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Yucca Mountain Site Characterization Project
Summary of Socioeconomic Data Analyses
Conducted in Support of the Radiological Monitoring Program
During Calendar Year 1994

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1.0 INTRODUCTION

The Radiological Monitoring Plan (DOE, 1990) for the Yucca Mountain Site Characterization Project (YMP) is the controlling document for the radiological monitoring activities associated with the YMP. That plan outlines the Radiological Monitoring Program (RadMP) and the data necessary to support radiological impact analysis.

The objective of this annual report is to provide detailed demographic and economic information, as defined in the YMP Socioeconomic Plan, on the area surrounding Yucca Mountain in support of the Radiological Monitoring Plan. These data can then be uploaded into a computer model to perform radiation dose and risk assessments. As these assessments are made using a circular grid incorporating both distance and direction, defining an appropriate study area requires knowledge of the spatial distribution of these population, economic, and agricultural characteristics.

Since March 1989, efforts have been ongoing to collect data for input into the socioeconomic database established in support of the RadMP. For calendar years 1990 through 1993, the annual reports documented quarterly estimates of community characteristics including housing units by type, population, and employment, as well as the economic characteristics of the grid area as defined by agricultural activities. This report of calendar year 1994 is the fifth in the series of reports discussing the data collection efforts used in the development and refinement of the RadMP database.

For calendar year 1994, the methods used to develop and update the housing and population databases are distinctly different from those documented in the previous reports. Chapter 2.0 describes in detail the revised data collection process. Also within this current document, various socioeconomic characteristics of the study area, such as estimates of housing units, population, and economic activities are presented. Appendix A presents summaries of the information collected for the database during the 1994 calendar year.

1.1 Background

The Radiological Monitoring Plan is written in compliance with the Nuclear Waste Policy Amendments Act (NWPAA). Within 10 Code of Federal Regulations (CFR) 960, there are several parts that make specific reference to population distributions and densities, to the socioeconomic conditions in the study area, and to the relative importance of these data. Based on the regulatory requirements and guidelines, knowledge of the radiological pathways to man within the study area is essential to ensure adherence to the Federal standards. The objective of this guidance is to "minimize risk to the public and permit compliance with the EPA and NRC regulations" (10 CFR 960, p. 47741). These regulations require that protective measures be assessed and that exposure to members of the public in unrestricted areas not only be limited, but be "further reduced below the limits to the extent reasonably achievable" (10 CFR 960, p. 47741).

The purpose for which the socioeconomic data are being collected is to be used in the calculation of potential "long-term" radiation doses to the populations within a 50-mile radius of Yucca Mountain. The primary data required for the socioeconomic support of radiological impact analyses are those used in computer models that assess radiation dose estimates for an individual or a population (DOE, 1990). These computer programs, along with the associated databases provide techniques used in the estimation of dose and risk from radionuclide emissions to air (EPA, 1992b, p.1-1). A computer model that incorporates distance and direction, with meteorological data, allows analysis of potential exposure doses to members of the public through atmospheric dispersion of radionuclide releases.

One such program, the CAP88-PC (Clean Air Act Assessment Package-1988 for a personal computer), allows users to perform dose and risk assessments for the purpose of demonstrating compliance with 40 CFR 61.93(a). CAP88-PC provides the methodology for "assessments of both collective populations and maximally-exposed individuals" (EPA, 1992b, p 1-1). It should be noted however, that the "dose and risk estimates from CAP88-PC are applicable only to low-level chronic exposures, since the health effects and dosimetric data are based on low-level chronic intakes. CAP88-PC cannot be used for either short-term or high-level radionuclide intakes" (EPA, 1992b, p. 1-3).

1.2 The RadMP Grid and Study Area

The grid, or the RadMP grid circle, is defined in the YMP Radiological Monitoring Plan (DOE, 1990) as an area with a radius of 84 kilometers (km) (approximately 50 miles). The grid is centered on a point on the western side of Exile Hill at Yucca Mountain site with the coordinates of Easting 551135.7, Northing 4078351.6 on the Universal Transverse Mercator (UTM) Projection Grid Zone 11 of the North American continent (see Figure 1).

The study area includes the communities of Pahrump, Beatty, and Amargosa Valley in southern Nye County, Nevada and Indian Springs in Clark County, Nevada, as well as Death Valley Junction in Inyo County, California. Also contained within the study area are portions of Death Valley National Park (DVNP), the Nevada Test Site (NTS), and the Nellis Air Force Range (NAFR). Although the southern portion of Pahrump falls outside the 84-km RadMP grid circle, the entire community of Pahrump is included in the analysis as population and economic characteristics refer to the entire community.

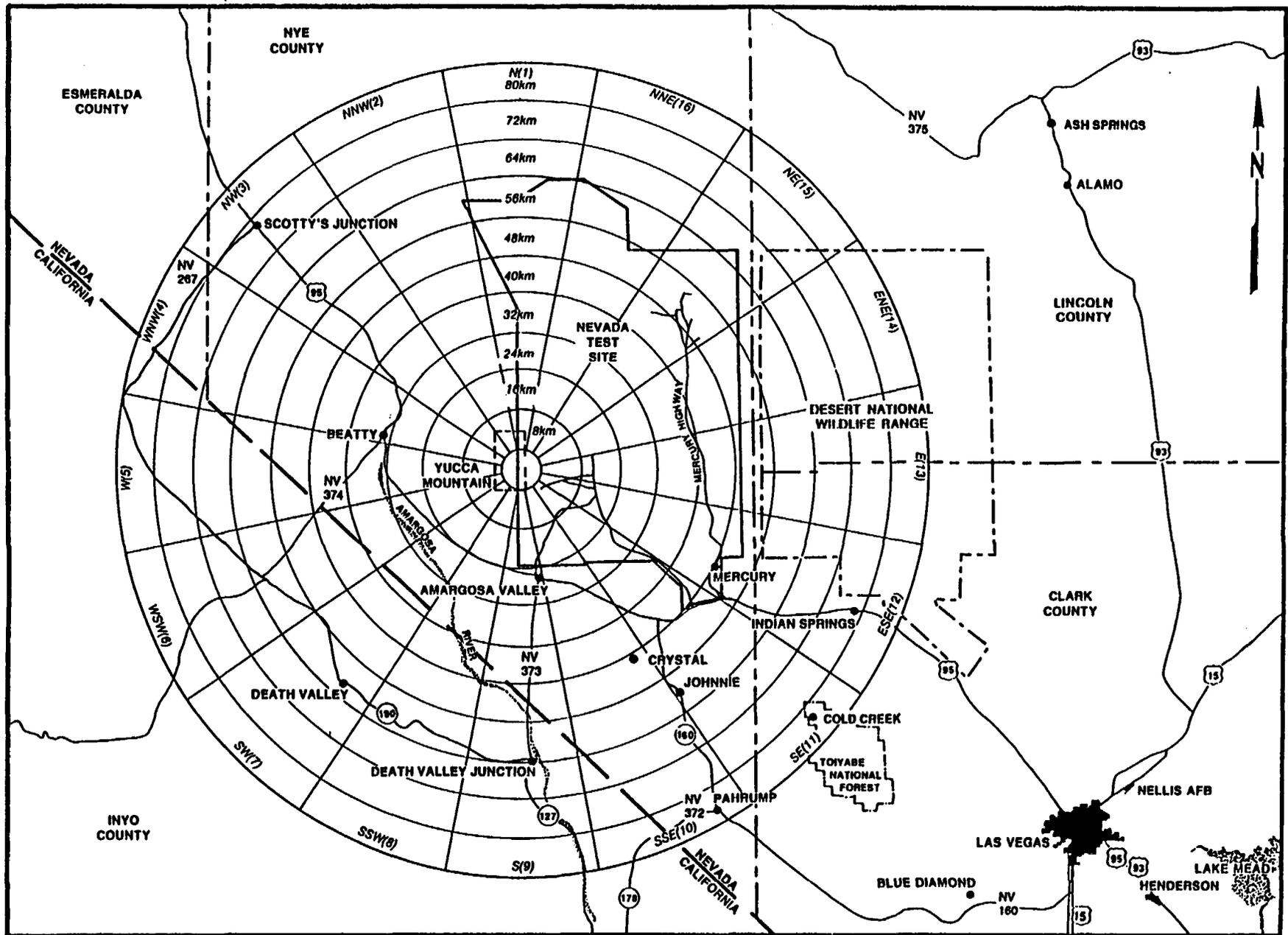


Figure 1. Radiological Monitoring Program Grid (RadMP Grid)

2.0 DATA REQUIREMENTS

Radiation is a part of our natural environment. Each year, the average "dose" to a person from natural or background radiation sources is approximately 360 millirem. Natural radiation exposure occurs through a variety of pathways, including absorption through external radiation exposure, as well as inhalation and/or ingestion of radioactive materials. Possible sources of this exposure consist of cosmic radiation from space, terrestrial radiation, including radon gas, foods, and man-made sources such as medical and dental X-ray treatments and smoke detectors.

The primary data required for the socioeconomic support of radiological impact analyses are those that allow assessment of radiation dose and exposure estimates for an individual or a population. The exposure and risk associated with the radiation absorbed can vary due to many factors -- the location and elevation of the place of residence, the type of house, and the types of foods consumed. Fruits and vegetables grown locally and meats from locally raised grazing animals represent potential "concentration mechanisms" or sources of possible concentrations of radionuclides from local origins. "Grazing animals ingest forage from large areas of ground surface and so represent a concentration mechanism. Home garden vegetables may be a direct route of exposure for humans" (EPA, 1990, p. 38). Milk, one of the most universally consumed food products, represents a particularly important source for assessing ingestion of radioactive material; this is due to the relatively rapid turnaround, and thus the

shortened decay period of radioactivity, from time of feed ingestion by the milk cows to the time the milk appears on grocery shelves for human consumption.

Information regarding the distribution of both the population and the possible sources of food supplies within the study area allows use of an appropriate model to calculate effective dose equivalents for an individual or an entire population (EPA, 1990). "Knowledge of population densities and spatial distribution of farm animals is necessary to assess protective measures required in the event of an accidental release of radioactivity...." (EPA, 1990, p. 11).

2.1 Site-Specific Data

Technical guidance recommends the use of site-specific data rather than generic data.

"Because of the arid characteristics of the Yucca Mountain area, site-specific data are very important because most generic data (e.g., Regulatory Guide 1.109 (NRC, 1977)) were developed for non-arid environments" (DOE, 1990, p. 5-2). Site-specific data for the Yucca Mountain area, include the characteristics of radioactive aerosols, the meteorology, agricultural and cultural characteristics, population demographics, and general biota data (DOE, 1990, p. 5-3).

2.2 Data Compilation Methodology

It was discovered from previous efforts that detailed information on the existing communities within the defined grid area was difficult to acquire, at best. This was particularly true of "socioeconomic" information (i.e., data on housing, population, and employment), due to the absence of regulatory mandates, such as building permits, and detailed records of the population composition.

During the initial data collection effort, the total number of housing units in southern Nye County was estimated using information from Valley Electric Association (VEA), a rural co-operative that provides electrical service to residents in the area. It was assumed that nearly all occupied housing units in the VEA service area would be connected to the electric service. Windshield surveys were conducted in early 1989 and the residential data collected were mapped by quarter Section (of the Township-Range-Section classification) for the various communities.

In 1990, local experts were employed to assist in the identification of community characteristics and in determining the precise location of residential and commercial activities. In doing so, the accuracy of the data concerning exact locations of residences and businesses was greatly improved.

For 1994, the method of collecting data on housing has changed again. The use of local experts over extended periods of time presumed the continued availability of those or other knowledgeable individuals. In both Pahrump and Indian Springs, however, local expert participation in the collection of housing data has become increasingly difficult to maintain. In Pahrump, both the size of the community and the rapid rate of growth have complicated this data collection process and it has become somewhat unmanageable for any single individual.

The amended method for collecting information on housing units for the 1994 calendar year pertained to the three communities in southern Nye County and required modification of the reporting of housing units within the entire study area. For the communities of Amargosa Valley, Beatty, and Pahrump, VEA records were used to identify new electrical meter installations. However, in the absence of specific assistance from meter readers in Pahrump, innovative methods were sought to identify and locate new housing starts in that community, and for consistency, were also employed for the other two communities in Nye County.

In order to maintain consistency and continuity within the database over time, methods were chosen that would be capable of being replicated. Therefore, VEA administrative records, Monthly Growth Reports (VEA, 1994-1995) and VEA Staking Sheets (VEA, 1993-1995), were employed to identify newly established accounts. The Monthly Growth Reports list all of those accounts that began service during each month, with the newly installed accounts having a unique identifying number. These accounts were then associated with a VEA

Staking Sheet. Aerial photography interpretation was used in conjunction with street maps to help locate new housing units within the general area illustrated on the Staking Sheets (bounded by existing streets). In addition, the Staking Sheets were examined for information that indicated if a meter installation was for a house, building, or for some other use i.e., security lights, well pumps, garage, etc. However, information on the type of housing unit located on the property, i.e., mobile home or stick built, was not specified. Because the exact location of each new meter was not always described, windshield surveying to identify housing type was not considered at this time. Therefore, the housing information in this document has been reported only as single family, multi-family, or group quarters.

2.3 Population Estimates

If a census were taken every year and this information were made public, it could be used to build a consistent database. However, as the U.S. census is taken only once a decade, updated estimates are essential when current demographic and socioeconomic data are required.

In the absence of detailed census data for small rural areas, the development of population estimates can be accomplished using a variation of the Housing Unit Method (HUM) of estimation. The formula employed by this method states that the population of the study area will be equal to the total number of occupied housing units multiplied by the average number of persons per occupied housing unit plus the total number of persons in group quarters. The

methodology used to estimate populations within the RadMP grid area has been detailed in the report entitled "Summary of Socioeconomic Data Analyses Conducted in Support of the Radiological Monitoring Program During Calendar Year 1990" (DOE, 1991b). Within that report, comparisons have been made with the U.S. Bureau of the Census 1990 population figures and community population estimates generated using a variation of the Housing Unit Method of identifying households in conjunction with the Local Expert Method. The analysis documented in that report has indicated that the combination of these methodologies produces highly accurate population estimates. Therefore, the use of the "persons per household" figures generated from the Local Expert Method to estimate population figures within the grid area has been continued.

As specific information on the residents within the study area is limited, assumptions are made concerning the composition of the population. The age distributions and proportions reported in the 1990 Census of Population are held constant for the calculation of age distributions in Tables A-9 through A-12 of Appendix A. The method used to determine these distributions is documented in the report entitled "Summary of Socioeconomic Data Analyses Conducted in Support of the Radiological Monitoring Program During Calendar Year 1991" (DOE, 1992).

2.4 Identification of Establishments versus Employment

Within this report, there has been a notable change in the technique of reporting economic characteristics. In past reports, employment information has been reported by RadMP grid cell and Standard Industrial Classification (SIC) using a survey conducted by the Center for Business and Economic Research (CBER) at the University of Nevada, Las Vegas (UNLV, 1991) as the base data. Each year, the list of business establishments and the corresponding employment estimation have been revised to reflect existing conditions. As time has passed further and further from this survey date and the mix of the local economy potentially has changed, the reliability of the employment estimates have been questioned. Therefore, the number and location of business establishments within the RadMP grid area have been reported instead of the estimated employment levels of these establishments.

2.5 Identification of Potential Dust Generators

Efforts were begun late in the data collection process to address potential Preclosure Radiological Safety issues concerning public health and safety. These concerns require knowledge of the spatial distribution of dust generating activities as possible sources of emissions of naturally occurring radionuclides. The potential for radionuclide releases into the atmosphere is increased in the vicinity of various activities. These activities include, but are not limited to, ones which disrupt the ground surface, i.e., grading, dredging, mining, clearing, trenching, and landfills, as well as those which increase the potential for dust (particulate

matter) to be in an airborne state, i.e., aircraft operations, cropdusting, general construction, and agricultural activities.

3.0 COMMUNITY CHARACTERISTICS

Community characteristic data are collected for use as input to the calculation of "long-term" radiation doses to the affected populations within an 84-km radius of Yucca Mountain. The calculations are part of a computer model that estimates radiation dose and risk assessment for an individual or a population. Estimates of radiation dose and risk exposure developed using these models "are applicable only to low-level chronic [long-term] exposures, since the health effects and dosimetric data are based on low-level chronic [long-term] intakes" (EPA, 1992b, p. 1-3).

"Long-term" populations can be expressed in terms of day-time populations and permanent night-time populations. Day-time populations are comprised of concentrations of employees and school age children located within the grid area; while night-time populations are a function of the number of occupied housing units multiplied by an appropriate persons per household factor. "Short-term" populations, or persons visiting or residing in the area on a temporary basis, such as those staying in recreational vehicle (RV) parks or jail facilities, are not included in the population estimates reported in the tables. Knowledge of these populations is necessary to assess protective and emergency response measures; however, their inclusion in the population estimates for radiological impact analyses would be misleading as the computer models "cannot be used for either short-term or high-level radionuclide intakes" (EPA, 1992b, p. 1-3).

3.1 The Four Communities Within the Study Area

Table 1 provides a summary of the housing, population, and business establishment characteristics for each community for the end of the first quarter of 1994. This date, March 31, best approximates the April 1 date used in the 1990 Census of Population so that estimates of each community's annual growth can be derived for purposes of comparison. The boundaries used to delineate Amargosa Valley, Beatty, and Pahrump are the tax boundaries specified by the Nye County Board of Commissioners. The boundary for Indian Springs is the legal description specified for the unincorporated town by the Clark County Commissioners. Taxation boundaries and town boundaries do not correspond directly to the RadMP grid cell boundaries used to compile data for RadMP analyses. Therefore, information within Table 1 is not directly comparable to the information presented in the Appendix. Due to the changes in data collection methodology, the information presented in this table is not directly comparable to previous reports.

Figure 2 exhibits the community boundaries within the RadMP grid area. Community boundaries encompass many partial grid cells, whole grid cells and, in some cases, extend beyond the 84-km grid delineation; therefore, community information is not directly comparable to grid-specific information, i.e., the information presented for the grids cannot be summed to community totals. This is most clearly demonstrated in the data for the community of Pahrump. In Table 1, the information for the housing units of the community

Table 1. Summary of Socioeconomic Characteristics Compiled by Community for the First Quarter of 1994 (January 1 to March 31)*

Socioeconomic Characteristics	Pahrump	Beatty	Amargosa Valley	Indian Springs
Square Miles	298	692.5	499	18
Acreage (1)	190,720	443,200	319,360	11,520
Total Occupied Housing Units:				
Single Family(2)	4,879	788	352	492
Multi Family	4,692	719	344	492
Group Quarters (3)	187	69	8	
	2	4		
Total Estimated Population:				
Single Family(2)	10,892	1,947	909	1,200
Multi Family	10,463	1,747	888	1,200
Group Quarters (3)	417	168	21	
	12	32		
Establishments by Standard Industrial Classification Group:				
Ag/For/Fishing (4)	660	134	60	37
Mining/Construction	20	6	7	
Manufacturing	98	15	6	
TCEGSS (5)	21	2	1	
Wholesale & Retail Trade	42	8	7	2
FIRE (6)	178	29	15	5
Services	67	17		7
Government	209	47	20	13
	25	10	4	10

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995; State of Nevada, 1995; Pahrump Town Office, 1994; PhoneDisc USA, 1994.

* Tax boundaries specified by the Nye County Board of Commissioners are used to delineate the boundaries for Pahrump, Beatty, and Amargosa Valley. For Indian Springs, the legal description specified by the Clark County Commissioners for the unincorporated town is used.

Please note: Community boundaries encompass many whole, as well as some partial, cells. Therefore, information within this table is not directly comparable to the information presented in the Appendix. For Pahrump, the information included in this table is for the entire community both inside and outside of the RadMP grid.

- (1) Acreages for the communities in Nye County were supplied by the Nye County Assessor's Office, and are the best estimate of the actual acreages encompassed within the taxation boundaries (Nye County Assessor's Office, 1988).
- (2) This category was redefined to include all single-family dwellings and mobile homes, due to the new method of data collection. Units housing persons visiting or residing in the area on a "short-term" temporary basis, such as in RV parks, are not included.
- (3) This category includes the group quarters in Pahrump and the employee housing in Beatty, reported as the number of facilities in the housing section (not included in total) and number of residents in the population section (included in total and not used to calculate the PPH).
- (4) Agriculture/Forestry/Fishing
- (5) TCEGSS refers to Transportation, Communications, Electric, Gas, and Sanitary Services.
- (6) FIRE refers to Finance, Insurance, Real Estate

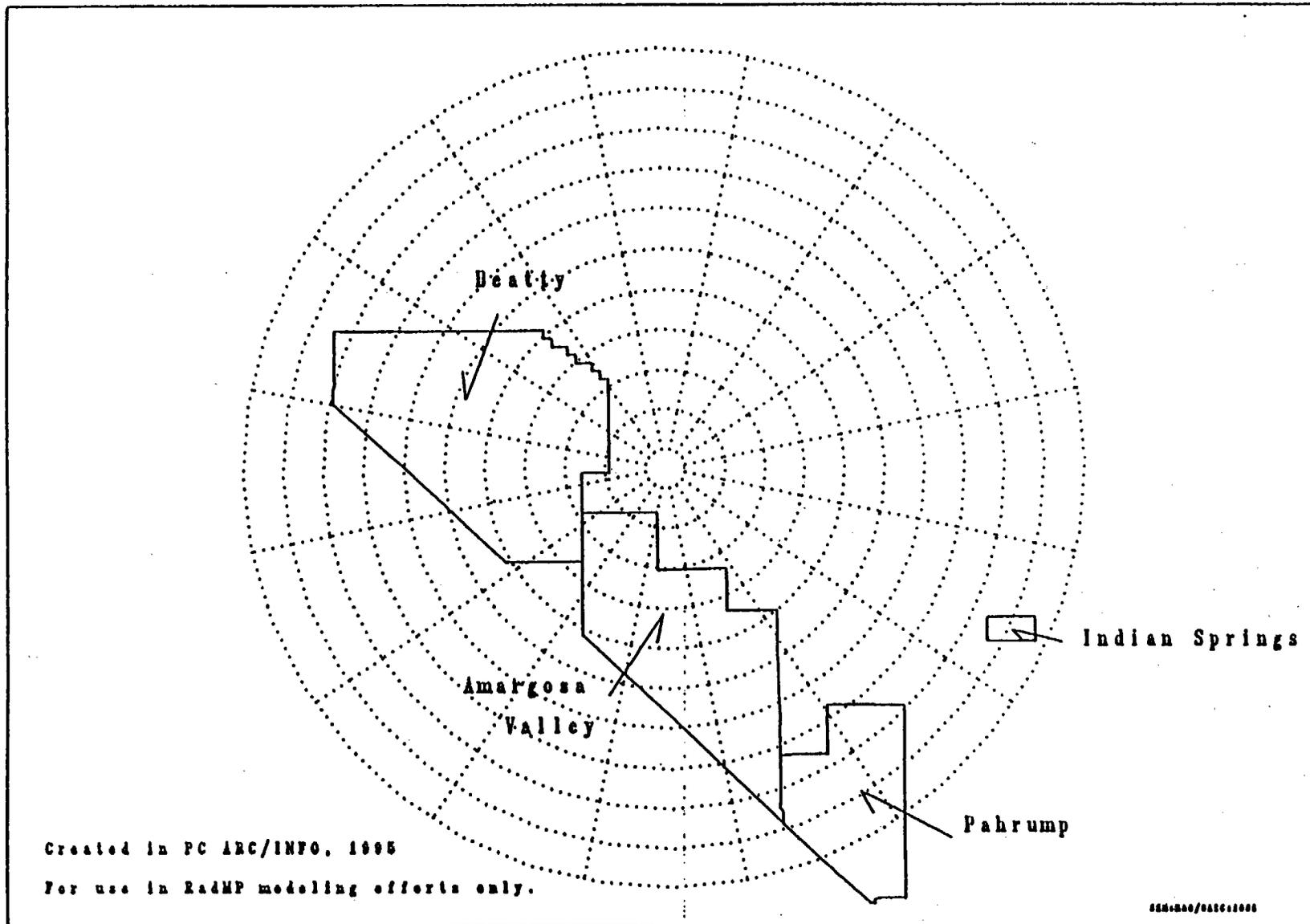


Figure 2. Boundaries for the Communities Within the RadMP Grid

differs from the information in Table 2 which represents only that portion of the community contained within the 84-km RadMP grid.

3.2 Housing

In the absence of post-census allocations of the population and housing mix of Nye County, other estimation methods were utilized to locate housing units. These methods included: consultation with local experts; windshield surveys; local utility administrative records; and the use of assessor's parcel files, subdivision plots, aerial photo interpretation, and community road maps. These methods provided input to the estimates of the total number of housing units, and to the occupancy rates, for the communities within the grid.

In Pahrump, housing is comprised of single-family structures, duplexes, apartments, and condominiums/townhomes. In addition to the year-round housing stock, there are RV parks in Pahrump that provide facilities for both seasonal/snowbird residents (people residing in the area for a short time) and temporary visitors. Much of the recent growth in Pahrump is attributable to a change in the perception of Pahrump as a bedroom community of Las Vegas. "Growth in rural towns is usually fueled by major employment opportunities, but not in Pahrump. The impetus there has been the quality of life. Minimal regulations, no zoning, low crime, wide open spaces and inexpensive land" are key reasons the housing stock has increased in recent years (Pledger, 1995).

Table 2. Housing Types by Community, 1994
(Only for Those Areas of the Communities Contained Within the RadMP Grid)

Total Occupied Housing Units By Type	Pahrump*	Beatty	Amargosa Valley	Indian Springs
First Quarter:				
Total Units	3,392	788	352	492
Single Family	3,215	719	344	492
Multi-Family	177	69	8	
Group Quarters***	2	4		
Second Quarter:				
Total Units	3,539	791	359	492
Single Family	3,356	722	351	492
Multi-Family	183	69	8	
Group Quarters***	2	4		
Third Quarter:				
Total Units	3,661	792	361	492
Single Family	3,464	723	353	492
Multi-Family	197	69	8	
Group Quarters***	2	4		
Fourth Quarter:				
Total Units	3,765	793	365	492
Single Family	3,568	724	357	492
Multi-Family	197	69	8	
Group Quarters***	2	4		

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995.

- * The information reported in this table reflects only those areas of Pahrump included within both the taxation boundaries and the 84-km RadMP grid; therefore, the information in this table is not comparable to the information presented in Table 1.
- ** Units housing persons visiting or residing in the area on a "short-term" temporary basis, such as in RV parks, are not included.
- *** This category includes the group quarters in Pahrump and the employee housing in Beatty.

NOTE: These data are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts.

The total number of housing units within the RadMP grid area increased from 5,547 to 5,979 units from the first to fourth quarter of 1994, representing a gain of 432 units (approximately an 8% increase). The communities of Amargosa Valley, Beatty, and Indian Springs exhibited little change for the year, while Pahrump continued to demonstrate a steady increase in housing stock each quarter (see Table 2). The number of housing units in the entire community of Pahrump increased by approximately 13% from the first to the fourth quarter of 1994, increasing by 625 units from 4,879 to 5,504. In 1994, the housing units in Pahrump contained within the RadMP grid increased by 373 units, growing from 3,392 to 3,765 units, representing approximately an 11% increase.

In Beatty, the permanent housing units remain relatively constant. Beatty's housing units are comprised of single-family permanent and mobile home units, RV parks, and apartment complexes. Most of the mobile-home parks are established in the southern part of town. There are seven hotels, motels and RV parks in the Beatty area that provide for both seasonal inhabitants and overnight visitors.

In Amargosa Valley, there are primarily single-family structures. One motel and one apartment building are located on the south end of the valley and are used essentially as long-term residences. As of the end of 1994, construction had begun on a new facility located near the Nevada/California border, designed to accommodate seasonal/tourist populations in Death Valley, as well as in Amargosa Valley.

The single-family housing stock in Indian Springs is also comprised primarily of mobile homes, although there are permanent structures scattered throughout the community.

Unoccupied military family housing units are located in the northwest section of town that can accommodate up to 340 persons; however, they have not been occupied since 1987. Barracks that can accommodate 215 enlisted personnel are used throughout the year to house personnel participating in NAFR exercises. Indian Springs also has motel and RV facilities that provide 60 spaces for seasonal residents.

3.3 Population

The methodology used to estimate populations within the RadMP grid area is detailed in the report entitled "Summary of Socioeconomic Data Analyses Conducted in Support of the Radiological Monitoring Program During Calendar Year 1990" (DOE, 1991b). Within that report, comparisons were made between the 1990 Census of Population figures and community population estimates generated using the RadMP variation of the Housing Unit Method. The analysis documented in that report indicates that the combination of these methodologies produces highly accurate population estimates. Therefore, applying these methods, and incorporating the "persons per household" multiplier generated from the Local Expert Method (refer to Table 3), is used again to develop estimates of the population within the grid in the absence of more current data.

**Table 3. Evaluation of Population per Household by Community
(All Housing Units)**

Community	1985 (1)	1988 (2)	1990 (3)
Amargosa Valley	2.6	2.66	2.58
Beatty	1.79	2.55	2.43
Pahrump	2.28	2.47	2.23
Indian Springs	N/A	2.95	2.44

N/A indicates not available.

(1) University of Nevada-Reno, 1985. Special Census of Nye County, Summary Report. Bureau of Business and Economic Research, College of Business Administration, Reno, Nevada.

(2) State of Nevada, 1988. Southern Nevada Communities and Nuclear Waste Survey, Nevada: Nevada Nuclear Waste Project Office.

(3) DOE, 1991b.

The distribution of long-term population within the RadMP grid area for the first quarter of 1994 is shown in Figure 3. Between the first and fourth quarter of 1994, the estimated total population within the RadMP grid area grew by 785 persons, from 13,220 to 14,005, approximately a 6% increase (see tables A-5 and A-8 in Appendix A), excluding the population in group quarters at Mercury on the NTS. The group quarters population for Mercury, grid cells 512 and 612, displayed a decrease of 182 persons, dropping from 537 people in the first quarter to 355 persons in the fourth quarter of 1994.

The majority of the population change during the year occurred in Pahrump (see Table 4). Pahrump's estimated population within the RadMP grid cells increased by an estimated 831 people, increasing from 7,576 persons in the first quarter to 8,407 in the fourth quarter of 1994. This represented an 11% increase in the Pahrump population within the RadMP grid

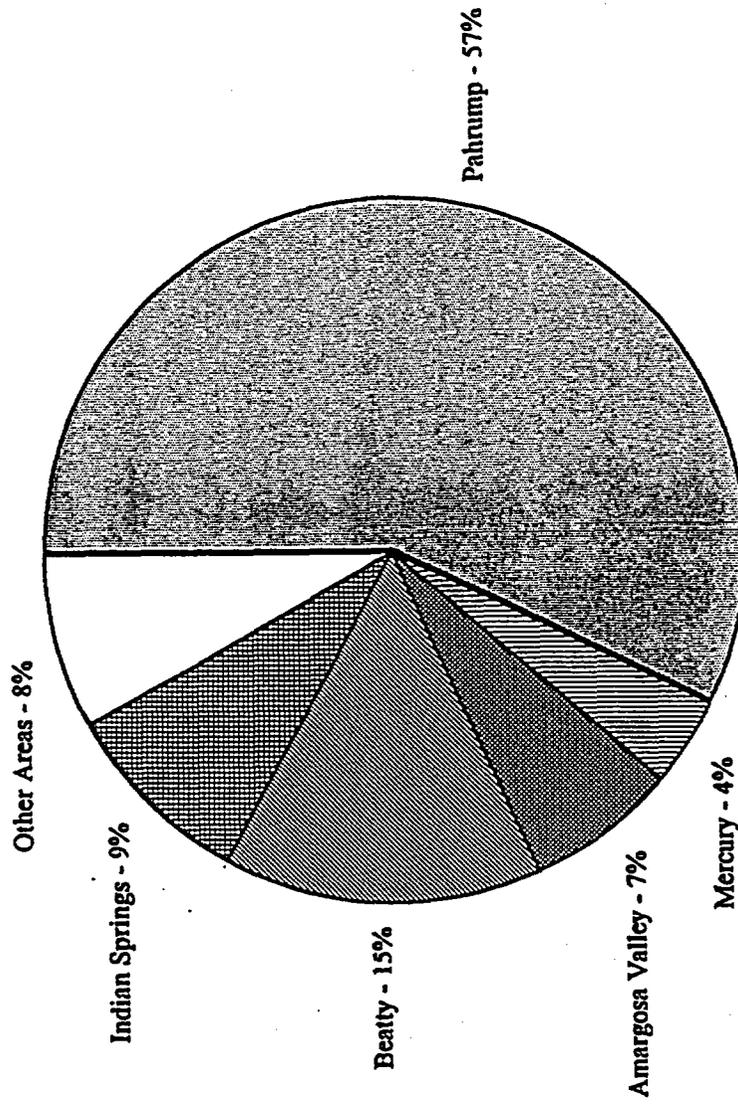


Figure 3. Distribution of Estimated Population for Designated Communities Within the RadMP Grid Area, First Quarter 1994

Table 4. Population Estimates by Housing Types by Community, 1994
(Only for Those Areas of the Communities Contained Within the RadMP Grid)

Population Estimates by Housing Type	Pahrump*	Beatty	Amargosa Valley	Indian Springs
First Quarter:				
Total Population**	7,576	1,947	909	1,200
Single Family	7,169	1,747	888	1,200
Multi-Family	395	168	21	
Group Quarters***	12	32		
Second Quarter:				
Total Population**	7,903	1,954	927	1,200
Single Family	7,484	1,754	906	1,200
Multi-Family	408	168	21	
Group Quarters***	11	32		
Third Quarter:				
Total Population**	8,175	1,957	932	1,200
Single Family	7,725	1,757	911	1,200
Multi-Family	439	168	21	
Group Quarters***	11	32		
Fourth Quarter:				
Total Population**	8,407	1,959	942	1,200
Single Family	7,957	1,759	921	1,200
Multi-Family	439	168	21	
Group Quarters***	11	32		

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995; DOE, 1991b.

- * The information reported in this table reflects only those areas of Pahrump included within both the taxation boundaries and the 84-km RadMP grid; therefore, the information in this table is not comparable to the information presented in Table 1.
- ** Units housing persons visiting or residing in the area on a "short-term" temporary basis, such as in RV parks, are not included.
- *** This category includes persons residing in group quarters in Pahrump and in employee housing in Beatty.

NOTE: These data are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts.

area. Both Amargosa Valley and Beatty showed marginal growth in the estimated long-term population over the same time period (approximately 4% and 1%, respectively).

3.4 Other Daytime Population Concentrations

It is also important to identify those segments of the day- and night-time population that are grouped in concentrations. These populations include: children attending school or enrolled in day-care facilities; those persons attending group functions, eg. churches, community centers, or fraternal organizations; persons gathered in hotels/motels and casinos; persons in medical clinics; and individuals at community detention facilities.

Determination of the school-age population is also an important component in daily population distributions. Concentrations of weekday day-time populations are located at the 13 schools and daycare facilities located within the grid area (see Table 5). The highest concentration appears in grid cell 1010, one of the grid cells representing Pahrump. All five public school buildings in Pahrump, a private school, and a nursery school are located in this grid cell (see Table 6).

There are numerous other group-function facilities located within the RadMP study area. These consist of churches, community and senior centers, fraternal organization meeting

Table 5. Number of School Facilities Within the RadMP Grid, 1994

RadMP Grid Cell	Number of Facilities by Community				
	Pahrump	Beatty	Amergosa Valley	Indian Springs	Death Valley
404		1			
405		2			
409			1		
707					1
912				1	
1010	7				

SOURCE: PhoneDisc USA, 1994.

Table 6. Average Number of Students per Weekday Within the RadMP Grid, 1994

RadMP Grid Cell	Number of Students			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
404	235	232	229	231
405	141	140	154	155
409	141	147	150	147
707	n/a	n/a	n/a	n/a
912	378	387	390	400
1010	2,124	2,131	2,340	2,355

SOURCE: Nye County, 1994-1995; Clark County, 1994-1995.

n/a indicates information not available.

places, and the community detention facilities. The hotels/motels and casinos classification also includes other locations which provide gaming facilities.

There were no hospitals identified within the grid area at this time. Small medical clinics in both Beatty and Amargosa Valley were recognized, although the clinic in Amargosa Valley is only open on a part-time basis. In addition, construction on a new urgent care facility in Pahrump was begun in 1994.

4.0 ECONOMIC CHARACTERISTICS

Within a radiological impact modeling program, knowledge of the spatial distribution of human populations, farm animals, and agricultural activities is "necessary to assess protective measures required in the event of an accidental release of radioactivity" within the study area (EPA, 1990, p. 11). The human population considered at risk at any one time is composed of people in their residence, place of work, and any other form of temporary assembly (schools, hospitals, churches, etc.). The agricultural component of a radiological impact model is considered in order to assess the "concentrations in food and intake rates to people from ingestion of food produced in the assessment area" (EPA, 1992b, p.1-2).

4.1 Employment Characteristics

During 1991, a comprehensive place-of-work survey was conducted by the Center for Business and Economic Research (CBER) at the University of Nevada, Las Vegas, (UNLV, 1991). From that one-time survey, CBER provided employment information by RadMP grid cell and Standard Industrial Classification (SIC) as presented within the RadMP report for calendar year 1991 (DOE, 1992). This effort reflected a single "snapshot in time" of the employment levels within southern Nye County.

No comparable data for employment levels within the RadMP grid area was available in 1994. As such, revision of the employment estimates presented in the 1991 report was not

considered a viable representation of current employment characteristics. Therefore, employment levels were reported only for the major employment centers through information collected from administrative records of the DOE and the State of Nevada Department of Minerals (Tables 7, 8, and 9). In order to demonstrate where there are potential employment concentrations, the number of operating commercial establishments was reported both by community (Table 1) and grid cell (Tables A-13 and A-14).

4.1.1 The Nevada Test Site

The NTS is discussed independently in this report because it represents a high concentration of employment in southern Nye County. Although there have been fluctuations in the employment levels at the NTS over the years, this work force represents a substantial portion of the total employment in Nye County.

Employment at the NTS for the past nine years is presented in Table 7 (DOE/NV, 1986-1995). For January of 1994, NTS employment is reported as 3,286 workers; by December 1994 employment had declined to 3,017 workers. This represents approximately an 8% loss in work force for the NTS, or a net loss of 269 workers from the RadMP area.

An NTS work force survey was conducted by Planning Information Corporation (PIC) for the Nevada Nuclear Waste Project Office in April 1988 (PIC, 1988) to evaluate the distribution of NTS employment. In previous reports, the distributions of NTS employment based on percent

Table 7. Nevada Test Site Monthly Employment Levels: 1986 - 1994

Month	YEAR								
	1986	1987	1988	1989	1990	1991	1992	1993	1994
January	5,378	5,323	4,791	5,027	4,823	4,524	4,434	3,832	3,286
February	5,363	5,410	4,868	5,105	4,765	4,518	4,503	4,134	3,286
March	5,287	5,387	4,907	5,098	4,705	4,489	4,502	4,592	3,224
April	5,148	5,387	4,949	5,114	4,794	4,388	4,474	3,742	3,205
May	5,058	5,250	5,094	5,151	4,783	4,367	4,487	3,757	3,161
June	5,140	5,441	5,067	5,086	4,788	4,417	4,429	3,781	3,234
July	5,122	5,405	5,066	5,036	4,776	4,466	4,457	3,711	3,177
August	5,131	5,407	5,168	5,021	4,780	4,464	4,479	3,679	3,223
September	5,284	5,390	5,211	5,013	4,758	4,553	4,382	3,638	3,242
October	5,236	5,253	5,283	4,949	4,604	4,520	4,173	3,468	3,128
November	5,262	5,235	5,195	4,893	4,589	4,465	4,037	3,421	3,062
December	5,323	4,869	5,067	4,834	4,492	4,421	3,922	3,319	3,017

SOURCE: DOE/NV, 1986-1995.

4-3

Table 8. YMP Monthly Employment Levels at the Nevada Test Site: 1988 - 1994

Month	YEAR						
	1988	1989	1990	1991	1992	1993	1994
January	n/a	34	20	16	46	149	307
February	n/a	27	16	17	50	183	356
March	n/a	32	15	17	53	183	344
April	n/a	54	15	17	54	232	336
May	n/a	34	14	17	54	238	309
June	38	23	22	17	54	243	322
July	36	24	22	21	59	261	324
August	40	25	22	27	59	262	352
September	41	24	22	97	107	304	444
October	42	23	21	99	108	300	302
November	46	23	17	44	149	302	306
December	36	23	17	45	149	305	478

SOURCE: DOE/NV, 1986-1995.

n/a indicates information not available.

Table 9. Employment Figures for the Major Mines Within the RadMP Grid

Major Mines Reported Within RadMP Grid	1989	1990	1991	1992	1993	1994
IMV Pits	72	74	54	53	46	37
Lac Minerals, Bullfrog Mine	280	310	330	268	266	290
Sterling Mine (Saga Explorations)	35	42	n/a	n/a	n/a	42
Vanderbilt, New Discovery Mine	7	8	10	10	6	6
Angst Mining (Gold Bar)	42	36	22	n/a	n/a	n/a
Crowell Mine(Daisy Mine)	2	n/a	n/a	n/a	n/a	n/a
Dagerstrom's Motherlode Mine	46	42	n/a	n/a	n/a	n/a
Cind-R-Lite	n/a	2	2	n/a	n/a	n/a
ABC Mill	26	n/a	n/a	n/a	n/a	n/a
TOTAL	510	514	418	331	318	375

SOURCE: State of Nevada, 1989-1994, State of Nevada, 1995a.
n/a indicates information not available from the source document.

distributions obtained from this survey were documented. However, as the length of time increased from the date of the original survey, the validity of applying this employment distribution diminished. As the scope of work at the NTS has changed recently (represented by the decrease of 269 NTS workers and the increase of 171 YMP workers in 1994), the need to reevaluate the use of this distribution was recognized. The dramatic increase in YMP employment since 1988 served to substantiate this argument (see Table 8); YMP employment in Area 25 of the NTS increased from 38 workers in June of 1988 to 478 workers by December of 1994. The numbers for both Table 7 and Table 8 were based on estimates of full-time equivalents (FTEs) provided by the DOE.

4.1.2 The Town of Pahrump

In Pahrump, agricultural activities historically were the dominant economic sector in the community. More recently, the growing population in Pahrump led to the demand for additional business and personal services, as well as retail establishments. Consequently, many of the new employment opportunities are within the retail and service sectors.

In July of 1994, a new business license ordinance was instituted to identify those local businesses with annual revenues in excess of \$6,000 (Pahrump, 1994). By December of 1994, 570 business owners had filed for licenses with the Pahrump Town Office (information prior to this date was unavailable, Pahrump Town Office, 1994). Of these, 496 were registered to owners with Pahrump addresses, 62 were registered to owners with addresses in other areas of

Nevada, and 12 were registered to owners outside Nevada. Another 200 to 300 businesses were estimated by the Town Manager to exist in Pahrump, but licenses were not issued because they did not generate the required revenues (Pledger, 1995).

During 1994, several notable commercial establishments either opened or expanded service. One of the more conspicuous arrivals was the November opening of the Smith's Food & Drug Center at the intersection of Highways 160 and 372. In addition, the Double Eagle Casino was built; Saddlewest Casino and Mountain View Casino both expanded; D&D Tire moved and expanded; and Big O Tire opened. Also, a 24-hour health clinic, Pahrump Valley Urgent Care sponsored by the Pahrump Valley Hospital Board, broke ground.

During 1994, the Pahrump Dairy reached production capacity with a reported 2,456 milk cows (Ferria, 1995). This dairy has represented an opportunity for the local feed producers, and to date six farms located in Nye County have contributed to the feed mix consumed at the dairy. Of this total, three are located within the RadMP grid area. These farmers produced alfalfa, oats, baled hay and hayfine. The Nye County farmers represented approximately 14% of the total feed utilized by the dairy, while another farm in central Lincoln County produced 34%. The remainder of the feed was obtained from out-of-state sources: a single farm in Utah produced 24% of the feed, and a grouping of farms in California produced approximately 28%.

4.1.3 The Town of Beatty

Historically, mining operations in the area surrounding Beatty have been the primary economic activity for that community. The frequent and sometimes dramatic changes in the work force employed in the mining industry have, in the past, resulted in rapid changes in Beatty's population, which in turn has produced an economic boom or bust for local businesses. The service industry (hotels and motels) is also important to Beatty. With its proximity to Death Valley National Park, the area benefits from tourist traffic and overnight visitors.

Employment reported at the mines within the area changed since 1993. The Nevada Department of Minerals (State of Nevada, 1995b) reported an increase from last year's figures of almost 18% in total employment at the mines located within the RadMP grid area. However, part of this dramatic increase resulted from the reporting of employees at the Sterling Mine for the first time since 1990 (refer to Table 9). Most of the actual change in 1994 employment occurred at the Bullfrog Mine.

4.1.4 The Town of Amargosa Valley

In the early 1980s, Amargosa Valley was primarily an agricultural area with a highly dispersed residential community. During this period, the American Borate Company (ABC) plant was also in full operation and provided employment opportunities for residents of the

community. However, in the late 1980s, a decrease in production at the ABC plant and a decline in crop production contributed to the economic decline in Amargosa Valley, which resulted in an out-migration of population .

Today, with the building of a new dairy at the southern end of the valley, the community has seen a resurgence in crop production, with the principal crop being alfalfa. The dairy has provided the resident farmers in the area with a local and constant consumer (Goucher, 1994-1995). Conversely, the local crop production has presented the dairy with a feed supply without the high transportation costs.

4.1.5 The Town of Indian Springs

The economic structure of Indian Springs is comprised primarily of local service oriented businesses and retail trade establishments that generate few employment opportunities in the community. The Indian Springs Air Force Base is used primarily for temporary duty exercises and has few personnel permanently stationed at the base. Due to the limited number of employment opportunities in the community, many Indian Springs residents commute to the NTS, the NAFR, the Southern Desert Correctional Facility, and the Las Vegas metropolitan area for employment (DOE, 1991b).

4.2 Agricultural Characteristics

Data on the distribution of livestock and agricultural activities within the grid area are included in Tables A-19, A-20, and A-21 in Appendix A. The majority of livestock in the area consisted of bee colonies in Pahrump used in honey production, a "catfish farm" in Amargosa Valley used to stock lakes throughout Nevada, dairy cows in Pahrump and Amargosa Valley used in the production of milk shipped to southern California, pigs raised for commercial consumption in Amargosa Valley, and range cattle. The amount of land being used for alfalfa production increased from 2,265 acres to 2,276, a total of 11 acres, less than 1%. The acreage planted in barley and oats decreased by 95 acres, representing a loss of 20%. This decrease may be explained, in part, by the amount of acreage (655 acres) reported as fallow in 1994. These acres may or may not represent "new" lands used for agricultural production as fallow acreages were not included in previous RadMP documents. The opening of the dairy on the south end of Amargosa Valley represented additional local demand for agricultural products .

4.3 Activities Associated with Dust Generation

Within the RadMP grid area, four potential dust generation categories were identified: Agricultural Activities, Mining & Open Pit Operations, Construction & Drilling Operations, and Airports & Airfields. Within the study area, the currently operational activities are widely dispersed and are prevalent in varying concentrations (see Table 10).

Table 10. Activities Associated with Potential Dust Generation Within the RadMP Grid, 1994

RadMP Grid Cell	Number of Activities			
	Agricultural Activities	Mining & Open Pit Operations	Construction & Drilling Operations	Airports & Airfields
1			1	
206		1		
208		1		
304	1	1		
305		1		
309				1
403	2			
404		2	2	1
405		2	1	1
408	3		2	
409	1			
414				1
503	1			
505		1		
508	2			
509	2	1		
512			1	
513				1
609		1		
610				1
611				1
710		1		
810			1	
903	1			1
910	16		11	
912				1
1010	16		52	
TOTAL	45	12	71	9

SOURCE: PhoneDisc USA, 1994; Pahrump Town Office, 1994; local expert information.

Agricultural activities are associated with dust emissions in many ways. As acreage is cleared and prepared for cultivation, the ground surface is, in many cases, considerably disturbed. Also included in agricultural activities are cropdusting and harvesting. Even grazing methods associated with some livestock activities can result in potential dust emission.

Forty-five agricultural operations were identified within the RadMP study area. Included within this grouping are: specialty pet care operations; small nurseries; vineyards; livestock; and alfalfa, oats, hay, sod, onions, and specialty food (nuts) production.

There are 12 mining & open pit operations and 71 construction & drilling operations located in the RadMP grid area. The activities associated with these businesses include above- and under-ground mining, sand and gravel operations, construction, drilling, and landfills. As materials are excavated, drilled, or ground and sorted, the potential exists for generation of particulate matter from both surface and subsurface sources.

Within the grid area, nine airfields are identified. Activities primarily involve small, private planes, with the exception of the Air Force activities. Activities associated with the NAFR occur over a wide geographic range, both displacing and transporting dust particles. In addition, NAFR activities often involve bombing simulations that cause ground-surface disturbance.

APPENDIX A

SOCIOECONOMIC DATA BY RadMP GRID CELL

APPENDIX A
SOCIOECONOMIC DATA BY RadMP GRID CELL

A.1 Reading the RadMP Grid

The RadMP grid is divided into 16 equal sections of 22.5 degree arcs. Beginning with an undivided 4-km circle at the center, there are ten concentric rings each 8-km in width. The RadMP grid is 84 kilometers from its center point, whose coordinates are defined as Easting 551135.7, Northing 4078351.6 Universal Transverse Mercator (UTM) Grid Zone 11.

The grid data from the tables contained in Appendix A are read as follows:

1. The center of the circle is grid cell 1.
2. Each concentric ring is numbered sequentially from 100 (the first ring surrounding the center grid cell) to 1000 (the last ring of the radiological circle).
3. The 16 sections are numbered sequentially beginning with number 1, which is centered on due north. Thereafter, each subsequent section is numbered counterclockwise, so that, Section 5 is due west, Section 9 is due south, and Section 13 is due east.
4. Grid cell identifiers consist of the number of the ring followed by the number of the section.

As an example (refer to Figure 1, p. 1-5), the community of Indian Springs is contained in grid cell 912.

A.2 Data Compiled by RadMP Grid

This section contains the data tables for specific economic/demographic characteristics within the RadMP grid. In each case, only those grids containing activity are included. Exclusion of a grid cell indicates zero activity.

Tax boundaries and town boundaries used for reporting community data in Tables 1, 2, and 4 are not equivalent to the RadMP grid cell boundaries used to compile data for RadMP analyses. Community boundaries encompasses many partial grid cells, and in some cases whole cells. Grid-specific data, therefore, are not directly comparable to community data.

TABLE A-1. Occupied Housing Units by Type by RadMP Grid Cells for the First Quarter of 1994

RadMP Grid Cell	Housing Units by Type			
	Single Family	Multi- Family	Group Quarters*	Cell Total
303	2			2
304	16			16
309	7			7
403	4			4
404	464	61	GQ*	525
405	227	8	GQ*	235
408	93			93
409	64			64
503	5			5
504				0
505	4			4
508	15			15
509	126	8		134
510	5			5
512			GQ*	GQ*
603	2			2
609	30			30
610	42			42
612			GQ*	GQ*
703	2			2
707**	206	118		324
710	8			8
711	3			3
803	4			4
809		2		2
810	7			7
904	1			1
906	19	35		54
910	1,036	4		1,040
912	504			504
1004**		16		16
1010	2,168	173	GQ*	2,341
1011	58			58
TOTAL	5,122	425	GQ*	5,547

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995.

* This category includes the group quarters in Pahrump, as well as the employee housing in Beatty. None of these units are included in the totals as they relate to beds and not housing units. The Group Quarters at Mercury are located in two grid cells, 512 and 612, and also are not included in the housing totals. However, the population estimates for all these group quarters are included in Table A-5.

** For Grid Cells 707 and 1004, the reported number of units includes 114 and 19 trailer spaces available at Furnace Creek Ranch and Stovepipe Wells, respectively, which are occupied by employees of the Fred Harvey Corporation from November through April.

NOTE: These data are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts. Due to the new method of data collection, the housing types have been redefined.

TABLE A-2. Occupied Housing Units by Type by RadMP Grid Cells for the Second Quarter of 1994

RadMP Grid Cell	Housing Units by Type			Cell Total
	Single Family	Multi- Family	Group Quarters*	
303	2			2
304	16			16
309	7			7
403	5			5
404	464	61	GQ*	525
405	228	8	GQ*	236
408	94			94
409	65			65
503	5			5
504	1			1
505	4			4
508	15			15
509	130	8		138
510	5			5
512			GQ*	GQ*
603	2			2
609	31			31
610	43			43
612			GQ*	GQ*
703	2			2
707**	206	118		324
710	8			8
711	3			3
803	4			4
809		2		2
810	7			7
904	1			1
906	19	35		54
910	1,091	4		1,095
912	504			504
1004**		16		16
1010	2,254	179	GQ*	2,433
1011	58			58
TOTAL	5,274	431	GQ*	5,705

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995.

* This category includes the group quarters in Pahrump, as well as the employee housing in Beatty. None of these units are included in the totals as they relate to beds and not housing units. The Group Quarters at Mercury are located in two grid cells, 512 and 612, and also are not included in the housing totals. However, the population estimates for all these group quarters are included in Table A-6.

** For Grid Cells 707 and 1004, the reported number of units includes 114 and 19 trailer spaces available at Furnace Creek Ranch and Stovepipe Wells, respectively, which are occupied by employees of the Fred Harvey Corporation from November through April.

NOTE: These data are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts. Due to the new method of data collection, the housing types have been redefined.

TABLE A-3. Occupied Housing Units by Type by RadMP Grid Cells for the Third Quarter of 1994

RadMP Grid Cell	Housing Units by Type			Cell Total
	Single Family	Multi- Family	Group Quarters*	
303	2			2
304	16			16
309	7			7
403	5			5
404	464	61	GQ*	525
405	229	8	GQ*	237
408	94			94
409	65			65
503	5			5
504	1			1
505	4			4
508	15			15
509	132	8		140
510	5			5
512			GQ*	GQ*
603	2			2
609	31			31
610	43			43
612			GQ*	GQ*
703	2			2
707**	206	118		324
710	8			8
711	3			3
803	4			4
809		2		2
810	7			7
904	1			1
906	19	35		54
910	1,131	4		1,135
912	504			504
1004**		16		16
1010	2,362	193	GQ*	2,555
1011	58			58
TOTAL	5,425	445	GQ*	5,870

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995.

* This category includes the group quarters in Pahrump, as well as the employee housing in Beatty. None of these units are included in the totals as they relate to beds and not housing units. The Group Quarters at Mercury are located in two grid cells, 512 and 612, and also are not included in the housing totals. However, the population estimates for all these group quarters are included in Table A-7.

** For Grid Cells 707 and 1004, the reported number of units includes 114 and 19 trailer spaces available at Furnace Creek Ranch and Stovepipe Wells, respectively, which are occupied by employees of the Fred Harvey Corporation from November through April.

NOTE: These data are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts. Due to the new method of data collection, the housing types have been redefined.

TABLE A-4. Occupied Housing Units by Type by RadMP Grid Cells for the Fourth Quarter of 1994

RadMP Grid Cell	Housing Units by Type			
	Single Family	Multi- Family	Group Quarters*	Cell Total
303	2			2
304	16			16
309	8			8
403	5			5
404	464	61	GQ*	525
405	229	8	GQ*	237
408	95			95
409	66			66
503	5			5
504	1			1
505	4			4
508	15			15
509	134	8		142
510	5			5
512			GQ*	GQ*
603	2			2
609	31			31
610	43			43
612			GQ*	GQ*
703	2			2
707**	206	118		324
710	8			8
711	3			3
803	4			4
809		2		2
810	7			7
904	1			1
906	19	35		54
910	1,170	4		1,174
912	504			504
1004**		16		16
1010	2,427	193	GQ*	2,620
1011	58			58
TOTAL	5,534	445	GQ*	5,979

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995.

* This category includes the group quarters in Pahrump, as well as the employee housing in Beatty. None of these units are included in the totals as they relate to beds and not housing units. The Group Quarters at Mercury are located in two grid cells, 512 and 612, and also are not included in the housing totals. However, the population estimates for all these group quarters are included in Table A-8.

** For Grid Cells 707 and 1004, the reported number of units includes 114 and 19 trailer spaces available at Furnace Creek Ranch and Stovepipe Wells, respectively, which are occupied by employees of the Fred Harvey Corporation from November through April.

NOTE: These data are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts. Due to the new method of data collection, the housing types have been redefined.

TABLE A-5. Population Estimates by Housing Type by RadMP Grid Cells for the First Quarter of 1994

RadMP Grid Cell	Estimates by Housing Type			
	Single Family	Multi- Family	General Quarters*	Cell Total
303	5			5
304	39			39
309	18			18
403	10			10
404*	1,128	148	21	1,297
405*	552	19	11	582
408	240			240
409	165			165
503	12			12
504				0
505	10			10
508	39			39
509	325	21		346
510	13			13
512**			268	268
603	5			5
609	77			77
610	108			108
612**			269	269
703	5			5
707	381	218		599
710	21			21
711	7			7
803	10			10
809		4		4
810	16			16
904	2			2
906	35	65		100
910	2,310	9		2,319
912	1,230			1,230
1004		30		30
1010*	4,835	386	12	5,233
1011	142			142
TOTAL	11,740	900	580	13,220

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995; DOE, 1991b.

Population estimates presented in this table were prepared using a variation of the Housing Unit Method (HUM). See DOE, 1991b, for documentation of this methodology.

* Population figures for these cells include individuals in group quarters in Pahrump, Beatty, and Mercury.

** Population figures for Mercury (grid cells 512 & 612) presented in this table represent actual occupancy as of March 31, 1994 (REECo, 1994).

NOTE: These data are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts. Due to the new method of data collection, the housing types have been redefined.

TABLE A-6. Population Estimates by Housing Type by RadMP Grid Cells for the Second Quarter of 1994

RadMP Grid Cell	Estimates by Housing Type			
	Single Family	Multi- Family	General Quarters*	Cell Total
303	5			5
304	39			39
309	18			18
403	12			12
404*	1,128	148	21	1,297
405*	554	19	11	584
408	243			243
409	168			168
503	12			12
504	2			2
505	10			10
508	39			39
509	335	21		356
510	13			13
512**	0		225	225
603	5			5
609	80			80
610	111			111
612**	0		225	225
703	5			5
707	381	218		599
710	21			21
711	7			7
803	10			10
809	0	4		4
810	16			16
904	2			2
906	35	65		100
910	2,433	9		2,442
912	1,230			1,230
1004	0	30		30
1010*	5,026	399	11	5,436
1011	142			142
TOTAL	12,082	913	493	13,488

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995; DOE, 1991b.

Population estimates presented in this table were prepared using a variation of the Housing Unit Method (HUM). See DOE, 1991b, for documentation of this methodology.

* Population figures for these cells include individuals in group quarters in Pahrump, Beatty, and Mercury.

** Population figures for Mercury (grid cells 512 & 612) presented in this table represent actual occupancy as of June 30, 1994 (REECo, 1994).

NOTE: These data are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts. Due to the new method of data collection, the housing types have been redefined.

TABLE A-7. Population Estimates by Housing Type by RadMP Grid Cells for the Third Quarter of 1994

RadMP Grid Cell	Estimates by Housing Type			
	Single Family	Multi- Family	General Quarters*	Cell Total
303	5			5
304	39			39
309	18			18
403	12			12
404*	1,128	148	21	1,297
405*	556	19	11	586
408	243			243
409	168			168
503	12			12
504	2			2
505	10			10
508	39			39
509	341	21		362
510	13			13
512**	0		209	209
603	5			5
609	80			80
610	111			111
612**	0		210	210
703	5			5
707	381	218		599
710	21			21
711	7			7
803	10			10
809	0	4		4
810	16			16
904	2			2
906	35	65		100
910	2,522	9		2,531
912	1,230			1,230
1004	0	30		30
1010*	5,267	430	11	5,708
1011	142			142
TOTAL	12,420	944	461	13,825

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995; DOE, 1991b.

Population estimates presented in this table were prepared using a variation of the Housing Unit Method (HUM). See DOE, 1991b, for documentation of this methodology.

* Population figures for these cells include individuals in group quarters in Pahrump, Beatty, and Mercury.

** Population figures for Mercury (grid cells 512 & 612) presented in this table represent actual occupancy as of September 30, 1994 (REECo, 1994).

NOTE: These data are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts. Due to the new method of data collection, the housing types have been redefined.

TABLE A-8. Population Estimates by Housing Type by RadMP Grid Cells for the Fourth Quarter of 1994

RadMP Grid Cell	Estimates by Housing Type			
	Single Family	Multi- Family	General Quarters*	Cell Total
303	5			5
304	39			39
309	21			21
403	12			12
404*	1,128	148	21	1,297
405*	556	19	11	586
408	245			245
409	170			170
503	12			12
504	2			2
505	10			10
508	39			39
509	346	21		367
510	13			13
512**	0		177	177
603	5			5
609	80			80
610	111			111
612**	0		178	178
703	5			5
707	381	218		599
710	21			21
711	7			7
803	10			10
809	0	4		4
810	16			16
904	2			2
906	35	65		100
910	2,609	9		2,618
912	1,230			1,230
1004	0	30		30
1010*	5,412	430	11	5,853
1011	142			142
TOTAL	12,664	944	397	14,005

SOURCE: VEA, 1990-1995; VEA, 1993-1995; VEA, 1994-1995; DOE, 1991b.

Population estimates presented in this table were prepared using a variation of the Housing Unit Method (HUM). See DOE, 1991b, for documentation of this methodology.

* Population figures for these cells include individuals in group quarters in Pahrump, Beatty, and Mercury.

** Population figures for Mercury (grid cells 512 & 612) presented in this table represent actual occupancy as of December 31, 1994 (REECo, 1995).

NOTE: These data are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts. Due to the new method of data collection, the housing types have been redefined.

TABLE A-9. Estimated Population by Age by RadMP Grid Cells for the First Quarter 1994

RadMP Grid Cell	Age Characteristics					Cell Total
	Under 18 months	18 months to < 5 yrs	5 yrs to < 18 yrs	18 yrs to < 65 yrs	Over 65 yrs	
303			1	3		5
304	1	2	7	26	3	39
309		1	3	12	1	18
403		1	2	7	1	10
404	30	78	242	848	99	1,297
405	14	35	109	381	44	582
408	6	14	45	157	18	240
409	4	10	31	108	13	165
503		1	2	8	1	12
504						0
505		1	2	7	1	10
508	1	2	7	26	3	39
509	8	21	65	226	26	346
510		1	2	7	3	13
512				263	4	268
603			1	3		5
609	2	5	14	50	6	77
610	2	5	17	62	23	108
612				264	5	269
703			1	3		5
707	6	17	52	396	127	599
710		1	3	12	4	21
711			1	4	1	7
803		1	2	7	1	10
809				3	1	4
810			3	9	3	16
903				1		2
906	1	3	9	66	21	100
910	36	100	364	1,323	495	2,319
912	33	66	293	747	91	1,230
1004		1	3	20	6	30
1010	81	226	822	2,987	1,117	5,233
1011	2	6	22	81	30	142
TOTAL	229	598	2,125	8,116	2,152	13,220

SOURCE: DOE, 1992.

Cell values are subject to rounding. Therefore, totals may not equal summation of the data.

NOTE: These data are for use in the RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts.

TABLE A-10. Estimated Population by Age by RadMP Grid Cells for the Second Quarter 1994

RadMP Grid Cell	Age Characteristics					Cell Total
	Under 18 months	18 months to < 5 yrs	5 yrs to < 18 yrs	18 yrs to < 65 yrs	Over 65 yrs	
303			1	3		5
304	1	2	7	26	3	39
309		1	3	12	1	18
403		1	2	8	1	12
404	30	78	242	848	99	1,297
405	14	35	109	382	45	584
408	6	15	45	159	19	243
409	4	10	31	110	13	168
503		1	2	8	1	12
504						2
505		1	2	7	1	10
508	1	2	7	26	3	39
509	8	21	66	233	27	356
510		1	2	7	3	13
512				221	4	225
603			1	3		5
609	2	5	15	52	6	80
610	2	5	17	63	24	111
612				221	4	225
703			1	3		5
707	6	17	52	396	127	599
710		1	3	12	4	21
711			1	4	1	7
803		1	2	7	1	10
809				3	1	4
810			3	9	3	16
903				1		2
906	1	3	9	66	21	100
910	38	105	384	1,394	521	2,442
912	33	66	293	747	91	1,230
1004		1	3	20	6	30
1010	84	235	854	3,102	1,161	5,436
1011	2	6	22	81	30	142
TOTAL	235	614	2,181	8,235	2,223	13,488

SOURCE: DOE, 1992.

Cell values are subject to rounding. Therefore, totals may not equal summation of the data.

NOTE: These data are for use in the RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts.

TABLE A-11. Estimated Population by Age by RadMP Grid Cells for the Third Quarter 1994

RadMP Grid Cell	Age Characteristics					Cell Total
	Under 18 months	18 months to < 5 yrs	5 yrs to < 18 yrs	18 yrs to < 65 yrs	Over 65 yrs	
303			1	3		5
304	1	2	7	26	3	39
309		1	3	12	1	18
403		1	2	8	1	12
404	30	78	242	848	99	1,297
405	14	35	109	383	45	586
408	6	15	45	159	19	243
409	4	10	31	110	13	168
503		1	2	8	1	12
504						2
505		1	2	7	1	10
508	1	2	7	26	3	39
509	8	22	68	237	28	362
510		1	2	7	3	13
512				205	3	209
603			1	3		5
609	2	5	15	52	6	80
610	2	5	17	63	24	111
612				206	4	210
703			1	3		5
707	6	17	52	396	127	599
710		1	3	12	4	21
711			1	4	1	7
803		1	2	7	1	10
809				3	1	4
810			3	9	3	16
903				1		2
906	1	3	9	66	21	100
910	39	109	398	1,444	540	2,531
912	33	66	293	747	91	1,230
1004		1	3	20	6	30
1010	88	247	897	3,258	1,219	5,708
1011	2	6	22	81	30	142
TOTAL	241	630	2,239	8,415	2,300	13,825

SOURCE: DOE, 1992.

Cell values are subject to rounding. Therefore, totals may not equal summation of the data.

NOTE: These data are for use in the RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts.

TABLE A-12. Estimated Population by Age by RadMP Grid Cells for the Fourth Quarter 1994

RadMP Grid Cell	Age Characteristics					Cell Total
	Under 18 months	18 months to < 5 yrs	5 yrs to < 18 yrs	18 yrs to < 65 yrs	Over 65 yrs	
303			1	3		5
304	1	2	7	26	3	39
309		1	4	14	2	21
403		1	2	8	1	12
404	30	78	242	848	99	1,297
405	14	35	109	383	45	586
408	6	15	46	160	19	245
409	4	10	32	111	13	170
503		1	2	8	1	12
504						2
505		1	2	7	1	10
508	1	2	7	26	3	39
509	9	22	68	240	28	367
510		1	2	7	3	13
512				174	3	177
603			1	3		5
609	2	5	15	52	6	80
610	2	5	17	63	24	111
612				174	3	178
703			1	3		5
707	6	17	52	396	127	599
710		1	3	12	4	21
711			1	4	1	7
803		1	2	7	1	10
809				3	1	4
810			3	9	3	16
903				1		2
906	1	3	9	66	21	100
910	40	113	411	1,494	559	2,618
912	33	66	293	747	91	1,230
1004		1	3	20	6	30
1010	91	253	920	3,340	1,250	5,853
1011	2	6	22	81	30	142
TOTAL	244	641	2,278	8,492	2,349	14,005

SOURCE: DOE, 1992.

Cell values are subject to rounding. Therefore, totals may not equal summation of the data.

NOTE: These data are for use in the RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts.

Table A-13. Establishments by SIC* by RadMP Grid Cells for 1994 (page 1 of 2)

RadMP Grid Cell	Standard Industrial Classifications								Cell Total
	0-9	10-19	20-39	40-49	50-59	60-69	70-89	90-99	
206		1							1
208		1							1
212								1	1
304	1	2					1		4
305		1							1
306				1					1
309				1	4		2		7
403	2								2
404	1	6	2	6	25	16	34	8	98
405		3		2	2	1	8	2	18
408	3	2	1		4		3		13
409				2	1		8	2	13
503	1				1				2
505		1			1		1		3
508	2						1		3
509	2	2		2	2		5		13
512								1	1
609		2		2	4		1	2	11
610	1			1	1	2	5		10
703							2		2
707				2	1		3	4	10
710		1							1
711					1				1
809							2		2
810		1							1
903	1						1		2
906							1	1	2
910	7	18	3	11	21	3	27		90
912				2	5	7	13	10	37
1004							1	2	3
1010	6	50	16	23	124	50	131	23	423
TOTAL	27	91	22	55	197	79	250	56	777

SOURCE: VEA, 1990-1995; VEA, 1994-1995; State of Nevada, 1995a; PhoneDisc USA, 1994.

* SIC (Standard Industrial Classification).

NOTE: These data reflect the change in reporting from number of employees to number of establishments and are not comparable with past reports.

They are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts.

Table A-13. Establishments by SIC* by RadMP Grid Cells for 1994 (page 2 of 2)

0 - 09:	Agriculture, Forestry, and Fishing.
10 - 19:	Mining and Construction. Revised to include construction employment not previously reported.
20 - 39:	Manufacturing.
40 - 49:	Transportation, Communications, Electric, Gas, and Sanitary Services.
50 - 59:	Wholesale and Retail Trade.
60 - 69:	Finance, Insurance, and Real Estate.
70 - 89:	Services (Hotels, Personal, Business, Automotive, Miscellaneous Repair, Motion Pictures, Amusement and Recreation, Health, Legal, Educational, Social, Museums, Membership Organizations, Engineering, Private, and Miscellaneous). Revised to include educational services employment not previously reported.
90 - 99:	Public Administration and Nonclassifiable Establishments.

Table A-14. Establishments Unable to be Accurately Located, by SIC* by RadMP Grid Cells, 1994

RadMP Grid Cell	Standard Industrial Classifications									Cell Total
	0 - 9	10 - 19	20 - 39	40 - 49	50 - 59	60 - 69	70 - 89	90 - 99	Unknown	
404									2	2
509									1	1
810	1									1
910	10	4		4	14	1	10		3	46
1010	12	2		11	54	9	33		14	135
Unknown									13	13
TOTAL	23	6	0	15	68	10	43	0	33	198

SOURCE: VEA, 1990-1995; VEA, 1994-1995; State of Nevada, 1995a; PhoneDisc USA, 1994.

* SIC (Standard Industrial Classification).

NOTE: These data reflect the change in reporting from number of employees to number of establishments and are not comparable with past reports.

They are for use in RadMP modeling efforts only and are not directly applicable to economic development or community planning efforts.

0 - 09: Agriculture, Forestry, and Fishing.

10 - 19: Mining and Construction. Revised to include construction employment not previously reported.

20 - 39: Manufacturing.

40 - 49: Transportation, Communications, Electric, Gas, and Sanitary Services.

50 - 59: Wholesale and Retail Trade.

60 - 69: Finance, Insurance, and Real Estate.

70 - 89: Services (Hotels, Personal, Business, Automotive, Miscellaneous Repair, Motion Pictures, Amusement and Recreation, Health, Legal, Educational, Social, Museums, Membership Organizations, Engineering, Private, and Miscellaneous). Revised to include educational services employment not previously reported.

90 - 99: Public Administration and Nonclassifiable Establishments.

TABLE A-15. Visitors to Death Valley National Park by Quarter

Year	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Totals
1975	164,676	139,416	95,439	168,733	568,264
1976	213,774	161,480	95,787	135,617	606,658
1977	209,495	157,585	109,483	169,724	646,287
1978	210,770	198,723	133,661	158,524	701,678
1979	186,509	196,835	130,460	143,645	657,449
1980	183,703	200,522	112,726	146,946	643,897
1981	174,109	169,496	141,478	171,585	656,668
1982	218,963	205,427	132,767	151,167	708,324
1983	184,647	196,567	104,394	176,457	662,065
1984	211,075	199,676	98,180	138,151	647,082
1985	204,695	157,904	92,814	145,296	600,709
1986	187,317	138,251	141,478	144,067	611,113
1987	180,990	185,189	149,576	177,209	692,964
1988	210,885	185,987	154,696	165,405	716,973
1989	178,100	188,040	151,946	174,050	692,136
1990	205,623	217,984	139,719	156,428	719,754
1991	139,976	187,520	201,246	245,849	774,591
1992	240,525	219,544	206,306	239,024	905,399
1993	218,926	319,442	262,621	236,055	1,037,044
1994	214,983	263,275	275,214	255,126	1,008,598

SOURCE: DOI (1975-1995).

TABLE A-16. Estimates of Livestock by RadMP Grid Cells for 1994

RadMP Grid Cell	Number of Head by Type							
	Catfish(1)	Cattle(2)	Sheep	Bees (3)	Milk Cows	Pigs	Family Goats (4)	Ostriches
203		11						
204		17						
205		13						
303		25						
304		10						
305		3						
403		23						
404		66						
408	30,000		6			200	40	
409		8						
503		36						
504		92						
508		72						
509					2,376	100		6
603		27						
604		29						
703		26						
704		47						
711		25						
803		37						
804		58						
811		25						
903		25						
904		70						
910		5		210			39	
911		13						
1003		48						
1004		76						
1010		36			2,456		3	
1011		19						
TOTAL	30,000	942	6	210	4,832	300	82	6

SOURCE: Local experts within the communities; Ferris, 1995; Goucher, 1995; Harris, 1994; Kennel, 1995.

- (1) The catfish reported here are contained in a series of holding tanks. It is estimated that there are approximately 30,000 fish per year.
- (2) These figures are calculated based on the permitted number of cattle allowed on current grazing allotments on BLM land, as well as any pastured cattle in the study area.
- (3) These values indicate the number of bee hives. There are approximately 50,000 bees per hive.
- (4) None of the goats are currently being used in commercial milk production.

TABLE A-17. Estimates of Agricultural Acreages by RadMP Grid Cells for 1994

RadMP Grid Cell	Agricultural Activity in Acres											
	Sod/Turf	Alfalfa	Other Hay	Barley & Oats	Onions	Wheat	Produce	Fruit Trees	Dates	Grapes	Pistachios Non-Producing	Fallow Fields
408		361	20	125	60		5	20			90	240
409		205					10					
508		145		80				6				290
509	140	415						5		15	10	125
707									20			
910		330	5	250								
1010		820				18		1			30	
TOTAL	140	2,276	25	455	60	18	15	32	20	15	130	655

SOURCE: M. Berry, 1993; aerial photography; local experts within the communities.

TABLE A-18. Estimates of Agricultural Yields by RadMP Grid Cells for 1994

RadMP Grid Cell	Agricultural Yield Estimates						
	Alfalfa(1)	Other Hay(2)	Barley & Oats(3)	Onions(4)	Wheat(5)	Milk(6)	Honey(7)
408	1,650	30	11,875	1,680			
409	937						
508	663		7,600				
509	1,897					42	
707							
910	1,508	8	23,750				11
1010	3,747				1,440	43	
TOTAL	10,401	38	43,225	1,680	1,440	85	11

(1) Yields for alfalfa are given in tons per year. Yields are estimated at 4.57 tons per acre in Nye County in 1993. SOURCE: State of Nevada, 1995b.

(2) Yields for other hays are given in tons per year. Yields are estimated at 1.51 tons per acre in Nye County in 1993. SOURCE: State of Nevada, 1995b.

(3) Yields for barley are given in bushels per year. Yields are estimated at 95 bushels per acre per year. SOURCE: State of Nevada, 1995b.

(4) Yields for onions are given in tons per year. Yields are estimated at 28 tons per acre per year. SOURCE: State of Nevada, 1995b.

(5) Yields for wheat are given in bushels per year. Yields are estimated at 80 bushels per acre per year. SOURCE: State of Nevada, 1995b.

(6) Yields for milk are given in million pounds per year. Yields are estimated at 17,550 pounds per cow per year. SOURCE: State of Nevada, 1995b.

(7) Yields for honey bee colonies (hives) are given in thousand pounds per year. Yields are estimated at 52 pounds per hive per year. SOURCE: State of Nevada, 1995b.

GLOSSARY OF TERMS

GLOSSARY OF TERMS

Dosimetric

Measurement for registering the total accumulated dose of ionizing radiation.

Effective Dose Equivalents

Summation of Dose Equivalents to specific organs or tissues that would be received from an intake of radioactive material by an individual during a 50-year period following the intake, multiplied by the appropriate weighting factor.

Full-Time Equivalent (FTE)

The translation of total hours worked into a standardized employment figure. As many establishments hire part-time employees, it would be inappropriate to count the total number of employees in employment statistics. Therefore, information is provided in FTE positions, where one FTE represents one full-time employee working 40 hours per week for a year.

Grid Area

The specific geographic area to be addressed as the affected environment as defined by EPA.

Group Quarters

All Persons not living in households and classified by the Census Bureau as living in group quarters. For purposes of this document, this information is reported in "beds" and does not include jail facilities. Two general categories of persons in group quarters are recognized: (1) institutionalized persons and (2) other persons in group quarters (also referred to as "noninstitutional group quarters").

Institutionalized Persons

Includes persons under formally authorized, supervised care or custody in institutions at the time of enumeration. Such persons are classified as "patients or inmates" of an institution regardless of the availability of nursing or medical care, the length of stay, or the number of persons in the institution. Generally, institutionalized persons are restricted to the institutional buildings and grounds (or must have passes or escorts to leave) and thus have limited interaction with the surrounding community. Also, they are generally under the care of trained staff who have responsibility for their safekeeping and supervision.

GLOSSARY OF TERMS (Continued)

Other Persons in Group Quarters (also referred to as "noninstitutional group quarters")

Includes all persons who live in group quarters other than institutions. Persons who live in the following living quarters are classified as "other persons in group quarters" when there are 10 or more unrelated persons living in the unit; otherwise, these living quarters are classified as housing units: rooming houses, group homes (homes for the mentally ill, homes for the mentally retarded, homes for the physically handicapped, homes or halfway houses for drug/alcohol abuse, maternity homes for unwed mothers, and other group homes), religious group quarters, college quarters off campus (dormitories), military quarters, agricultural workers' dormitories, other workers' dormitories, emergency shelters for homeless persons (shelters with sleeping facilities, shelters for runaway, neglected, and homeless children, shelters for abused women, and visible in street locations), dormitories for nurses and interns in general military hospitals, crews of maritime vessels, staff residents of institutions, living quarters for victims of natural disasters, and other nonhousehold living situations.

Housing Units

Housing structures that are determined to be occupied on a permanent basis. For the purpose of the RadMP study, occupancy of a housing structure is assumed through the existence of an active utility (electric or water/sewer account) connection.

Long-Term Population

Persons whose primary place of residence is within the RadMP grid area, excluding those who are visiting or residing in the area on a temporary basis, such as those staying in RV Parks; also persons whose place of employment is within the grid area, as well as children attending schools located within the RadMP grid.

Maximally-Exposed Individual

A hypothetical person who is exposed to a release of radioactivity in such a way that he receives the maximum possible individual radiation dose or dose commitment. This term is not meant to imply that there really is such a person; it is used only to indicate the maximum exposure a person could receive.

Millirem

One-thousandth part of a roentgen. The unit of dose of any ionizing radiation that produces the same biological effect as a unit of absorbed dose of ordinary X-rays.

GLOSSARY OF TERMS (Continued)

Multi-Family Residential Unit

Residential structures containing two or more units, including duplexes, condominiums, and apartments.

Natural Background Radiation

Radiation that occurs naturally in the environment from such sources as cosmic rays, the naturally occurring radioactive elements in the earth, and naturally occurring radionuclides in living organisms.

Persons Per Household (PPH)

A computed value derived by dividing the population living in housing units by the number of occupied housing units.

Radiation Dose

Quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body.

Radionuclide

A radioactive nuclide. There are several hundred known radionuclides, both produced and naturally occurring; radionuclides are characterized by the number of neutrons and protons in the nucleus of an atom.

Radionuclide Emissions

Releases of airborne radioactive materials to the environment.

Short-Term Population

Persons who are visiting or residing in the area on a temporary basis, such as those staying in recreational vehicle (RV) parks or in local jail (not prison) facilities.

Single-Family Residential Unit

All structures which stand alone as single-family residences. This includes permanent structures as well as mobile homes and pre-fabricated, or pre-formed, units such as Boise Cascade.

GLOSSARY OF TERMS (Continued)

Standard Industrial Classification (SIC)

Terminology developed by the Federal government for use in the classification of establishments by economic activity. Use of SIC encoding promotes uniformity and comparability between data sets.

Windshield Surveying

Method of recording activities of interest in a chosen area by means of observation from a motor vehicle.

LIST OF ACRONYMS

LIST OF ACRONYMS

ABC	American Borate Company
BLM	Bureau of Land Management
CAP88-PC	Clean Air Act Assessment Package-1988 for a personal computer
CBER	Center for Business and Economic Research
CFR	Code of the Federal Register
DOE	Department of Energy
DVNP	Death Valley National Park
EPA	Environmental Protection Agency
FTE	Full-Time Equivalent
HUM	Housing Unit Method
km	Kilometers
NAFR	Nellis Air Force Range
NEPA	National Environmental Policy Act
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NPS	National Park Service
NRC	U. S. Nuclear Regulatory Commission
NTS	Nevada Test Site
NWPAA	Nuclear Waste Policy Amendments Act
PIC	Planning Information Corporation
RadMP	Radiological Monitoring Program
RV	Recreational Vehicles

LIST OF ACRONYMS (Continued)

SIC	Standard Industrial Classification
UNLV	University of Nevada, Las Vegas
UTM	Universal Transverse Mercator
VEA	Valley Electric Association
YMP	Yucca Mountain Site Characterization Project

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ATTACHMENT 3

PREDECISIONAL DRAFT

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DATE: April 18, 1996
TO: Miguel A. Lugo
M&O/TRW
THRU: Robert L. Kimble, Regional Studies Department
FROM: John A. Raines *R. Kimble for JAR*
SUBJECT: Data Defining the Characteristics of a Critical Group in Amargosa Valley,
Nevada

DEFINITION OF CRITICAL GROUP

According to the National Academy of Sciences (NAS), the critical group was "Originally defined for dose by the International Commission on Radiological Protection (ICRP, 1977, p. 17; ICRP, 1985b, pp.3-4) as a relatively homogeneous group of people whose location and habits are such that they are representative of those individuals expected to receive the highest doses as a result of the discharges of radionuclides. The definition is extended to risk in Chapter 2 of this report (NAS, "Technical Bases for Yucca Mountain Standards," 1995, p. 190)." In Chapter 2 the NAS report recommended the following, in part, for the individual-risk standard: "The critical group for risk should be representative of those individuals in the population who, based on cautious, but reasonable, assumptions, have the highest risk resulting from repository releases, the group should be small enough to be relatively homogeneous with respect to diet and other aspects of behavior that affect risks. The critical group includes the individuals at maximum risk and is homogeneous with respect to risk. (NAS, "Technical Bases for Yucca Mountain Standards," 1995, pp. 53-54)." For the post-closure period, it is reasonable to postulate that the critical group is similar to the existing population in terms of characteristics

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and habits or behaviors that cause contact with the water supply that is down gradient from Yucca Mountain.

For the purpose of developing a characterization of the postulated critical group, the area down gradient from Yucca Mountain was evaluated. This area, referred to as Amargosa Valley, is shown in Figure 1, along with the nearby communities and a depiction of the hydrogeologic areas near Yucca Mountain. The area depicted as Amargosa Valley in Figure 1, is intended to represent the current boundaries of the unincorporated town of Amargosa Valley (499 square miles) and not the Amargosa Valley Census division (528.7 miles squares).

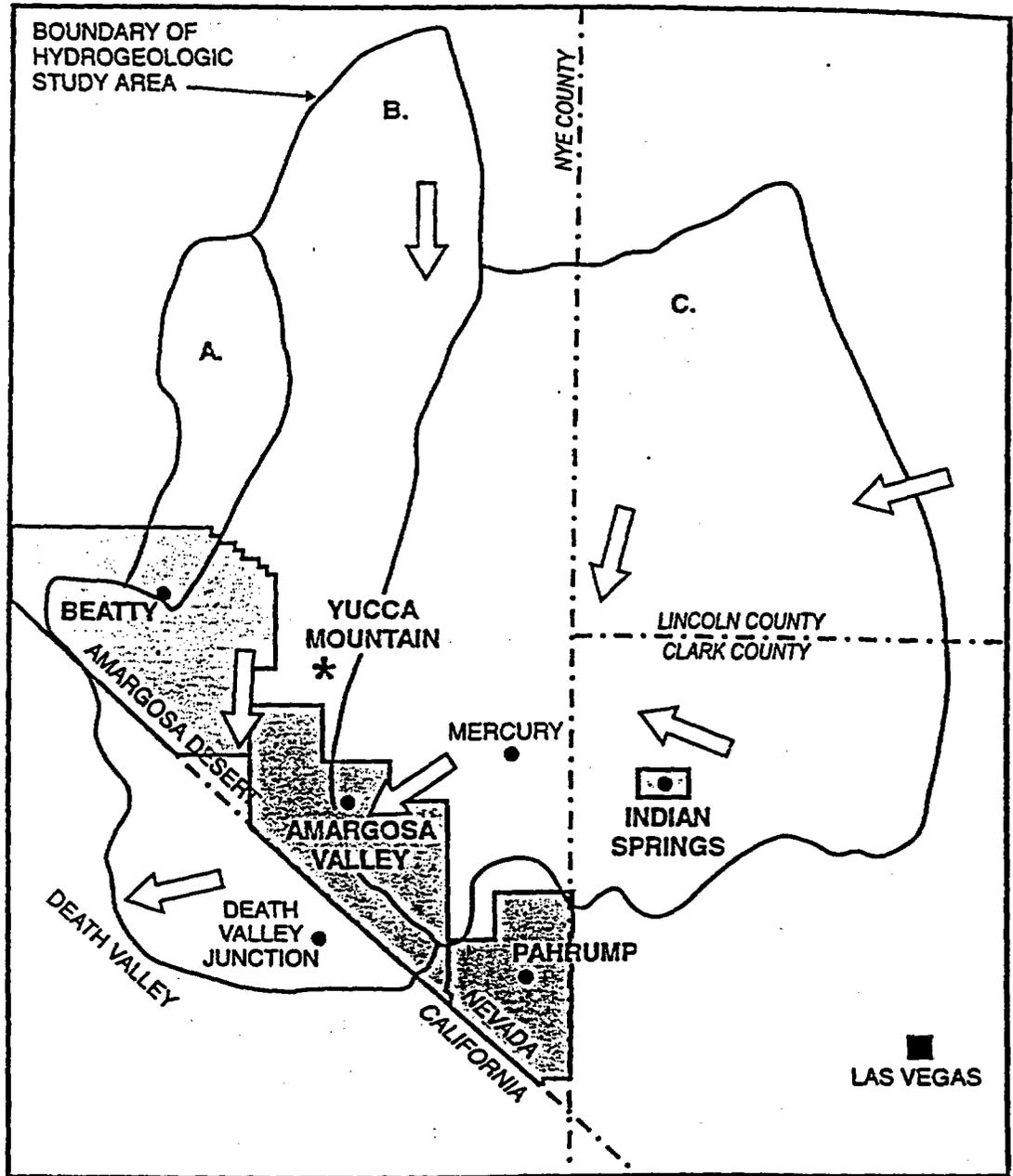
CHARACTERISTICS OF RESIDENTS OF AMARGOSA VALLEY

Amargosa Valley, with a 1990 census population of 761, is defined by the U. S. Census Bureau as a census division of Nye County (DOC, 1991). According to the Census Bureau, the Amargosa Valley division consists of 528.7 square miles and had a population density of 1.44 people per square mile ($761/528.7$) in 1990. While the statistic is true overall, it doesn't reflect that there are pockets where the population density is much higher and others where it is considerably lower. Amargosa Valley would be considered a rural, sparsely populated area.

As shown in Table 1, the median age of Amargosa Valley residents was 32.4 years. Of the 761 residents, 65 were under 5 years of age, 173 were between 5 to 17, 51 were between 18 to 24, 240 were between 25 to 44, 154 were between 45 to 64, and 78 were 65 or older. At the time of

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Figure 1: Community Boundaries and Hydrogeologic Study Area Near Yucca Mountain



APPROXIMATE LOCATION OF HYDROGEOLOGIC AREAS



GENERAL DIRECTION OF REGIONAL GROUND-WATER FLOW

- A. OASIS VALLEY SUBBASIN
- B. ALKALI FLAT-FURNANCE CREEK RANCH SUBBASIN
- C. ASH MEADOWS SUBBASIN

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Table 1
Population by Sex and Age Groups
Amargosa Valley Division

Population	Number	Percent
Sex		
Male	388	51.0%
Female	373	49.0%
Total	751	100.0%

Age Groups By Years

Under 5	65	8.5%
5 to 17	173	22.7%
18 to 24	51	6.7%
25 to 44	240	31.5%
45 to 64	154	20.2%
65 or Over	78	10.2%
Total	761	100.0%

Median Age = 32.4 years

Source: 1990 Census of Population and Housing
Tables 1 and 3, 1990 Census of Population and Housing
1990 CPH-1-30, July 1991

the Census, 388 (51.0 percent) of the residents were male and 373 (49.0 percent) were female (DOC, 1991).

The Amargosa Valley division, along with the Beatty division to the west are both in Census Block Numbering Area (BNA) 9803. Using the data for the BNA, it is possible to estimate the distribution of households by size. As shown in Table 2, of the 279 households, 69 were 1 person households, 80 had 2 persons, 48 had 3 persons, 44 had 4 persons, 24 had 5 persons, and 14 had 6 or more people in the household.

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Table 2
Household Characteristics of
Amargosa Valley Division

Households*	Number	Percent	Population	Average
Persons in Unit				
1 Person	69	24.7%	69	
2 Persons	80	28.7%	160	
3 Persons	48	17.2%	144	
4 Persons	44	15.8%	176	
5 Persons	24	8.6%	120	
6 or More	14	5.0%	92	
Total	279	100.0%	761	2.73
Family Status				
Family	199	71.3%	659	3.31
Nonfamily	80	28.7%	102	1.28
Total	279	100.0%	761	2.73
Married Couples				
	177	63.4%		
Living Alone				
Total	69	24.7%		
Age 65 +	20	7.2%		

*Interpolated from Table 9 (1990 CPH-3-30) and Table 5 (1990 CPH-1-30), 1990 Census of Population and Housing

The population lived in 279 households, of which 199 were family households and 80 were nonfamily households. Of the 199 family households, 177 were married-couple family households. Of the 80 nonfamily households, 69 consisted of a householder living alone. Of those household heads living alone, 20 were age 65 or over. The population per household was 2.73 overall and 3.31 for families in the division (DOC, 1991).

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CRITICAL GROUP

The ultimate size of the critical group will be dependent upon the tests for homogeneity, calculations of dose and/or risk (NAS, "Technical Bases for Yucca Mountain Standards," 1995, pp. 52-54). For purposes of initial testing of homogeneity, researchers may need the characteristics of a representative group that includes a sensitive receptor or infant under the age of one.

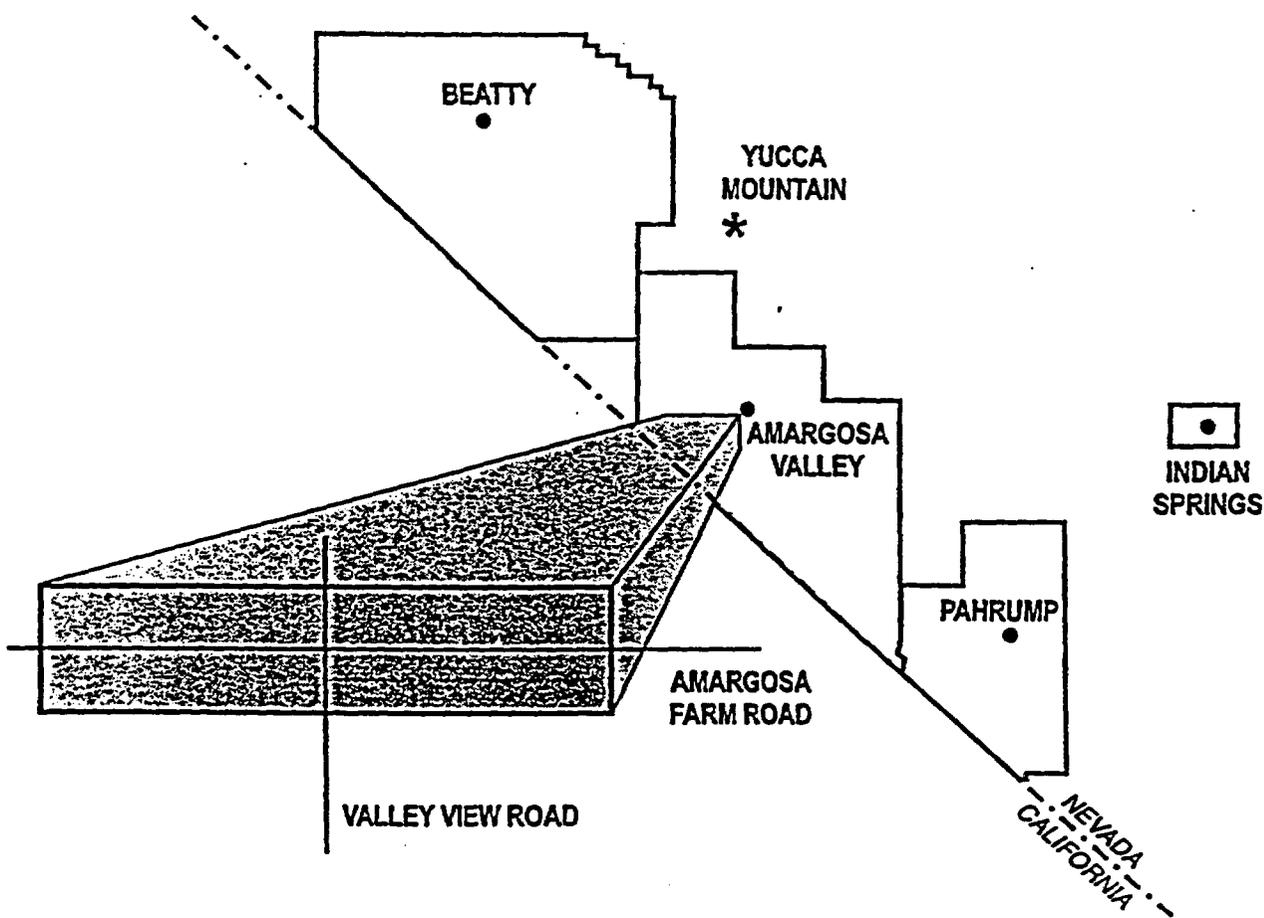
Various local experts were contacted during the Spring of 1996 to describe the most recent characteristics of a sub-area of the Amargosa Valley division (Figure 2). This procedure is not designed to develop a census or provide a statistical sample; however, it does provide generally reliable descriptive information. The area shown in Figure 2 contains the nearest concentration of population down gradient from Yucca Mountain, Nevada.

A knowledgeable resident, using the 1990 aerial photographs obtained from United States Department of Agriculture, Agricultural Stabilization & Conservation Service, could identify 18 households with a population of 48 in a quarter square mile area. This is equivalent to a population density of 192 people per square mile, which is much higher than the average for Amargosa Valley reported in the 1990 Census.

Table 3 assumes that the critical group consists of 20 households, which is the minimum number necessary to obtain a representative age distribution of population given current characteristics

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**Figure 2: Sub-Area of Amargosa Valley –
Nearest Concentration of Population
to Yucca Mountain**



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Table 3
Summary of Socioeconomic Characteristics for the
Critical Group Population
(20 Households)

Amargosa Valley		
Population	Persons	Percent
Sex		
Male	28	50.9%
Female	27	49.1%
Total	55	100.00%
Age Groups By Years		
Under 5	5	9.1%
5 to 17	12	21.8%
18 to 24	4	7.3%
25 to 44	17	30.9%
45 to 64	11	20.0%
65 or Over	6	10.9%
Total	55	100.00%
Households*		
Persons in Unit		
1 Person	5	9.1%
2 Persons	12	21.8%
3 Persons	9	16.4%
4 Persons	12	21.8%
5 Persons	10	18.2%
6 or More	7	12.7%
Total	55	100.00%
Family Status		
Family	47	85.5%
Nonfamily	8	14.5%
Total	55	100.00%
Married		
Couples	13	
Living Alone		
Total	5	
Age 65 +	1	

*Estimates based on 1990 Census information reflected in Table 1 and Table 2.

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of Amargosa Valley residents. Their household characteristics can be estimated using the population characteristics of Amargosa Valley found in the 1990 Census. The 20 households, would include a population of 55 (28 males and 27 females). Of the 55, 5 are under 5 years of age (one infant), 12 are school-age or from 5 to 17 years, 4 are 18 to 24, 17 are 25 to 44, 11 are 45 to 64, and 6 are 65 or over. The overall household size is 2.75. Of the 20 households, 5 have individuals that live by themselves, 6 households consist of 2 people, 3 consist of 3 people, 3 consist of 4 people, 2 consist of 5 people, and 1 household has 7 individuals. This hypothetical critical group of households includes 14 family status households with a population of 47 and 6 nonfamily households with a population of 8. Of the 20 households, 13 include married couples with or without children. A total of 5 individuals live by themselves, of which, one is age 65 or over.

Within the area shown in Figure 2, there are several activities of interest. In particular, there are various home gardens that produce a variety of fruit and vegetables, at least two local commercial gardens, a catfish farm, an elementary school, a senior center, and a community center.

AGRICULTURAL ACTIVITIES IN AMARGOSA VALLEY

Table 4 provides an indication of the agricultural activities in Amargosa Valley, during a recent five year period (1990 - 1994). It should be noted that the source for the information regarding agricultural production included local experts who, over the years, may have had different systems of categorizing fruit and vegetables or livestock and estimating the number of acres in

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Table 4
Estimated Agricultural Activities in Amargosa Valley
For a Five Year Period (1990 - 1994)

Estimated/Year	1990	1991	1992	1993	1994
Acreages:					
Sod/Turf	80	320	120	200	140
Pasture		80			
Alfalfa	229	1,100	635	1,115	1,126
Other Hay				25	20
Grain/Barley/Oats		160	120	160	205
Onions		5		60	60
Garlic			12		
Potatoes			2		
Pistachio	20	140	100	100	100
Fruit	50		17	31	31
Peaches		30			
Grapes		30	4	12	15
Produce				7	15
Fallow					240
Total Acres	379	1,865	1,010	1,710	1,952
Livestock:					
Catfish	20,000	20,000	30,000	30,000	30,000
Cattle			10	38	80
Sheep				12	6
Milk Cows					2,376
Goats	14	14	14	40	40
Pigs			200	300	300
Ostriches					6

1. Only 12 acres of pistachio trees were in production in 1990. None of the pistachio trees were producing from 1991 to 1994.

2. None of the goats were used in commercial milk production.

3. The catfish are in holding ponds with an estimated 10,000 per pond. The catfish are used to stock water ways in Nevada.

4. All of these milk cows are at a single dairy farm, which also has some 900 (non-producing) young cows. The raw milk is shipped out of Amargosa Valley.

Source: Draft Summary of Socioeconomic Data Analyses Conducted in Support of the Radiological Monitoring Program During Calendar Years 1990 Through 1994 (April 91, April 92, May 93, June 94, June 95).

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production. Table 4 illustrates the variety and potential of the agricultural activities in Amargosa Valley. It also illustrates that new products have been brought into production in recent years. Two operations started raising pigs commercially in 1992 and two introduced sheep in 1993. In 1994, ostriches were introduced into Amargosa Valley and a large dairy farm started to produce milk. Some of these agricultural operations have linkages to each other. Currently, according to a local alfalfa grower, the dairy farm purchases about 10 percent of its feed locally, but the majority comes from Utah.

Table 5 illustrates food groups that are grown in Amargosa Valley. This is not meant to be an exhaustive inventory of all the food products produced and consumed locally. Amargosa Valley is a rural community and many households have gardens that range in size and purpose. During a field trip in the Spring of 1996, a knowledgeable resident was asked about the number of households that had gardens. Using the aerial photographs, mentioned above, he could readily identify most of the households in an area of 29 square miles (not meant to be statistically representative of Amargosa Valley). He knew of 58 households or dwelling units, of which 37 (over 60 percent) had gardens. The size and intensity of gardening varies considerably and the existence of a garden by itself is not the variable of interest. Some people plant only one or two items, while at least two households have commercial operations. Garden products are bought, sold, shared, and bartered locally throughout Amargosa Valley. In order to get an idea of the magnitude of personal consumption, a few residents were asked to estimate how much of what they ate (last year) was produced in the Amargosa Valley. Responses ranged from less than 1 percent, to 20 to 25 percent for an individual with a commercial garden, to up to 50 percent for another individual with a commercial operation. The question is not an easy one to answer, and

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individuals in the same household may generate very different responses. In a household with a commercial garden, one individual answered that 50 percent of what was consumed by total volume was produced locally, while another member of the same household responded that 90 percent of the vegetables and 10 percent of the meat (hogs and rabbits) were produced in the valley.

Table 5
Garden Products Grown in Amargosa Valley

Vegetables

Beets
Broccoli
Brussels Sprout
Cabbage
Carrots
Cauliflower
Corn
Garlic
Kohlrabi
Lettuce - Head and Loose Leaf
Okra

Onions
Peppers - Chili, Sweet, Banana, and Bell
Potatoes
Pumpkins
Radishes
Squash - Variety of Summer and Winter
Tomatoes
Turnips
Watermelon
Zucchini

Fruit Trees

Apple
Apricot
Peaches

Pear
Plums
Pomegranate

Nut Trees

Almonds
Pecans

Source: Residents and two commercial growers in Amargosa Valley, March 20, 1996.

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SOME COMMERCIAL DEVELOPMENTS IN AMARGOSA VALLEY

A few points of interest about commercial developments in Amargosa Valley near Yucca Mountain should be mentioned. The nearest commercial activity that is down gradient from Yucca Mountain (excluding site characterization activities) is a mining operation at Cind-R-Lite, 11 or 12 miles from Yucca Mountain. The operation is small and only had 2 employees in 1990 and 1991, but has the nearest private well to Yucca Mountain. The second nearest commercial activity is 14 to 15 miles from Yucca Mountain at the junction of U.S. Highway 95 and Nevada Highway 373. Lathrop Wells has a convenience store, casino, gas station, bar, restaurant, airport, and bordello, and a 91 unit recreational vehicle park is under construction. While at least 4 individuals live there on a continuous basis and others reside there during the week, the resident population of Lathrop Wells does not include families with children. Probably the nearest residential area with a concentration of families is about twenty miles from Yucca Mountain, near the school and community center off the Amargosa Farm Road.

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ATTACHMENT 4