineral Production, 1980²³
(in thousands of dollars)

County	Petroleum	Gas	Coal	Uranium	Oil Shale	Volcanic Scoria	Sand and Gravel	Limestone
Garfield	87	9,717	313	--	--	--	3,105	289
Moffat	9,458	30,535	108,252	303	--	--	1,387	--
Rio Blanco	369,911	42,914	4,206	--	3,000	--	176	--
Routt	3,063	90	146,592	--	--	265	2,024	--
Four-County Total	382,519	83,256	259,363	303	3,000	265	6,692	289
State Total	616,593	260,856	379,703	30,230	3,000	638	88,359	14,749
% of State	62.0%	31.9%	68.3%	100%	100%	41.5%	7.6%	2.0%

(Rangely — 8.87" average annual precipitation) to as much as 50 inches on the Continental Divide (Steamboat Springs — 23.5" average annual precipitation).²⁴ Approximately half the precipitation occurs as snow and another third of it can be attributed to summer thunderstorms; the rest occurs as rainfall throughout the year. Temperatures can vary from extreme cold in winter (-40° F) to extreme heat in the summer (100° F). The average winter mean temperature is in the low to mid-20s, generally ranging between 4° F at night to 36° F during the day. The average summer mean temperature is in the mid-60s, generally ranging between 44° F at night to 88° F during the day. The prevailing winds are from the west-southwest at about 3 to 5 miles per hour. Wind speed and direction are influenced by the local topography; localized weather is often a result of topographic influence around peaks, saddles, ridges, or in canyons. Winds of up to 100 miles per hour can be caused by sharp cold fronts in the winter, or by thunderstorms during the spring and early summer.

The vegetation in the region is dominated by sagebrush. Sagebrush and a sparse understory of various bunchgrasses commonly develop where soil moisture is the limiting factor.²⁵ Where water is more abundant, snowberry, serviceberry, cattails, cottonwoods, scattered junipers, Gambel's oak and other plants will grow along with the sagebrush. On high, moist, or north-facing slopes, where there is enough water for trees to grow, stands of aspen are present. Mixed conifer stands, composed of spruce, subalpine fir, lodgepole pine, and Douglas fir, along with aspen, can be found at higher elevations. Major migration routes for deer and elk occur in the four-county area; the area is heavily used for hunting. The Williams Fork and Yampa Rivers vicinity is one

of the most productive areas in Colorado for small game such as sage and sharp-tailed grouse.²⁶ The dominant mammals are rodents including marmots and jackrabbits. With the rodents come their common predators, coyote, bobcat, and weasels. Numerous species of birds also inhabit the area.

Substantial coal reserves are found within the study area; it is estimated that 61.1 percent of the deep coal reserves found in Colorado (12.465 billion short tons) lie within the four-county region. Heat values for the area's coals are better than the state average of 11,160 Btu/lb. The coal reserves are summarized below:

Table 1-8

Four-County Coal Reserve Base, 1980²⁷

County	Deep	Strip	Total	S	Ash	H ₂ O	Heat Content
	Millions	of Short Tons		Percent			(Btu/lb)
Garfield	552.99	0	552.99	0.2	7.4	6.6	12,130
Moffat	2,570.55	270.0	2,840.55	0.2	3.8	11.5	11,510
Rio Blanco	1,067.37	0	1,067.37	0.4	6.0	11.7	11,210
Routt	3,413.89	413.00	3,826.89	0.8	6.4	9.4	11,560
Four-County Total	17,604.80	683.00	8,287.8				
State Total	12,465.5	3,791.1	16,256.6				
% of State	61.0%	18.0%	51.0%				

The four-county area has two coal regions located within it, the Green River Region in Moffat and Routt counties and the Unita Region in Rio Blanco and Garfield counties. The Green River Region is a south-eastern trending extension of the Sand Wash Basin of Wyoming.²⁸

Relatively gentle local folding along the southern edge of the basin grades into complex local folding toward the eastern edge; faulting and minor intrusives complicate the structure along the southeast and east rims. The Yampa Coal Field is the producing field in the Green River Region. In the Yampa field, 23,607 million tons of coal were estimated as originally being in place, three-quarters of which was bituminous and one-quarter of which was subbituminous.²⁹ The Green River Region is the only region in the state where strip coal is of major importance; 90 percent of Colorado's strippable coal resources are estimated to be in the Yampa field.

The Unita Region coal fields occur on the moderately to steeply dipping flanks of the Piceance Basin, which is a southeastern extension of the Unita Basin of Utah. Three coal fields are of importance in the study area, the Lower White River field, the Danforth Hills field and the Grand Hogback field. In the Lower White River field, which is located on the north rim of the Piceance Basin west of the Danforth Hills, the coal being mined is bituminous. All coals mined in this field are in the Williams Fork member of the "Mesaverde" Formation; they occur in seams varying from 8 feet to 12 feet 3 inches thick.³⁰ The Danforth Hills field stretches nearly 30 miles in length along the northeast side of the Piceance Basin northwest of Meeker. Although the strata dip to the southwest, the regional dip is interrupted by several local anticlines. The coals are generally bituminous, but some of the younger coal beds in the northern part of the field are subbituminous. "Mesaverde" coal-bearing rocks are exposed at some very steep dips in the Grand Hogback Coal Field, along the eastern edge of the Piceance Basin. The steep dips are caused by the monoclinal fold which forms the

eastern rim of the basin. All coals in the Grand Hogback field are bituminous.

The four-county area produced 68.3 percent of the 1980 coal production for Colorado. Routt County, Colorado's largest producer, accounted for 38.6 percent of the state's coal production. The 1980 coal production figures for the four counties are listed below.

Table 1-9
Four-County Coal Production, 1980³¹

County	Tonnage	% of State
Garfield	15,500	0.08%
Moffat	5,351,067	28.51%
Rio Blanco	207,894	1.11%
Routt	7,246,316	38.60%
Four-County Total	12,820,777	68.30%
State Total	18,770,318	

The presence of oil and natural gas is closely tied to the location of large structural basins, like the two which occur in the four-county area. Although Colorado's oil and gas concentrations can occur in either structural or stratigraphic traps, the largest oil producer in the study area is a structural trap. The Rangely Mancos pool in Rio Blanco County has produced nearly 64 percent of the oil from the northwestern Colorado region.³² The Rangely Mancos pool occurs in fractures caused by faulting of a major anticlinal structure. A summary of the oil and gas production for the four-county region is listed below:

Table 1-10
Four-County Oil and Gas Production, 1980³³

County	Number of Producing Wells	Oil Production (Bbls)	Gas Production (MCF)
Garfield	123	4,223	7,144,872
Moffat	217	457,131	22,452,249
Rio Blanco	961	17,878,737	31,554,384
Routt	25	148,062	66,356
Four-County Total	1,326	18,488,153	61,217,861
% of State	19.8%	62.0%	31.9%
State Total	6,696	29,801,524	191,805,615

As can be seen from the table, the four-county region produces 31.9 percent of the state's gas and 62 percent of the state's oil production; 59.9 percent of the oil production comes from Rio Blanco County, primarily from the Rangely Mancos pool.

Uranium occurs in three of the four counties within the study region, Garfield, Moffat, and Rio Blanco, however, Moffat County was the only county which contributed to Colorado's 1980 uranium production; Moffat County's production only amounted to 1 percent of the state total. These low grade deposits were formed by migrating uranium-bearing solutions that altered the original host rock (sandstone); they are termed "roll front" deposits because the uranium is concentrated along the C-shaped interface between the oxidized and reduced portions of the sandstone.

Although the Colorado Plateau province contains the largest U_3O_8 reserves in the nation (378,000 tons), the uncertain future of the

nuclear industry in the U.S. has caused cutbacks in exploration and development of uranium resources.³⁴ Until a definite nuclear energy policy is developed in the U.S., the uranium industry in Colorado will be in a state of flux.

The largest high grade oil shale deposits in the U.S. are located in the 25,000 square mile Green River Formation in Colorado, Utah, and Wyoming; these deposits average 30 or more gallons of oil per ton.³⁵ The richest section occurs in the Piceance Creek Basin where the oil shale is up to 2,000 feet thick and contains individual beds which have up to 80 gallons of oil per ton. Total in place reserves, including shale zones greater than 15 feet thick and averaging at least 15 gallons per ton, are thought to be around 1.25 trillion barrels.³⁶

Although oil shale development has created a great deal of controversy in Colorado, it has yet to become a major factor in Colorado's economy. Rio Blanco accounted for 100 percent of the 1980 oil shale production in Colorado, but the income generated is minor when compared to oil, gas, or coal. The current federal administration has curtailed price guarantees, loan guarantees and other forms of government support for oil shale, which has slowed development activities significantly.

In addition to the fossil fuels, the four-county area produced 7.6 percent of the state's sand and gravel, 41.5 percent of the state's volcanic scoria, and 2.0 percent of Colorado's limestone.

A significant portion of the growth in northwestern Colorado can probably be attributed to the development of the mining sector. Population growth rates for the four-county area can be seen in the table below.

Table 1-11

Percent Change in Population, 1970-1980³⁷

<u>County</u>	<u>Percent Change</u>
Garfield	52
Moffat	101
Rio Blanco	29
Routt	103

STATEMENT OF THE PROBLEM

The natural resource base in the region, while relatively abundant in terms of the capability to satisfy local demands, is also the focal point for regional and extra-regional economic conflict. Ownership of the large deposits of exploitable resources is vested largely with the Federal Government and corporations headquartered out of state. Thus, from a regional perspective, policies affecting the disposition of the regional resource base are usually determined outside of the region. From this same perspective, there is a need to develop a detailed description of the economy as it presently exists and an analytical framework which is capable of assessing the direct and indirect consequences of alternative scenarios for resource exploitation proposed by the public and private sectors of the economy. This description and analysis constitutes the major thrust of the research reported here.

THE METHOD USED TO ESTIMATE REGIONAL IMPACTS

A tool particularly designed to analyze the direct plus indirect effects of changes in irrigated crop output is the comprehensive inter-industry production model developed by Nobel prize winner W. W.

Leontief. The strength of this model lies in its capability not only to describe the interdependence existing among sectors of an economy but also in the capacity to demonstrate, sector by sector, the total consequences of any number of economic scenarios. The model is thus both descriptive and analytical. An interindustry model is constructed through the collection of extensive primary data, from firms and agencies within the region, and subsequent tabulation of the data in a form consistent with the interindustry framework. The analytical phase includes impact analysis, development of the various multipliers, and consistent forecasting under alternative resource development scenarios.

The purpose of the interindustry technique is to provide a detailed description of a regional economy and to develop a means for projecting future economic conditions. The input-output approach utilizes the following base data:

1. An industry-by-industry sales and purchases distribution, measured in dollars.
2. A measurement of the extent to which each industry purchases labor, raw materials, and processed goods within the study region as opposed to imports from outside the region.
3. Employment on an industry-by-industry basis in the study region.

In addition to the information provided directly by the base year data, the input-output model is used to: (1) generate provisional forecasts of future economic activity in each economic sector, and (2) estimate industry-by-industry output, employment and population in future years. These provisional forecasts may be based upon expectations for change in the key economic sectors which have the greatest

economic influence on the study region. For northwest Colorado, of course, the primary economic sectors are resource-related.

Nature of the Model

An interindustry model empirically illustrates the interdependent economic structure of the study region. The model provides an account of transactions among the sectors of the economy. This involves a calculation of the input requirements of these sectors. Essentially, the model is a system of double-entry bookkeeping such that sales and purchases by each sector to and from all other sectors are accounted for and measured.

The model consists of two major components — those transactions which are identified as intermediate transactions and those which are termed final. Intermediate transactions are the purchase and sale of intermediate goods (i.e., those which are subject to further local processing). Final transactions include all purchases and sales from or to sectors which are external to the model (i.e., to sectors not identified as intermediate or producing sectors). Such transactions would include, for example, sales from intermediate sectors to investment, non-local governments, and exports and purchases by intermediate sectors from non-local governments, or imports.

The model is "driven" by the final demand sectors. Thus, if it is known that sales to state or federal government or exports by any particular sector are going to change, the model estimates the impacts of this change on the entire economy. These impacts, whether measured in terms of employment, income, or the value of production, provide

consistent estimates which mutually and simultaneously satisfy all requirements for intermediate and final production.

Once the basic empirical description of economic transactions has been developed, forecasting with the analytical technique requires only the specification of appropriate changes in investment and exports by sector.

The input-output methodology is simply to divide the industries of the regional economy into two groups: (1) businesses which service and supply inputs mainly to other businesses within the region, and (2) business firms which sell mainly to customers outside the region. The latter group of firms are often termed "basic" industries. "Basic" industries along with state and federal government, form the demands which determine the business activity of the local suppliers of raw materials, labor, and processed goods.* The local economy is said to be "driven" by the growth of basic industry. Thus, in order to project local business activity, it is important to determine the key economic sectors. These driving sectors will be the businesses which sell most of their output outside the region but purchase a significant share of their inputs inside the region. In order to be of major importance, the businesses must also have a significant size and show expectations of volatility (high future growth or, possibly, high rates of decline).

In order to determine the interindustry structure in a region and to identify the important driving sectors, a transactions table is constructed. This transactions table is a system of double-entry book-keeping such that sales and purchases by each industry to and from each

*The primary "basic" sectors in northwest Colorado are energy extraction and production.

other industry (as well as labor, government, and exports) are accounted for and measured.

Two features of the input-output technique make it particularly desirable for the analysis of growth or decline in a regional economy. First, the technique provides information on sales and related variables (such as employment and income) on an industry-by-industry basis. This information is much more useful than more generally aggregated data. Second, the projections of future business activity in the region are consistent. That is, the projected value of production by each sector is the amount required to meet the needs of other industries in the region and projected exports. Inputs and outputs must be in accounting balance at all times. This simultaneous balancing of production to requirements among industries in the region provides much more realistic projections than isolated forecasts for individual industries.

Input-Output Projections

The input-output technique provides two forecasting tools: (1) multipliers and (2) development scenarios. A business transactions multiplier indicates how much business activity in dollars of transactions is generated within the region for each dollar of sales by a given industry to final demand. Final demand is defined as sales to federal and state government, investments, and exports outside of the region. A multiplier will be large for an industry which purchases a large part of its inputs from within the local economy. This is because the money which it earns from its sales will be spent again in the region.

Several types of multipliers may be calculated. The business transaction multiplier just discussed shows the total business spending within the region per dollar of additional sales to final demand by a given industry. An employment multiplier shows the total added employment in the region per dollar of additional sales to final demand by a given industry. An income multiplier shows the increase of personal income per dollar of additional sales to final demand by a given industry. The multipliers may all include direct, indirect, and induced effects. For example, if a "basic" industry such as coal mining expands its sales to exports by \$1,000, it may spend \$600 directly on locally produced goods. The producers of these local goods are then indirectly required to purchase some local goods and services themselves in order to meet this additional demand, and so on. The induced impact refers to the assumption that labor hired by coal mines and by other sectors will respnd a fixed proportion of its added income stimulating further expansion of the regional economy. Thus, both local producers and local labor are assumed to respnd locally part of their increased incomes which resulted from the increased exports of coal. The total effect is reflected in the multiplier.

The second forecasting tool provided by the input-output technique is the projection of future business activity by sector. In addition to the projection of dollar sales for each sector, variables which may be assumed to rise proportionately with production may also be estimated. Employment, population, and water use are examples of variables which may be projected in this manner.

Projections of future economic activity are derived from the interindustry model by focusing on the "basic" or driving industries.

Examination of the size of the multipliers and the size and expected change of the basic industries reveals the key sectors. For northwest Colorado, estimates of expected export change in energy extraction sectors must be obtained in order to drive the input-output model.

Expected growth or decline estimates for the extractive industries and other key sectors are introduced into the interindustry model to generate new, consistent estimates of the value of sales for each industry. The interindustry model has the flexibility to be adapted in many ways according to the needs of the researcher. One important application is the projection of employment-related population change. This can be projected by an interindustry model if employment for each sector can be assumed proportional to the output of that sector and further that family size and workers per family are also constant over time. Ideally, each sector would not only have a unique ratio of employment to output, but also each industry would have a unique ratio of population to worker (the ratio of persons per family divided by workers per family). Projections by the input-output model of output per sector could then be converted into estimates of both employment and population change (if the unemployment rate in the region was assumed constant). After adjusting for natural population growth in the region, the net migration implied by the projection of output change could also be determined.

OUTLINE OF THE REPORT

The remainder of the report consists of a description of the method of the study which is presented in Chapter 2; the analysis of the regional economy, which is the concern of Chapter 3; and an

extension of the basic model to include an analysis of water use which is contained in Chapter 4.

In addition to the main text of the report, there are several appendices. These contain the sector definitions, the input-output tables, and the survey forms.

FOOTNOTES

¹Colorado State Planning Division, Colorado Yearbook 1962-64, 1964, p. 498.

²U.S. Bureau of the Census, 1980 Colorado Final Population and Housing Unit Counts, March 1981, pp. 4-10.

³Colorado Department of Agriculture, 1981 Colorado Agricultural Statistics, July 1981, pp. 25-40, 135-139.

⁴Colorado Division of Mines, A Summary of Mineral Industry Activities in Colorado 1980, Part II: Metal-Nonmetal, August 15, 1981, pp. 12-29.

⁵C-b Shale Oil Project, Oil Tract C-b, Socio-Economic Assessment, Volume I, Baseline Description, March 1976, p. III-1.

⁶Colorado Yearbook 1962-64, op. cit., p. 776.

⁷Ibid., p. 507.

⁸VTN, Environmental Impact Assessment for the Proposed Colowyo Mine, Colowyo Coal Company, December 1975, pp. IV 1-6.

⁹VTN Colorado, Socioeconomic and Environmental Land Use Survey, Moffat, Routt, and Rio Blanco Counties, Colorado, Summary Report, April 24, 1975, p. 40.

¹⁰Energy Policy Coordination Office, U.S. Environmental Protection Agency, Colorado Coal Resources, Production and Distribution, October 1980, p. 4.

¹¹Department of Natural Resources, Colorado Geological Survey, 1972 Summary of Coal Resources in Colorado, 1973, p. 9.

¹²Ibid., p. 6.

¹³Ibid.

¹⁴Oil and Gas Conservation Commission, Department of Natural Resources, 1980 Oil and Gas Statistics, 1981, p. 84.

¹⁵Ibid., pp. 4-177.

¹⁶Colorado Energy Research Institute, Colorado Energy Resources Handbook, Volume 3: Uranium, December 1977, p. 8.

¹⁷Ibid., p. 10.

- ¹⁸1980 Colorado Final Population and Housing Unit Counts, op. cit., pp. 4-10.
- ¹⁹Colorado Yearbook 1962-64, op. cit., p. 498.
- ²⁰1980 Colorado Final Population and Housing Unit Counts, op. cit., pp. 4-10.
- ²¹1981 Colorado Agricultural Statistics, op. cit., pp. 25-40, 135-139.
- ²²Socioeconomic and Environmental Land Use Survey, Moffat, Routt, and Rio Blanco Counties, Colorado, Summary Report, op. cit., p. 40.
- ²³A Summary of Mineral Industry Activities in Colorado 1980, Part II: Metal-Nonmetal, op. cit., pp. 12-29.
- ²⁴Environmental Impact Assessment for the Proposed Colowyo Mine, Colowyo Coal Company, op. cit., pp. IV 1-6.
- ²⁵Socioeconomic and Environmental Land Use Survey, Moffat, Routt, and Rio Blanco Counties, Colorado, Summary Report, op. cit., p. 61.
- ²⁶Ibid., p. 64.
- ²⁷Colorado Coal Resources, Production and Distribution, op. cit., p. 4.
- ²⁸1972 Summary of Coal Resources in Colorado, op. cit., p. 9.
- ²⁹Ibid., p. 10.
- ³⁰Ibid., p. 5.
- ³¹Colorado Division of Mines, A Summary of Mineral Activities in Colorado 1980, Part I: Coal, May 1, 1981, pp. 17-24.
- ³²William W. Mallory, Oil and Gas from Fractured Shale Reservoirs in Colorado and Northwest New Mexico, RMAG Special Publication Number 1, 1977, p. 7.
- ³³1980 Oil and Gas Statistics, op. cit., pp. 4-177.
- ³⁴Colorado Energy Resources Handbook, Volume 3: Uranium, op. cit., p. 8.
- ³⁵Oil Shale Tract C-b, Socio-Economic Assessment, Volume I, Baseline Description, op. cit., p. III-7.
- ³⁶Ibid.
- ³⁷1980 Colorado Final Population and Housing Unit Counts, op. cit., pp. 4-10.

CHAPTER 2
THE METHODOLOGY OF THE STUDY

INTRODUCTION

The national energy and minerals situation has focused an increasing attention on the natural resources in the northwest region of Colorado. The exploration, development, and extraction activities associated with these natural resources have generally been viewed as isolated from, or independent of, the remainder of the economic environment. While it is not proposed to perform an ex-post evaluation of the impacts of existing developments, a major product of this research is the provision of the analytical capability for assessing the regional impacts of continued resource developments.

The interindustry model identifies the interdependent structure of an economy. No producing sector is autonomous (independent of the other sectors); rather, each sector interacts with other sectors (industrial, commercial, labor, government) through the purchases of goods and services and the sale of outputs. Structural interdependence means, quite simply, that the activities of one sector have impacts on others. The identification of the nature and magnitude of this interdependence is one of the most useful results of the interindustry model.

The model is driven by what are termed final demands. Final demands (as opposed to intermediate demands) reflect the demand for

goods and services in final form. Thus, final demand sectors use or consume a finished good. Intermediate demands, on the other hand, reflect the demand for goods and services which are processed before becoming available for final consumption. Thus, changes in final demands result in changes in the processing (or intermediate) sectors of the economy. The primary purpose of the interindustry model is to trace these impacts throughout the economy. Tracing these direct and indirect impacts allows the derivation of the multiplier effects on production, income, employment, or water use, and also allows the use of the model in providing consistent forecasts of economic activity.¹

PROCEDURES FOLLOWED

The discussion of procedures followed in conducting the research may be conveniently condensed into several categories including: the definition of the region, delineation of economic sectors, the data collection effort, selection of the base year, and data processing. Each is discussed, as briefly as possible, in the following pages.

DEFINITION OF THE REGION

The two economies that are the focus of this study are Mesa County and Garfield, Moffat, Rio Blanco and Routt counties. This regional definition allows for an analysis of an area most immediately impacted by actual and potential coal and oil shale development.

SECTOR DELINEATIONS

The interindustry model requires the separation of the economy into various economic entities or "sectors." Total output, by interindustry accounting procedures, is the aggregate value of all sales or

purchases that take place, i.e., the total sales or purchases during a year. This total output must be divided up into sectors in order to assess the interindustry structural dependence that prevails. The model structures economic activity into two major components, suppliers (or sellers) and purchasers (or users). Each of these is further subdivided according to the following scheme: Suppliers include: 1) intermediate or processing suppliers who are producers who must purchase inputs to be processed into output which they sell to final users or as inputs to other processors; and 2) primary suppliers whose output is not directly dependent on purchased inputs. This latter category includes non-local suppliers (or imports). Purchasers include: 1) intermediate or processing purchasers who buy the outputs of suppliers for use as inputs for further processing; and 2) final purchasers who buy the outputs of suppliers in their final form and for final use. This latter category includes purchases by non-local users (or sales to exports). The level of demand by final purchasers, and its composition, are determined outside the processing sector. Production to meet the exogenously determined final demands generates intermediate purchases and sales. Primary suppliers and final purchasers may or may not be one and the same. However, in the interindustry model, their activities are treated as if they were completely independent of one another.

In summary, the two major divisions of suppliers are the intermediate suppliers, which are called the processing sector, and the primary suppliers, which are referred to as the final payments sector. (The suppliers are conventionally shown along the left border of an interindustry table.) The two major divisions of the purchasers are

the intermediate purchasers, which are labeled as the processing sector (just as with the intermediate suppliers) and the final purchasers which are labeled final demand. (The purchasers are conventionally shown along the top of an interindustry or input-output table.) It is within this general framework that a further sector disaggregation must be accomplished.

The ideal sector delineation would allow unique recognition of industries or producer groups which provide a homogenous good or service. This ideal is very difficult to achieve because of the large amounts of time and finances required for detailed disaggregation, disclosure problems,² and lack of data. Any of these factors or a combination of them lead to a violation of the homogenous product ideal.

Sector selection, in addition to dependence upon financing, time, and data availability, is determined to a large extent by the objectives of the study. Research objectives can often be achieved without detailed disaggregation in all sectors. Since the purpose here is largely to determine the impacts of oil shale development and of sectors such as coal, uranium, agriculture, and local government, economic sectors such as trade and services do not require detailed disaggregation. The final delineation of the sectoring plans adopted for this study are shown in Appendix A. Difference in sectoring between Mesa County and the Garfield, Moffat, Rio Blanco and Routt models reflects the relatively small amount of irrigated crop production in the four-county region. A discussion of the two non-conventional accounting device sectors and how they are used follows. These sectors are the local and county taxes account and the transfer account. There is also an explanation of the profit and depreciation sectors.

The local and county government tax sector is employed as an accounting device, including all building permit fees, franchise taxes, local and county liquor license fees, charges for services, intergovernmental transfers, and fines and forfeitures. All revenues accruing to local and county government entities are shown as being paid to this account (sector). In turn the account distributes the tax monies to the appropriate agencies.

Thus, the entries in the row for the local and county government tax sector show the amounts of local taxes and other charges paid by each respective sector in the study regions. In turn, the column entries in the local tax account distribute monies for health, education, social services, roads and bridges operation and maintenance, other general government activities, and otherwise unallocated bond indenture sinking funds. (The local tax sector is combined with local govt.)

Another accounting device employed in the interindustry model is the transfer sector. This accounting device allows for two unique and distinctive characteristics that are not usually found in other regional interindustry studies. First, the assumption that transfer payments cancel in the net is dropped. Second, the model handles financial balances in such a manner as to give rise to a definition of regional income more analogous to the definition of national income. There are several reasons for this. (The reader is referred to the gross flows in Appendix B for the positioning of the transfer sector and the relative magnitudes of its row and column values.)

First, insurance premiums are divided so that a value equal to loss experiences is separated from other revenues. This value equal to loss experiences is the prorated among the various sectors in

accordance with their premium payments and directly charged into the transfer row. Thus, the loss experience is not part of the total gross output of the insurance and real estate sector. The transfer column in turn is shown as making the claim payments to the various sectors, such as construction, retail trade, health medical care services, services N.E.C., households, and imports.

Second, the State of Colorado generates revenues in the study regions that differ from the value of the state's expenditures in the region. A financial surplus is shown as an outlay by the state sector to the transfer account row. The transfer column then shows the state's financial surplus as an import from outside the study region. Similarly, the federal government may generate a surplus in the study region. The accounting for this is to have the federal government column charge the surplus to the transfer row. In turn, the transfer column charges the amount of the surplus to the imports from the world row. Thus, the federal government's financial surplus is removed from the region.

Third, transfer payments to households are handled through the transfer account.³ Taxes collected in the region are always shown as being paid to the respective government accounts, i.e., local and county tax accounts, State of Colorado, or federal government. Any inter-governmental transfer is shown as a sale by the recipient and a purchase by the grantor. In turn, the account that grants the transfer payment(s) to the household sector is shown as making a purchase from the transfer account row in the amount of the transfer payment(s). The transfer account column then makes the payment to the household account.

Fourth, financial capital finds its way into the study region by means other than local financial institutions.⁴ When interest payments are made on this outside finance, the dollars involved leave the region. To account for this, the total gross output of the regional financial institutions is increased so that all interest payments in the region can be shown as being made to the finance sector. The finance sector is then charged the transfer row with the amount of the increase and the transfer column charged the same to the imports from outside the study region.

Fifth, interest paid by local financial institutions on savings accounts and certificates of deposit is charged against the transfer account row. The transfer account column is used to distribute this interest to the profit and rents row entry.

The transfer account is used to close profits, interest, rents, and the like into the household sector. To accomplish this, the transfer account column is given a credit at the intersection with the profit sector while the same amount is charged at the intersection with the household row.

Finally, the transfer account row is used to export the region's net capital shortage, mineral research and development, and dividends paid to area residents by out-of-the-region firms. The transfer account row is used to charge these amounts to the profits row.

Where enterprise accounting is employed, the profit sector includes after-tax profits, charges to reserves for bad debts, capital loss amortization, and outlays for rents and royalties.⁵ Where government fund accounting is employed, the profit sector includes surplus of current revenues over current⁶ expenditures,⁷ the value of capital

expenditures appropriated out of current revenues, contributions to bond indenture sinking funds out of current revenues, net charges out of current revenues to any other reserve fund (e.g., contingency funds), and rent payments.

The depreciation sector includes both depreciation and net inventory depletions. Inventory depletions are, relatively speaking, insignificant and are placed with depreciation charges. Similarly, the net inventory accumulation values were incorporated in the investment sector.

With the exception of the intersection of the household row and the transfer column and the household on household cell, the household row represents wages and salaries paid subject to withholding.

QUESTIONNAIRE DESIGN AND USE

Previous experience with questionnaires employed to obtain primary information for interindustry models suggested that a questionnaire, as such, should not be used in the pursuit of the primary data. The reason behind this is that no firm accounts for expenditure and revenue patterns on an SIC basis, the language ultimately employed in an interindustry model. Rather, a firm's books are designed around process or product activities. The use of a questionnaire, either by mail or by interview, presupposes adequate translation from a firm's accounting language into SIC codes. The typical entrepreneur or manager does not ordinarily work with SIC descriptions, a rather precise and technical language.

Accordingly, a determination was made to conduct all interviews in a basic accounting language tailored to the individual firms involved

and for the researcher to make the translation to SIC classification. Thus, the questionnaire form which appears in the appendix represents the format for the final translation by the researcher. A large majority of the primary data were originally collected in field notes that described the detail behind profit and loss statements for the firms interviewed.

Not all interviews could, however, be conducted as planned. It was found, for example, that some firms would have to refer for legal advice while others did not want to reveal information in the form desired. Even though it was established that the research should not solicit primary data through the mail, it was necessary to design a questionnaire for use both as an interview focal point and as an item that could be left with an interviewed firm.

The questionnaire was designed to fit three sheets of paper. A cover sheet was used to briefly explain the nature of the research and to solicit information on the nature of the firm's product lines, the number of employees, water use, and level of capacity utilization. Outlay patterns, both of a cash flow and a non-cash flow nature, were the concern of the second sheet; information on sales distribution was solicited on the third. Both sales and outlay patterns were disaggregated according to interindustry study sector descriptions and regionalized according to (a) study region, (b) adjoining study region, and (c) activity outside the two study regions. A question on water use was included to provide information on sector-by-sector water withdrawals. The level of production capacity utilization question was used to provide general background information.

SELECTION OF THE BASE YEAR

There is no price index constructed specifically for the study regions. This effectively removes one criterion (relatively stable prices) from consideration when selecting a base year for economic studies in northwest Colorado. The 1980 base was selected for the initial survey for the following two reasons.

Interviewing for the five county interindustry study commenced in November 1981. Calendar 1980 was the most recently completed accounting cycle for most firms; it was anticipated that the information from this cycle would be, qualitatively speaking, foremost in the command of the interviewees. Also, activities of relatively new firms were automatically incorporated in the primary data base by soliciting what was then the most current information.

CONDUCT OF THE SURVEY

Interview schedules were arranged by telephone between three days and a week in advance. Every effort was made to gain an interview with the person who would have immediate authority to release information. The length of time spent on an individual interview varied from firm to firm. Several were conducted in less than an hour; some took place over several days. The survey process continued over a three-month period.

PROCESSING THE DATA

Information gathered on the outlay and sales patterns for any given enterprise was tabulated to conform to the sector delineations and regional descriptions as defined in Appendix A. Care was exercised

at this step to assure a balance between outlays and sales. Any anomalies were checked and corrected before proceeding further.

The next step was to aggregate questionnaire forms within a sector and to expand the information to represent gross flows. An iterative process was used to accomplish this so that the relative composition of a given sector delineated for the regional interindustry model would be more truly reflected.⁸ The final iteration produced gross flow patterns for the respective sectors delineated in the model.⁹ The gross flows identified in this manner provide the border totals for the initial transactions statement.

Reconciling discrepancies in any given transaction cell is to be expected; only if the research yielded perfect knowledge about outlays and sales would this be avoided. A discrepancy can emanate from one of several sources or a combination thereof. The sales or purchases of one industry to or from another industry can be misrepresented, or the total gross output value for individual sectors can be in error. In the former case other rows and columns are affected by the error. In the latter, there is an aggregate distribution error in both outlays and sales for the sector. Each discrepancy is examined individually and reconciled on a case-by-case basis. Fortunately, the sources of relatively large discrepancies could be isolated and remedied through additional examination. Small discrepancies were reconciled by using imports from and exports to the world other than the study regions as residual accounts.

DATA SOURCES BY SECTOR

Agricultural Production SIC 01,02,07

Colorado. Department of Agriculture. Colorado Crop and Livestock Reporting Service. Colorado Agricultural Statistics. Annual.

Colorado State University. Cooperative Extension Service Data. Department of Economics.

Industry survey data.

U.S. Department of Commerce. Bureau of the Census. Census of Agriculture: 1974. Volume 1, Area Reports, part 41, Colorado, Section 2, County Data. Washington, D.C.: Government Printing Office, 1972.

Colorado Agricultural Statistics reports crops on a production and market value basis. By contrast the total gross output in the inter-industry model is reported on a market receipts basis. The implication of this difference is not too critical when virtually all production is marketed; this is not the case with hay, however, a major crop in the study region. Thus, to obtain an estimate of the market receipts from hay, the ratio of hay marketings reported in the 1979 Federal Census of Agriculture to the 1979 market value of hay reported in Colorado Agricultural Statistics was applied to the latter's 1980 report.

Data on the value of marketings of livestock are not published on a county basis in Colorado. Thus, the value of the total gross output of the livestock sector in the five counties was determined from information secured from the Cooperative Extension Service. The value of output by agricultural services was estimated by using information gained in surveys conducted during 1975.

Coal Production SIC 12

Colorado. Department of Natural Resources. Division of Mines. A Summary of Mineral Industry Activities in Colorado. Part I: Coal. Annual.

Colorado. Public Utilities Commission. Files.

Hebb, D. H., and Curtin, M. S., "Colorado Coal: A Production and Shipment Directory." (U.S. Department of Interior, Bureau of Mines.) Golden, Colorado: Colorado School of Mines Mineral Economics Institute, 1977. (Photocopy reproduction.)

Industry survey data.

Data on tonnage and labor days are available in the Division of Mines publication on a mine-by-mine basis. The PUC files, the Hebb-Curtin study, and survey information provided the data used in estimating price.

Metal Mining, Oil and Natural Gas Production, and Nonmetal Mining SIC 10,13,14

Colorado. Department of Natural Resources. Division of Mines. A Summary of Mineral Industry Activities in Colorado. Part II. Metal-Nonmetal. Annual.

Colorado. Department of Natural Resources. Oil and Gas Conservation Commission. Oil and Gas Statistics. Annual.

Industry survey data.

Pederson, John A., and Rudawsky, Oded, "The Role of Minerals and Energy in the Colorado Economy." (U.S. Bureau of Mines Grant No. G-0122090.) Golden, Colorado: Department of Mineral Economics, Colorado School of Mines, 1974. (Photocopy reproduction.)

Total gross output values for metal mining, oil and natural gas production, and nonmetal mining were taken from the State of Colorado publications. Interindustry flows were estimated by using the Pederson-Rudawsky study adjusted and updated with information gained in

independent surveys and using both Nelson and Wholesale Price Indices. It should be noted that the intrasector transaction estimate (essentially operators purchasing from related services) causes the total gross output value of the sectors to be greater than the output value of minerals and fuels.

Also, the market value of stripper wells and natural gas production increased at a greater rate than did input prices from the time of the Pederson-Rudawsky study to 1980. After accounting for increased royalty values (an estimate based on the United States Government's royalty revenues) and increased input prices, there was still a considerable portion of the regional oil and gas dollar that was unaccounted for. That residual was charged to profits and the imputed federal and state corporate income taxes.

Construction SIC 15,16,17

Colorado. Department of Labor and Employment. Files.
Industry survey data.

Information gained by interviews with contractors was used to calculate a ratio between contract value and outlay for labor on a two-digit SIC level. This ratio was then applied to the annualized employment and wage data for 1980 provided by the Colorado Department of Labor and Employment to estimate total gross output.

Manufacturing SIC 20,24,25,27,28,29,32,33,34,35,38,39

Colorado. Department of Labor and Employment. Colorado Manpower Review. Monthly.

Colorado. Department of Labor and Employment. Files.
Industry survey data.

For those firms not directly surveyed in the two counties, the survey results from the nine-county study were used as a proxy. It is unlikely that this method seriously biases the results as the firms involved rely on rather standardized technology, e.g., dairy manufacturing.

Transportation and Communication SIC 40,41,42,45,47,48

Colorado. Department of Labor and Employment. Files.

Colorado. Public Utilities Commission. Files.

Colorado. State Auditor. Files.

Industry survey data.

Information pertinent to railroad and telephone communications was gained from filed PUC reports and survey. Because of the nature of the accounting systems employed by the firms involved, a significant amount of prorating was required to scale the data to approximate the two county conditions. The methods of prorating, originally developed for 1974 conditions in nine northwestern Colorado counties, were applied to reported 1980 data.

Electric and Natural Gas Utilities SIC 491,492,493

Colorado. Department of Labor and Employment. Files.

Colorado. Public Utilities Commission. Files.

Colorado. State Auditor. Files.

Industry survey data.

A certain amount of prorating and imputation was involved in this sector because of geographic location of activity. This was especially true for activities of the Public Service Company of Colorado and Western Slope Gas as their 1980 PUC reports were used extensively. Electric activities under the control of local public authorities were

identified by examining 1980 reports filed with the State Auditor. Finally, information gained from the Colorado Department of Labor and Employment and from interviews provided cross checks throughout the estimation of the activities of this sector.

Wholesale Trade SIC 50,51; also

Retail Trade SIC 52,53,54,55,56,57,58,59

Colorado. Department of Labor and Employment. Colorado Manpower Review. Monthly.

Colorado. Department of Labor and Employment. Files.

Colorado. Department of Revenue. Annual Report. Annual.

Industry survey data.

Interviews conducted for the nine-county study in northwestern Colorado with a 1974 base year were used to determine the basic outlay patterns for the trade sectors for the 1980 models. Mention is made here of the practice of "margining" the trade account sectors. Convention dictates that the trade sectors are entered in the interindustry model at the level of gross margins. The reasoning behind this is to facilitate showing the direct economic links between producers and users. In a well developed economy, the absence of margins would interject huge trade dollar turnover between producers and consumers.

Finance, Insurance, and Real Estate SIC 60,61,62,63,64, 65,66

Colorado. Department of Labor and Employment. Colorado Manpower Review. Monthly.

Colorado. Department of Labor and Employment. Files.

Colorado. Department of Regulatory Agencies. Division of Insurance. Insurance Industry in Colorado: Statistical Report. Annual.

Colorado. Department of Revenue. Annual Report.
Annual.

County Clerk Office, respective counties. Files.

Federal Credit Banks of Wichita. Files.

Federal Home Loan Bank Board. Combined Financial
Statements — Member Savings and Loan Associations
of the Federal Home Loan Bank System. Annual.

Industry survey data.

Sheshunoff & Company, Inc. The Banks of Colorado.
(A private publication.) Annual.

The output value of the finance sector was entered in the two interindustry models as the estimated value of interest charges incurred within the region. Interest earnings by commercial banks were readily identified in the Sheshunoff publication; likewise, the Federal Credit Banks of Wichita provided data relevant to the operations of the Production Credit Association and Federal Land Bank Association. Regional information on the activities of savings and loan associations is not readily available so the data published for Colorado in the Federal Home Loan Bank Board's Combined Financial Statement were prorated by a wage and salary formula for the study region. Survey data were used both as a cross check to published data and to estimate financing from outside the region, e.g., certain school bonds, Rural Electrification Association loans, insurance company loans, and so forth.

Information gained in interviews with several major insurance companies in the 1974 nine-county interindustry study suggested that a precise accounting for insurance premiums paid on per county basis was a near impossibility. Another difficulty observed was with respect to loss claims; specifically, in a small region the losses incurred by any

one economic sector cannot be predicted with any certainty. Thus, for the northwest Colorado interindustry models, the insurance sector was handled as follows.

Gross insurance premiums paid in the study region were approximated by prorating premiums paid in the State of Colorado by a personal adjusted gross income figure. Premiums paid in Colorado are reported in the State Division of Insurance's Statistical Report; personal income is reported in the Department of Revenue's Annual Report. The state loss experience ratio was then used to split gross premiums paid; the loss portion was charged to the transfer account in the interindustry models and the balance was charged as gross output of the insurance sector. Accordingly, the transfer row collects the portion of premiums paid that subsequently reimburses for losses and the transfer account column distributes the same to contractors, auto dealers, health practitioners, and so forth. (The reader is alerted to the fact that the transfer account is also used for other purposes in the model; see the section on transfer account.)

Information on documentary fees paid for real estate transactions was secured from the county clerks in the respective counties. The fee information was used to estimate the gross value of transactions, and survey information provided a means to estimate the commissions which make up the gross output of the real estate sector.

Survey information collected for 1974 in the nine counties in northwestern Colorado provided the means to make a first approximation distribution of the total gross outlays in the finance, insurance, and real estate sector. Select adjustments were then made to accommodate certain relative price changes such as for utilities, taxes, and wages.

Services SIC 70,72,73,74,75,76,78,79,81,86,89

Colorado. Department of Labor and Employment. Colorado Manpower Review. Monthly.

Colorado. Department of Labor and Employment. Files.

Colorado. Department of Revenue. Annual Report. Annual.

Industry survey data.

U.S. Department of Commerce. Bureau of the Census. Census of Selected Service Industries, 1972: Area Series, Colorado, 72-A-6. Washington, D.C.: Government Printing Office, 1974.

Sales by the hotels and other lodging facilities sector were estimated by annualizing the pertinent information reported in the Department of Revenue's Annual Report.

The ski industry was surveyed for the 1980 season and a separate sector designed accordingly.

Health SIC 80

Colorado. Department of Labor and Employment. Files.

Colorado. Department of Revenue. Annual Report. Annual.

Colorado. State Auditor. Files.

Industry survey data.

Health facilities owned by local public authorities had current financial statements on file with the State Auditor. The deliveries of services in nursing home situations were used as they appeared in the 1974 nine-county study. Other components of the health/medical care sector were increased from the estimated 1974 conditions in accordance with population increases as reported in the Department of Revenue's Annual Reports. Further adjustments were made for relative price changes. Information was not available to estimate changes in wage

rates from 1974 to 1980 for this sector so the state change in the retail trade sectors was arbitrarily used as a proxy.

Education SIC 82

Colorado. Department of Education. Files.

Colorado. Department of Education. Revenues and Expenditures: Colorado School Districts. Annual.

Industry survey data.

Information on public school districts is published on an annual basis in Revenues and Expenditures.

Water, Sewer, and Trash SIC 494,495,496,497; also

Local and County Roads; also

Local and County Government; also

Local and County Taxes

Colorado. State Auditor. Files.

Industry survey data.

The 1980 audit reports for all local and county government authorities were examined and the data contained therein were aggregated. Information gained in select interviews facilitated the distribution of the various sectors' outlays.

Households

Colorado. Department of Labor and Employment. Files.

Colorado. Department of Revenue. Annual Report.
Annual.

Colorado. Public Employees Retirement Association.
Files.

Community Services Administration. Federal Outlays in
Colorado. Annual. (Prior to fiscal 1975 published
by Office of Economic Opportunity.)

Industry survey data.

U.S. Department of Commerce. Bureau of the Census.
Census of the Population, 1970: General Social and
Economic Characteristics, Final Report, Colorado,
PC (1)-C7. Washington, D.C.: Government Printing
Office, 1972.

U.S. Department of the Treasury. Internal Revenue
Service. Statistics of Income 1969, ZIP Code Area
Data from Individual Income Tax Returns.
Washington, D.C.: Government Printing Office, 1972.

Household income in the northwest Colorado interindustry models is shown as emanating from wages and salaries subject to withholding, proprietorship, partnership, and Sub-Chapter S Corporation income, interest, rent, and dividend income, and transfer payments.

The Department of Revenue's Annual Report publishes, on a county basis, personal adjusted gross income figures.

Audit reports for the respective counties provided information on the level of payments made to households by the five counties' departments of social services. An estimate of payments by the Colorado Public Employees' Retirement Association was made based on information provided by the Association. The value of transfer payments made by the U.S. Government was approximated by the reported information in Federal Outlays. Life insurance distributions were estimated in accordance with the procedure described in the insurance section of this writing.

Payments made to the household account by the respective regional economic sectors reflect an estimate of wages paid subject to withholding. For most of the private enterprise portion of the economy, this estimate reflects the place of work data base provided by the Colorado Department of Labor and Employment files. Estimates on the earnings of agricultural, railroad, and government employees reflect the information sources peculiar to those sectors. The transfer column entry for households is a closing entry that is described in detail in the transfer account section. Essentially it is an entry that brings non-wage and salary income to the household sector.

Households were not surveyed to gain information on their outlay patterns. Rather, there was a reliance on the sales information provided by regional brochures. Accordingly, the import figures, aside from the post marginal trade sector merchandise, for households is largely a residual value.

State Government; also

Federal Government

Colorado. Department of Education. Revenues and Expenditures: Colorado School Districts. Annual.

Colorado. Department of Highways. Colorado's Annual Highway Report. Annual.

Colorado. Department of Natural Resources. Division of Wildlife. Colorado Big Game Harvest. Annual.

Colorado. Department of Natural Resources. State Board of Land Commissioners. Summary of Transactions. Annual.

Colorado. Department of Planning and Budget. Files.

Colorado. Department of Revenue. Annual Report. Annual.

Colorado. State Auditor. Files.

Colorado. Public Employees Retirement Association. Files.

Colorado. Public Utilities Commission. Files.

Community Services Administration. Federal Outlays in Colorado. Annual. (Prior to fiscal 1975 published by Office of Economic Opportunity.)

Industry survey data.

Sheshunoff & Company, Inc. The Banks of Colorado. (A private publication.) Annual.

U.S. Department of the Treasury. Bureau of Government Financial Operations. Combined Statement of Receipts, Expenditures, and Balances of the United States Government. Washington, D.C.: Government Printing Office. Annual.

U.S. Department of the Treasury. Internal Revenue Service. Statistics of Income 1969, ZIP Code Area Data from Individual Income Tax Returns. Washington, D.C.: Government Printing Office, 1972.

Total gross output for the government sectors is defined in terms of the estimate of revenues from all sources. For private enterprise

in the endogenous portion of the model, an estimate was made of income and payroll tax liabilities and fees and royalties paid by each respective sector. There is no real cross check against these estimates because neither Colorado nor the U.S. Government reports business tax liabilities on a county basis. Further, previous research experience has demonstrated that prorating the reported state level of collections (reported in the Treasury's Combined Statement of Receipts, Expenditures, and Balances and the Department of Revenue's Annual Report) by such factors as population or personal income produces questionable results.

Personal tax and fee liabilities were much more readily estimated by using such publications as the Department of Revenue's Annual Report, the Division of Wildlife's Big Game Harvest, and the IRS's ZIP Code Area Data. The exports by the State of Colorado include estimates of sales taxes.

All estimates of government revenues were annualized and put on a 1980 basis. Expenditures were likewise adjusted.

For the U.S. Government, the publication Federal Outlays was used as a first approximation of expenditures. Select interviews with the larger agencies, such as the U.S. Forest Service, Bureau of Land Management, and U.S. Postal Service, provided the information to estimate agency operating expenditure patterns. Information on direct payments for such things as schools, interest on government securities held by commercial banks, highways, and local government activities was taken from the Colorado Department of Education's Revenues and Expenditures, Sheshunoff's The Banks of Colorado, Colorado's Annual Highway Report, and files in the Colorado State Auditor's office.

State of Colorado expenditures were first approximated by information contained in regionalized budgets provided by the Department of Planning and Budget. This information was on a state planning region basis and was designed for state analysis for the fiscal 1980 budget so modification was necessary on an agency-by-agency basis. Contacts were made with the larger agencies such as the Division of Wildlife and the State Department of Highways to accommodate this requirement.

Survey information was used to estimate the investment column. The value of these investments was then set against the value of the profit and depreciation rows. Out of the net difference, the estimate of entrepreneurial income was taken and closed to households; the residual after accounting for entrepreneurial income was treated as a regional capital shortage.

Imports — Colorado; also

Exports — Colorado; also

Imports — World; also

Exports — World

Imports and exports in the northwest Colorado interindustry models were estimated by using survey information. Also, in the process of reconciling and balancing the transactions table, the entries in these rows and columns were used as the adjustment mechanism.

Labor

Colorado. Department of Labor and Employment. Colorado Manpower Review. Monthly.

Colorado. Department of Labor and Employment. Files.

Industry survey data.

U.S. Department of Commerce. Bureau of the Census.
Colorado Population Reports, 1980 Census Report,
1980 Census Results: Population, Housing, Age, Sex
and Ethnicity, Number 2, October 1981.

The labor estimates are annualized full-time equivalents of wage and salaried employees. Further, the estimates refer to work performed within the study regions. The private sector of the economy, with the exception of agriculture, was estimated by using the quarterly report information by place of work submitted to the Colorado Department of Labor and Employment.

No single source or agency seems to be able to provide an adequate estimate of annualized full-time equivalent employment in agriculture. Consequently, using Colorado State University farm and ranch survey data and wage rates published in the Colorado Agricultural Statistics, full-time employment equivalents were imputed. Employment by government agencies was estimated by using survey information.

Caution is exercised to the fact that employment levels as defined in the northwest Colorado interindustry models do not approximate employment levels as defined in some commonly distributed publications. The Colorado Manpower Review, for example, publishes county estimates on the resident adjusted labor force. Aside from the definitional difference, and the fact that employment by industry is not reported for low population counties, the current method used to estimate the resident adjusted labor force is extremely questionable. The reader is referred to the January 1977 Manpower Review for a complete discussion on this matter.

FOOTNOTES

¹The projections are consistent but the underlying assumptions in the model of fixed production coefficients qualify the results unless some dynamic adjustment of technology is explicitly involved.

²Information obtained from the Colorado Division of Employment cannot be published unless there are at least three firms in a given sector and no two firms account for more than 80 percent of the total employment. Ethical considerations also dictate that the operations of any single enterprise can never be divulged.

³At the county and state levels these transfer payments are monies distributed for social services, to unemployment compensation insurance claims and pensions. Federal government transfer payments include bonus payments under the food stamp program, direct payments to households under the social security program, such as disability, retirement, and survivor benefits, railroad retirement benefits, black lung benefits, veterans and military pensions, federal employee retirement benefits, and medicare payments.

⁴An example would be the sale of bonds in an open market by a school district.

⁵Except in the case where rents (e.g., agricultural land leases) and royalties (e.g., oil and gas) were paid to the state and federal governments. In these instances the amounts are shown as being paid directly to the respective governments.

⁶Current in the sense that it occurred in 1980.

⁷An exception to this is in the state and federal government sectors; see the explanation of the transfer section.

⁸For example: There were three two-digit SIC classifications incorporated in the sector delineation for construction. Accordingly the questionnaire forms were first aggregated on the basis of the two-digit categories. Regional payroll data (ES-202 data from the Colorado Division of Employment) were then aggregated on the same basis. The payroll values on the aggregated questionnaire forms represented a given proportion of the regional payroll in each respective SIC classification; based on this ratio the information on the aggregated two-digit level questionnaire sheets was blown up to represent the total pattern for the two-digit delineation. Subsequently, the computed totals at the two-digit level were aggregated to represent the construction sector in the interindustry model.

⁹The gross flow patterns were arrived at in either one of two ways. First there was a method that used payroll data (described in the preceding footnote) when an adequate total gross output value had not been identified. The second method distributed gross flows within the bounds of a total gross output value based on the relative allocation of the flows identified on initially aggregated questionnaire forms.

CHAPTER 3
ANALYSIS OF THE REGION'S ECONOMIES

INTRODUCTION

The results of the descriptive analysis of the economies of Mesa County and Garfield, Moffat, Rio Blanco and Routt counties are presented in this chapter. The discussion contained in the chapter includes: the transactions among sectors in the economies; an analysis of the nature and magnitude of economic interdependence among processing sectors; the various business activity and income multipliers; and an analysis of employment in the regions.

The description and analysis of the local economies hinges on three major components of the interindustry model. These are: the transactions among sectors table; the table of direct production requirements; and the table of direct plus indirect production requirements. These tables are discussed and interpreted in turn. Because of the size of the tables, they are presented in Appendix B.

THE TRANSACTIONS AMONG SECTORS TABLE

The first essential component of any interindustry study is the collection and tabulation of data which serve to describe the flows of commodities from each supplying sector to each purchasing sector. These flows are typically expressed in terms of the dollar value of transactions occurring in a specific period of time, normally one year. The information is arrayed in tabular form with the suppliers (selling

sectors) listed at the left of the table and the purchasing sectors listed at the top. The information in this table, termed the transactions among sectors table, does two things simultaneously: it identifies the estimated dollar value of sales by each sector to each of the other sectors (thus, the distribution of each sector's output), and it identifies the purchases of ingredients of production by each sector from each of the other sectors (the distribution of purchases). In essence, the material contained in the transactions table represents a double-entry system of bookkeeping in which every sale is simultaneously described as a purchase. Thus, the system deliberately double counts. The transactions among sectors tables for the two economies are found in Appendix B. A description of the sector identification labels used throughout the appendix and in the tables of this chapter is shown in Appendix A.

The rows and columns of Table B-1 for Mesa County which are numbered 1-30, identify the processing, or intermediate demand, sectors. (The household sector in row and column 32 is included in the processing sector also when the projection scenarios are developed.) Row and column 31 represent subtotals of activities within the processing sector. This portion of the table describes, in dollar terms, the flow of goods and services necessary to satisfy intermediate demands. Final demands, i.e., demands for goods and services that will not be further processed within the region, are identified in columns 32-40 and 42-43. Rows 32-35 and 37-38 identify the final payments sector. Final payments include, then, federal and state taxes, wages, profits, rents, losses, net inventory depletions, and payments for goods and services

imported from outside the region. The column numbered 41 and the row numbered 36 contains the transfer accounting device. The last row and column of Table B-1 contain, respectively, total outlay (purchases) and total output (sales) for each sector of the regional economy.

The distribution of total output of each sector, according to the sectors in which the output is sold, may be readily discerned by reading across the rows of the transactions among sectors tables in Appendix B. The bill of purchases by each sector is found by reading down any column of the tables. These column entries show the allocation of purchases by cost component.

For example, again referring to the Mesa County table, consider sector 5, coal mines. Reading across row 5 of the table shows that the total output of coal mines was distributed in the following way: \$470,459 of coal was sold to households, and \$34,369,389 was exported. The total gross output of the coal mines sector is the sum of these individual sales or \$34,839,848.

The distribution of purchases by coal mines, by cost category, is shown in column 5 of the table. Purchases by coal mines from refining were \$37,915; from loc-const, \$225,086; from stone-clay, \$340,858; from elect-mfg, \$379,832; from other-mfg, \$129,424; from transportation and communication, \$4,087,902; from electricity and natural gas utilities, \$398,847; from wat/sew/tr, \$21,383; from wholesale trade, \$39,714; from gas/auto, \$4,910; from other retail trade, \$8,320; from health-ser, \$28,840; from other services, \$56,271. Coal mining paid local property and sales taxes amounting to \$224,677. The total purchases by coal mines from the processing sector are thus estimated at \$5,983,979 for 1980. Final payments made by coal mines were estimated at \$28,855,869.

These payments were distributed as follows: wages subject to withholding, \$8,801,000; taxes and charges of the State of Colorado, \$148,872; taxes and charges of the Federal Government, \$2,783,741; profits, royalties, and rents, \$3,179,028; imports from the rest of the world, \$13,943,228. Total purchases thus amount to \$34,839,848 and, as required by the accounting format, equal the value of output.

Other information can be obtained directly from the transactions table. The household row, with the exception of the sale by households to the transfer account represents wages paid subject to withholding. This row shows household income. The leading contributors to household income in Mesa County are: other services, \$43,522,820; other retail, \$39,005,881; health services, \$36,077,556; transportation and communication, \$26,113,638; and education, \$24,051,596. Similarly, sector-by-sector contributions to taxes may be directly obtained from Table B-1. The sectors showing the greatest dollar outlay for local and county taxes in Mesa County are: households, \$12,234,780; exports to Garfield, Moffat, Rio Blanco and Routt counties, \$4,203,052; refining, \$3,776,657; state government, \$3,071,327; and other retail, \$2,845,220.

Estimates of gross regional income and gross regional product may be obtained from the final payments and final demands portion of the table. Gross regional product is defined as the sum of deliveries to final demand, net of imports. Traditionally, all local and county government activities are included as part of final demand. Because this model treats these accounts as part of the processing sector, an adjustment is required. Also, the transfer sector account is not counted in final demand, for to do so would be double counting. Gross regional income (which must equal gross regional product) is computed

as the sum of final payments excluding imports.

While these items, obtained directly from the transactions among sectors table, are useful as initial indicators of the relative importance of each sector in the regional economy, the important question of interdependence is not addressed. In order to do so, it is first necessary to isolate the direct production relationships existing in the economy.

DIRECT PRODUCTION REQUIREMENTS

The direct production requirements, or coefficients, represent the second major component of the interindustry analysis. These direct requirements are presented in Appendix B. Computation of the direct production requirements is quite simple, given the transactions table and requires only that each column entry of the transactions table be divided by the respective column total. The resulting coefficients describe the direct purchases necessary from each supplier (at the left of the table) in order for the purchasing sector (at the head of the column) to produce one dollar's worth of output. The coefficients, then, are interpreted as the direct requirements per dollar of output produced by each sector.

As an example using the Mesa County table, consider the coal mining sector, sector 5 (column 5 of the direct requirements table). For every dollar's worth of output produced by coal mines in the region, \$.001088 worth of refining products are required; \$.006461, maintenance construction; \$.009784, stone/clay; \$.010902, elect-mfg; and so on down

the column. It is obvious from the table that far and away the largest local purchases made by the coal mining sector are those for labor services, with a direct outlay of over 25 cents per each dollar of output produced. Imports from outside the region, however, account for 40 percent of coal mine spending. Each column of the direct requirements table is interpreted in this manner.

These direct requirements identify only a portion of the total economic impacts that would accompany a change in final demands for the output of a given sector. There are additional, or indirect, impacts which can be quite important. Assessment of all direct and indirect impacts of these exogenous (final demand) changes is made possible through the third analytical component of interindustry analysis. This component is the table of direct plus indirect production requirements.

DIRECT PLUS INDIRECT IMPACTS

The concept of interdependence can be fairly easily established with a brief example. Suppose that the export demand for coal production increases. There will be immediate, or direct, responses of the following type. Coal production will have to increase. In order for coal production to increase, inputs must be obtained from sectors such as transportation, utilities for power, and labor. These are direct impacts. As transportation and utilities increase their output to meet the increasing requirements in the coal sector, their own requirements for productive ingredients increase, e.g., services, labor, petroleum and natural gas, and coal. The chain of events goes on. The total impacts are readily estimated through the input-output framework and are presented in Appendix B.

Before proceeding to a discussion of the table, a few comments regarding the treatment of households are in order. Households may be treated as either a part of the processing sector of the economy or as a part of the final demand component. In the first instance, households are treated in precisely the same manner as any other production sector. The estimate of the direct and indirect production impacts of a change in final demand include the induced production impacts which derive from increased household incomes and increased consumption. In the latter, with households a component in final demand, the induced impacts of successive rounds of consumer spending are omitted. For purposes of this report, the discussion of economic interdependencies and the subsequent business and income multiplier analysis is based upon the model which includes households both as a member of the processing sector of the economy and as a final demand sector.

The direct plus indirect coefficients are interpreted as the production required or generated in all sectors of the economy in order to sustain the delivery of one dollar's worth of output to final demand by any single sector. It should be carefully noted that these coefficients reflect production generated per dollar of final demand as opposed to requirements per dollar of output. This, of course, reflects the fact that the model is driven by changes in final demand.

For purposes of interpretation, using the Mesa County table, consider the coal mining sector. Suppose that the export demand for the mining of coal increases by \$1 million. What is the estimated impact that this increase will have on the Mesa County region of the northwest Colorado economy? The answer to this question may be obtained directly by reading down column five of the table and summing the individual

sector impacts. Thus, the increase of \$1 million in the final demand for coal generates a total direct plus indirect production valued at \$800 in fruit-ag; \$900 in ir-ag; \$100 in dry-ag; \$200 in livestock ; coal, \$1,00,200; and so on down the column. Any column of this table is interpreted in this same manner. The sum of the entries in column 5 show the total production generated locally as a result of the increase in final demands for the coal mine sector. Thus, the total business activity generated per dollar increase in final demand for coal is \$1.7899 or, in our example assuming a \$1 million increase, \$1,789,900 worth of business activity results. These column sums are one of the various multiplier concepts which are derived from input-output analysis.

BUSINESS MULTIPLIERS

The column sums of the direct plus indirect requirements table are termed business activity (or production) multipliers. They identify the total value of production in the region which results from a dollar's worth of output delivered to final demand. Table 3-1 presents the business multipliers. These estimates indicate that in Mesa County, the greatest business activity generated per dollar of delivery to final demand is in the local government sector. The business multiplier for this sector is 2.92 which indicates that, as the "final" local government services increases by \$1, a total production of \$2.92 is generated in the Mesa County economy. Other sectors of the Mesa County economy which have relatively large multipliers include: other mining, 2.58; education, 2.47; fruit-ag, 2.45; and elect-mfg, 2.39. The largest multipliers in the Garfield, Moffat, Rio Blanco and Routt

Table 3-1

Business Activity Multipliers Mesa County and
Garfield, Moffat, Rio Blanco, Routt Counties,
Colorado by Sector, 1980

Mesa County Region			Four-County Region				
Business Multipliers	Type I	Type II	Business Multipliers	Type I	Type II		
1	fruit-ag	1.7972	2.4483	1	irrig-ag	1.2917	1.4979
2	irrig-ag	1.3069	1.5300	2	dry-ag	1.5218	1.7582
3	dry-ag	1.4252	1.6360	3	livestock	1.8242	2.1628
4	livestock	1.6975	2.0884	4	coal-mines	1.1480	1.6920
5	coal-mines	1.2148	1.7899	5	other-mine	1.1008	2.5328
6	other-mine	1.1029	2.5794	6	oil/g-s-pr	1.0855	1.1321
7	oil/g-s-pr	1.2115	1.4306	7	oil/g-s-ser	1.0739	1.6269
8	oil/g-s-ser	1.1534	1.8592	8	loc-const	1.1812	1.5676
9	refining	1.1256	1.2163	9	food-proc	1.4976	1.9853
10	loc-const	1.2871	1.8510	10	stone/clay	1.2224	1.5089
11	food-proc	1.2757	1.7789	11	other-mfg	1.1455	1.9221
12	stone/clay	1.1967	1.7159	12	trans/comm	1.4381	1.7398
13	fab-met	1.2054	1.8742	13	elect-gen	1.3763	1.6608
14	elect-mfg	1.1508	2.3803	14	utilities	1.5957	1.8924
15	other-mfg	1.1386	1.6549	15	wat/sew/tr	1.3034	1.9508
16	trans/comm	1.1894	1.6703	16	wholesale	1.1720	1.9039
17	elect-gen	1.2209	1.4425	17	gas/auto	1.2742	2.0515
18	utilities	1.7666	2.2537	18	food-lodge	1.4150	2.0838
19	wat/sew/tr	1.1407	1.5868	19	other-ret	1.3867	2.0979
20	wholesale	1.2455	1.9269	20	f/i/r/e	1.2519	1.5272
21	gas/auto	1.3679	2.1483	21	health-ser	1.1322	2.1622
22	food-lodge	1.3630	2.1331	22	education	1.3186	2.4834
23	other-ret	1.3586	2.2206	23	ski-tows	1.2132	1.9998
24	f/i/r/e	1.2473	1.5353	24	other-ser	1.1723	1.7939
25	health-ser	1.1360	2.2705	25	loc-roads	1.4938	2.0838
26	education	1.2003	2.4720	26	loc-gov	1.7700	2.6267
27	ski-tows	1.3314	2.0380	27	households		1.8046
28	other-ser	1.1966	1.9071				
29	loc-roads	1.2112	2.1236				
30	loc-gov	1.7823	2.9219				
31	households		1.8927				

region are: loc-gov, 2.63; other-mine, 2.53; education, 2.48; livestock, 2.16; and health-ser, 2.16. These sectors show the greatest degree of interdependence with other sectors of the regional economy. At the margin, these sectors generate the greatest business activity per dollar of output delivered to final demand. The first column of Table 3-1 shows the business multipliers with households in final demand; the second column shows the business multipliers with households endogenous (part of the processing sector).

INCOME MULTIPLIERS

Other multiplier effects can also be estimated from the inter-industry model. For example, there are income multipliers which relate to changes in income paid to the household sector. The following discussion presents what are termed the Type I and Type II income multipliers.

The Type I and Type II income multipliers are estimated ratios: Type I is the ratio of direct plus indirect income to the direct income paid households; Type II is the ratio of direct plus indirect plus induced income to direct income. Thus, while the business activity multipliers are related to changes in sales to final demand, the income multipliers are related to changes in income paid to the household sector. The Type I multiplier describes the direct plus indirect income increases emanating from an additional dollar of direct income paid to households. The Type II multiplier takes into account not only the direct plus indirect changes in income, but also the induced income increases generated by additional consumer spending. Accordingly, the Type II income multiplier identifies the direct plus indirect plus

Table 3-2

Income Multipliers Mesa County and
Garfield, Moffat, Rio Blanco, Routt Counties,
Colorado by Sector, 1980

Mesa County Region			Four-County Region				
Income Multipliers	Type I	Type II	Income Multipliers	Type I	Type II		
1	fruit-ag	2.0431	2.4493	1	irrig-ag	2.0574	2.3944
2	irrig-ag	2.0692	2.4806	2	dry-ag	3.7421	4.3551
3	dry-ag	3.9877	4.7806	3	livestock	3.7011	4.3074
4	livestock	2.8487	3.4151	4	coal-mines	1.0887	1.2671
5	coal-mines	1.2028	1.4419	5	other-mine	1.0299	1.1986
6	other-mine	1.0344	1.2400	6	oil/gs-pr	3.0535	3.5536
7	oil/gs-pr	1.8162	2.1773	7	oil/gs-ser	1.0580	1.2313
8	oil/gs-ser	1.0936	1.3111	8	loc-const	1.2249	1.4255
9	refining	2.8038	3.3612	9	food-proc	1.2723	1.4807
10	loc-const	1.2891	1.5454	10	stone/clay	1.3689	1.5931
11	food-proc	1.1996	1.4381	11	other-mfg	1.0662	1.2409
12	stone/clay	1.1807	1.4155	12	trans/comm	1.1887	1.3834
13	fab-met	1.1374	1.3636	13	elect-gen	2.6998	3.1420
14	elect-mfg	1.0607	1.2717	14	utilities	1.8036	2.0990
15	other-mfg	1.1161	1.3380	15	wat/sew/tr	1.1862	1.3805
16	trans/comm	1.2058	1.4455	16	wholesale	1.0905	1.2692
17	elect-gen	1.9065	2.2856	17	gas/auto	1.1441	1.3315
18	utilities	1.9790	2.3724	18	food-lodge	1.2568	1.4627
19	wat/sew/tr	1.1773	1.4114	19	other-ret	1.2418	1.4452
20	wholesale	1.2034	1.4427	20	f/i/r/e	1.3392	1.5586
21	gas/auto	1.2699	1.5224	21	health-ser	1.0679	1.2429
22	food-lodge	1.2712	1.5239	22	education	1.1134	1.2958
23	other-ret	1.1981	1.4363	23	ski-tows	1.0867	1.2647
24	f/i/r/e	1.3246	1.5879	24	other-ser	1.1148	1.2974
25	health-ser	1.0759	1.2898	25	loc-roads	1.5137	1.7616
26	education	1.0648	1.2764	26	loc-gov	2.6850	3.1248
27	ski-tows	1.2139	1.4552				
28	other-ser	1.1385	1.3649				
29	loc-roads	1.1153	1.3771				
30	loc-gov	2.2341	2.6783				

induced income generated by an additional dollar of income paid directly to households.

Attention is drawn to the comparatively higher income multiplier value estimates for the agriculture and livestock sectors. The reason for this relatively high value is straightforward. The northwest Colorado interindustry study allocated proprietorship and partnership net incomes to the profit account. As a result, labor inputs (household account) for agriculture and livestock, are somewhat understated because this sector is characterized by a relatively high incidence of proprietorship and partnership enterprises with relatively little hired help. By understating the value (contribution) of labor inputs for this sector, the value (contribution) of other inputs, relative to labor, become larger. And with direct income being the denominator of the Type I and Type II income multiplier ratios, the multiplier estimate for this sector is of the relatively high magnitude observed. By contrast, the relatively high multiplier values for refining, loc-gov, utilities and elect-gen exist because these sectors exhibit greater interdependence in the northwest Colorado economy.

EMPLOYMENT ANALYSIS

Direct employment requirements as is the case with direct business activity and direct income payments, are, by themselves, of limited use for assessing the impacts of various changes in economic activity. This limitation arises because direct requirements differ from total requirements, the difference being indirect requirements that emanate from sectoral interdependence. The interindustry model provides a framework within which both direct and indirect employment requirements

can be addressed. Basic to the analysis are data on employment levels in the respective sectors and the table of direct plus indirect requirements per dollar of output delivered to final demand.

The estimated employment levels and corresponding employment coefficients (expressed as the number of employees per dollar of total gross output) used in the analysis are presented in Table 3-3.

To assess the total employment impacts of exogenous changes in final demand, the respective tables of direct and indirect requirements per dollar of delivery to final demand were pre-multiplied by a diagonal matrix of direct labor use requirements (where the elements of the diagonal are the employment coefficients shown in Table 3-3). Summing down the respective columns of the resulting matrix yielded the estimates of the direct and indirect labor requirements per dollar delivered to final demand. Table 3-4 presents the estimates.

The interpretation of the entries in Table 3-4 is demonstrated by an example from the coal mining sector of Mesa County. As the final demand for the output of coal expands by \$1, there will be a direct expansion of employment in that sector as well as those sectors responsible for supplying production ingredients to the coal mining sector. The sectors supplying ingredients to the coal mining sector will in turn require production ingredients from others and this will further expand indirect employment impacts; and so forth. The magnitude of the direct, indirect and induced (Type II) employment impacts, .01996, shows the total employment generated in the entire Mesa County economy as this single sector, coal mining, increases by \$1,000, its deliveries to final demand. That is to say that an increase of \$1 million in the final demands, e.g., exports to the rest of Colorado or out of state,

Table 3-3

Total Employment and Employment
Coefficients, Mesa County and
Four-County Region, by Sector, 1980

Mesa County Region			Four-County Region				
Sector	Total Employment	Workers per Thousand Dollars Output	Sector	Total Employment	Workers per Thousand Dollars Output		
1	fruit-ag	1,808	.40000	1	irrig-ag	211	.06200
2	irrig-ag	580	.06200	2	dry-ag	207	.03200
3	dry-ag	23	.03200	3	livestock	1,760	.01600
4	livestock	636	.01100	4	coal-mines	2,318	.012620
5	coal-mines	348	.00998	5	other-mine	126	.06486
6	other-mine	525	.03488	6	oil/gs-pr	176	.00033
7	oil/gs-pr	638	.07301	7	oil/gs-ser	888	.01354
8	oil/gs-ser	875	.01562	8	loc-const	2,681	.02564
9	refining	114	.00070	9	food-proc	34	.01642
10	loc-const	2,691	.02854	10	stone/clay	75	.00396
11	food-proc	225	.01453	11	other-mfg	467	.02860
12	stone/clay	295	.01470	12	trans/comm	1,621	.00684
13	fab-met	242	.01975	13	elect-gen	511	.00268
14	elect-mfg	574	.06615	14	utilities	197	.00378
15	other-mfg	1,076	.02005	15	wat/sew/tr	25	.00326
16	trans/comm	1,408	.01136	16	wholesale	658	.02464
17	elect-gen	32	.00229	17	gas/auto	764	.02817
18	utilities	84	.00245	18	food-lodge	2,917	.06100
19	wat/sew/tr	292	.02861	19	other-ret	2,070	.03227
20	wholesale	1,507	.01996	20	f/i/r/e	1,292	.01033
21	gas/auto	903	.02430	21	health-ser	918	.03704
22	food-lodge	2,488	.06684	22	education	2,210	.07092
23	other-ret	3,504	.03415	23	ski-tows	439	.04500
24	f/i/r/e	1,284	.00866	24	other-ser	1,127	.02626
25	health-ser	2,424	.03744	25	loc-roads	499	.05165
26	education	2,401	.05677	26	loc-gov	3,139	.05396
27	ski-tows	52	.04500	27	households	266	.00054
28	other-ser	3,456	.02618	28	state-gov	183	.00620
29	loc-roads	343	.05632	29	fed-gov	566	.00500
30	loc-gov	2,548	.05850				
31	households	3,832	.00054				
32	state-gov	1,181	.02693				
33	fed-gov	1,005	.00426				

Table 3-4

Direct Plus Indirect Requirements Per
Thousand Dollars Delivered to Final Demand
and Per Added Worker Hired, Mesa County
and Four-County Region, by Sector, 1980

Mesa County			
Sector	Direct Plus Indirect Labor Requirements Per Thousand Dollars of Final Demand		Direct Plus Indirect Labor Requirement Per Added Worker Hired*
	Type I	Type II*	
1 fruit-ag	.41390	.42040	1.051
2 irrig-ag	.06906	.07128	1.150
3 dry-ag	.04157	.04367	1.365
4 livestock	.02641	.03029	2.754
5 coal-mines	.01425	.01996	2.000
6 other-mine	.03693	.05161	1.480
7 oil/gs-pr	.07896	.08114	1.111
8 oil/gs-ser	.01847	.02549	1.632
9 refining	.00396	.00486	6.946
10 loc-const	.03452	.04012	1.406
11 food-proc	.01976	.02477	1.705
12 stone/clay	.01813	.02329	1.584
13 fab-met	.02355	.03019	1.529
14 elect-mfg	.06946	.08168	1.235
15 other-mfg	.02224	.02737	1.365
16 trans/comm	.01830	.02307	2.031
17 elect-gen	.00801	.01022	4.463
18 utilities	.01279	.01763	7.196
19 wat/sew/tr	.03157	.03600	1.258
20 wholesale	.02503	.03180	1.593
21 gas/auto	.03170	.03946	1.624
22 food-lodge	.07809	.08574	1.255
23 other-ret	.04565	.05422	1.588
24 f/i/r/e	.01168	.01454	1.679
25 health-ser	.04077	.05205	1.390
26 education	.05996	.07260	1.279
27 ski-tows	.05017	.05720	1.271
28 other-ser	.03056	.03762	1.437
29 loc-roads	.06051	.06958	1.235
30 loc-gov	.09075	.10210	1.745
31 households		.01881	

*These employment multipliers include direct, indirect, and induced labor requirements.

Table 3-4
(Continued)

Four-County Region			
Sector	Direct Plus Indirect Labor Requirements Per Thousand Dollars of Final Demand		Direct Plus Indirect Labor Requirement Per Added Worker Hired*
	Type I	Type II*	
1 irrig-ag	.06862	.07050	1.137
2 dry-ag	.04441	.04657	1.455
3 livestock	.03430	.03739	2.337
4 coal-mines	.01512	.03008	1.591
5 other-mine	.06690	.07998	.1233
6 oil/gs-pr	.00233	.00276	8.364
7 oil/gs-ser	.01509	.02014	1.487
8 loc-const	.02922	.03275	1.286
9 food-proc	.03236	.03681	2.242
10 stone/clay	.00747	.01009	2.548
11 other-mfg	.03106	.03816	1.334
12 trans/comm	.00937	.01212	1.772
13 elect-gen	.01075	.01335	4.981
14 utilities	.00929	.01200	3.175
15 wat/sew/tr	.00818	.01409	4.322
16 wholesale	.02779	.03448	1.399
17 gas/auto	.03306	.04016	1.426
18 food-lodge	.06836	.07447	1.221
19 other-ret	.04053	.04703	1.457
20 f/i/r/e	.01389	.01640	1.588
21 health-ser	.04005	.04945	1.335
22 education	.07731	.08794	1.240
23 ski-tows	.04910	.05628	1.251
24 other-ser	.03001	.03569	1.359
25 loc-roads	.06524	.07063	1.367
26 loc-gov	.09128	.09911	1.837
27 households		.01648	

*These employment multipliers include direct, indirect, and induced labor requirements.

for coal would result in an estimated additional employment of 20 persons in the Mesa County region. All remaining entries in Table 3-4 have analogous interpretations for their respective sectors. Thus, the leading sectors in terms of direct and indirect employment generation in the Mesa County economy are fruit-ag, local government, food-lodge, elect-mfg, and oil/gs-pr. In the Garfield, Moffat, Rio Blanco and Routt County region the highest employment multipliers are local government, education, other mines, food and lodging, and local roads. Table 3-4 also shows the total employment impact of exogenous changes in workers hired. This information is found simply by dividing the direct plus indirect labor requirements per thousand dollars of final demand (in Table 3-4) by the workers per thousand dollars of final demand shown in Table 3-3. The workers added per worker hired column for Mesa County shows that for each worker hired by coal mines, an additional worker is hired throughout the region's economy. Thus the multiplier for exogenous changes in coal mine employment is 2.0.

CHAPTER 4
REGIONAL WATER REQUIREMENTS

INTRODUCTION

The previous chapter presented what may be appropriately called the results of traditional applications of the Leontief interindustry model. In addition to the descriptive analysis and the attendant development of various multipliers, application of the model can be extended to other questions. The I-0 technique, because of the detailed analysis of interdependence among economic sectors, is readily adaptable to an examination of resource use associated with economic activity in the region. This chapter is concerned with an analysis of water withdrawal and consumptive use in the northwest Colorado regional economies. Other resource impacts, e.g., water and air quality impacts, land use, and growth of various types of energy consumption, could also be studied, providing adequate data are available.

WATER USE ANALYSIS

The water use analysis requires data pertaining to water withdrawals and consumptive use on a sector-by-sector basis. It is further required that these data be related to economic activity on a per dollar basis. These data, particularly for consumptive use, are difficult to obtain on a sector-by-sector basis and for a rather small regional economy.

Water use by commercial establishments is very small relative to agriculture, the extractive industries, electricity generation, and manufacturing. Little detailed information is available from secondary sources for the commercial sectors and, thus most coefficients are based upon results from our survey and past surveys and Water Resources Council¹ estimates. The Water Resources Council Report provides no detail among commercial establishments. WRC data also were at variance with other data in the agricultural and manufacturing sectors. The primary data source for the agricultural sector was the Census of Agriculture.² The withdrawal rate per dollar of output estimated from Census data was almost twice the size of the rate estimated from Water Resources Council data. Because of the indirect procedure required to convert the secondary data to a useful form for the input-output analysis, the exact source of the discrepancy is not easily traced. Water use estimates for the extractive sectors are based mainly upon the Census of Mineral Industries.³ Unfortunately, disclosure problems limit the available data to rather large regions in some cases. Withdrawal and consumptive use figures vary considerably among regions and their accuracy for a relatively small region is questionable. Water use in manufacturing is taken from the Census of Manufacturers.⁴ In a few cases, disclosure prevents the use of regional water data. However, the magnitude of the error involved in the computation of the weighted average manufacturing water use coefficients for the region is probably small.

Estimates of withdrawal and consumptive use by sector are shown in Table 4-1. While more than one data source is available, only the best estimates are shown. In most cases, the larger numbers are derived

Table 4-1

Withdrawal and Consumptive Use Requirements
by Sector, Mesa County and Four-County Region
(in gallons per dollar of output)

Mesa County			Four-County Region				
Sector	With- drawal	Consumptive Use	Sector	With- drawal	Consumptive Use		
1	fruit-ag	2,409	383	1	irrig-ag	18,040	5,390
2	irrig-ag	18,040	5,390	2	dry-ag	0	0
3	dry-ag	0	0	3	livestock	30	30
4	livestock	3.0	30	4	coal-mines	15.5	1.6
5	coal-mines	15.5	1.6	5	other-mine	940	94
6	other-mine	940	94	6	oil/gs-pr	47.1	4.7
7	oil/gs-pr	47.1	4.7	7	oil/gs-ser	77.6	7.8
8	oil/gs-ser	77.6	7.8	8	loc-const	4.0	.4
9	refining	52.6	5.1	9	food-proc	6.0	.4
10	loc-const	4.0	0.4	10	stone/clay	394.2	70.8
11	food-proc	6.0	0.4	11	other-mfg	15.5	4.0
12	stone/clay	394.2	70.8	12	trans-comm	2.1	0.1
13	fab-met	1.6	0.2	13	elect-gen	267	13.6
14	elect-mfg	2.0	0.4	14	utilities	0	0
15	other-mfg	15.5	4.0	15	wat/sew/tr	0	0
16	trans/comm	2.1	0.1	16	wholesale	2.3	0.6
17	elect-gen	267.0	13.6	17	gas/auto	2.3	0.2
18	utilities	0	0	18	food-lodge	7.0	2.1
19	wat/sew/tr	0	0	19	other-ret	3.9	0.6
20	wholesale	2.3	0.6	20	f/i/r/e	4.9	1.2
21	gas/auto	2.3	0.2	21	health-ser	5.1	1.3
22	food-lodge	7.0	2.1	22	education	1.5	0.4
23	other-ret	3.9	0.6	23	ski-tows	5.6	0.3
24	f/i/r/e	4.9	1.2	24	other-ser	3.5	0.9
25	health-ser	5.1	1.3	25	loc-roads	0	0
26	education	1.5	0.4	26	loc-gov	0	0
27	ski-tows	5.6	0.3				
28	other-ser	3.5	0.9				
29	loc-roads	0	0				
30	loc-gov	0	0				

Sources: Water Resources Council, Census of Water Use in Manufacturing, Census of Mineral Industries, Census of Agriculture.

from the source which is considered to be more authoritative for the region. In each sector we have used the largest figure (shown in Table 4-1) for the water analysis which follows.

Table 4-2 presents the estimated withdrawals and consumptive use for each of the processing sectors of the regional economy in millions of gallons. Irrigated agriculture accounts for about 75 percent of withdrawals and over 85 percent of consumptive use in the processing sectors of Mesa County. In Garfield, Moffat, Rio Blanco and Routt counties irrigated agriculture uses 38 percent of withdrawal and 62 percent of consumptive use. Electric generation makes up 31.6 percent of withdrawal and 8.8 percent of consumptive use in the four-county region.

It should be noted that the estimates presented in Tables 4-1 and 4-2 do not include water use in the final demand/final payments sector. In order to assess total water use, it is necessary to have some indication of requirements in the final demand sectors, e.g., households and governments. Aggregated data generally show depletions for irrigation as a separate category of water use and a second category consisting of municipal and industrial and domestic water use. Since industrial, commercial, mining, and agricultural water use has been estimated above, the final demand use of water could be computed as a residual if estimates of total withdrawal and total consumption were available.

Estimates of total withdrawal and total consumptive use of water are useful from a purely descriptive point of view. However, the model allows also the analysis of direct and indirect water use which parallels the previous discussion of direct and indirect production. The

Table 4-2

Total Water Use by Sector,
Mesa County and Four-County Region, 1980
(in millions of gallons)

Mesa County		
Sector	Withdrawal	Consumptive Use
1 fruit-ag	10,890	1,731
2 irrig-ag	168,800	50,450
3 dry-ag	0	0
4 livestock	1,734	1,734
5 coal-mines	540	55.74
6 other-mine	14,150	1,415
7 oil/gs-pr	411.7	41.1
8 oil/gs-ser	4,348	437.1
9 refining	8,526	826.7
10 loc-const	377.2	37.72
11 food-proc	92.94	6.2
12 stone/clay	7,909	1,421
13 fab-met	19.6	2.45
14 elect-mfg	17.34	3.47
15 other-mfg	831.6	214.6
16 trans/comm	260.3	12.4
17 elect-gen	3,744	190.7
18 utilities	0	0
19 wat/sew/tr	0	0
20 wholesale	173.6	45.3
21 gas/auto	85.5	7.43
22 food-lodge	254.8	76.5
23 other-ret	400.2	61.6
24 f/i/r/e	726.3	17.8
25 health-ser	330.2	84.2
26 education	57.2	15.3
27 ski-tows	6.4	0.34
28 other-ser	462	118.8
29 loc-roads	0	0
30 loc-gov	0	0
Total Processing Use	225,147.88	59,006.45

Table 4-2
(Continued)

Garfield, Moffat, Rio Blanco and Routt Counties

<u>Sector</u>	<u>Withdrawal</u>	<u>Consumptive Use</u>
1 irrig-ag	61,490	18,380
2 dry-ag	0	0
3 livestock	3,300	3,300
4 coal-mines	2,848	293.9
5 other-mine	1,823	182.3
6 oil/gs-pr	25,130	2,507
7 oil/gs-ser	5,090	511.6
8 loc-const	418.2	41.8
9 food-proc	12.6	0.8
10 stone/clay	7,481	1,344
11 other-mfg	253.1	65.3
12 trans/comm	497.8	23.7
13 elect-gen	50,920	2,594
14 utilities	0	0
15 wat/sew/tr	0	0
16 wholesale	61.5	16.0
17 gas/auto	62.4	5.4
18 food-lodge	334.7	100.4
19 other-ret	250.2	38.5
20 f/i/r/e	612.6	150.0
21 health-ser	126.4	32.2
22 education	46.7	12.5
23 ski-tows	54.6	2.9
24 other-ser	150.2	38.6
25 loc-roads	0	0
26 loc-gov	0	0
Total Processing Use	160,963.0	29,640.9

purpose of such analysis is to isolate the effect of economic interdependence on water requirements. The specific question to be addressed is that of determining the likely impact of expanding final demand in any or all processing sectors on the regional water requirements. The key element in the assessment is the derivation of the direct plus indirect water requirements per dollar of output delivered to final demand.

The calculation of water multipliers is not difficult once the direct water requirements and the table of direct plus indirect production requirements have been obtained. The matrix of direct and indirect production coefficients is premultiplied by a diagonal matrix consisting of the direct water requirements along the diagonal and zeros elsewhere. The columns of the resulting matrix are summed in order to obtain the direct plus indirect water requirements per dollar of output delivered to final demand by each sector. These requirements for the two northwest Colorado economies are shown in Table 4-3. The importance of considering indirect as well as direct water requirements in the planning perspective can be readily seen by comparing Table 4-1 and Table 4-3. Consider, for example the direct withdrawal and consumptive use requirements for coal mines in Mesa County in Table 4-1. The direct requirements are 15.5 and 1.6 gallons for each dollar of output. However, as the final demand for the output of the coal sector expands by one dollar, there is a total direct plus indirect water requirement of 42.8 gallons (withdrawal) and 8.1 gallons (consumptive) generated throughout the economy. The indirect impacts, because of the significant interdependencies within and between coal and other sectors, are far more important than the direct requirements. Applying

Table 4-3

Direct Plus Indirect Water Requirements
 Mesa County and Four-County Region, 1980
 (in gallons per dollar of output
 delivered to final demand)

Mesa County			Four-County Region		
Sector	With- drawal*	Consumptive Use*	Sector	With- drawal*	Consumptive Use*
1 fruit-ag	2,581	415.8	1 irrig-ag	18,040	5,392
2 irrig-ag	18,050	5,393	2 dry-ag	28.8	8.1
3 dry-ag	28.8	7.9	3 livestock	467.5	161.3
4 livestock	942.5	300.6	4 coal-mines	29.1	4.6
5 coal-mines	42.8	8.1	5 other-mine	968.1	101.0
6 other-mine	996.4	108.6	6 oil/gs-pr	51.0	5.2
7 oil/gs-pr	59.9	7.8	7 oil/gs-ser	91.2	11.2
8 oil/gs-ser	111.1	16.4	8 loc-const	22.8	5.0
9 refining	57.7	6.2	9 food-proc	2569.0	767.4
10 loc-const	51.9	12.7	10 stone/clay	438.8	79.3
11 food-proc	102.0	29.1	11 other-mfg	32.5	8.0
12 stone/clay	428.5	78.4	12 trans/comm	26.4	3.6
13 fab-met	29.2	7.2	13 elect-gen	277.6	15.6
14 elect-mfg	49.8	12.7	14 utilities	77.5	5.4
15 other-mfg	37.8	9.6	15 wat/sew/tr	21.6	5.1
16 trans/comm	24.8	5.7	16 wholesale	25.1	6.5
17 elect-gen	277.1	16.1	17 gas/auto	20.1	4.4
18 utilities	100.6	9.3	18 food-lodge	88.0	24.0
19 wat/sew/tr	27.4	7.0	19 other-ret	239.3	69.5
20 wholesale	35.4	8.9	20 f/i/r/e	13.1	3.2
21 gas/auto	35.1	8.4	21 health-ser	26.3	6.6
22 food-lodge	105.5	28.9	22 education	32.4	8.0
23 other-ret	464.2	133.5	23 ski-tows	24.8	4.5
24 f/i/r/e	17.6	4.5	24 other-ser	23.4	6.1
25 health-ser	49.6	12.8	25 loc-roads	32.3	8.5
26 education	54.6	14.0	26 loc-gov	25.5	6.4
27 ski-tows	43.4	9.7	27 households	32.5	8.5
28 other-ser	37.5	9.7			
29 loc-roads	50.8	11.9			
30 loc-gov	54.2	13.3			
31 households	68.7	18.2			

*Type II multipliers.

only the direct water requirements to assumed increases in deliveries to final demand can obviously result in an understatement of water use.

FOOTNOTES

¹The Nation's Water Resources, 1975-2000, Vol. 3: Analytical Data Appendix II, Annual Water Supply and Use Analysis, Table II-4, Annual Water Requirements for Offstream Uses, Base Conditions, No/So Platte Region, Subregion 1007, Dec. 1978; and as above, Analytical Data Appendix I, Social, Economic, and Environmental Data, and Table I-2, Earnings by Major Sectors, No/So Platte Region, Subregion 1007, Dec. 1978, Second National Water Assessment by the U.S. Water Resources Council.

²1974 Census of Agriculture, Vol. I, part 50, Wyoming, State and County Data, U.S. Dept. of Commerce, Bureau of the Census, Table 3, p. IV-8; Table 13, p. IV-12; Table 3, p. IV-26, Table 13, p. IV-30, Table 3, p. IV-116; Table 13, p. IV-120.

³1972 Census of Mineral Industries, Subject Series, Water Use in Mineral Industries, MIC72(1)-2, Sept. 1975, Table 2B, Gross Water Used and Water Intake, By Source and Kind, for Geographic Areas and Major Industry Groups; and as above, Table 2C, Gross Water Used and Water Intake, By Source and Kind, for Water Use Regions and Major Industry Groups; and as above, Table 1C, Selected Water Use Statistics for Water Use Regions: 1972; Sept. 1975.

⁴1972 Census of Manufacturers, Water Use in Manufacturing, Special Report Series, Sept. 1975, Table 2C, Gross Water Used and Water Intake, By Source and Kind, for Water Use Regions and Major Industry Groups: 1973; and as above, Table 5C, Gross Water Used Including Recirculated, Total Water Intake, and Treated and Untreated Water Discharged, By Point of Discharge, for Water Use Regions and Major Industry Groups: 1973.

APPENDICES

- APPENDIX A — SECTOR IDENTIFICATION, MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND RUTT COUNTIES MODEL
- APPENDIX B — INPUT-OUTPUT TABLES FOR MESA COUNTY AND GARFIELD, MOFFAT, RIO BLANCO, AND RUTT COUNTIES MODEL
- B-1 MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND RUTT COUNTIES MODEL, TRANSACTIONS AMONG SECTORS, 1980
 - B-2 MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND RUTT COUNTIES MODEL, DIRECT REQUIREMENTS PER DOLLAR OF OUTPUT, 1980
 - B-3 MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND RUTT COUNTIES MODEL, DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR OF OUTPUT DELIVERED TO FINAL DEMAND, 1980
(Households in Processing Sector)
 - B-4 MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND RUTT COUNTIES MODEL, DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR OF OUTPUT DELIVERED TO FINAL DEMAND, 1980
(Households in Final Demand)
- APPENDIX C — SURVEY FORMS USED FOR THE NORTHWEST COLORADO INTERINDUSTRY STUDIES
- APPENDIX D — CRITIQUE OF DATA SOURCES

APPENDIX A
SECTOR IDENTIFICATION

APPENDIX A
SECTOR IDENTIFICATION FOR MESA COUNTY, COLORADO

Sector	1972 SIC Codes
Fruit-Ag	017
Irrig-Ag	01 (part)
Dry-Ag	01 (part)
Livestock	02
Coal-Mines	1111, 1112
Other-Mine	10, 14 (excluding 142 and 144)
Oil/Gas-Pr	131, 132
Oil/Gas-Ser	138, 1112, 1213, 108, 148
Refining	28, 29 (excludes combined shale upgrading)
Loc-Const	15, 16, 17
Food-Proc	20
Stone/Clay	32
Fab-Met	34
Elect-Mfg	36, 37
Other-Mfg	21-27, 30, 31, 33, 35, 39
Trans/Comm	40-48, 491 (part) (includes Post Office and electrical transmission)
Elect-Gen	491 (excludes transmission and distribution)

APPENDIX A
SECTOR IDENTIFICATION FOR MESA COUNTY, COLORADO

Sector	1972 SIC Codes
Utilities	491 (distribution only), 492 (excludes generation and transmission)
Water/Sewer/Tr	493-497
Wholesale	50-51
Gas/Auto	55
Food-Lodge	58, 70
Other-Ret	52-54, 56, 57, 59
F/I/R/E	60-62, 63-64, 65-67
Health-Ser	80
Education	82
Ski-Tows	79 (part)
Other-Ser	72-76, 78, 79 (except Ski), 81, 82, 84, 86, 89
Loc-Roads	91-96
Loc-Gov	83, 91-96
Households	
State-Gov	91-97
Fed-Gov	91-97

APPENDIX A
 SECTOR IDENTIFICATION FOR GARFIELD, MOFFAT,
 RIO BLANCO AND ROUTT COUNTIES, COLORADO

Sector	1972 SIC Codes
Irrig-Ag	01 (part)
Dry-Ag	01 (part)
Livestock	02
Coal-Mines	1111, 1112
Other-Mine	10, 14 (excluding 142 and 144)
Oil/Gas-Pr	131, 132
Oil/Gas-Ser	138, 1112, 1213, 108, 148
Loc-Const	15, 16, 17
Food-Proc	20
Stone/Clay	32
Other-Mfg	21-27, 30-39
Trans/Comm	40-48, 491 (part) (includes Post Office and electrical transmission)
Elect-Gen	491 (excludes transmission and distribution)
Utilities	491 (distribution only), 492 (excludes generation and transmission)
Water/Sewer/Tr	493-497
Wholesale	50-51

APPENDIX A
 SECTOR IDENTIFICATION FOR GARFIELD, MOFFAT,
 RIO BLANCO AND ROUTT COUNTIES, COLORADO

Sector	1972 SIC Codes
Gas/Auto	55
Food-Lodge	58, 70
Other-Ret	52-54, 56, 57, 59
F/I/R/E	60-62, 63-64, 65-67
Health-Ser	80
Education	82
Ski-Tows	79 (part)
Other-Ser	72-76, 78, 79 (except Ski), 81, 82, 84, 86, 89
Loc-Roads	91-96
Loc-Gov	91-96
Households	
State-Gov	91-97
Fed-Gov	91-97

APPENDIX B

INPUT-OUTPUT TABLES FOR MESA COUNTY AND GARFIELD, MOFFAT,
RIO BLANCO, AND ROUTT COUNTIES MODEL

B-1

MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND
ROUTT COUNTIES MODEL, TRANSACTIONS AMONG SECTORS, 1980

B-2

MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND
ROUTT COUNTIES MODEL, DIRECT REQUIREMENTS PER DOLLAR OF OUTPUT, 1980

B-3

MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND
ROUTT COUNTIES MODEL, DIRECT AND INDIRECT REQUIREMENTS PER
DOLLAR OF OUTPUT DELIVERED TO FINAL DEMAND, 1980
(Households in Processing Sector)

B-4

MESA COUNTY MODEL AND GARFIELD, MOFFAT, RIO BLANCO, AND
ROUTT COUNTIES MODEL, DIRECT AND INDIRECT REQUIREMENTS PER
DOLLAR OF OUTPUT DELIVERED TO FINAL DEMAND, 1980
(Households in Final Demand)

Table B-1
Mesa County
Mesa County Model and Garfield, Moffat, Rio Blanco, and
Routt Counties Model, Transactions Among Sectors, 1980

TRANSACTIONS AMONG SECTORS (purchases by sectors shown at top from sectors shown at left...last rows are resource inputs)										
	1	2	3	4	5	6	7	8	9	10
	fruit-ag	irrig-ag	dry-ag	livestock	coal-mines	other-mine	oil/gs-pr	oil/gs-ser	refining	loc-const
	DOLLARS									
1	fruit-ag	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	irrig-ag	0.	0.	571.	2729169.	0.	0.	0.	0.	0.
3	dry-ag	0.	355336.	23982.	0.	0.	0.	0.	0.	0.
4	livestock	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	coal-mines	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	oil/gs-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	oil/gs-ser	0.	0.	0.	0.	167041.	23784.	1004344.	15885.	678650.
9	refining	0.	28639.	3789.	37915.	56975.	4359.	173704.	1864015.	2140427.
10	loc-const	0.	18702.	3426.	225086.	28280.	932672.	0.	0.	0.
11	food-proc	0.	0.	0.	0.	0.	0.	236614.	0.	1640672.
12	stone/clay	1601810.	0.	0.	0.	11762.	0.	0.	0.	0.
13	fab-met	0.	0.	0.	0.	0.	0.	0.	2674457.	0.
14	elect-mfg	0.	0.	0.	379832.	0.	0.	0.	0.	0.
15	other-mfg	0.	65106.	3997.	129424.	48376.	0.	11207.	16533.	160293.
16	trans/comm	490350.	28053.	3426.	4087902.	186340.	87644.	459475.	4895067.	716614.
17	elect-gen	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	utilities	32690.	46755.	5139.	1498556.	104890.	66473.	95257.	1060000.	226302.
19	wat/sew/tr	37360.	187020.	19524.	21383.	5460.	1330.	16810.	0.	235727.
20	wholesale	46370.	411337.	19524.	1471619.	29228.	68179.	696506.	306501.	3256372.
21	gas/auto	0.	3709.	490.	348902.	7379.	562.	0.	0.	87890.
22	food-lodge	0.	0.	0.	0.	361.	0.	279654.	0.	204607.
23	other-ret	0.	14592.	4721.	5205824.	11701.	4775.	487177.	628.	3824303.
24	f/i/r/e	448320.	635869.	102780.	12411972.	84490.	0.	1965980.	48626.	5930960.
25	health-ser	0.	0.	0.	0.	28840.	0.	33620.	0.	0.
26	education	0.	0.	0.	0.	0.	0.	0.	0.	0.
27	ski-tows	0.	0.	0.	0.	0.	0.	0.	0.	0.
28	other-ser	93400.	187020.	23411.	1834535.	0.	12573.	1412046.	113462.	1923558.
29	loc-roads	0.	0.	0.	0.	0.	0.	0.	0.	0.
30	loc-gov	154110.	196371.	31405.	1959366.	224677.	160366.	67240.	3776657.	301736.
31	subtotals	2904410.	2180511.	226161.	30584665.	5983979.	1722077.	6939634.	14771831.	21328111.
32	households	761210.	533007.	19985.	4190335.	8801000.	557283.	19107442.	2769584.	21791704.
33	state-gov	18680.	140265.	4568.	373324.	148872.	301935.	560336.	534891.	1244652.
34	fed-gov	46700.	850942.	19985.	1849394.	2783741.	1188091.	2179705.	5186826.	4035693.
35	profits	593090.	3890023.	211270.	3179028.	524912.	4157376.	16367401.	17359657.	10475833.
36	transfers	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	4-cty-imp	0.	0.	0.	0.	3221.	215145.	0.	86960375.	113143.
38	other-imp	196470.	1765264.	233531.	20775855.	982341.	959319.	10879036.	34505130.	35303640.
39	totals	4520560.	9366012.	715500.	5779573.	34839848.	15058005.	8741846.	56033555.	162088294.

1 EMPLOYMENT 0.1808E 04 0.5803E 03 0.2290E 02 0.6357E 03 0.3477E 03 0.5252E 03 0.6382E 03 0.8752E 03 0.1135E 03 0.2691E 04
 2 WITHDRAWAL 0.1089E 11 0.1688E 12 0. 0.1734E 10 0.5400E 09 0.1415E 11 0.4117E 09 0.4348E 10 0.8525E 10 0.3772E 09
 3 CONSUMP. 0.1731E 10 0.5045E 11 0. 0.1734E 10 0.5574E 08 0.1415E 10 0.4109E 08 0.4371E 09 0.8267E 09 0.3772E 08

Table B-1
(Continued)
Mesa County

TRANSACTIONS AMONG SECTORS (purchases by sectors shown at top from sectors shown at left...last rows are resource inputs)		11	12	13	14	15	16	17	18	19	20	
		DOLLARS										
		food-proc	stone/clay	fab-met	elect-mfg	other-mfg	trans-comm	elect-sen	utilities	wat/sew/tr	wholesale	
1	fruit-ag	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2	irrig-ag	21770.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
3	dry-ag	335408.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
4	livestock	782618.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
5	coal-mines	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
6	other-mines	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
7	oil/gas-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
8	oil/gas-ser	0.	0.	0.	0.	0.	4582261.	0.	0.	0.	0.	
9	refining	139497.	66400.	7995.	15918.	182698.	262458.	0.	40836.	11211.	165093.	
10	loc-const	298555.	119847.	568416.	22380.	0.	252834.	0.	20000.	0.	161160.	
11	food-proc	171047.	1033.	0.	0.	0.	1169478.	0.	0.	0.	328075.	
12	stone/clay	0.	582878.	0.	0.	0.	0.	0.	0.	0.	656150.	
13	fab-met	4666.	9298.	0.	42193.	0.	0.	0.	0.	0.	344482.	
14	elect-mfg	0.	0.	0.	11924.	0.	12000.	0.	0.	19008.	328075.	
15	other-mfg	15550.	725920.	18947.	57235.	28981.	111649.	0.	1600.	0.	656155.	
16	trans-comm	206811.	319754.	624626.	201607.	1123315.	1610826.	1783436.	9911260.	51233.	4915380.	
17	elect-sen	0.	0.	0.	0.	0.	0.	0.	10151630.	0.	0.	
18	utilities	99498.	421563.	132277.	157947.	857585.	527926.	0.	235879.	0.	483480.	
19	wat/sew/tr	3110.	207831.	6972.	7240.	55581.	29076.	0.	800.	800.	40290.	
20	wholesale	151703.	201390.	20655.	19870.	883936.	678782.	42005.	47013.	72211.	3038341.	
21	gas/auto	18092.	8599.	1035.	2061.	23661.	32744.	0.	5288.	1452.	23971.	
22	food-lodge	57361.	17168.	0.	8625.	34961.	2847.	0.	6871.	0.	58284.	
23	other-ret	55203.	6479.	523.	10037.	151905.	413702.	20192.	5619.	203143.	357446.	
24	f/i/r/e	522471.	210915.	366881.	97226.	1411376.	1338234.	0.	8000.	78251.	1168410.	
25	health-ser	0.	0.	0.	55034.	0.	4386.	0.	0.	0.	0.	
26	education	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
27	ski-tows	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
28	other-ser	97963.	97681.	202609.	162350.	784220.	4430756.	104.	148000.	345403.	1248990.	
29	loc-roads	0.	4084.	0.	0.	0.	0.	0.	0.	0.	0.	
30	loc-gov	51328.	77723.	22090.	97226.	109666.	2454256.	503109.	906584.	24393.	725220.	
31	subtotals	3032851.	3078563.	1972976.	968873.	5647885.	17914225.	2348846.	21253501.	1042984.	14719002.	
32	households	3433381.	4662090.	3802247.	5310737.	13112603.	26113638.	860856.	4435346.	2042585.	22586283.	
33	state-gov	51300.	343705.	36660.	111223.	114771.	2398479.	49224.	449680.	30440.	7211910.	
34	fed-gov	500701.	607738.	321478.	648033.	803055.	5618912.	149839.	470407.	103444.	5318280.	
35	profits	1433685.	3663745.	1450509.	1533591.	4336373.	18580457.	3100867.	4372148.	4735630.	13376280.	
36	transfers	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
37	4-cty-imp	284560.	0.	0.	0.	0.	8337727.	0.	0.	0.	282030.	
38	other-imp	6753255.	7707944.	4655235.	99417.	29634614.	44969397.	7512038.	3121869.	2246794.	12003860.	
39	totals	15489733.	20063785.	12239105.	8671874.	53649301.	123932835.	14021670.	34102951.	10201877.	75497645.	
1	EMPLOYMENT	0.2251E 03	0.2949E 03	0.2417E 03	0.5736E 03	0.1076E 04	0.1408E 04	0.3211E 02	0.8355E 02	0.2919E 03	0.1507E 04	
2	WITHDRAWAL	0.9294E 08	0.7909E 10	0.1958E 08	0.1734E 08	0.8316E 09	0.2603E 09	0.3744E 10	0.	0.	0.1736E 09	
3	CONSUMP.	0.6196E 07	0.1421E 10	0.2448E 07	0.3469E 07	0.2146E 09	0.1239E 08	0.1907E 09	0.	0.	0.4530E 08	

Table B-1
(Continued)
Mesa County

TRANSACTIONS AMONG SECTORS (purchases by sectors shown at top from sectors shown at left...last rows are resource inputs)		DOLLARS									
	21	22	23	24	25	26	27	28	29	30	
	gas/auto	food-lodge	other-ret	f/i/r/e	health-ser	education	ski-tows	other-ser	loc-roads	loc-gov	
1	fruit-as	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	irrig-as	89769.	850006.	0.	0.	0.	0.	0.	0.	0.	0.
3	dry-as	110891.	2279033.	0.	0.	0.	0.	0.	0.	0.	0.
4	livestock	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	coal-mines	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	oil/95-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	oil/95-ser	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	refining	156334.	53134.	75410.	8909.	95503.	22877.	451601.	0.	162355.	
10	loc-const	394157.	451071.	129748.	88151.	46693.	7500.	409347.	198187.	3527755.	
11	food-proc	0.	3409780.	18372.	0.	0.	4000.	219991.	0.	77361.	
12	stone/clay	0.	34698.	0.	0.	0.	0.	105638.	221143.	201529.	
13	fab-met	16423.	0.	0.	0.	0.	0.	0.	0.	64206.	
14	elect-mfg	0.	34698.	0.	0.	3595.	0.	0.	0.	502288.	
15	other-mfg	492696.	781514.	808134.	213678.	0.	0.	1241243.	4354.	66674.	
16	trans/comm	2036477.	1811212.	1321913.	1086085.	1457851.	9175.	1835454.	9687.	434372.	
17	elect-gen	0.	0.	0.	0.	0.	0.	0.	0.	0.	
18	utilities	689774.	825512.	394290.	77397.	1091301.	36149.	1920321.	52712.	937222.	
19	wat/sew/tr	49270.	649502.	277582.	89667.	163876.	0.	224480.	1902.	15789.	
20	wholesale	6437.	80301.	25185.	272995.	366945.	6691.	1477486.	267198.	144564.	
21	gas/auto	3243402.	20247.	6881.	1154.	9766.	2963.	58485.	0.	21033.	
22	food-lodge	23757.	22917.	39061.	148343.	45810.	0.	165616.	0.	14234.	
23	other-ret	38855.	352919.	92350.	163808.	294061.	16562.	1636193.	2343.	81833.	
24	f/i/r/e	1937938.	1056100.	3573873.	642365.	1203203.	99831.	4555625.	135960.	727366.	
25	health-ser	0.	0.	0.	2153796.	6194.	0.	79228.	0.	53788.	
26	education	0.	0.	0.	28665.	0.	0.	0.	0.	14011718.	
27	ski-tows	0.	0.	0.	0.	0.	0.	0.	0.	0.	
28	other-ser	837583.	2054115.	1734890.	960651.	893751.	88000.	2746580.	76009.	1374465.	
29	loc-roads	0.	0.	0.	0.	0.	0.	0.	0.	4355131.	
30	loc-gov	525542.	1156430.	2845220.	390374.	57516.	0.	2152368.	32492.	583185.	
31	subtotals	10292311.	9954558.	27446451.	29277986.	5738667.	293748.	19279656.	1001487.	27358848.	
32	households	12066703.	11652932.	39005881.	17023489.	24051596.	352664.	43522820.	2629865.	11737195.	
33	state-gov	2463480.	528050.	763352.	392161.	2973089.	28000.	462165.	71603.	103777.	
34	fed-gov	2841214.	2223091.	6523186.	1751625.	3353.	25000.	7130544.	160945.	1142719.	
35	profits	7899559.	10064633.	26474421.	8867438.	144737.	88451.	27888.	6230.	0.	
36	transfers	0.	0.	0.	74268084.	0.	0.	0.	0.	0.	
37	4-cty-imp	65692.	168976.	1417056.	0.	0.	0.	0.	0.	0.	
38	other-imp	1533716.	1811926.	979084.	14100145.	4464487.	358727.	61574036.	2214112.	3210712.	
39	totals	37162675.	36404166.	102609431.	148228254.	36115460.	1146590.	131997109.	6084245.	43553251.	

1 EMPLOYMENT 0.9031E 03 0.2488E 04 0.3504E 04 0.1284E 04 0.2424E 04 0.2164E 04 0.5160E 02 0.3454E 04 0.3427E 03 0.2548E 04
 2 WITHDRAWAL 0.6547E 08 0.2548E 09 0.4002E 09 0.7263E 09 0.3302E 09 0.5717E 08 0.6421E 07 0.4620E 09 0.
 3 CONSUMP. 0.7433E 07 0.7645E 08 0.6157E 08 0.1779E 09 0.8418E 08 0.1525E 08 0.3440E 06 0.1188E 09 0.

Table B-1
(Continued)
Mesa County

TRANSACTIONS AMONG SECTORS (purchases by sectors shown at top from sectors shown at left...last rows are resource inputs)

DOLLARS

	41	42	43	44
	transfers	4-cty-exp	other-exp	totals
1 fruit-ag	0.	0.	0.	0.
2 irrig-ag	0.	4209578.	2794557.	4520560.
3 dry-ag	0.	0.	9000.	9360012.
4 livestock	0.	0.	0.	715500.
5 coal-mines	0.	0.	56851930.	57795373.
6 other-mine	0.	0.	34369389.	34839848.
7 oil/gas-pr	0.	0.	15058005.	15058005.
8 oil/gas-ser	0.	0.	4159585.	8741846.
9 retining	0.	9055041.	55564376.	56033554.
10 loc-const	0.	7774505.	127839103.	162068294.
11 food-proc	0.	1125480.	40337705.	94292776.
12 stone/clay	0.	0.	8877324.	15489733.
13 fab-met	0.	8722531.	6339043.	20063785.
14 elect-mfg	0.	0.	0.	12239105.
15 other-mfg	0.	43596569.	7380454.	8671874.
16 trans/comm	0.	52139401.	0.	53649301.
17 elect-gen	0.	0.	0.	123932835.
18 utilities	0.	0.	3870040.	14021670.
19 wat/sew/tr	0.	0.	0.	34102951.
20 wholesale	0.	13138865.	0.	10201877.
21 gas/auto	0.	527678.	29189166.	75497645.
22 food-lodge	0.	14186395.	1584582.	37162675.
23 other-ret	0.	9508270.	0.	36404166.
24 f/i/r/e	0.	20466297.	0.	10260933.
25 health-ser	0.	0.	15894456.	148228254.
26 education	0.	0.	0.	64753736.
27 ski-toys	0.	286647.	0.	38115480.
28 other-ser	0.	32316954.	0.	1146590.
29 loc-roads	0.	0.	0.	131997109.
30 loc-gov	0.	4203052.	5.	6084243.
31 subtotals	0.	221257266.	410118724.	1421369712.
32 households	323519068.	0.	0.	739768248.
33 state-gov	0.	0.	0.	86494961.
34 fed-gov	0.	0.	0.	164086160.
35 profits	-67657987.	0.	0.	149485652.
36 transfers	0.	0.	0.	225684406.
37 4-cty-imp	0.	0.	0.	102768064.
38 other-imp	0.	72972904.	121587990.	0.E 14
39 totals	255861082.	294230172.	531706716.	0.E 14
1 EMPLOYMENT	0.	0.	0.	0.
2 WITHDRAWAL	0.	0.	0.	0.
3 CONSUMP.	0.	0.	0.	0.

Table B-1
(Continued)

Garfield, Moffat, Rio Blanco, and Routt Counties

TRANSACTIONS AMONG SECTORS (purchases by sectors shown at top from sectors shown at left...last rows are resource inputs)

DOLLARS

	1	2	3	4	5	6	7	8	9	10
	irris-ag	dry-ag	livestock	coal-mines	other-mine	oil/gs-pr	oil/gs-ser	loc-const	food-proc	stone/clay
1	0.	0.	2263298.	0.	0.	0.	0.	0.	291485.	0.
2	126192.	6471.	5991364.	0.	0.	0.	0.	0.	82547.	0.
3	0.	271821.	8566473.	0.	0.	0.	0.	0.	165341.	0.
4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	0.	0.	0.	0.	0.	354864.	0.	0.	0.	0.
7	0.	0.	0.	477844.	25336.	8653730.	79344.	0.	0.	0.
8	6641.	38831.	0.	1277810.	6552.	2654537.	282216.	1531329.	8635.	178016.
9	0.	0.	0.	0.	0.	0.	0.	0.	15375.	0.
10	0.	0.	0.	91475.	0.	27626.	276423.	1174283.	0.	1635341.
11	19975.	45303.	0.	173652.	10406.	0.	0.	166622.	3791.	13944.
12	9962.	38831.	830050.	6908445.	20523.	266349.	228174.	515734.	36225.	187738.
13	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	16604.	58247.	3379373.	4928177.	11747.	10618599.	96073.	198358.	19797.	53510.
15	64417.	0.	0.	82109.	91.	3540.	18014.	174556.	1053.	17272.
16	124396.	185561.	1873603.	1157004.	3816.	1054474.	354690.	1826617.	13642.	635996.
17	5455.	23037.	2633017.	67211.	7824.	23703.	484659.	517116.	13711.	32809.
18	0.	0.	0.	24687.	0.	2454.	171801.	139701.	1700.	27182.
19	5519.	44806.	8671232.	172795.	664.	15127.	294329.	2548840.	1809.	61800.
20	225817.	1164947.	22407006.	0.	18269.	356.	826833.	4316280.	35172.	209931.
21	0.	0.	0.	50419.	0.	1265.	6005.	0.	0.	0.
22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23	0.	0.	0.	0.	0.	0.	0.	0.	0.	20049.
24	66417.	265349.	3276666.	509284.	35758.	64050.	720550.	1570998.	22957.	73349.
25	0.	0.	0.	0.	0.	0.	0.	0.	0.	3519.
26	69737.	355956.	3922251.	2589295.	11351.	7949159.	54041.	206291.	6950.	185402.
27	743082.	2499160.	63814333.	18510227.	152337.	31689833.	3817608.	14964069.	720190.	3335858.
28	189288.	226517.	5577415.	50867166.	1494404.	4512991.	18998513.	18273827.	447336.	2200504.
29	49812.	51775.	1054990.	9371316.	43952.	38856284.	540413.	999721.	11794.	199411.
30	302197.	226517.	4669118.	975619.	96210.	20048918.	2227702.	3522850.	63815.	506889.
31	1381473.	2394614.	0.	25565903.	0.	232202800.	21220210.	8537354.	190813.	3440519.
32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33	88302.	0.	4209578.	3173103.	44556.	491960.	732560.	1690376.	233145.	0.
34	654992.	1073341.	30680161.	75296616.	108142.	30699123.	18051562.	56560912.	439009.	9292662.
35	3409146.	6471924.	110005595.	183709950.	1959601.	533501912.	65588568.	104551109.	2106102.	18977843.

1	EMPLOYMENT	0.2114E 03	0.2071E 03	0.1760E 04	0.2318E 04	0.1258E 03	0.1761E 03	0.8681E 03	0.2681E 04	0.3458E 02	0.7515E 02
2	WITHERNAL	0.6149E 11	0.	0.3300E 10	0.2848E 10	0.1823E 10	0.2513E 11	0.5090E 10	0.4182E 09	0.1244E 08	0.7481E 10
3	CONSUMP.	0.1636E 11	0.	0.3300E 10	0.2939E 09	0.1823E 09	0.2507E 10	0.5116E 09	0.4162E 08	0.8424E 06	0.1344E 10

Table B-1
(Continued)

Garfield, Moffat, Rio Blanco, and Routt Counties

TRANSACTIONS AMONG SECTORS (purchases by sectors shown at top from sectors shown at left...last rows are resource inputs)

	11	12	13	14	15	16	17	18	19	20
	other-mfg	trans-comm	elect-gen	utilities	wat/sew/tr	wholesale	gas/auto	food-lodge	other-ret	f/i/r/e
	DOLLARS									
1 irrig-ag	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2 dry-ag	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3 livestock	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4 coal-mines	0.	0.	4880000.	0.	0.	0.	0.	0.	0.	0.
5 other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6 oil/95-pr	0.	78232636.	0.	0.	0.	0.	0.	0.	0.	0.
7 oil/95-ser	0.	2228456.	0.	0.	0.	0.	0.	0.	0.	0.
8 loc-const	26232.	923872.	0.	18000.	48914.	126071.	251542.	784932.	1065498.	161814.
9 food-proc	0.	0.	0.	0.	0.	47277.	0.	0.	1158150.	25204.
10 stone/clay	0.	0.	0.	0.	0.	78795.	0.	0.	254793.	0.
11 other-mfg	82871.	213961.	300.	3300.	338.	94553.	317161.	905017.	2849049.	528944.
12 trans-comm	293488.	2430728.	59000.	7775756.	28236.	929775.	1323329.	1864111.	4238829.	1585968.
13 elect-gen	0.	0.	0.	13125267.	0.	0.	0.	0.	0.	0.
14 utilities	385170.	456355.	0.	7407.	331080.	110312.	448401.	4309220.	1436106.	504315.
15 wat/sew/tr	54472.	23691.	0.	2520.	1417.	0.	32810.	769258.	185304.	80865.
16 wholesale	57366.	909697.	177539.	33002.	45643.	74986.	110571.	21746.	89790.	166451.
17 gas/auto	34739.	157740.	1369.	16976.	32285.	34520.	659449.	89199.	639794.	53423.
18 food-lodge	4806.	1508.	0.	4402.	0.	11562.	16047.	24731.	67972.	50159.
19 other-ret	15170.	792647.	30381.	11119.	173497.	218208.	24229.	77356.	57732.	280540.
20 f/i/r/e	329966.	1792112.	0.	157592.	648279.	661874.	1268646.	1303620.	2362626.	17984845.
21 health-ser	0.	1764.	0.	0.	0.	0.	0.	0.	0.	0.
22 education	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23 ski-tows	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24 other-ser	282607.	2998732.	6375.	159403.	458516.	898258.	546830.	2251147.	1134987.	2843497.
25 loc-roads	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26 loc-gov	146504.	1581411.	8696196.	688050.	9598.	183426.	339035.	1449724.	1945692.	509395.
27 SUBTOTALS	1713391.	92745310.	57771160.	22002794.	1777803.	3469617.	5538050.	14007413.	18086560.	24775420.
28 households	6591474.	33347433.	11140368.	4740955.	2322575.	9936826.	10207489.	14101129.	20358174.	14239469.
29 state-gov	237187.	4637599.	1489597.	175098.	17700.	2915397.	1607680.	753488.	505586.	467722.
30 fed-gov	618552.	8012245.	1126470.	510381.	93797.	2190488.	1848285.	3233482.	4609437.	5341134.
31 profits	1198719.	35592262.	30726504.	6078066.	2407602.	4790707.	5151139.	13413090.	16677360.	10788457.
32 transfers	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33 mesa-imp	88767.	5240147.	140000.	8050.	75482.	1239572.	533920.	1542050.	1403372.	5717578.
34 other-imp	5882424.	57458066.	88324307.	18477762.	985299.	2173944.	2222512.	768231.	2499287.	156263.
35 TOTALS	16330514.	237033064.	190718406.	51993106.	7679758.	26716551.	27109075.	47818883.	64145776.	125027181.

1 EMPLOYMENT 0.4671E 03 0.1621E 04 0.5111E 03 0.1965E 03 0.2504E 02 0.6583E 03 0.7637E 03 0.2917E 04 0.2070E 04 0.1292E 04
 2 WITHDRAWAL 0.2531E 09 0.4978E 09 0.5092E 11 0. 0.6145E 08 0.6235E 08 0.3347E 09 0.2502E 09 0.6126E 09
 3 CONSUMP. 0.6532E 08 0.2370E 08 0.2594E 10 0. 0.1603E 08 0.5422E 07 0.1004E 09 0.3849E 08 0.1500E 09

Table B-1
(Continued)

Garfield, Moffat, Rio Blanco, and Routt Counties

TRANSACTIONS AMONG SECTORS (purchases by sectors shown at top from sectors shown at left...last rows are resource inputs)

DOLLARS

	21	22	23	24	25	26	27	28	29	30
	health-ser	education	ski-tows	other-ser	loc-roads	loc-gov	SUBTOTALS	households	state-gov	fed-gov
1 irrig-ag	0.	0.	0.	0.	0.	0.	3320644.	0.	0.	0.
2 dry-ag	0.	0.	0.	0.	0.	0.	6471924.	0.	0.	0.
3 livestock	0.	0.	0.	0.	0.	0.	8731814.	0.	0.	0.
4 coal-mines	0.	0.	0.	0.	0.	0.	48800000.	0.	0.	0.
5 other-mine	0.	0.	0.	0.	0.	0.	78587500.	0.	0.	0.
6 oil/gas-pr	0.	0.	0.	0.	0.	0.	11464730.	0.	0.	0.
7 oil/gas-ser	0.	0.	0.	0.	0.	0.	13465621.	2500596.	206656.	15007.
8 loc-const	8533.	0.	0.	124693.	1939717.	2001236.	1313018.	0.	0.	0.
9 food-proc	0.	0.	0.	67012.	9679.	0.	3548415.	35000.	220115.	0.
10 stone/clay	0.	0.	0.	189052.	0.	14772.	5751157.	1315662.	7241.	4001.
11 other-mfg	92846.	263719.	25350.	559109.	5386.	233652.	31165384.	14859528.	41873.	267449.
12 trans/comm	409437.	0.	122850.	0.	0.	0.	13125267.	0.	0.	0.
13 elect-gen	0.	0.	0.	615422.	141839.	385825.	30358808.	16498496.	42509.	54991.
14 utilities	265790.	1108256.	474825.	0.	0.	0.	1725510.	2999430.	1151.	37178.
15 wat/sew/tr	26838.	36795.	1950.	68380.	11465.	66693.	9825986.	7617545.	48687.	24401.
16 wholesale	90144.	159894.	35206.	292895.	223544.	107713.	5920297.	11362843.	27961.	81820.
17 gas/auto	1936.	14598.	2759.	73793.	28556.	68819.	728623.	19335953.	1655.	87522.
18 food-lodge	75787.	3829.	3577.	46152.	0.	50566.	16090196.	43159439.	21602.	22673.
19 other-ret	74842.	722641.	21331.	466735.	682289.	624558.	33872737.	0.	88381.	0.
20 f/i/r/e	294000.	2002457.	408525.	1387717.	78049.	1213648.	61100367.	0.	0.	1064000.
21 health-ser	753213.	48697.	0.	24134.	0.	925440.	1810937.	21904910.	0.	843368.
22 education	12723.	0.	0.	0.	0.	20045363.	20058086.	1204156.	9056229.	0.
23 ski-tows	0.	0.	0.	836652.	0.	0.	20049.	380000.	0.	0.
24 other-ser	321359.	2600365.	39000.	0.	264960.	2078273.	24326339.	13151000.	158624.	1374684.
25 loc-roads	0.	281330.	0.	0.	0.	4006939.	4291788.	0.	3017004.	2348036.
26 loc-gov	100302.	277216.	269100.	655646.	318760.	1581519.	34102007.	11407148.	10631047.	1276233.
27 SUBTOTALS	2527750.	7517797.	1404473.	5407392.	3704024.	33405016.	436104676.	201624444.	23570735.	7501363.
28 households	13244231.	18066131.	3910725.	13258039.	2085836.	10284910.	290623336.	1323555.	2424284.	10382886.
29 state-gov	142347.	0.	192075.	140783.	1518.	117129.	59583874.	28526228.	389121.	16319000.
30 fed-gov	731733.	510361.	839475.	2172078.	128409.	480411.	245036586.	68334982.	41548.	0.
31 profits	2642550.	10127.	1971450.	8495238.	0.	10696584.	445575560.	30629085.	567408.	131270.
32 transfers	0.	0.	0.	0.	0.	0.	57175778.	0.	1623049.	75326000.
33 mesa-imp	0.	0.	9750.	207957.	0.	30778.	21339708.	15604921.	0.	0.
34 other-imp	5491236.	5057423.	1422052.	13227052.	3737041.	3151352.	445817436.	147268248.	879102.	3748993.
35 TOTALS	24779847.	31161839.	9750000.	42908539.	9656828.	58167780.	2001258960.	493311464.	29495247.	113409512.

1 EMPLOYMENT	0.9178E 03	0.2210E 04	0.4387E 03	0.1127E 04	0.4988E 03	0.3139E 04	0.	0.2644E 03	0.1829E 03	0.5670E 03
2 WITHDRAWAL	0.1264E 09	0.4674E 08	0.5460E 08	0.1502E 09	0.	0.	0.	0.	0.	0.
3 CONSUMP.	0.3221E 08	0.1246E 08	0.2925E 07	0.3862E 08	0.	0.	0.	0.	0.	0.

Table B-2
 Mesa County Model and Garfield, Moffat, Rio Blanco, and
 Routt Counties Model, Direct Requirements Per Dollar of Output, 1980

		Mesa County									
		DIRECT INPUT COEFFICIENTS (% of purchases by sector at top of table from sectors at the left)									
		1	2	3	4	5	6	7	8	9	10
		fruit-ag	irrig-ag	dry-ag	livestock	coal-mines	other-mine	oil/gs-pr	oil/gs-ser	refinings	loc-const
1	fruit-ag	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	irrig-ag	0.	0.	0.000798	0.	0.	0.	0.	0.	0.	0.
3	dry-ag	0.	0.037963	0.033518	0.	0.	0.	0.	0.	0.	0.
4	livestock	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	coal-mines	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	oil/gs-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	oil/gs-ser	0.	0.003060	0.005296	0.	0.	0.011093	0.002721	0.	0.000098	0.
9	refining	0.	0.001998	0.004788	0.046616	0.001088	0.003784	0.000496	0.017924	0.011500	0.007197
10	loc-const	0.	0.	0.	0.	0.006461	0.001878	0.106691	0.003100	0.	0.022700
11	food-proc	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	stone/clay	0.354339	0.	0.	0.	0.009784	0.	0.	0.004223	0.	0.017400
13	fab-met	0.	0.	0.	0.	0.	0.000781	0.	0.	0.016500	0.
14	elect-mfg	0.	0.	0.	0.	0.010902	0.	0.	0.	0.	0.
15	other-mfg	0.	0.006956	0.005586	0.	0.003715	0.003213	0.	0.000200	0.000102	0.001700
16	trans/comm	0.108471	0.002997	0.004788	0.007451	0.117334	0.012375	0.010026	0.008200	0.030200	0.007600
17	elect-gen	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	utilities	0.007231	0.004995	0.007182	0.025929	0.011448	0.006966	0.007604	0.001700	0.006540	0.002400
19	wat/sew/tr	0.008264	0.019981	0.	0.	0.000614	0.000363	0.000152	0.000300	0.	0.002500
20	wholesale	0.010258	0.043946	0.027287	0.025463	0.001140	0.001941	0.007799	0.012430	0.001891	0.034535
21	gas/auto	0.	0.000396	0.000685	0.006037	0.000141	0.000490	0.000064	0.000000	0.	0.000932
22	food-lodge	0.	0.	0.	0.	0.000024	0.000024	0.	0.004991	0.	0.002170
23	other-ret	0.	0.001773	0.005899	0.090076	0.000239	0.000777	0.000546	0.008694	0.000004	0.040558
24	f/i/r/e	0.099174	0.067935	0.143648	0.214764	0.	0.005611	0.	0.035066	0.000300	0.062899
25	health-ser	0.	0.	0.	0.	0.000828	0.	0.	0.000600	0.	0.
26	education	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27	ski-tows	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
28	other-ser	0.020661	0.019981	0.032720	0.031743	0.001615	0.028358	0.001438	0.025200	0.000700	0.020400
29	loc-roads	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30	loc-gov	0.034091	0.020980	0.043892	0.033903	0.006449	0.003505	0.018345	0.001200	0.023300	0.003200
31	households	0.168388	0.056945	0.027932	0.072505	0.252613	0.754204	0.063749	0.341000	0.017087	0.231107
32	state-gov	0.004132	0.014986	0.006384	0.006806	0.004273	0.016123	0.034539	0.010000	0.003300	0.013200
33	fed-gov	0.010331	0.090912	0.027932	0.032000	0.079901	0.048204	0.135908	0.036900	0.032000	0.042800
34	profits	0.131198	0.415600	0.295276	0.	0.071247	0.034859	0.475572	0.292100	0.107100	0.111099
35	transfers	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
36	4-city-imp	0.	0.	0.	0.	0.	0.000214	0.024611	0.	0.536500	0.001200
37	other-imp	0.043461	0.188596	0.326389	0.359484	0.400209	0.065237	0.109739	0.194152	0.212879	0.374405

Table B-2
(Continued)
Mesa County

	11	12	13	14	15	16	17	18	19	20
	food-proc	stone/clay	fab-met	elect-mfg	other-mfg	trans/comm	elect-gen	utilities	wat/sew/tr	wholesale
1 fruit-ag	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2 irrig-ag	0.001405	0.	0.	0.	0.	0.	0.	0.	0.	0.
3 dry-ag	0.021654	0.	0.	0.	0.	0.	0.	0.	0.	0.
4 livestock	0.050525	0.	0.	0.	0.	0.	0.	0.	0.	0.
5 coal-mines	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6 other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7 oil/gas-pr	0.	0.	0.	0.	0.	0.036974	0.	0.	0.	0.
8 oil/gas-ser	0.	0.	0.	0.	0.	0.002118	0.	0.	0.	0.
9 refining	0.009019	0.003309	0.000653	0.001836	0.003405	0.002040	0.	0.001197	0.001099	0.002452
10 loc-const	0.019274	0.005973	0.046443	0.002581	0.	0.009436	0.	0.000586	0.	0.002135
11 food-proc	0.011043	0.000051	0.	0.	0.	0.	0.	0.	0.	0.004345
12 stone/clay	0.	0.029051	0.	0.	0.	0.	0.	0.	0.	0.008691
13 fab-met	0.000301	0.000463	0.	0.004865	0.	0.	0.	0.	0.	0.004563
14 elect-mfg	0.	0.	0.	0.001375	0.	0.000097	0.	0.	0.001863	0.004345
15 other-mfg	0.001004	0.036181	0.001548	0.006600	0.000540	0.00901	0.	0.000047	0.	0.008691
16 trans/comm	0.013351	0.015937	0.051035	0.023248	0.020938	0.012998	0.127191	0.290628	0.005022	0.065106
17 elect-gen	0.	0.	0.	0.	0.	0.	0.	0.297676	0.	0.
18 utilities	0.006423	0.021011	0.010808	0.018214	0.015985	0.004260	0.	0.	0.023121	0.006404
19 wat/sew/tr	0.000201	0.010359	0.000566	0.006835	0.001036	0.000235	0.	0.000023	0.000078	0.000534
20 wholesale	0.009794	0.010037	0.001688	0.002291	0.016476	0.005477	0.002996	0.001379	0.007078	0.040244
21 gas/auto	0.001168	0.000429	0.000065	0.000238	0.000441	0.000264	0.	0.000155	0.000142	0.000318
22 food-lodge	0.003703	0.000856	0.	0.000995	0.000652	0.000023	0.	0.000201	0.	0.000772
23 other-ret	0.003544	0.000323	0.000043	0.001157	0.002831	0.003338	0.001440	0.000165	0.019912	0.004735
24 f/i/r/e	0.033730	0.010512	0.029976	0.011212	0.026307	0.010798	0.	0.000235	0.007670	0.015476
25 health-ser	0.	0.	0.	0.006346	0.	0.000035	0.	0.	0.	0.
26 education	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27 ski-tows	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
28 other-ser	0.006324	0.004869	0.016554	0.018721	0.014618	0.035751	0.000007	0.004340	0.033857	0.016543
29 loc-roads	0.	0.000204	0.	0.	0.	0.	0.	0.	0.	0.
30 loc-gov	0.003314	0.003874	0.001805	0.011212	0.002044	0.019803	0.035881	0.026584	0.002391	0.009606
31 households	0.221655	0.232363	0.310464	0.612409	0.244413	0.210708	0.061395	0.130058	0.200217	0.299165
32 state-gov	0.003312	0.017131	0.002995	0.012826	0.002139	0.019353	0.003511	0.013186	0.002984	0.095525
33 fed-gov	0.032325	0.030290	0.026266	0.074728	0.014969	0.045338	0.010486	0.013794	0.010140	0.070443
34 profits	0.092557	0.182605	0.118514	0.176847	0.080828	0.149924	0.221148	0.128204	0.464192	0.177175
35 transfers	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
36 4-cty-imp	0.018371	0.	0.	0.	0.	0.067276	0.	0.	0.	0.003736
37 other-imp	0.435983	0.384172	0.380357	0.011464	0.552377	0.362853	0.535745	0.091542	0.220233	0.158996

Table B-2
(Continued)
Mesa County

	21	22	23	24	25	26	27	28	29	30
1 fruit-ag	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2 irrig-ag	0.	0.002466	0.008284	0.	0.	0.	0.	0.	0.	0.
3 dry-ag	0.	0.003066	0.022211	0.	0.	0.	0.	0.	0.	0.
4 livestock	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5 coal-mines	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6 other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7 oil/gs-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8 oil/gs-ser	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9 refining	0.	0.004294	0.000518	0.000509	0.000138	0.002506	0.019952	0.003421	0.	0.003728
10 loc-const	0.010606	0.021613	0.004396	0.000875	0.001361	0.001225	0.006541	0.003101	0.032574	0.080999
11 food-proc	0.	0.	0.03231	0.000124	0.	0.	0.003489	0.001667	0.	0.001776
12 stone/clay	0.	0.	0.000338	0.	0.	0.	0.	0.	0.036347	0.004627
13 fab-met	0.000442	0.	0.	0.	0.	0.	0.	0.000800	0.	0.001474
14 elect-mfg	0.	0.	0.000338	0.	0.	0.000094	0.	0.	0.	0.011533
15 other-mfg	0.013258	0.021468	0.028743	0.005452	0.003300	0.	0.	0.009404	0.000716	0.001531
16 trans/comm	0.054799	0.049753	0.064249	0.006918	0.016773	0.038248	0.006002	0.013905	0.001592	0.009973
17 elect-gen	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18 utilities	0.018561	0.022676	0.021304	0.002660	0.011944	0.028631	0.031527	0.014548	0.006582	0.021519
19 wat/sew/tr	0.001326	0.017841	0.002705	0.000422	0.001385	0.004299	0.	0.001701	0.000313	0.000363
20 wholesale	0.000173	0.002206	0.000245	0.001506	0.004216	0.009627	0.005836	0.011193	0.043916	0.0003319
21 gas/auto	0.087276	0.000556	0.000067	0.000066	0.000018	0.000324	0.002584	0.000443	0.	0.000483
22 food-lodge	0.000639	0.000630	0.000489	0.000264	0.002002	0.001202	0.	0.001255	0.	0.000327
23 other-ret	0.001046	0.009694	0.000900	0.000871	0.002839	0.007115	0.014445	0.012396	0.000385	0.001879
24 f/i/r/e	0.052147	0.029010	0.034630	0.157937	0.010229	0.031567	0.087068	0.034513	0.022346	0.016701
25 health-ser	0.	0.	0.	0.	0.033261	0.000163	0.	0.000600	0.	0.001235
26 education	0.	0.	0.	0.	0.000443	0.	0.	0.	0.	0.321715
27 ski-tows	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
28 other-ser	0.022538	0.056425	0.016908	0.015283	0.014835	0.023449	0.076749	0.020808	0.012493	0.031604
29 loc-roads	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.099996
30 loc-gov	0.014142	0.031766	0.027729	0.002634	0.003464	0.001509	0.	0.016306	0.005940	0.013390
31 households	0.324700	0.320099	0.380139	0.114846	0.557150	0.631019	0.307576	0.329726	0.432242	0.269491
32 state-gov	0.066289	0.014505	0.007439	0.002646	0.004956	0.078002	0.024420	0.003501	0.011769	0.002383
33 fed-gov	0.076453	0.061067	0.063573	0.029002	0.027051	0.000088	0.021804	0.054020	0.026453	0.026237
34 profits	0.212567	0.276469	0.258012	0.059823	0.091941	0.003797	0.077143	0.000211	0.001024	0.
35 transfers	0.	0.	0.	0.501039	0.	0.019403	0.	0.	0.	0.
36 4-cty-imp	0.001768	0.004642	0.013810	0.	0.	0.	0.	0.	0.	0.
37 other-imp	0.041270	0.049772	0.009542	0.095125	0.212098	0.117131	0.312864	0.466480	0.363909	0.073719

Table B-2
(Continued)
Mesa County

	31	32	33	34	35	36	37	38	39	40	41	42
1 fruit-ag	households	state-gov	fed-gov	road-const	comm-const	hous-const	coal-const	oil-shale	other-inv	transfers	4-cty-exp	other-exp
2 irrig-ag	0.001108	0.	0.	0.	0.	0.	.132923E 37	0.	0.	0.	0.014307	0.005256
3 dry-ag	0.	0.000018	0.	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.000017
4 livestock	0.000161	0.001022	0.	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.
5 coal-mines	0.000663	0.	0.	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.106923
6 other-mine	0.	0.	0.	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.064640
7 oil/gas-pr	0.	0.	0.	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.028320
8 oil/gas-ser	0.	0.	0.	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.007823
9 refining	0.022357	0.002333	0.000409	0.	0.004107	0.006891	.132923E 37	0.002768	0.	0.	0.030775	0.104502
10 loc-const	0.004407	0.013470	0.	0.	0.304069	0.175400	.132923E 37	0.	0.000000	0.	0.026423	0.240432
11 food-proc	0.001755	0.000152	0.	0.	0.	0.	.132923E 37	0.	0.000000	0.	0.003825	0.075865
12 stone/clay	0.003385	0.002452	0.000058	0.067563	0.024945	0.041500	.132923E 37	0.	0.000000	0.	0.	0.016696
13 fab-met	0.000051	0.	0.000036	0.021935	0.	0.	.132923E 37	0.	0.	0.	0.029645	0.011922
14 elect-afs	0.	0.	0.	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.
15 other-afs	0.001611	0.000208	0.000057	0.	0.001227	0.001300	.132923E 37	0.	0.000000	0.	0.	0.013881
16 trans/comm	0.030623	0.001868	0.002626	0.	0.000586	0.004700	.132923E 37	0.013441	0.000000	0.	0.148172	0.
17 elect-gen	0.	0.	0.	0.	0.	0.	.132923E 37	0.	0.000000	0.	0.177206	0.
18 utilities	0.025465	0.006851	0.000029	0.	0.001308	0.002500	.132923E 37	0.008931	0.000000	0.	0.	0.007279
19 wat/sew/tr	0.005872	0.000522	0.000005	0.	0.026635	0.026100	.132923E 37	0.002741	0.000000	0.	0.	0.
20 wholesale	0.019999	0.002592	0.000679	0.020868	0.026182	0.029835	.132923E 37	0.000932	0.000000	0.	0.	0.044655
21 gas/auto	0.002895	0.000302	0.000053	0.	0.000532	0.000892	.132923E 37	0.000358	0.000001	0.	0.001793	0.002980
22 food-lodge	0.029189	0.000055	0.000179	0.	0.001892	0.001302	.132923E 37	0.005820	0.000000	0.	0.048215	0.
23 other-ret	0.103506	0.001931	0.001523	0.015033	0.009072	0.050747	.132923E 37	0.001151	0.000000	0.	0.032316	0.
24 f/i/r/e	0.075800	0.002570	0.	0.	0.016395	0.090000	.132923E 37	0.000393	0.000000	0.	0.069559	0.
25 health-ser	0.052378	0.007414	0.037943	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.
26 education	0.006104	0.443746	0.001236	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.029893
27 ski-tows	0.	0.	0.	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.
28 other-ser	0.038082	0.007522	0.183812	0.	0.026353	0.010100	.132923E 37	0.027651	0.000000	0.	0.000974	0.
29 loc-reads	0.	0.037480	0.000348	0.	0.	0.	.132923E 37	0.	0.000000	0.	0.109836	0.
30 loc-gov	0.017241	0.070084	0.008866	0.	0.002615	0.002600	.132923E 37	0.007163	0.000000	0.	0.	0.000000
31 households	0.005708	0.256692	0.057727	0.398723	0.183870	0.155100	.132923E 37	0.711016	0.000000	1.264433	0.	0.
32 state-gov	0.05041	0.001063	0.067649	0.028030	0.007745	0.010700	.132923E 37	0.010666	0.000000	0.	0.	0.
33 fed-gov	0.138517	0.014446	0.000011	0.059330	0.025146	0.034400	.132923E 37	0.040531	0.000000	0.	0.	0.
34 profits	0.041832	0.020382	0.001257	0.090770	0.064777	0.090100	.132923E 37	0.	0.000000	-0.264433	0.	0.
35 transfers	0.	0.054680	0.628562	0.	0.	0.	.132923E 37	0.	0.	0.	0.	0.
36 4-cty-imp	0.006303	0.	0.000064	0.029114	0.000503	0.001400	.132923E 37	0.001085	0.000000	0.	0.	0.
37 other-imp	0.298736	0.050165	0.006871	0.268633	0.272040	0.264432	.132923E 37	0.165352	0.999999	0.	0.248013	0.228675

Table B-2
(Continued)

Garfield, Moffat, Rio Blanco, and Routt Counties

	11	12	13	14	15	16	17	18	19	20
	other-mfg	trans-comm	elect-gen	utilities	wat/sew/tr	wholesale	sas/auto	food-lodge	other-ret	f/i/r/e
1	0.	0.	0.	0.	0.	0.	0.	0.003291	0.009389	0.
2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	0.	0.	0.255875	0.	0.	0.	0.	0.	0.	0.
5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	0.330049	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	0.009401	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	0.001606	0.003898	0.	0.000346	0.006369	0.004719	0.009279	0.016415	0.016611	0.001294
9	0.	0.	0.	0.	0.	0.001770	0.	0.	0.018055	0.000202
10	0.	0.	0.	0.	0.	0.002949	0.	0.	0.003972	0.
11	0.005075	0.000903	0.000002	0.000063	0.000044	0.005339	0.011699	0.018926	0.044415	0.004231
12	0.017972	0.010255	0.000309	0.149554	0.003677	0.034801	0.048815	0.038983	0.066081	0.012685
13	0.	0.	0.	0.252442	0.	0.	0.	0.	0.	0.
14	0.023586	0.001925	0.	0.000142	0.043111	0.004129	0.016541	0.090115	0.022388	0.004034
15	0.003336	0.000100	0.	0.000048	0.000185	0.	0.001210	0.016087	0.002889	0.000647
16	0.003513	0.003838	0.000931	0.000635	0.005943	0.002807	0.004079	0.000455	0.001400	0.001331
17	0.002127	0.000665	0.000007	0.000327	0.004204	0.001292	0.031703	0.001865	0.009974	0.000427
18	0.000294	0.000006	0.	0.000085	0.000433	0.000592	0.000517	0.000517	0.001060	0.000401
19	0.000929	0.003344	0.000159	0.000214	0.022591	0.008168	0.000894	0.001618	0.000900	0.002244
20	0.020205	0.007561	0.	0.003031	0.084414	0.024774	0.046798	0.027262	0.036832	0.143847
21	0.	0.000007	0.	0.	0.	0.	0.	0.	0.	0.
22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24	0.017305	0.012651	0.000033	0.003066	0.059704	0.033622	0.020171	0.047077	0.017694	0.022743
25	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26	0.008971	0.006672	0.045597	0.013233	0.001250	0.006866	0.012506	0.030317	0.030332	0.004074
27	0.403629	0.140687	0.058413	0.091184	0.302428	0.371935	0.376534	0.294886	0.317374	0.113891
28	0.014524	0.019585	0.007810	0.003368	0.002240	0.109123	0.059304	0.015757	0.007944	0.003741
29	0.037877	0.033802	0.005906	0.009816	0.012214	0.081990	0.068180	0.067619	0.071859	0.042720
30	0.073404	0.150157	0.161109	0.116901	0.313500	0.179316	0.190015	0.280498	0.259992	0.086289
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.457307
32	0.005436	0.022107	0.000734	0.000155	0.009829	0.046397	0.019695	0.032248	0.021878	0.001250
33	0.360211	0.242405	0.463114	0.355389	0.128298	0.081371	0.081984	0.016065	0.033963	0.096642

Table B-2
(Continued)

Garfield, Moffat, Rio Blanco, and Routt Counties

	21	22	23	24	25	26	27	28	29	30
	health-ser	education	ski-tows	other-ser	loc-roads	loc-gov	households	state-gov	fed-gov	road-const
1 irrig-ag	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2 dry-ag	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3 livestock	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4 coal-mines	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5 other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6 oil/g5-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7 oil/g5-ser	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8 loc-const	0.000344	0.	0.	0.002906	0.200865	0.034405	0.005069	0.007006	0.000132	0.055246
9 food-proc	0.	0.	0.	0.001562	0.	0.	0.	0.	0.	0.
10 stone/clay	0.	0.	0.	0.	0.001002	0.	0.000071	0.007463	0.	0.136605
11 other-mfg	0.003747	0.	0.	0.004406	0.	0.000254	0.002667	0.000245	0.000035	0.
12 trans/comm	0.016523	0.008463	0.012600	0.013030	0.000556	0.004017	0.030122	0.001420	0.002358	0.
13 elect-sen	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14 utilities	0.010726	0.035500	0.048700	0.014343	0.014688	0.006633	0.033444	0.001441	0.000485	0.
15 wat/sew/tr	0.001083	0.001181	0.000200	0.001594	0.001187	0.001147	0.006080	0.000039	0.000328	0.
16 wholesale	0.003638	0.005131	0.003611	0.004826	0.023149	0.001852	0.015442	0.001651	0.000215	0.017179
17 gas/auto	0.000078	0.000468	0.000283	0.001720	0.002936	0.001183	0.023074	0.000948	0.000721	0.
18 food-lodge	0.003058	0.000123	0.000367	0.001076	0.	0.000869	0.039196	0.000056	0.000772	0.
19 other-ret	0.003020	0.023190	0.002188	0.010877	0.070654	0.010737	0.067489	0.000732	0.000200	0.
20 f/i/r/e	0.011864	0.064260	0.041900	0.032341	0.008082	0.020845	0.068644	0.002996	0.	0.
21 health-ser	0.030396	0.001563	0.	0.000562	0.	0.015910	0.044404	0.	0.009382	0.
22 education	0.000513	0.	0.	0.	0.	0.344613	0.002441	0.307040	0.007436	0.
23 ski-tows	0.	0.	0.	0.	0.	0.	0.000770	0.	0.	0.
24 other-ser	0.012969	0.083447	0.004000	0.019498	0.027438	0.05729	0.026659	0.005378	0.012121	0.
25 loc-roads	0.009028	0.009028	0.	0.	0.	0.068886	0.	0.102288	0.020704	0.
26 loc-gov	0.004048	0.008896	0.027600	0.015280	0.033009	0.027189	0.023124	0.360433	0.011253	0.
27 households	0.534476	0.579752	0.401100	0.308984	0.215996	0.176808	0.002683	0.082192	0.091552	0.225259
28 state-gov	0.005744	0.	0.019700	0.003281	0.000157	0.002014	0.057826	0.013193	0.143894	0.015768
29 fed-gov	0.029529	0.016378	0.086100	0.050621	0.013297	0.008259	0.138523	0.001409	0.	0.035519
30 profits	0.106641	0.000325	0.202200	0.197985	0.	0.183926	0.062089	0.019237	0.001157	0.142542
31 transfers	0.	0.	0.	0.	0.	0.	0.	0.055027	0.664195	0.
32 mesa-imp	0.221601	0.	0.001000	0.004847	0.	0.000529	0.031633	0.	0.	0.019574
33 other-imp	0.162295	0.145851	0.308262	0.308262	0.368984	0.054177	0.298530	0.029805	0.033057	0.354308

Table B-2
(Continued)

Garfield, Moffat, Rio Blanco, and Routt Counties

	31	32	33	34	35	36	37	38
	hous-const	coal-const	oil-shale	comm-const	other-inv	transfers	mesa-exp	other-exp
1 irrig-ag	0.	.132923E 37	0.	0.	0.	0.	0.	0.000081
2 dry-ag	0.	.132923E 37	0.	0.	0.	0.	0.	0.
3 livestock	0.	.132923E 37	0.	0.	0.	0.	0.	0.092392
4 coal-mines	0.	.132923E 37	0.	0.	0.	0.	0.	0.123079
5 other-mine	0.	.132923E 37	0.	0.	0.	0.	0.	0.001770
6 oil/as-pr	0.	.132923E 37	0.	0.	0.000051	0.	0.897388	0.355681
7 oil/as-ser	0.000763.	.132923E 37	0.038389	0.000740	0.384700	0.	0.028565	0.009477
8 loc-const	0.246628.	.132923E 37	0.075615	0.325997	0.038227	0.	0.068621	0.022074
9 food-proc	0.	.132923E 37	0.	0.	0.000077	0.	0.	0.000717
10 stone/clay	0.023966.	.132923E 37	0.004970	0.028544	0.002939	0.	0.	0.007539
11 other-mfg	0.001307.	.132923E 37	0.	0.001904	0.001621	0.	0.005311	0.007627
12 trans/comm	0.003159.	.132923E 37	0.013761	0.006770	0.000583	0.	0.000114	0.171424
13 elect-gen	0.	.132923E 37	0.	0.	0.	0.	0.	0.162019
14 utilities	0.002832.	.132923E 37	0.030305	0.001164	0.001275	0.	0.	0.
15 wat/sew/tr	0.019281.	.132923E 37	0.	0.015868	0.001115	0.	0.	0.
16 wholesale	0.022518.	.132923E 37	0.017069	0.014304	0.020403	0.	0.	0.001308
17 sas/auto	0.007994.	.132923E 37	0.001524	0.002578	0.060334	0.	0.	0.001062
18 food-lodge	0.002238.	.132923E 37	0.000085	0.000698	0.000316	0.	0.	0.024952
19 other-ret	0.031736.	.132923E 37	0.000340	0.019684	0.003367	0.	0.	0.000151
20 f/i/r/e	0.063969.	.132923E 37	0.	0.006452	0.005573	0.	0.	0.018402
21 health-ser	0.	.132923E 37	0.	0.	0.	0.	0.	0.
22 education	0.	.132923E 37	0.	0.	0.	0.	0.	0.
23 ski-tows	0.	.132923E 37	0.	0.	0.	0.	0.	0.008530
24 other-ser	0.012092.	.132923E 37	0.005061	0.018934	0.002863	0.	0.	0.000623
25 loc-roads	0.	.132923E 37	0.	0.	0.	0.	0.	0.
26 loc-gov	0.002614.	.132923E 37	0.001085	0.002539	0.000532	0.	0.	0.000127
27 households	0.159480.	.132923E 37	0.188315	0.201289	0.049297	0.938212	0.	0.
28 state-gov	0.012963.	.132923E 37	0.011389	0.007193	0.002939	0.	0.	0.
29 fed-gov	0.049021.	.132923E 37	0.029791	0.022636	0.009069	0.	0.	0.
30 profits	0.116887.	.132923E 37	0.188315	0.056589	0.021634	0.061788	0.	0.
31 transfers	0.	.132923E 37	0.	0.	0.	0.	0.	0.
32 mesa-imp	0.020480.	.132923E 37	0.066503	0.009625	0.001773	0.	0.	0.
33 other-imp	0.180053.	.132923E 37	0.327484	0.256472	0.371294	0.	0.	0.010964

Table B-3

Mesa County Model and Garfield, Moffat, Rio Blanco, and Routt Counties Model, Direct and Indirect Requirements Per Dollar of Output Delivered to Final Demand, 1980 (Households in Processing Sector)

Mesa County

(I-A) INVERSE MATRIX

	1	2	3	4	5	6	7	8	9	10
1 fruit-as	1.0009	0.0003	0.0003	0.0013	0.0008	0.0019	0.0003	0.0010	0.0001	0.0011
2 irrig-ag	0.0003	1.0005	0.0013	0.0499	0.0009	0.0023	0.0005	0.0013	0.0002	0.0018
3 dry-ag	0.0001	0.0393	1.0348	0.0021	0.0001	0.0002	0.0000	0.0001	0.0000	0.0002
4 livestock	0.0002	0.0001	0.0001	1.0003	0.0002	0.0004	0.0001	0.0002	0.0000	0.0002
5 coal-mines	0.0003	0.0001	0.0001	0.0002	1.0002	0.0006	0.0001	0.0003	0.0000	0.0002
6 other-mine	0.	0.	0.	0.0002	0.	1.0000	0.	0.	0.	0.
7 oil/95-pr	0.0055	0.0007	0.0008	0.0017	0.0054	0.0026	1.0009	0.0014	0.0014	0.0014
8 oil/95-ser	0.0003	0.0000	0.0001	0.0001	0.0003	0.0113	0.0028	1.0001	0.0002	0.0001
9 refinings	0.0118	0.0071	0.0094	0.0540	0.0102	0.0263	0.0049	0.0290	1.0133	0.0163
10 loc-const	0.0116	0.0052	0.0112	0.0077	0.0127	0.0115	0.1126	0.0082	0.0040	1.0280
11 food-proc	0.0026	0.0012	0.0013	0.0048	0.0021	0.0053	0.0011	0.0029	0.0004	0.0036
12 stone/clay	0.3876	0.0014	0.0016	0.0023	0.0121	0.0047	0.0030	0.0068	0.0006	0.0206
13 fab-met	0.0006	0.0004	0.0004	0.0012	0.0003	0.0015	0.0002	0.0007	0.0168	0.0006
14 elect-mfg	0.0008	0.0006	0.0008	0.0008	0.0112	0.0005	0.0004	0.0003	0.0003	0.0004
15 other-mfg	0.0176	0.0095	0.0068	0.0071	0.0070	0.0103	0.0017	0.0046	0.0007	0.0073
16 trans/comm	0.1497	0.0196	0.0227	0.0467	0.1453	0.0696	0.0239	0.0381	0.0386	0.0373
17 elect-gen	0.0094	0.0037	0.0045	0.0119	0.0074	0.0113	0.0040	0.0052	0.0029	0.0050
18 utilities	0.0316	0.0124	0.0151	0.0398	0.0248	0.0380	0.0135	0.0175	0.0097	0.0167
19 wat/sew/tr	0.0153	0.0212	0.0013	0.0033	0.0034	0.0071	0.0015	0.0038	0.0005	0.0056
20 wholesale	0.0267	0.0516	0.0346	0.0368	0.0113	0.0249	0.0159	0.0243	0.0041	0.0463
21 gas/auto	0.0017	0.0010	0.0013	0.0076	0.0014	0.0037	0.0007	0.0015	0.0002	0.0023
22 food-lodge	0.0127	0.0043	0.0041	0.0076	0.0109	0.0278	0.0044	0.0183	0.0017	0.0129
23 other-ret	0.0456	0.0184	0.0218	0.1180	0.0398	0.1005	0.0201	0.0568	0.0045	0.0602
24 f/i/r/e	0.1707	0.1059	0.1959	0.2942	0.0409	0.1053	0.0244	0.0903	0.0087	0.1179
25 health-ser	0.0225	0.0077	0.0073	0.0135	0.0207	0.0508	0.0076	0.0249	0.0032	0.0194
26 education	0.0191	0.0101	0.0176	0.0175	0.0085	0.0152	0.0085	0.0075	0.0089	0.0073
27 ski-tours	0.0005	0.0002	0.0002	0.0003	0.0004	0.0011	0.0002	0.0005	0.0001	0.0004
28 other-ser	0.0530	0.0335	0.0477	0.0557	0.0255	0.0769	0.0127	0.0501	0.0064	0.0431
29 loc-roads	0.0052	0.0029	0.0052	0.0050	0.0020	0.0029	0.0024	0.0015	0.0027	0.0016
30 loc-gov	0.0514	0.0287	0.0522	0.0496	0.0196	0.0295	0.0238	0.0149	0.0266	0.0159
31 households	0.4124	0.1413	0.1335	0.2476	0.3642	0.9352	0.1388	0.4471	0.0574	0.3571

Table B-3
(Continued)
Mesa County

	11	12	13	14	15	16	17	18	19	20
1 fruit-ag	0.0007	stone/clay	fab-met	elect-mfg	other-mfg	trans/comm	elect-gen	utilities	wat/sew/tr	wholesale
2 irrig-ag	0.0049	0.0007	0.0009	0.0016	0.0007	0.0007	0.0003	0.0007	0.0008	0.0009
3 dry-ag	0.0229	0.0008	0.0011	0.0020	0.0009	0.0009	0.0004	0.0008	0.0012	0.0012
4 livestock	0.0513	0.0001	0.0001	0.0002	0.0001	0.0001	0.0000	0.0001	0.0001	0.0002
5 coal-mines	0.0002	0.0002	0.0002	0.0004	0.0002	0.0002	0.0001	0.0001	0.0002	0.0004
6 other-mine	0.	0.	0.	0.0005	0.0002	0.0002	0.0001	0.0002	0.0002	0.0003
7 oil/gas-pr	0.0014	0.0017	0.0030	0.0028	0.0018	0.0383	0.0051	0.0131	0.0012	0.0036
8 oil/gas-ser	0.0001	0.0001	0.0002	0.0002	0.0001	0.0023	0.0003	0.0008	0.0001	0.0002
9 refining	0.0197	0.0116	0.0113	0.0206	0.0114	0.0098	0.0039	0.0096	0.0081	0.0133
10 loc-const	0.0244	0.0104	0.0528	0.0119	0.0040	0.0189	0.0066	0.0121	0.0036	0.0090
11 food-proc	1.0134	0.0020	0.0025	0.0045	0.0021	0.0020	0.0010	0.0019	0.0024	0.0073
12 stone/clay	0.0022	1.0318	0.0030	0.0040	0.0018	0.0021	0.0012	0.0021	0.0016	0.0117
13 fab-met	0.0008	0.0008	1.0003	0.0055	0.0004	0.0003	0.0002	0.0003	0.0003	0.0052
14 elect-mfg	0.0003	0.0003	0.0003	1.0019	0.0003	0.0005	0.0006	0.0007	0.0021	0.0049
15 other-mfg	0.0045	0.0400	0.0053	0.0126	1.0035	0.0038	0.0014	0.0030	0.0031	0.0131
16 trans/comm	0.0388	0.0455	0.0815	0.0761	0.0477	1.0353	0.1392	0.3538	0.0321	0.0984
17 elect-gen	0.0058	0.0100	0.0076	0.0133	0.0082	0.0048	1.0020	0.3017	0.0100	0.0067
18 utilities	0.0196	0.0388	0.0256	0.0446	0.0274	0.0160	0.0066	1.0134	0.0336	0.0224
19 wat/sew/tr	0.0028	0.0131	0.0038	0.0065	0.0035	0.0026	0.0011	0.0025	1.0023	0.0039
20 wholesale	0.0213	0.0199	0.0143	0.0217	0.0255	0.0147	0.0080	0.0128	0.0148	1.0535
21 gas/auto	0.0028	0.0016	0.0016	0.0029	0.0016	0.0014	0.0005	0.0013	0.0011	0.0019
22 food-lodge	0.0133	0.0107	0.0127	0.0241	0.0104	0.0092	0.0042	0.0094	0.0084	0.0137
23 other-ret	0.0434	0.0361	0.0474	0.0843	0.0380	0.0370	0.0172	0.0353	0.0505	0.0515
24 f/i/r/e	0.0942	0.0497	0.0848	0.0961	0.0667	0.0485	0.0184	0.0397	0.0413	0.0674
25 health-ser	0.0173	0.0179	0.0230	0.0489	0.0178	0.0186	0.0077	0.0168	0.0154	0.0235
26 education	0.0073	0.0067	0.0075	0.0157	0.0061	0.0117	0.0147	0.0191	0.0057	0.0104
27 ski-tows	0.0004	0.0004	0.0005	0.0009	0.0004	0.0004	0.0002	0.0004	0.0003	0.0005
28 other-ser	0.0281	0.0244	0.0421	0.0404	0.0335	0.0542	0.0137	0.0345	0.0503	0.0434
29 loc-roads	0.0017	0.0017	0.0015	0.0034	0.0013	0.0030	0.0043	0.0054	0.0012	0.0024
30 loc-sov	0.0167	0.0147	0.0154	0.0339	0.0127	0.0304	0.0432	0.0536	0.0125	0.0242
31 households	0.3188	0.3289	0.4236	0.7788	0.3270	0.3046	0.1403	0.3086	0.2826	0.4316

Table B-3
(Continued)

Mesa County

	21	22	23	24	25	26	27	28	29	30	31
	sas/auto	food-lodge	other-ret	f/i/r/e	health-ser	education	ski-tows	other-ser	loc-roads	loc-90v	households
1	fruit-as	0.0010	0.0036	0.0094	0.0004	0.0017	0.0011	0.0018	0.0012	0.0016	0.0025
2	irrig-as	0.0013	0.0045	0.0237	0.0005	0.0022	0.0015	0.0014	0.0015	0.0020	0.0030
3	dry-as	0.0001	0.0003	0.0018	0.0000	0.0002	0.0002	0.0002	0.0001	0.0002	0.0003
4	livestock	0.0002	0.0002	0.0004	0.0001	0.0004	0.0004	0.0003	0.0003	0.0004	0.0005
5	coal-mines	0.0003	0.0003	0.0004	0.0001	0.0005	0.0003	0.0003	0.0004	0.0005	0.0008
6	other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	oil/95-pr	0.0037	0.0034	0.0040	0.0009	0.0024	0.0018	0.0018	0.0016	0.0030	0.0025
8	oil/95-ser	0.0002	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001	0.0001	0.0002	0.0002
9	refinins	0.0123	0.0168	0.0145	0.0051	0.0173	0.0314	0.0145	0.0143	0.0228	0.0283
10	loc-const	0.0194	0.0311	0.0144	0.0034	0.0091	0.0122	0.0097	0.0399	0.0760	0.0112
11	food-proc	0.0030	0.0033	0.0369	0.0013	0.0042	0.0048	0.0048	0.0036	0.0063	0.0067
12	stone/clay	0.0029	0.0042	0.0065	0.0010	0.0037	0.0025	0.0026	0.0414	0.0140	0.0059
13	fab-met	0.0009	0.0005	0.0005	0.0002	0.0006	0.0007	0.0013	0.0006	0.0022	0.0008
14	elect-mfg	0.0005	0.0007	0.0010	0.0001	0.0004	0.0003	0.0005	0.0006	0.0122	0.0006
15	other-mfg	0.0190	0.0265	0.0337	0.0081	0.0090	0.0052	0.0137	0.0071	0.0085	0.0085
16	trans/comm	0.0987	0.0917	0.1086	0.0232	0.0641	0.0497	0.0486	0.0429	0.0800	0.0681
17	elect-gen	0.0114	0.0126	0.0125	0.0029	0.0108	0.0144	0.0092	0.0087	0.0171	0.0115
18	utilities	0.0382	0.0422	0.0420	0.0097	0.0364	0.0484	0.0309	0.0291	0.0576	0.0386
19	wat/sew/tr	0.0052	0.0218	0.0074	0.0019	0.0067	0.0035	0.0051	0.0050	0.0075	0.0086
20	wholesale	0.0138	0.0172	0.0168	0.0067	0.0221	0.0185	0.0235	0.0615	0.0329	0.0282
21	gas/auto	1.0973	0.0024	0.0020	0.0007	0.0024	0.0044	0.0020	0.0020	0.0032	0.0040
22	food-lodge	0.0155	1.0153	0.0169	0.0058	0.0240	0.0134	0.0147	0.0173	0.0224	0.0355
23	other-ret	0.0550	0.0441	1.0604	0.0208	0.0795	0.0938	0.0409	0.0635	0.0855	0.1269
24	f/i/r/e	0.1232	0.0935	0.1073	1.2079	0.0882	0.1552	0.0910	0.0911	0.1198	0.1231
25	health-ser	0.0269	0.0266	0.0297	0.0099	1.0734	0.0439	0.0251	0.0314	0.0406	0.0650
26	education	0.0133	0.0189	0.0184	0.0040	0.0126	0.0080	0.0126	0.0107	0.3383	0.0175
27	ski-tows	0.0006	0.0006	0.0007	0.0002	0.0009	1.0005	0.0005	0.0007	0.0009	0.0015
28	other-ser	0.0551	0.0886	0.0514	0.0285	0.0532	0.1043	1.0469	0.0445	0.0830	0.0595
29	loc-roads	0.0032	0.0049	0.0047	0.0009	0.0024	0.0016	0.0031	1.0022	0.1038	0.0031
30	loc-90v	0.0319	0.0495	0.0468	0.0088	0.0241	0.0163	0.0307	0.0224	1.0377	0.0314
31	households	0.4943	0.4878	0.5460	0.1824	0.7186	0.4476	0.4500	0.5779	0.7218	1.1988

Table B-3
(Continued)

Garfield, Moffat, Rio Blanco, and Routt Counties

(I-A) INVERSE MATRIX

	1	2	3	4	5	6	7	8	9	10
1 irrig-as	1.0003	0.0014	0.0237	0.0005	0.0011	0.0000	0.0005	0.0006	0.1417	stone/clay
2 dry-ag	0.0387	1.0439	0.0627	0.0000	0.0001	0.0000	0.0001	0.0001	0.0516	0.0000
3 livestock	0.0000	0.0001	1.0846	0.0001	0.0001	0.0000	0.0001	0.0001	0.0658	0.0000
4 coal-mines	0.0009	0.0013	0.0032	1.0028	0.0030	0.0014	0.0011	0.0009	0.0018	0.0008
5 other-mine	0.	0.	0.	0.	1.0000	0.	0.	0.	0.	0.
6 oil/gs-pr	0.0048	0.0074	0.0128	0.0199	0.0193	1.0025	0.0076	0.0072	0.0132	0.0076
7 oil/gs-ser	0.0002	0.0003	0.0006	0.0035	0.0139	0.0143	1.0003	0.0011	0.0006	0.0004
8 loc-const	0.0054	0.0119	0.0077	0.0117	0.0132	0.0063	0.0083	1.0184	0.0093	0.0133
9 food-proc	0.0004	0.0006	0.0022	0.0007	0.0017	0.0001	0.0007	0.0010	1.0082	0.0005
10 stone/clay	0.0003	0.0004	0.0007	0.0009	0.0007	0.0002	0.0049	0.0128	0.0004	1.0947
11 other-mfg	0.0062	0.0106	0.0083	0.0042	0.0136	0.0003	0.0036	0.0054	0.0068	0.0029
12 trans-comm	0.0147	0.0223	0.0387	0.0603	0.0584	0.0055	0.0230	0.0218	0.0398	0.0230
13 elect-gen	0.0034	0.0050	0.0125	0.0108	0.0117	0.0055	0.0044	0.0036	0.0072	0.0031
14 utilities	0.0136	0.0198	0.0494	0.0428	0.0464	0.0217	0.0176	0.0143	0.0286	0.0121
15 wat/sew/tr	0.0207	0.0016	0.0027	0.0031	0.0069	0.0003	0.0030	0.0037	0.0057	0.0025
16 wholesale	0.0407	0.0340	0.0265	0.0129	0.0182	0.0028	0.0120	0.0229	0.0207	0.0404
17 gas/auto	0.0055	0.0062	0.0339	0.0094	0.0277	0.0010	0.0168	0.0119	0.0175	0.0068
18 food-lodge	0.0054	0.0063	0.0090	0.0141	0.0367	0.0013	0.0168	0.0113	0.0134	0.0090
19 other-ret	0.0159	0.0241	0.1086	0.0334	0.0841	0.0034	0.0370	0.0479	0.0377	0.0213
20 f/i/r/e	0.1041	0.2416	0.3049	0.0351	0.0994	0.0045	0.0499	0.0757	0.0952	0.0346
21 health-ser	0.0066	0.0062	0.0110	0.0168	0.0429	0.0017	0.0167	0.0116	0.0148	0.0088
22 education	0.0104	0.0236	0.0204	0.0102	0.0147	0.0060	0.0053	0.0047	0.0092	0.0066
23 ski-tows	0.0001	0.0001	0.0002	0.0003	0.0007	0.0000	0.0003	0.0002	0.0002	0.0013
24 other-ser	0.0334	0.0610	0.0583	0.0187	0.0559	0.0029	0.0262	0.0283	0.0351	0.0146
25 loc-roads	0.0021	0.0048	0.0042	0.0020	0.0026	0.0012	0.0009	0.0009	0.0018	0.0015
26 loc-gov	0.0292	0.0673	0.0577	0.0271	0.0361	0.0171	0.0129	0.0119	0.0244	0.0179
27 households	0.1329	0.1524	0.2184	0.3508	0.9235	0.0301	0.3567	0.2492	0.3145	0.1847

Table B-3
(Continued)
Garfield, Moffat, Rio Blanco, and Routt Counties

	11	12	13	14	15	16	17	18	19	20
1 irrig-ag	0.0006	0.0003	0.0002	0.0003	0.0008	0.0009	0.0006	0.0003	0.0125	0.0003
2 dry-ag	0.0001	0.0000	0.0000	0.0000	0.0001	0.0002	0.0001	0.0002	0.0014	0.0000
3 livestock	0.0001	0.0000	0.0000	0.0000	0.0001	0.0002	0.0001	0.0001	0.0016	0.0001
4 coal-mines	0.0030	0.0011	0.2569	0.0654	0.0041	0.0017	0.0026	0.0073	0.0030	0.0009
5 other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6 oil/gas-pr	0.0158	0.3377	0.0070	0.0543	0.0118	0.0203	0.0266	0.0257	0.0320	0.0084
7 oil/gas-ser	0.0007	0.0151	0.0010	0.0026	0.0005	0.0009	0.0012	0.0012	0.0015	0.0004
8 loc-const	0.0075	0.0065	0.0063	0.0051	0.0118	0.0105	0.0160	0.0236	0.0241	0.0039
9 food-proc	0.0010	0.0005	0.0004	0.0004	0.0013	0.0028	0.0010	0.0009	0.0191	0.0007
10 stone/clay	0.0004	0.0003	0.0003	0.0002	0.0005	0.0037	0.0005	0.0006	0.0049	0.0002
11 other-mfg	1.0098	0.0029	0.0020	0.0021	0.0056	0.0084	0.0171	0.0235	0.0495	0.0068
12 trans/comm	0.0479	1.0226	0.0211	0.1644	0.0358	0.0614	0.0805	0.0777	0.0970	0.0255
13 elect-gen	0.0117	0.0045	1.0041	0.2555	0.0160	0.0065	0.0102	0.0284	0.0116	0.0034
14 utilities	0.0463	0.0177	0.0160	1.0122	0.0634	0.0259	0.0405	0.1123	0.0459	0.0133
15 wat/sew/tr	0.0071	0.0016	0.0016	0.0016	1.0035	0.0036	0.0051	0.0196	0.0069	0.0022
16 wholesale	0.0125	0.0063	0.0062	0.0056	0.0141	1.0117	0.0137	0.0095	0.0114	0.0050
17 gas/auto	0.0150	0.0059	0.0049	0.0054	0.0154	0.0135	1.0456	0.0133	0.0225	0.0051
18 food-lodge	0.0202	0.0078	0.0074	0.0077	0.0167	0.0192	0.0206	1.0178	0.0194	0.0075
19 other-ret	0.0468	0.0217	0.0184	0.0190	0.0616	0.0517	0.0474	0.0431	1.0445	0.0192
20 f/i/r/e	0.0729	0.0293	0.0205	0.0249	0.1426	0.0764	0.1068	0.0806	0.0946	1.1867
21 health-ser	0.0234	0.0093	0.0095	0.0094	0.0195	0.0221	0.0235	0.0206	0.0219	0.0083
22 education	0.0104	0.0070	0.0202	0.0125	0.0073	0.0094	0.0120	0.0182	0.0181	0.0044
23 ski-tows	0.0004	0.0002	0.0001	0.0001	0.0003	0.0004	0.0004	0.0003	0.0004	0.0001
24 other-ser	0.0393	0.0224	0.0118	0.0151	0.0811	0.0549	0.0445	0.0710	0.0427	0.0350
25 loc-roads	0.0019	0.0014	0.0041	0.0025	0.0013	0.0017	0.0023	0.0036	0.0036	0.0008
26 loc-gov	0.0266	0.0190	0.0572	0.0348	0.0182	0.0238	0.0313	0.0497	0.0493	0.0115
27 households	0.5008	0.1946	0.1835	0.1914	0.4175	0.4720	0.5013	0.4313	0.4587	0.1775

Table B-3
(Continued)
Garfield, Moffat, Rio Blanco, and Routt Counties

	21	22	23	24	25	26	27
	health-ser	education	ski-tows	other-ser	loc-roads	loc-gov	households
1	irrig-ag	0.0009	0.0012	0.0007	0.0009	0.0010	0.0014
2	dry-ag	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001
3	livestock	0.0001	0.0002	0.0001	0.0002	0.0001	0.0002
4	coal-mines	0.0026	0.0046	0.0046	0.0023	0.0030	0.0032
5	other-mine	0.	0.	0.	0.	0.	0.
6	oil/gas-pr	0.0175	0.0185	0.0155	0.0125	0.0141	0.0190
7	oil/gas-ser	0.0008	0.0008	0.0007	0.0006	0.0007	0.0009
8	loc-const	0.0075	0.0109	0.0069	0.0083	0.0579	0.0115
9	food-proc	0.0013	0.0019	0.0010	0.0025	0.0016	0.0020
10	stone/clay	0.0005	0.0007	0.0004	0.0004	0.0012	0.0008
11	other-mfg	0.0100	0.0065	0.0075	0.0088	0.0071	0.0101
12	trans/comm	0.0530	0.0560	0.0470	0.0378	0.0428	0.0575
13	elect-gen	0.0103	0.0178	0.0181	0.0084	0.0119	0.0126
14	utilities	0.0406	0.0707	0.0718	0.0332	0.0470	0.0498
15	wat/sew/tr	0.0061	0.0070	0.0040	0.0047	0.0061	0.0085
16	wholesale	0.0154	0.0193	0.0128	0.0143	0.0167	0.0199
17	gas/auto	0.0170	0.0200	0.0133	0.0122	0.0164	0.0293
18	food-lodge	0.0295	0.0301	0.0205	0.0170	0.0231	0.0461
19	other-ret	0.0634	0.0932	0.0490	0.0480	0.0769	0.1047
20	f/i/r/e	0.0781	0.1514	0.0990	0.0787	0.1120	0.1086
21	health-ser	1.0622	0.0367	0.0240	0.0195	0.0433	0.0540
22	education	0.0113	1.0146	0.0173	0.0114	0.3648	0.0155
23	ski-tows	0.0005	0.0006	1.0004	0.0003	0.0004	0.0009
24	other-ser	0.0409	0.1184	0.0277	1.0387	0.0954	0.0449
25	loc-roads	0.0019	0.0117	0.0034	0.0022	0.0759	0.0027
26	loc-gov	0.0264	0.0371	0.0467	0.0302	1.0546	0.0367
27	households	0.6643	0.7512	0.5073	0.4009	0.5525	1.1638

Table B-4
(Continued)
Mesa County

	11	12	13	14	15	16	17	18	19	20
1 fruit-ag	food-proc	stone/clay	fab-met	elect-mfg	other-mfg	trans/comm	elect-gen	utilities	wat/sew/tr	wholesale
2 irrig-ag	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0001
3 dry-ag	0.0041	0.0000	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0005	0.0002
4 livestock	0.0228	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
5 coal-mines	0.0511	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002
6 other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7 oil/95-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8 oil/95-ser	0.0008	0.0010	0.0021	0.0012	0.0011	0.0376	0.0049	0.0124	0.0006	0.0027
9 refinings	0.0122	0.0001	0.0001	0.0001	0.0001	0.0023	0.0003	0.0007	0.0000	0.0002
10 loc-const	0.0214	0.0038	0.0013	0.0022	0.0037	0.0026	0.0005	0.0023	0.0014	0.0031
11 food-proc	1.0116	0.0002	0.0002	0.0001	0.0002	0.0003	0.0002	0.0002	0.0008	0.0048
12 stone/clay	0.0006	1.0302	0.0010	0.0002	0.0002	0.0006	0.0005	0.0006	0.0002	0.0096
13 fab-met	0.0006	0.0006	1.0001	0.0050	0.0002	0.0001	0.0001	0.0001	0.0001	0.0049
14 elect-mfg	0.0002	0.0001	0.0001	1.0016	0.0001	0.0004	0.0005	0.0006	0.0020	0.0047
15 other-mfg	0.0022	0.0377	0.0023	0.0071	1.0012	0.0017	0.0004	0.0008	0.0011	0.0101
16 trans/comm	0.0207	0.0268	0.0574	0.0319	0.0291	1.0180	0.1312	0.3362	0.0160	0.0739
17 elect-gen	0.0028	0.0049	0.0035	0.0058	0.0050	0.0019	1.0006	0.2987	0.0073	0.0025
18 utilities	0.0093	0.0232	0.0119	0.0196	0.0169	0.0062	0.0021	1.0035	0.0245	0.0086
19 wat/sew/tr	0.0005	0.0108	0.0008	0.0010	0.0011	0.0004	0.0001	0.0003	1.0002	0.0008
20 wholesale	0.0139	0.0122	0.0043	0.0034	0.0178	0.0075	0.0047	0.0055	0.0081	1.0434
21 gas/auto	0.0017	0.0005	0.0002	0.0003	0.0005	0.0004	0.0001	0.0003	0.0002	0.0004
22 food-lodge	0.0039	0.0010	0.0002	0.0011	0.0007	0.0002	0.0001	0.0003	0.0001	0.0009
23 other-ret	0.0097	0.0013	0.0026	0.0019	0.0034	0.0048	0.0024	0.0026	0.0206	0.0059
24 f/i/r/e	0.0615	0.0160	0.0413	0.0162	0.0331	0.0172	0.0040	0.0080	0.0122	0.0231
25 health-ser	0.0000	0.0000	0.0000	0.0046	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001
26 education	0.0027	0.0020	0.0014	0.0043	0.0013	0.0072	0.0127	0.0146	0.0016	0.0042
27 ski-tows	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
28 other-ser	0.0123	0.0081	0.0211	0.0218	0.0173	0.0391	0.0048	0.0192	0.0363	0.0220
29 loc-roads	0.0008	0.0008	0.0004	0.0013	0.0004	0.0022	0.0039	0.0046	0.0005	0.0013
30 loc-90v	0.0083	0.0061	0.0043	0.0134	0.0041	0.0224	0.0395	0.0455	0.0051	0.0129

Table B-4
(Continued)
Mesa County

	21	22	23	24	25	26	27	28	29	30
	gas/auto	food-lodge	other-ret	f/i/r/e	health-ser	education	ski-tows	other-ser	loc-roads	loc-90v
1	fruit-ag	0.0000	0.0026	0.0000	0.0009	0.0019	0.0009	0.0009	0.0004	0.0014
2	irrig-ag	0.0001	0.0033	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001
3	dry-ag	0.0000	0.0001	0.0000	0.0004	0.0029	0.0208	0.0039	0.0007	0.0058
4	livestock	0.0000	0.0000	0.0000	0.0024	0.0026	0.0080	0.0055	0.0346	0.0823
5	coal-mines	0.0000	0.0000	0.0000	0.0002	0.0004	0.0043	0.0023	0.0003	0.0023
6	other-mine	0.0000	0.0000	0.0000	0.0001	0.0002	0.0003	0.0004	0.0386	0.0104
7	oil/gas-pr	0.0026	0.0024	0.0005	0.0001	0.0001	0.0005	0.0010	0.0003	0.0018
8	oil/gas-ser	0.0002	0.0001	0.0000	0.0001	0.0002	0.0001	0.0003	0.0003	0.0119
9	refinings	0.0006	0.0053	0.0008	0.0004	0.0009	0.0020	0.0105	0.0030	0.0034
10	loc-const	0.0147	0.0266	0.0017	0.0024	0.0026	0.0080	0.0023	0.0101	0.0390
11	food-proc	0.0002	0.0006	0.0002	0.0002	0.0004	0.0043	0.0023	0.0003	0.0023
12	stone/clay	0.0005	0.0018	0.0001	0.0001	0.0002	0.0003	0.0004	0.0386	0.0104
13	fab-met	0.0006	0.0002	0.0000	0.0001	0.0001	0.0005	0.0010	0.0003	0.0018
14	elect-mfg	0.0002	0.0005	0.0001	0.0001	0.0002	0.0001	0.0003	0.0003	0.0119
15	other-mfg	0.0155	0.0230	0.0068	0.0039	0.0009	0.0020	0.0105	0.0030	0.0034
16	trans/comm	0.0707	0.0640	0.0129	0.0233	0.0512	0.0243	0.0231	0.0101	0.0390
17	elect-gen	0.0066	0.0079	0.0011	0.0039	0.0069	0.0101	0.0049	0.0031	0.0102
18	utilities	0.0223	0.0265	0.0038	0.0132	0.0300	0.0340	0.0164	0.0105	0.0344
19	wat/sew/tr	0.0017	0.0183	0.0006	0.0016	0.0045	0.0003	0.0019	0.0009	0.0023
20	wholesale	0.0022	0.0057	0.0024	0.0052	0.0110	0.0079	0.0129	0.0479	0.0159
21	gas/auto	1.0957	0.0007	0.0001	0.0001	0.0004	0.0029	0.0005	0.0001	0.0008
22	food-lodge	0.0008	1.0008	0.0007	0.0027	0.0013	0.0002	0.0014	0.0002	0.0011
23	other-ret	0.0026	0.0125	0.0015	0.0035	0.0066	0.0161	0.0133	0.0024	0.0091
24	f/i/r/e	0.0725	0.0434	1.1892	0.0145	0.0404	0.1092	0.0448	0.0318	0.0457
25	health-ser	0.0000	0.0001	0.0000	1.0344	0.0002	0.0001	0.0007	0.0000	0.0015
26	education	0.0061	0.0118	0.0013	0.0021	1.0015	0.0015	0.0061	0.0023	0.3277
27	ski-tows	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000
28	other-ser	0.0306	0.0643	0.0195	0.0175	0.0274	0.0821	1.0246	0.0158	0.0472
29	loc-roads	0.0019	0.0037	0.0004	0.0005	0.0005	0.0005	0.0019	1.0007	0.1019
30	loc-90v	0.0190	0.0367	0.0040	0.0052	0.0048	0.0046	0.0189	0.0072	1.0187

Table B-4
(Continued)

Garfield, Moffat, Rio Blanco, and Routt Counties

(I-A) INVERSE MATRIX

	1	2	3	4	5	6	7	8	9	10
1 irrig-ag	1.0001	0.0012	0.0235	0.0000	0.0000	0.0000	0.0001	0.0003	0.1414	0.0001
2 dry-ag	0.0387	1.0439	0.0626	0.0000	0.0000	0.0000	0.0000	0.0000	0.0516	0.0000
3 livestock	0.0000	0.0000	1.0846	0.0000	0.0000	0.0000	0.0000	0.0000	0.0858	0.0000
4 coal-mines	0.0005	0.0009	0.0026	1.0018	0.0004	0.0013	0.0002	0.0002	0.0010	0.0003
5 other-mine	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6 oil/gs-pr	0.0027	0.0049	0.0092	0.0142	0.0042	1.0020	0.0018	0.0031	0.0080	0.0046
7 oil/gs-ser	0.0001	0.0002	0.0004	0.0032	0.0133	0.0163	1.0001	0.0009	0.0004	0.0002
8 loc-const	0.0041	0.0104	0.0056	0.0082	0.0041	0.0060	0.0048	1.0160	0.0062	0.0115
9 food-proc	0.0002	0.0004	0.0018	0.0001	0.0001	0.0000	0.0001	0.0005	1.0076	0.0002
10 stone/clay	0.0002	0.0003	0.0005	0.0007	0.0001	0.0002	0.0047	0.0127	0.0002	1.0946
11 other-mfg	0.0070	0.0092	0.0065	0.0012	0.0057	0.0001	0.0005	0.0033	0.0040	0.0014
12 trans/comm	0.0081	0.0147	0.0279	0.0430	0.0128	0.0040	0.0054	0.0095	0.0243	0.0139
13 elect-gen	0.0020	0.0033	0.0101	0.0070	0.0018	0.0052	0.0006	0.0009	0.0038	0.0011
14 utilities	0.0079	0.0132	0.0400	0.0278	0.0059	0.0204	0.0024	0.0037	0.0152	0.0042
15 wat/sew/tr	0.0197	0.0005	0.0011	0.0005	0.0001	0.0001	0.0004	0.0019	0.0034	0.0011
16 wholesale	0.0384	0.0314	0.0228	0.0069	0.0024	0.0023	0.0059	0.0186	0.0153	0.0372
17 gas/auto	0.0022	0.0044	0.0284	0.0006	0.0044	0.0003	0.0078	0.0056	0.0096	0.0022
18 food-lodge	0.0001	0.0003	0.0004	0.0002	0.0001	0.0001	0.0027	0.0015	0.0009	0.0016
19 other-ret	0.0039	0.0104	0.0889	0.0018	0.0010	0.0007	0.0049	0.0255	0.0094	0.0047
20 f/i/r/e	0.0917	0.2274	0.2845	0.0023	0.0132	0.0017	0.0166	0.0525	0.0659	0.0174
21 health-ser	0.0004	0.0011	0.0009	0.0006	0.0001	0.0003	0.0001	0.0001	0.0003	0.0002
22 education	0.0086	0.0215	0.0175	0.0055	0.0024	0.0056	0.0006	0.0014	0.0050	0.0042
23 ski-tows	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0012
24 other-ser	0.0283	0.0552	0.0499	0.0051	0.0203	0.0018	0.0125	0.0187	0.0230	0.0075
25 loc-roads	0.0018	0.0045	0.0037	0.0012	0.0005	0.0012	0.0001	0.0003	0.0010	0.0011
26 loc-gov	0.0250	0.0625	0.0508	0.0161	0.0069	0.0161	0.0017	0.0040	0.0145	0.0121

Table B-4
(Continued)
Garfield, Moffat, Rio Blanco, and Routt Counties

	11	12	13	14	15	16	17	18	19	20
	other-mfg	trans-comm	elect-gen	utilities	wat/sew/tr	wholesale	gas/auto	food-lodge	other-ret	f/i/r/e
1	irrig-as	0.0000	0.0000	0.0000	0.0003	0.0004	0.0000	0.0034	0.0120	0.0000
2	dry-ag	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0013	0.0000
3	livestock	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0016	0.0000
4	coal-mines	0.0016	-0.0006	0.2564	0.0029	0.0004	0.0000	0.0061	0.0017	0.0004
5	other-mine	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	oil/95-pr	0.0077	0.3346	0.0040	0.0050	0.0126	0.0184	0.0186	0.0246	0.0055
7	oil/95-ser	0.0003	0.0150	0.0008	0.0002	0.0006	0.0008	0.0009	0.0011	0.0002
8	loc-const	0.0025	0.0066	0.0045	0.0077	0.0058	0.0111	0.0193	0.0196	0.0021
9	food-proc	0.0001	0.0001	0.0000	0.0006	0.0020	0.0001	0.0002	0.0183	0.0003
10	stone/clay	0.0001	0.0002	0.0001	0.0002	0.0034	0.0002	0.0003	0.0046	0.0000
11	other-mfg	1.0055	0.0013	0.0004	0.0020	0.0044	0.0127	0.0198	0.0455	0.0053
12	trans-comm	0.0232	1.0130	0.0121	0.0151	0.0380	0.0558	0.0504	0.0744	0.0167
13	elect-gen	0.0063	0.0024	1.0021	0.2535	0.0015	0.0048	0.0237	0.0066	0.0014
14	utilities	0.0248	0.0094	0.0062	1.0040	0.0058	0.0190	0.0939	0.0263	0.0057
15	wat/sew/tr	0.0034	0.0002	0.0002	1.0005	0.0002	0.0014	0.0165	0.0035	0.0009
16	wholesale	0.0040	0.0050	0.0030	0.0069	1.0036	0.0051	0.0021	0.0036	0.0019
17	gas/auto	0.0024	0.0010	0.0003	0.0048	0.0016	1.0330	0.0024	0.0109	0.0007
18	food-lodge	0.0004	0.0001	0.0001	0.0002	0.0005	0.0007	1.0007	0.0012	0.0005
19	other-ret	0.0017	0.0042	0.0019	0.0240	0.0092	0.0023	0.0043	1.0032	0.0032
20	f/i/r/e	0.0261	0.0112	0.0034	0.1036	0.0323	0.0600	0.0403	0.0517	1.1701
21	health-ser	0.0002	0.0002	0.0009	0.0001	0.0002	0.0003	0.0006	0.0006	0.0001
22	education	0.0037	0.0044	0.0177	0.0099	0.0031	0.0053	0.0124	0.0120	0.0020
23	ski-tows	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24	other-ser	0.0200	0.0149	0.0048	0.0650	0.0367	0.0252	0.0544	0.0250	0.0281
25	loc-roads	0.0008	0.0009	0.0037	0.0004	0.0006	0.0011	0.0026	0.0025	0.0004
26	loc-90v	0.0108	0.0129	0.0514	0.0051	0.0089	0.0155	0.0361	0.0348	0.0059

Table B-4
(Continued)

Garfield, Moffat, Rio Blanco, and Routt Counties

	21	22	23	24	25	26
	health-ser	education	ski-tows	other-ser	loc-roads	loc-gov
1 irrig-ag	0.0001	0.0003	0.0000	0.0004	0.0009	0.0003
2 dry-ag	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000
3 livestock	0.0000	0.0001	0.0000	0.0002	0.0001	0.0001
4 coal-mines	0.0008	0.0025	0.0032	0.0010	0.0012	0.0015
5 other-mine	0.	0.	0.	0.	0.	0.
6 oil/gas-pr	0.0067	0.0062	0.0072	0.0059	0.0040	0.0051
7 oil/gas-ser	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
8 loc-const	0.0010	0.0035	0.0019	0.0044	0.2076	0.0524
9 food-proc	0.0001	0.0006	0.0001	0.0018	0.0015	0.0006
10 stone/clay	0.0000	0.0002	0.0001	0.0001	0.0041	0.0009
11 other-mfs	0.0043	0.0020	0.0031	0.0054	0.0043	0.0023
12 trans/comm	0.0202	0.0189	0.0219	0.0180	0.0122	0.0155
13 elect-gen	0.0031	0.0097	0.0127	0.0041	0.0048	0.0059
14 utilities	0.0122	0.0385	0.0502	0.0161	0.0188	0.0234
15 wat/sew/tr	0.0012	0.0015	0.0003	0.0018	0.0020	0.0021
16 wholesale	0.0041	0.0064	0.0041	0.0074	0.0278	0.0073
17 gas/auto	0.0002	0.0011	0.0005	0.0021	0.0051	0.0024
18 food-lodge	0.0032	0.0003	0.0004	0.0012	0.0005	0.0012
19 other-ret	0.0036	0.0256	0.0033	0.0120	0.0775	0.0272
20 f/i/r/e	0.0161	0.0813	0.0517	0.0413	0.0280	0.0605
21 health-ser	1.0315	0.0019	0.0005	0.0009	0.0007	0.0176
22 education	0.0024	1.0046	0.0106	0.0061	0.0133	0.3574
23 ski-tows	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000
24 other-ser	0.0153	0.0895	0.0082	1.0232	0.0374	0.0741
25 loc-roads	0.0004	0.0100	0.0022	0.0013	1.0028	0.0747
26 loc-gov	0.0055	0.0134	0.0307	0.0176	0.0387	1.0372

APPENDIX C

SURVEY FORMS USED FOR THE
NORTHWEST COLORADO INTERINDUSTRY STUDIES

HOW TO ANSWER THE SURVEY

We need your profile of expenses to assess business activity in the region. In accountant's terminology, a profit and loss statement is the easiest source of the data we need. Remember, all data on your individual firm is confidential. Anonymous code numbers go onto the surveys so that identity is impossible to track. In exchange for your generosity, we take your privacy very seriously. This is our strict policy.

GUIDELINES:

- 1) use 1980 or the 12 month accounting period that comes closest to calendar year 1980;
- 2) enter expenses and use of funds according to the four step process outlines below;
- 3) answers should be based mainly on the costs, write offs and charges that are tied to ongoing operations; data that goes into an accountant's income statement normally is the kind of data that shows the financial side of the operations;
- 4) investment does receive some attention in items (f), (g) and (h) at the end of the survey;
- 5) simply skip a category where there is no expense that applies.

FOUR STEP PROCESS:

STEP I: Enter only local expenses in categories (1) through (29);

STEP II: for categories (30) through (33) enter all expenses in all regions regardless of where spent, i.e. drop the local separation of expenses you have been using in categories (1) through (29);

STEP III: put any other expenses still unaccounted for into categories (34) through (39) depending on where purchases are being made. Categories (34) through (39) are like a residual; that is, they take all other expensed items not yet shown;

STEP IV: address items (a) through (h).

Again, our sincere thanks. This project is possible because of your support.

EXPENDITURES AND FLOW OF FUNDS

STEP I: SHOW LOCAL EXPENDITURES AND FLOW OF FUNDS MADE ONLY IN MESA COUNTY:

- | | |
|--|----------|
| 1. <u>Fruit Agriculture:</u> | \$ _____ |
| 2. <u>Irrigated Agriculture:</u> | \$ _____ |
| 3. <u>Dryland Agriculture:</u> | \$ _____ |
| 4. <u>Sand and Gravel and Scoria Mining:</u> | \$ _____ |
| 5. <u>Coal Mines:</u> | \$ _____ |
| 6. <u>All Other Mining: Uranium, Vanadium etc.</u> | \$ _____ |
| 7. <u>Oil and Natural Gas Producers:</u> | \$ _____ |
| 8. <u>Oil, Coal and Other Mining Services:</u> | \$ _____ |
| 9. <u>Chemical and Petroleum Refining:</u> | \$ _____ |
| 10. <u>Local Construction: Building Contractors; Heavy Construction (road, pipeline, dirt work); Trades, e.g. electricians, plumbers, carpenters, decorating, heating specialists, etc.</u> | \$ _____ |
| 11. <u>Food Processing: packing plants, dairy products, canning, grain mills, food packaging, bottlers, bakeries, etc.</u> | \$ _____ |
| 12. <u>Stone, Clay, Glass, and Concrete Manufacturers: cement, stone, brick and pipe, ready-mix and prestressed concrete.</u> | \$ _____ |
| 13. <u>Fabricated Metal and Non-Electrical Machinery Manufacturers:</u> | \$ _____ |
| 14. <u>Electrical and Transportation Equipment:</u> | \$ _____ |
| 15. <u>All Other Manufacturers:</u> | \$ _____ |
| 16. <u>Transportation and Communication: trucking and storage, railroad, bus, airlines, oil pipelines; telephone, radio, TV, Post Office.</u> | \$ _____ |
| 17. <u>Electrical Power Generating Stations:</u> | \$ _____ |
| 18. <u>Electrical and Natural Gas Utilities:</u> | \$ _____ |
| 19. <u>Water, Sewer, Trash Removal:</u> | \$ _____ |
| 20. <u>Wholesale: purchases from all firms that principally sell to firms (as opposed to retail that sells to the general public)</u> | \$ _____ |
| 21. <u>Gas Stations and Auto Dealers:</u> | \$ _____ |
| 22. <u>Restaurants and Drinking Places, Lodging: motels, hotels, campgrounds.</u> | \$ _____ |
| 23. <u>All Other Retail: hardware and lumber, variety stores, appliances, groceries, furniture, auto parts, liquor, clothing, catalog stores.</u> | \$ _____ |
| 24. <u>Finance, Insurance, Real Estate: interest and fees to banks and savings and loans (no principal), insurance agents, real estate and title insurance offices, property developers and subdividers.</u> | \$ _____ |
| 25. <u>Health (private): clinics, doctors, retirement homes.</u> | \$ _____ |
| 26. <u>Ski Industry: lifts, tows, instruction, rentals.</u> | \$ _____ |
| 27. <u>All Other Services: laundry, business and computer services, garages and repairs, leasing, legal, accounting, etc.</u> | \$ _____ |
| 28. <u>Local Roads:</u> | \$ _____ |
| 29. <u>City and County Governments, Improvement Districts:(except utilities)</u> | \$ _____ |

STEP II: FOR THESE CATEGORIES SHOW EXPENDITURES AND FLOW OF FUNDS IN MESA COUNTY
AND ALL OTHER REGIONS COMBINED:

- 30. Gross Salaries and Wages: \$ _____
- 31. Colorado State Government: fees, licenses, taxes, etc. \$ _____
- 32. Federal Government: fees, royalties, payroll and income taxes, etc. \$ _____
- 33. Property Rents, Depreciation, Dividends, Current Earnings: \$ _____

STEP III: SHOW RESIDUAL EXPENSES AND OUTLAYS NOT YET ASSIGNED ABOVE:

- 34. Expenses and Outlays in Garfield County: \$ _____
- 35. Expenses and Outlays in Rio Blanco County: \$ _____
- 36. Expenses and Outlays in Routt County: \$ _____
- 37. Expenses and Outlays in Moffat County: \$ _____
- 38. Expenses and Outlays in the Rest of Colorado: \$ _____
- 39. Expenses and Outlays in the Rest of U.S. and World: \$ _____
- 40. TOTAL (CATEGORIES 1 through 39; this figure should equal sales) \$ _____

a) Please state your major business, e.g. grocery, gas station, contractor, accountant, etc.

b) Inventory change from end of 1979 to end of 1980: \$ _____

c) What was your FTE (Full Time Equivalent) employment in 1980?
Average number of employees: _____

d) At what level of capacity did you operate during 1980? % of capacity When

Lowest	_____	_____
Highest	_____	_____

e) Water Intake, per day or per month or per year? _____ gallons.

f) Amount of Capital Outlays (that were not expensed) in 1980: \$ _____

g) Amounts paid as Principal on Business Indebtedness in 1980: \$ _____

h) Describe plans, if any, for future capital outlays (dollars?, renovation?, expansion? etc.)
The purpose in this question is to anticipate where business activity and capacity will go.

Four County Model

HOW TO ANSWER THE SURVEY

We need your profile of expenses to assess business activity in the region. In accountant's terminology, a profit and loss statement is the easiest source of the data we need. Remember, all the data on your individual firm is confidential. Anonymous code numbers go onto the surveys so that identity is impossible to track. In exchange for your generosity, we take your privacy very seriously. This is our strict policy.

GUIDELINES:

- 1) Use 1980 or the 12 month accounting period that comes closest to calendar year 1980;
- 2) enter expenses and use of funds according to the four step process outlined below;
- 3) answers should be based mainly on the costs, write offs and charges that are tied to ongoing operations; data that goes into an accountant's income statement normally is the kind of data that shows the financial side of the operations;
- 4) investment does receive some attention in items (f), (g) and (h) at the end of the survey;
- 5) simply skip a category when there is no expense that applies.

FOUR STEP PROCESS:

STEP I: enter only local expenses in category (1) through (29);

STEP II: for categories (30) through (33) enter all expenses in all regions regardless of where spent, i.e. drop the local separation of expenses you have been using in categories (1) through (29);

STEP III: put any expenses still unaccounted for into categories (34) through (36) depending on where purchases are being made. Categories (34) through (36) are like a residual; that is, they take all other expensed items not yet shown;

STEP IV: address items (a) through (h).

Again our sincere thanks. This project is possible because of your support.

EXPENDITURES AND FLOW OF FUNDS

STEP I: SHOW LOCAL EXPENDITURES AND FLOW OF FUNDS MADE ONLY IN
GARFIELD, ROUTT, RIO BLANCO, OR MOFFAT COUNTIES:

1. <u>Fruit Agriculture:</u>	\$ _____
2. <u>Irrigated Agriculture:</u>	\$ _____
3. <u>Dryland Agriculture:</u>	\$ _____
4. <u>Sand and Gravel and Scoria Mining:</u>	\$ _____
5. <u>Coal Mines:</u>	\$ _____
6. <u>All Other Mining:</u> Uranium, Vanadium etc.	\$ _____
7. <u>Oil and Natural Gas Producers:</u>	\$ _____
8. <u>Oil, Coal and Other Mining Services:</u>	\$ _____
9. <u>Chemical and Petroleum Refining:</u>	\$ _____
10. <u>Local Construction:</u> Building Contractors; Heavy Construction (road, pipeline, dirt work); Trades, e.g. electricians, plumbers, carpenters, decorating, heating specialists, etc.	\$ _____
11. <u>Food Processing:</u> packing plants, dairy products, canning, grain mills, food packaging, bottlers, bakeries, etc.	\$ _____
12. <u>Stone, Clay, Glass, and Concrete Manufacturers:</u> cement, stone, brick and pipe, ready-mix and prestressed concrete.	\$ _____
13. <u>Fabricated Metal and Non-Electrical Machinery Manufacturers:</u>	\$ _____
14. <u>Electrical and Transportation Equipment:</u>	\$ _____
15. <u>All Other Manufacturers:</u>	\$ _____
16. <u>Transportation and Communication:</u> trucking and storage, railroad, bus, airlines, oil pipelines; telephone, radio, TV, Post Office.	\$ _____
17. <u>Electrical Power Generating Stations:</u>	\$ _____
18. <u>Electrical and Natural Gas Utilities:</u>	\$ _____
19. <u>Water, Sewer, Trash Removal:</u>	\$ _____
20. <u>Wholesale:</u> purchases from all firms that principally sell to firms (as opposed to retail that sells to the general public)	\$ _____
21. <u>Gas Stations and Auto Dealers:</u>	\$ _____
22. <u>Restaurants and Drinking Places, Lodging:</u> motels, hotels, campgrounds.	\$ _____
23. <u>All Other Retail:</u> hardware and lumber, variety stores, appliances, groceries, furniture, auto parts, liquor, clothing, catalog stores.	\$ _____
24. <u>Finance, Insurance, Real Estate:</u> interest and fees to banks and savings and loans (no principal), insurance agents, real estate and title insurance offices, property developers and subdividers.	\$ _____
25. <u>Health (private):</u> clinics, doctors, retirement homes.	\$ _____
26. <u>Ski Industry:</u> lifts, tows, instruction, rentals.	\$ _____
27. <u>All Other Services:</u> laundry, business and computer services, garages and repairs, leasing, legal, accounting, etc.	\$ _____
28. <u>Local Roads:</u>	\$ _____
29. <u>City and County Governments, Improvement Districts:</u> (except utilities)	\$ _____

STEP II: FOR THESE CATEGORIES SHOW EXPENDITURES AND FLOW OF FUNDS IN GARFIELD, ROUTT, RIO BLANCO, AND MOFFAT COUNTIES AND ALL OTHER REGIONS COMBINED:

- 30. Gross Salaries and Wages: \$ _____
- 31. Colorado State Government: fees, licenses, taxes, etc. \$ _____
- 32. Federal Government: fees, royalties, payroll and income taxes, etc. \$ _____
- 33. Property Rents, Depreciation, Dividends, Current Earnings: \$ _____

STEP III: SHOW RESIDUAL EXPENSES AND OUTLAYS NOT YET ASSIGNED ABOVE:

- 34. Expenses and Outlays in Mesa County: \$ _____
- 35. Expenses and Outlays in the Rest of Colorado: \$ _____
- 36. Expenses and Outlays in the Rest of U.S. and World: \$ _____
- 37. TOTAL (CATEGORIES 1 through 36; this figure should equal sales) \$ _____

a) Please state your major business, e.g. grocery, gas station, contractor, accountant, etc.

b) Inventory change from end of 1979 to end of 1980: \$ _____

c) What was your FTE (Full Time Equivalent) employment in 1980?
Average number of employees: _____

d) At what level of capacity did you operate during 1980? % of capacity When

Lowest	_____	_____
Highest	_____	_____

e) Water Intake, per day or per month or per year? _____ gallons.

f) Amount of Capital Outlays (that were not expensed) in 1980: \$ _____

g) Amounts paid as Principal on Business Indebtedness in 1980: \$ _____

h) Describe plans, if any, for future capital outlays (dollars?, renovation?, expansion? etc.)
The purpose in this question is to anticipate where business activity and capacity will go.

APPENDIX D
CRITIQUE OF DATA SOURCES

APPENDIX D
CRITIQUE OF DATA SOURCES

INTRODUCTION

Data gathered for the northwest Colorado interindustry models were secured from a wide variety of primary and secondary sources. Data from secondary sources were basically used to provide preliminary estimates of total gross output levels for the respective sectors delineated in the study. As the study progressed, it was discovered that particular secondary sources could not be used for such estimation purposes. The reasons for this are quite specific and vary depending on the source. Primary data were used extensively to estimate the transactions among sectors table; they were also used to estimate a level of total gross output for several of the sectors. Thus, the purpose of this section is to criticize the various data sources and specifically explain how the data and any attending problems were handled in the study. The discussion commences with an overview of the primary sources. Following this, the section is divided by SIC division descriptions with each containing an identification of relevant data sources, comment on the adequacy of the data for the northwest Colorado region interindustry models, and mention of how the data were handled.

Following the discussion is a complete listing, in bibliographic form, of data sources cited. Reference numbers in the text of this section refer to the sequence numbers of this list. Following each

entry is an abbreviated annotation in brackets. The SIC numbers in the annotation indicate that data pertinent to that respective SIC classification are contained in the source cited; a verbal description is used when SIC numbers are not appropriate.

PRIMARY SOURCES

Data from primary sources can be classified into two categories: first, information obtained directly from economic producers, and second, information obtained from the files of government agencies, trade associations, and others who receive report forms from economic producers. As indicated previously, data obtained directly from economic producers were secured through the interview process; a mail questionnaire was not employed in the study.

Data identifying gross flows for the agriculture and livestock sectors were largely secured from the Cooperative Extension Service, Department of Economics, Colorado State University, and a study conducted at Colorado State University, for Bureau of Land Management and the Forest Services, Effects of Federal Grazing Land on the Economy of Colorado (45) (also see 38). Specifically, the Extension Service data pertained to estimated costs of producing particular crops and animals, not the aggregate expense levels of individual farm operators.

John Pederson and Oded Rudawsky of the Colorado School of Mines developed a rather extensive study of minerals and energy in Colorado (41). Their study was supplemented by interviews of the important extractive industries in the study region.

Special comment on the data secured from the Colorado Department of Labor and Employment is warranted (10). Employment and wage

information contained in the reports of each employer in the state is placed on reels of computer tape for processing by the Department. The Colorado Manpower Review (9) publishes a summary of this data for the state and the Denver-Boulder labor market area; detailed information for individual counties does not ordinarily get published. Accordingly, the information pertinent to employment and earnings in the two study areas of northwest Colorado had to be obtained directly from the Colorado Department of Labor and Employment.

Serious difficulties were not encountered with the information secured from the files and in-house reports of other government agencies, trade associations, and other organizations (5, 6, 10, 22, 23, 24, 25, 29, 31, 39, 46, 70, and 79). The data were not always in the form requested, but were sufficiently detailed so that, with slight modifications, they were quite useful. Specific comment on these data and others follow in the respective SIC division.

AGRICULTURE AND FORESTRY

Of all economic sectors in the model, agriculture has the most current and detailed secondary data. The most versatile document in terms of securing individual crop data on an individual county basis is the Colorado Agricultural Statistics publication (1). Issued annually by the Colorado Department of Agriculture, it publishes detail on major state crops, and identifies the production levels in respective counties. Specific limitations are nonetheless inherent in tabular presentations. For example, crops are reported on a production and market value basis; and there is a difference between market value and market receipts. The implication of this is not too severe for crops when

virtually all production is marketed; but this is not the case with crops such as hay. Total gross output in the model is defined in terms of market receipts; so an adjustment of the value of the hay crop, as reported in Colorado Agricultural Statistics, was made. Specifically, the ratio of hay marketings reported in the 1979 Federal Census of Agriculture to the 1979 market value of hay reported in Colorado Agricultural Statistics was applied to the latter's 1980 report.

The Colorado Agricultural Statistics also has a tendency to aggregate certain "minor" crops not only across crop lines but also county lines. For example, potatoes are identified for Morgan, Weld, and the respective counties in the San Luis Valley; one value is then reported for the rest of the state. Hence, while potato production is not relevant in northwest Colorado, precise documentation of that fact is not possible because of aggregated reporting for crops.

Other particular adjustments were not attempted on the irrigated and dry agricultural output as reported by Colorado Agricultural Statistics. The publication is not well enough documented to determine whether or not an adjustment is warranted. Further, all production indices available are for the entire state and are highly aggregated (2).

Procedures employed to secure and report information are not documented in Colorado Agricultural Statistics. A regional analyst must be concerned with the quality of data, but really has no basis for judgment without supporting documentation. For example, onion production is reported in Colorado Agricultural Statistics for the Western Slope (no county delineation); the Bureau of Reclamation also reports onion production in the annual publication of Water and Land Resource

Accomplishments for farms served by the Grand Valley and Uncompahgre projects (73) and (74). The Bureau's report suggests there is a definite element of randomness involved, i.e., both acreage planted and production yields vary over time. By contrast, the acreages reported by Colorado Agricultural Statistics are rather consistent. It should also be mentioned that in certain years the Bureau's publication reports considerably more acreage for farms served by the above two projects than the state publication does for the entire Western Slope; and for the counties involved, the authors suggest that it makes a considerable difference in the aggregate value of marketings.

Data on the value of marketings of livestock are reported in Colorado Agricultural Statistics for final marketings only. Further, the data are reported at the state level. Not only are interfarm transactions not reported, but the relative value of individual county output cannot be directly determined. Thus, the value of the total gross output of the livestock sector in the northwest Colorado inter-industry study was determined from information secured from the Cooperative Extension Service, Department of Economics, Colorado State University.

Determination of the gross flows for agriculture and livestock production was highly dependent on information secured from the Cooperative Extension Service and Federal Grazing in Colorado, an unpublished study conducted at Colorado State University for the Bureau of Land Management and the Forest Service. This was supplemented with data published in Cost of Producing Crops in the Irrigated Southwest (84) and information supplied by the Northwest Colorado Agri-Business Association (39) and Tri River Agri-Business Farm Management

Association (46). Government payments to the agricultural sectors were determined from the Agricultural Stabilization and Conservation Service, Annual Report – Colorado (47).

Data on the employment of labor in the agricultural sectors are not readily available from published sources. The estimate of the dollars paid for wages in each of the sectors was based on the Cooperative Extension Service information and Laing's thesis on the Impacts of Federal Grazing Land (38). Employment levels were then imputed using a 2,000 hour work year. The number of people employed in agriculture as identified in the Census of Population (61) could also have been used to obtain an employment coefficient, but wasn't. The aggregate value for agricultural services was estimated by using the Cooperative Extension Service information and checked for consistency by interview.

In summary, adequate data do appear to exist for the agricultural sectors of the northwest Colorado economy. However, particular concern is noted for the high level of aggregation in some cases, a lack of published interfarm transaction values for livestock, and lack of good data on employment. Also, it appears that there is a general lack of documentation; a deficiency which must be overcome in order to judge the quality of the data.

MINING

Publications by the federal government were not considered for inclusion in the mining division of the model. At the national level, and sometimes the state level, information pertaining to mining production quantities and values can be secured. Because of the characteristically small number of operators, information on specific minerals in

specific counties is rarely published. Examples of federal publications for which this is largely true are: Census of Mineral Industries (60); Minerals Yearbook (72); Statistical Data for the Uranium Industry (77); and Uranium Exploration Expenditures and Plans (78).

State of Colorado documents were relied upon quite extensively, but not without reservation. The most comprehensive, yet most limiting, state document is A Summary of Mineral Industry Activities in Colorado (13). This publication lists production by mineral value and by county. Listing by mineral value has several very specific limitations. For some outputs the unit price is not always given; thus, quantity calculation becomes difficult, if not nearly impossible. Where unit price is given it is always applied to all production; thus, for example, the market value for metallurgical coal is published as being equal to the market value for other types of coal. The unit price for ores refers to a refined market value; thus, when ore is subject to reduction away from the county in which it was mined, the value accruing to the mining county is overstated. One last criticism is leveled at the practice in the publication of adding nearly \$100 million to the value of state mineral production and footnoting it as minerals mined out of, but refined in, the state; no indication is given as to what the minerals are or where they are refined.

Data are available monthly in the Monthly Report (15) and annually in Coal (14) on the production of coal. Tonnage values, labor employed, and days worked are reported for every coal mine in the state. Barrels of oil pumped, cubic feet of gas produced, and the volume of injections are published for every well in the state in Oil and Gas Statistics (17). Thus, the researcher is left with the task of

determining a unit value when information on coal, oil, and gas is secured from these sources.

The Pederson and Rudawsky study, "The Role of Minerals and Energy in the Colorado Economy," was used as a secondary data source in the mining division, especially as it related to oil and gas production. A publication that complemented Oil and Gas Statistics when identifying potential interviews for the oil and gas sector was the Rocky Mountain Petroleum Directory (83).

In the final analysis, the total gross output values used in the mining division of the northwest Colorado study were estimated based on information gained by interviewing. Federal publications fail to publish sufficient information at the county level and state publications leave much to be desired with respect to unit pricing. Furthermore, state documents do not necessarily identify the economic production that takes place in some counties.

CONSTRUCTION

Publications such as the Census of Construction Industries (52) and (53) and the Construction Review (67) aggregate on the state level and hence are inadequate for estimation of activities in individual counties. The publication Construction Reports – Housing Authorized by Building Permits and Public Contracts (65), though county specific, fails to account for permits and contracts authorized during a given period. In a relatively small county there is not necessarily sufficient volume to either avoid "lumpy" reporting or maintenance of the assumption that level of work in a given period is equal to the dollar value of the authorizations. Finally, the Construction Reports do not

suggest how much of the job is involved with various types of contractors so that an estimation of value of intersector transactions can be made. In conclusion, the authors saw no alternative but to estimate total gross output for the construction sector from primary data.

MANUFACTURING

Both the Census of Manufacturers (59) and County Business Patterns (66) are fairly complete in a broad sense but still quite limited in what detail published. Disclosure requirements preclude publishing critical information and result in a high degree of aggregation. Even in those sectors where the data are published, restrictions are imposed because seasonal variations and secular growth are not reflected in the first quarter reporting. As a result, neither of these publications was of much use for the estimation of a control total. In fact, levels of output for the manufacturing sectors had to be estimated from primary data.

The Directory of Colorado Manufacturers (81), published annually by the Bureau of Economic and Business Research (University of Colorado), was used extensively in the determination of which manufacturers to interview. The publication identifies firms by four-digit SIC classification, location, and employment range. Key personalities are also identified. Some information in the Directory of Colorado Manufacturers is quite dated, but the document is nonetheless an invaluable reference.

Before interviewing a given owner or manager, an attempt was always made to gain a "feel" for the type of firm that was involved. For example, research was done on what the output per worker might be

and what might be expected in terms of value added. A publication quite often referred to for answers to these types of questions was the Annual Survey of Manufacturers (50). Though the information contained therein was not directly used in the northwest Colorado study, it did provide for an ongoing consistency check. Specifically, the document contains, on a four-digit SIC basis, ratios pertaining to inputs and outputs of the manufacturing sectors of the national economy.

In summary, detailed secondary data do not exist for manufacturing activities in the study region. Aggregate levels of economic activity for individual sectors must be determined from primary data and checked for consistency by observing secondary data.

TRANSPORTATION, COMMUNICATING, ELECTRIC, GAS, AND SANITARY SERVICES

Secondary data for the transportation, communications, electric, gas, and sanitary services sectors are readily available and generally speaking, of fairly good quality. Despite this, only a limited amount of them were used in this study. The reasons for this are largely in the nature of the filing system at the Colorado Public Utilities Commission (PUC) (23) and methods employed prior to seeking an interview with any given firm. Consequently, before any single interview was conducted, an attempt was made to learn as much as possible about the firm in question. This meant that for firms in the public utilities sectors, the research started with an examination of the reports filed with the PUC. The PUC reports were also used to estimate levels of total gross output where applicable. For those cases in which the PUC does not have jurisdiction, because municipal-owned enterprises are involved, estimates were made based on information filed with the

Colorado State Auditor (24). Despite the above-mentioned relatively high incidence of direct information, secondary data sources still merit comment.

The Interstate Commerce Commission publishes materials pertaining to various forms of transportation on a regional basis: examples are Transport Statistics in the United States: Pipelines (36) and Transport Statistics in the United States: Motor Carriers (37). These types of documents were not really helpful in the study because their use necessitates a significant amount of prorating. As a result, the best alternative was to estimate the level of economic activity in the transportation sector from PUC reports, State Auditor's reports and information gained in interviews.

United States Postal Service (U.S.P.S.) revenues were determined by examining postal receipt schedules for each post office in the region. Since Congress created the independent U.S.P.S., postal receipts for individual post offices are no longer published. Accordingly, this information was obtained directly from the Sectional Center Facility (SCF) managers (79). Despite the accuracy of this information, it is suggested that the regional accounting perspective can lead to an erroneous conclusion about the U.S.P.S. This is because the postal sector's total gross output was defined in terms of an expense level rather than a revenue level. The reason for doing this is that the imputed postal revenue for the northwest Colorado region is higher than the actual revenue, but it is not known how much higher. For example, Mountain Bell mails statements to local customers from Denver; the actual revenue for the U.S.P.S. is identified with the Denver Post Office, yet a portion of the expenses connected with the handling of

those statements is absorbed by the local Post Office. Thus, a portion of the actual Denver revenue imputes to the study region.

Information on rural telephone systems can be obtained from the Annual Statistical Report: Rural Telephone Borrowers (49). Territorial integrity for rural systems in the region is such that the information is straightforward and does not have to be allocated. Mountain Bell's activities, on the other hand, had to be estimated by prorating the various revenues and charges identified in their annual report to the Colorado PUC. This was greatly facilitated by having additional information supplied directly by the company. Radio and television activities were estimated by prorating data contained in the Federal Communications Commission's Annual Report (30). Specifically, the data identified revenue for stations outside the metropolitan area. The basis for allocation was the volume of retail sales as identified in the Annual Report (21) of the Colorado Department of Revenue.

Published secondary data were of limited use for estimating electric and gas revenues. For example, examination of Annual Statistical Report: Rural Electric Borrowers (48) sometimes fails to include the operation of electric associations which are headquartered outside the study region. Information contained in Statistics of Publicly Owned Electric Utilities in the United States (34) is reported on a company basis and the study region is only part of the territory of the Public Service Company of Colorado. Statistics of Publicly Owned Electric Utilities in the United States (35) does not identify all the municipal operations in the northwest Colorado region. Thus, the estimation of total gross output for the electricity and natural gas sector was

determined by the information obtained from PUC reports, the State Auditor, and interviews.

The water, sewerage, and sanitary services sector is characterized by a high incidence of special tax districts. Complete information on the activities of these districts is not published anywhere. Thus, the audit reports filed with the Colorado State Auditor were examined in detail to secure information for this sector. For those instances where private enterprise is involved, the information was obtained at the PUC office.

In summary, though considerable information is published for the transportation, communication, electric, gas, and sanitary services sectors, problems associated with excessive aggregation, territorial integrity, and incomplete reporting precluded use of the information in the northwest Colorado interindustry study.

TRADE — WHOLESALE AND RETAIL

Secondary data sources used to estimate the levels of total gross output included the Census of Wholesale Trade (64), the Census of Retail Trade (62), and the Colorado Department of Revenue's Annual Report (21). Problems associated with the use of the Department of Revenue report stem from the failure to identify the ratio of tax exempt sales at the county level and what appears to be a rather significant understatement of the volume of wholesale activities. Interviews were used to gain information relative to what values would be used for regional flows and margining of the trade sectors. Further, information contained in publications such as "Economic Impact of Alternative Energy Supply Policies in Colorado" (26) and "An

Interindustry Analysis of the Colorado River Basin in 1960 with Projections to 1980 and 2010" (80) was used to routinely check for inconsistency.

FINANCE, INSURANCE, AND REAL ESTATE

Secondary data on the activities of commercial banks are contained in Sheshunoff & Company's The Banks of Colorado (44). This is a privately-printed industry publication that shows the balance sheet and income statement for each bank in the state. A source such as Bank Operating Statistics (32), published by the Federal Deposit Insurance Corporation, aggregates information by region; none of these regions correspond to the geographic delineation of the northwest Colorado study. Accordingly, the Sheshunoff data were used to identify the level of economic activity for commercial banks.

Savings and Loan Association data are published in Combined Financial Statements — Member Savings and Loan Association of the Federal Home Loan Bank System (33). Association activities are identified by state total, metropolitan area, and the area outside the metropolitan area. Thus, to estimate total gross output for savings and loan associations, the activity outside the metropolitan area was prorated to the study regions by using the personal adjusted gross income figures reported in the Colorado Department of Revenue's Annual Report (21). Information pertaining to the activities of the Federal Credit Bank's operations was gained from filed reports (31).

Insurance activities were estimated from information gained largely from interview. The Colorado Division of Insurance publishes the Insurance Industry in Colorado: Statistical Report (20). This

document identifies, on a company basis and a line basis, premiums earned and losses incurred. As a first approximation, the difference between premiums and losses was prorated by Colorado adjusted gross income to estimate the study regions' insurance activity. This first approximation was then modified based on information gained in interviews.

Real estate activities were estimated by first obtaining the value of documentary fees paid in each of the five counties (29). From the documentary fees paid an estimate was made of the transaction values involved and a 6 percent commission was allowed on the same. The estimated commissions were used in turn as the approximation for the total gross output of the real estate sector.

In summary, direct information pertaining to finance, insurance, and real estate does not exist in published form for the study region. Estimates must be made using a combination of published secondary data and information gained from primary sources.

SERVICES

Data sources for services are grouped into three categories for discussion purposes. The first part of the discussion will focus on data sources pertinent to the health and medical care field; the second pertains to data sources for the education sector; and final portion comments on data sources for all other services.

Information pertaining to institutional health care was secured directly from the providers of the services. A partial list of hospitals and nursing homes in the region is contained in the Directory — Medicare Providers and Suppliers of Services (68).

The value of services provided by physicians, dentists, optometrists, and others was estimated by using secondary information. For a first approximation, information contained in "National Health Expenditures" (28) was adjusted by using the index values published in Medicare: Health Insurance for the Aged - Geographical Index of Reimbursement by State and County (69). The resulting figure was then adjusted based on information gained in interviews and secured from the Colorado State Department of Health (7), the Colorado Department of Social Services (22), and the Social Security Administration (70).

Data are readily available for education activities in the northwest Colorado region. Data pertaining to colleges were secured directly from the respective institutions. Revenues and Expenditures: Colorado School Districts (6), published annually by the Colorado Department of Education, was used to identify the level of total gross output for public schools. This document is comprehensive and identifies revenues and expenditures for each school district in the state. Data secured from the CCHE and the Department of Education's revenue and expenditure report were supplemented with information gained in interviews. Because of the high quality data described above, the Bureau of the Census data contained in Finances of School Districts (57) were not used in the northwest Colorado interindustry study.

The information contained in Census of Selected Service Industries (63) was used as a first approximation of the total gross output for all other services. Colorado Department of Labor and Employment data were used to update the census data to an approximation of 1980 conditions. Concomitantly, the data pertained to dental laboratories in this publication were removed to the health and medical care sector.

Estimation of total gross output for ski tows was accommodated by interview. Limited primary information was collected for the services not elsewhere classified sector. Accordingly, given this limitation, caution is expressed with regard to the accuracy of the coefficients in this sector in the northwest Colorado interindustry models. Further, it is recommended that an in-depth study of the sector be conducted employing primary data collection techniques.

PUBLIC ADMINISTRATION

Rather extensive information on local and county government activities is contained in the Bureau of Census publications, Compendium of Government Finances (54), Finances of County Governments (55), Finances of Municipalities and Township Governments (56), and Compendium of Public Employment (58). Two considerations precluded the use of these documents in this interindustry study. First, the desire to have even more detailed data to facilitate the separation of local and county government enterprises. Second, preliminary investigation suggested that the dollar increase in a number of local and county government budgets was rather significant between 1972 and 1980.

Secondary data published by the state were used extensively during the preliminary stages of the research but were later replaced with primary data. The Local Government Financial Compendium (11) does not list expenditures and revenues for communities under 1,000 people. Further, the publication does not account for special tax districts. The Division of Property Taxation's Annual Report to the Governor and the Legislature (12) identifies valuations, levies, and property tax revenues for every local tax authority. The Colorado Department of

Revenue's Annual Report (21) contains information sufficient to estimate local sales tax collections. Though each publication contains good quality data, the northwest Colorado study eventually used the files of the State Auditor. The audit reports filed here are more complete, more detailed, and more extensive in coverage than the state publication.

Data pertaining to the total expenditures of the State of Colorado were secured directly from the Colorado Department of Planning and Budget (19). An executive order caused all state budgets to be regionalized according to the various planning regions in the state. Though the planning regions do not conform to the delineation of the northwest Colorado interindustry study, the budget regionalization greatly facilitated the search for data on state expenditures. Information on tax payments to the State of Colorado is contained in the Department of Revenue's Annual Report (21). An estimation of revenues from hunting and fishing licenses was made based on information in Colorado Big Game Harvest (16). Revenue generated because of activities on state lands was estimated by using the State Board of Land Commissioners' Summary of Transactions (18).

Following the collection of the above data, interviews were arranged with the agencies that made significant expenditures in behalf of the State of Colorado. Scheduling the expense patterns of the Colorado Department of Highways was greatly facilitated by the use of Colorado's Annual Highway Report (8). In summary, the data secured on the State of Colorado pecuniary activities were not difficult to obtain and are rather comprehensive.

Revenues accruing to the federal government account were largely estimated by prorating from a Colorado base. The Treasury publication, Combined Statement of Receipts, Expenditures, and Balances of the United States Government for the Fiscal Year Ended June 30, 1975 (75), identified revenue by state and by category. Thus, the figure published for Colorado was adjusted by using information in the Colorado Department of Revenue's Annual Report (21) and the Treasury's Statistics of Income 1969, ZIP Code Area Data from Individual Income Tax Returns (76). This first approximation was then adjusted by using information gained from the Forest Service, the Bureau of Land Management, the Bureau of Reclamation, and the publication Public Land Statistics (71).

For a first approximation of federal expenditures, data were secured from Federal Outlays in Colorado (39). This publication shows estimates for federal outlays by agency and by county. Many of the estimates are prorated by using standardized criteria. Thus, the research for the northwest Colorado interindustry study sought to estimate federal expenditures independently. Some documents, such as the Veterans Administration's Annual Report (82) and the Railroad Retirement Board's Annual Report (42), were examined and the data so secured prorated to the study region. This practice was too limiting, so more direct information was obtained. Specifically, major federal agencies were contacted.

In summary, the data on federal government revenues are approximations derived largely from state totals. The data pertaining to federal expenditures are largely estimations based on information gained from interviews.

Households were not interviewed for their purchases distribution. The data pertaining to household income and expenses are a direct result of the estimations made for the income and expenses of the other sectors in the study.

SOURCES CITED IN APPENDIX D

- (1) Colorado. Department of Agriculture. Colorado Crop and Livestock Reporting Service. Colorado Agricultural Statistics. Annual. [01, 02, 07]
- (2) Colorado. Department of Agriculture. Colorado Crop and Livestock Reporting Service. Colorado Farm Income. March 1975. [01, 02]
- (3) Colorado. Department of Agriculture. Colorado Crop and Livestock Reporting Service. Colorado Fruit Tree Survey - 1067, by William C. Dobbs. February 1963. [01]
- (4) Colorado. Department of Agriculture. Colorado Crop and Livestock Reporting Service. Colorado Peach Tree Survey - 1971, by Larry C. Johnson. February 1972. [01]
- (5) Colorado. Department of Education. Commission on Higher Education. Files. [822]
- (6) Colorado. Department of Education. Revenues and Expenditures: Colorado School Districts. Annual. [821]
- (7) Colorado. Department of Health. Files. [80]
- (8) Colorado. Department of Highways. Colorado's Annual Highway Report. Annual. [state highways, state patrol]
- (9) Colorado. Department of Labor and Employment. Colorado Manpower Review. Monthly. [employment, earnings]
- (10) Colorado. Department of Labor and Employment. Files. [employment, earnings]
- (11) Colorado. Department of Local Affairs. Division of Local Government. Local Government Financial Compendium. Annual. [local and county governments]

- (12) Colorado. Department of Local Affairs. Division of Property Taxation. Annual Report to the Governor and the Legislature. Annual.
[valuations, levies, property tax revenues]
- (13) Colorado. Department of Natural Resources. Division of Mines. A Summary of Mineral Industry Activities in Colorado. Annual.
[10, 12, 13, 14]
- (14) Colorado. Department of Natural Resources. Division of Mines. Coal. Annual.
[12]
- (15) Colorado. Department of Natural Resources. Division of Mines. State Coal Mine Inspection. Monthly Report. Monthly.
[12]
- (16) Colorado. Department of Natural Resources. Division of Wildlife. Colorado Big Game Harvest. Annual.
[hunting and fishing statistics]
- (17) Colorado. Department of Natural Resources. Oil and Gas Conservation Commission. Oil and Gas Statistics. Annual.
[13]
- (18) Colorado. Department of Natural Resources. State Board of Land Commissioners. Summary of Transactions. Annual.
[public land administration]
- (19) Colorado. Department of Planning and Budget. Files.
[state government]
- (20) Colorado. Department of Regulatory Agencies. Division of Insurance. Insurance Industry in Colorado: Statistical Report. Annual.
[63, 64]
- (21) Colorado. Department of Revenue. Annual Report. Annual.
[population, income, state tax revenues, motor vehicle registration]
- (22) Colorado. Department of Social Services. Files.
[80, 83, households]
- (23) Colorado. Public Utilities Commission. Files.
[40-42, 45-49]
- (24) Colorado. State Auditor. Files.
[local and county governments, special tax districts]
- (25) Colorado Health Care Association, Denver, Colorado. Files.
[80]

- (26) Colorado School of Mines. Department of Mineral Economics. "Economic Impact of Alternative Energy Supply Policies in Colorado." J. P. Mather, Project Coordinator. (Economic Development Administration Project No. 05-06-01465 and the Four Corners Regional Commission.) Golden, Colorado: Department of Mineral Economics, Colorado School of Mines, 1975. (photocopy reproduction.)
[energy sources, methodology]
- (27) Colorado State University. State Forest Service. Colorado Forest Products Directory. Biannual.
[directory, forest products]
- (28) Cooper, Barbara S.; Nancy L. Worthington; and Paula A. Piro. "National Health Expenditures 1929-73." Social Security Bulletin, February 1974, 3-19, 48.
[80]
- (29) County Clerk Offices, respective counties. Files.
[65]
- (30) Federal Communications Commission. Annual Report. Annual.
[40]
- (31) Federal Credit Banks of Wichita. Files.
[61]
- (32) Federal Deposit Insurance Corporation. Bank Operating Statistics. Annual.
[60]
- (33) Federal Home Loan Bank Board. Combined Financial Statements — Member Savings and Loan Associations of the Federal Home Loan Bank System. Annual.
[61]
- (34) Federal Power Commission. Statistics of Privately Owned Electric Utilities in the United States. Washington, D.C.: Government Printing Office. Annual.
[491, 493]
- (35) Federal Power Commission. Statistics of Publicly Owned Electric Utilities in the United States. Washington, D.C.: Government Printing Office. Annual.
[491, 493]
- (36) Interstate Commerce Commission. Bureau of Accounts. Transport Statistics in the United States: Pipelines. Annual.
[46]
- (37) Interstate Commerce Commission. Bureau of Accounts. Transport Statistics in the United States: Motor Carriers. Annual.
[42]

- (38) Laing, Ann J., "The Impacts of Federal Grazing Land on the Upper Colorado Mainstem Economy.: M.S. thesis, Fort Collins, Colorado: Department of Economics, Colorado State University, August 1979.
[07, I-0 Methodology]
- (39) Northwest Colorado Agri-Business Association, Meeker, Colorado. Files.
[01, 02, 07]
- (40) Office of Economic Opportunity. Federal Outlays in Colorado. Annual. (Starting in fiscal 1975 published by Community Services Administration.)
[Federal Government]
- (41) Pederson, John A. and Oded Rudawsky. "The Role of Minerals and Energy in the Colorado Economy." (U.S. Bureau of Mines Grant No. G-0122090.) Golden, Colorado: Department of Mineral Economics, Colorado School of Mines, 1974. (photocopy reproduction.)
[10, 12, 13, 14, 20, 32, 33, 491, 493, methodology]
- (42) Railroad Retirement Board. Annual Report. Annual.
[households]
- (43) Robert Morris Associations. Annual Statement Studies. Philadelphia, Pennsylvania. Annual.
[financial statements]
- (44) Sheshunoff & Company, Inc. The Banks of Colorado. Private publication. Annual.
[60]
- (45) Taylor, R. Garth; Tom Bartlett; and John McKean. "Effects of Federal Grazing Land on the Economy of Colorado." (U.S. Bureau of Land Management and U.S. Forest Service Contract No. 78-270450-151.) Fort Collins, Colorado: Department of Range Science and Department of Economics, Colorado State University, 1979. (photocopy reproduction.)
[07]
- (46) Tri River Agri-Business Farm and Ranch Management Association, Delta, Colorado. Files.
[01, 02, 07]
- (47) U.S. Department of Agriculture. Agricultural Stabilization and Conservation Service. Annual Report - Colorado. Annual.
[01, 02]
- (48) U.S. Department of Agriculture. Rural Electrification Administration. Annual Statistical Report: Rural Electric Borrowers. Washington, D.C.: Government Printing Office. Annual.
[49]

- (49) U.S. Department of Agriculture. Rural Electrification Administration. Annual Statistical Report: Rural Telephone Borrowers. Washington, D.C.: Government Printing Office. Annual.
[48]
- (50) U.S. Department of Commerce. Bureau of the Census. Annual Survey of Manufacturers. Washington, D.C.: Government Printing Office. Annual.
[20-39]
- (51) U.S. Department of Commerce. Bureau of the Census. Census of Agriculture: 1974. Colorado County Data. Washington, D.C.: Government Printing Office.
[01, 02, 07, 08]
- (52) U.S. Department of Commerce. Bureau of the Census. Census of Construction Industries, 1972: Area Series, Mountain States, CC72-A-8. Washington, D.C.: Government Printing Office, 1975.
[15, 16, 17]
- (53) U.S. Department of Commerce. Bureau of the Census. Census of Construction Industries, 1972: Industry Series (various titles). Washington, D.C.: Government Printing Office, 1975.
[15, 16, 17]
- (54) U.S. Department of Commerce. Bureau of the Census. Census of Governments: 1972. Volume 4, Government Finances, Number 5, Compendium of Government Finances. Washington, D.C.: Government Printing Office, 1974.
[local and county governments]
- (55) U.S. Department of Commerce. Bureau of the Census. Census of Governments: 1972. Volume 4, Government Finances, Number 3, Finances of County Governments. Washington, D.C.: Government Printing Office, 1974.
[county governments]
- (56) U.S. Department of Commerce. Bureau of the Census. Census of Governments: 1972. Volume 4, Government Finances, Number 4, Finances of Municipalities and Township Governments. Washington, D.C.: Government Printing Office, 1974.
[local governments]
- (57) U.S. Department of Commerce. Bureau of the Census. Census of Governments: 1972. Volume 4, Government Finances, Number 1, Finances of School Districts. Washington, D.C.: Government Printing Office, 1974.
[821]

- (58) U.S. Department of Commerce. Bureau of the Census. Census of Governments: 1972. Volume 3, Public Employment, Number 2, Compendium of Public Employment. Washington, D.C.: Government Printing Office, 1974.
[local and county public employment]
- (59) U.S. Department of Commerce. Bureau of the Census. Census of Manufacturers, 1972: Area Series, Colorado, MC 72 (3)-6. Washington, D.C.: Government Printing Office, 1975.
[20-39]
- (60) U.S. Department of Commerce. Bureau of the Census. Census of Mineral Industries, 1972: Area Series, Mountain States, MIC72(2)-8. Washington, D.C.: Government Printing Office, 1975.
[10, 12, 13, 14]
- (61) U.S. Department of Commerce. Bureau of the Census. Census of Population, 1970: General Social and Economic Characteristics, Final Report, Colorado, PC(I)-C7. Washington, D.C.: Government Printing Office, 1972.
[households]
- (62) U.S. Department of Commerce. Bureau of the Census. Census of Retail Trade, 1972: Area Series, Colorado, RC 72-A-6. Washington, D.C.: Government Printing Office, 1972.
[52-59]
- (63) U.S. Department of Commerce. Bureau of the Census. Census of Selected Service Industries, 1972: Area Series, Colorado, 72-A-6. Washington, D.C.: Government Printing Office, 1974.
[70-79, 8072, 81, 891]
- (64) U.S. Department of Commerce. Bureau of the Census. Census of Wholesale Trade, 1972: Area Series, Colorado, WC 72-A-6. Washington, D.C.: Government Printing Office, 1974.
[50-51]
- (65) U.S. Department of Commerce. Bureau of the Census. Construction Reports — Housing Authorized by Building Permits and Public Contracts. Washington, D.C.: Government Printing Office. Annual.
[51]
- (66) U.S. Department of Commerce. Bureau of the Census. County Business Patterns, Colorado. Washington, D.C.: Government Printing Office. Annual.
[employment and earnings]
- (67) U.S. Department of Commerce. Domestic and International Business Administration. Bureau of Domestic Commerce. Construction Review. Washington, D.C.: Government Printing Office. Monthly.
[15, 16, 17]

- (68) U.S. Department of Health, Education, and Welfare. Social Security Administration. Directory - Medicare Providers and Suppliers of Services. Washington, D.C.: Government Printing Office, 1974.
[directory, institutional health medical care]
- (69) U.S. Department of Health, Education, and Welfare. Social Security Administration. Medicare: Health Insurance for the Aged - Geographical Index of Reimbursement by State and County. Washington, D.C.: Government Printing Office. Annual.
[80]
- (70) U.S. Department of Health, Education, and Welfare. Social Security Administration, Grand Junction, Colorado. Files.
[80, households]
- (71) U.S. Department of the Interior. Bureau of Land Management. Public Land Statistics. Washington, D.C.: Government Printing Office. Annual.
[public land administration]
- (72) U.S. Department of the Interior. Bureau of Mines. Minerals Yearbook, Volume III, Area Reports, Domestic. Washington, D.C.: Government Printing Office. Annual.
[10, 12, 13, 14]
- (73) U.S. Department of the Interior. Bureau of Reclamation. Water and Land Resource Accomplishments: Statistical Appendix I. Annual.
[01, 497]
- (74) U.S. Department of the Interior. Bureau of Reclamation. Water and Land Resource Accomplishments: Summary Report. Annual.
[01, 491, 497]
- (75) U.S. Department of the Treasury. Bureau of Government Financial Operations. Combined State of Receipts, Expenditures and Balances of the United States Government for the Fiscal Year Ended June 30, 1975. Washington, D.C.: Government Printing Office, 1975.
[Federal Government finances]
- (76) U.S. Department of the Treasury. Internal Revenue Service. Statistics of Income 1969, ZIP Code Area Data from Individual Income Tax Returns. Washington, D.C.: Government Printing Office, 1972.
[households, Federal Government]
- (77) U.S. Energy Research and Development Administration. Statistical Data of the Uranium Industry. Grand Junction, Colorado. Annual.
[10]

- (78) U.S. Energy Research and Development Administration. Uranium Exploration Expenditures and Plans. Grand Junction, Colorado. Annual.
[10]
- (79) U.S. Postal Service. Sectional Center Facility Managers.
[43]
- (80) Udis, Bernard, ed., "An Interindustry Analysis of the Colorado River Basin in 1960 with Projections to 1980 and 2010." (The Federal Water Pollution Control Administration Contract No. WA 67-4.) Boulder, Colorado: Department of Economics, University of Colorado, 1968. (stencil reproduction.)
[methodology, input-output]
- (81) University of Colorado. Bureau of Economic and Business Research. Directory of Colorado Manufacturers. Annual.
[directory, manufacturers]
- (82) Veterans Administration. Administrator of Veterans Affairs. Annual Report. Annual.
[80]
- (83) Western Oil Reporter. Rocky Mountain Petroleum Directory. Denver, Colorado: Hart Publications, Inc. Annual.
[directory, petroleum industry]
- (84) Wright, N. Gene; Thomas M. Stubblefield; Henry P. Gronewoller; Harry E. Crim; and Daniel A. Swope. Cost of Producing Crops in the Irrigated Southwest. Part IV. Colorado. Technical Bulletin 221. Tucson, Arizona: Agricultural Experiment Station, University of Arizona, September 1975.
[01]