AN ECONOMIC INPUT-OUTPUT STUDY OF THE HIGH PLAINS REGION OF EASTERN COLORADO

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Colorado State University
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PREFACE

This publication is one of six technical reports prepared by Colorado State University, the Colorado Office of Energy Conservation, the Colorado Division of Water Resources, and the Colorado Department of Local Affairs as part of the six-state High Plains-Ogallala Aquifer Study. The study was authorized by Congress in 1976 under Public Law 92-587 to investigate the extent of groundwater depletion of the Ogallala Aquifer to project its future depletion to 2020 A.D. and the associated economic impacts upon the High Plains region of the United States and to develop recommendations for action to minimize economic disruption in the region.

The six technical reports listed below make up the Colorado portion of this study:

Technical Report No. 29. McKean, John, et al. An Economic Input-Output Study of the High Plains Region of Eastern Colorado.

Technical Report No. 30. McBroom, Emm. Energy Production and Use in Colorado's High Plains Region.

Technical Report No. 31. Burns, Robert. Community and Socio-Economic Analysis of Colorado's High Plains Region.

Technical Report No. 32. Longenbaugh, Robert. Hydrologic and Pumping Data for Colorado's Ogallala Aquifer Region, 1979.

Technical Report No. 33. McKean, John. Projected Population, Employment, and Economic Output in Colorado's Eastern Plains, 1979-2020.

Technical Report No. 34. Young, Robert, et al. Energy and Water Scarcity and the Irrigated Agricultural Economy of the Colorado High Plains: Direct Economic-Hydrologic Impact Analysis.

Copies of the Colorado technical reports may be purchased at $7.00 each from: Colorado Water Resources Research Institute, Bulletin Room, 171 Aylesworth Hall SW, Colorado State University, Fort Collins, Colorado, 80523 (Telephone: 303/491-6198). Prepayment requested for orders under $25.00. An abstract of any of the reports will be sent upon request.

In addition to these technical reports, a 12-page newspaper published in November 1982 summarizes research results for the Colorado portion of the study and describes possible options for action. Copies are available at no cost upon request from: Resource Analysis Section, Colorado Department of Agriculture, 1525 Sherman Street, Denver, Colorado, 80203, telephone (303) 866-3219.

The studies on which these reports are based were financed in part by the Economic Development Administration of the U. S. Department of Commerce under Contract No. EDA-78-2550 with the State of Colorado. The statements, findings, conclusions, recommendations, and other data contained therein are solely those of the authors and do not necessarily reflect the views of the Economic Development Administration or the U. S. Government in general.

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CHAPTER 1

INTRODUCTION

The purpose of this report is to provide a description and analysis of a regional economy within the State of 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 region.

THE REGION UNDER STUDY

Eleven counties in eastern Colorado make up the study area. Commonly the area is known as the High Plains region. The counties in the study region are Baca, Cheyenne, Kiowa, Kit Carson, Lincoln, Logan, Phillips, Prowers, Sedgwick, Washington, and Yuma. The land area contained in this 11 county region is approximately 13,080,450 acres. This is some 19.7 percent of the state total land area (excluding water area). The federal government owns only 217,870 acres or 1.7 percent of the region's total land area.[1] Over 205,000 acres are national forest and the remainder is under the control of the Bureau of Land Management. The very small federal ownership share is in marked contrast to the state as a whole which is over 36 percent federal land.

The region's 1978 population is estimated at 79,650 inhabitants with an adjusted gross income (state definition) of some $424 million in fiscal 1978. The region's 1978 population is estimated at 79,650 inhabitants with an adjusted gross income (state definition) of some $424 million in fiscal 1978. The region's population is about 2.7 percent of the state total.

On balance, the region is a net exporter (where exports vs. imports are defined in terms of dollar sales of goods and services inside or outside the

region's boundaries). Net exports are estimated at $94.2 million. The major exporting activities are dryland crops, irrigated crops, ranch and feedlot cattle, food processing, wholesale farm products, oil and gas production, and other wholesale and retail trade. About 27 percent of the state's cattle on feed and 43 percent of the state's crop output occurs in the study region.[3]

Recreation and tourism is a relatively minor output for the region. Antelope is the major big game species with 737 taken in 1978. This amounts to over 15 percent of the antelope shot in Colorado. Only 408 deer were recorded for 1978 and this is less than 1 percent of the state total.[4]

STATEMENT OF THE PROBLEM

The natural resource base of the region, which is currently adequate to satisfy local demands, is nonetheless the focal point for regional and extra-regional economic conflict. The mining of the Ogallala aquifer, which has little natural recharge, implies future decline in agriculture and agribusiness activity. Decline in oil and gas production is also forecasted. These are the primary export sectors for the region. Control over exploitable resources, such as groundwater, surface water, and oil and gas, is vested with state and federal agencies and with corporations headquartered outside the region. Water use is governed by state water law, interstate compacts, and international treaty. Thus, from a regional perspective, policies affecting the disposition of the regional resource base are largely 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 MODEL USED

A tool particularly adapted to these questions is the comprehensive interindustry production model developed by W. W. Leontief. The strength of this model (often termed the input-output 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 development scenarios. The model is thus both descriptive and analytical. The descriptive components are accommodated through the collection of extensive primary data, from firms wihtin the region, and subsequent tabulation of the data in the form required by the interindustry framework. The analytical phase consists of the impact analysis, development of the various multipliers, and consistent forecasting under alternative resource development scenarios.

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, including income and employment, 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 input-output tables, the sector identification used in the analysis, and a detailed critique of the data sources used in constructing the model.

NOTES

[1]Colorado State Planning Division, Colorado Year Book, 1962-64, pp. 492-509.

[2]Colorado State Planning Office and Colorado Department of Revenue, Annual Report, Fiscal Year Ending June 30, 1978 (and similar publication for 1979).

[3]Colorado Department of Agriculture, Colorado Crop and Livestock Reporting Service, Colorado Agricultural Statistics - 1979, July, 1979. Colorado Department of Natural Resources, Division of Mines, A Summary of Mineral Industry Activities in Colorado - 1976, June, 1977.

[4]Colorado Department of Natural Resources, Division of Wildlife, 1978 Colorado Big Game Harvest.

CHAPTER 2

THE METHODOLOGY OF THE STUDY

INTRODUCTION

The national energy situation and the depletion of the Ogallala aquifer has focused increasing attention on the high plains region of Eastern Colorado. Changes in the types of crops produced are occurring in response to the falling water table and increasing energy prices which raise pumping costs. Changes in crop mix have further ramifications for those industries which process or utilize certain crops as inputs to their production process. These agricultural and agribusiness sectors provide the economic base of the region.

These developments cannot be viewed as isolated from, or independent of, the remainder of the economic environment. The total consequences of such changes should be thoroughly analyzed. While this report does not propose to perform an evaluation of the impacts of change in energy costs or the decline of the aquifer, it does present the economic model for the region which provides that capability.

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.[1] 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.[2]

PROCEDURES FOLLOWED

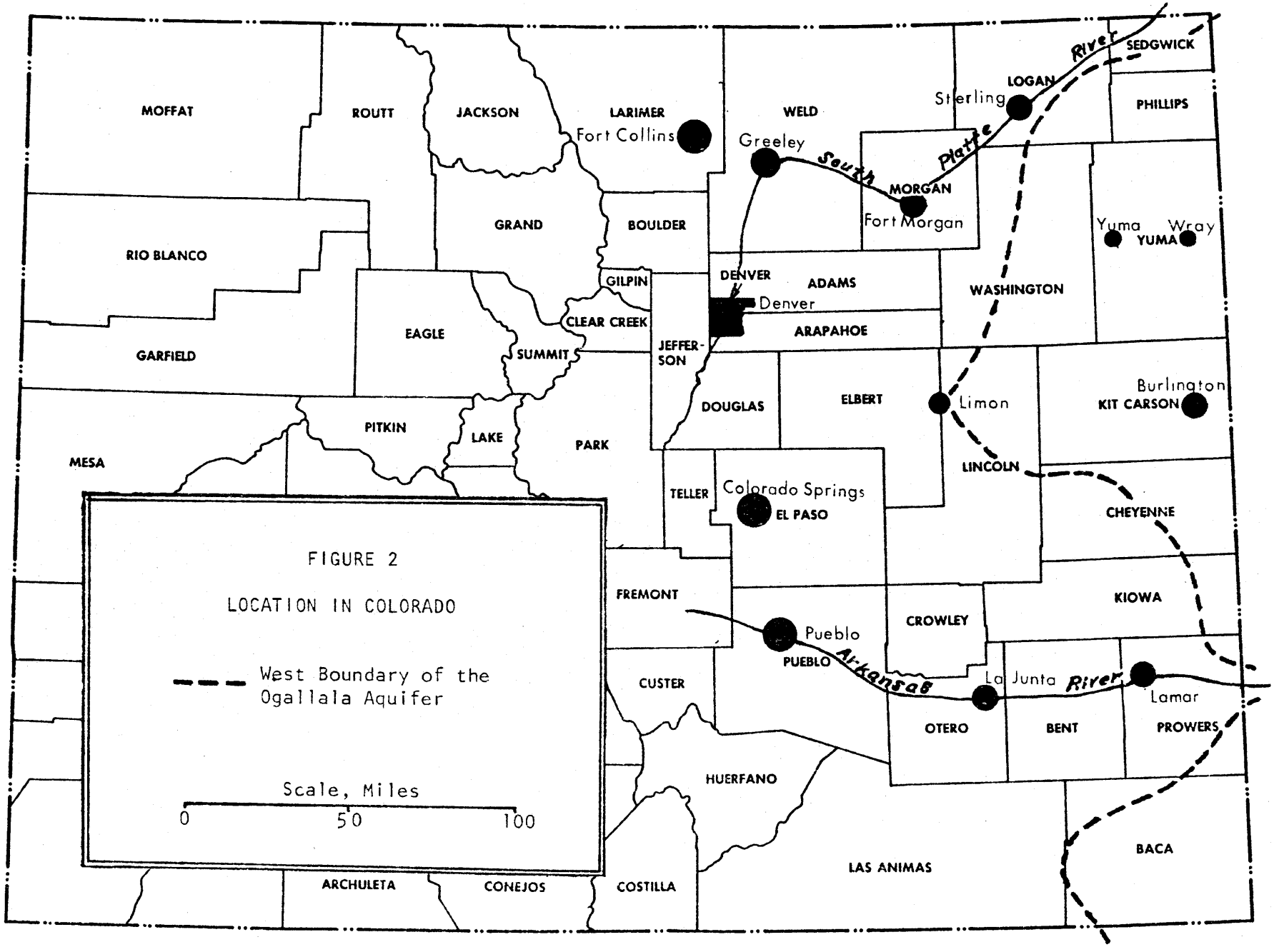
The discussion of procedures followed in conducting the research may be conveniently condensed into several categories including: the definition of the region, delineation of economic sectors, the data collection effort, selection of the base year, and data processing. Each is discussed, as briefly as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

DEFINITION OF THE REGION

The High Plains region of Eastern Colorado, for purposes of this study, was defined as eleven counties. This regional definition allows for an analysis of an area most immediately impacted by decline in the Ogallala Aquifer since each of the counties is partly underlain by the aquifer (see following map).

SECTOR DELINEATIONS

The input-output technique 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 and purchases that


MOFFAT
ROUTT
JACKSON
LARIMER
Fort Collins
WELD
Greeley
Sterling
LOGAN
SEDGWICK
PHILLIPS
South Platte River
MORGAN
Fort Morgan
RIO BLANCO
GRAND
BOULDER
GILPIN
DENVER
ADAMS
Denver
ARAPAHOE
WASHINGTON
Yuma
Wray
YUMA
GARFIELD
EAGLE
CLEAR CREEK
SUMMIT
JEFFER-SON
DOUGLAS
ELBERT
Limon
Burlington
KIT CARSON
PITKIN
LAKE
PARK
MESA
TELLER
Colorado Springs
EL PASO
LINCOLN
CHEYENNE
FREMONT
CROWLEY
KIOWA
Pueblo
PUEBLO
Arkansas River
La Junta
Lamar
CUSTER
OTERO
BENT
PROWERS
HUERFANO
BACA
LAS ANIMAS
ARCHULETA
CONEJOS
COSTILLA
FIGURE 2
LOCATION IN COLORADO
West Boundary of the Ogallala Aquifer
Scale, Miles
0
50
100

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 supplier 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 labled as the processing sector (just as with the intermediate suppliers) and the final purchasers which are labled 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 idea is very difficult to achieve because of the large amounts of time and finance required for detailed disaggregation, disclosure problems, and lack of data. Any of these factors or a combination of them lead to a violation of the homogenous product ideal.[3]

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 analyze the impacts of change in the agricultural sector, and related sectors such as food processing, and local government, economic sectors such as manufacturing do not require detailed disaggregation. The final delineation of the sectoring plan adopted for this study is shown in Table 2-1. A discussion of a non-conventional accounting sector and how it is used follows. This sector is the transfer account. There is also an explanation of the profit and depreciation sector.

A unique accounting device employed in the Upper Main Stem interindustry model is the transfer sector. This accounting device allows for two 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.

First, insurance premiums were divided so that a value equal to loss experiences was separated from other revenues. This value equal to loss experiences was 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, construction, wholesale, automobile dealers, retail trade, insurance and real estate, health medical care services, services N.E.C., households, imports from Colorado other than the Upper Main Stem region, and imports from the rest of the world.

Second, transfer payments to household are handled through the transfer account.[4] 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 accout.

Third, financial capital finds its way into the High Plains region by means other than local financial institutions.[5] 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 was increased so that all interest payments in the region could be shown as being made to the finance sector. The finance sector then charged the transfer row with the amount of the increase and the transfer column charged the same to imports.

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

The transfer account was used to close profits, interest, rents, and the like into the household sector. To accomplish this, the transfer account column was 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 was used to export the region's capital shortage, and dividends paid to area residents by out-of-the-region firms. The transfer account row in turn charged these amounts to the profits row.

Where enterprise accounting was employed, the profit sector includes after-tax profits, charges to reserves for bad debts, capital loss amortization, and outlays for rents and royalties.[6] Where government fund accounting was employed, the profit sector includes surplus of current revenues over current[7] expenditures,[8] 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, 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 by High Plains interindustry study sector descriptions and regionalized according to (a) High Plains, (b) Colorado other than the High Plains region, and (c) activity outside Colorado. 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

Other than a consumer price index for the Denver metropolitan area,[9] there is no price index constructed specifically for Colorado. This effectively removes one criterion (relatively stable prices) from consideration when selecting a base year for Colorado economic studies. The 1978 base was selected for the initial survey for the following two reasons.

Interviewing for the High Plains interindustry study occurred in 1980. Calendar 1978 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 con-

ducted in less than an hour; some took place over several days. The interviews were conducted over a five 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 Table 2-1. 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 High Plains interindustry model would be more truly reflected.[10] The final iteration produced gross flow patterns for the respective sectors delineated in the model. 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 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 Colorado 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 interindustry 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 1974 Federal Census of Agriculture to the 1974 market value of hay reported in Colorado Agricultural Statistics was applied to the latter's 1978 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 study region was determined from information secured from the Cooperative Extension Service and by prorating state data.

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 1978. After accounting for increased royalty values (an estimate based on the United State 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 1978 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.

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 eleven county conditions.

Where the airports are operated by local public authorities, the relevant information was obtained from reports filed with the Colorado State Auditor.

Data on employment and earnings for components other than rail and air transportation sectors were obtained for the year 1978 from the Colorado Department of Labor and Employment.

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. Electric activities under the control of local public authorities were identified by examining 1978 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.

Mention is made here of the practice of "margining" the trade account sectors. With rare exception, 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. The absence of margining would interject the huge trade sector dollar turnover between producers and consumers. The High Plains model was margined.* The output of local producers was distributed to the various sectors in accordance with survey findings. Where the output,

*An unmargined version of the model is also available.

e.g., grocery stores, before going to a regional user, e.g., household in the model, the sale was made directly. A margin on the sale is attributed to the trade sector. Merchandise imports by the trade sectors were prorated and assigned to the various regional sectors based on the relative volumes of purchases from the trade sectors.

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 eleven county interindustry model 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 Statements

were prorated by a wage and salary formula for the High Plains 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 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 High Plains interindustry model, the insurance sector was handled as follows.

Gross insurance premiums paid in the High Plains 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 High Plains interindustry model 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.

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.

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.

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. Information on the Colorado Extension Service was secured directly. All data were annualized and distributed on the basis of survey information.

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 1978 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 High Plains interindustry model 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 household by the eleven counties' department 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 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 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 State 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.

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. 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 Educations' Revenues and Expenditures, Sheshunoff's The Banks of Colorado, Colorado's Annual Highway Report, and files of the Colorado State Auditor.

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 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.

Transfer Account. The transfer account is an accounting device that allows for two unique and distinctive characteristics that are not found in conventional 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.

Entrepreneurial earnings and rents were charged to the profit row. The profit row entries for the various local and county government columns account for funds set aside for capital expenditures and bond principal repayments and the surplus of revenues over commitments. The profit row entry for the household column largely represents the estimate of household saving.

Many organizations and business firms have funds in interest earning deposits. No satisfactory method was discovered to assign these interest earnings to the various sectors. Thus, the transfer column delivers these interest earnings to the profits row.

Survey information was used to estimate the investment column. The value of investment was then set against the value of the profit and depreciation row. 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 High Plains interindustry model 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. Census of Population, 1970: General Social and Economic Characteristics, Final Report, Colorado, PC (1) - C7. Washington, C.D.: Government Printing Office, 1972.

The labor estimates are annualized full-time equivalents of wage and salaries employees. Further, the estimates refer to work performed within the High Plains region. 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. This information was secured for 1977 and 1978 on a three-digit SIC basis.

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 and County Business Patterns.

Caution is exercised to the fact that employment levels as defined in the High Plains interindustry model 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, certain methods used to estimate the resident adjusted labor force are extremely questionable. The reader is referred to the January 1977 Manpower Review for a complete discussion on this matter.

NOTES

[1]See Chapter 3 for a more complete explanation of the interindustry model.

[2]The projections are consistent but the underlying assumption of fixed production coefficients qualifies the results unless some dynamic adjustment of technology is explicitly involved.

[3]Information obtained from the Colorado Department of Labor and 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.

[4]At the county level these transfer payments are monies distributed by the various departments of social services. The State of Colorado transfer payments are confined largely to unemployment compensation insurance claims and distribution of funds from the Public Employees Retirement Association accoutn. 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, medicare payments, and payments to farm operators under the agricultural stabilization and conservation program and the sugar program.

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

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

[7]Current in the sense that it occurred in 1978.

[8]An exception to this is in the Colorado and Federal Government sectors.

[9]Colorado Department of Labor and Employment, Division of Employment and Training, Colorado Manpower Review, Monthly.

[10]For 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 from the Colorado Department of Labor and Employment was 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 High Plains interindustry model.

CHAPTER 3

ANALYSIS OF THE HIGH PLAINS REGION OF EASTERN COLORADO

INTRODUCTION

The results of the descriptive analysis of the High Plains economy are presented in this chapter. The discussion contained in the chapter includes: the description of the economy; 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 region.

The description and analysis of the economy hinges on three major components of the interindustry model. These are: the gross flows or transactions 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 the appendix.

THE TRANSACTION 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 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 table for the High Plains economy is found in the appendix. A description of the sector identification lables used throughout the appendix and in the tables of this chapter is also shown in the appendix.

The rows and columns of Table B-1 which are numbered 1-38, identify the processing, or intermediate demand, sectors. Fow and column 39 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 40-42 and 44-45. Rows 40-42 and 44-45 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 row and column numbered 43 (the transfer account) is an accounting device as described previously. 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 total 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 Table B-1. The bill of purchases by each sector is found

by reading down any column of the table. These column entries show the allocation of purchases by cost component.

For example, consider sector 1, irr-corn. Reading across row 1 of Table B-1 shows that the total output of irr-corn was distributed in the following way: $59,402,188 worth of output was sold to feedlots; $4,650,500 to range-cttl; $3,905,580 to other-anim; $5,961,550 to food-proc; $41,032,928 to whlsl-farm; and $208,100 to oth-whlsl. Total sales by irr-corn to the processing sector of the economy thus amounted to $115,168,855. The remaining sales were to the final demand sectors consisting of exports of $13,658,389. The total gross output of the irr-corn sector is the sum of these individual sales or $128,827,244.

The distribution of purchases by irr-corn by cost category are shown in column 2 of Table B-1. Purchases by irr-corn from whlsl-farm were estimated at $37,319,619; from whlsl-fuel at $235,321; from ag-service, $2,424,202; from finance, $6,710,000; from ins/re, $1,054,710; from other-ser, $4,337,360; from gas-pr/dis, $15,413,000; from electric, $13,103,800; and from loc-govt, $2,712,490. Total purchases by irr-corn from the processing sector are thus estimated at $83,310,502 for 1978. Final payments made by irr-corn were distributed as follows: wages subject to withholding, $8,124,358; transfers, $753,611; profit/depreciation, $30,230,470 and imports of, $6,408,303.* Total purchases thus amount to $128,827,244 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 trans-

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*Note: accurate data on taxes for the farm sectors were not available and thus state and federal tax is included in profits.

fer account represents wages paid subject to withholding. This row shows household income. The eight leading contributors to household income in descending order are: education, range-cttl, dry-wheat, other-rtl, loc-govt, food-proc, constructn, and transport. Similarly, sector-by-sector contributions to taxes may be directly obtained from Table B-1. The eight sectors showing the greatest dollar outlay for local and county taxes in descending order are: range-cttl, exports, dry-wheat, households, state-govt, oil/gs-prod, fed-govt, and irr-corn.

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, 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 account cannot be counted in final demand, for to do so would be double counting. Thus, the sum of postal services, health; education; water, sewerage, and sanitation; local government; households; state government; federal government; investment and inventory accumulation; and exports, less regional imports, yields the estimated gross regional product. Gross regional income (which must equal gross regional product) is computed as the sum of final payments less imports. Again, the local and county tax account and the transfer account must be excluded to avoid double counting.

While these items, obtained directly from the transactions 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 the appendix. 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 consider the irr-corn sector, sector 1 (column 1 of the direct requirements table). For every dollar's worth of output produced by irr-corn in the region, $.29 worth of inputs are required from the whlsl-farm sector, $.002 from whlsl-fuel, $.019 from ag-service, $.052 from finance and so on down the column. It is obvious from the table that far and away the largest direct purchases made by the irr-corn sector are those for whlsl-farm inputs, with a direct outlay of over 28 cents per each dollar of output produced. This says that a dollar's worth of production in irr-corn requires an input of whlsl-farm services valued at 28 cents. Each column of the direct requirements table is interpreted in this manner.

These direct impacts 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 established with a brief example. Suppose that the export demand for irr-corn production increases. There will be immediate, or direct, responses of the following type: whlsl-farm production will have to increase. In order for whlsl-farm production to increase, local inputs must be obtained from sectors such as labor, utilities, and transport. These are direct impacts. As labor, utilities, and transport increase their output to meet the increasing requirements in the whlsl-farm sector, their own requirements for productive ingredients increase. The chain of events goes on. The total impacts are readily estimated through the input-output framework and are presented in the appendix.

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. Business and income multiplier estimates are shown for both the model which includes households as a member of the processing sector of the economy and the model which has households 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, consider the irr-corn sector. Suppose that the export sales for irr-corn increase by $1 million. What is the estimated impact that this increase will have on the entire High Plains region of the Colorado economy? The answer to this question may be obtained directly by reading down column 1 of the Direct and Indirect Requirements table and summing the individual sector impacts. Thus, the increase of $1 million in the final demand for irr-corn generates a direct plus indirect production valued at $1,059,200 in irr-corn ($1 million x 1.0592); $122,100 in the dry-wheat sector; $28,000 in other-irr and so on down the column. Any column of this table is interpreted in this same manner. The sum of the entries in column 2 show the total production generated locally as a result of the increase in export demands for irr-corn. Thus, the total business activity generated per dollar increase in final demand for irr-corn is $2.44 or, in our example assuming a $1 million increase, $2.44 million 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 the greatest business activity generated per dollar of delivery to final demand is the loc-govt sector. The business multiplier for this sector is 2.7 which indicates that, as the "final demand" for loc-govt increases by $1, a total production of $2.70 is generated in the High Plains economy. Other sectors of the economy which have relatively large business multipliers are: range-cttl (2.6), whlsl-farm (2.6), oth-whlsl (2.5), and irr-corn (2.4). 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 phrase, "at the margin," is important as a qualification in the use of these multipliers. It implies a word of caution concerning the implications of the multipliers. In using the business multipliers, the argument should be stated in terms of the impacts of an equal dollar increase in final demands. That is, for a equal increase (in dollar terms) in final demands, local taxes will generate more business activity in the local economy than will any other private sector. However, a large exogenous change in local taxes is less likely to occur than is a large increase in irr-corn (which indirectly changes local tax collections). 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 interindustry 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.

TABLE 3-1

BUSINESS ACTIVITY MULTIPLIERS
HIGH PLAINS REGION OF EASTERN COLORADO
BY SECTOR, 1978

(In dollars of business activity generated in the High Plains region of Eastern Colorado per dollar delivered to final demand.)

	Sector	Business Multiplier I	Business Multiplier II
1	irr-corn	2.1673	2.4391
2	irr-wheat	1.8124	2.0453
3	irr-sorg	1.9293	2.1895
4	dry-wheat	1.9048	2.2653
5	dry-sorg	1.9533	2.2424
6	other-irr	1.7732	2.1375
7	other-dry	1.8312	2.1434
8	feedlots	1.9702	2.1513
9	range-cttl	2.2543	2.6177
10	other-anim	2.0090	2.2493
11	food-proc	2.0602	2.2259
12	printing	1.1797	1.7057
13	mach-mfg	1.1049	1.3823
14	stone/clay	1.1489	1.4624
15	other-mfg	1.0925	1.4833
16	oil/gs-pr	1.3899	1.6585
17	construction	1.5010	2.0984
18	whlsl-mach	1.3163	2.0901
19	whlsl-farm	2.3020	2.5666
20	oth-whlsl	1.7900	2.4627
21	rtl-fuel	1.4039	1.8675
22	whlsl-fuel	1.2386	1.8743
23	auto-dlr	1.2571	2.3343
24	eat/drink	1.3669	2.0423
25	other-rtl	1.5290	2.0727
26	ag-service	1.3219	1.4392
27	finance	1.0536	1.2803
28	ins/re	1.0458	1.1519
29	education	1.2115	2.2036
30	health	1.2017	2.0401
31	other-ser	1.1404	1.4053
32	postal-ser	1.6144	2.4012
33	communicat	1.1492	1.6039
34	transport	1.1308	1.6618
35	gas-pr/dis	1.3460	1.5471
36	electric	1.6988	1.9093
37	wat/se/san	1.7841	2.3284
38	loc-govt	1.7858	2.7053
39	households	------	1.6712

TABLE 3-2

INCOME MULTIPLIERS
HIGH PLAINS REGION OF EASTERN COLORADO
BY SECTOR, 1978

(In dollars of income generated per dollar of direct income paid to households.)

Sector	Income Multipliers	
	Type I	Type II
irr-corn	2.5792	2.8901
irr-wheat	2.3098	2.5882
irr-sorg	2.2577	2.5298
dry-wheat	1.6255	1.8214
dry-sorg	2.0307	2.2754
other-irr	1.5216	1.7050
other-dry	1.7008	1.9058
feedlots	5.1945	5.8207
range-cttl	2.2479	2.5189
other-anim	3.8830	4.3511
food-proc	3.2395	3.6301
printing	1.1521	1.2910
mach-mfg	1.1176	1.2523
stone/clay	1.1909	1.3345
other-mfg	1.0845	1.2153
oil/gs-pr	1.6959	1.9003
constructn	1.4399	1.6135
whlsl-mach	1.1585	1.2981
whlsl-farm	5.8680	6.5754
oth-whlsl	1.2330	1.3816
rtl-fuel	1.2725	1.4259
whlsl-fuel	1.1180	1.2527
auto-dlr	1.0817	1.2121
eat/drink	1.1706	1.3118
other-rtl	1.4349	1.6079
ag-service	2.2963	2.5731
finance	1.0841	1.2148
ins/re	1.1735	1.3150
education	1.0766	1.2064
health	1.0884	1.2196
other-ser	1.1992	1.3438
postal-ser	1.5563	1.7439
communicat	1.1780	1.3201
transport	1.1034	1.2364
gas-pr/dis	1.6851	1.8883
electric	2.1866	2.4502
wat/se/san	2.0103	2.2526
loc-govt	2.5508	2.8583

The Type I and Type II income multipliers are estimated ratios: Type I is the ratio of the 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 induced income generated by an additional dollar of income paid directly to households.

Attention is drawn to the comparatively high income multiplier value estimates for the agricultural sectors. The reason for this relatively high value is straightforward. The High Plains 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, became 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 value for sectors such as wholesale farm products and feedlots exist because these sectors exhibit greater interdependence in the High Plains 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 in the High Plains region. 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.

Before proceeding with the analysis some discussion on the table of direct and indirect requirements per dollar of delivery to final demand is warranted. When the household sector is included as a processing sector in the interindustry model it becomes simply another producer. To treat households in this manner is consistent within the interindustry framework, but it imposes a critical assumption on household purchase patterns. Specifically, household purchases are expressed as a proportional function of income; the marginal and the average propensities to consume are assumed to be one and the same. To change this limiting assumption, the household sector has to be treated as a part of final demand.

Treating the household sector in this manner removes the assumption that household purchases are a proportional function of income. Specifically,

because the interindustry model is a final demand driven model, treating the household sector as any other producing sector implies the level of employment was dependent on the level of state and federal government expenditures, investment expenditures, inventory accumulation, and exports. If households are assumed exogenous, this assumption is expanded to include a dependency on the level of household expenditures. The multiplier effects of a given change in final demand are smaller when households are assumed to be exogenous. This is because increased spending (e.g., exports) which stimulates additional output and employment is not reinforced by households even though their earnings will rise. 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 was pre-multiplied by a diagonal matrix of direct labor use requirements (where the elements of the diagonal were 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. Type I multipliers assume households exogenous and Type II multipliers assume households endogenous.

The interpretation of the entries in Table 3-4 is demonstrated by an example from the irr-corn sector. As the final demand for the output of corn 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 irr-corn sector. The sectors supplying ingredients to the irr-corn sector will in turn require production ingredients from others and this will further expand indirect employment impacts; and so forth. The magnitude of the Type II direct and indirect employment impacts, .021 shows the total employment generated in the entire High Plains economy as this single sector, irr-corn, 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, for irr-corn would result in an estimated additional employment of 21 persons in the High Plains 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 High Plains economy are eating and drinking establishments (which includes lodging), health services, auto dealers, and education. 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 shows that for each worker hired by irr-corn, 2.28 workers are hired throughout the region's economy. Thus, the multiplier for exogenous changes in irr-corn employment is 2.28.

TABLE 3-3

TOTAL EMPLOYMENT AND EMPLOYMENT COEFFICIENTS
HIGH PLAINS REGION OF EASTERN COLORADO
BY SECTOR, 1978

(In number of workers in the High Plains region of Eastern Colorado and workers per thousand dollars of output.)

	Sector	Total Employment	Workers Per Thousand $ Total Output
1	irr-corn	1172	.0091
2	irr-wheat	110	.0091
3	irr-sorg	65	.0091
4	dry-wheat	1329	.0091
5	dry-sorg	68	.0091
6	other-irr	389	.0091
7	other-dry	146	.0091
8	feedlots	3539	.0108
9	range-cttl	2654	.0108
10	other-anim	318	.0114
11	food-proc	965	.0025
12	printing	169	.0373
13	mach-mfg	295	.0196
14	stone/clay	67	.0150
15	other-mfg	165	.0263
16	oil/gs-pr	550	.0081
17	constructn	931	.021
18	whlsl-mach	535	.0337
19	whlsl-farm	698	.0028
20	oth-whlsl	705	.0338
21	rtl-fuel	474	.036
22	whlsl-fuel	155	.0342
23	auto-dlr	560	.0588
24	eat/drink	2083	.101
25	other-rtl	2247	.0326
26	ag-service	127	.0035
27	finance	739	.0123
28	ins/re	229	.0067
29	education	2751	.0552
30	health	1647	.0991
31	other-ser	1042	.0191
32	postal-ser	127	.0202
33	communicat	322	.0228
34	transport	625	.0165
35	gas-pr/dis	161	.0049
36	electric	201	.0033
37	wat/se/san	52	.0111
38	loc-govt	1042	.0177
39	households	----	-----
40	state-govt	272	.0068
41	fed-govt	367	.0048

CHAPTER 4

EXTENSIONS OF THE BASIC ANALYSIS: 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-O 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 High Plains regional economy. 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 sales 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 High Plains survey and past surveys and Water Resources Council[1] estimates. The Water Resources Council Report provides no detail among commercial establishments. WRC data were also 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

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[1] The 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, December 1978, Second National Water Assessment by the U.S. Water Resources Council.

[2] 1974 Census of Agriculture, Vol. I, part 50, Wyoming, State and County Data, U.S. Department of Commerce, Bureau of the Census, Table 3, page IV-8; Table 13, page IV-12; Table 3, page IV-26; Table 13, page IV-30; Table 3, page IV-116; Table 13, page IV-120.

[3] 1972 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.

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 coefficients for the region is probably quite small.

Estimates of withdrawal and consumptive use by sector are shown in Table 4-1. Generally, where more than one data source is available, the larger numbers are derived from the source which is considered to be more authoritative. In each sector we have used the higher coefficients 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. Farms and ranches account for over 82 percent of withdrawals and over 85 percent of consumptive use by processors in the region.

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 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 in the derivation of the direct plus indirect water requirements per dollar output delivered to final demand.

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[4] 1972 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.

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 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 tri-county economy 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 feedlots in Table 4-1. The direct requirements are 30 gallons withdrawal and consumptive use for each dollar of output. However, as the final demand for the output of the feedlots sector expands by one dollar, there is total direct plus indirect water requirements of 528 gallons (withdrawal) and 132 gallons (consumptive) generated throughout the economy. The indirect impacts, because of the significant interdependencies within and between feedlots and other sectors, are <u>far</u> more important than the direct requirements. Applying only the direct water requirements to assumed increases in deliveries to final demand can obviously result in an understatement of water use.

TABLE 4-1

ESTIMATED WITHDRAWAL AND CONSUMPTIVE USE REQUIREMENTS BY SECTOR, HIGH PLAINS REGION OF EASTERN COLORADO

(In Gallons Per Dollar of Output)

	Sector	Withdrawal	Consumptive
1	irr-corn	1,872.0	749.0
2	irr-wheat	1,893.0	757.0
3	irr-sorg	2,666.0	1,066.0
4	dry-wheat	0	0
5	dry-sorg	0	0
6	other-irr	2,093.0	837.0
7	other-dry	0	0
8	feedlots	30.0	30.0
9	range-cttl	0	0
10	other-anim	16.0	16.0
11	food-proc	6.0	.4
12	printing	2.0	.2
13	mach-mfg	7.0	1.7
14	stone/clay	137.0	4.8
15	other-mfg	27.6	8.9
16	oil/gs-pr	1,031.0	529.2
17	constructn	4.0	.4
18	whlsl-mach	2.3	.6
19	whlsl-farm	2.3	.6
20	oth-whlsl	2.3	.6
21	rtl-fuel	2.3	.6
22	whlsl-fuel	2.3	.6
23	auto-dlr	3.9	1.0
24	eat/drink	7.0	2.1
25	other-rtl	3.9	1.0
26	ag-service	8.0	.8
27	finance	2.3	.2
28	ins/re	8.0	.8
29	education	1.5	.4
30	health	5.1	1.3
31	other-ser	3.5	.7
32	postal-ser	1.0	.1
33	communicat	2.1	.1
34	transport	2.1	.1
35	gas-pr/dis	267.0	13.4
36	electric	267.0	13.4
37	wat/se/san	0	.1
38	loc-govt	1.0	.32
39	households	3.2	.1
40	state-govt	1.0	.1
41	fed-govt	1.0	.1

TABLE 4-2

TOTAL WATER USE BY PROCESSING SECTORS
HIGH PLAINS REGION OF EASTERN COLORADO, 1978

(In Millions of Gallons)

	Sector	Withdrawal	Consumptive Use
1	irr-corn	241,200	96,490
2	irr-wheat	22,760	9,100
3	irr-sorg	19,100	7,635
4	dry-wheat	0	0
5	dry-sorg	0	0
6	other-irr	89,350	35,730
7	other-dry	0	0
8	feedlots	9,831	9,831
9	range-cttl	0	0
10	other-anim	446	446
11	food-proc	2,317	155
12	printing	907	907
13	mach-mfg	105	26
14	stone/clay	613	21
15	other-mfg	173	56
16	oil/gs-pr	69,960	35,910
17	constructn	177	18
18	whlsl-mach	36	10
19	whlsl-farm	574	150
20	oth-whlsl	48	13
21	rtl-fuel	30	8
22	whlsl-fuel	10	3
23	auto-dlr	37	10
24	eat/drink	144	43
25	other-rtl	269	69
26	ag-service	291	29
27	finance	138	12
28	ins/re	274	27
29	education	75	20
30	health	85	22
31	other-ser	191	38
32	postal-ser	6	1
33	communicat	30	1
34	transport	80	4
35	gas-pr/dis	8,775	440
36	electric	16,280	817
37	wat/se/san	0	0
38	local-govt	59	6
39	households	1,358	136
40	state-govt	40	4
41	fed-govt	76	8

TABLE 4-3

DIRECT PLUS INDIRECT WATER REQUIREMENTS,
HIGH PLAINS REGION OF EASTERN COLORADO, 1978

(In Gallons Per Dollar of Output Delivered to Final Demand)

	Sector	Withdrawal	Consumptive Use
1	irr-corn	2160	837
2	irr-wheat	2085	809
3	irr-sorg	2886	1127
4	dry-wheat	195	13
5	dry-sorg	181	68
6	other-irr	2265	879
7	other-dry	149	56
8	feedlots	528	222
9	range-cttl	340	132
10	other-anim	649	259
11	food-proc	339	137
12	printing	19	4
13	mach-mfg	18	4
14	stone/clay	148	7
15	other-mfg	42	12
16	oil/gs-pr	1204	607
17	constructn	43	10
18	whlsl-mach	30	6
19	whlsl-farm	603	232
20	oth-whlsl	153	57
21	rtl-fuel	42	8
22	whlsl-fuel	24	5
23	auto-dlr	33	7
24	eat/drink	57	9
25	other-rtl	54	9
26	ag-service	298	111
27	finance	9	16
28	ins/re	11	1
29	education	30	7
30	health	32	7
31	other-ser	19	3
32	postal-ser	24	5
33	communicat	13	3
34	transport	20	4
35	gas-pr/dis	503	131
36	electric	426	22
37	wat/se/san	52	7
38	loc-govt	30	7
39	households	31	7

APPENDICES

Appendix

A. Sector Identification, High Plains Region of Eastern Colorado

B. Input-Output Tables for the High Plains Region of Eastern Colorado

B-1 High Plains Region of Eastern Colorado, Gross Flows Table, 1978

B-2 High Plains Region of Eastern Colorado, Direct Requirements Per Dollar of Output, 1978

B-3 High Plains Region of Eastern Colorado, Direct and Indirect Requirements Per Dollar of Output Delivered to Final Demand (Households in Processing Sector), 1978

B-4 High Plains Region of Eastern Colorado, Direct and Indirect Requirements Per Dollar of Output Delivered to Final Demand (Households in Final Demand), 1978

C. Critique of Data Sources

D. Survey Form Used for the High Plains Interindustry Model

E. Bibliography

APPENDIX A

SECTOR IDENTIFICATION, HIGH PLAINS REGION
OF EASTERN COLORADO, 1978

	Sector	1972 SIC Codes
1	Corn (irrigated)	0115 (part)
2	Wheat (irrigated)	0111 (part)
3	Grain Sorghums (irrigated)	0119 (part)
4	Corn (non-irrigated)	0115 (part)
5	Wheat (non-irrigated)	0111 (part)
6	Grain Sorghums (non-irrigated)	0119 (part)
7	Other Irrigated Crop Production	01 (part)
8	Other Non-Irrigated Crop Production	01 (part)
9	Feedlot Cattle	0211
10	Range Cattle	0212
11	Other Farm Animals	02 (part)
12	Meat Processing	201
13	Grain Mill Products	204
14	Other Food and Kindred Products	202,203,205-209
15	Apparel, Textiles	22,23
16	Paper products and Printing	26,27
17	Chemicals, Petroleum Refining & Rubber/Plastics	28,29,30
18	Farm & Garden Machinery & Equipment	352
19	Other Machinery & Fabricated Metals	34,35,36
20	Stone, Clay, Glass, Concrete	32
21	All Other Manufacturing	21,23,24,31,33,37,38
22	Oil and Gas	131,132
23	Oil and Gas Services	138
24	Construction	144,15,16,17
25	Wholesale Machinery and Equipment	508
26	Wholesale Farm Products	515
27	Hardware Stores	525
28	Other Wholesale Trade	50,51
29	Retail Fuel	554
30	Wholesale Fuel	517
31	Auto Dealers and Repairs	551,552
32	Eating/Drinking, Hotels, other Lodging	58,70
33	Other Retail	52
34	Agricultural Services	07
35	Financial Institutions	60-62
36	Insurance	63,64
37	Real Estate	65,66
38	Educational Services	82
39	Health Services	80
40	All Other Services	72,73,75,76,78,79,81, 86,88,89

	Sector	1972 SIC Codes
41	Railroads	40
42	Motor Freight/warehousing	42
43	Postal Service	43
44	Communication	48
45	Other Transportation	41,45,46,47,48
46	Gas Production and Distribution	492
47	Electricity	491,493
48	Water Supply, Sewer, Other	494,495,497

APPENDIX B

INPUT-OUTPUT TABLES FOR THE HIGH PLAINS REGION OF EASTERN COLORADO, 1978

B-1 - High Plains Region of Eastern Colorado, Gross Flows Table, 1978 Dollars

B-2 - High Plains Region of Eastern Colorado, Direct Requirements Per Dollar of Output, 1978

B-3 - High Plains Region of Eastern Colorado, Direct and Indirect Requirements Per Dollar Delivered to Final Demand, (Households in Processing Sector), 1978

B-4 - High Plains Region of Eastern Colorado, Colorado Direct and Indirect Requirements Per Dollar Delivered to Final Demand, (Households in Final Demand), 1978

B-1 HIGH PLAINS REGION OF EASTERN COLORADO, GROSS FLOWS TABLE, 1978

		1	2	3	4	5	6	7	8	9	10
		irr-corn	irr-wheat	irr-sorg	dry-wheat	dry-sorg	other-irr	other-dry	feedlots	range-cttl	other-anim
1	irr-corn	0.	0.	0.	0.	0.	0.	0.	59402188.	4658500.	3905580.
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	0.	0.	0.	0.	0.	0.	0.	1639736.	4658500.	2984980.
7	other-dry	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	feedlots	0.	0.	0.	0.	0.	0.	0.	0.	24901800.	0.
9	range-cttl	0.	0.	0.	0.	0.	0.	0.	54052452.	0.	0.
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.	2622318.
11	food-proc	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	printing	0.	0.	0.	0.	0.	0.	0.	8996.	0.	0.
13	mach-mfg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	stone/clay	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	other-mfg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16	oil/gs-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17	constructn	0.	0.	0.	0.	0.	0.	0.	713975.	0.	0.
18	whlsl-mach	0.	0.	0.	0.	0.	0.	0.	115384.	0.	31559.
19	whlsl-farm	37319619.	1478530.	1199558.	36937932.	1802284.	4299970.	3631450.	18211362.	73880000.	446350.
20	oth-whlsl	0.	0.	0.	0.	0.	0.	0.	890189.	0.	557079.
21	rtl-fuel	0.	0.	0.	0.	0.	0.	0.	89583.	0.	0.
22	whlsl-fuel	235321.	21957.	14552.	796844.	23495.	116375.	82329.	56573.	852628.	82459.
23	auto-dlr	0.	0.	0.	0.	0.	0.	0.	64189.	0.	33162.
24	eat/drink	0.	0.	0.	0.	0.	0.	0.	7563.	0.	0.
25	other-rtl	0.	0.	0.	0.	0.	0.	0.	265083.	0.	0.
26	ag-service	2424202.	505415.	211665.	17448409.	717777.	890136.	209350.	1538953.	12051600.	195280.
27	finance	6710000.	627000.	374000.	7613880.	317400.	2640000.	811910.	1937949.	9362549.	2287554.
28	ins/re	1054710.	169199.	82386.	2470960.	58905.	356447.	172200.	1638784.	2173670.	146439.
29	education	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30	health	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	other-ser	4337360.	97770.	241755.	1445787.	1153623.	2417010.	3085260.	2772244.	7719800.	2175966.
32	postal-ser	0.	0.	0.	0.	0.	0.	0.	18722.	0.	0.
33	communicat	0.	0.	0.	0.	0.	0.	0.	264474.	0.	0.
34	transport	0.	0.	0.	0.	0.	0.	0.	3914887.	13310000.	111560.
35	gas-pr/dis	15413000.	1420000.	864000.	0.	0.	3762300.	0.	302153.	0.	0.
36	electric	13103900.	1194500.	765300.	0.	0.	5395630.	0.	1541952.	0.	540000.
37	wat/se/san	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
38	loc-govt	2712490.	435152.	211522.	6050180.	144276.	920775.	0.	1259965.	9922000.	306867.
39	subtotals	83310502.	5949523.	3964738.	72763992.	4217760.	20798693.	7992499.	150707366.	163491048.	16427153.
40	households	8124358.	725247.	494018.	19382720.	634232.	6116850.	1756680.	6833694.	23764400.	1032190.
41	state-govt	0.	0.	0.	0.	0.	0.	0.	662418.	266200.	167382.
42	fed-govt	0.	0.	0.	0.	0.	0.	0.	6233965.	4186600.	83690.
43	transfers	753611.	120896.	58866.	1765548.	42088.	254688.	123040.	1170943.	1553130.	104634.
44	prof-depr	30230470.	4347818.	2186896.	21196392.	1514312.	12657650.	4517170.	19646573.	38000000.	5523606.
45	imports	6408303.	877164.	458038.	30939402.	1035565.	2860431.	1603221.	142432826.	14436256.	4540371.
46	totals	128827244.	12020648.	7162556.	146048054.	7443957.	42688312.	15992610.	327687768.	245697634.	27879026.

B-1 HIGH PLAINS REGION OF EASTERN COLORADO, GROSS FLOWS TABLE, 1978 (continued)

		11 food-proc	12 printing	13 mach-mfg	14 stone/clay	15 other-mfg	16 oil/gs-pr	17 constructn	18 whlsl-mach	19 whlsl-farm	20 oth-whlsl
1	irr-corn	5961559.	0.	0.	0.	0.	0.	0.	0.	41032928.	208100.
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	2942564.	0.	0.	0.	0.	0.	0.	0.	84798136.	178371.
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	8150320.	0.	0.	0.	0.	0.	0.	0.	16042397.	89190.
7	other-dry	760500.	0.	0.	0.	0.	0.	0.	0.	8356712.	89190.
8	feedlots	177000000.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	range-cttl	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	food-proc	7027482.	0.	0.	0.	0.	0.	0.	0.	0.	4190980.
12	printing	9197.	18210.	60964.	0.	13860.	0.	51214.	20836.	120233.	193818.
13	mach-mfg	118864.	0.	500000.	0.	46768.	139670.	0.	0.	0.	206800.
14	stone/clay	0.	0.	0.	0.	0.	209480.	2219249.	0.	0.	0.
15	other-mfg	48783.	0.	0.	0.	46768.	0.	0.	0.	0.	0.
16	oil/gs-pr	0.	0.	0.	0.	0.	8350906.	0.	0.	0.	0.
17	constructn	0.	391.	20618.	232582.	2470.	1132054.	6409752.	150682.	70551.	1333572.
18	whlsl-mach	1734.	0.	11313.	4638.	0.	94094.	53362.	0.	41691.	0.
19	whlsl-farm	0.	0.	0.	0.	0.	0.	0.	0.	10602624.	1010769.
20	oth-whlsl	75900.	87.	1797.	10808.	20892.	28150.	4564087.	7045.	14499.	46322.
21	rtl-fuel	0.	12082.	13496.	0.	3585.	5416.	0.	159418.	82961.	35681.
22	whlsl-fuel	66313.	1763.	15529.	18709.	3278.	70144.	12277.	23264.	12107.	18941.
23	auto-dlr	12881.	28.	8181.	2658.	764.	6763.	43825.	1887.	1437.	6764.
24	eat/drink	0.	568.	0.	0.	6574.	58323.	3971.	36233.	11150.	13699.
25	other-rtl	17730.	8732.	2047.	0.	14005.	1804.	24618.	62561.	31892.	96478.
26	as-service	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27	finance	0.	54560.	161666.	93927.	0.	304927.	163973.	652743.	981213.	406266.
28	ins/re	41993.	17416.	120623.	43435.	15368.	150961.	492095.	315392.	496592.	200700.
29	education	0.	0.	0.	0.	0.	1004.	0.	0.	0.	0.
30	health	0.	0.	0.	0.	0.	1765.	0.	0.	0.	0.
31	other-ser	92721.	51872.	48564.	27060.	40482.	263999.	256066.	363783.	605090.	140346.
32	postal-ser	18099.	208276.	10137.	2236.	3113.	9493.	29000.	57880.	21006.	37853.
33	communicat	115313.	54951.	61424.	26836.	25713.	73542.	157234.	827761.	222804.	115748.
34	transport	7923285.	11881.	98142.	5814.	56538.	76352.	14376.	400586.	13129.	54771.
35	gas-pr/dis	11968.	21455.	57757.	4472.	20487.	306908.	51000.	180205.	424216.	105119.
36	electric	513175.	42629.	87329.	17892.	57397.	2556613.	108000.	191700.	560300.	92157.
37	wat/se/san	181462.	0.	1552.	2236.	1520.	10242.	32400.	14721.	2488.	27974.
38	loc-govt	503115.	61579.	42778.	4600.	50970.	3723722.	51213.	464092.	825918.	113146.
39	subtotals	211594970.	566480.	1323917.	497903.	430552.	17576332.	14737712.	3930789.	165372084.	9012755.
40	households	11821755.	1238549.	2236917.	704457.	1352884.	6430622.	11006392.	6337716.	6727097.	6805365.
41	state-govt	203292.	46298.	70443.	14420.	31178.	1750111.	287513.	255692.	127157.	456580.
42	fed-govt	2996601.	138311.	562964.	190091.	256346.	9630510.	1053916.	1176823.	418701.	963946.
43	transfers	30004.	12444.	86188.	31035.	10980.	107865.	351612.	225354.	354824.	143404.
44	prof-depr	5345352.	616793.	1355718.	413728.	421718.	18872188.	1925894.	3279656.	14344223.	2645948.
45	imports	154187308.	1914458.	9426505.	2621109.	3770251.	13484650.	14969393.	653130.	62027168.	816869.
46	totals	386179284.	4533333.	15062652.	4472743.	6273909.	67852278.	44332432.	15859160.	249371258.	20844867.

B-1 HIGH PLAINS REGION OF EASTERN COLORADO, GROSS FLOWS TABLE, 1978 (continued)

		21	22	23	24	25	26	27	28	29	30
		rtl-fuel	whlsl-fuel	auto-dlr	eat/drink	other-rtl	ag-service	finance	ins/re	education	health
1	irr-corn	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	0.	0.	0.	0.	0.	4353888.	0.	0.	0.	0.
7	other-dry	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	feedlots	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	range-cttl	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	food-proc	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	printing	105200.	28802.	533000.	54210.	2100000.	4136.	56880.	145813.	0.	7600.
13	mach-mfg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	stone/clay	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	other-mfg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16	oil/gs-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17	constructn	0.	32352.	12620.	448932.	4798000.	53342.	583831.	33544.	311694.	81010.
18	whlsl-mach	0.	0.	0.	0.	0.	0.	0.	0.	96045.	0.
19	whlsl-farm	0.	0.	0.	0.	0.	0.	0.	0.	264080.	33950.
20	oth-whlsl	221797.	139.	1324.	0.	100220.	14862.	5415.	3205.	598955.	1465.
21	rtl-fuel	0.	0.	80397.	25340.	345489.	4334.	1736.	29520.	0.	20887.
22	whlsl-fuel	0.	0.	11733.	3698.	52625.	33820.	253.	4308.	15861.	3216.
23	auto-dlr	0.	20061.	0.	1556.	39064.	12371.	676.	8406.	44137.	4345.
24	eat/drink	0.	911.	5091.	0.	79385.	219.	4979.	15301.	190217.	9606.
25	other-rtl	87494.	0.	6339.	139293.	327542.	17277.	15521.	25172.	226537.	305535.
26	ag-service	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27	finance	479124.	333650.	142835.	1537342.	1015032.	1772107.	0.	131653.	1335400.	278800.
28	ins/re	167543.	138159.	397481.	33982.	1350493.	97781.	250243.	40131.	1906896.	306955.
29	education	0.	0.	0.	0.	28349.	0.	3400.	1490.	1305690.	0.
30	health	0.	0.	0.	0.	0.	0.	0.	0.	79550.	394480.
31	other-ser	1868532.	84043.	253438.	292152.	5304210.	25691.	769769.	309810.	1585360.	433200.
32	postal-ser	38155.	12290.	21454.	22348.	183358.	6096.	237000.	48906.	5980.	234630.
33	communicat	119372.	70994.	356898.	518822.	1283702.	31352.	49253.	263004.	11940.	152830.
34	transport	19077.	30197.	0.	45782.	3879556.	3483.	15800.	0.	222060.	10230.
35	gas-pr/dis	287802.	36892.	94651.	326155.	1698485.	1126252.	84820.	32207.	25040.	149200.
36	electric	431157.	42777.	31550.	1306106.	3530861.	62134.	103668.	39365.	209810.	109950.
37	wat/se/san	191868.	7735.	4543.	121324.	147993.	2334.	11434.	7805.	12378.	47000.
38	loc-govt	92118.	61154.	93490.	574726.	1190130.	52254.	178305.	102139.	6560.	0.
39	subtotals	4109239.	900156.	2046844.	5451768.	27454494.	7673733.	2372983.	1241779.	8454190.	2584889.
40	households	2867355.	1543146.	5679079.	7120145.	15628370.	1110388.	7513270.	1851823.	27482810.	7658740.
41	state-govt	47967.	118275.	52903.	253135.	1010022.	1127.	227819.	36780.	2026360.	51600.
42	fed-govt	93753.	375040.	370402.	1449461.	5704722.	61250.	4259674.	219793.	0.	467610.
43	transfers	119713.	98717.	284008.	24280.	964954.	69867.	32143908.	28674.	1362514.	215325.
44	prof-depr	5074636.	1350493.	871549.	5780412.	15600375.	1063621.	9700809.	2439400.	5045530.	3894490.
45	imports	840281.	149452.	225637.	544900.	2569811.	26334488.	3824105.	28417416.	5471229.	1738766.
46	totals	13152944.	4535279.	9530422.	20624101.	68932748.	36314474.	60042568.	34235665.	49842633.	16615420.

B-1 HIGH PLAINS REGION OF EASTERN COLORADO, GROSS FLOWS TABLE, 1978 (continued)

		31	32	33	34	35	36	37	38	39	40
		other-ser	postal-ser	communicat	transport	gas-pr/dis	electric	wat/se/san	loc-govt	subtotals	households
1	irr-corn	0.	0.	0.	0.	0.	0.	0.	0.	115168955.	0.
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.	0.	0.	0.	0.	0.	0.	0.	87919071.	0.
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	0.	0.	0.	0.	0.	0.	0.	0.	37919011.	1500945.
7	other-dry	0.	0.	0.	0.	0.	0.	0.	0.	9206402.	0.
8	feedlots	0.	0.	0.	0.	0.	0.	0.	0.	201901800.	0.
9	range-cttl	0.	0.	0.	0.	0.	0.	0.	0.	54052452.	0.
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	2622318.	0.
11	food-proc	0.	0.	0.	0.	0.	0.	0.	0.	11218462.	950090.
12	printing	300555.	0.	5440.	69169.	17557.	9678.	0.	0.	3935368.	592685.
13	mach-mfg	0.	0.	0.	0.	0.	0.	0.	0.	1012102.	0.
14	stone/clay	0.	0.	0.	0.	0.	0.	0.	0.	2428729.	1680580.
15	other-mfg	0.	0.	0.	0.	0.	0.	0.	0.	95551.	0.
16	oil/gs-pr	0.	0.	0.	0.	6323732.	0.	0.	0.	14674638.	0.
17	constructn	229846.	11546.	7610.	0.	48224.	26480.	976205.	2708609.	20430492.	1621660.
18	whlsl-mach	0.	0.	0.	716.	19911.	0.	9373.	156380.	636200.	0.
19	whlsl-farm	0.	0.	0.	0.	0.	0.	1778.	0.	191120258.	0.
20	oth-whlsl	50097.	0.	836.	221275.	46364.	111145.	53187.	605473.	8252614.	1882737.
21	rtl-fuel	130061.	0.	24040.	33241.	10845.	29282.	0.	0.	1137394.	6399982.
22	whlsl-fuel	18980.	0.	3508.	27552.	1583.	4273.	2261.	62603.	2771132.	933972.
23	auto-dlr	20969.	15441.	3876.	31003.	1119.	4073.	3739.	149174.	542549.	0.
24	eat/drink	56902.	0.	5480.	38474.	1186.	7887.	0.	3896.	557615.	12347979.
25	other-rtl	465675.	659.	3226.	39256.	34818.	21536.	636.	12051.	2253517.	33512472.
26	as-service	0.	0.	0.	0.	0.	0.	2260.	60097.	36255144.	59330.
27	finance	983534.	0.	163028.	82374.	223964.	124021.	394029.	306058.	44804468.	15238100.
28	ins/re	196953.	0.	31692.	431384.	342129.	109004.	31407.	485199.	16535707.	17669144.
29	education	0.	0.	0.	0.	0.	0.	0.	28371060.	30210993.	2608840.
30	health	0.	0.	0.	0.	0.	0.	2772.	482651.	961218.	15654202.
31	other-ser	357804.	98142.	22364.	82666.	85185.	95810.	151136.	1051826.	40207696.	14011560.
32	postal-ser	210840.	0.	113474.	39823.	117747.	119562.	73.	17927.	1845478.	1547505.
33	communicat	789914.	22755.	0.	252266.	21181.	50806.	4375.	181081.	6126345.	7914250.
34	transport	232859.	3201680.	11951.	339849.	44246.	0.	213740.	31509.	34293340.	3352510.
35	gas-pr/dis	470386.	0.	20649.	256105.	15209.	12355.	0.	0.	27581246.	5253365.
36	electric	574916.	38529.	24995.	256928.	70603.	22253983.	340836.	364356.	56560948.	4298210.
37	wat/se/san	193214.	2204.	4500.	28334.	1412.	37914.	0.	412457.	1509044.	2493880.
38	loc-govt	409805.	0.	854218.	1143434.	677266.	2113440.	352971.	737711.	36444081.	5887580.
39	subtotals	5693310.	3390956.	1300887.	3373849.	8104281.	25131249.	2540778.	36700118.	1103192272.	157411780.
40	households	7210752.	1903240.	3260412.	10903632.	2346781.	3513020.	757892.	12695309.	244572310.	1388470.
41	state-govt	795853.	0.	119548.	625886.	266907.	42119.	79579.	565950.	10660514.	23931040.
42	fed-govt	2779549.	171660.	288643.	2637269.	1412965.	231874.	47368.	478418.	48941915.	49505200.
43	transfers	140727.	0.	22645.	308233.	244458.	77886.	22441.	346684.	43780188.	12624946.
44	prof-depr	14618768.	279994.	5096917.	4724351.	2988420.	12800000.	990977.	3705644.	285068500.	15409090.
45	imports	23312327.	545889.	4027445.	15299590.	17501461.	19187002.	239075.	4367795.	624059096.	164172986.
46	totals	54551288.	6291739.	14116497.	37872810.	32865273.	60983150.	4678110.	58859918.	2360274784.	424443512.

B-1 HIGH PLAINS REGION OF EASTERN COLORADO, GROSS FLOWS TABLE, 1978 (continued)

		41	42	43	44	45	46
		state-govt	fed-govt	transfers	investment	exports	totals
1	irr-corn	0.	0.	0.	0.	13658389.	128827244.
2	irr-wheat	0.	0.	0.	0.	12020648.	12020648.
3	irr-sorg	0.	0.	0.	0.	7162556.	7162556.
4	dry-wheat	0.	0.	0.	0.	58128982.	146048054.
5	dry-sorg	0.	0.	0.	0.	7443957.	7443957.
6	other-irr	0.	0.	0.	0.	3268356.	42668312.
7	other-dry	0.	0.	0.	0.	6786208.	15992610.
8	feedlots	0.	0.	0.	0.	125785986.	327687788.
9	range-cttl	0.	0.	0.	0.	191645182.	245697634.
10	other-anim	0.	0.	0.	0.	25256708.	27879026.
11	food-proc	0.	122000.	0.	0.	373888732.	386179284.
12	printing	4175.	905.	0.	0.	0.	4533333.
13	mach-mfg	0.	0.	0.	0.	14050550.	15062652.
14	stone/clay	90468.	0.	0.	272966.	0.	4472743.
15	other-mfg	0.	0.	0.	0.	6178358.	6273909.
16	oil/gs-pr	0.	0.	0.	0.	53177640.	67852278.
17	constructn	7279782.	6687.	0.	14993811.	0.	44332432.
18	whlsl-mach	0.	0.	0.	15222960.	0.	15859160.
19	whlsl-farm	12374.	0.	0.	0.	58238626.	249371258.
20	oth-whlsl	6441.	543914.	0.	0.	10159161.	20844867.
21	rtl-fuel	15638.	28939.	0.	0.	5570991.	13152944.
22	whlsl-fuel	12958.	4223.	0.	0.	812994.	4535279.
23	auto-dlr	9343.	0.	0.	8978530.	0.	9530422.
24	eat/drink	2478.	0.	0.	0.	7716029.	20624101.
25	other-rtl	10272.	10264.	0.	0.	33146223.	68932748.
26	ag-service	0.	0.	0.	0.	0.	36314474.
27	finance	0.	0.	0.	0.	0.	60042568.
28	ins/re	0.	30814.	0.	0.	0.	34235665.
29	education	15622800.	1400000.	0.	0.	0.	49842633.
30	health	0.	0.	0.	0.	0.	16615420.
31	other-ser	68490.	263540.	0.	0.	0.	54551286.
32	postal-ser	6745.	2892011.	0.	0.	0.	6291739.
33	communicat	32692.	43210.	0.	0.	0.	14116497.
34	transport	13140.	213820.	0.	0.	0.	37872810.
35	gas-pr/dis	30660.	0.	0.	0.	0.	32865273.
36	electric	118372.	5620.	0.	0.	0.	60983150.
37	wat/se/san	4186.	671000.	0.	0.	0.	4678110.
38	loc-govt	4283870.	2851000.	0.	0.	9393397.	59859918.
39	subtotals	27624884.	9087947.	0.	39468267.	1023489664.	2360274848.
40	households	4632896.	3348000.	170501834.	0.	0.	424443512.
41	state-govt	420198.	4942000.	0.	0.	0.	39953752.
42	fed-govt	102.	301320.	0.	0.	0.	98748537.
43	transfers	0.	56415017.	0.	0.	0.	112820151.
44	prof-depr	62076.	497780.	-114108834.	0.	0.	186928614.
45	imports	7213596.	1777418.	0.	132068532.	154251352.	1083542992.
46	totals	39953752.	76369482.	56393000.	171536800.	1177741024.	4306712384.

B-2 HIGH PLAINS REGION OF EASTERN COLORADO, DIRECT REQUIREMENTS PER DOLLAR OF OUTPUT, 1978

		1	2	3	4	5	6	7	8	9	10
		irr-corn	irr-wheat	irr-sorg	dry-wheat	dry-sorg	other-irr	other-dry	feedlots	range-cttl	other-anim
1	irr-corn	0.	0.	0.	0.	0.	0.	0.	0.181277	0.018960	0.140090
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	0.	0.	0.	0.	0.	0.	0.	0.005004	0.018960	0.107069
7	other-dry	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	feedlots	0.	0.	0.	0.	0.	0.	0.	0.	0.101351	0.
9	range-cttl	0.	0.	0.	0.	0.	0.	0.	0.164951	0.	0.
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.094061
11	food-proc	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	printing	0.	0.	0.	0.	0.	0.	0.	0.000027	0.	0.
13	mach-mfg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	stone/clay	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	other-mfg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16	oil/gs-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17	constructn	0.	0.	0.	0.	0.	0.	0.	0.002179	0.	0.
18	whlsl-mach	0.	0.	0.	0.	0.	0.	0.	0.000352	0.	0.001132
19	whlsl-farm	0.289687	0.122999	0.167476	0.252916	0.242114	0.100729	0.227071	0.055575	0.300695	0.016010
20	oth-whlsl	0.	0.	0.	0.	0.	0.	0.	0.002717	0.	0.019982
21	rtl-fuel	0.	0.	0.	0.	0.	0.	0.	0.000273	0.	0.
22	whlsl-fuel	0.001827	0.001827	0.002032	0.005456	0.003156	0.002726	0.005148	0.000173	0.003470	0.002958
23	auto-dlr	0.	0.	0.	0.	0.	0.	0.	0.000196	0.	0.001189
24	eat/drink	0.	0.	0.	0.	0.	0.	0.	0.000023	0.	0.
25	other-rtl	0.	0.	0.	0.	0.	0.	0.	0.000809	0.	0.
26	as-service	0.018817	0.042046	0.029552	0.119470	0.096424	0.020852	0.013090	0.004696	0.049051	0.007005
27	finance	0.052085	0.052160	0.052216	0.052133	0.042639	0.061844	0.050768	0.005914	0.038106	0.082053
28	ins/re	0.008187	0.014076	0.011502	0.016919	0.007913	0.008350	0.010767	0.005001	0.006847	0.005253
29	education	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30	health	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	other-ser	0.033668	0.008134	0.033753	0.009899	0.154974	0.056620	0.192918	0.006460	0.031420	0.078050
32	postal-ser	0.	0.	0.	0.	0.	0.	0.	0.000057	0.	0.
33	communicat	0.	0.	0.	0.	0.	0.	0.	0.000807	0.	0.
34	transport	0.	0.	0.	0.	0.	0.	0.	0.011947	0.054172	0.004002
35	gas-pr/dis	0.119641	0.118130	0.120627	0.	0.	0.068134	0.	0.000922	0.	0.
36	electric	0.101716	0.099371	0.106847	0.	0.	0.126397	0.	0.004706	0.	0.019369
37	wat/se/san	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
38	loc-govt	0.021055	0.036200	0.029532	0.041426	0.019382	0.021570	0.	0.003845	0.040383	0.011007
39	households	0.063064	0.060333	0.068972	0.132715	0.085201	0.143291	0.109843	0.020854	0.096722	0.037024
40	state-govt	0.	0.	0.	0.	0.	0.	0.	0.002021	0.001083	0.006004
41	fed-govt	0.	0.	0.	0.	0.	0.	0.	0.019024	0.017040	0.003002
42	transfers	0.005850	0.010057	0.008219	0.012089	0.005654	0.005966	0.007694	0.003573	0.006321	0.003753
43	prof-depr	0.234659	0.361696	0.305323	0.145133	0.203426	0.296513	0.282454	0.059955	0.154662	0.198128
44	imports	0.049743	0.072971	0.063949	0.211844	0.139115	0.067007	0.100248	0.434660	0.058756	0.162860

B-2 HIGH PLAINS REGION OF EASTERN COLORADO, DIRECT REQUIREMENTS PER DOLLAR OF OUTPUT, 1978 (continued)

		11	12	13	14	15	16	17	18	19	20
		food-proc	printing	mach-mfg	stone/clay	other-mfg	oil/gs-pr	constructn	whlsl-mach	whlsl-farm	oth-whlsl
1	irr-corn	0.015437	0.	0.	0.	0.	0.	0.	0.	0.164546	0.009983
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.007620	0.	0.	0.	0.	0.	0.	0.	0.340048	0.008557
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	0.021105	0.	0.	0.	0.	0.	0.	0.	0.064331	0.004279
7	other-dry	0.001969	0.	0.	0.	0.	0.	0.	0.	0.033511	0.004279
8	feedlots	0.458336	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	range-ctl	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	food-proc	0.018197	0.	0.	0.	0.	0.	0.	0.	0.	0.201056
12	printing	0.000024	0.004017	0.004047	0.	0.002209	0.	0.001155	0.001314	0.000482	0.009298
13	mach-mfg	0.000308	0.	0.033195	0.	0.007454	0.002058	0.	0.	0.	0.009921
14	stone/clay	0.	0.	0.	0.	0.	0.003087	0.050059	0.	0.	0.
15	other-mfg	0.000126	0.	0.	0.	0.007454	0.	0.	0.	0.	0.
16	oil/gs-pr	0.	0.	0.	0.	0.	0.123075	0.	0.	0.	0.
17	constructn	0.	0.000086	0.001369	0.052000	0.000394	0.016684	0.144584	0.009501	0.000283	0.063976
18	whlsl-mach	0.000004	0.	0.000751	0.001037	0.	0.001387	0.001204	0.	0.000167	0.
19	whlsl-farm	0.	0.	0.	0.	0.	0.	0.	0.	0.042517	0.048490
20	oth-whlsl	0.000197	0.000019	0.000119	0.002416	0.003330	0.000415	0.102951	0.000444	0.000058	0.002222
21	rtl-fuel	0.	0.002665	0.000896	0.	0.000571	0.000080	0.	0.010052	0.000333	0.001712
22	whlsl-fuel	0.000172	0.000389	0.001031	0.004183	0.000522	0.001034	0.000277	0.001467	0.000049	0.000909
23	auto-dlr	0.000033	0.000006	0.000543	0.000594	0.000122	0.000100	0.000989	0.000119	0.000006	0.000324
24	eat/drink	0.	0.000125	0.	0.	0.001048	0.000860	0.000090	0.002285	0.000045	0.000657
25	other-rtl	0.000046	0.001926	0.000136	0.	0.002232	0.000027	0.000555	0.003945	0.000128	0.004628
26	ag-service	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27	finance	0.	0.012035	0.010733	0.021000	0.	0.004494	0.003699	0.041159	0.003935	0.019490
28	ins/re	0.000109	0.003842	0.008008	0.009711	0.002450	0.002225	0.011100	0.019887	0.001991	0.009628
29	education	0.	0.	0.	0.	0.	0.000015	0.	0.	0.	0.
30	health	0.	0.	0.	0.	0.	0.000026	0.	0.	0.	0.
31	other-ser	0.000240	0.011442	0.003224	0.006050	0.006452	0.003891	0.005776	0.022938	0.002426	0.006733
32	postal-ser	0.000047	0.045943	0.000673	0.000500	0.000496	0.000140	0.000654	0.003650	0.000084	0.001816
33	communicat	0.000299	0.012122	0.004078	0.006000	0.004098	0.001084	0.003547	0.052195	0.000893	0.005553
34	transport	0.020517	0.002621	0.006516	0.001300	0.009012	0.001125	0.000324	0.025259	0.000053	0.002628
35	gas-pr/dis	0.000031	0.004733	0.003834	0.001000	0.003265	0.004523	0.001150	0.011363	0.001701	0.005043
36	electric	0.001329	0.009403	0.005798	0.004000	0.009149	0.037679	0.002436	0.012068	0.002247	0.004421
37	wat/se/san	0.000470	0.	0.000103	0.000500	0.000242	0.000151	0.000731	0.000928	0.000010	0.001342
38	loc-govt	0.001303	0.013584	0.002640	0.001028	0.008124	0.054880	0.001155	0.029263	0.003312	0.005428
39	households	0.030612	0.273209	0.148508	0.157500	0.215637	0.094774	0.248270	0.399625	0.026976	0.326477
40	state-govt	0.000526	0.010213	0.004677	0.003224	0.004969	0.025793	0.006485	0.016123	0.000510	0.021904
41	fed-govt	0.007760	0.030510	0.037375	0.042500	0.040659	0.141933	0.023773	0.074205	0.001675	0.046244
42	transfers	0.000078	0.002745	0.005722	0.006939	0.001750	0.001590	0.007931	0.014210	0.001423	0.006880
43	prop-depr	0.013842	0.136057	0.090005	0.092500	0.067218	0.278136	0.043447	0.206799	0.057527	0.126935
44	imports	0.399264	0.422307	0.625820	0.586018	0.600941	0.198735	0.337662	0.041183	0.248734	0.039188

B-2 HIGH PLAINS REGION OF EASTERN COLORADO, DIRECT REQUIREMENTS PER DOLLAR OF OUTPUT, 1978 (continued)

		21	22	23	24	25	26	27	28	29	30
		rtl-fuel	whlsl-fuel	auto-dlr	eat/drink	other-rtl	ag-service	finance	ins/re	education	health
1	irr-corn	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	0.	0.	0.	0.	0.	0.119894	0.	0.	0.	0.
7	other-dry	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	feedlots	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	range-cttl	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	food-proc	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	printing	0.007998	0.006351	0.055926	0.002628	0.030464	0.000114	0.000947	0.004259	0.	0.000457
13	mach-mfg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	stone/clay	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	other-mfg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16	oil/gs-pr	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17	constructn	0.	0.007133	0.001324	0.021767	0.069604	0.001469	0.009724	0.000980	0.006254	0.004876
18	whlsl-mach	0.	0.	0.	0.	0.	0.	0.	0.	0.001927	0.
19	whlsl-farm	0.	0.	0.	0.	0.	0.	0.	0.	0.005298	0.002043
20	oth-whlsl	0.016863	0.000031	0.000139	0.	0.001454	0.000409	0.000090	0.000094	0.012017	0.000088
21	rtl-fuel	0.	0.	0.008436	0.001229	0.005012	0.000119	0.000029	0.000882	0.	0.001257
22	whlsl-fuel	0.	0.	0.001231	0.000179	0.000763	0.000931	0.000004	0.000126	0.000318	0.000194
23	auto-dlr	0.	0.004423	0.	0.000075	0.000567	0.000341	0.000011	0.000246	0.000886	0.000262
24	eat/drink	0.	0.000201	0.000534	0.	0.001152	0.000006	0.000083	0.000447	0.003816	0.000578
25	other-rtl	0.006652	0.	0.000665	0.006754	0.004752	0.000476	0.000258	0.000735	0.004545	0.018389
26	ag-service	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27	finance	0.036427	0.072568	0.014987	0.074541	0.014725	0.048799	0.	0.003945	0.026792	0.016780
28	ins/re	0.012738	0.030463	0.041707	0.001648	0.019591	0.002693	0.004168	0.001172	0.038258	0.018474
29	education	0.	0.	0.	0.	0.000411	0.	0.000057	0.000044	0.026196	0.
30	health	0.	0.	0.	0.	0.	0.	0.	0.	0.001596	0.023742
31	other-ser	0.142062	0.018531	0.026593	0.014166	0.076948	0.000707	0.012820	0.009049	0.031807	0.026072
32	postal-ser	0.002901	0.002710	0.002251	0.001084	0.002660	0.000168	0.003947	0.001429	0.000120	0.014121
33	communicat	0.009076	0.015654	0.037448	0.025156	0.018623	0.000863	0.000820	0.007682	0.000240	0.009198
34	transport	0.001450	0.006658	0.	0.002220	0.056280	0.000096	0.000263	0.	0.004455	0.000616
35	gas-pr/dis	0.021881	0.008134	0.009931	0.015814	0.024640	0.031014	0.001413	0.000941	0.000502	0.008980
36	electric	0.032780	0.009432	0.003310	0.063329	0.051222	0.001711	0.001727	0.001150	0.004209	0.006617
37	wat/se/san	0.014587	0.001706	0.000477	0.005883	0.002147	0.000064	0.000190	0.000228	0.000248	0.002829
38	loc-govt	0.007004	0.013484	0.009810	0.027867	0.017265	0.001439	0.002970	0.002983	0.000132	0.
39	households	0.218001	0.340254	0.595890	0.345234	0.226719	0.030577	0.125132	0.054090	0.551392	0.460942
40	state-govt	0.003647	0.026079	0.005551	0.012274	0.014652	0.000031	0.003794	0.001074	0.040655	0.003106
41	fed-govt	0.007128	0.082694	0.038865	0.070280	0.082758	0.001687	0.070944	0.006420	0.	0.028143
42	transfers	0.009102	0.021766	0.029800	0.001177	0.013998	0.001924	0.535352	0.000838	0.027336	0.013200
43	prof-depr	0.385818	0.297775	0.091449	0.280275	0.226313	0.029289	0.161566	0.071253	0.101229	0.234390
44	imports	0.063885	0.032953	0.023675	0.026421	0.037280	0.725179	0.063690	0.830053	0.109770	0.104648

B-2 HIGH PLAINS REGION OF EASTERN COLORADO, DIRECT REQUIREMENTS PER DOLLAR OF OUTPUT, 1978 (continued)

		31	32	33	34	35	36	37	38	39	40
		other-ser	postal-ser	communicat	transport	gas-pr/dis	electric	wat/se/san	loc-govt	households	state-govt
1	irr-corn	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	0.	0.	0.	0.	0.	0.	0.	0.	0.003536	0.
7	other-dry	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	feedlots	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	range-ctti	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	food-proc	0.	0.	0.	0.	0.	0.	0.	0.	0.002236	0.
12	printing	0.005510	0.	0.000385	0.001826	0.000534	0.000159	0.	0.	0.001397	0.000104
13	mach-mfg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	stone/clay	0.	0.	0.	0.	0.	0.	0.	0.	0.003959	0.002264
15	other-mfg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16	oil/gs-pr	0.	0.	0.	0.	0.192414	0.	0.	0.	0.	0.
17	constructn	0.004213	0.001835	0.000539	0.	0.001467	0.000434	0.208675	0.046018	0.003821	0.182205
18	whlsl-mach	0.	0.	0.	0.000019	0.000606	0.	0.002004	0.002657	0.	0.
19	whlsl-farm	0.	0.	0.	0.	0.	0.	0.000380	0.	0.	0.000310
20	oth-whlsl	0.000918	0.	0.000059	0.005843	0.001411	0.001823	0.011369	0.010287	0.004436	0.000161
21	rtl-fuel	0.002384	0.	0.001703	0.000878	0.000330	0.000480	0.	0.	0.015079	0.000391
22	whlsl-fuel	0.000348	0.	0.000249	0.000727	0.000048	0.000070	0.000483	0.001064	0.002200	0.000324
23	auto-dlr	0.000384	0.002454	0.000275	0.000819	0.000034	0.000067	0.000799	0.002534	0.	0.000234
24	eat/drink	0.001043	0.	0.000388	0.001016	0.000036	0.000129	0.	0.000066	0.029092	0.000062
25	other-rtl	0.008536	0.000105	0.000229	0.001037	0.001059	0.000353	0.000136	0.000205	0.078956	0.000257
26	ag-service	0.	0.	0.	0.	0.	0.	0.000483	0.001021	0.000140	0.
27	finance	0.018030	0.	0.011549	0.002175	0.006815	0.002034	0.084228	0.005200	0.035901	0.
28	ins/re	0.003610	0.	0.002245	0.011390	0.010410	0.001787	0.006714	0.008243	0.041629	0.
29	education	0.	0.	0.	0.	0.	0.	0.	0.490505	0.006146	0.391022
30	health	0.	0.	0.	0.	0.	0.	0.000593	0.008200	0.036882	0.
31	other-ser	0.006559	0.015599	0.001584	0.002183	0.002592	0.001571	0.032307	0.017870	0.033012	0.001714
32	postal-ser	0.003865	0.	0.008038	0.001051	0.003583	0.001961	0.000016	0.000305	0.003646	0.000169
33	communicat	0.014480	0.003617	0.	0.006661	0.000644	0.000833	0.000935	0.003076	0.018646	0.000818
34	transport	0.004269	0.508870	0.000847	0.008973	0.001346	0.	0.045689	0.000535	0.007899	0.000329
35	gas-pr/dis	0.008623	0.	0.001463	0.006762	0.000463	0.000203	0.	0.	0.012377	0.000767
36	electric	0.010539	0.006124	0.001771	0.006784	0.002148	0.364920	0.072858	0.006190	0.010127	0.002963
37	wat/se/san	0.003542	0.000350	0.000319	0.000748	0.000043	0.000622	0.	0.007007	0.005876	0.000105
38	loc-govt	0.007512	0.	0.060512	0.030191	0.020607	0.034656	0.075452	0.012533	0.013871	0.107221
39	households	0.132183	0.302498	0.230965	0.287901	0.071406	0.057606	0.162008	0.215687	0.003271	0.115956
40	state-govt	0.014589	0.	0.008469	0.016526	0.008121	0.000691	0.017011	0.009615	0.056382	0.010517
41	fed-govt	0.050953	0.027283	0.020447	0.069635	0.042993	0.003802	0.010125	0.008128	0.116636	0.000003
42	transfers	0.002580	0.	0.001604	0.008139	0.007438	0.001277	0.004797	0.005890	0.029745	0.
43	prof-depr	0.267982	0.044502	0.361061	0.124743	0.090929	0.209894	0.211833	0.062957	0.036304	0.001554
44	imports	0.427347	0.086763	0.285301	0.403973	0.532521	0.314628	0.051105	0.074207	0.386796	0.130549

B-2 HIGH PLAINS REGION OF EASTERN COLORADO, DIRECT REQUIREMENTS PER DOLLAR OF OUTPUT, 1978 (continued)

		41	42	43	44
		fed-govt	transfers	investment	exports
1	irr-corn	0.	0.	0.	0.011597
2	irr-wheat	0.	0.	0.	0.010207
3	irr-sorg	0.	0.	0.	0.006082
4	dry-wheat	0.	0.	0.	0.049356
5	dry-sorg	0.	0.	0.	0.006321
6	other-irr	0.	0.	0.	0.002775
7	other-dry	0.	0.	0.	0.005762
8	feedlots	0.	0.	0.	0.106803
9	range-cttl	0.	0.	0.	0.162723
10	other-anim	0.	0.	0.	0.021445
11	food-proc	0.001597	0.	0.	0.317463
12	printing	0.000012	0.	0.	0.
13	mach-mfg	0.	0.	0.	0.011930
14	stone/clay	0.	0.	0.001591	0.
15	other-mfg	0.	0.	0.	0.005246
16	oil/gs-pr	0.	0.	0.	0.045152
17	constructn	0.000088	0.	0.087409	0.
18	whlsl-mach	0.	0.	0.088745	0.
19	whlsl-farm	0.	0.	0.	0.049449
20	oth-whlsl	0.007122	0.	0.	0.008626
21	rtl-fuel	0.000379	0.	0.	0.004730
22	whlsl-fuel	0.000055	0.	0.	0.000690
23	auto-dlr	0.	0.	0.052342	0.
24	eat/drink	0.	0.	0.	0.006552
25	other-rtl	0.000134	0.	0.	0.028144
26	ag-service	0.	0.	0.	0.
27	finance	0.	0.	0.	0.
28	ins/re	0.000403	0.	0.	0.
29	education	0.018332	0.	0.	0.
30	health	0.	0.	0.	0.
31	other-ser	0.003451	0.	0.	0.
32	postal-ser	0.037869	0.	0.	0.
33	communicat	0.000566	0.	0.	0.
34	transport	0.002800	0.	0.	0.
35	gas-pr/dis	0.	0.	0.	0.
36	electric	0.000074	0.	0.	0.
37	wat/se/san	0.008786	0.	0.	0.
38	loc-govt	0.037332	0.	0.	0.007976
39	households	0.043840	3.023457	0.	0.
40	state-govt	0.064712	0.	0.	0.
41	fed-govt	0.003946	0.	0.	0.
42	transfers	0.738712	0.	0.	0.
43	prof-depr	0.006518	-2.023457	0.	0.
44	imports	0.023274	0.	0.769914	0.130972

B-3 HIGH PLAINS REGION OF EASTERN COLORADO, DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR DELIVERED TO FINAL DEMAND, 1978 (Households Endogenous)

		1	2	3	4	5	6	7	8	9	10
		irr-corn	irr-wheat	irr-sorg	dry-wheat	dry-sorg	other-irr	other-dry	feedlots	range-cttl	other-anim
1	irr-corn	1.0592	0.0253	0.0344	0.0520	0.0497	0.0208	0.0464	0.2208	0.1044	0.1710
2	irr-wheat	0.	1.0000	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	1.0000	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.1221	0.0521	0.0708	1.1072	0.1024	0.0427	0.0957	0.0685	0.1370	0.0324
5	dry-sorg	0.	0.	0.	0.	1.0000	0.	0.	0.	0.	0.
6	other-irr	0.0280	0.0164	0.0187	0.0373	0.0333	1.0122	0.0220	0.0248	0.0550	0.1272
7	other-dry	0.0120	0.0051	0.0070	0.0106	0.0101	0.0042	1.0094	0.0068	0.0135	0.0033
8	feedlots	0.0005	0.0005	0.0005	0.0006	0.0005	0.0006	0.0004	1.0176	0.1037	0.0025
9	range-cttl	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.1679	1.0171	0.0004
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1038
11	food-proc	0.0011	0.0010	0.0010	0.0012	0.0010	0.0013	0.0009	0.0013	0.0014	0.0054
12	printing	0.0016	0.0012	0.0015	0.0017	0.0022	0.0019	0.0025	0.0011	0.0020	0.0020
13	mach-mfg	0.0001	0.0001	0.0001	0.0000	0.0000	0.0001	0.0000	0.0001	0.0001	0.0003
14	stone/clay	0.0012	0.0011	0.0012	0.0014	0.0012	0.0015	0.0012	0.0009	0.0015	0.0011
15	other-mfg	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	oil/gs-pr	0.0296	0.0280	0.0289	0.0041	0.0039	0.0214	0.0031	0.0073	0.0056	0.0080
17	constructn	0.0079	0.0077	0.0080	0.0088	0.0074	0.0085	0.0065	0.0074	0.0095	0.0085
18	whlsl-mach	0.0004	0.0004	0.0004	0.0003	0.0002	0.0003	0.0001	0.0005	0.0004	0.0014
19	whlsl-farm	0.3589	0.1532	0.2080	0.3150	0.3012	0.1254	0.2812	0.2012	0.4026	0.0945
20	oth-whlsl	0.0031	0.0031	0.0032	0.0033	0.0027	0.0035	0.0023	0.0049	0.0041	0.0247
21	rtl-fuel	0.0033	0.0027	0.0031	0.0040	0.0036	0.0042	0.0039	0.0024	0.0043	0.0030
22	whlsl-fuel	0.0034	0.0028	0.0032	0.0071	0.0046	0.0038	0.0065	0.0020	0.0055	0.0046
23	auto-dlr	0.0002	0.0003	0.0003	0.0003	0.0003	0.0002	0.0002	0.0004	0.0004	0.0015
24	eat/drink	0.0056	0.0048	0.0053	0.0073	0.0060	0.0074	0.0064	0.0037	0.0074	0.0050
25	other-rtl	0.0156	0.0132	0.0149	0.0201	0.0174	0.0207	0.0188	0.0111	0.0206	0.0143
26	ag-service	0.0353	0.0492	0.0392	0.1343	0.1105	0.0267	0.0260	0.0260	0.0701	0.0176
27	finance	0.0785	0.0703	0.0731	0.0839	0.0725	0.0821	0.0762	0.0385	0.0747	0.1214
28	ins/re	0.0240	0.0267	0.0255	0.0341	0.0225	0.0242	0.0251	0.0177	0.0289	0.0193
29	education	0.0239	0.0283	0.0263	0.0301	0.0184	0.0224	0.0085	0.0140	0.0330	0.0162
30	health	0.0073	0.0064	0.0071	0.0097	0.0076	0.0096	0.0080	0.0048	0.0098	0.0064
31	other-ser	0.0538	0.0228	0.0504	0.0322	0.1747	0.0744	0.2120	0.0329	0.0595	0.1117
32	postal-ser	0.0024	0.0021	0.0023	0.0020	0.0022	0.0027	0.0024	0.0013	0.0022	0.0022
33	communicat	0.0059	0.0047	0.0056	0.0069	0.0077	0.0073	0.0084	0.0048	0.0078	0.0061
34	transport	0.0044	0.0037	0.0042	0.0047	0.0048	0.0054	0.0052	0.0242	0.0618	0.0088
35	gas-pr/dis	0.1347	0.1275	0.1316	0.0186	0.0177	0.0977	0.0142	0.0333	0.0253	0.0364
36	electric	0.1860	0.1725	0.1874	0.0262	0.0257	0.2161	0.0234	0.0541	0.0403	0.0951
37	wat/se/san	0.0019	0.0017	0.0019	0.0022	0.0022	0.0024	0.0023	0.0012	0.0024	0.0018
38	loc-govt	0.0450	0.0543	0.0500	0.0566	0.0341	0.0415	0.0142	0.0263	0.0624	0.0300
39	households	0.1823	0.1562	0.1745	0.2417	0.1939	0.2443	0.2093	0.1214	0.2436	0.1611

B-3 HIGH PLAINS REGION OF EASTERN COLORADO, DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR DELIVERED TO FINAL DEMAND, 1978 (Households Endogenous) (continued)

		11 food-proc	12 printing	13 mach-mfg	14 stone/clay	15 other-mfg	16 oil/gs-pr	17 constructn	18 whlsl-mach	19 whlsl-farm	20 oth-whlsl
1	irr-corn	0.1207	0.0003	0.0002	0.0006	0.0004	0.0004	0.0058	0.0005	0.2035	0.0462
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.0436	0.0003	0.0001	0.0005	0.0003	0.0004	0.0052	0.0005	0.4204	0.0411
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	0.0343	0.0014	0.0007	0.0009	0.0011	0.0008	0.0035	0.0020	0.0870	0.0179
7	other-dry	0.0056	0.0000	0.0000	0.0001	0.0001	0.0001	0.0010	0.0001	0.0414	0.0078
8	feedlots	0.4752	0.0007	0.0004	0.0012	0.0008	0.0008	0.0124	0.0012	0.0004	0.0973
9	range-cttl	0.0784	0.0001	0.0001	0.0002	0.0001	0.0001	0.0020	0.0002	0.0001	0.0161
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	food-proc	1.0194	0.0015	0.0008	0.0026	0.0018	0.0016	0.0266	0.0026	0.0009	0.2087
12	printing	0.0009	1.0060	0.0052	0.0013	0.0037	0.0011	0.0047	0.0045	0.0018	0.0122
13	mach-mfg	0.0004	0.0000	1.0344	0.0001	0.0078	0.0025	0.0013	0.0001	0.0000	0.0105
14	stone/clay	0.0007	0.0018	0.0010	1.0041	0.0014	0.0058	0.0611	0.0033	0.0011	0.0061
15	other-mfg	0.0001	0.0000	0.0000	0.0000	1.0075	0.0000	0.0000	0.0000	0.0000	0.0000
16	oil/gs-pr	0.0046	0.0024	0.0016	0.0011	0.0018	1.1422	0.0022	0.0046	0.0086	0.0045
17	constructn	0.0049	0.0077	0.0053	0.0658	0.0061	0.0302	1.1894	0.0238	0.0066	0.0859
18	whlsl-mach	0.0003	0.0001	0.0008	0.0012	0.0001	0.0019	0.0016	1.0002	0.0004	0.0003
19	whlsl-farm	0.1054	0.0007	0.0003	0.0011	0.0008	0.0009	0.0115	0.0012	1.2383	0.0906
20	oth-whlsl	0.0032	0.0033	0.0019	0.0105	0.0057	0.0059	0.1253	0.0068	0.0025	1.0143
21	rtl-fuel	0.0020	0.0084	0.0039	0.0034	0.0048	0.0030	0.0067	0.0185	0.0034	0.0091
22	whlsl-fuel	0.0015	0.0013	0.0015	0.0047	0.0012	0.0017	0.0017	0.0028	0.0037	0.0026
23	auto-dlr	0.0003	0.0003	0.0006	0.0007	0.0002	0.0004	0.0014	0.0004	0.0002	0.0006
24	eat/drink	0.0034	0.0106	0.0055	0.0062	0.0088	0.0064	0.0120	0.0177	0.0054	0.0140
25	other-rtl	0.0097	0.0307	0.0153	0.0172	0.0236	0.0149	0.0338	0.0465	0.0150	0.0416
26	as-service	0.0144	0.0002	0.0001	0.0001	0.0001	0.0002	0.0010	0.0002	0.0565	0.0076
27	finance	0.0239	0.0287	0.0199	0.0316	0.0125	0.0154	0.0273	0.0672	0.0574	0.0493
28	ins/re	0.0120	0.0213	0.0174	0.0207	0.0153	0.0135	0.0342	0.0464	0.0227	0.0349
29	education	0.0095	0.0143	0.0053	0.0048	0.0094	0.0366	0.0088	0.0270	0.0191	0.0143
30	health	0.0044	0.0136	0.0071	0.0080	0.0100	0.0075	0.0153	0.0200	0.0070	0.0173
31	other-ser	0.0209	0.0301	0.0127	0.0170	0.0195	0.0158	0.0281	0.0515	0.0377	0.0362
32	postal-ser	0.0011	0.0484	0.0021	0.0020	0.0022	0.0015	0.0035	0.0075	0.0018	0.0052
33	communicat	0.0040	0.0210	0.0089	0.0115	0.0106	0.0062	0.0150	0.0654	0.0061	0.0174
34	transport	0.0334	0.0326	0.0105	0.0054	0.0142	0.0049	0.0090	0.0371	0.0038	0.0185
35	gas-pr/dis	0.0209	0.0112	0.0073	0.0049	0.0060	0.0085	0.0099	0.0211	0.0393	0.0207
36	electric	0.0369	0.0274	0.0157	0.0136	0.0235	0.0748	0.0202	0.0381	0.0616	0.0351
37	wat/se/san	0.0015	0.0027	0.0015	0.0021	0.0022	0.0020	0.0040	0.0052	0.0017	0.0049
38	loc-govt	0.0175	0.0240	0.0082	0.0068	0.0154	0.0704	0.0125	0.0470	0.0358	0.0226
39	households	0.1111	0.3527	0.1660	0.2102	0.2621	0.1801	0.4006	0.5188	0.1774	0.4511

B-3 HIGH PLAINS REGION OF EASTERN COLORADO, DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR DELIVERED TO FINAL DEMAND, 1978 (Households Endogenous) (continued)

		21 rtl-fuel	22 whlsl-fuel	23 auto-dlr	24 eat/drink	25 other-rtl	26 ag-service	27 finance	28 ins/re	29 education	30 health
1	irr-corn	0.0011	0.0004	0.0006	0.0005	0.0008	0.0026	0.0002	0.0001	0.0022	0.0009
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.0010	0.0003	0.0005	0.0005	0.0007	0.0052	0.0002	0.0001	0.0032	0.0013
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	0.0015	0.0017	0.0028	0.0018	0.0016	0.1216	0.0006	0.0003	0.0032	0.0023
7	other-dry	0.0002	0.0001	0.0001	0.0001	0.0001	0.0005	0.0000	0.0000	0.0004	0.0001
8	feedlots	0.0023	0.0009	0.0014	0.0012	0.0017	0.0002	0.0004	0.0002	0.0025	0.0011
9	range-cttl	0.0004	0.0001	0.0002	0.0002	0.0003	0.0000	0.0001	0.0000	0.0004	0.0002
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	food-proc	0.0050	0.0019	0.0029	0.0026	0.0037	0.0005	0.0009	0.0003	0.0053	0.0024
12	printing	0.0109	0.0091	0.0601	0.0054	0.0335	0.0007	0.0018	0.0047	0.0040	0.0041
13	mach-mfg	0.0002	0.0001	0.0001	0.0001	0.0002	0.0000	0.0000	0.0000	0.0002	0.0001
14	stone/clay	0.0019	0.0026	0.0036	0.0038	0.0061	0.0006	0.0013	0.0004	0.0037	0.0032
15	other-mfg	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	oil/gs-pr	0.0064	0.0035	0.0050	0.0053	0.0072	0.0096	0.0009	0.0005	0.0028	0.0043
17	constructn	0.0132	0.0182	0.0154	0.0388	0.0923	0.0047	0.0145	0.0029	0.0211	0.0184
18	whlsl-mach	0.0002	0.0001	0.0002	0.0003	0.0003	0.0001	0.0001	0.0000	0.0021	0.0001
19	whlsl-farm	0.0022	0.0009	0.0012	0.0012	0.0017	0.0152	0.0004	0.0002	0.0090	0.0036
20	oth-whlsl	0.0207	0.0047	0.0063	0.0075	0.0142	0.0016	0.0025	0.0009	0.0184	0.0054
21	rtl-fuel	1.0054	0.0069	0.0202	0.0086	0.0113	0.0014	0.0025	0.0020	0.0107	0.0104
22	whlsl-fuel	0.0009	1.0011	0.0030	0.0014	0.0018	0.0015	0.0004	0.0003	0.0020	0.0016
23	auto-dlr	0.0002	0.0046	1.0003	0.0004	0.0009	0.0004	0.0001	0.0003	0.0011	0.0005
24	eat/drink	0.0094	0.0128	0.0219	1.0135	0.0121	0.0024	0.0046	0.0026	0.0236	0.0172
25	other-rtl	0.0333	0.0348	0.0597	0.0438	1.0354	0.0070	0.0127	0.0066	0.0590	0.0648
26	ag-service	0.0003	0.0002	0.0003	0.0002	0.0002	1.0032	0.0001	0.0000	0.0006	0.0003
27	finance	0.0557	0.0939	0.0496	0.0972	0.0355	0.0613	1.0072	0.0075	0.0590	0.0438
28	ins/re	0.0293	0.0518	0.0766	0.0252	0.0404	0.0086	0.0116	1.0048	0.0712	0.0462
29	education	0.0123	0.0157	0.0197	0.0255	0.0200	0.0050	0.0044	0.0032	1.0393	0.0111
30	health	0.0119	0.0163	0.0276	0.0175	0.0141	0.0031	0.0058	0.0027	0.0270	1.0457
31	other-ser	0.1604	0.0407	0.0635	0.0390	0.0986	0.0129	0.0203	0.0129	0.0655	0.0557
32	postal-ser	0.0062	0.0060	0.0095	0.0046	0.0072	0.0011	0.0049	0.0022	0.0042	0.0181
33	communicat	0.0191	0.0265	0.0558	0.0365	0.0300	0.0031	0.0047	0.0096	0.0169	0.0235
34	transport	0.0109	0.0159	0.0152	0.0118	0.0666	0.0020	0.0050	0.0022	0.0165	0.0189
35	gas-pr/dis	0.0290	0.0158	0.0230	0.0241	0.0327	0.0437	0.0042	0.0023	0.0127	0.0197
36	electric	0.0674	0.0295	0.0300	0.1166	0.0971	0.0310	0.0079	0.0046	0.0295	0.0311
37	wat/se/san	0.0175	0.0049	0.0059	0.0095	0.0055	0.0007	0.0013	0.0008	0.0051	0.0071
38	loc-govt	0.0204	0.0258	0.0299	0.0450	0.0342	0.0089	0.0068	0.0054	0.0161	0.0149
39	households	0.3108	0.4262	0.7223	0.4529	0.3645	0.0787	0.1520	0.0711	0.6652	0.5621

B-3 HIGH PLAINS REGION OF EASTERN COLORADO, DIRECT AND INDIRECT REQUIREMENTS PER DOLLAR DELIVERED TO FINAL DEMAND, 1978 (Households Endogenous) (continued)

		31 other-ser	32 postal-ser	33 communicat	34 transport	35 gas-pr/dis	36 electric	37 wat/se/san	38 loc-govt	39 households
1	irr-corn	0.0002	0.0006	0.0003	0.0006	0.0003	0.0003	0.0022	0.0021	0.0008
2	irr-wheat	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	irr-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	dry-wheat	0.0002	0.0005	0.0003	0.0005	0.0002	0.0003	0.0021	0.0025	0.0007
5	dry-sorg	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	other-irr	0.0007	0.0021	0.0012	0.0015	0.0006	0.0006	0.0021	0.0031	0.0043
7	other-dry	0.0000	0.0001	0.0000	0.0001	0.0000	0.0001	0.0004	0.0003	0.0001
8	feedlots	0.0005	0.0013	0.0007	0.0013	0.0005	0.0007	0.0044	0.0033	0.0020
9	range-cttl	0.0001	0.0002	0.0001	0.0002	0.0001	0.0001	0.0007	0.0005	0.0003
10	other-anim	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	food-proc	0.0011	0.0028	0.0015	0.0027	0.0011	0.0014	0.0095	0.0071	0.0042
12	printing	0.0068	0.0038	0.0020	0.0038	0.0014	0.0011	0.0030	0.0039	0.0053
13	mach-mfg	0.0000	0.0001	0.0000	0.0001	0.0005	0.0001	0.0004	0.0003	0.0001
14	stone/clay	0.0012	0.0027	0.0017	0.0019	0.0018	0.0009	0.0145	0.0061	0.0054
15	other-mfg	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	oil/gs-pr	0.0027	0.0028	0.0015	0.0029	0.2203	0.0006	0.0017	0.0026	0.0041
17	constructn	0.0107	0.0128	0.0099	0.0089	0.0109	0.0072	0.2604	0.0734	0.0188
18	whlsl-mach	0.0001	0.0002	0.0003	0.0002	0.0011	0.0002	0.0027	0.0039	0.0002
19	whlsl-farm	0.0005	0.0012	0.0008	0.0013	0.0006	0.0008	0.0048	0.0064	0.0017
20	oth-whlsl	0.0034	0.0076	0.0039	0.0094	0.0040	0.0054	0.0423	0.0279	0.0082
21	rtl-fuel	0.0053	0.0089	0.0066	0.0066	0.0025	0.0030	0.0061	0.0100	0.0177
22	whlsl-fuel	0.0008	0.0017	0.0011	0.0017	0.0007	0.0005	0.0017	0.0028	0.0027
23	auto-dlr	0.0005	0.0031	0.0006	0.0010	0.0002	0.0003	0.0015	0.0033	0.0003
24	eat/drink	0.0063	0.0161	0.0095	0.0116	0.0043	0.0045	0.0111	0.0202	0.0329
25	other-rtl	0.0232	0.0436	0.0252	0.0301	0.0122	0.0122	0.0307	0.0532	0.0907
26	as-service	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	0.0010	0.0016	0.0004
27	finance	0.0274	0.0256	0.0266	0.0193	0.0149	0.0110	0.1058	0.0495	0.0494
28	ins/re	0.0129	0.0312	0.0184	0.0293	0.0185	0.0112	0.0309	0.0585	0.0520
29	education	0.0083	0.0177	0.0364	0.0224	0.0195	0.0305	0.0485	0.5221	0.0192
30	health	0.0068	0.0202	0.0122	0.0138	0.0054	0.0059	0.0152	0.0328	0.0426
31	other-ser	1.0170	0.0423	0.0186	0.0205	0.0115	0.0114	0.0563	0.0655	0.0517
32	postal-ser	0.0055	1.0037	0.0099	0.0033	0.0046	0.0040	0.0032	0.0044	0.0061
33	communicat	0.0192	0.0197	1.0075	0.0154	0.0045	0.0050	0.0122	0.0192	0.0257
34	transport	0.0103	0.5228	0.0103	1.0159	0.0061	0.0043	0.0538	0.0145	0.0183
35	gas-pr/dis	0.0122	0.0126	0.0068	0.0131	1.0040	0.0029	0.0079	0.0118	0.0188
36	electric	0.0242	0.0322	0.0135	0.0229	0.0215	1.5802	0.1307	0.0353	0.0341
37	wat/se/san	0.0050	0.0046	0.0030	0.0035	0.0013	0.0024	1.0037	0.0118	0.0078
38	loc-govt	0.0143	0.0286	0.0484	0.0400	0.0371	0.0588	0.0918	1.0287	0.0240
39	households	0.1776	0.5275	0.3049	0.3560	0.1348	0.1411	0.3649	0.6165	1.1205

APPENDIX C

CRITIQUE OF DATA SOURCES

INTRODUCTION

Data gathered for the High Plains interindustry study 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 gross flows matrix; 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 High Plains interindustry study, 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, not the bibliography entries at the conclusion of the report. 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 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 sector were largely secured from the Cooperative Extension Service, Department of Economics, Colorado State University, and a study conducted at Colorado State University, for the Bureau of Land Management and the Forest Service, Effects of Federal Grazing Land on the Economy of Colorado (37). Specifically, the Extension Service data pertained to estimated cost of producing particular crops and animals, not the aggregate expense of individual farm operators.

Special comment on the data secured from the Colorado Department of Labor and Employment is warranted (7). 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 (6) 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 High Plains region of Western Colorado had to be obtained directly from the

Colorado Department of Labor and Employment. The computer print outs released for use in the High Plains study covered the parts of calendar years 1978-79.

Useful data were secured from the files and in-house reports of other government agencies, trade associations, and other organizations (2, 3, 14, 17, 18, 19, 20, 23, 25, and 66). The data were not always in the form requested, but were sufficiently detailed so that, with slight modifications, they were quite valuable. Specific comment on these data and others follow in the respective SIC division.

AGRICULTURE

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 the 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 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 important in the High Plains region of Eastern 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.

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 High Plains interindustry study was determined partly from information secured from the Cooperative Extension Service, Department of Economics, Colorado State University and from the Economics and Cooperative Service, USDA.

Determination of the gross flows and the distribution of purchases for livestock production was highly dependent on information secured from the Cooperative Extension Service and Effects of Federal Grazing Land on the Economy of Colorado (37) an unpublished study conducted at Colorado State University for the Bureau of Land Management and the Forest Service. Government payments to the agricultural sectors were determined from the Agricultural Stabilization and Conservation Service, Annual Report - Colorado (38).

Data on the employment of labor in the agricultural sectors are not readily available from published sources. The estimate of the dollars for wages in each of the sectors was based on the Cooperative Extension Service information and on Effects of Federal Grazing Land on the Economy of Colorado (37). Employment levels were then imputed using a 2,000 hour work year. The

number of people employed in agriculture as identified in the 1970 Census of Population (52) could also have been used to obtain an employment coefficient, but wasn't. The aggregate value for agriculture 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 High Plains 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.

OIL AND GAS PRODUCTION

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 (12). Thus, the researcher is left with the task of determining a unit value when information on 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 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 (69).

In the final analysis, the total gross output values used in the oil and gas division of the High Plains region 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 (43) and (44) and the Construction Review (58) 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 (56), 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 1972 Census of Manufacturers (50) and County Business Patterns (57) is fairly complete in a broad sense but still quite limited in what detail is 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

(e.g., as in food processing) are not reflected in the first quarter reporting. As a result, neither of these publications was of much use for the High Plains interindustry study. In fact, levels of output for the manufacturing sectors had to be estimated from primary data and employment totals.

The Directory of Colorado Manufacturers (67), published annually by the Bureau of Economic and Business Research (University of Colorado), was used extensively in the determination of which manufacturers to review. 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, secondary 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 (41). Though the information contained therein was not directly used in the High Plains 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, COMMUNICATIONS, ELECTRIC, GAS, AND SANITARY SERVICES

Secondary data for the transportation, communications, electric, gas, and sanitary services sectors are quite available and generally speaking, of fairly good quality. Despite this, only a limited amount of them were used in the High Plains study. The reasons for this are largely in the nature of the filing system for Colorado Public Utilities Commission (PUC) (18). 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 (18). The PUC reports were readily accessible so they 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 (19). 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 (30) and Transport Statistics in the United States: Motor Carriers (31). These types of documents were not really helpful in the study because their use necessitates a significant amount of regional prorating. A similar argument holds for documents published by the Federal Aviation Administration. As a result, the best alternative was to estimate the level of economic activity in the transportation sector from PUC 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 (66). 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 High Plains region of Eastern Colorado is higher than the actual revenue, but it is not known how much higher. For example, Mountain Bell mails statements to local customers 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 High Plains region.

Information on rural telephone systems can be obtained from the Annual Statistical Report: Rural Telephone Borrowers (40). 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 (24). 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 (16) 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 (39) 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 (28) is reported on a company basis and the High Plains region is only a small part of the territory of the Public Service Company of Colorado. Statistics of Publicly Owned Electric Utilities in the United States (29) does not identify all the municipal operations in the study 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 in-

complete reporting precluded use of the information in the High Plains interindustry study.

TRADE - WHOLESALE AND RETAIL

Examination of Robert Morris Associates' Annual Statement Studies (35) suggested that to arrive at any meaningful coefficients for the trade sectors, a rather exhaustive and detailed study of the trade sectors would have been required. Considering the time and financial constraint imposed on the research, such a detailed study could not be justified. Accordingly, very little primary data were secured for the trade sectors other than gasoline stations and restaurants in the High Plains interindustry study.

Secondary data sources used to estimate the levels of total gross output included the Census of Wholesale Trade (55), the Census of Retail Trade (53), and the Colorado Department of Revenue's Annual Report (16). Both Census publications referred to calendar year 1972, and needed updating to reflect 1978 conditions.

Select interviews were used to gain information relative to what values would be used for regional flows and margining of the trade sectors. Caution must be expressed in regard to the accuracy of the coefficients in the trade sector. It is recommended that an in-depth study of this sector, employing primary data collection techniques, be undertaken in the near future.

FINANCE, INSURANCE, AND REAL ESTATE

Secondary data on the activities of commercial banks are contained in Sheshunoff and Company's The Banks of Colorado (36). This is a privately-printed industry publication that shows the balance sheet and income state-

ment for each bank in the state. A source such as Bank Operating Statistics (26), published by the Federal Deposit Insurance Corporation, aggregates information by region; none of these regions correspond to the geographic delineation of the High Plains 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 (27). 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 High Plains region by using the personal adjusted gross income figures reported in the Colorado Department of Revenue's Annual Report (16). Information pertaining to the activities of the Federal Credit Bank's operations was gained from filed reports (25).

Insurance activities were estimated from information gained largely from interview. The Colorado Division of Insurance publishes the Insurance Industry in Colorado: Statistical Report (15). 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 High Plains 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 eleven counties (23). From the documentary fees paid an estimate was made of the transaction values involved and a

six 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 (59).

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" (22) was adjusted by using the index values published in Medicare: Health Insurance for the Aged - Geographical Index of Reimbursement by State and County (60). The resulting figure was then adjusted based on information gained in interviews and secured from the Colorado State Department of Health (4), and the Colorado Department of Social Services (17).

Data are readily available for education activities in the High Plains region. Data pertaining to colleges were secured directly from the respective institutions. The Colorado Commission on Higher Education (CCHE) (2) also provided information on other institutions of higher education. Revenues and Expenditures: Colorado School Districts (3), published annually by the Colorado Department of Education, was used to identify the level of total gross output for public schools. This document is rather comprehensive and identifies revenues and expenditures for each school district in the state. Because of the high quality data described above, the Bureau of the Census data contained in Finances of School Districts (48) were not used in the High Plains interindustry study.

The information contained in Census of Selected Service Industries (54) 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 1978 conditions. Concomitantly, the data that pertained to dental laboratories in this publication were removed to the health and medical care sector.

As with the trade sectors, very little 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 High Plains interindustry study.

PUBLIC ADMINISTRATION

Rather extensive information on local and county government activities is contained in the Bureau of Census publications, Compendium of Government Finances (45), Finances of County Governments (46), Finances of Municipalities

and Township Governments (47), and Compendium of Public Employment (49). Two considerations precluded the use of these documents in the High Plains 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 1978.

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 (8) 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 (9) identifies valuations, levies, and property tax revenues for every local tax authority. The Colorado Department of Revenue's Annual Report (16) contains information sufficient to estimate local sales tax collections. Though each publication contains good quality data, the High Plains 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 (14). All state budgets are regionalized according to the various planning regions in the state. Though the planning regions do not conform to the delineation of the High Plains 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 (16). An estimation of revenues from hunting and fishing licenses was made based on information in Colorado Big Game Harvest (11). Revenue generated because of activities on state lands was estimated by using the State Board of Land Commissioners' Summary of Transactions (13).

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 (5). 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 (64), 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 (16) and the Treasury's Statistics of Income 1969, ZIP Code Area Data from Individual Income Tax Returns (65). This first approximation was then adjusted by using information gained from the publication Public Land Statistics (61).

For a first approximation of federal expenditures, data were secured from Federal Outlays in Colorado (32). This publication shows estimates for federal outlays by agency and by county. Many of the estimates are prorated by using standardized criteria. Some documents, such as the Veterans Administration's Annual Report (68) and the Railroad Retirement Board's Annual Report (34),

were examined and the data so secured prorated to the High Plains region of Eastern Colorado. This practice was too limiting, so more direct information was obtained. Certain major agencies were surveyed.

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 in interviews.

Households were not interviewed for the High Plains study. Further, 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 C *

1. Colorado. Department of Agriculture. Colorado Crop and Livestock Reporting Service. Colorado Agricultural Statistics. Annual. (01,02,07)

2. Colorado. Department of Education. Commission on Higher Education. Files. (822)

3. Colorado. Department of Education. Revenues and Expenditures: Colorado School Districts. Annual. (821)

4. Colorado. Department of Health. Files. (80)

5. Colorado. Department of Highways. Colorado's Annual Highway Report. Annual. (state highways, state patrol)

6. Colorado. Department of Labor and Employment. Colorado Manpower Review. Monthly. (employment, earnings)

7. Colorado. Department of Labor and Employment. Files. (employment, earnings)

8. Colorado. Department of Local Affairs. Division of Local Government. Local Government Financial Compendium. Annual. (local and county governments)

9. Colorado. Department of Local Affairs. Division of Property Taxation. Annual Report to the Governor and the Legislature. Annual. (valuations, levies, property tax revenues)

10. Colorado. Department of Natural Resources. Division of Mines. A Summary of Mineral Industry Activities in Colorado. Annual. (10, 12, 13, 14)

11. Colorado. Department of Natural Resources. Division of Wildlife. Colorado Big Game Harvest. Annual. (hunting and fishing statistics)

12. Colorado. Department of Natural Resources. Oil and Gas Conservation Commission. Oil and Gas Statistics. Annual. (13)

* Relevant SIC classifications are shown in brackets.

13. Colorado. Department of Natural Resources. State Board of Land Commissioners. Summary of Transactions. Annual.
(public land administration)

14. Colorado. Department of Planning and Budget. Files.
(state government)

15. Colorado. Department of Regulatory Agencies. Division of Insurance. Insurance Industry in Colorado: Statistical Report. Annual.
(63, 63)

16. Colorado. Department of Revenue. Annual Report. Annual.
(population, income, state tax revenues, motor vehicle registrations)

17. Colorado. Department of Social Services. Files.
(80, 83, households)

18. Colorado. Public Utilities Commission. Files.
(40-42, 45-49)

19. Colorado. State Auditor. Files.
(local and county governments, special tax districts)

20. Colorado Health Care Association, Denver, Colorado. Files.
(80)

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APPENDIX D

SURVEY FORM USED FOR THE INTERINDUSTRY STUDY

PURCHASES ANALYSIS

Supply Source Sectors where you purchase or pay expenditures	Purchases in Colorado ($ or % of total)	(City town or vicinity)	Purchases in NB, KS OK, TX, NM ($ or % of Total)	(City town or vicinity)	Purchases in States other than CO, NB, KS OK, TX, NM ($ or % of total)	Purchases Outside U.S. ($ or % of total)
AGRICULTURE PRODUCTION:						
1. Corn (irrigated)						
2. Wheat (irrigated)						
3. Grain Sorghums (irrigated)						
4. Corn (non-irrigated)						
5. Wheat (non-irrigated)						
6. Grain Sorghums (non-irrigated)						
7. Other Irrigated Crop Production						
8. Other Non-Irrigated Crop Production						
9. Feedlot Cattle						
10. Range Cattle						
11. Other Farm Animals (sheep, dairy, poultry, hogs, etc.)						
PROCESSING AND MANUFACTURING:						
12. Meat Processing						
13. Grain Mill Products						
14. Other Food and Kindred Products						
15. Apparel, Textiles						
16. Paper products and Printing						
17. Chemicals, Petroleum Refining and Rubber/Plastics						
18. Farm and Garden Machinery and Equipment						
19. Other Machinery and Fabricated Metals						
20. Stone, Clay, Glass, Concrete						
21. All Other Manufacturing						
22. Oil and Gas						
23. Oil and Gas Services						
24. Construction						
TRADE:						
25. Wholesale Machinery and Equipment						
26. Wholesale Farm Products						
27. Hardware Stores						
28. Other Wholesale Trade						
29. Retail Fuel						
30. Wholesale Fuel						
31. Auto Dealers and Repairs						
32. Eating/Drinking, Hotels, other Lodging						
33. Other Retail						
SERVICES:						
34. Agricultural Services						
35. Financial Institutions						
36. Insurance						

PURCHASE ANALYSIS

Supply Source	Purchases in Colorado ($ or % of total)	(City town or vicinity)	Purchases in NB, KS OK, TX, NM ($ or $ of Total)	(City town or vicinity)	Purchases in States other than CO, NB, KS OK, TX, NM ($ or % of total)	Purchases Outside U.S. ($ or % of total)
37. Real Estate						
38. Educational Services						
39. Health Services						
40. All Other Services						
41. Railroads						
42. Motor Freight/warehousing						
43. Postal Service						
44. Communication						
45. Other Transportation						
46. Gas Production and Distribution						
47. Electricity						
48. Water Supply, Sewer, Other						
49. Households (subject to withholdings)						
50. Local Government (taxes, lic., etc.)						
51. State Government (taxes, lic., etc.)						
52. Federal Government (taxes, FICA, etc.)						
53. Depreciation						
54. Rents, Profits, Dividends, Retained Earnings						
55. TOTAL PURCHASES						
SALES ANALYSIS						
Demand Source: Sectors to which you sell SECTORS: 1.						
2.						
3.						
4.						
5.						
6.						
7. Households						
8. Local Government						
9. State Government (expenditures)						
10. Federal Government (expenditures)						
11. Investment and Capital Formation						
12. TOTAL SALES						

At what level of output capacity did your establishment operate during 1977. LEVEL OF CAPACITY UTILIZATION

% _____?

What is your estimate of your establishment's total water use for all phases of your operation? (Note: Please use any convenient unit of measurement; e.g., gallons per day, 1000 gallons per day, acre feet year, etc.)

TOTAL WATER INTAKE: _____

Please indicate the value of your establishment's net inventory change in 1977. (This may be a positive or negative figure.) NET INVENTORY CHANGE: $_____

APPENDIX E

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(methodology, input-output)

COLORADO WATER RESOURCES RESEARCH INSTITUTE

LIST OF PUBLICATIONS AVAILABLE

A. MANAGEMENT OF HYDROLOGIC EXTREMES

		Date	Price
CR 16	Experimental Investigation of Small Watershed Floods	6/68	$ 2.00
CR 18	Experimental Investigation of Small Watershed Floods	6/70	5.00
CR 29	Identification of Urban Watershed Units Using Remote Multispectral Sensing	6/71	5.00
CR 40	Selection of Test Variable for Minimal Time Detection of Basin Response to Natural or Induced Changes	12/72	3.00
CR 42	Theory and Experiments in the Prediction of Small Watershed Response	12/72	5.00
CR 43	Experiments in Small Watershed Response	12/72	5.00
CR 56	Evaluation and Implementation of Urban Drainage and Flood Control Projects	6/74	8.00
CR 65	Urban Drainage and Flood Control Projects: Economic, Legal and Financial Aspects	7/75	10.00
CR 83	Modelling the Dynamic Response of Floodplains to Urbanization in Eastern New England	1/78	6.50
CR 95	Drought-Induced Problems and Responses of Small Towns and Rural Water Entities in Colorado: The 1976-1978 Drought	6/80	4.00
S-GS856	Research Data Assembly for Small Watershed Floods, Part II	1967	.50
IS 13	Flood Plain Management of the Cache La Poudre River near Fort Collins	8/74	2.75
IS 17	Cache La Poudre River near Fort Collins, Colorado - Flood Management Alternatives - Relocations and Levies	8/74	5.00
IS 22	Implementation of the National Flood Insurance Program in Larimer County, Colorado	9/76	4.00
IS 24	Factors Affecting Public Acceptance of Flood Insurance in Larimer and Weld Counties, Colorado	9/77	3.00
IS 27	Proceedings, Colorado Drought Workshops	11/77	Free
IS 44	The National Flood Insurance Program in the Larimer County, Colorado area	8/80	3.00

B. WATER SUPPLY AUGMENTATION AND CONSERVATION

CR 3	Snow Accumulation in Relation to Forest Canopy	6/69	1.50
CR 4	Runoff from Forest and Agricultural Watersheds	6/69	3.00
CR 8	Improving Efficiency in Agricultural Water Use	6/69	1.00
CR 9	Controlled Accumulation of Blowing Snow	6/69	2.50
CR 15	Hydraulic Operating Characteristics of Low Gradient Border Checks in the Management of Irrigation Water	6/68	3.00
CR 16	Experimental Investigation of Small Watershed Floods	6/68	2.00
CR 18	Experimental Investigation of Small Watershed Floods	6/70	5.00
CR 19	Hydraulics of Low Gradient Border Irrigation Systems	6/70	3.00
CR 20	Improving Efficiency in Agricultural Water Use	7/70	3.00
CR 23	A Systematic Treatment of the Problem of Infiltration	6/71	3.00
CR 24	Studies of the Atmospheric Water Balance	8/71	5.00
CR 25	Evaporation of Water as Related to Wind Barriers	6/71	5.00
CR 30	Geohydraulics at the Unconformity between Bedrock and Alluvial Aquifers	6/72	5.00
CR 35	An Application of Multi-Variate Analysis in Hydrology	8/72	5.00
CR 40	Selection of Test Variable for Minimal Time Detection of Basin REsponse to Natural or Induced Changes	12/72	3.00
CR 41	Groundwater Recharge as Affected by Surface Vegetation and Management	12/72	5.00
CR 42	Theory and Experiments in the Prediction of Small Watershed Response	12/72	5.00
CR 43	Experiments in Small Watershed Response	12/72	5.00
CR 49	Improvements in Moving Sprinkler Irrigation Systems for Conservation of Water	6/73	7.50
CR 50	Systematic Treatment of Infiltration with Applications	6/73	5.00

		Date	Price
CR 51	An Experimental Study of Soil Water Flow Systems Involving Hystersis	8/73	$ 7.00
CR 52	Consolidation of Irrigation Systems: Phase 1 - Engineering, Legal and Sociological Constraints and/or Facilitators	6/73	25.00
CR 53	Systematic Design of Legal Regulations for Optimal Surface-Groundwater Usage	8/73	7.00
CR 57	Snow-Air Interactions and Management of Mountain Watershed Snowpack	6/74	3.00
CR 63	Analysis of Colorado Precipitation	6/75	2.00
CR 64	Computer Estimates of Natural Recharge from Soil Moisture Data - High Plains of Colorado	1/76	4.00
CR 68	Systematic Design of Legal Regulations for Optimal Surface-Groundwater Usage, Phase 2	9/75	12.00
CR 69	Engineering and Ecological Evaluation of Antitranspirants for Increasing Runoff in Colorado Watersheds	9/75	2.50
CR 75	Physical and Economic Effects on the Local Agricultural Economy of Water Transfer to Cities	10/76	3.00
CR 76	Determination of Snow Depth and Water EQuivalent by Remote Sensing	6/76	2.00
CR 80	Achieving Urban Water Conservation, A Handbook	9/77	6.00
CR 81	Achieving Urban Water Conservation, Testing Community Acceptance	9/77	5.00
CR 82	Development of a Subsurface Hydrologic Model and Use for Integrated Management of Surface and Subsurface Water Resources	12/77	3.00
CR 87	Development of a Stream-Aquifer Model Suited for Management	8/78	3.00
CR 89	Synthesis and Calibration of a River Basin Water Management Model	10/78	3.00
CR 90	Models for System Water Planning with Special Reference to Water Reuse	6/78	5.00
CR 92	Hydraulic Conductivity of Mountain Soils	10/78	3.00
CR 94	Consolidation of Irrigation Systems: Phase II, Engineering, Economic, Legal and Sociological Requirements	5/80	8.00
CR 97	Water REquirements for Urban Lawns in Colorado	8/80	3.00
CR 99	Applications of Remote Sensing in Hydrology	9/80	3.00
CR 100	A Watersned Information System	9/80	4.00
CR 105	Municipal Water Use in Northern Colorado: Development of Efficiency-of-Use Criterion	9/80	4.00
CR 106	Urban Lawn Irrigation and Management Practices for Water Saving with Minimum Effect on Lawn Quality	9/80	6.00
IS 16	Annotated Bibliography on Trickle Irrigation	6/75	Free
IS 26	Water Use and Management in an Arid Region (Fort Collins, Colorado and Vicinity)	9/77	5.00
IS 31	The Denver Basin: Its Bedrock Aquifers	1/79	Free
IS 32	Snowpack Augmentation by Cloud Seeding in Colorado and Utah	8/79	4.00
IS 33	The Impacts of Improving Efficiency of Irrigation Systems on Water Availability	1/79	Free
IS 35	Federal Water Storage Projects: Pluses and Minuses	6/79	Free
IS 36	Cutting City Water Demand	5/79	Free
IS 37	Water for the South Platte Basin	3/79	Free
IS 39	Administration of the Small Watershed Program, 1955-1978 - An Analysis	8/79	3.00
TR 8	Models Designed to Efficiently Allocate Irrigation Water Use Based on Crop Response to Soil Moisture Stress	5/77	4.00
TR 13	Impact of Irrigation Efficiency Improvements on Water Availability in the South Platte River Basin	1/79	5.00
TR 15	Weekly Crop Consumptive Use and Precipitation in the Lower South Platte River Basin	2/79	Free
TR 16	Water Management Model for Front Range River Basins	4/79	5.00
TR 18	An Interactive River Basin Water Management Model: Synthesis and Application	8/79	4.00
TR 28	An Assessment of Water Use and Policies in Northern Colorado Cities	3/81	5.00
S-TB128	Evaluating Water Distributions of Sprinkler Irrigations Systems	1976	.85
S-TB 76	Introduction of Supplemental Irrigation Water	1965	.50

C. IDENTIFICATION AND CONTROL OF ENTERING POLLUTANTS

		Date	Price
CR 14	Hydrogeology and Water Quality Studies in the Cache La Poudre River Basin, Colorado	6/69	$ 5.00
CR 21	Waterfowl-Water Temperature Relations in Winter	6/70	5.00
CR 26	Water Temperature as a Quality Factor in the Use of Streams and Reservoirs	12/71	3.00
CR 31	Sedimentation and Contaminant Criteria for Watershed Planning and Management	6/72	5.00
CR 54	Geologic Factors in the Evaluation of Water Pollution Potential at Mountain Dwelling Sites	12/73	10.00
CR 59	A System for Geologic Evaluation of Pollution at Mountain Dwelling Sites	1/75	3.50
CR 60	Research Needs as Related to the Development of Sediment Standards in Rivers	3/75	3.00
CR 67	Toxic Heavy Metals in Groundwater of a Portion of the Front Range Mineral Belt	6/75	3.00
CR 71	Salt Transport in Soil Profiles with Application to Irrigation Return Flow - The Dissolution and Transport of Gypsum in Soils	1/76	5.00
CR 72	Toxic Heavy Metals in Groundwater of a Portion of the Front Range Mineral Belt	6/76	4.00
CR 79	Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin	9/77	4.00
CR 84	Pollutional Characteristics of Urban Stormwater Funoff	9/78	7.00
CR 104	Detection of Water Quality Changes Through Optimal Tests and Reliability of Tests	9/80	4.00

D. EFFECTS OF POLLUTANTS

CR 26	Water Temperature as a Quality Factor in the Use of Streams and Reservoirs	12/71	3.00
CR 67	Toxic Heavy Metals in Groundwater of a Portion of the Front Range Mineral Belt	6/75	3.00
CR 72	Toxic Heavy Metals in Groundwater of a Portion of the Front Range Mineral Belt	6/76	4.00
CR 73	Production of Mutant Plants Conducive to Salt Tolerance	7/76	4.00
CR 96	The Production of Agriculturally Useful Mutant Plants with Characteristics Conducive to Salt Tolerance and Efficient Water Utilization	10/79	3.00
CR 98	The Effect of Algal Inhibitors on Higher Plant Tissues	7/80	2.50
IS 25	Surveillance Data Plains Segment of the Cache La Poudre River, Colorado 1970-1977	1/78	5.00
S-GS870	Chemical Quality of Ground Water in the Prospect Valley Area, Colorado	1968	.25

E. TREATMENT AND DISPOSAL OF WASTES

CR 1	Bacterial Response to the Soil Environment	6/69	3.50
CR 2	Computer Simulation of Waste Transport in Groundwater Aquifers	6/69	2.00
CR 23	A Systematic Treatment of the Problem of Infiltration	6/71	3.00
CR 28	Combined Cooling and Bio-Treatment of Beet Sugar Factory Condenser Water Effluent	6/71	5.00
CR 32	Bacterial Movement Through Fractured Bedrock	7/72	5.00
CR 33	The Mechanism of Waste Treatment at Low Temperature, Part A: Microbiology	8/72	5.00
CR 34	The Mechanism of Waste Treatment at Low Temperature, Part B: Sanitary Engineering	8/72	5.00
CR 50	Systematic Treatment of Infiltration with Applications	6/73	5.00
CR 66	Individual Home Wastewater Characterization and Treatment	7/75	8.00
CR 77	Evaporation of Wastewater from Mountain Cabins	3/77	8.00
IS 4	Proceedings Workshop on Home Sewage Disposal in Colorado	6/72	Free
IS 9	Proceedings of the Symposium on Land Treatment and Secondary Effluent	11/73	3.00
IS 10	Proceedings of a Workshop on Revegatation of High-Altitude Disturbed Lands	7/74	3.00
IS 12	Recreation Benefits of Water Quality: Rocky Mountain National Park, South Platte River Basin, Colorado	5/78	4.00
IS 20	Proceedings, Second Workshop on Home Sewage Disposal in Colorado	9/75	3.00
IS 29	Third Workshop on Home Sewage Disposal in Colorado - Community Systems Management	7/78	4.00

			Date	Price
TR	17	Land Treatment of Municipal Sewage Effluent at Hayden, Colorado	10/77	$ 3.00

F. ECONOMIC EFFECTS

CR	10	Economics and Administration of Water Resources	6/69	2.00
CR	12	Economics and Administration of Water Resources	6/69	3.00
CR	13	Economics of Groundwater Development in the High Plains of Colorado	6/69	1.50
CR	44	Economic, Political, and Legal Aspects of Colorado Water Law	2/73	5.00
CR	46	Evaluation or Urban Water Management Policies in the Denver Metropolitan Area	6/73	7.50
CR	58	Primary Data on Economic Activity and Water Use in Prototype Oil Shale Development Areas of Colorado: An Initial Inquiry	6/74	2.00
CR	61	Economic and Institutional Analysis of Colorado Water Quality Management	6/74	2.00
CR	65	Urban Drainage and Flood Control Projects: Economic, Legal and Financial Aspects	7/75	10.00
CR	70	An Economic Analysis of Water Use in Colorado's Economy	12/75	5.00
CR	75	Physical and Economic Effects on the Local Agricultural Economy of Water Transfer to Cities	10/76	3.00
CR	91	Economic Benefits from Instream Flow in a Colorado Mountain Stream	6/79	5.00
CR	101	An Empirical Application of a Model for Estimating the Recreation Value of Instream Flow	10/80	3.00
CR	102	Measuring Benefits and the Economic Value of Water in Recreation on High Country Reservoirs	9/80	3.00

SR	3	Irrigation Development Potential in Colorado		4.00

IS	2	Economics of Water Quality--Salinity Pollution - Abridged Bibliography	6/71	11.00
IS	35	Federal Water Storage Projects: Pluses and Minuses	6/79	Free

TR	14	Economic Value of Benefits from Recreation at High Mountain Reservoirs	12/78	3.00
TR	19	An Economic Evaluation of the General Management for Yosemite National Park	3/80	4.00
TR	21	The Economy of Albany, Carbon, and Sweetwater Counties,Wyoming-Description & Analysis	1/81	3.00
TR	22	An Input-Output Study of the Upper Colorado Main Stem Region of Western Colorado	1/81	4.00
TR	23	The Economy of Moffat, Routt, & Rio Blanco Counties,Colorado-Description and Analysis	1/81	4.00
TR	24	The Survey-Based Input-Output Model as a Resource Planning Tool	1/81	3.00
TR	25	The Economy of Northwestern Colorado - Description and Analysis	1/81	4.00
TR	26	An Input-Output Analysis of Sportsman Expenditures in Colorado	1/81	4.00
TR	27	An Input-Output Study of the Kremmling Region of Western Colorado	3/81	3.00

S-GS953	Economic Analysis of Water Use in Boulder, Larimer and Weld Counties, with Projections to 1980	197[illegible]	1.00
S-543S	Pump Irrigation on the Colorado High Plains	197[illegible]	.65
S-545S	Secondary Economic Effects of Irrigation on the Colorado High Plains	197[illegible]	.80

G. ECOSYSTEM EFFECTS

			Date	Price
CR	5	Soil Movement in an Alpine Area	6/69	1.00
CR	21	Waterfowl-Water Temperature Relations in Winter	6/70	5.00
CR	55	Water Law in Relation to Environmental Quality	3/74	30.00
CR	69	Engineering and Ecological Evaluation of Antitranspirants for Increasing Runoff in Colorado Watersheds	9/75	2.50
CR	93	Application of Geomorphic Principles to Environmental Management	2/80	3.00
SR	2	Environment and Colorado - A Handbook	1973	4.00
SR	4	Piceance Basin Inventory	12/71	10.00
IS	7	Wildlife and the Environment, Proceedings of Governor's Conference, March 1973	3/73	3.00
IS	10	Proceedings of a Workshop on Revegetation of High-Altitude Distrubed Lands	7/74	3.00
IS	11	Surface Rehabilitation of Land Distrubances Resulting from Oil Shale Development	6/74	Free
IS	14	Bibliography Pertinent to Disturbance and Rehabilitation of Alpine and Subalpine Lands in Southern Rocky Mountains	2/75	3.00
IS	21	Proceedings: High Altitude Revegetation Workshop No. 2	8/76	4.00
IS	25	Surveillance Data - Plains Segment of the Cache La Poudre River, Colorado 1970-77	1/78	5.00
IS	28	Proceedings of a Workshop on Revegetation of High-Altitude Distrubed Lands, No. 3	6/68	4.00
IS	40	Proceedings of the Workshop on Instream Flow Habitat Criteria and Modeling	12/79	5.00
IS	42	Proceedings: High-Altitude Revegetation Workshop No. 4	6/80	4.00
TR	1	Surface Rehabilitation of Land Distrubances Resulting from Oil Shale Development	6/74	10.00
TR	4	Vegetative Stabilization of Spent Oil Shales	12/74	3.00
TR	5	Revegetation of Distrubed Surface Soils in Various Vegetation Ecosystems of the Piceance Basin	12/74	4.25

H. PUBLIC WELFARE (SOCIAL GOALS) EFFECTS

CR	37	Searching the Social Science Literature on Water: A Guide to Selected Information Storage and Retrieval Systems - Preliminary Version	9/72	5.00
CR	38	Water Quality Management Decision in Colorado	6/72	5.00
CR	39	Institutions for Urban-Metropolitan Water Management Essays in Social Theory	11/72	5.00
CR	62	Feasibility and Potential of Enhancing Water Recreation Opportunities on High Country Reservoirs	6/75	4.00
CR	75	Physical and Economic Effects on the Local Agricultural Economy of Water Transfer to Cities	10/76	3.00
CR	78	Selecting and Planning High Country Reservoirs for Recreation Within a Multi-purpose Management Framework	7/77	6.00
CR	81	Achieving Urban Water Conservation: Testing Community Acceptance	9/77	5.00
CR	91	Economic Benefits from Instream Flow in a Colorado Mountain Stream	6/79	5.00
CR	95	Drought-Induced Problems and Responses of Small Towns and Rural Water Entities in Colorado: The 1976-1978 Drought	6/80	4.00
CR	103	Empirical Application of a Model for Estimating the Recreation Value of Water in Reservoirs Compared to Instream Flow	12/80	3.00
CR	106	Urban Lawn Irrigation and Management Practices for Water Saving with Minimum Effect on Lawn Quality	5/81	6.00

			Date	Price
IS	15	Proceedings of the Symposium on Water Policies on U.S. Irrigated Agriculture: Are Increased Acreages Needed to Meet Domestic or World Needs?	3/75	4.00
IS	18	Minimum Stream Flows and Lake Levels in Colorado	8/75	8.00
IS	35	Federal Water Storage Projects: Pluses and Minuses	6/79	Free
IS	38	Public Participation Practices of the U.S. Army Corps of Engineers	7/79	3.00
TR	3	Implementation of the Federal Water Project Recreation Act in Colorado	6/74	Free
TR	11	Federal Water Recreation in Colorado: Comprehensive View and Analysis	1978	4.00
TR	12	Recreation Benefits of Water Quality: Rocky Mountain National Park, South Platte River Basin, Colorado	5/78	4.00

I. INSTITUTIONAL PROBLEMS

CR	11	Organizational Adaptation to Change in Public Objectives for Water Management of Cache La Poudre River System	6/69	3.00
CR	12	Economics and Administration of Water Resources	6/69	3.00
CR	17	An Exploration of Components Affecting and Limiting Policymaking Options in Local Water Agencies	11/68	5.00
CR	36	Urban-Metropolitan Institutions for Water Planning Development and Management	9/72	5.00
CR	39	Institutions for Urban-Metropolitan Water Management Essays in Social Theory	11/72	5.00
CR	44	Economic, Political and Legal Aspects of Colorado Water Law	2/73	5.00
CR	48	Institutional Requirements for Optimal Water Quality Management in Arid Urban Areas	6/73	3.00
CR	52	Consolidation of Irrigation Systems: Phase 1 - Engineering, Legal and Sociological Constraints and/or Facilitators	6/73	25.00
CR	55	Water Law in Relation to Environmental Quality	3/74	30.00
CR	65	Urban Drainage and Flood Control Projects: Economic, Legal and Financial Aspects	7/75	10.00
CR	68	Systematic Design of Legal Regulations for Optimal Surface-Groundwater Usage,Phase 2	9/75	12.00
CR	88	Institutional Arrangements for Effective Water Management in Colorado	11/78	4.00
CR	94	Consolidation of Irrigation Systems: Phase II - Engineering, Economic, Legal and Sociological Requirements	5/80	8.00
CR	95	Drought-Induced Problems and Responses of Small Towns and Rural Water Entities in Colorado: The 1976-1978 Drought	6/80	4.00
CR	105	Municipal Water Use in Northern Colorado: Development of Efficiency of Use Criterion	9/80	4.00
CR	106	Urban Lawn Irrigation and Management Practices for Water Saving with Minimum Effect on Lawn Quality	5/81	6.00
IS	6	Water Law and Its Relationship to Environmental Quality: Bibliography of Source Material	1/73	7.00
IS	12	Water Quality Control and Administration Laws and Regulations	1974	15.00
IS	22	Implementation of the National Flood Insurance Program in Larimer County,Colorado	9/76	4.00
IS	24	Factors Affecting Public Acceptance of Flood Insurance in Larimer and Weld Counties, Colorado	9/77	3.00
IS	34	San Luis Valley Water Problems: A Legal Perspective	1/79	4.00
IS	39	Administration of the Small Watershed Program, 1956-1978 - An Analysis	8/79	3.00
TR	28	An Assessment of Water Use and Policies in Northern Colorado Cities	3/81	5.00

		Date	Price
X-740A	Ground Water Management District Director's Handbook	1970	.25
SR 5	A Guide to Colorado Water Law	9/78	2.50

J. PLANNING AND ANALYSIS METHODOLOGY

CR 11	Organizational Adaptation to Change in Public Objectives for Water Management of Cache La Poudre River System	6/69	3.00
CR 13	Economics of Groundwater Development in the High Plains of Colorado	6/69	1.50
CR 17	An Exploration of Components Affecting and Limiting Policymaking Options in Local Water Agencies	11/68	5.00
CR 22	An Exploration of Components Affecting and Limiting Policymaking Options in Local Water Agencies	6/70	3.00
CR 27	Local Water Agencies, Communication Patterns, and the Planning Process	9/71	5.00
CR 37	Searching the Social Science Literature on Water: A Guide to Selected Information Storage and Retrieval Systems - Preliminary Version	9/72	5.00
CR 38	Water Quality Management Decisions in Colorado	6/72	5.00
CR 45	Mathematical Modeling of Water Management Strategies in Urbanizing River Basins	6/73	7.50
CR 46	Evaluation of Urban Water Management Policies in the Denver Metropolitan Area	6/73	7.50
CR 47	Coordination of Agricultural and Urban Water Quality Management in the Utah Lake Drainage Area	6/73	7.50
CR 56	Evaluation and Implementation of Urban Drainage and Flood Control Projects	6/74	8.00
CR 61	Economic and Institutional Analysis of Colorado Water Quality Management	3/75	5.00
CR 62	Feasibility and Potential of Enhancing Water Recreation Opportunities on High Country Reservoirs	6/75	4.00
CR 70	An Economic Analysis of Water Use in Colorado's Economy	12/75	5.00
CR 74	The Relevance of Technological Change in Long Term Water Resources Planning	10/76	3.50
CR 75	Physical and Economic Effects on the Local Agricultural Economy of Water Transfer to Cities	10/76	3.00
CR 78	Selecting and Planning High Country Reservoirs for Recreation Within a Multi-purpose Management Framework	7/77	6.00
CR 82	Development of a Subsurface Hydrologic Model and Use for Integrated Management of Surface and Subsurface Water Resources	12/77	3.00
CR 85	Development of a Drainage and Flood Control Management Program for Urbanizing Communities - Part I	9/78	2.00
CR 86	Development of a Drainage and Flood Control Management Program for Urbanizing Communities - Part II	9/78	7.00
CR 87	Development of a Stream-Aquifer Model Suited for Management	9/78	3.00
CR 89	Synthesis and Calibration of a River Basin Water Management Model	10/78	3.00
CR 90	Models for System Water Planning with Special Reference to Water Reuse	6/78	5.00
CR 91	Economic Benefits from Instream Flow in a Colorado Mountain Stream	6/79	5.00
CR 93	Application of Geomorphic Principles to Environmental Management	2/80	3.00
CR 101	An Empirical Application of a Model for Estimating the Recreation Value of Instream Flow	10/80	3.00
CR 102	Measuring Benefits and the Economic Value of Water in Recreation on High Country Reservoirs	9/80	3.00
CR 103	Empirical Application of a Model for Estimating the Recreation Value of Water in Reservoirs Compared to Instream Flow	12/80	3.00
CR 105	Municipal Water Use in Northern Colorado: Development of Efficiency-of-Use Criterion	9/80	4.00
CR 106	Urban Lawn Irrigation and Management Practices for Water Saving with Minimum Effect on Lawn Quality	5/81	6.00
SR 1	Design of Water and Wastewater Systems for Rapid Growth Areas (Boom Towns - Mountain Resorts)	7/76	4.00
SR 3	Irrigation Development Potential in Colorado	5/77	4.00

		Date	Price
IS 19	The Environmental Quality Objective of Principles and Standards for Planning	8/75	7.00
IS 38	Public Participation Practices of the U.S. Army Corps of Engineers	7/79	3.00
IS 40	Proceedings of the Workshop on Instream Flow Habitat Criteria and Modeling	12/79	5.00
IS 43	An Evaluation of the Cache La Poudre Wild and Scenic River Draft Environmental Impact Statement and Study Report	8/80	5.00
TR 6	Colorado Environmental Data Systems (abridged)	10/72	5.00
TR 7	Manual for Training in the Application of Principles and Standards (Water Resources Council)	12/74	10.00
TR 8	Models Designed to Efficiently Allocate Irrigation Water Use Based on Crop Response to Soil Moisture Stress	5/77	4.00
TR 9	The 1972 Federal Water Pollution Control Act's Area-Wide Planning Provision: Has Executive Implementation Met Congressional Intent?	11/77	5.00
TR 10	Efficiency of Wastewater Disposal in Mountain Areas	1/78	5.00
TR 18	An Interactive River Basin Water Management Model: Synthesis and Application	3/80	4.00
TR 20	Development of Methodologies for Determining Optimal Water Storage Strategies	9/80	2.00
TR 26	An Input-Output Analysis of Sportsman Expenditures in Colorado	1/81	4.00
S-TB127	A Simulation Model for Analyzing Timber-Water Joint Production in the Colorado Rockies	1975	1.25

K. WATER CONVEYANCE AND CONTROL WORKS

CR 6	Stabilization of Alluvial Channels	6/69	3.00
CR 7	Stability of Slopes with Seepage	6/69	3.00
SR 1	Design of Water and Wastewater Systems for Rapid Growth Areas (Boom Towns - Mountain Resorts)	6/76	4.00
S-496S	Farm Irrigation Structures	1966	.50
S-TB76	Parshall Measuring Flumes of Small Sizes	1957	.25
X-426A	Parshall Flumes of Large Size	1961	.50
S-TB120	Selection and Installation of Cutthroat Flumes for Measuring Irrigation and Drainage Water	1976	1.25
S-TB126	A Shunt-Line Metering System for Irrigation Wells	1977	.75
S-522S	Weed Seed and Trash Screens for Irrigation Water	1966	.35

L. OTHER

			Date	Price
IS	1	Inventory of Environmental Resources Research in Progress - Colorado State University	1/71	Free
IS	3	Inventory of Environmental Resources Research in Progress - Colorado State University	7/72	Free
IS	5	Directory of Environmental Research Faculty - Colorado State University	12/72	Free
IS	8	Inventory of Current Water Resources Research at Colorado State University	7/73	Free
IS	23	Inventory of Colorado's Front Range Mountain Reservoirs	5/77	5.00
IS	30	The Larimer-Weld Council of Governments 208 Water Quality Plan: An Assessment and Suggestions for Future Directions	8/78	2.00
TR	2	Estimated Average Annual Water Balance for Piceance and Yellow Creek Watersheds	8/74	Free
S-504S		Colorado's Ground Water Problems	1967	.35
S-512S		Ground Water in the Bijou Valley	1961	.25
S-GS757		Public Water Supplies of Colorado 1959-1960	1961	1.25