UNITED STATES
DEPARTMENT OF THE INTERIOR

U.S. Building Exposure County Data File-User's Manual

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USGS CONTRACT NO. 14-08-0001-18204
Supported by the EARTHQUAKE HAZARDS REDUCTION PROGRAM

OPEN FILE NO. 80-1169

U.S. Geological Survey
OPEN FILE REPORT

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U.S. BUILDING EXPOSURE COUNTY DATA FILE - USER'S MANUAL

by

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Technical Report No. 80-1353-2

Principal Investigator:	John H. Wiggins
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Effective Date of Contract:	23 February 1979
Contract Expiration Date:	22 February 1980
Amount of Contract:	$49,971.00

The research reported here was supported by the U.S. Geological Survey, under Contract Number 14-08-0001-18204

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March 1980

FOREWORD

Natural hazard evaluations require the knowledge of the value and type of items exposed to the hazard. The exposure model described in this report was initially compiled under a National Science Foundation technology assessment grant, and its development is documented by Hirschberg et al., (1978). The exposure model is now available on digital magnetic tape. This manual, prepared under a U.S. Geological Survey Earthquake Hazards Reduction program contract, documents the availability and use of the County Data Base for application to other potential uses. A companion report, prepared under this grant analyzes and compares different risk mapping procedures by computing national annualized losses due to earthquake. The exposure model described herein has also been used in other natural hazard evaluations including tornado, hurricane wind, severe wind, storm surge, tsunami, riverine flooding, landslide and expansive soils.

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COUNTY DATA BASE EXPOSURE MODEL - USER'S MANUAL

1. INTRODUCTION

Natural hazard evaluations have required an estimation of the vulnerability and value of items exposed to the hazard. In this study, Exposure is represented by the total market value of structures which may experience the hazard, at any level of intensity. The building exposure model has been compiled and written onto magnetic tape and is referred to herewith as the "County Data Base." The various categories of exposure listed on this tape are described in Section 2 along with a brief summary of their derivation. The various parameters used to read (and write) the computer tape are outlined in Section 3, and the sources from which the data were obtained are listed and described in Section 4. Finally, the appendices contain listings of the FORTRAN computer programs used to write, and read the magnetic tape, as well as a sample of the data on the tape. The primary documentation for the development of this exposure model can be found in Hirschberg et al., (1978).

2. DESCRIPTION OF THE COUNTY DATA BASE

The County Data Base was originally compiled by Hirschberg et al. (1978) for use in a technology assessment study of nine natural hazards affecting the United States, funded by the National Science Foundation. A detailed description of the derivation of the County Data Base can be found in that study. This report describes the County Data Base as it has been re-written onto magnetic tape for use in this study. The tape contains only exposure data, i.e. data relevant to the computation of the building value and population of each county in the United States. Various hazard parameters present in the earlier study have been left off of this tape, as they are not directly concerned with the exposure. Also, data regarding the contents of structures have not been included. The basic data and their sources are described in Table 2-1.

Each record is written onto magnetic tape in the form of 64 ten character words. Each record on the tape represents one county, and each word represents one component of the exposure data for that county. Not all of the 64 words available are used at this time, leaving space for additional data. The exposure components which are present in the County Data Base at this time can be categorized into seven groups, each of which is discussed below. The first component of each exposure record is the sequential number of the county. This number ranges from 1 to 3132 (3132 is the total number of counties in the United States, and hence, the total number of records on the tape).

The first three data groups comprise miscellaneous identification data. The first of these represents state identification data, including the state abbreviation, state sequential number, and the state 3-character regional code (see Appendix A). Miscellaneous county information comprises the second group. The county name, area, and population (1970) are self explanatory, as are the latitude and longitude of the county seat (although

Table 2-1. County Data Base, Sources and Scale from which Estimated

GENERAL COUNTY DATA	DATA AGGREGATED TO LEVEL OF:	DATE DATA TAKEN	NUMBER OF DATA POINTS	SOURCE
County population	County	1970	3,132	[Newspaper Enterprise Assoc., 1974]
County area	County	1970	3,132	" "
County name	County	1970	3,132	[National Bureau of Standards 1974]
County latitude and longitude	County	1970	3,132	[Dept. of Interior, 1970]
HOUSING CHARACTERISTICS DATA				
Percent of housing units with basements	State NSMSA SMSA	1970	298*	[U.S. Bureau of Census, 1972]
Percent of housing units with cement slab foundation	State NSMSA SMSA	1970	298	" "
Percent of housing units built before 1940	State NSMSA SMSA	1970	298	" "
Percent of housing units that are mobile homes	State NSMSA SMSA	1970	298	" "
Percent of housing units in structures with 4 or more stories	State NSMSA SMSA	1970	298	" "
Percent of housing units in structures with 5 or more stories	State NSMSA SMSA	1970	298	" "
Average number of persons per housing units	State NSMSA SMSA	1970	298	" "
Locally assessed real property values	County	1971	3,132	[U.S. Bureau of Census, 1972]
Assessment-Sales price ratios	State	1971	2,002	" "
Total personnel income percapita	NSMSA - WRCS, and SMSA	(1980)**	452	[U.S. Water Resources Council, 1974]
Total agricultural income percapita	NSMSA - WRCS, and SMSA	(1980)	452	" "
Total mining income percapita	NSMSA - WRCS, and SMSA	(1980)	452	" "
Total construction income percapita	NSMSA - WRCS, and SMSA	(1980)	452	" "
Total manufacturing income percapita	NSMSA - WRCS, and SMSA	(1980)	452	" "
Total wholesale-retail income percapita	NSMSA - WRCS, and SMSA	(1980)	452	" "
Total financial insurance, real estate income percapita	NSMSA - WRCS, and SMSA	(1980)	452	" "
Total service industry income percapita	NSMSA - WRCS, and SMSA	(1980)	452	" "
Total federal government income percapita	NSMSA - WRCS, and SMSA	(1980)	452	" "
Total state and local government income percapita	NSMSA - WRCS, and SMSA	(1980)	452	" "
Percent of national average of total local income percapita	NSMSA - WRCS, and SMSA	(1980)	452	" "
Intercept of population projection***	NSMSA - WRCS, and SMSA	(1970-2000)	452	[U.S.Water Resources Council, 1974]
Slope of population projection***	NSMSA - WRCS, and SMSA	(1970-2000)	452	" "
Intercept of income/ percapita projection***	NSMSA - WRCS, and SMSA	(1970-2000)	452	" "
Slope of income/ percapita projection***	NSMSA - WRCS, and SMSA	(1970-2000)	452	" "

*247 SMSA where used in the 1970 census and 51 states, District of Columbia the 51st.

**Projected data.

***Computed linear least square fit of projected data from 1970-2020.

NOTE: SMSA = STANDARD METROPOLITAN STATISTICAL AREA

WRCS = WATER RESOURCES COUNCIL SUB AREAS

a few counties have two county seats). The Water Resources Council Subarea Codes are shown in Figure 2-1, and can be used in the regionalization of the economic data. The third data group provides identification of Standard Metropolitan Statistical Areas (SMSA), (see Figure 2-2). The SMSA code is a flag which identifies counties which are included in SMSA's. The SMSA number is assigned to each SMSA by the Water Resources Council (1974), and the rank is assigned by population (the largest being marked first).

Data pertaining to real property values, listed in 1971 dollars, comprise the next major data group. The locally assessed real property values are taken from the 1972 Census of Gcvernments. The estimates of the ratios of real property sales values to the assessed values are derived from samples of sales in more than 2000 counties over a six month period [U.S. Bureau of Census, 1972]. Where a county level sales price-to-assessment ratio is unavailable, the state level ratio is used. The state total real property values per capita are listed for both urban (SMSA) and rural (non-SMSA) portions.

Growth parameters form the next data group. Linear growth for both population and income per capita is assumed. The parameters were derived from linear regression analysis of the OBERS* [Water Resources Council, 1974] projected data for years from 1970 to 2020. Slopes and intercepts are listed with the intercepts representing 1950 values. The income values are in 1967 dollars.

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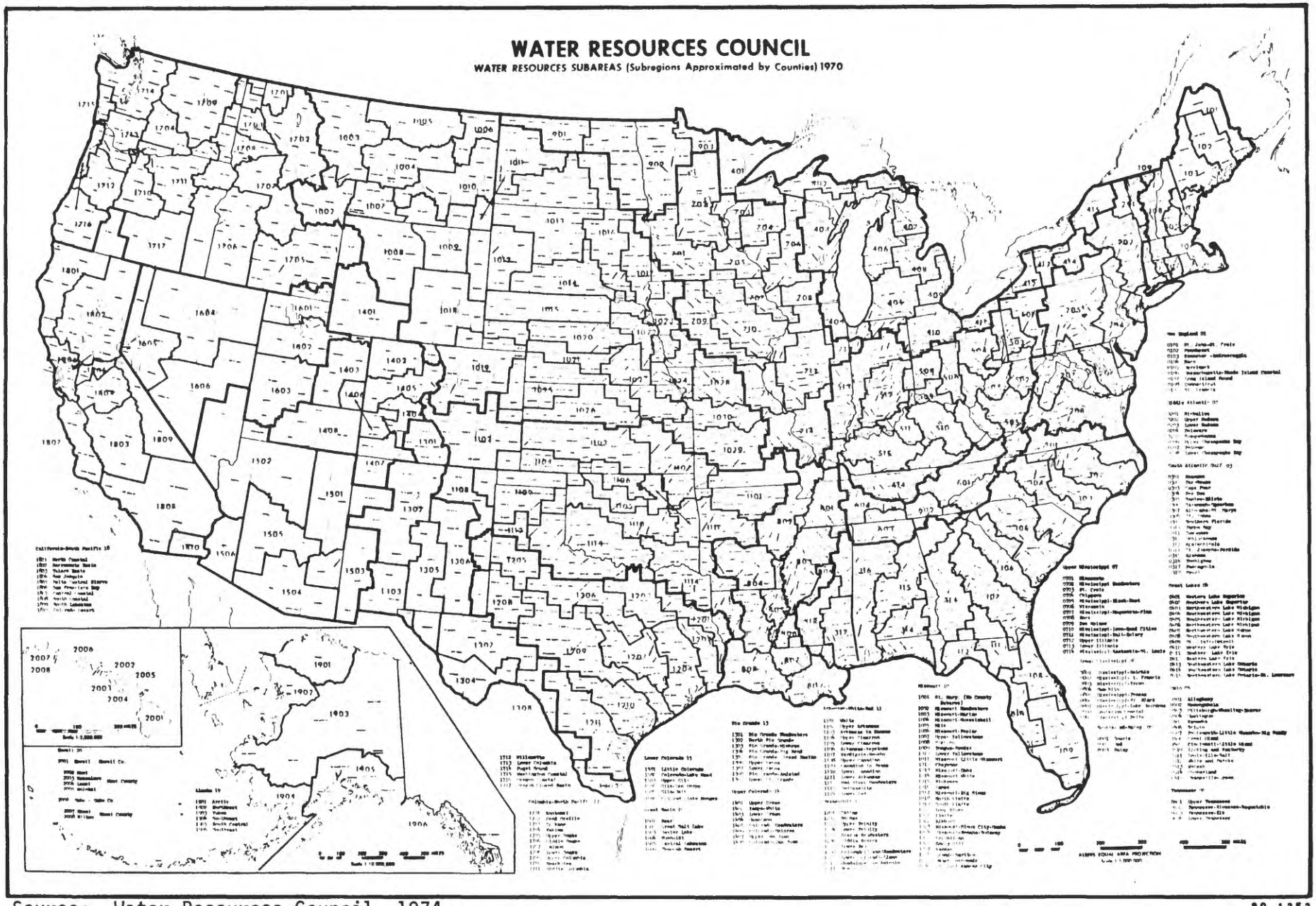
*OBERS is an acronym for the united effort of OBE, the Office of Business Economics, and ERS, the Economic Research Service. Since the time of the original collaboration, however, the OBE has been renamed the Bureau of Economic Analysis, but the widespread use of OBERS has led to the continued use of the acronym.



Source: Water Resources Council, 1974

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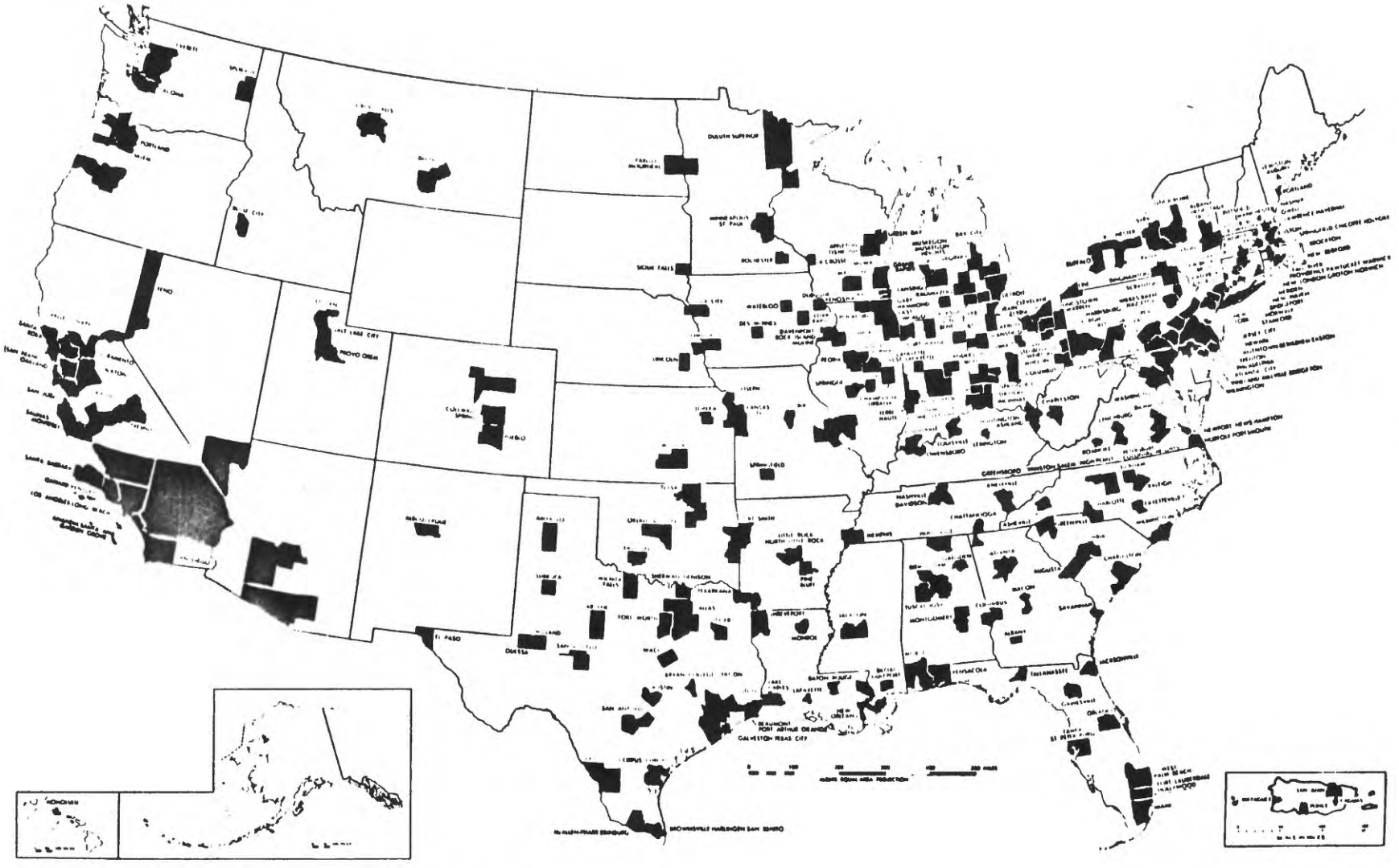
Figure 2-1. Water Resources Council Sub-Areas (W.R.C.S.A.)



Areas defined by Office of Management and Budget, February 1971.

U.S. DEPARTMENT OF COMMERCE Social and Economic Statistics Administration BUREAU OF THE CENSUS

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Figure 2-2. Standard Metropolitan Statistical Areas (SMSA)

The sixth data group consists of income per capita data, which has been segregated by economic sector. The data represent the OBERS projections for 1980 (in 1967 dollars) since restrictions on disclosure of specific information did not allow the 1970 totals to be known [U.S. Water Resources Council, 1974]. Total personal income per capita is listed (in 1967 dollars) followed by the commercial/industrial income per capita (in thousand of 1967 dollars) for the eight private sectors of the economy listed below:

1. Agricultural
2. Mining
3. Construction
4. Manufacturing
5. Transportation
6. Wholesale/Retail Trade
7. Finance, Insurance, Real Estate
8. Service

Income per capita are also listed for federal, state and local governments. The employment per capita and the ratio of the local total personal income per capita relative to the national average are both listed as percentages, and represent 1980 projected values [Water Resources Council, 1974].

The seventh, and final group of exposure model data consists of housing information, i.e., residential exposure data. The residential data are categorized into several structural types: (a) based upon foundation type, such as basement, cement slab or other; (b) based upon age, i.e., those built before 1940 (1934 was used for California since earthquake resistant construction was required after 1933); and (c) based upon structural size including those higher than four floors or those with 5 or more units. A separate classification was used for mobile homes. The data tape lists the proportions of units in each of the above categories relative to the total number of housing units. Also listed is the average population per housing unit for the county. These residential ratios all represent 1970 values, and are derived from the 1970 Census of Housing [U.S. Bureau of Census, 1972]. Table 2-2 describes the record content of the exposure data and provides comments on each component where appropriate.

Table 2-2. Record Content

FIELD POSITION	FORTRAN READ FORMAT	PARAMETER	COMMENTS
1-10	A10	SEQUENCE NUMBER	SEQUENTIAL NUMBER OF COUNTY, ALPHABETICAL ORDER BY STATE, COUNTY, EXCEPT ALASKA AND HAWAII AT THE END.
11-20	F10.0	NO DATA	
21-30	A10	STATE ABBREVIATION	U.S. POSTAL SERVICE ABBREVIATION (2 LETTERS, LEFT JUSTIFIED).
31-40	A10	STATE SEQUENCE NUMBER	STATES ARE ALPHABETICALLY ORDERED AND NUMBERED, WITH THE EXCEPTION OF ALASKA AND HAWAII, WHICH ARE LAST (2 DIGITS, LEFT JUSTIFIED).
41-50	A10	STATE REGIONAL CODE	CODE USED TO CATEGORIZE STATES BY REGION AND DIVISION. THREE CHARACTERS ARE USED, THE FIRST DEFINES THE REGION, THE SECOND DEFINES THE DIVISION WITHIN A REGION, AND THE THIRD DEFINES THE STATE WITHIN THAT DIVISION. APPENDIX A SHOWS THE CODE IDENTIFICATIONS. (3 DIGITS, LEFT JUSTIFIED)
51-60	F10.0	NO DATA	
61-70	A10	COUNTY NAME (PART 1)	NAME OF THE COUNTY, IN TWO PARTS IF MORE THAN 10 LETTERS.
71-80	A10	COUNTY NAME (PART 2)	(10 LETTERS EACH PART, LEFT JUSTIFIED)
81-90	A10	NO DATA	
91-100	F10.0	COUNTY POPULATION	1970 COUNTY POPULATION BASED UPON THE 1970 U.S. CENSUS [THE WORLD ALMANAC AND BOOK OF FACTS, 1974]
101-110	F10.0	COUNTY AREA (SQUARE MILES)	COUNTY AREAS FROM 1970 DATA [THE WORLD ALMANAC AND BOOK OF FACTS, 1974]
111-120	F10.5	GEOGRAPHICAL LATITUDE OF THE COUNTY SEAT (DEGREES NORTH)	LATITUDE DATA FROM NATIONAL ATLAS [U.S. DEPARTMENT OF THE INTERIOR, 1970]
121-130	F10.5	GEOGRAPHICAL LONGITUDE OF THE COUNTY SEAT (DEGREES WEST)	DATA SOURCE SAME AS ABOVE

Table 2-2. Record Content (Continued)

FIELD POSITION	FORTRAN READ FORMAT	PARAMETER	COMMENTS
131-140	A10	WATER RESOURCES COUNCIL SUB-AREA CODE	SEE FIGURE 2-1. FOR AREA CODES (4 DIGITS LEFT JUSTIFIED) [WATER RESOURCES COUNCIL, 1974]
141-150	F10.0	NO DATA	
151-160	A10	STANDARD METROPOLITAN STATISTICAL AREA (SMSA) FLAG	COUNTIES WHICH ARE PART OF AN SMSA WILL HAVE 'SMSA' IN THIS FIELD, OTHERWISE IT IS LEFT BLANK. FIGURE 2 IDENTIFIES THE SMSA REGIONS. (4 LETTERS, LEFT JUSTIFIED).
161-170	A10	STANDARD METROPOLITAN STATISTICAL AREA NAME (PART 1)	NAME AS IN FIGURE 2. UP TO FORTY LETTERS ALLOWED. (10 CHARACTERS, LEFT JUSTIFIED)
171-180	A10	SMSA NAME (PART 2)	(10 CHARACTERS, LEFT JUSTIFIED)
181-190	A10	SMSA NAME (PART 3)	(10 CHARACTERS, LEFT JUSTIFIED)
191-200	A10	SMSA NAME (PART 4)	(10 CHARACTERS, LEFT JUSTIFIED)
201-210	A10	SMSA NUMBER	NUMBER ASSIGNED TO THE SMSA BY THE OFFICE OF BUSINESS ECONOMICS AND THE ECONOMIC RESEARCH SERVICE (OBERS) (4 DIGITS, LEFT JUSTIFIED)
211-220	A10	SMSA RANK	RANK IS BASED ON THE POPULATION (IN 1970) OF THE SMSA WITH THE LARGEST BEING RANKED NUMBER 1. (3 CHARACTERS, LEFT JUSTIFIED)
221-230	F10.0	NO DATA	
231-240	F10.0	LOCALLY ASSESSED REAL PROPERTY VALUE (1971 DOLLARS)	REAL PROPERTY VALUES TAKEN FROM THE 1972 CENSUS OF GOVERNMENTS [U.S. BUREAU OF CENSUS, 1972]
241-250	F10.4	VALUE PER ASSESSMENT-COUNTY (PERCENT)	RATIO OF REAL PROPERTY SALES VALUE TO ASSESSED VALUE, BASED ON SAMPLES OF SALES IN 2002 COUNTIES OVER A SIX MONTH PERIOD IN 1971 [U.S. BUREAU OF CENSUS, 1972]
251-260	F10.4	VALUE PER ASSESSMENT-STATE (PERCENT)	AS ABOVE, EXCEPT THE STATEWIDE AVERAGE; USED FOR COUNTIES WITHOUT A COUNTY LEVEL ESTIMATE.

Table 2-2. Record Content (Continued)

FIELD POSITION	FORTRAN READ FORMAT	PARAMETER	COMMENTS
261-270	F10.2	URBAN REAL MARKET VALUE PER CAPITA (STATE TOTAL, 1970 DOLLARS)	VALUE FROM THE SMSA DATA [U.S. BUREAU OF CENSUS, 1972]
271-280	F10.2	RURAL REAL MARKET VALUE PER CAPITA (STATE TOTAL, L971 DOLLARS)	VALUE FROM THE NON-SMSA DATA [U.S. BUREAU OF CENSUS, 1972]
281-290	F10.0	NO DATA	
291-300	F10.2	SLOPE OF THE POPULATION PROJECTION (PERSONS PER YEAR)	SLOPE DETERMINED FROM A LINEAR REGRESSION FIT TO THE OBERS PROJECTIONS FOR THE YEARS 1970 TO 2020 [WATER RESOURCES COUNCIL, 1974]
301-310	F10.2	INTERCEPT OF THE POPULATION PROJECTION (PERSONS IN 1950)	INTERCEPT DETERMINED FROM LINEAR REGRESSION AS ABOVE, INTERCEPT REPRESENTS POPULATION PROJECTED TO THE YEAR 1950. [WATER RESOURCES COUNCIL, 1974]
311-320	F10.2	SLOPE OF THE INCOME PROJECTION (1967 DOLLARS PER YEAR)	SLOPE DETERMINED FROM A LINEAR REGRESSION FIT TO THE OBERS PROJECTIONS FOR THE YEARS 1970 TO 2020. [WATER RESOURCES COUNCIL, 1974]
321-330	F10.2	INTERCEPT OF THE INCOME PROJECTION (1967 DOLLARS)	INTERCEPT DETERMINED AS ABOVE, INCOME PROJECTED TO THE YEAR 1950. [WATER RESOURCES COUNCIL, 1974]
331-340	F10.0	NO DATA	
341-350	F10.0	TOTAL PERSONAL INCOME PER CAPITA (1967 DOLLARS)	1980 PROJECTED TOTAL PERSONAL INCOME PER CAPITA, TAKEN FROM THE OBERS PROJECTIONS. [WATER RESOURCES COUNCIL, 1974]
351-360	F10.8	AGRICULTURAL INCOME PER CAPITA (THOUSANDS OF 1967 DOLLARS)	1980 PROJECTED INCOME PER CAPITA FOR THE AGRICULTURAL INDUSTRY; DERIVED FROM THE OBERS DATA. [WATER RESOURCES COUNCIL, 1974]
361-370	F10.8	MINING INCOME PER CAPITA (THOUSANDS OF 1967 DOLLARS)	1980 PROJECTED INCOME PER CAPITA FOR THE MINING INDUSTRY; DERIVED FROM THE OBERS DATA. [WATER RESOURCES COUNCIL, 1974]

Table 2-2. Record Content (Continued)

FIELD POSITION	FORTRAN READ FORMAT	PARAMETER	COMMENTS
371-380	F10.8	CONSTRUCTION INCOME PER CAPITA (THOUSANDS OF 1967 DOLLARS)	1980 PROJECTED INCOME PER CAPITA FOR THE CONSTRUCTION INDUSTRY; DERIVED FROM THE OBERS DATA. [WATER RESOURCES COUNCIL, 1974]
381-390	F10.8	MANUFACTURING INCOME PER CAPITA (THOUSANDS OF 1967 DOLLARS)	1980 PROJECTED INCOME PER CAPITA FOR THE MANUFACTURING INDUSTRY; DERIVED FROM THE OBERS DATA [WATER RESOURCES COUNCIL, 1974]
391-400	F10.8	TRANSPORTATION INCOME PER CAPITA (THOUSANDS OF 1967 DOLLARS)	1980 PROJECTED INCOME PER CAPITA FOR THE TRANSPORTATION INDUSTRY; DERIVED FROM THE OBERS DATA. [WATER RESOURCES COUNCIL, 1974]
401-410	F10.8	WHOLESALE-RETAIL TRADE INCOME PER CAPITA (THOUSANDS OF 1967 DOLLARS)	1980 PROJECTED INCOME PER CAPITA FOR THE WHOLESALE AND RETAIL TRADE INDUSTRIES; DERIVED FROM THE OBERS DATA. [WATER RESOURCES COUNCIL, 1974]
411-420	F10.8	FINANCE, INSURANCE AND REAL ESTATE INCOME PER CAPITA (THOUSANDS OF 1967 DOLLARS)	1980 PROJECTED INCOME PER CAPITA FOR THE FINANCE, INSURANCE AND REAL ESTATE INDUSTRIES; DERIVED FROM THE OBERS DATA. [WATER RESOURCES COUNCIL, 1974]
421-430	F10.8	SERVICE INCOME PER CAPITA (THOUSANDS OF 1967 DOLLARS)	1980 PROJECTED INCOME PER CAPITA FOR THE SERVICE INDUSTRIES; DERIVED FROM THE OBERS DATA. [WATER RESOURCES COUNCIL, 1974]
431-440	F10.8	FEDERAL GOVERNMENT INCOME PER CAPITA (THOUSANDS OF 1967 DOLLARS)	1980 PROJECTED INCOME PER CAPITA FOR THE FEDERAL GOVERNMENT; DERIVED FROM THE OBERS DATA. [WATER RESOURCES COUNCIL, 1974]
441-450	F10.8	STATE AND LOCAL GOVERNMENT INCOME PER CAPITA (THOUSANDS OF 1967 DOLLARS)	1980 PROJECTED INCOME PER CAPITA FOR STATE AND LOCAL GOVERNMENTS; DERIVED FROM THE OBERS DATA. [WATER RESOURCES COUNCIL, 1974]
451-460	F10.4	EMPLOYMENT PER CAPITA (PERCENT)	1980 PROJECTED EMPLOYMENT PER CAPITA RATIO FOR THE COUNTY; DERIVED FROM THE OBERS DATA. [WATER RESOURCES COUNCIL, 1974]
461-470	F10.4	RELATIVE VALUE OF TOTAL PERSONAL INCOME PER CAPITA (PERCENT)	1980 PROJECTION OF THE RATIO OF THE LOCAL TOTAL PERSONAL INCOME PER CAPITA TO THE NATIONAL AVERAGE. [WATER RESOURCES COUNCIL, 1974]

Table 2-2. Record Content (Continued)

FIELD POSITION	FORTRAN READ FORMAT	PARAMETER	COMMENTS
471-480	F10.0	NO DATA	
481-490	F10.8	FRACTION OF HOUSING UNITS WITH BASEMENTS	RATIO OF UNITS WITH BASEMENTS TO TOTAL HOUSING UNITS; DERIVED FROM THE 1970 CENSUS. [U.S. BUREAU OF CENSUS, 1972]
491-500	F10.8	FRACTION OF HOUSING UNITS WITH CEMENT SLAB FOUNDATIONS	RATIO OF UNITS WITH CEMENT SLAB FOUNDATIONS TO TOTAL HOUSING UNITS; DERIVED FROM THE 1970 CENSUS. [U.S. BUREAU OF CENSUS, 1972]
501-510	F10.8	FRACTION OF HOUSING UNITS WITH OTHER FOUNDATIONS	RATIO OF UNITS WITH OTHER FOUNDATIONS TO TOTAL HOUSING UNITS; DERIVED FROM 1970 CENSUS. [U.S. BUREAU OF CENSUS, 1972]
511-520	F10.8	FRACTION OF HOUSING UNITS BUILT PRIOR TO 1940 (1934 FOR CALIFORNIA)	RATIO OF UNITS BUILT BEFORE 1940 TO TOTAL HOUSING UNITS; CUT OFF DATE IS SET TO 1934 FOR CALIFORNIA; DERIVED FROM 1970 CENSUS. [U.S. BUREAU OF CENSUS, 1972]
521-530	F10.8	FRACTION OF HOUSING UNITS THAT ARE MOBILE HOMES	RATIO OF MOBILE HOMES TO TOTAL HOUSING UNITS, DERIVED FROM THE 1970 CENSUS. [U.S. BUREAU OF CENSUS, 1972]
531-540	F10.8	FRACTION OF HOUSING UNITS IN STRUCTURES HIGHER THAN 4 FLOORS	RATIO OF UNITS IN STRUCTURES HIGHER THAN 4 FLOORS TO TOTAL HOUSING UNITS; DERIVED FROM THE 1970 CENSUS. [U.S. BUREAU OF CENSUS, 1972]
541-550	F10.8	FRACTION OF HOUSING UNITS IN STRUCTURES WITH 5 OR MORE UNITS	RATIO OF UNITS IN STRUCTURES HAVING 5 OR MORE UNITS, TO TOTAL HOUSING UNITS; DERIVED FROM THE 1970 CENSUS. [U.S. BUREAU OF CENSUS, 1972]
551-560	F10.8	POPULATION PER HOUSING UNIT	AVERAGE NUMBER OF PERSONS PER HOUSING UNIT. (U.S. BUREAU OF CENSUS, 1972]
561-640	8F10.0	NO DATA	THESE FIELDS ARE AVAILABLE FOR ADDITIONAL DATA TO BE ADDED BY THE USER.

3. TAPE FORMAT

The County Data Base exposure model is written on a standard, 2400 ft. length, 1/2 inch, quality magnetic tape certified at 1600 bpi. The data tape is written as nine track, binary coded in S (Stranger tape) format at 800 bpi. Data for each county represents one physical record of fixed length equal to 64 words of 10 characters each, for a field length of 640 characters. The tape is blocked so that each block contains as many whole records as possible within the maximum size declared. The maximum blocking length specified is 5120 characters or 512 words, so that each block contains up to eight complete records (or counties). A total of 393 blocks were written. Figure 3-1 is a copy of the dayfile produced when writing (and reading) the tape, and shows the job control language appropriate for the CDC Cyber 73, NOS/BE operating system on which it was produced.

```
  MFB   PARSONS NOS/BE 1.1 LVL 434 LD R.D 23.38
18.40.15.SWIGGFK  FROM     /BM
18.40.15.IP  00000704 WORDS - FILE INPUT  , DC 00
18.40.15.SWIGG,T600,NT1,CM170000,P3.
18.40.15.COMMENT. CHARGE WIGG1353 01 7954
18.40.16.FTN,R=3,PL=100000,OPT=0.
18.40.19.       .410 CP SECONDS COMPILATION TIME
18.40.19.REQUEST,TAPE2,NT,S,HD,SV,RING,IB,VSN=JHW
18.40.19.170.
18.49.33.( NT 041 ASSIGNED)
18.49.33.FILE,TAPE2,BT=E,FL=640,RT=F,MBL=5120.
18.49.33.REWIND,TAPE2.
18.49.33.LDSET,FILES=TAPE2.
18.49.33.LGO.
18.49.37.NT41 VOLUME SERIAL NUMBER IS  JHW170
18.52.59.NT41  BLOCKS READ 000393
18.52.59.  EXIT
18.52.59.   197.005 CP SECONDS EXECUTION TIME
18.52.59.OP  00327360 WORDS - FILE OUTPUT , DC 40
18.52.59.MS  329728  WORDS  (  336896 MAX USED)
18.52.59.CP      198.626 SEC.       198.626 ADJ.
18.52.59.SS                         212.127
18.52.59.IO       19.720 SEC.        19.720 ADJ.
18.52.59.CM    1974.516 KWS.         24.681 ADJ.
18.52.59.   MAXFL =052000
18.52.59.PP       31.756 SEC.      DATE 01/24/80
18.52.59.EJ  END OF JOB, BM
```

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Figure 3-1. Dayfile Produced When Writing the County Data Base Magnetic Tape

4. DATA SOURCES

The County Data Base was constructed using the following compilations:

- The 1970 Census of Population and Housing [U.S. Bureau of Census, 1972].

- SMSA and non-SMSA portions of Water Resources Council Sub-areas (NSMSA-WRCS data), approximated by county, Figure 2-1.

- SMSA and non-SMSA portions of state census data (state NSMSA), Figure 2-2.

- The 1972 Census of Governments [U.S. Bureau of the Census, 1972].

- OBERS Series E Projections of Regional Economic Activity in the United States [U.S. Water Resources Council, 1974]

Estimates of national building wealth were made for private and public sectors by using the recent series of wealth estimates published by the U.S. Bureau of Economic Analysis (BEA), [BEA, 1974; Loftus, 1972]; Musgrave, 1974; Shavell, 1971; and Young, et al., 1971].

A complete list of references follows. Hirschberg et al (1978) provide a detailed description of the data compilation.

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APPENDIX A

REGIONAL STATE CODE

REGION: Northeast

DIVISION: New England

111 - Maine
112 - New Hampshire
113 - Vermont
114 - Massachusetts
115 - Rhode Island
116 - Connecticut

DIVISION: Mid-Atlantic

121 - New York
122 - New Jersey
123 - Pennsylvania

REGION: South

DIVISION: South Atlantic

311 - Delaware
312 - Maryland
313 - District of Columbia
314 - Virginia
315 - West Virginia
316 - North Carolina
317 - South Carolina
318 - Georgia
319 - Florida

DIVISION: East South Central

321 - Kentucky
322 - Tennessee
323 - Alabama
324 - Mississippi

DIVISION: West South Central

331 - Arkansas
332 - Louisiana
333 - Oklahoma
334 - Texas

REGION: North Central

DIVISION: East North Central

211 - Ohio
212 - Indiana
213 - Illinois
214 - Michigan
215 - Wisconsin

DIVISION: West North Central

221 - Minnesota
222 - Iowa
223 - Missouri
224 - North Dakota
225 - South Dakota
226 - Nebraska
227 - Kansas

REGION: West

DIVISION: Mountain

411 - Montana
412 - Idaho
413 - Wyoming
414 - Colorado
415 - New Mexico
416 - Arizona
417 - Utah
418 - Nevada

DIVISION: Pacific

421 - Washington
422 - Oregon
423 - California
424 - Alaska
425 - Hawaii

APPENDIX B

SAMPLE PROGRAM USED TO READ THE "COUNTY DATA BASE" TAPE

```
      PROGRAM READXP (INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE2)
C  EXPOSURE MODEL DATA
C
C  E(N01) = SEQUENTIAL NUMBER                                          H
C    N03  = STATE ABBREVIATION                                         H
C    N04  = STATE NUMBER  SEQUENTIAL                                   H
C    N05  = STATE NUMBER  3 CHARACTER CODE  REGION/DIVISION/STATE      H
C    N07  = COUNTY NAME  PART 1                                        H
C    N08  = COUNTY NAME  PART 2                                        H
C    N09  = COUNTY NUMBER  5 DIGITS W/ZEROES                           H
C    N10  = COUNTY POPULATION
C    N11  = COUNTY AREA  SQUARE MILES
C    N12  = LATITUDE  COUNTY SEAT  DEGREES NORTH
C    N13  = LONGITUDE  COUNTY SEAT  DEGREES WEST
C    N14  = WATER RESOURCES COUNCIL SUBAREA CODE                       H
C    N16  = SMSA CODE  SMSA OR BLANK                                   H
C    N17  = SMSA NAME  PART 1                                          H
C    N18  = SMSA NAME  PART 2                                          H
C    N19  = SMSA NAME  PART 3                                          H
C    N20  = SMSA NAME  PART 4                                          H
C    N21  = SMSA NUMBER                                                H
C    N22  = SMSA RANK                                                  H
C    N24  = LOCALLY ASSESSED VALUE
C    N25  = VALUE PER ASSESSMENT  PERCENTAGE  COUNTY
C    N26  = VALUE PER ASSESSMENT  PERCENTAGE  STATE
C    N27  = STATE TOTAL 1  VALUE/CAPITA  URBAN
C    N28  = STATE TOTAL 2  VALUE/CAPITA  RURAL
C    N30  = SLOPE  POPULATION PROJECTION
C    N31  = INTERCEPT  POPULATION PROJECTION
C    N32  = SLOPE  INCOME PROJECTION
C    N33  = INTERCEPT  INCOME PROJECTION
C    N35  = TOTAL  PERSONAL INCOME/CAPITA
C    N36  = AGRICULTURAL      INCOME/CAPITA   $1967X1000
C    N37  = MINING            INCOME/CAPITA   $1967X1000
C    N38  = CONSTRUCTION      INCOME/CAPITA   $1967X1000
C    N39  = MANUFACTURING     INCOME/CAPITA   $1967X1000
C    N40  = TRANSPORTATION    INCOME/CAPITA   $1967X1000
C    N41  = WHOLESALE/RETAIL TRADE      INCOME/CAPITA  $1967X1000
C    N42  = FINANCE,INSURANCE,REAL ESTATE   INCOME/CAPITA  $1967X1000
C    N43  = SERVICE           INCOME/CAPITA  $1967X1000
C    N44  = FEDERAL GOVERNMENT          INCOME/CAPITA  $1967X1000
C    N45  = STATE + LOCAL GOVERNMENT    INCOME/CAPITA  $1967X1000
C    N46  = EMPLOYMENT/CAPITA  PERCENTAGE
C    N47  = RELATIVE VALUE  INCOME/CAPITA  PERCENT OF NATIONAL AVERAGE 1980
C    N49  = FRACTION HOUSING UNITS W/BASEMENTS
C    N50  = FRACTION HOUSING UNITS W/CEMENT SLAB FOUNDATIONS
C    N51  = FRACTION HOUSING UNITS W/OTHER FOUNDATIONS
C    N52  = FRACTION HOUSING UNITS BUILT BEFORE 1940  (1933 CA)
C    N53  = FRACTION HOUSING UNITS MOBILE HOMES
C    N54  = FRACTION HOUSING UNITS IN STRUCTURES HIGHER THAN 4 FLOORS
C    N55  = FRACTION HOUSING UNITS IN STRUCTURES W/5 OR MORE UNITS
C    N56  = POPULATION PER HOUSING UNIT
C
      DIMENSION  E(64)
      ICOUNT = 1
      DO 20 K=1,64
   20 E(K) = 0.0
```

```
      DO 100 I=1,3132
      READ (2) E
      IF (ICOUNT .EQ. 1) WRITE (6,101)
  101 FORMAT (1H1//58X,"EXPOSURE MODEL"/)
      WRITE (6,102) (K,E(K),K=1,64)
  102 FORMAT (1H0,1X,"N",I2,"=",A10,1X,"N",I2,"=",F10.8,3(1X,"N",I2,"="
     1,A10),1X,"N",I2,"=",F10.8,2(1X,"N",I2,"=",A10)/2X,"N",I2,"=",A10,2
     2(1X,"N",I2,"=",F10.0),2(1X,"N",I2,"=",F10.5),1X,"N",I2,"=",A10,1X
     3,"N",I2,"=",F10.8,1X,"N",I2,"=",A10/1X,6(1X,"N",I2,"=",A10),1X,"N"
     4,I2,"=",F10.8,1X,"N",I2,"=",F10.0/1X,2(1X,"N",I2,"=",F10.4),2(1X,
     5"N",I2,"=",F10.2),1X,"N",I2,"=",F10.8,3(1X,"N",I2,"=",F10.2)/1X,2(
     61X,"N",I2,"=",F10.2,1X,"N",I2,"=",F10.8),4(1X,"N",I2,"=",F10.8)/1X
     7,5(1X,"N",I2,"=",F10.8),2(1X,"N",I2,"=",F10.4,)1X,"N",I2,"=",F10.8
     8/1X,8(1X,"N",I2,"=",F10.8)/1X,8(1X,"N",I2,"=",F10.8))
      IF (ICOUNT .EQ. 7)  ICOUNT = 1
      ICOUNT = ICOUNT + 1  $  NL = I
  100 CONTINUE
      WRITE (6,200)  NL
  200 FORMAT (1H1,"READ COMPLETE,",I5," RECORDS READ")
      CALL EXIT
      END
```

APPENDIX C

SAMPLE OUTPUT FROM THE PROGRAM IN APPENDIX B

```
N 1= 191        N 2=0.00000000 N 3=CA         N 4= 4          N 5=423         N 6=0.00000000 N 7=SAN BENITU N 8=
N 9=            N10=    16226. N11=     1396. N12=  36.83000 N13= 121.42000 N14=1807        N15=0.00000000 N16=
N17=            N18=           N19=           N20=            N21=            N22=           N23=0.00000000 N24=     60672.
N25=     0.0000 N26=   19.7000 N27=      0.00 N28=       0.00 N29=0.00000000 N30=     890.00 N31= 110750.00 N32=     198.00
N33=  -2450.00 N34=0.00000000 N35=   3900.00 N36= .11331862 N37= .01103753 N38= .22663723 N39= .21854305 N40= .23693893
N41= .41059603 N42= .10301692 N43= .42531273 N44= .04047093 N45= .89477557 N46=   38.0000 N47=   84.0000 N48=0.00000000
N49= .00479241 N50= .30012843 N51=0.00000000 N52= .26785382 N53= .05744891 N54= .00156904 N55= .06963118 N56=2.82531534
N57=0.00000000 N58=0.00000000 N59=0.00000000 N60=0.00000000 N61=0.00000000 N62=0.00000000 N63=0.00000000 N64=0.00000000

N 1= 192        N 2=0.00000000 N 3=CA         N 4= 4          N 5=423         N 6=0.00000000 N 7=SAN BERNAR N 8=DINO
N 9=SIDE-ONTAR  N10=   681535. N11=    20117. N12=  34.12000 N13= 117.32000 N14=1808        N15=0.00000000 N16=SMSA
N17=SAN BERNAR  N18=DINO-RIVER N19=SIDE-ONTAR N20=IO, CALIF. N21=6780        N22= 28        N23=0.00000000 N24=   1383142.
N25=   18.8000 N26=   19.7000 N27=      0.00 N28=       0.00 N29=0.00000000 N30=   12085.00 N31= 982035.00 N32=     203.50
N33=  -2337.50 N34=0.00000000 N35=   4200.00 N36= .11679602 N37= .02253033 N38= .20503353 N39= .48315877 N40= .19169618
N41= .50335316 N42= .12936450 N43= .61261115 N44= .13601085 N45= .50617572 N46=   39.0000 N47=   69.0000 N48=0.00000000
N49= .06907878 N50= .61860392 N51=0.00000000 N52= .14256746 N53= .06271292 N54= .00026335 N55= .07662013 N56=2.73678288
N57=0.00000000 N58=0.00000000 N59=0.00000000 N60=0.00000000 N61=0.00000000 N62=0.00000000 N63=0.00000000 N64=0.00000000

N 1= 193        N 2=0.00000000 N 3=CA         N 4= 4          N 5=423         N 6=0.00000000 N 7=SAN DIEGO  N 8=
N 9=A           N10=  1357854. N11=     4261. N12=  32.58000 N13= 117.17000 N14=1808        N15=0.00000000 N16=SMSA
N17=SAN DIEGO,  N18= CALIFORNI N19=A          N20=            N21=7320        N22= 23        N23=0.00000000 N24=   2964434.
N25=   21.6000 N26=   19.7000 N27=      0.00 N28=       0.00 N29=0.00000000 N30=   21276.50 N31= 900177.50 N32=     195.50
N33=  -1557.50 N34=0.00000000 N35=   4700.00 N36= .03864416 N37= .00534160 N38= .24426273 N39= .58718016 N40= .20911369
N41= .48562385 N42= .18497758 N43= .66069111 N44= .27591664 N45= .43926405 N46=   44.0000 N47=   99.0000 N48=0.00000000
N49= .08724858 N50= .55791372 N51=0.00000000 N52= .16742414 N53= .04934428 N54= .01052835 N55= .17951563 N56=3.01921119
N57=0.00000000 N58=0.00000000 N59=0.00000000 N60=0.00000000 N61=0.00000000 N62=0.00000000 N63=0.00000000 N64=0.00000000

N 1= 194        N 2=0.00000000 N 3=CA         N 4= 4          N 5=423         N 6=0.00000000 N 7=SAN FRANCI N 8=SCO
N 9=D, CALIF.   N10=   715674. N11=       45. N12=  37.67000 N13= 122.42000 N14=1806        N15=0.00000000 N16=SMSA
N17=SAN FRANCI  N18=SCO-OAKLAN N19=D, CALIF.  N20=            N21=7360        N22=  6        N23=0.00000000 N24=   1924442.
N25=    0.0000 N26=   19.7000 N27=      0.00 N28=       0.00 N29=0.00000000 N30=   31940.50 N31=2525437.50 N32=     246.50
N33=  -1672.50 N34=0.00000000 N35=   6200.00 N36= .02281170 N37= .00760390 N38= .29652310 N39= .76369863 N40= .56312398
N41= .80212445 N42= .39293592 N43=1.00644300 N44= .29269213 N45= .63405503 N46=   46.0000 N47=  131.0000 N48=0.00000000
N49= .42335310 N50= .32284050 N51=0.00000000 N52= .36794249 N53= .00810520 N54= .07440008 N55= .26362704 N56=2.75385333
N57=0.00000000 N58=0.00000000 N59=0.00000000 N60=0.00000000 N61=0.00000000 N62=0.00000000 N63=0.00000000 N64=0.00000000

N 1= 195        N 2=0.00000000 N 3=CA         N 4= 4          N 5=423         N 6=0.00000000 N 7=SAN JOAQUI N 8=N
N 9=            N10=   289564. N11=     1612. N12=  37.92000 N13= 121.33000 N14=1805        N15=0.00000000 N16=SMSA
N17=STOCKTON,   N18=CALIFORNIA N19=           N20=            N21=8120        N22=107        N23=0.00000000 N24=    588345.
N25=   21.3000 N26=   19.7000 N27=      0.00 N28=       0.00 N29=0.00000000 N30=     873.00 N31= 287215.00 N32=     228.50
N33=  -2262.50 N34=0.00000000 N35=   5100.00 N36= .39696382 N37=0.00000000 N38= .19832041 N39= .69250646 N40= .25549096
N41= .53714470 N42= .12758398 N43= .47189922 N44= .24224806 N45= .58301034 N46=   39.0000 N47=  108.0000 N48=0.00000000
N49= .21343931 N50= .35523197 N51=0.00000000 N52= .29929523 N53= .03427613 N54= .00900369 N55= .10997961 N56=3.00338415
N57=0.00000000 N58=0.00000000 N59=0.00000000 N60=0.00000000 N61=0.00000000 N62=0.00000000 N63=0.00000000 N64=0.00000000

N 1= 196        N 2=0.00000000 N 3=CA         N 4= 4          N 5=423         N 6=0.00000000 N 7=SAN LUIS O N 8=BISPO
N 9=            N10=   105690. N11=     3163. N12=  35.33000 N13= 120.67000 N14=1807        N15=0.00000000 N16=
N17=            N18=           N19=           N20=            N21=            N22=           N23=0.00000000 N24=    234586.
N25=   20.2000 N26=   19.7000 N27=      0.00 N28=       0.00 N29=0.00000000 N30=     890.00 N31= 110750.00 N32=     198.00
N33=  -2450.00 N34=0.00000000 N35=   3900.00 N36= .11331862 N37= .01103753 N38= .22663723 N39= .21854305 N40= .23693893
N41= .41059603 N42= .10301692 N43= .42531273 N44= .04047093 N45= .89477557 N46=   38.0000 N47=   84.0000 N48=0.00000000
N49= .00479241 N50= .30012843 N51=0.00000000 N52= .26785382 N53= .05744891 N54= .00156904 N55= .06963118 N56=2.82531534
N57=0.00000000 N58=0.00000000 N59=0.00000000 N60=0.00000000 N61=0.00000000 N62=0.00000000 N63=0.00000000 N64=0.00000000

N 1= 197        N 2=0.00000000 N 3=CA         N 4= 4          N 5=423         N 6=0.00000000 N 7=SAN MATEO  N 8=
N 9=D, CALIF.   N10=   556601. N11=      447. N12=  37.52000 N13= 122.25000 N14=1806        N15=0.00000000 N16=SMSA
N17=SAN FRANCI  N18=SCO-OAKLAN N19=D, CALIF.  N20=            N21=7360        N22=  6        N23=0.00000000 N24=   1649124.
N25=   20.2000 N26=   19.7000 N27=      0.00 N28=       0.00 N29=0.00000000 N30=   31940.50 N31=2525437.50 N32=     246.50
N33=  -1672.50 N34=0.00000000 N35=   6200.00 N36= .02281170 N37= .00760390 N38= .29652310 N39= .76369863 N40= .56312398
N41= .80212445 N42= .39293592 N43=1.00644300 N44= .29269213 N45= .63405503 N46=   46.0000 N47=  131.0000 N48=0.00000000
N49= .42335310 N50= .32284050 N51=0.00000000 N52= .36794249 N53= .00810520 N54= .07440008 N55= .26362704 N56=2.75385333
N57=0.00000000 N58=0.00000000 N59=0.00000000 N60=0.00000000 N61=0.00000000 N62=0.00000000 N63=0.00000000 N64=0.00000000
```