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BWIP Repository Project

Working Draft
Interim Economic and
Demographic Profile—
Benton and Franklin
Counties, Washington

D. C. Clark

November 1987

Prepared by
Battelle Human Affairs Research Centers
for the Pacific Northwest Laboratory
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1.0 BACKGROUND AND OVERVIEW

1.1 Overview of the BWIP Program

By the end of this century, the Federal Government plans to begin operating the first geologic repository for permanent disposal of commercial spent nuclear fuel and high-level radioactive waste. The Office of Civilian Radioactive Waste Management (OCRWM) of the U.S. Department of Energy (DOE) is responsible for implementing the Nuclear Waste Policy Act of 1982 (NWSA). In the NWSA, Congress approved geologic disposal by declaring that one of the key purposes of the NWSA is to "establish a schedule for the siting, construction, and operation of repositories that will provide a reasonable assurance that the public and the environment will be adequately protected from the hazards posed by high-level radioactive waste and such spent nuclear fuel as may be disposed of in a repository" (42 U.S.C. §111(b)(1) (1982)).

The NWSA specifies the process for selecting a repository site and involving the public in the siting decision. The DOE's final siting guidelines (10 CFR Part 960) further detail the steps leading to the siting decision. Following this process, in February, 1983, the DOE identified nine potentially acceptable sites for the first repository. These sites were evaluated in accordance with the DOE's siting guidelines. The results of these evaluations were reported in Draft Environmental Assessments (EAs), which were issued for public review and comment in December, 1984. The final EAs were issued in May, 1986. Chapter 4 of each EA included a description of site characterization activities and an analysis of the potential for environmental and socioeconomic impacts resulting from these activities. At that time, the Secretary of Energy identified five sites as suitable for site characterization and recommended three sites for characterization as candidate sites for the first repository. On May 28, 1986, the President approved characterization at these three sites: Deaf Smith, Texas; Yucca Mountain, Nevada; and Hanford, Washington. This formally began the site characterization phase of the repository siting process. Site characterization is expected to last about seven years.

Issues resolution strategies have guided, and will continue to guide, the design of the site characterization activities at the Hanford Site. As part of this effort, the DOE will prepare a Site Characterization Plan (SCP) that describes in some detail the site, the proposed site characterization activities, and plans for decommissioning the exploratory shaft facility (ESF) and mitigating any significant environmental impacts caused by site characterization should the site be decommissioned. A significant part of the site characterization effort (which will be described in the SCP) will be research performed from the ESF. At each of the three proposed sites, one or more shafts will be sunk to a level where the potential repository would be built. Underground drifts connecting these shafts and underground rooms will be excavated so that tests and measurements can be made. In addition to the ESF, extensive surface-based field studies will be implemented during site characterization. These studies, which represent a significant level of effort, include surveys of soil conditions, monitoring of seismic activity, geologic and hydrologic investigations at the ground surface and in boreholes not hydrologically connected with the ESF,

and selected environmental reviews. Technical descriptions of the environmental and socioeconomic studies to be undertaken during site characterization will be provided in the Environmental and Socioeconomic Monitoring and Mitigation Plans (MMPs) and Comprehensive Environmental and Socioeconomic Plans (CEP and CSP).

The Mined Geologic Disposal System Program administers the overall site characterization effort for the Repository Program, and is responsible for site selection and repository construction. At BWIP, this program is organized into eight components: (1) Systems Engineering; (2) Waste Package Engineering; (3) Site Characterization; (4) Repository Design; (5) Regulatory and Institutional Activities; (6) Exploratory Shaft; (7) Test Facilities; and (8) Program Management. To implement the site characterization phase of the repository program, a work force of management, technical, and support services workers will be employed and a variety of materials and services will be procured. The program will pay taxes and make Payments Equal to Taxes (PETT) to state, county, and local government units. The program also involves extensive regulatory and institutional activities that include communication and liaison with other federal agencies, and with state, tribal, and local governments.

1.2 Purpose of the BWIP Socioeconomic Profile Reports

The BWIP Socioeconomic Profile Reports are designed to provide information about the characteristics of the in which socioeconomic impacts from the BWIP may occur. The Profile Reports present a compilation of historical information about socioeconomic conditions in the affected communities. These reports are designed to provide a transition between the BWIP EA, published in 1986; the Monitoring Reports; and other technical reports associated with the BWIP SMMP and CSP. A principal objective of the Profile Reports is to update the DOE BWIP socioeconomic database by compiling available secondary and primary data and to make this information available to both the DOE program and other interested parties. The initial Profile Reports will help identify the need for additional data. The database developed for the profiles will assemble socioeconomic data in a uniform, readily accessible format.

A series of BWIP Socioeconomic Profile Reports are being prepared. This report is one of the first set of five separate BWIP Profile Reports, which cover the following topics:

- Economic/Demographic Conditions;
- Fiscal Conditions;
- Housing Conditions;
- Public Facilities and Services; and
- Socioeconomic Conditions in Cultural Communities.

The Profile Reports will be supported by an Interim Monitoring Report on BWIP Project Characteristics, which will provide information until SMMP implementation about the work force,

purchases, and tax payments of the BWIP Program. The Interim Monitoring Report on BWIP Project Characteristics will include data from a survey of the BWIP work force that was conducted in August, 1987.

1.3 Overview of the Study Area Described In the Profile Report

The BWIP Reference Repository Location (RRL) is located within the DOE-controlled Hanford Site in south-central Washington. The 570 square-mile Hanford Site is institutionally controlled. Since 1983 it has been restricted to projects directly associated with nuclear activities. As shown in Figure 1, the Hanford Site extends into Benton, Franklin, and Grant counties and is near the communities of Richland, Kennewick, Pasco, West Richland, and Benton City. During the 1970s, the Benton-Franklin MSA¹ was one of the most rapidly growing metropolitan areas in the nation. However, the January, 1982, termination of Washington Public Power Supply System Nuclear Project WNP-4 and mothballing of WNP-1 abruptly reversed of this growth and initiated a period of employment and population decline that continued through the mid-1980s.

The economic history of the Benton-Franklin MSA since 1970 has been dominated by three primary influences: (1) nuclear weapons-grade fuel manufacturing by the DOE and its contractors, (2) construction of nuclear power plants by the Washington Public Power Supply System (the "Supply System") at the Hanford Site between 1973 and 1983, and (3) agriculture. These three activities have directly employed about 40 percent of the employed labor force in the MSA, and have indirectly supported (through local purchases of goods and services) an even higher proportion. Due to the high salaries and wages paid by the DOE, Supply System, and their contractors, and, during the 1970s, a healthy agricultural economy, families in the MSA enjoyed relatively high incomes. Between 1981 and 1983, however, the Supply System completed one nuclear power plant (WNP-2) and halted construction on the two additional units (WNP-1 and WNP-4) being built on the Hanford Site. The resulting loss of about 10,000 jobs, along with a downturn in the agricultural economy, was largely responsible for a local recession that lasted from 1982 to 1984. The number of employed residents of the Benton-Franklin MSA fell from 75,900 people in 1981 to 59,400 in 1984 (average annual basis). It then gradually rose to 62,100 in 1986. Had it not been for increasing employment by DOE and its contractors between 1982 and 1986, the local recession probably would have been sharper and more prolonged.

Population in the Benton-Franklin MSA has exhibited similar fluctuation. The MSA's total population grew from 93,356 people in 1970 to 147,900 in 1982, fueled largely by increasing employment opportunities. The decrease in employment opportunities between 1981 and 1984 led to population out-migration. By 1986 the total population had fallen to 139,300. Although the MSA's population increased slightly in 1987 to 139,600 due to natural increase (births minus deaths), it appears that out-migration continued between 1986 and 1987 despite growth in employment.

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¹MSAs, metropolitan statistical areas, are urbanized areas that constitute integrated economic areas. MSAs are used by the U.S. Department of Commerce, Bureau of the Census, as geographic reporting units for a variety of social and economic data. The Benton-Franklin Metropolitan Statistical Area is composed of Benton and Franklin counties.

FIGURE 1. Map of Benton and Franklin Counties, Washington

1.4 Organization of this Profile Report

This report is organized into five sections. Section 2 summarizes the methods used to compile and analyze the data presented in the report. It includes a discussion of the Quality Assurance context within which the data were collected, analyzed, and stored; a definition of the variables and time period included in the profile; description of the secondary and primary data collection, compilation, and analysis procedures used in preparing the report; and a summary of the database management system that will be used to store and provide access to the data presented in the report. Section 3 contains the profile information, organized by topic. A combination of tables, figures, and text are used to describe the economic and demographic conditions in Benton and Franklin counties. Section 4 summarizes outstanding technical issues and data requirements, and Section 5 provides a bibliography of the documents and personal communications from which the data in this report were obtained.

2.0 METHODS

2.1 Quality Assurance Context

The Quality Assurance Program of Battelle's Pacific Northwest Laboratories ensures that researchers conduct activities in a planned and controlled manner and verify the quality of their results. Quality assurance for the data reported here is guided by PNL-MA-60, Quality Assurance Manual for License-Related Programs (Battelle 1985). PNL-MA-60 is designed to satisfy the requirements of NQA-1-1983, 10 CFR 50 Appendix B, and DOE-RL Order 5700.1A, Quality Assurance.

QA Plan ED-29 specifies which elements of PNL-MA-60 must be implemented for the Basalt Waste Isolation Environmental and Socioeconomic Program. Technical procedures for data collection for the Basalt Waste Isolation Environmental and Socioeconomic Program are prepared in accordance with PNL Administrative Procedure (PAP) 501, Preparation, Review and Approval of Procedures (PNL-MA-60, Procedures for License-Related Programs, Vol. I).

The data presented in this report were collected in accordance with Technical Procedures SMP-101 and SMP-102, which guide the collection of primary and secondary data, respectively (Battelle 1987a, 1987b). SMP-101, Documentation of Primary Data Collection, is designed to ensure that sound social science practices are used in the collection of data from individual respondents, through direct observations, or from primary historical records, and that methods for data collection have been documented. SMP-102, Documentation of Secondary (Documentary) Data Collection, is designed to ensure that complete and accurate attribution is made for all secondary data cited in any project report.

Data traceability is provided through the application of procedures spelled out in SMP-101 and SMP-102. Reference to the source and origin of all data, whether collected from primary or secondary sources, will be provided by the BWIP database management system. This system will support the cataloging, cross referencing, and retrieval of full citations for all data elements.

2.2 Variables and Time Period Included In the Profile

The purpose of this report is to describe the economy and demography of Benton and Franklin Counties, Washington. These counties comprise the Benton-Franklin Metropolitan Statistical Area (MSA), which is often referred to as the "Tri-Cities area." For comparison, data are also presented, where available, for the larger cities and towns in the Benton-Franklin MSA, as well as the unincorporated area, and for the State of Washington. The time period included in the profile is 1970 to the present (1987), or to the most recent available data.²

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²Most demographic and economic data are available only periodically (such as decennial Census data) or are unavailable for recent years or months due to reporting lags (such as employment and income data from the U.S. Department of Commerce's Bureau of Economic Analysis). Data are therefore presented, as available, for the period from 1970 to the present.

The Benton-Franklin MSA is expected to experience the bulk of the economic and demographic impacts stemming from the employment by and purchase of goods and services for site characterization and potential repository development activities. Other areas may ultimately be determined to experience significant impacts as well. If so, later profile reports will include those areas. Section 4 discusses outstanding data requirements.

The variables under consideration in this report include economic and demographic indicators of the effects of project employment and purchases, along with variables used to estimate or interpret those indicators. These indicators include:

- Employment and unemployment;
- Employment by industrial category;
- Occupational structure;
- Personal income, both total and by source;
- Population size and distribution;
- Age, sex, race, and ethnic characteristics; and
- Household and family characteristics.

This profile report focuses on trends in Benton and Franklin counties and the larger cities and towns therein (Richland, Kennewick, Pasco, West Richland, and Prosser). Data for the State of Washington are presented for comparison. Future updates will extend the coverage to smaller communities and provide additional detail.

Because the recent economic history of the Benton-Franklin MSA has been greatly influenced by construction of the Supply System nuclear plants, the time period chosen for the analysis includes the entire period during which the Supply System was engaged in construction in the MSA (1973-1983). Population and economic data from the 1970 Census are also presented since they represent the most detailed information on many variables and provide an indication of the size and structure of the MSA before the Supply System began construction.

2.3 Secondary Data Collection, Compilation, and Analysis

This report relies entirely on secondary data. A large volume of secondary economic and demographic data are available for the Benton-Franklin MSA; only a fraction of those data have been compiled and analyzed to date. The purpose of this report is to provide an initial profile of the economic and demographic characteristics of the Benton-Franklin MSA using data that are readily available from the U. S. Department of Commerce, the State of Washington, and other public sources. Analyses of these data indicate topics for which additional secondary data collection and analysis are warranted.

Data analysis has generally been straightforward. Except for some calculations of percentages and sums, and estimates of population migration figures, most data have not been manipulated for this report, but have been presented directly from the source documents and personal communications. However, to enhance the meaning of some data series, this profile report does draw some tentative conclusions about the relationship among variables, based on generally accepted principals of regional growth and development. For example, the relationship between loss of employment in the MSA between 1981 and 1985 and the out-migration of persons beginning in 1981 is discussed in Section 3.3.

Secondary data collection supports a number of BWIP study elements. First, it provides much of the basis for development of an economic-demographic (ED) forecasting and simulation model.³ Second, radiological analyses will require population estimates and forecasts, which will likely be produced using the ED model and other information. Third, the SMMP monitoring and mitigation activities will be supported by economic and demographic information gathered during the study period.

2.4 Primary Data Collection, Compilation, and Analysis

No primary data were collected for this profile report. Rather, the focus has been on initiating assembly of a database comprised of secondary sources. As secondary data collection proceeds, topics for which secondary data are inadequate or untimely will be identified and plans for primary data collection will be developed.

2.5 Data Storage and Access

To support the profiling effort, a database system is needed that supports multiple users and networks and provides access, security, integrity, and synchronization. Both research specialists and casual users need the data to be available on an ad hoc as well as production basis, and they need to be able to access any combination of data elements. To meet quality assurance requirements, the data in the system must be modifiable only by authorized personnel who follow specified procedures, and the system must be constructed and operated in a manner that assures the data are accurate, without inconsistencies or anomalies in design or values.

In order to meet these requirements, the BWIP Socioeconomic Program is establishing a relational database in which the data presented in this paper will be stored. A relational database is best suited to the storage and retrieval of the quantity and type of information included in the profile reports. It represents the data in tables and provides commands that allow manipulation of the data to create new tables that contain the data elements of particular interest. In this database system, Standard Query Language (SQL) will be used because it provides the necessary power, ease of use, flexibility, and accessibility. SQL is emerging as a standard for database languages.

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³A description of the approach to be used in selecting and integrating the elements of the ED model can be found in An Evaluation of Economic-Demographic Models for Impact Assessment of Nuclear Waste Repository Development and Hanford, Washington (USDOE 1987a).

The database management system (DBMS) will use INGRES, a well-known commercial software program that provides access level authorization, journaling, and built-in referential integrity for related data elements. An expanded data dictionary structure will be provided in the database system to facilitate system access and use. The dictionary, coupled with a basic knowledge of SQL, will enable the user to access needed information quickly and easily while protecting data integrity and security. To further ensure data integrity, software control procedures are being implemented for database creation and maintenance.⁴ For ease of use, the system will support multiple users and networks.

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⁴The database design for the relational database model will be based on Entity-Relationship diagramming, using Yourdon-DeMarco data flow diagrams for analysis. The relationships have been put into Third Normal Form, with referential keys identified.

3.0 ECONOMIC AND DEMOGRAPHIC PROFILE OF BENTON AND FRANKLIN COUNTIES

3.1 General Background

The recent economic history of the Benton-Franklin MSA has been dominated by three primary influences: (1) nuclear energy and weapons production by the DOE and its contractors, (2) construction of nuclear power plants by the Supply System, and (3) the agricultural sector. Although other activities are also important contributors to the local economy because they bring income into the region,⁵ the overall economic health of the MSA has been most affected by the employment and income generated by these three activities. The MSA's economy has influenced and been influenced by its total population and demographic makeup.

The importance of these three activities is illustrated by comparing trends in the Benton-Franklin MSA's employment to trends in its total population. After increasing rapidly during the 1970s, employment peaked at 75,900 workers in 1981, then declined to 61,100 in 1985, primarily due to the loss of about 10,000 Supply System jobs after 1981. The MSA's population followed a similar trend, with a slight lag. After steady increases before 1981, the MSA's population grew very little from 1981 to 1982, when it reached 147,900 persons, then decreased to 139,300 by 1986.

The primary link between the employment and population losses described above is population migration. Between 1982 and 1986 net out-migration⁶ from the Benton-Franklin MSA totaled an estimated 19,997 persons. The bulk of this out-migration probably occurred due to the loss of employment opportunities in the MSA.

Thus, much of the economic and demographic history of the Benton-Franklin MSA can be viewed in light of changes in DOE, Supply System, and agricultural activities. The following sections describe the area's economy and population, including data for the MSA and cities therein and information describing the activities of the DOE, the Supply System, and the agricultural sector. Economic factors are described first, since regional development theory postulates that economic growth is the primary engine driving population growth.

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⁵For example, some of the Tri-Cities trade, services, and transportation businesses serve demand outside the area (USDOE 1987), and thus are part of the area's economic base.

⁶Net migration is the difference between immigration and out-migration.

3.2 Economic Conditions

Employment

TABLE 1. Employment and Unemployment, Benton and Franklin Counties and the State of Washington

Year	Labor Force			Employed			Unemployment Rate (percent)			
	Benton	Franklin	MSA	Benton	Franklin	MSA	Benton	Franklin	MSA	State
1970	na	na	40,330	na	na	36,570	na	na	9.3	9.2
1971	na	na	40,490	na	na	36,500	na	na	9.9	10.1
1972	na	na	40,740	na	na	36,960	na	na	9.3	9.5
1973	na	na	42,520	na	na	38,960	na	na	8.4	7.9
1974	na	na	45,270	na	na	42,300	na	na	6.6	7.2
1975	na	na	49,190	na	na	45,550	na	na	7.4	9.5
1976	na	na	54,840	na	na	50,650	na	na	7.3	8.7
1977	na	na	58,220	na	na	53,440	na	na	8.2	8.8
1978	49,400	19,300	68,700	46,300	18,100	64,400	6.3	6.2	6.3	6.9
1979	56,300	19,100	75,500	52,800	17,600	70,500	8.2	7.9	6.6	6.8
1980	60,300	19,600	80,000	54,600	17,500	72,100	9.5	10.7	9.9	7.9
1981	62,800	20,400	83,300	57,500	18,400	75,900	8.4	9.8	8.9	9.5
1982	61,500	20,100	81,600	53,000	17,000	70,000	13.8	15.4	14.2	12.1
1983	55,600	18,000	73,600	47,900	15,300	63,200	13.8	15.0	14.1	11.2
1984	52,700	16,000	68,700	45,700	13,700	59,400	13.3	14.4	13.5	9.5
1985	52,200	15,800	68,000	47,100	14,000	61,100	9.8	11.4	10.1	8.1
1986	53,000	16,000	69,000	47,900	14,200	62,100	9.6	11.3	10.0	8.2
6/87 ^a	55,300	16,500	71,800	50,400	14,900	65,300	8.9	9.7	9.1	7.5

^a Nygaard, personal communication, 28 July 87.

na means not available.

Adapted from Nygaard, Personal Communication, 28 July 87; and Washington State Employment Security Department, years indicated.

As seen in Table 1, employment in the Benton-Franklin MSA grew steadily from 36,570 workers in 1970 to an all-time peak of 75,900 workers in 1981 (place-of-residence basis⁷). Much of this growth was fueled by increasing employment by the DOE and its contractors and construction of the Supply System nuclear projects WNP-1, WNP-2, and WNP-4. In January, 1982, however, WNP-4 was terminated. In April, 1982, WNP-1 was mothballed. Construction of WNP-2 was completed in late 1983. The resulting loss of Supply System jobs⁸ was primarily responsible for declines in MSA employment that lasted until 1984, when the number of employed MSA residents averaged 59,400. Employment increased after 1984, to an annual average of 62,100 in 1986, and has continued to grow in 1987.

⁷"Place-of-residence" basis means that data are classified into jurisdictions according to the locations of the residences of the subject persons. By contrast, "place-of-work" means that the data are reported according to the jurisdictions in which the subject persons work.

⁸Employment by the Supply System declined from 11,278 in 1981 to 8,841 in 1982, and continued to decline to 1,700 in 1986 (USDOE 1987), as shown in Table 3.

FIGURE 2. Employment and Unemployment, Benton and Franklin Counties

^a May, 1987 figures from Nygaard, personal communication, 28 July 1987.

Adapted from Nygaard, personal communication, 28 July 87; and Washington State Employment Security Department, years indicated.

Unemployment rates in the Benton-Franklin MSA have historically fluctuated with the state's rate. However, the Supply System layoffs contributed to an increase in the unemployment rate from 8.9 percent of the civilian labor force in 1981 to 14.2 percent by 1982.⁹ Unemployment rates remained well above the Washington rate through 1985. Unemployment trends in the two counties are graphed in Figure 2.

⁹Some of this increase was probably caused by the national economic recession of 1980-1982. However, the MSA unemployment rate increased by more than the State rate between 1981 and 1982, indicating that the Supply System layoffs worsened the local recession.

Employment by Industry: Benton-Franklin MSA and the State of Washington

TABLE 2. Employment by Sector, Benton and Franklin MSA and the State of Washington, 1970-1984, Place-of-Work Basis

	1970		1975		1976		1980		1981		1982		1984	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Benton-Franklin MSA														
Wage and Salary Employment	34,348	88.68%	46,463	87.08%	67,661	88.54%	67,842	88.19%	71,560	86.38%	67,326	87.40%	59,631	85.18%
Farm	2,718	6.78%	4,638	8.69%	4,670	6.12%	4,872	6.07%	3,987	4.89%	4,661	6.98%	4,198	6.00%
Mining and Agricultural services	346	0.87%	608	1.14%	1,128	1.48%	1,201	1.56%	1,187	1.43%	1,211	1.57%	1,107	1.56%
Construction	1,788	4.39%	5,493	10.29%	11,288	14.77%	10,202	13.26%	13,801	17.04%	9,619	12.48%	3,250	4.65%
General building contractors	897	1.74%	1,180	2.23%	2,435	3.19%	1,648	2.14%	999	0.74%	382	0.50%	547	0.78%
Heavy construction contractors	205	0.51%	2,281	4.22%	3,853	5.04%	4,790	6.23%	5,968	7.36%	5,157	6.69%	1,638	2.34%
Special trade contractors	686	1.14%	2,053	3.85%	5,001	6.54%	3,764	4.89%	7,244	8.95%	4,079	5.29%	1,073	1.52%
Manufacturing	5,543	13.85%	8,903	12.94%	9,282	12.16%	9,187	11.94%	9,323	11.91%	9,564	12.44%	10,742	15.34%
Nonurable goods	5,078	12.67%	5,804	11.18%	8,342	10.91%	8,246	10.72%	8,431	10.41%	8,748	11.35%	9,674	14.10%
Food and kindred products	1,578	3.94%	2,048	3.84%	2,525	3.30%	2,422	3.15%	2,232	2.76%	2,244	2.91%	2,264	3.23%
Chemical and allied products	3,099	7.73%	3,370	6.32%	5,256	6.88%	5,324	6.82%	5,784	7.14%	6,128	7.95%	7,318	10.45%
Durable goods	465	1.16%	949	1.78%	960	1.24%	939	1.22%	882	1.10%	829	1.09%	888	1.24%
Transportation and public utilities	1,658	4.12%	1,797	3.37%	2,432	3.14%	2,439	3.20%	2,436	3.01%	2,234	2.90%	2,116	3.02%
Railroad transportation	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Trucking and warehousing	468	1.14%	435	0.82%	513	0.67%	466	0.63%	559	0.69%	572	0.74%	543	0.78%
Wholesale trade	848	2.21%	1,382	2.61%	2,130	2.79%	1,910	2.48%	1,882	2.34%	1,670	2.17%	1,917	2.74%
Retail trade	4,634	12.06%	5,676	10.64%	9,385	12.28%	9,410	12.23%	10,037	12.39%	9,883	12.79%	8,773	12.53%
Building materials & farm equip.	231	0.58%	248	0.46%	414	0.54%	430	0.56%	426	0.53%	363	0.47%	383	0.52%
Finance, insurance, real estate	700	1.75%	856	1.59%	1,734	2.27%	1,740	2.28%	1,853	2.04%	1,736	2.28%	1,583	2.26%
Services	9,390	23.43%	10,306	20.42%	15,446	20.21%	16,325	21.22%	16,248	20.06%	15,791	20.50%	15,822	22.32%
Hotels and other lodging places	446	1.11%	621	1.16%	786	1.03%	840	1.09%	848	1.08%	772	1.00%	795	1.14%
Business services	(a)	(a)	4,824	9.04%	7,326	9.58%	7,489	9.73%	7,228	8.93%	6,742	8.78%	6,951	9.93%
Government and govt. enterprises	6,518	16.28%	8,087	15.16%	10,170	13.31%	10,738	13.96%	11,067	13.67%	10,957	14.22%	10,318	14.74%
Federal, civilian	830	2.07%	890	1.67%	1,058	1.38%	1,124	1.46%	1,061	1.33%	1,085	1.41%	1,062	1.52%
State and local	5,693	12.71%	6,588	12.34%	8,526	11.15%	8,987	11.68%	9,143	11.29%	8,955	11.82%	6,352	11.53%
Proprietors	5,734	14.31%	6,695	12.52%	8,798	11.46%	8,060	11.51%	9,413	11.62%	9,700	12.48%	10,373	14.82%
Farm	2,407	6.01%	2,283	4.22%	2,911	3.29%	2,576	3.26%	2,678	3.31%	2,638	3.42%	2,597	3.65%
TOTAL EMPLOYMENT	46,080	100%	53,388	100%	76,437	100%	76,931	100%	80,978	100%	77,048	100%	70,084	100%
State of Washington														
Wage and Salary Employment	1,240,186	88.65%	1,390,764	86.02%	1,738,665	86.99%	1,788,198	85.46%	1,765,001	85.18%	1,732,090	84.07%	1,797,950	83.41%
Farm	32,946	2.31%	43,197	2.67%	46,091	2.23%	46,060	2.19%	38,169	1.84%	46,168	2.19%	40,492	1.88%
Agric. services, forestry, fisheries	7,156	0.50%	8,666	0.58%	13,579	0.67%	16,085	0.78%	17,062	0.82%	18,717	0.81%	17,689	0.82%
Mining	1,706	0.12%	1,982	0.12%	3,040	0.15%	3,155	0.15%	3,070	0.15%	3,012	0.15%	2,646	0.12%
Construction	55,327	3.88%	59,530	3.68%	104,293	5.16%	93,794	4.58%	89,978	4.34%	78,186	3.70%	78,884	3.57%
General building contractors	16,781	1.18%	17,503	1.08%	35,185	1.74%	27,933	1.36%	23,271	1.12%	20,161	0.98%	24,723	1.15%
Heavy construction contractors	14,762	1.03%	14,327	0.88%	21,582	1.07%	22,150	1.08%	21,779	1.05%	18,241	0.89%	13,372	0.62%
Special trade contractors	23,794	1.67%	27,700	1.71%	47,486	2.35%	43,711	2.12%	44,928	2.17%	37,793	1.83%	38,769	1.80%
Manufacturing	215,488	15.08%	243,741	15.08%	309,715	15.34%	308,940	14.90%	304,189	14.68%	288,654	14.01%	285,263	13.23%
Nonurable goods	71,919	5.04%	74,908	4.83%	87,238	4.32%	87,324	4.25%	86,796	4.19%	85,423	4.15%	87,349	4.05%
Food and kindred products	28,240	1.96%	28,972	1.79%	32,829	1.63%	31,929	1.58%	31,820	1.54%	31,765	1.54%	30,565	1.42%
Chemical and allied products	5,686	0.40%	6,256	0.39%	8,868	0.43%	8,692	0.43%	9,226	0.48%	9,487	0.46%	10,522	0.49%
Durable goods	143,538	10.06%	168,823	10.44%	222,486	11.02%	221,016	10.74%	217,371	10.49%	203,231	9.86%	197,914	9.16%
Transportation and public utilities	70,889	4.91%	72,763	4.50%	89,322	4.42%	81,288	4.43%	90,156	4.35%	90,043	4.32%	90,355	4.19%
Railroad transportation	11,643	0.83%	10,973	0.68%	10,872	0.52%	9,846	0.48%	9,030	0.44%	7,747	0.38%	6,949	0.32%
Trucking and warehousing	14,389	1.01%	15,762	0.98%	20,846	1.03%	20,892	1.01%	20,105	0.97%	19,641	0.96%	21,559	1.00%
Wholesale trade	82,764	4.40%	79,293	4.90%	102,076	5.04%	100,407	4.88%	101,731	4.91%	109,615	4.99%	102,381	4.75%
Retail trade	180,341	12.83%	208,178	12.75%	277,020	13.72%	289,791	13.64%	288,316	13.82%	284,225	13.80%	301,079	13.97%
Building materials & farm equip.	8,663	0.61%	8,306	0.51%	13,436	0.67%	13,028	0.63%	12,914	0.62%	12,168	0.59%	12,251	0.57%
Finance, insurance, real estate	59,594	4.16%	66,398	4.11%	92,631	4.53%	84,942	4.81%	95,989	4.63%	95,008	4.61%	98,901	4.59%
Services	208,814	14.62%	246,508	15.25%	321,908	15.94%	335,850	16.31%	344,166	16.81%	342,755	16.64%	372,606	17.33%
Hotels and other lodging places	12,070	0.82%	13,949	0.86%	17,788	0.88%	18,144	0.88%	18,176	0.88%	17,994	0.87%	18,847	0.92%
Business services	20,390	1.43%	31,533	1.89%	46,955	2.42%	52,872	2.57%	53,475	2.56%	47,906	2.33%	56,444	2.64%
Government and govt. enterprises	246,223	17.26%	262,380	16.41%	376,056	18.72%	388,320	18.91%	394,205	19.03%	390,311	18.95%	408,498	19.95%
Federal, civilian	54,633	3.97%	60,834	3.76%	84,463	3.19%	87,803	3.29%	86,644	3.22%	86,526	3.23%	89,053	3.20%
State and local	210,631	14.78%	235,105	14.94%	246,964	12.23%	253,583	12.32%	281,126	12.12%	245,894	11.94%	259,219	12.03%
Proprietors	187,203	13.12%	225,999	13.98%	282,940	14.01%	299,584	14.59%	308,992	14.81%	328,134	15.93%	357,641	16.59%
Farm	41,039	2.88%	38,040	2.35%	42,392	2.10%	43,508	2.11%	45,212	2.18%	44,538	2.16%	42,173	2.00%
TOTAL EMPLOYMENT	1,427,391	100%	1,616,763	100%	2,019,825	100%	2,088,793	100%	2,071,984	100%	2,080,224	100%	2,155,591	100%

Footnote:

(a) no data due to federal disclosure regulations.

Adapted from U.S. Department of Commerce 1986a.

The distribution of employment by industry is shown in Table 2, which includes all 1-digit level Standard Industrial Classifications (SICs), as well as selected 2-digit level SIC industries¹⁰ that are important to the MSA. The distribution of employment by industry in the Benton-Franklin MSA shows that services, manufacturing, and government provided the greatest number of jobs

¹⁰SIC codes are used by the BEA and other government agencies to classify employment, income, and other data by industry. The higher the SIC level, the greater the level of industry detail.

in 1984.¹¹ Production of nondurable goods dominates manufacturing,¹² reflecting the importance of chemicals and allied products manufacturing (into which much of the employment provided by the DOE and its contractors is classified) and food processing.

The distribution of employment in the Benton-Franklin MSA changed noticeably between 1981 and 1984. Contract construction was the MSA's second-largest employer in 1981, accounting for 13,801 jobs, but by 1984 construction employment had fallen to only 3,255. The 10,546 construction jobs lost during this period accounted for virtually the entire MSA-wide loss of 10,974 jobs between 1981 and 1984. However, trends in the non-construction industries over the period are also notable. The following sectors experienced employment declines between 1981 and 1984: agricultural services, forestry, and fisheries; finance, insurance, and real estate (FIRE); transportation, communications and public utilities (TCPU); retail trade; services; and government. The only industry with substantial employment growth was manufacturing (which grew from 9,323 to 10,742 jobs, almost entirely due to growth in chemical and allied products manufacturing). Farming and wholesale trade experienced very small employment increases.

Since 1984, employment in the Benton-Franklin MSA has increased as the economy has rebounded from the loss of Supply System jobs and the economic recession of the early 1980s. The distribution of employment among industries in the MSA, however, has generally not changed greatly from the 1984 data shown in Table 2. The most notable changes include: (1) slight reductions in the proportion of total employment accounted for by agriculture and food processing; (2) generally increased employment in chemicals manufacturing related to DOE activities (Schau, personal communication, 10 August 1987); and (3) continued reductions in Supply System employment.

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¹¹The most comprehensive source of data on employment by industry is the U.S. Department of Commerce, Bureau of Economic Analysis (BEA). The most recent year covered by BEA employment data is 1984.

¹²Production of durable goods is more important state-wide.

Employment by Industry: Benton and Franklin Counties

TABLE 3. Employment by Sector, Benton and Franklin Counties, 1970-1984, Place-of-Work Basis

	1970		1975		1979		1980		1981		1982		1984	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Benton County														
Wage and Salary Employment	24,260	87.05%	33,388	88.08%	52,050	89.70%	52,381	89.35%	56,438	89.69%	52,563	88.60%	48,020	88.35%
Farm	1,744	6.26%	3,008	7.93%	2,958	5.08%	2,954	5.04%	2,502	3.98%	2,980	4.99%	2,855	4.98%
Mining and Agricultural services	235	0.84%	312	0.82%	573	0.99%	628	1.07%	857	1.04%	721	1.22%	726	1.36%
Construction	1,502	5.38%	4,837	12.76%	10,394	17.91%	9,454	16.13%	13,214	21.00%	9,052	15.26%	2,670	5.01%
General building contractors	847	2.32%	1,094	2.89%	2,249	3.88%	1,518	2.59%	493	0.78%	278	0.47%	484	0.87%
Heavy construction contractors	106	0.38%	1,953	5.15%	3,588	6.18%	4,613	7.87%	5,801	9.22%	4,932	8.31%	1,363	2.56%
Special trade contractors	749	2.69%	1,790	4.72%	4,556	7.86%	3,323	5.67%	6,920	11.00%	3,842	6.48%	843	1.58%
Manufacturing	4,380	15.72%	5,225	13.78%	7,718	13.30%	7,748	13.22%	7,994	12.70%	8,385	14.05%	9,717	18.23%
Nondurable goods	3,888	14.31%	4,717	12.44%	6,894	11.88%	6,928	11.82%	7,220	11.47%	7,603	12.62%	8,938	16.77%
Food and kindred products	884	2.98%	1,088	2.87%	1,294	2.23%	1,286	2.16%	1,085	1.74%	1,134	1.91%	1,337	2.51%
Chemical and allied products	3,098	11.12%	3,370	8.89%	5,256	9.06%	5,324	9.09%	5,784	9.19%	6,128	10.33%	7,318	13.73%
Durable goods	392	1.41%	508	1.34%	822	1.42%	818	1.40%	774	1.23%	732	1.23%	779	1.46%
Transportation and public utilities	645	2.31%	884	1.80%	1,112	1.92%	1,146	1.98%	1,082	1.72%	1,013	1.71%	971	1.82%
Railroad transportation	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Trucking and warehousing	205	0.74%	171	0.45%	94	0.16%	93	0.16%	102	0.16%	123	0.21%	116	0.22%
Wholesale trade	368	1.32%	549	1.45%	786	1.35%	810	1.04%	824	0.99%	580	0.98%	736	1.38%
Retail trade	3,220	11.55%	3,789	9.94%	8,968	12.01%	8,980	11.88%	7,398	11.76%	7,285	12.28%	6,565	12.32%
Building materials and farm equipment	133	0.48%	207	0.55%	360	0.62%	335	0.57%	329	0.52%	272	0.46%	249	0.47%
Finance, insurance, real estate	465	1.67%	829	1.86%	1,254	2.16%	1,252	2.14%	1,173	1.86%	1,283	2.16%	1,210	2.27%
Services	7,468	26.80%	9,006	23.78%	13,085	22.57%	13,910	23.74%	13,825	21.97%	13,455	22.68%	13,388	25.12%
Hotels and other lodging places	288	0.95%	381	1.01%	558	0.96%	527	0.90%	537	0.85%	476	0.80%	541	1.02%
Business services	4,310	15.47%	4,841	12.24%	6,955	11.99%	7,118	12.15%	6,902	10.97%	6,491	10.94%	6,873	12.52%
Government and government enterprises	4,243	15.23%	5,388	14.18%	7,198	12.40%	7,701	13.14%	7,969	12.84%	7,879	13.28%	7,382	13.85%
Federal, civilian	491	1.78%	496	1.31%	592	1.02%	840	1.09%	580	0.92%	584	0.98%	613	1.15%
State and local	3,405	12.22%	4,498	11.87%	6,181	10.82%	6,587	11.24%	6,742	10.71%	6,591	11.11%	6,081	11.41%
Proprietors	3,608	12.95%	4,518	11.92%	5,975	10.30%	6,239	10.85%	6,489	10.31%	6,763	11.40%	7,277	13.85%
Farm	1,398	5.01%	1,257	3.32%	1,401	2.41%	1,437	2.45%	1,494	2.37%	1,472	2.48%	1,427	2.68%
TOTAL EMPLOYMENT	27,868	100%	37,804	100%	58,025	100%	58,600	100%	62,927	100%	59,326	100%	53,297	100%
Franklin County														
Wage and Salary Employment	10,086	82.59%	13,077	84.82%	15,831	84.90%	15,481	84.45%	15,127	83.80%	14,773	83.37%	13,811	81.47%
Farm	974	7.98%	1,832	10.58%	1,719	9.34%	1,718	9.37%	1,455	8.06%	1,721	9.71%	1,543	9.24%
Mining and Agricultural services	113	0.93%	298	1.92%	555	3.01%	573	3.13%	500	2.77%	490	2.77%	381	2.28%
Construction	256	2.10%	658	4.24%	895	4.86%	746	4.08%	587	3.25%	587	3.20%	585	3.50%
General building contractors	50	0.41%	950.61%	188	1.01%	130	0.71%	106	0.59%	105	0.59%	83	0.50%	
Heavy construction contractors	99	0.81%	298	1.93%	267	1.45%	177	0.97%	157	0.87%	225	1.27%	272	1.63%
Special trade contractors	107	0.88%	263	1.70%	442	2.40%	441	2.41%	324	1.79%	237	1.34%	230	1.38%
Manufacturing	1,183	9.52%	1,678	10.86%	1,578	8.58%	1,441	7.88%	1,329	7.38%	1,249	7.05%	1,025	6.14%
Nondurable goods	1,090	8.93%	1,237	8.00%	1,448	7.86%	1,320	7.20%	1,211	6.71%	1,142	6.45%	936	5.60%
Food and kindred products	914	7.48%	962	6.22%	1,231	6.69%	1,158	6.31%	1,137	6.30%	1,110	6.26%	927	5.55%
Chemical and allied products		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%
Durable goods	73	0.60%	441	2.85%	128	0.70%	121	0.68%	118	0.65%	107	0.60%	89	0.53%
Transportation and public utilities	1,010	8.27%	1,113	7.20%	1,320	7.17%	1,313	7.16%	1,354	7.50%	1,221	6.89%	1,145	6.85%
Railroad transportation	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Trucking and warehousing	250	2.05%	284	1.71%	419	2.28%	393	2.14%	453	2.51%	449	2.53%	427	2.56%
Wholesale trade	518	4.24%	843	5.45%	1,344	7.30%	1,300	7.09%	1,268	7.02%	1,090	6.15%	1,181	7.07%
Retail trade	1,614	13.22%	1,909	12.35%	2,417	13.13%	2,450	13.37%	2,638	14.62%	2,568	14.49%	2,208	13.22%
Building materials and farm equipment	98	0.80%	390.25%	54	0.29%	95	0.52%	870.54%	91	0.51%	114	0.68%		
Finance, insurance, real estate	235	1.92%	327	2.12%	480	2.61%	488	2.68%	480	2.68%	453	2.56%	373	2.23%
Services	1,922	15.74%	1,894	12.26%	2,351	12.77%	2,415	13.17%	2,417	13.39%	2,338	13.18%	2,234	13.37%
Hotels and other lodging places	180	1.47%	240	1.55%	228	1.24%	313	1.71%	311	1.72%	298	1.67%	254	1.52%
Business services	(a)	(a)	183	1.18%	371	2.01%	371	2.02%	326	1.81%	251	1.42%	278	1.66%
Government and government enterprises	2,275	18.83%	2,719	17.59%	2,974	16.15%	3,035	16.56%	3,098	17.16%	3,078	17.37%	2,938	17.57%
Federal, civilian	339	2.78%	394	2.55%	486	2.53%	484	2.64%	501	2.78%	501	2.83%	449	2.69%
State and local	1,888	13.82%	2,087	13.50%	2,364	12.84%	2,400	13.09%	2,401	13.30%	2,364	13.34%	2,271	13.59%
Proprietors	2,128	17.41%	2,377	15.38%	2,781	15.10%	2,850	15.55%	2,924	16.20%	2,946	16.83%	3,096	18.53%
Farm	1,011	8.28%	986	6.44%	1,110	6.03%	1,139	6.21%	1,184	6.58%	1,186	6.58%	1,130	6.76%
TOTAL EMPLOYMENT	12,212	100%	15,454	100%	18,412	100%	18,331	100%	18,051	100%	17,719	100%	16,707	100%

(a) No data due to federal disclosure regulations.

Adapted from U.S. Department of Commerce 1986a.

Although the economies of Benton and Franklin counties are closely linked, the MSA-based employment data blur some important differences. As seen in Table 3, Franklin County's largest industries, in descending order of 1-digit SIC sectors, are government, agriculture, retail trade, and TCPU. Benton County's largest employing sectors are services, manufacturing, government, and retail trade. Agriculture is far less prominent¹³ than employment by DOE and its contractors, which is classified primarily as chemicals manufacturing and services employment.

Employment Trends: Benton and Franklin County

Figure 3 on the following page depicts trends in employment by industry in Benton and Franklin counties that highlight the differences in their economies. Prior to 1981, employment in Benton County had been increasing in all sectors. Between 1981 and 1984, total employment in Benton County declined by 15.3 percent. Construction employment declined by almost 60 percent and employment in the retail trade sector decreased by about 11 percent. Although employment in some other sectors of the Benton County economy also declined over this period (TCPU, services, government), employment in a number of sectors continued to increase (farm, agricultural services, manufacturing, wholesale trade, FIRE, and proprietors) indicating that the dampening effect of the Supply System layoffs was not sufficient to cause decline throughout the economy.

By contrast, Franklin County's economy, which had also been growing prior to 1981, experienced a decline in overall employment of only 7.45 percent between 1981 and 1984. Construction employment actually increased somewhat over this period. Nevertheless, a greater number of industrial sectors in Franklin County than in Benton County experienced sharp declines (agricultural services, manufacturing, TCPU, retail trade, and FIRE lost over 15 percent of their employment) over this period.

Although further research is warranted, the data suggest that two factors contributed to the more widespread, and for some sectors more severe, decline in Franklin County employment. First, the 19.9 percent decline in Franklin County farm income (Benton County farm income decreased by only 6.3 percent; see Table 9) may have caused a cumulative effect on the Franklin County economy when combined with the Supply System reductions. Second, the Supply System layoffs may have affected Franklin County's employment more broadly than Benton County's. A recent analysis (USDOE 1987b) indicated that sales tax receipts in Pasco have historically exceeded the level suggested by the city's population alone. Thus, a significant portion of Pasco's sales, and hence employment, may be dependent on Benton County residents' spending. The issues of the level of dependency of the Franklin County economy on Benton County spending patterns and exports to other areas merits further research.

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¹³Although the absolute size of Benton County's agricultural sector in terms of sales of farm products, farm acreage, or employment is only slightly less than in Franklin County, when expressed as a proportion of total county income or employment, it is much smaller.

FIGURE 3. Benton and Franklin County Employment Trends, 1970-1984

BENTON COUNTY

FRANKLIN COUNTY

Key:

●- Farm, forestry, fisheries, mining	■- Manufacturing	▲- Services and FIRE
○- Construction	□- Transportation and public utilities	×- Government
	★- Retail and wholesale trade	

Adapted from U.S. Department of Commerce 1986a..

Economic Base

DOE and Supply System Employment

TABLE 4. Trends in Employment by the DOE and Washington Public Power Supply System and their Contractors, and Agriculture, Benton and Franklin Counties, 1970-1988

Year	DOE ^a	Number of Jobs Place-of-work basis		Place-of-residence basis	
		Supply System ^b	Agriculture ^c	Total ^d	Percent of MSA ^e
1970	7,900	0	6,695	14,200	38.8
1971	6,500	0	6,931	13,106	35.9
1972	7,000	0	6,867	13,517	36.6
1973	7,570	530	7,732	15,454	39.7
1974	8,700	1,115	8,407	17,787	42.0
1975	9,800	1,946	8,941	20,197	44.3
1976	10,680	2,945	10,167	23,258	44.9
1977	12,300	3,412	8,823	23,732	42.8
1978	11,750	7,097	9,036	26,827	41.7
1979	12,000	8,926	9,716	29,551	41.9
1980	12,100	7,935	9,668	28,757	39.9
1981	11,880	11,728	8,855	30,497	40.3
1982	11,357	8,841	9,559	28,049	40.1
1983	11,740	5,498	9,064	27,840	44.1
1984	12,891	2,015	9,055	23,288	39.2
1985	13,570	1,800	9,120	23,812	39.0
1986	14,200	1,700	9,100	24,316	39.2

^a Estimates for 1970-1984 from Cluett *et al.* 1984; 1985 and 1986 from USDOE 1987b.

^b From McGinnis and Schau 1983 for data through 1981. Subsequent unpublished estimates from USDOE 1987b.

^c U.S. Department of Commerce 1986a for data through 1984. Subsequent data from USDOE 1987b.

^d Total of DOE and Supply System employment, reduced by 5 percent to reflect estimate of net commuting patterns into the Benton-Franklin MSA (USDOE 1987b), plus agricultural employment.

^e Previous column divided by total MSA employment shown in Table 1.

Adapted from Cluett *et al.* 1984, McGinnis and Schau 1983, U.S. Department of Commerce 1986a, USDOE 1987b, USDOE 1987b, USDOE 1987b, and USDOE 1987b.

As noted earlier, since the mid-1970s the economic base of the Benton-Franklin MSA has consisted primarily of DOE and its contractors, the Supply System, and agricultural employment. Historical trends in DOE, Supply System, and agricultural employment are shown in Table 4. Jobs provided by DOE and the Supply System alone accounted for about 26 percent of the total employed work force in the MSA in 1986. Expenditures for goods and services by these employers and their workers supported additional employment.

Agriculture

According to the 1982 Census of Agriculture (U.S. Department of Commerce 1984), 61.7 percent of Benton County's and 79.5 percent of Franklin County's land area was devoted to farming in 1982, compared to the state average of 38.7 percent. Despite a downward nationwide

trend, Franklin County farm acreage increased between 1978 and 1982, rising from 609,816 to 632,519 acres. Benton County's farm acreage decreased slightly over this period, from 685,709 to 676,837 acres. Sales of farm products totaled \$140.1 and \$151.1 million in Benton and Franklin Counties, respectively, in 1982.

In 1986, the agricultural sector employed an estimated 8,810 persons in the Benton-Franklin MSA, or 14 percent of total employment (place-of-work basis). Agricultural employment figures are shown in Table 4.¹⁴ Although it employed fewer persons in 1986 than in 1982, agriculture remains important to the local economy, particularly in Franklin County.

Both counties produce a variety of agricultural products, including wheat, vegetables, fruit, cattle, and poultry, and are among the state's principal producing counties for a number of agricultural commodities. Franklin County ranked first among the state's counties in alfalfa hay, tart cherry, asparagus, and carrot production in 1985, and had the state's second largest inventory of cattle and calves. Benton County ranked in the top five counties in the state in production of spearmint, peppermint, potatoes, asparagus, sweet corn, and dry onions, and had the state's third largest inventory of sheep and lambs (Washington Agricultural Statistics Service, no date). Apples are also important agricultural products in both counties. In the primary apple-producing state in the nation, Benton County ranked sixth, and Franklin County seventh, in apple orchard acreage in 1986 (Washington Agricultural Statistics Service, no date). Although direct employment by vineyards is relatively small, grape-growing is a rapidly-growing activity in both counties, and also attracts tourists to the MSA (Washington State Employment Security Department 1986).

Other Basic Employment

Other basic employment includes some trade and services jobs, tourism, and jobs at some of the MSA's major employers. The Benton-Franklin MSA is a regional trade and services center and has a growing convention business. Battelle Memorial Institute's Pacific Northwest Laboratories (3,000 jobs) is located in Richland, the Burlington Northern regional terminus (350 jobs) is located in Pasco, Advanced Nuclear Fuels (700 jobs) in Richland, and Sandvik Special Metals (300 jobs) in Kennewick. Boise-Cascade's corrugated paper mill (721 jobs) is located in Wallula (Walla Walla County), but most of its employees are residents of the Benton-Franklin MSA (Foreman, personal communication, 26 July 1987; USDOE 1987b).

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¹⁴ The data in Table 4 include wage and salaried farm workers, farm proprietors, and wage and salary workers in the food and kindred products manufacturing sector. These figures differ slightly from the figures in Table 3 since they are based on estimates of food and kindred products manufacturing employment rather than actual figures for food and kindred products manufacturing from the Bureau of Economic Analysis as presented in Table 2. It should also be noted that data on the number of farm employees are not considered reliable since many are probably illegal aliens who are not included in employment reports by their employers.

Basic and Nonbasic Employment

A useful statistic for describing regional economies is the "basic-nonbasic multiplier." Economic base theory postulates that goods-exporting, or "basic," sectors are the driving force in regional economic change. Exporting goods and services brings income into a region, which supports wages and profits of employees and owners of the exporting firms. A portion of these earnings are then spent on local goods and services, and recipients of this income in turn re-spend a part of their earnings locally. Ultimately, the total number of jobs and amount of income supported by exports are multiples of the directly affected jobs and income. For example, a basic-nonbasic employment multiplier of 2.2 means that one job in the basic sector supports 1.2 jobs in nonbasic industries.

The basic-nonbasic multiplier is a measure of the level of economic integration in a region. Most rural areas have a smaller variety of goods and services than more economically integrated urban areas. Hence, rural residents spend a larger proportion of their incomes outside their area. Although other factors, such as relative wages in basic and nonbasic sectors, affect the size of the multiplier, it tends to be lower in rural areas than in urban areas.

Several distinct types of multipliers are used to express economic linkages in terms of employment, income, or sales. "Type I" multipliers express the number of jobs or income created by export sales (or other variables such as employment in basic industries) including only impacts that arise from industry linkages (exporting firms purchasing goods and services from local firms). Type II multipliers are the same as Type I but include the induced effects of the re-spending of household income. Type III multipliers also include state and local government spending, and Type IV multipliers incorporate induced investment spending as well. Type IV multipliers are the most comprehensive and are typically the multipliers that can be most easily inferred through statistical analysis of time-series employment and income data.

Multipliers can be estimated as averages for exports as a whole from a region, or for exports from particular economic sectors. For example, a recent DOE study (USDOE 1987b) relied on three methods to derive MSA-based Type IV employment multipliers ranging from 2.2 to 2.45. The simpler method entailed identifying export industries (including those described in Table 3) and dividing total employment by estimated export employment to yield a multiplier estimate of 2.29 for nuclear materials production, and 2.38 for all Hanford Site employment. A somewhat more complex method was also used, in which time-series employment data were econometrically analyzed, to yield a multiplier of 2.4 to 2.45 for all Hanford Site employment. A local multiplier estimate of 2.2 for nuclear materials production employment was derived using very technical analytical procedures (see Pagaoulatos *et al.* 1986), combined with judgment by the study authors.

Aside from the DOE study cited above, input-output-derived multipliers for the Benton-Franklin MSA have not been recently generated and more study is required to derive multipliers useful for the BWIP. The economic-demographic simulation and forecasting model being

developed for the BWIP¹⁵ is an input-output-based model which is well-suited for deriving a variety of multipliers.

Care must be taken to account correctly for lag effects when estimating and applying economic multipliers. Further analysis of the relationship between the economies of Benton and Franklin counties and between employment and migration will enhance understanding of the appropriate multipliers for the Benton-Franklin area.

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¹⁵A description of the approach to be used in selecting and integrating the elements of the ED model can be found in An Evaluation of Economic-Demographic Models for Impact Assessment of Nuclear Waste Repository Development and Hanford, Washington (USDOE 1987a).

Employment in Cities and Towns

TABLE 5. Employment in Benton and Franklin Counties, Selected Municipalities and the State of Washington, 1970 and 1980

	Benton County		Kennewick		Richland		Prosser		West Richland		Franklin County		Pasco	
	1970	1980	1970	1980	1970	1980	1970	1980	1970(a)	1980	1970	1980	1970	1980
Employed, over 15 years old	25,320	52,030	5,503	16,844	10,442	16,435	1,028	1,705		1,402	9,936	15,275	5,384	7,620
Unemployment rate (percent of civilian labor force over 15)	8.7	5.8	8.7	6.7	5.5	4.3	7.3	4.8		4.8	6.5	7.4	8.8	10.1
Employment by sector:														
Agriculture, fisheries	1,847	2,182	123	303	51	87	na	280		23	1,371	2,058	148	478
Mining	24	77	4	42	20	13	na	6		0	14	16	14	14
Construction	1,746	8,481	580	3,090	384	2,171	47	177		288	751	1,814	483	854
Manufacturing	4,759	7,278	729	1,982	2,489	2,829	186	264		252	1,072	2,271	637	1,332
Transportation	745	1,283	312	567	101	216	18	42		16	731	1,015	484	546
Communications and other utilities	698	3,830	239	1,432	140	1,411	30	38		121	359	821	185	342
Wholesale trade	583	1,303	212	622	98	1,582	20(b)	55		28	509	651	316	380
Retail trade	4,014	7,189	1,084	2,823	1,382	1,799	(b)	155		100	1,707	2,180	1,170	1,286
Finance, insurance, real estate	815	2,220	271	875	280	528	83(c)	107		35	285	648	177	283
Services:	9,292	16,588	1,882	4,837	5,028	6,968	na	515		507	2,695	3,410	1,509	1,759
Business & repair services	3,839	6,882	449	1,472	2,842	3,557	(c)	84		274	418	883	243	589
Personal, entertainment, and recreation	1,323	1,521	307	818	600	468	na	19		40	499	423	350	247
Health services	1,069	2,378	257	728	472	874	na	82		78	415	423	226	280
Educational services	1,902	3,378	430	1,029	788	1,092	186	287		58	1,004	1,156	448	419
Public administration	987	1,851	277	481	459	455	27	68		52	442	591	260	368

Footnotes:

(a) No data were reported for West Richland in 1970.

(b) 220 employed in wholesale and retail trade combined.

(c) 83 employed in finance, insurance, real estate, and business and repair services combined.

na means not available.

Adapted from U.S. Department of Commerce 1973 and 1983.

Data on employment, unemployment, and employment by industry for cities in the Benton-Franklin MSA are available only from decennial Bureau of the Census counts; these are place-of-residence rather than place-of-work data. The most current data, shown in Table 5, are for 1980, before the Supply System layoffs. They are therefore not very descriptive of the current situation. The census data in Table 5 do not correspond to the Washington State Employment Security or BEA data in Tables 1 and 2 due to differences in data collection and analysis methods by the respective agencies.

As shown in Table 5, the residents of Richland were less likely to be unemployed than residents of Benton County in 1970 and 1980, while the residents of the other cities had higher unemployment rates than the county as a whole. Richland residents tended to work in the manufacturing and services sectors, as might be expected given their proximity to the Hanford site and the DOE-sponsored research facilities in Richland. City residents accounted for a large proportion of workers in all industries except agriculture. Agricultural workers tended to live outside the MSA's larger cities in both 1970 and 1980.

TABLE 6. Occupational Characteristics of Benton-Franklin MSA and State of Washington Residents by Place of Residence, 1980

Occupation	Benton-Franklin MSA 1980		State of Washington 1980
	Number	Percent	Percent
Managerial, Professional	17,035	25.3	23.8
Engineers and Natural Scientists	4,744	7.0	na
Technical, Sales, Administrative Support	19,311	28.7	30.7
Service Workers	7,095	10.5	12.9
Farm, Forestry, and Fisheries Occupations	3,782	5.6	3.8
Precision Production, Craft, and Repair	11,279	16.8	13.8
Construction Trades	5,908	8.8	na
Operators, Fabricators, and Laborers	8,803	13.1	14.9
TOTAL	67,305	100.0	100.0 ^a

^a Total employment in the State = 1,794,354

na means not available

Adapted from U.S. Department of Commerce 1983.

Occupational data for the Benton-Franklin MSA are provided by two sources: decennial counts by the Bureau of the Census, which are on a place-of-residence basis and cover all employed persons; and the Washington State Employment Security Department occupational data, which are on a place-of-work basis and include only employment covered by unemployment insurance. Table 6 depicts 1980 data for the Benton-Franklin MSA and the state from the Bureau of the Census. These data show that the MSA had a higher proportion of managerial/professional, production/craft/repair, and farm/forestry/fisheries workers than the State of Washington in 1980, results that are consistent with the occupational requirements of the DOE contractors, the Supply System, and the agricultural sector.

The MSA also had a slightly lower proportion of technical/sales/administrative support, service workers, and operators/fabricators/laborers than the State of Washington. These occupational characteristics reflect the generally higher proportion of MSA residents employed in higher-wage occupations than in the State of Washington as a whole.

Occupational Structure in 1985

TABLE 7. Occupational Characteristics of Benton-Franklin MSA and State of Washington Residents by Place of Work^a, 1985

Occupation	Benton-Franklin MSA 1985		State of Washington 1985
	Number	Percent	Percent
Professional and Technical	11,080	22.3	14.5
Managers and Officers	5,380	10.8	10.9
Sales Workers	2,630	5.3	7.5
Clerical Workers	8,840	17.8	20.8
Craft Workers and Supervision	5,850	11.8	11.6
Operatives	4,660	9.4	12.3
Service Workers	8,070	16.3	16.8
Laborers, except farm	3,070	6.2	5.6
Farm Workers	60	0.1	0.04
TOTAL	49,640	100.0	100.0 ^b

^a Includes only employment covered by unemployment insurance.

^b Total employment in the State = 1,520,310.

Adapted from Washington State Employment Security Department, no date.

Table 7 includes 1985 estimates provided by the Washington State Employment Security Department. The data in Tables 6 and 7 do not form a basis for precise comparisons of changes in occupational structure over time because different occupational categories and data collection procedures were used. Table 7 shows that in 1985 the MSA had a noticeably higher concentration of employment in the professional and technical occupations (reflecting the local importance of scientific research and development, largely by DOE contractors), but lower concentrations in the sales, clerical, and service worker categories (reflecting a somewhat less-developed service economy) than the state average. The lower proportions of operatives in the MSA relative to the state is indicative of the loss of Supply System jobs.

Income

Personal Income by Source

TABLE 8. Personal Income by Source, Benton and Franklin Counties and the State of Washington, 1970-1984 (\$000s)

	1970	1975	1978	1980	1981	1982	1983	1984
	Total Percent	Total Percent	Total Percent	Total Percent	Total Percent	Total Percent	Total Percent	Total Percent
BENTON COUNTY								
Per capita income (posttax)	3,884	8,821	10,323	10,757	12,816	12,387	12,887	12,873
Derivation of total personal income								
Earnings by place of work	215,423	431,811	881,151	1,818,484	1,278,582	1,251,850	1,208,788	1,120,846
Less: pers. contrib. for social insurance	9,147	25,728	54,799	58,549	78,048	78,205	75,979	69,789
Plus: adjustment for residence	3,031	2,545	-18,582	-8,242	-68,795	-62,759	-38,754	-11,038
Equals: net earnings, place of residence	210,207 80.88%	407,827 80.88%	878,760 81.71%	1,750,705 78.78%	1,129,819 78.29%	1,110,886 78.72%	1,094,058 75.82%	1,040,119 73.47%
Plus: disbursements, interest, and rent	25,485 9.78%	30,326 9.68%	114,877 18.89%	137,568 11.54%	175,150 12.28%	188,302 13.07%	190,852 13.24%	212,579 15.02%
Plus: transfer payments	24,854 9.54%	51,287 10.08%	81,514 7.60%	102,729 8.78%	118,091 8.43%	147,826 10.21%	156,196 10.64%	183,089 11.51%
TOTAL PERSONAL INCOME, residence basis	260,556 100%	509,430 100%	1,075,151 100%	1,991,002 100%	1,424,060 100%	1,448,024 100%	1,441,101 100%	1,415,707 100%
Farm	11,340 4.35%	28,882 5.67%	34,855 3.25%	47,949 4.08%	50,289 3.53%	54,221 3.74%	49,247 3.42%	47,148 3.33%
Nonfarm	249,216 95.65%	480,548 94.33%	1,039,296 96.75%	1,943,053 95.92%	1,373,771 96.47%	1,393,803 96.26%	1,391,854 96.58%	1,368,559 96.67%
FRANKLIN COUNTY								
Per capita income (posttax)	3,587	8,885	8,789	8,186	10,745	10,764	10,770	10,583
Derivation of total personal income								
Earnings by place of work	78,137	161,811	231,883	248,288	270,823	263,556	283,934	257,787
Less: pers. contrib. for social insurance	2,870	8,315	11,850	12,954	14,086	14,148	14,007	14,315
Plus: adjustment for residence	-3,587	-7,578	-5,881	-581	21,883	21,945	18,883	7,769
Equals: net earnings, place of residence	71,819 77.51%	145,889 77.68%	214,253 75.43%	235,175 72.70%	278,620 72.37%	271,353 80.74%	287,810 86.32%	231,241 85.84%
Plus: disbursements, interest, and rent	9,949 18.77%	19,788 18.49%	59,259 15.17%	48,274 14.39%	58,485 15.17%	69,829 18.88%	83,025 19.87%	76,012 18.15%
Plus: transfer payments	19,831 11.72%	22,286 11.84%	33,872 11.40%	42,847 13.00%	47,987 12.46%	57,570 14.59%	61,232 15.81%	82,474 18.20%
TOTAL PERSONAL INCOME, residence basis	101,599 100%	187,961 100%	207,982 100%	226,294 100%	285,095 100%	300,752 100%	332,067 100%	309,728 100%
Farm	12,824 12.64%	38,836 20.68%	27,329 13.18%	35,878 15.86%	49,585 17.39%	49,988 16.62%	47,588 14.33%	39,888 12.88%
Nonfarm	78,766 77.36%	149,125 79.32%	180,653 86.82%	190,416 84.14%	235,510 82.61%	250,764 83.38%	284,479 85.67%	269,840 87.12%
STATE OF WASHINGTON								
Per capita income (posttax)	4,848	6,213	8,439	10,248	11,288	11,849	12,894	12,785
Derivation of total personal income								
Earnings by place of work	10,728,548	18,749,511	28,584,438	31,226,153	33,984,851	34,547,280	35,887,281	38,881,828
Less: pers. contrib. for social insurance	464,567	1,016,494	1,842,893	1,828,842	2,129,946	2,187,326	2,274,229	2,418,894
Plus: adjustment for residence	128,884	378,377	514,245	589,184	581,384	830,529	885,149	741,052
Equals: net earnings, place of residence	10,392,865 75.15%	18,111,394 75.15%	27,255,790 75.15%	30,006,495 75.15%	32,436,289 75.15%	33,190,483 75.15%	34,508,201 75.15%	37,203,986 75.15%
Plus: disbursements, interest, and rent	1,844,882 13.34%	3,052,388 13.58%	5,708,245 13.99%	6,785,835 13.99%	8,588,216 13.99%	8,588,216 13.99%	9,514,856 13.99%	10,837,949 13.99%
Plus: transfer payments	1,680,889 11.31%	3,220,329 13.77%	4,766,391 13.22%	5,668,615 13.21%	6,968,381 13.77%	7,411,568 14.84%	7,887,024 15.19%	9,129,135 14.84%
TOTAL PERSONAL INCOME, residence basis	13,918,643 100%	24,384,111 100%	37,728,521 100%	42,561,923 100%	48,000,000 100%	49,190,069 100%	52,000,000 100%	57,171,070 100%
Farm	358,888 2.58%	846,153 3.48%	871,817 2.39%	887,790 2.09%	1,086,883 2.22%	1,084,434 2.22%	1,086,390 2.09%	1,089,844 1.96%
Nonfarm	13,559,755 97.42%	23,537,958 96.52%	36,856,704 97.61%	41,674,133 97.91%	46,913,117 97.78%	48,105,635 97.78%	50,913,610 97.91%	56,081,226 98.04%

Adapted from U.S. Department of Commerce 1986b.

Trends in personal income by source between 1970 and 1984 are shown in Table 8.¹⁶ Personal income in the Benton-Franklin MSA changed at rates generally similar to employment between 1970 and 1984.¹⁷ The differences between employment and income trends are primarily attributable to (1) changes in inflation; (2) availability of unemployment and pension benefits, which softened the impact on incomes of persons laid off by the Supply System; and (3) differences in wage levels among sectors.

Although Benton County's per capita personal incomes fell relative to the state's between 1981 and 1984, the county average of \$12,573 in 1984 was comparable to the state average of \$12,755. Franklin County's per capita incomes exhibited the same declining trend, and maintained their historically lower level than either Benton County or the state.

¹⁶The data presented are in nominal dollars; conversion of MSA nominal incomes to real (inflation-adjusted) incomes comparable to the state-wide average is not possible since cost-of-living data for the MSA and state do not exist.

¹⁷The most authoritative source of personal income data is the Department of Commerce, Bureau of Economic Analysis (BEA). 1984 is the most recent year covered by BEA data.

Table 8 indicates that Benton-Franklin MSA residents also receive substantial non-labor income. Residents of both counties relied more heavily on non-labor income in 1984 than in 1980. Dividends, interest, and rent were 15.7 percent of net earnings in the Benton-Franklin MSA by place of residence in 1984, and transfer payments were 12.5 percent, compared to state-wide rates of 19.7 and 14.7 percent. Transfer payments, which are important to the MSA economy because they are income derived largely from outside the area, comprised a larger proportion of income for residents of Franklin County than Benton County. The \$225.5 million dollars in transfer payments made to MSA residents in 1984 exceeded labor's and proprietors' earnings in the farm sector. Per-capita 1984 retirement and social security payments exceeded national averages, reflecting historically higher average wages in the MSA (U.S. Department of Commerce 1986c).

Income by Industry

The distribution of income among industries for Benton and Franklin counties is close to the employment distribution discussed in Section 3.1. Income distribution by industry is shown in Table 9. Differences in average earnings per worker account for most of the differences in the employment and earnings distribution among industries. Analysis of average earnings per worker based on the data in Tables 2 and 8 indicates that retail trade, finance, insurance, and real estate, and agricultural services had relatively low average earnings per worker in 1984, while the manufacturing and construction sectors exhibited high average earnings.

The relatively high earnings per worker in construction and manufacturing in Benton County have been the primary reason for the Benton-Franklin MSA's high per capita incomes seen in Table 8. Based on the data in Tables 2 and 9, the MSA's overall average earnings per worker was about equal to the state average in 1970. However, average earnings per worker in the MSA grew faster than in the state through 1982, when the MSA and state averages were \$19,670 and \$16,770, respectively. By 1984, however, the differential had declined: the MSA's average earnings per worker was \$19,690, while the state's was \$17,690.

The declining differential is primarily due to the MSA's loss of about 10,000 high-wage construction jobs (which paid, on average, about \$34,000 per worker annually) between 1981 and 1984, although reduced earnings by the MSA's farm proprietors also had noticeable effects. Strong growth in employment and average earnings per worker in chemical and allied products manufacturing in Benton County prevented the area from experiencing even more rapid income deterioration since 1982.

TABLE 9. Income by Industry, Benton and Franklin Counties and the State of Washington, 1970-1984, Place-of-Work Basis (\$000s)

	1970 Total Percent	1975 Total Percent	1979 Total Percent	1980 Total Percent	1983 Total Percent	1982 Total Percent	1984 Total Percent
BENTON COUNTY							
Earnings by Industry							
FARM	11,940 5.26%	28,582 6.70%	34,685 3.44%	47,649 4.68%	50,299 3.93%	54,221 4.33%	47,148 4.21%
NONFARM	204,083 94.74%	402,129 93.30%	916,496 96.56%	970,648 95.32%	1,228,263 96.07%	1,197,829 95.67%	1,073,799 95.79%
Agric. services, forestry, fisheries	1,322 0.61%	2,071 0.49%	5,131 0.54%	5,111 0.50%	5,322 0.42%	6,133 0.49%	8,662 0.58%
Mining	(a) (a)	40 0.01%	(a) (a)	(a) (a)	(a) (a)	(a) (a)	(a) (a)
Construction	20,004 9.29%	88,940 20.84%	262,729 27.82%	227,669 22.39%	401,775 31.40%	318,902 25.22%	92,816 8.28%
General building contractors	7,601 3.62%	16,793 4.38%	50,174 5.28%	34,038 3.34%	12,824 1.00%	8,845 0.71%	14,718 1.31%
Heavy construction contractors	1,371 0.64%	38,452 8.68%	92,874 9.78%	104,742 10.28%	182,024 14.24%	163,196 14.63%	47,841 4.27%
Special trade contractors	10,832 5.03%	33,715 7.82%	119,681 12.58%	88,889 8.73%	208,927 16.18%	123,781 9.80%	30,257 2.70%
Manufacturing	48,369 22.45%	80,919 18.37%	173,546 18.25%	189,828 18.84%	225,470 17.62%	266,385 20.48%	338,528 30.08%
Nonferrous goods	44,948 20.86%	72,242 16.78%	158,488 16.45%	170,447 16.79%	205,979 16.11%	236,421 18.89%	314,938 28.10%
Food and kindred products	4,780 2.21%	10,393 2.41%	18,607 1.95%	19,473 1.91%	19,820 1.55%	21,977 1.76%	28,281 2.52%
Chemical and allied products	38,423 17.64%	58,434 13.67%	132,125 13.86%	148,286 14.38%	180,762 14.14%	204,577 16.40%	280,600 25.03%
Durable goods	3,411 1.58%	7,777 1.80%	17,088 1.80%	19,191 1.88%	19,491 1.52%	19,964 1.59%	21,589 1.93%
Fabricated metal products	102 0.08%	903 0.21%	811 0.08%	802 0.08%	845 0.06%	844 0.06%	467 0.04%
Transportation and public utilities	6,049 2.81%	9,817 2.21%	22,957 2.37%	25,184 2.47%	26,104 2.04%	26,744 2.14%	29,181 2.60%
Railroad transportation	(b) (b)	(b) (b)	(b) (b)	(b) (b)	(b) (b)	(b) (b)	(b) (b)
Trucking and warehousing	1,407 0.64%	2,456 0.57%	2,240 0.24%	2,448 0.24%	2,900 0.23%	3,294 0.26%	3,336 0.30%
Wholesale trade	3,489 1.70%	7,130 1.65%	15,462 1.63%	12,487 1.23%	13,711 1.07%	12,402 0.99%	15,908 1.42%
Retail trade	19,187 8.98%	30,757 7.14%	64,194 6.75%	68,771 6.78%	76,302 5.97%	78,245 6.25%	72,513 6.47%
Building materials and farm equip.	1,239 0.58%	2,413 0.56%	5,328 0.56%	5,080 0.50%	5,806 0.44%	5,108 0.41%	4,048 0.36%
Finance, insurance, real estate	4,079 1.89%	9,326 2.17%	19,107 2.01%	19,773 1.94%	17,089 1.34%	18,265 1.46%	18,076 1.61%
Services	72,437 33.63%	115,289 27.88%	245,489 25.83%	291,349 28.81%	310,748 24.30%	328,223 26.22%	340,961 30.49%
Hotels and other lodging places	1,201 0.56%	1,901 0.44%	3,872 0.41%	3,774 0.37%	3,445 0.28%	2,875 0.23%	4,381 0.39%
Business services	51,468 23.89%	75,441 17.50%	155,404 16.34%	174,407 17.18%	183,433 14.35%	194,488 15.44%	214,510 19.10%
Government and govt. enterprises	29,011 13.47%	50,020 11.48%	109,081 11.36%	130,673 12.83%	151,660 11.84%	158,310 12.41%	161,328 14.30%
Federal, civilian	4,032 1.86%	8,074 2.11%	14,227 1.48%	16,577 1.62%	18,074 1.42%	18,948 1.50%	19,874 1.77%
State and local	22,399 10.40%	48,108 11.18%	92,527 9.73%	113,515 11.18%	132,721 10.38%	134,889 10.78%	137,448 12.38%
TOTAL EARNINGS BY PLACE OF WORK	215,423 100%	431,011 100%	951,151 100%	1,018,494 100%	1,278,582 100%	1,251,850 100%	1,120,948 100%
Components of Earnings							
Wages and salaries	188,411 88.07%	370,576 86.08%	841,241 88.44%	896,441 88.04%	1,142,968 89.59%	1,116,005 88.15%	971,238 86.64%
Other labor income	3,361 1.56%	20,253 4.70%	51,908 5.38%	57,339 5.63%	49,842 3.86%	77,943 6.23%	88,920 7.93%
Proprietors' income	21,651 10.05%	39,882 9.25%	58,702 6.17%	64,824 6.34%	65,984 5.16%	57,862 4.62%	60,792 5.42%
Farm	4,918 2.28%	14,895 3.41%	11,602 1.22%	21,764 2.14%	28,032 2.04%	25,952 2.07%	18,922 1.69%
FRANKLIN COUNTY							
Earnings by Industry							
FARM	12,624 18.16%	38,036 23.81%	27,329 11.86%	34,673 13.97%	49,585 18.29%	46,989 17.63%	39,680 18.40%
NONFARM	56,513 81.84%	123,775 76.19%	204,384 88.20%	212,802 86.03%	221,388 81.71%	216,897 82.17%	218,027 84.60%
Agric. services, forestry, fisheries	591 0.78%	2,010 1.24%	4,771 2.09%	4,724 1.90%	5,740 1.98%	3,998 1.52%	3,426 1.33%
Mining	47 0.00%	171 0.11%	(a) (a)	(a) (a)	(a) (a)	(a) (a)	(a) (a)
Construction	3,706 4.74%	11,876 7.34%	23,346 10.88%	21,607 8.79%	18,380 6.78%	16,042 6.09%	16,593 6.44%
General building contractors	713 0.91%	1,945 1.20%	5,663 2.44%	4,460 1.80%	3,521 1.30%	3,077 1.17%	3,210 1.25%
Heavy construction contractors	1,487 1.88%	4,961 3.07%	5,668 2.84%	4,447 1.79%	4,886 1.89%	6,411 2.43%	7,132 2.77%
Special trade contractors	1,526 1.95%	4,970 3.07%	11,708 5.19%	12,700 5.12%	10,274 3.78%	6,564 2.49%	6,521 2.83%
Manufacturing	7,170 9.18%	20,401 12.61%	21,206 9.15%	20,012 8.06%	20,405 7.61%	20,274 7.69%	19,464 7.55%
Nonferrous goods	6,392 8.18%	10,511 6.50%	16,701 8.07%	17,452 7.03%	18,135 6.69%	18,174 6.80%	17,786 6.90%
Food and kindred products	6,199 8.05%	8,344 5.16%	15,412 6.88%	14,866 5.99%	16,756 6.18%	17,570 6.47%	17,547 6.81%
Paper and allied products	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chemical and allied products	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Durable goods	774 1.00%	9,890 6.11%	2,504 1.08%	2,500 1.03%	2,470 0.91%	2,100 0.80%	1,878 0.85%
Fabricated metal products	560 0.70%	9,068 5.60%	988 0.43%	975 0.39%	1,060 0.39%	1,008 0.38%	1,078 0.42%
Transportation and public utilities	10,188 13.08%	18,650 10.41%	30,693 13.28%	32,038 12.90%	34,069 12.58%	32,236 12.23%	32,948 12.78%
Railroad transportation	(b) (b)	(b) (b)	(b) (b)	(b) (b)	(b) (b)	(b) (b)	(b) (b)
Trucking and warehousing	2,405 3.08%	3,740 2.31%	7,991 3.48%	8,221 3.31%	9,418 3.46%	9,621 3.61%	8,784 3.41%
Wholesale trade	4,372 5.60%	10,517 6.50%	21,077 9.10%	21,851 8.72%	22,846 8.37%	21,567 8.18%	23,922 9.28%
Retail trade	10,527 13.47%	18,247 10.44%	25,981 11.21%	27,624 11.13%	31,067 11.47%	31,462 11.94%	29,212 11.34%
Building materials and farm equip.	717 0.92%	352 0.22%	873 0.39%	1,207 0.49%	1,268 0.47%	1,258 0.49%	1,581 0.61%
Finance, insurance, real estate	1,988 2.51%	3,143 1.84%	7,185 3.10%	7,220 2.91%	7,246 2.67%	6,814 2.62%	5,855 2.19%
Services	12,013 15.37%	17,448 10.78%	31,552 13.62%	34,897 14.08%	36,393 13.08%	33,473 12.70%	33,865 13.00%
Hotels and other lodging places	734 0.94%	1,259 0.78%	1,624 0.73%	2,874 1.15%	2,086 0.77%	1,564 0.60%	1,871 0.73%
Business services	(b) (b)	1,778 1.10%	5,771 2.49%	6,488 2.61%	5,884 2.17%	4,734 1.80%	4,229 1.64%
Government and govt. enterprises	14,496 18.68%	25,112 15.52%	38,564 16.85%	42,821 17.25%	48,153 17.77%	50,601 19.20%	62,882 26.82%
Federal, civilian	3,485 4.46%	6,080 3.75%	9,501 4.10%	10,560 4.25%	12,171 4.49%	12,875 4.81%	12,348 4.79%
State and local	10,521 13.48%	17,703 10.84%	29,064 12.37%	31,781 12.80%	35,982 13.01%	36,988 14.03%	39,481 18.31%
TOTAL EARNINGS BY PLACE OF WORK	78,137 100%	161,811 100%	231,683 100%	247,475 100%	270,973 100%	263,886 100%	257,707 100%
Components of Earnings							
Wages and salaries	59,397 76.02%	114,108 70.52%	187,912 81.11%	197,615 79.58%	208,443 76.21%	205,181 77.55%	201,343 78.13%
Other labor income	2,498 3.20%	8,194 3.33%	11,212 4.88%	12,191 4.91%	13,301 4.91%	14,713 5.58%	16,890 6.48%
Proprietors' income	16,242 20.79%	41,609 25.86%	32,458 14.01%	36,474 15.50%	51,159 18.88%	43,682 16.87%	39,674 16.40%
Farm	9,061 11.60%	29,682 18.53%	14,460 6.24%	21,280 8.57%	35,898 13.26%	31,138 11.81%	23,066 9.19%

Footnotes:

(a) Included in agricultural services, forestry and fisheries to comply with federal disclosure regulations.
(b) suppressed to comply with federal disclosure regulations.

(Continued on next page)

TABLE 9. (Continued) Income by Industry, Benton and Franklin Counties and the State of Washington, 1970-1984, Place-of-Work Basis (\$000s)

	1970		1975		1979		1980		1981		1982		1984	
	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent
BENTON-FRANKLIN MSA														
Earnings by Industry														
FAPB	23,964	8.16%	66,916	11.20%	61,984	5.24%	62,327	6.50%	99,664	6.44%	101,210	6.65%	86,826	6.30%
NONFARM	289,594	91.84%	526,004	88.71%	1,120,860	94.76%	1,182,447	93.42%	1,449,621	93.56%	1,414,196	93.32%	1,291,826	93.70%
Agri. services, forestry, fisheries	1,913	0.65%	4,081	0.69%	9,902	0.84%	9,836	0.78%	9,062	0.68%	10,131	0.67%	9,928	0.72%
Mining	(a)	(a)	211	0.04%	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Construction	23,710	4.08%	100,836	17.01%	286,070	24.19%	249,278	19.88%	420,156	27.12%	331,944	21.90%	106,679	7.96%
General building contractors	6,514	2.90%	20,738	3.50%	55,237	4.72%	39,489	3.04%	16,346	1.06%	12,022	0.72%	17,928	1.30%
Heavy construction contractors	2,638	0.97%	41,413	6.98%	98,702	8.33%	109,189	8.62%	186,669	12.04%	189,607	12.51%	54,973	3.99%
Special trade contractors	12,358	4.21%	38,685	6.53%	131,476	11.12%	101,589	8.02%	217,201	14.02%	130,316	8.60%	38,778	2.87%
Manufacturing	66,529	16.92%	100,420	16.94%	194,761	16.40%	209,840	16.59%	246,078	15.89%	276,659	18.28%	366,992	28.82%
Nonferrous goods	51,340	17.49%	82,783	13.96%	175,169	14.81%	188,099	14.85%	224,114	14.40%	264,596	16.80%	332,724	24.13%
Food and kindred products	9,959	3.39%	18,737	3.16%	33,919	2.87%	34,341	2.71%	39,576	2.38%	39,547	2.61%	46,828	3.32%
Chemical and allied products	38,423	13.09%	58,238	9.94%	132,125	11.17%	146,266	11.56%	180,762	11.67%	208,577	13.76%	280,600	20.39%
Durable goods	4,189	1.43%	17,667	2.98%	19,692	1.66%	21,741	1.72%	21,981	1.42%	22,064	1.48%	23,268	1.69%
Fabricated metal products	662	0.22%	9,971	1.68%	1,599	0.14%	1,877	0.12%	1,705	0.11%	1,860	0.11%	1,535	0.11%
Transportation and public utilities	16,232	5.53%	26,367	4.46%	53,250	4.59%	57,222	4.52%	69,175	3.88%	58,090	3.90%	62,129	4.81%
Railroad transportation	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)
Trucking and warehousing	4,212	1.43%	6,196	1.06%	10,251	0.87%	10,669	0.84%	12,315	0.79%	12,778	0.84%	12,119	0.89%
Wholesale trade	6,031	2.74%	17,847	2.98%	36,639	3.09%	34,136	2.69%	36,387	2.35%	35,969	2.34%	39,688	2.89%
Retail trade	28,694	10.12%	47,004	7.93%	99,166	7.69%	96,395	7.61%	107,479	6.94%	109,707	7.64%	101,725	7.39%
Building materials and farm equip.	1,986	0.67%	2,765	0.47%	8,901	0.51%	6,257	0.49%	6,891	0.44%	6,394	0.42%	8,607	0.63%
Finance, insurance, real estate	6,033	2.09%	9,469	1.59%	26,292	2.22%	27,001	2.13%	24,334	1.57%	25,179	1.68%	23,721	1.72%
Services	64,460	28.77%	136,737	23.07%	277,241	23.44%	306,246	25.75%	346,141	22.34%	361,696	23.67%	374,608	27.17%
Hotels and other lodging places	1,937	0.68%	3,160	0.53%	5,896	0.48%	6,448	0.52%	5,634	0.36%	4,469	0.29%	6,262	0.46%
Business services	(b)	(b)	77,217	13.03%	161,177	13.43%	180,896	14.28%	196,317	12.28%	199,222	13.19%	219,038	16.89%
Government and govt. enterprises	43,607	14.83%	63,132	10.42%	146,646	12.40%	173,464	13.70%	199,803	12.99%	206,811	13.68%	214,208	15.94%
Federal, civilian	9,617	3.24%	15,134	2.55%	23,758	2.01%	26,137	2.06%	28,246	1.82%	29,624	1.98%	32,222	2.34%
State and local	32,930	11.22%	46,811	7.87%	121,188	10.39%	146,298	11.47%	167,966	10.84%	171,874	11.34%	176,984	12.83%
TOTAL EARNINGS BY PLACE OF WORK	293,560	100%	592,922	100%	1,182,834	100%	1,266,774	100%	1,549,486	100%	1,515,406	100%	1,378,652	100%
Components of Earnings														
Wages and salaries	244,945	83.36%	484,984	81.81%	1,029,154	87.01%	1,084,258	86.38%	1,349,419	87.08%	1,321,186	87.18%	1,172,576	85.05%
Other labor income	10,859	3.70%	28,447	4.80%	62,520	5.29%	69,520	5.49%	62,943	4.06%	62,696	4.12%	106,610	7.66%
Proprietors' income	37,693	12.81%	81,391	13.75%	91,160	7.71%	102,996	8.13%	117,123	7.58%	101,524	6.70%	100,466	7.29%
Farm	13,979	4.76%	44,677	7.54%	28,082	2.20%	43,044	3.40%	61,930	4.00%	57,090	3.77%	42,616	3.09%
STATE OF WASHINGTON														
Earnings by Industry														
FAPB	386,090	3.32%	696,153	5.17%	871,617	3.06%	867,709	2.74%	1,008,908	2.97%	1,004,434	2.91%	1,099,646	2.89%
NONFARM	10,370,456	96.68%	16,882,366	94.83%	27,722,616	96.95%	30,466,444	97.26%	32,977,968	97.02%	33,642,866	97.09%	36,981,338	97.11%
Agri. services, forestry, fisheries	67,306	0.63%	114,019	0.68%	294,026	0.99%	293,036	0.94%	274,351	0.81%	266,710	0.74%	299,064	0.79%
Mining	17,202	0.16%	33,896	0.20%	88,527	0.24%	75,869	0.24%	79,271	0.23%	78,213	0.23%	76,876	0.20%
Construction	684,822	4.38%	1,063,256	6.35%	2,458,891	8.78%	2,403,261	7.67%	2,517,228	7.41%	2,203,619	6.38%	2,126,436	5.89%
General building contractors	193,077	1.89%	288,157	1.72%	616,208	2.28%	714,341	2.28%	635,665	1.87%	583,906	1.60%	704,476	1.85%
Heavy construction contractors	182,979	1.71%	264,992	1.58%	583,842	1.84%	587,086	1.88%	661,648	1.95%	596,041	1.72%	409,204	1.07%
Special trade contractors	308,446	2.88%	510,109	3.05%	1,123,647	3.93%	1,101,418	3.52%	1,219,933	3.59%	1,054,679	3.06%	1,011,766	2.64%
Manufacturing	2,484,742	23.28%	3,896,891	22.07%	8,993,284	23.06%	7,400,221	22.82%	8,019,666	23.09%	8,080,076	23.39%	8,592,134	22.58%
Nonferrous goods	675,524	6.28%	999,090	5.90%	1,834,207	5.72%	1,798,463	5.74%	1,847,141	5.73%	2,021,348	5.86%	2,304,996	6.05%
Food and kindred products	242,299	2.26%	384,792	2.19%	559,160	1.69%	591,830	1.69%	649,156	1.91%	678,043	1.96%	689,999	1.84%
Chemical and allied products	67,627	0.63%	104,694	0.63%	199,074	0.79%	220,002	0.70%	246,247	0.73%	271,368	0.79%	361,222	0.92%
Durable goods	1,621,218	16.96%	2,697,801	16.11%	4,968,077	17.34%	5,601,739	17.88%	6,072,716	17.87%	6,068,626	17.54%	6,267,135	16.51%
Fabricated metal products	76,886	0.71%	178,441	1.07%	246,313	0.66%	262,789	0.80%	303,428	0.89%	259,774	0.79%	284,672	0.87%
Transportation and public utilities	767,667	7.16%	1,173,289	7.01%	2,050,300	7.17%	2,270,128	7.25%	2,426,539	7.14%	2,937,606	7.35%	2,830,474	7.43%
Railroad transportation	128,476	1.20%	172,606	1.03%	264,139	0.90%	261,367	0.83%	298,638	0.78%	245,754	0.71%	268,616	0.67%
Trucking and warehousing	148,998	1.39%	248,454	1.48%	462,841	1.62%	490,949	1.59%	512,178	1.51%	506,119	1.47%	568,938	1.49%
Wholesale trade	664,369	6.19%	1,166,341	6.96%	1,972,559	6.90%	2,132,912	6.51%	2,309,968	6.89%	2,363,079	6.84%	2,536,306	6.64%
Retail trade	1,195,040	11.14%	1,798,596	10.74%	2,968,031	10.36%	3,160,786	10.09%	3,427,666	10.09%	3,560,395	10.31%	3,903,712	10.26%
Building materials and farm equip.	71,106	0.66%	102,496	0.61%	213,972	0.79%	213,734	0.68%	224,647	0.68%	218,664	0.64%	209,553	0.55%
Finance, insurance, real estate	649,346	6.12%	791,853	4.31%	1,586,710	5.59%	1,691,281	5.40%	1,646,532	4.91%	1,766,223	5.08%	2,046,716	5.42%
Services	1,492,873	13.92%	2,466,788	14.73%	4,428,699	16.44%	5,109,033	16.31%	5,702,781	16.79%	5,789,288	16.70%	6,636,607	17.42%
Hotels and other lodging places	60,347	0.58%	80,416	0.48%	152,706	0.53%	166,267	0.53%	166,541	0.49%	147,162	0.43%	208,993	0.54%
Business services	178,341	1.68%	362,826	2.17%	798,487	2.79%	963,651	3.04%	1,036,237	3.05%	946,564	2.74%	1,159,663	2.99%
Government and govt. enterprises	2,447,477	22.82%	3,649,406	21.79%	5,268,978	18.43%	5,930,968	18.93%	6,551,741	19.28%	6,937,679	20.08%	7,915,123	20.72%
Federal, civilian	588,401	5.43%	906,994	5.42%	1,269,177	4.44%	1,389,899	4.44%	1,473,868	4.34%	1,575,884	4.56%	1,797,581	4.72%
State and local	1,421,878	13.26%	2,211,173	13.20%	3,378,493	11.82%	3,860,754	12.29%	4,213,502	12.40%	4,376,658	12.67%	5,005,466	13.14%
TOTAL EARNINGS BY PLACE OF WORK	10,726,546	100%	16,749,511	100%	28,594,433	100%	31,326,153	100%	33,986,861	100%	34,547,290	100%	38,081,026	100%
Components of Earnings														
Wages and salaries	9,121,200	85.03%	13,691,611	82.94%	24,056,573	84.13%	26,656,365	85.09%	29,195,872	85.90%	29,921,698	86.61%	32,323,492	84.84%
Other labor income	422,630	3.94%	913,827	5.46%	1,746,258	6.24%	2,054,306	6.56%	2,267,021	6.67%	2,529,267	7.32%	3,075,394	8.08%
Proprietors' income	1,182,516	11.02%	1,944,073	11.61%	2,793,602	9.63%	2,615,483	8.35%	2,523,968	7.43%	2,098,307	6.07%	2,682,140	7.04%
Farm	228,267	2.13%	657,888	3.93%	642,532	2.25%	488,866	1.56%	680,640	1.94%	599,898	1.74%	683,667	1.82%

Footnotes:
(a) included in agricultural services, forestry and fisheries to comply with federal disclosure regulations.
(b) suppressed to comply with federal disclosure regulations.

Adapted from U.S. Department of Commerce 1986b.

Income Levels and Distribution

TABLE 10. Income Distribution in Benton and Franklin Counties, Selected Municipalities, and the State of Washington, 1970 and 1980

	Benton County		Kennewick		Richland		Prosser		West Richland		Franklin County		Pasco		Washington	
	1970	1980	1970	1980	1970	1980	1970	1980	1970(b)	1980	1970	1980	1970	1980	1970	1980
Per capita income	3,204	8,763	3,087	8,528	3,628	9,837	2,888	7,019		9,080	2,885	7,069	2,923	6,667	3,370	8,073
Households (number)(c):	20,505	39,249	4,845	12,937	8,157	12,422	989	1,432		1,109	7,875	12,013	4,748	6,766	975,515	1,842,685
Mean income	na	24,406	na	23,662	na	26,473	na	16,847		24,349	na	20,842	na	17,825	10,140	21,337
Median income	na	22,668	na	21,145	na	25,388	na	16,769		23,790	na	18,062	na	15,986	9,126	18,367
Income distribution, percent:																
Under \$5,000	15.4	7.6	17.8	9.1	10.9	6.2	23.2	14.1		7	17.8	12.6	20	16.1	16.5	11.3
\$5,000-9,999	29.4	9.8	32.2	10.9	25.3	8.6	28	12.4		7.5	33.6	13.2	36.1	16.3	30.5	14.7
\$10,000-14,999	31.6	11.5	32.2	13	33.6	9.9	34.2	17		12.7	29.5	15	27.6	14.5	30.1	14.5
\$15,000-24,999	20.2	27.2	14.7	28.3	26.1	24.3	10.4	30.9		28.6	16.4	27.3	14.5	27.9	16.3	27.2
\$25,000-34,999	3.1	36.6	2.8	34.1	3.9	44.4	3.6	22.6		39.6	2.4	26	1.6	23.4	3.9	27.5
\$35,000 or more	0.2	5.3	0.4	4.6	0.3	6.6	0.5	2.9		4.6	0.2	3.9	0.3	1.8	0.7	4.7
Families (number):	17,521	29,271	3,909	9,147	6,971	9,185	742	1,020		837	6,344	9,154	3,526	4,575	862,542	1,086,319
Median income	10,888	25,472	10,001	24,328	11,793	26,666	9,775	20,417		25,392	9,815	20,989	9,348	18,783	10,407	21,896
Mean income	11,351	27,005	10,064	25,701	12,566	29,598	10,432	21,619		26,713	10,488	23,003	9,696	20,351	11,511	24,529
Income distribution, percent:																
Below poverty line	7.3	5.6	6.4	7.2	4.5	3.7	10.2	10.2		3.6	9.4	10.4	10.1	12	7.6	7.2
Below 125 percent of poverty line	10.3	7.6	11.5	9.1	7.1	5	na	15.9		13.4	12.7	15	13.6	17.1	10.9	10.2

Footnotes:

(a) income data are actually for 1969 and 1979.

(b) no data for West Richland were reported in the 1970 Census.

(c) estimated based on average household sizes and total population.

Adapted from U.S. Department of Commerce 1973 and 1983.

In 1979, Benton County residents had higher mean and median per capita, family, and household incomes than the state as a whole, while the corresponding indicators for Franklin County were all below state averages. Benton County also had a higher proportion of families in the upper-income brackets, and a lower proportion of families and households in the lower brackets, than the state average; the reverse was true for Franklin County. These relative distributions are indicative of the heavier reliance of Benton County residents on higher-paying employment provided by the Supply System, the DOE, and their contractors. Income distribution data are displayed in Table 10. Since the most recent income distribution data are from the 1980 Census and were gathered during the Supply System construction period, they may not reflect the current situation.

Income levels and distributions for cities and towns in the Benton-Franklin MSA, like the counties, reflect the primary industries in the incorporated areas. Cities dependant upon agriculture, such as Prosser and Pasco, have historically had low per capita incomes, and income distributions that were skewed more toward lower income categories, compared with the state average. Kennewick and Richland, on the other hand, enjoyed higher per capita, family, and household incomes in 1979 than the state-wide average.

3.3 Population Size, Distribution, and Composition

Population Size and Change

TABLE 11. Population Trends, Benton and Franklin Counties, 1970-1987

Municipality by County	1970 ^a	1980	1981 ^b	1982	1983	1984	1985	1986	1987 ^c	Change, 1981-1987 ^a (percent)
TOTAL MSA	93,356	144,469	147,200	147,900	144,700	144,000	140,900	139,300	139,600	-7,600 (-5.2)
Benton Co.	67,540	109,444	111,300	111,700	108,700	107,700	105,200	104,000	104,100	-7,200 (6.5)
Kennewick	15,212	34,397	34,700	35,350	35,700	37,240	36,990	36,600	37,320	2,620 (7.6)
Richland	28,290	33,578	33,700	33,550	32,000	31,660	30,508	30,240	30,280	-3,420 (-10.1)
Prosser	2,954	4,049	4,120	4,170	4,150	4,180	3,980	4,010	4,000	-120 (-2.9)
West Rich- land	1,143	2,938	3,783	3,934	3,869	3,650	3,730	3,720	3,700	-83 (-2.2)
Benton City	1,070	2,087	2,150	1,970	1,880	1,975	1,930	1,820	1,815	-335 (-15.6)
Unincorpor- ated	20,871	32,395	32,847 ^d	32,726	31,101	28,995	28,062	27,610	26,985	-5862 (-17.8)
Franklin Co.	25,816	35,025	35,900	36,200	36,000	36,300	35,700	35,300	35,500	-400 (-1.1)
Pasco	13,920	18,428	18,700	19,050	19,100	18,930	18,700	18,420	18,520	-180 (-1.0)
Connell	1,161	1,981	1,970	1,960	1,840	2,065	2,075	2,046	2,060	90 (4.6)
Kahlotus	308	203	205	215	210	226	225	225	223	18 (8.8)
Mesa	274	278	350	275	270	280	245	260	260	-90 (-25.7)
Unincorpor- ated	10,153	14,135	14,675 ^d	14,700	14,580	14,799	14,455	14,349	14,437	-238 (-1.6)

^a U.S. Department of Commerce 1973.

^b The 1981 figures for Benton and Franklin County were adjusted by Office of Financial Management(1986). Since the population of the unincorporated area is calculated as a residual (total county estimate minus estimates for cities and towns), the estimate for the unincorporated area has been adjusted in this table to make the totals match the revised county figures.

^c Office of Financial Management 1987.

^d Population growth figures for some cities are somewhat misleading due to city annexations. Between April 2, 1980 and April 1, 1986, the following populations were added to cities by annexation (Office of Financial Management 1986): Benton City, 52; Kennewick, 3,649; Prosser, 19; Richland, 2; West Richland, 638; Connell, 8; and Pasco, 91.

Adapted from Washington Office of Financial Management 1986, U.S. Department of Commerce 1973, and Office of Financial Management 1987.

Population size and change in population size over time, the distribution of the population across jurisdictions within the study area, and the composition of the population with respect to age and sex, race and ethnicity, household and education characteristics, labor force participation, and vital rates are important demographic characteristics of the study area that are described in this report. As seen in Table 11, the MSA's population increased from 93,356 people in 1970 to its all-time peak of 147,900 in 1982, when the effects of Supply System layoffs began. The MSA's population then declined through 1988, to 139,300 persons, before increasing slightly to 139,600 in 1987. Benton County accounted for most of the growth between 1970 and 1982, as well as most of the decline after 1982, probably because most of the Supply System construction workers lived in Benton County.¹⁸

¹⁸ Although employment loss in many sectors of the Benton County economy was proportionately less than in Franklin County over the 1981-1986 period (as shown in Table 1), total job loss, and population declines, were more evident in Benton County.

Natural Increase and Net Migration

TABLE 12. Components of Population Change, Benton and Franklin Counties, 1980-1987^a

	BENTON COUNTY			FRANKLIN COUNTY			BENTON-FRANKLIN MSA TOTAL		
	Population	Natural Increase ^b	Net Migration	Population	Natural Increase	Net Migration	Population	Natural Increase	Net Migration
1980	109,444	1,466	390	35,025	742	133	144,469	2,208	523
1981	111,300	1,674	-1,274	35,900	632	-332	147,200	2,306	-1,606
1982	111,700	1,616	-4,816	36,200	728	-928	147,900	2,344	-5,544
1983	108,700	1,537	-2,537	36,000	840	-340	144,700	2,177	-2,877
1984	107,700	1,401	-3,901	36,300	614	-1,214	144,000	2,015	-5,115
1985	105,200	1,237	-2,437	35,700	498	-898	140,900	1,735	-3,335
1986	104,000	1,295	-1,195	35,300	525	-325	139,300	1,820	-1,520
1987	104,100			35,500			139,600		
Totals ^c		8,760	-15,960		3,637	-4,037		12,397	-19,997

^a Table 17 provides additional detail.

^b Births minus deaths.

^c 1981 through 1986.

Adapted from Washington Department of Social and Health Services, years indicated; and Office of Financial Management 1986 and 1987.

If the number of births in a population exceeds the number of deaths, the population will experience a net natural increase.¹⁹ Population size, however, is often strongly influenced by migration, especially in small geographic areas such as a county. In the case of Benton and Franklin counties, the historical influence of net migration has been tremendous. Between 1981, the peak year for MSA employment, and 1985, when employment stabilized, Benton and Franklin counties experienced net out-migration of an estimated 18,477 persons. Estimates of net migration are presented in Table 12. The data show that out-migration continued during 1986 despite the stabilization of the MSA's economy. The lagged response of out-migration to economic recession is typical, since people who lose their jobs often remain in an area for some time, often living on unemployment insurance or savings before leaving, and sometimes seeking temporary employment outside the area while maintaining their family base in the local area. In the Benton-Franklin MSA, anticipation of prospective work and relatively long prior residence in the area may have affected the pattern of out-migration of unemployed workers.

For these reasons, long-term net migration provides a more accurate picture of the population's response to employment changes than annual estimates do. Comparing the net migration estimate of 19,997 out-migrants from the MSA between 1981 and 1986 to the 14,800-person reduction in the employed labor force that occurred between 1981 and 1985 (Table 1) results in an estimate of 1.35 out-migrants for every job lost in the MSA. Out-migration due to the economy's poor performance between 1981 and 1985 period may not yet be fully realized,

¹⁹Net natural increase is determined by subtracting the number of deaths in that population from the number of births.

however. Thus, this ratio may underestimate the long-term relationship between job loss and out-migration in the MSA.

TABLE 13. Estimated Net Migration for Sub-county Areas, 1981-1986

Area	Estimated Net Migration, 1981-1986 ^a	Percent of 1980 Population
Benton County, total	-15,960	-14.6
Kennewick	-5,004	-14.6
Richland	-5,157	-15.4
Other areas	-5,770	-13.9
Franklin County, total	-4,037	-11.5
Pasco	-2,430	-13.2
Other areas	-1,577	-9.5

^a Totals of sub-area estimates are not the same as the respective county totals because city data on births and deaths do not hold city boundaries constant over time. This results in some error in the subarea migration estimates, which hold city boundaries constant at their 1980 locations.

Adapted from Office of Financial Management 1986 and 1987 and Washington Department of Social and Health Services (years indicated).

Net migration patterns for major subareas within Benton and Franklin counties can be approximated if the jurisdictional boundaries are held constant for the 1981-1986 period. Table 13 indicates that on a proportional basis, out-migrants were spread fairly evenly among Richland, Kennewick, Pasco, and areas outside those cities.

Net migration for other cities in the MSA cannot be estimated with reasonable precision since complete birth and death data are unavailable. Based on the population data²⁰ in Table 11, Benton City appears to have suffered relatively high proportional loss between 1981 and 1987, as might be expected given its proximity to the Hanford Site. Mesa lost an even higher proportion of its population, but much the indicated loss could be due to factors other than the Supply System layoffs.

Demographic Characteristics

The demographic characteristics discussed in this report include age and sex distribution, race and ethnicity, household and education characteristics, labor force participation rates, and vital rate (birth and death rate) statistics. Most reliable demographic data are available only in the form of the decennial Censuses of the U.S. Department of Commerce, Bureau of the Census. Thus, most demographic data are now seven years old and do not reflect changes in the Benton-Franklin MSA since 1980.²¹

²⁰The population figures for sub-county jurisdictions are indicative of net migration but are not exact proxies since population change is composed of births, deaths, and net migration.

²¹The State of Washington Office of Financial Management provides annual population estimates at the county level and for some cities. On occasion, Office of Financial Management will conduct an inter-censal population count. However, these data generally do not provide the same level of detail regarding population characteristics as found in the decennial Census data.

Age and Sex

Age and sex data are depicted in Figure 4. The age distribution of both Benton and Franklin counties is more skewed toward younger age cohorts than is the state's. In 1980 both counties had higher proportions of persons under age 15 than the state average of 22.4 percent; Benton County had 25.6 percent, and Franklin County had 28.1 percent. Both counties also had lower percentages of persons over age 64 than the state average of 10.4; Benton County had 6.6 percent, and Franklin County had 7.6 percent. Age distributions for 1985 have been estimated by Office of Financial Management (1986). These data indicate that both counties have followed the state-wide trend toward an aging of the population, with decreasing proportions of children, and increasing proportions of older persons. Nevertheless, both counties' age structures remained generally younger than the state's in 1985. Females accounted for less than half of the population of both Benton and Franklin counties in 1980 and 1985. Slightly over half the population of the state was female in both years.

FIGURE 4. Age and Sex Distributions

Benton County, 1970

Franklin County, 1970

State of Washington, 1970

(continued on next page)

FIGURE 4 (continued). Age and Sex Distributions, 1970

Kennewick, 1970

Pasco, 1970

Richland, 1970

(continued on next page)

FIGURE 4 (continued). Age and Sex Distributions

Prosser, 1970

Benton County, 1980

Franklin County, 1980

(continued on next page)

FIGURE 4 (continued). Age and Sex Distributions

State of Washington 1980

Kennewick, 1980

Pasco, 1980

(continued on next page)

FIGURE 4 (continued). Age and Sex Distributions

Richland, 1980.

Prosser, 1980

West Richland, 1980

(continued on next page).

FIGURE 4 (continued). Age and Sex Distributions

Benton County, 1985^a

Franklin County, 1985^a

State of Washington, 1985^a

^a U.S. Office of Financial Management 1986.

Adapted from Office of Financial Management 1986; and U.S. Department of Commerce 1973 and 1983..

Race and Ethnicity

TABLE 14. Race and Ethnicity, 1970 and 1980
(Percent)

	White		Asian and Pacific Islander ^a		Black		American Indian		Other		Persons of Spanish Origin	
	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980
Benton County	98.4	94.2	na	1.7	0.4	0.9	na	0.7		na	2.1	4.2
Kennewick	99.0	95.2	na	1.5	0.0	0.5	0.3	0.8	na	2.1	1.7	na
Richland	97.8	94.5	0.4	2.9	1.3	1.4	0.4	0.6	0.1	0.6	0.9	na
Prosser	99.5	87.5	0.1	1.5	0.1	0.8	0.1	0.5	0.2	9.7	na	na
West Richland	na	95.8	na	2.1	na	1.5	na	0.3	na	0.3	na	na
Franklin County	93.0	86.4	na	1.0	5.4	4.4	na	1.1	5.4	7.0	4.0	15.5
Pasco	88.6	79.5	0.5	1.4	9.6	7.9	0.4	1.4	0.9	9.8	2.6	na
Washington		91.7		2.7		2.6		1.5		1.5		2.9

^a In 1970 Asian and Pacific Islander includes only Japanese, Chinese, and Filipino.
na means not available

Adapted from U.S. Department of Commerce 1973 and 1983.

The population of the Benton-Franklin MSA was predominantly white in 1980, with proportionally fewer other races than the state. Within the MSA, however, Franklin County had a slightly lower proportion of persons classified as white, and more persons classified as Black or "other" race, than the state. The 1970 and 1980 racial distributions for Benton and Franklin counties and the state are shown in Table 14.

Both counties had higher proportions of persons of Spanish language than the state in both 1980 and 1986. In 1980, 4.2 and 15.5 percent, respectively, of Benton and Franklin Counties' populations were of Spanish origin, compared to a state-wide average of 2.7 percent. The Office of Financial Management (1986:23) estimated that by 1986 these percentages had increased to 5.2, 18.0, and 3.0, respectively, for Benton County, Franklin County, and the State.

The absolute numbers of Asians and Pacific Islanders, Blacks, and American Indians living in the Benton-Franklin MSA in 1980 were modest--2,186; 2,512; and 1,128 persons respectively. By 1980, approximately 10,000 persons of Spanish language lived in the MSA. Total population in the MSA at this time was approximately 144,500 people. The ethnic and racial characteristics of the residents of the three affected Tribes' reservations are discussed in the accompanying report on Socioeconomic Conditions in Cultural Communities.

Household and Education Characteristics

TABLE 15. Household and education characteristics, Benton and Franklin Counties and the State of Washington, 1970 and 1980

	Benton County		Kennebec		Richland		Prosser		West Richland		Franklin County		Pasco		Washington	
	1970	1980	1970	1980	1970	1980	1970	1980	1970(a)	1980	1970	1980	1970	1980	1970	1980
Average household size	3.27	2.78	3.11	2.63	3.21	2.69	2.91	2.67		2.69	3.34	2.89	2.90	2.63	2.96	2.61
Average family size	na	3.23	na	3.18	na	3.19	na	3.20		3.16	na	3.37	na	3.26	3.46	3.14
Median years of school, persons over 24	12.5	12.8	12.4	12.8	13	13.4	12.3	na		na	12.4	12.6	12.2	12.3	12.4	12.7

na means not available.

Footnote:

(a) no data are available for West Richland 1980.

Adapted from U.S. Department of Commerce 1973 and 1983.

Benton County households averaged 2.78 persons in 1980, and Franklin County households averaged 2.89, compared to the state average of 2.61. Average household sizes decreased in the MSA between 1970 and 1980; cities tended to have smaller households than the counties as a whole.

Benton County residents had completed more years of school (12.8) in 1980 than the state average (12.7), while Franklin County residents had fewer years of schooling (12.6). Richland residents averaged 13.4 years of school completed, the highest average reported for incorporated areas in the MSA. The average years of education completed increased throughout the MSA between 1970 and 1980, as was the case state-wide. Household and education data are presented in Table 14.

Labor Force Participation

TABLE 16. Labor Force Participation Rates, Benton and Franklin Counties and the State of Washington, 1970 and 1980

	Benton County		Kennewick		Richland		Franklin County		Pasco		Washington	
	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980
Labor force participation:												
Males in labor force, % of total aged:												
16-19	54.8	60.1	51.8	64.2	50.9	60.2	56.6	66.5	56.8	68.2	52.1	52.4
20-24	86	93.4	87.6	94.1	87.6	93.9	85.1	90.8	85.1	89.8	82.8	74.6
25-64	93.1	95.4	92	96	94.6	97.3	92.7	91.5	89.8	88.7	92.4	88.9
over 64	21.5	23.1	21.5	21.9	20.3	27.5	32	30	36.2	21.8	22.3	16.7
Females in labor force, % of total aged:												
16-19	40.1	54.1	39.3	62.7	46.1	51.8	42.4	50.4	42.1	50.1	35.8	51.6
20-24	52.9	71	54.3	73.5	53.7	76.1	52.4	62.1	54.6	65.2	54.3	68
25-64	46.8	56.7	44.6	58.6	48.8	55.9	50	56.4	53.1	60.7	46.6	57.9
over 64	9	5.8	13	7.8	8.5	5	14.7	9.1	13.9	9.2	9.2	7.2

Adapted from U.S. Department of Commerce 1973 and 1983.

As was the case nationwide, labor force participation rates for females of all age groups except those over 64 years old increased in the Benton-Franklin MSA between 1970 and 1980. The most dramatic increases in terms of total numbers of women entering the work force were realized by females between 25 and 64 years of age, the prime working-age cohort. In 1980, the Benton County participation rate for females in this cohort were higher than the corresponding rate for Franklin County, a reverse of the situation in 1970. Labor force participation rates for the MSA's males remained relatively constant between 1970 and 1980, although a noticeable increase in the participation rate for males aged 16-19 was evident. Labor force participation rates are shown in Table 16.

Birth and Death Rates

TABLE 17. Birth and Deaths, with Rates,^a Benton and Franklin Counties and the State of Washington, 1980-1986

Jurisdiction	1980		19 81		19 82		1983		1984		19 85		19 86	
	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths
State (rate only)16.4		7.8	16.4	7.5	16.3	7.6	16	7.8	15.9	7.8	16	7.9	15.7	7.7
Benton County	2058	592	2217	543	2162	546	2105	568	1988	616	1881	644	1913	618
rate	18.8	5.4	19.8	4.8	19.4	4.9	19.4	5.2	18.5	15.7	17.9	6.1	18.4	5.9
Kennewick	900	215	974	196	943	214	917	224	846	212	812	264	857	274
rate	26.2	6.3	28.1	5.4	26.7	6.1	25.7	6.3	22.7	5.7	22	7.1	23.4	7.5
Richland	505	218	502	195	523	185	487	188	515	216	459	220	443	190
rate	15	6.5	14.9	5.8	15.6	5.5	15.2	5.9	16.3	6.8	15	7.2	14.6	6.3
Prosser	na	na	na	na	na	na	na	na	na	na	na	40	na	32
rate	na	na	na	na	na	na	na	na	na	na	na	10.1	na	8
West Richland	na	na	na	na	na	na	na	na	na	na	na	7	na	18
rate	na	na	na	na	na	na	na	na	na	na	na	1.9	na	4.8
Franklin County	944	202	871	239	937	209	866	226	794	210	743	245	774	249
rate	27	5.8	23.7	6.5	25.9	5.8	24.1	6.3	21.9	5.8	20.8	6.9	21.9	7.1
Pasco	570	148	558	181	576	158	547	163	524	149	478	167	472	178
rate	31.8	8.2	29.8	9.7	30.2	8.3	28.6	8.5	27.7	7.9	25.6	8.9	25.6	9.7

Footnotes:

(a) rates are expressed as number of births or deaths per 1,000 population.

na means not available

Adapted from Washington Department of Health and Human Services, years indicated, except 1985 and 1986 data from Threatt 1987.

Crude birth rates²² in the Benton-Franklin MSA, expressed on the basis of births per 1,000 population, have been consistently above the state averages since 1980, while deaths per 1,000 population have been consistently below the state averages. Birth and death data for cities indicate that the cities followed the trends in the counties from 1980 to 1986, with two primary exceptions: Richland's birth rates have historically been lower than the state's, and Pasco's death rates have historically been higher than the state average. Crude birth and death data are shown in Table 16.

²²Crude birth and death rates refer to the number of births or deaths per 1,000 members of the population. Since these rates vary by the age of the members of the population, crude birth and death rates are affected by differences in the age composition of the populations examined.

4.0 OUTSTANDING TECHNICAL ISSUES AND DATA REQUIREMENTS

4.1 Introduction

Although they are drawn from the most commonly-used secondary sources, the data presented in this document do not cover all data that are available to describe the economy and demography of the Benton-Franklin MSA. Further work is needed to incorporate other useful data sources, expand the geographic scope of the data base, and provide additional detail, particularly regarding socioeconomic issues that are likely to be important for monitoring and managing the impacts of the BWIP. Technical issues and additional data needs are discussed in the following sub-sections.

4.2 Geographic Relationships Between Basic and Nonbasic Employment

The geographic locations of basic (or export) jobs in the Benton-Franklin MSA are relatively easy to identify since most of that employment is by the DOE, the Supply System, and their contractors; agriculture; and a few large firms in other industries. However, recent data on employment by industry for nonbasic employment are compiled only at the county level. In addition, the apparently strong recession in many Franklin County economic sectors that occurred after the Supply System layoffs (Section 3.2) suggests that residents of the MSA may have spent relatively large proportions of their disposable incomes on goods and services in Pasco. In addition to providing a better picture of the events following the Supply System layoffs, sub-county data on spending patterns and employment by industry could form the basis for a model of the MSA's employment changes in the future.

The Washington State Department of Revenue may be able to provide additional information on taxable retail sales. These data could be supplemented by primary data describing the locations of purchases by households and employment by industry.

4.3 Relationship of Residence Location to Place of Work

Development of a model of population by city or other sub-county jurisdiction would be facilitated by a clear understanding of the choice of residence location by MSA workers. Traditional location theory holds that factors such as driving time to work, quality of urban services, income, cost of housing, and other factors influence residence location decisions. Most of these data, if available for recent years, have not been compiled in standard secondary source documents.

Data on commuting patterns from the Washington State Department of Transportation or local agencies involved in transportation planning would be useful in furthering the understanding of residence location. The 1980 Census included some relevant data items, but the data are

probably now too dated to be of much use, particularly with the new bridge across the Columbia River that makes Franklin County more accessible to the Hanford site. Nonetheless, use of these secondary data along with primary data on local residents' perceptions of the quality of urban services and "community attractiveness," income, commuting patterns, housing costs, and other topics would increase understanding of historical population change, and assist development of a sub-county population model. Data from the work force survey will provide this type of information for the direct project work force. Other sources will be needed to obtain similar information for the "indirect" population associated with the BWIP project.

4.4 Relationship of Income and Employment to Population Migration

One of the most striking aspects of the Benton-Franklin MSA's population trends since the Supply System layoffs is the apparently low ratio of out-migration to employment loss. Although households averaged 2.8 and 2.9 persons, respectively, in Benton and Franklin counties in 1980 (Table 14), the 1981-1986 ratio of out-migrants to jobs lost between 1981 and 1985 was only 1.35 (Section 3.3). The reasons for this seemingly low ratio are as yet unclear, in part because current secondary data on the characteristics that cause workers to decide to migrate are lacking. These characteristics include income, family and household status, duration of local residence, union membership, and occupation. At an economy-wide level, more detailed occupational supply and demand information would also be useful, since structural unemployment (the mismatch between industry's skill requirements and labor force qualifications) may play a part in migration patterns.

4.5 Labor Force Participation Rates

Changes in labor force participation rates can affect the size of the total population that can be supported by a given level of employment in an area. The nationwide trend of increasing labor force participation rates by women was evident in the Benton-Franklin MSA between 1970 and 1980 (Table 15), but more current data are unavailable. Future data collection and analysis will include increased emphasis on age- and sex-specific labor force participation rates, and on understanding the relationship between labor force participation rates and wage and salary levels, employment opportunities, and household and family characteristics.

4.6 Extensions to the Geographic Scope of the Analysis

This profile has focused on the Benton-Franklin MSA and its major cities. Additional data are available from the 1980 Census counts at the small-city and census tract level, which are not published in hard-copy form. Although outdated, these data may be of use in resolving all three issues outlined above. Additional data for smaller communities from other sources, such as Office of Financial Management and the cities themselves, should also be collected.

4.7 Data on Major Projects

This profile report has presented limited data on major projects or employers in the Benton-Franklin MSA. Data on major projects' historical and current employment levels, payrolls, purchases of local goods and services, and worker characteristics such as residence location, family, and household characteristics would be very useful in resolving the issues described earlier. Since little secondary data exist on these issues, a primary data collection program would be necessary to collect the needed data.

5.0 REFERENCES

5.1 Documents

Battelle Human Affairs Research Centers 1987a. Documentation of Primary Data Collection. SMP-101. Seattle, WA: Battelle Human Affairs Research Centers.

Battelle Human Affairs Research Centers 1987b. Documentation of Secondary (Documentary) Data Collection. SMP-102. Seattle, WA: Battelle Human Affairs Research Centers.

Battelle Pacific Northwest Laboratories 1985. Quality Assurance Manual for License-Related Programs. PNL-MA-60. Richland, WA: Battelle Pacific Northwest Laboratories.

Cluett, Christopher et al. 1984. Nuclear Waste Repository in Basalt: Preliminary Socioeconomic Assessment. Report prepared by Battelle Human Affairs Research Centers for Rockwell Hanford Operations under Contract DE-AC06-77 RLO 1030.

USDOE 1987a. An Evaluation of Economic-Demographic Models for Impact Assessment of Nuclear Waste Repository Development and Hanford, Washington. Working Draft. Richland, WA: Richland Operations Office, Basalt Waste Isolation Division, Licensing, Environmental and Safety Branch. September.

DOE 1987b. The Economic and Community Impacts of Closing Hanford's N Reactor. Report prepared by Battelle Pacific Northwest Laboratory under Contract DE-AC06-76 RLO 1830. Richland, Washington.

Office of Financial Management 1987. Populations of Cities, Towns, and Counties for the Allocation of State Revenues. April 1, 1987.

Office of Financial Management 1986. Population Estimation and Forecasting Unit. 1986 Population Trends for Washington State. Publication P86-09.

Pagaoulatos, A., K. Mattas, and L.D. Debertin 1986. "A Comparison of Some Alternatives to Input-Output Multipliers." Land Economics 62(4):371-377.

U.S. Department of Commerce 1986a. Bureau of Economic Analysis, Regional Economic Information System. Full-time and part-time employees by major industry. April.

_____. 1986b. Bureau of Economic Analysis, Regional Economic Information System. Income by source. April.

_____. 1986c. Bureau of Economic Analysis, Regional Economic Information System. Transfer payments. April.

_____. 1984. 1982 Census of Agriculture. Volume 1, Part 47, Washington State and County Data. Document AC82-A-47. Issued May 1984.

_____. 1983. Bureau of the Census. 1980 Census of the Population. Volume 1, Characteristics of the Population, Part 49, Washington. Publication PC80-1-C49. Issued August 1983.

_____. 1973. Bureau of the Census. 1970 Census of the Population. Volume 1, Characteristics of the Population, Part 49, Washington. Issued January 1973.

Washington Agricultural Statistics Service, no date. Washington Fruit Survey, 1986. Issued cooperatively by the State of Washington Department of Agriculture and the U.S. Department of Agriculture.

_____. 1986. Washington Agricultural Statistics, 1985-86. Issued cooperatively by the State of Washington Department of Agriculture and the U.S. Department of Agriculture. September.

Washington Department of Social and Health Services, years indicated. Center for Health Statistics, Division of Health. Report: Vital Statistics. Olympia.

Washington State Employment Security Department, years indicated. Labor Market and Economic Analysis Branch. Annual Averages, Washington State Resident Labor Force and Employment by Labor Area. Olympia.

_____ no date(a). Occupational Projections, 1985-1990, Benton and Franklin Counties.

_____ no date(b). Occupational Projections, 1985-1990, Washington State.

_____ 1986. Labor Area Summaries, Benton-Franklin MSA. Labor Market and Economic Analysis Branch. Kennewick, Washington, October.

5.2 Personal Communications

Foreman, Jane, Office Administrator, Tri-City Industrial Development Council, Kennewick, personal communication, 26 July 1987.

Nygaard, Jim, 1987. Supervisor, Local Area Unemployment Statistics Unit, Labor Market Information and Economic Analysis Branch, Washington State Employment Security Department. Personal communication, 28 July 1987.

Schau, Dean, Economist, Washington State Employment Security Department, personal communication, 10 July 1987.

Starzyk, Pat, 1987. Research Investigator, Washington Department of Social and Health Services, Olympia. Personal communication, 24 July 1987.

Threatt, Jeff, 1987. Research Analyst and Nosologist, Washington Department of Social and Health Services, Olympia. Personal communication, 24 July 1987.

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