

Churchill County
Impact Report

August 2001

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1.0 INTRODUCTION

Churchill County is located in west central Nevada and encompasses close to 4,900 square miles. Fallon is located in the west central part of the county at the junction of Highways 50 and 95. Interstate 80 traverses Churchill County along its northern edge. Just over 90 percent of the Churchill County population is located in the Fallon urban area. One of the primary agricultural regions in the state, the Fallon area is also home to Fallon Naval Air Station (NAS Fallon). NAS Fallon is the primary training facility for the U.S. Navy's Advanced Fighter Weapons School. The location of Fallon with respect to Nevada's highway system is illustrated in Figure 1-1.

Located in the Carson desert, mountainous areas are present to the east, northwest, and southwest. Several lakes and sensitive wetland areas are scattered throughout the county near Fallon. Fallon Naval Air Station is located just a few miles to the southeast of Fallon, while the Fallon Indian Reservation lies about 7 miles east of the city. The Stillwater national Wildlife Refuge lies to the northeast. Figure 1-2 depicts the project study area for this report.

Purpose and Need

This report is a preliminary investigation into the potential social, economic impact, and transportation impacts that could occur in Churchill County as a result of the Yucca Mountain Repository program and related transportation activities. The analysis considers direct, indirect and risk induced impacts associated with the repository program and more specifically the transportation program. Impacts discussed in this report are primarily related to transportation impacts. Although U.S. 95 is not currently a preferred route to Yucca Mountain, states have the ability to select alternative routes that could place waste shipments to Yucca Mountain on a host of alternative routes other than U.S. DOT preferred transportation routes (interstate System).

Figure 1-1 Project Vicinity Map

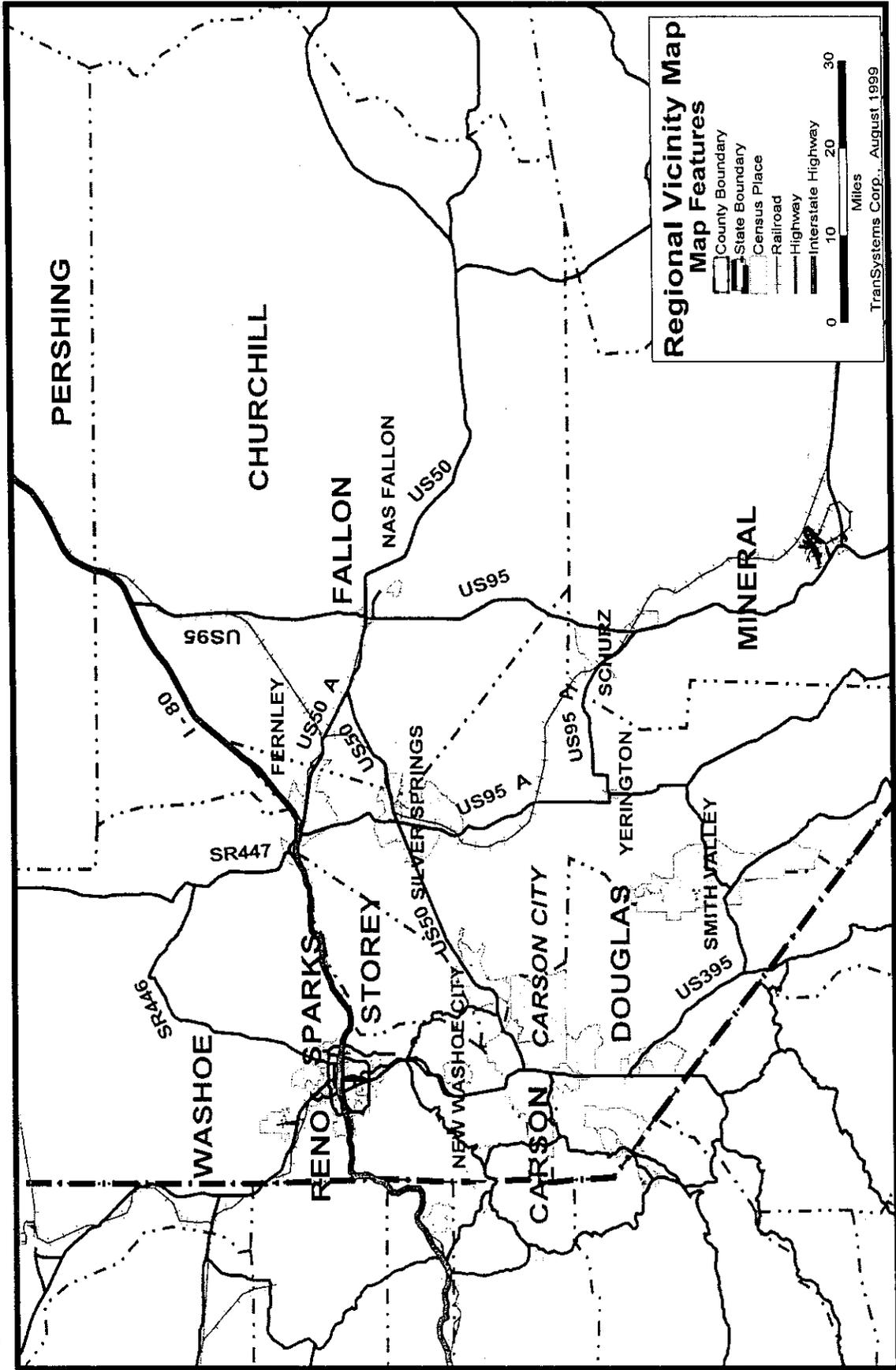
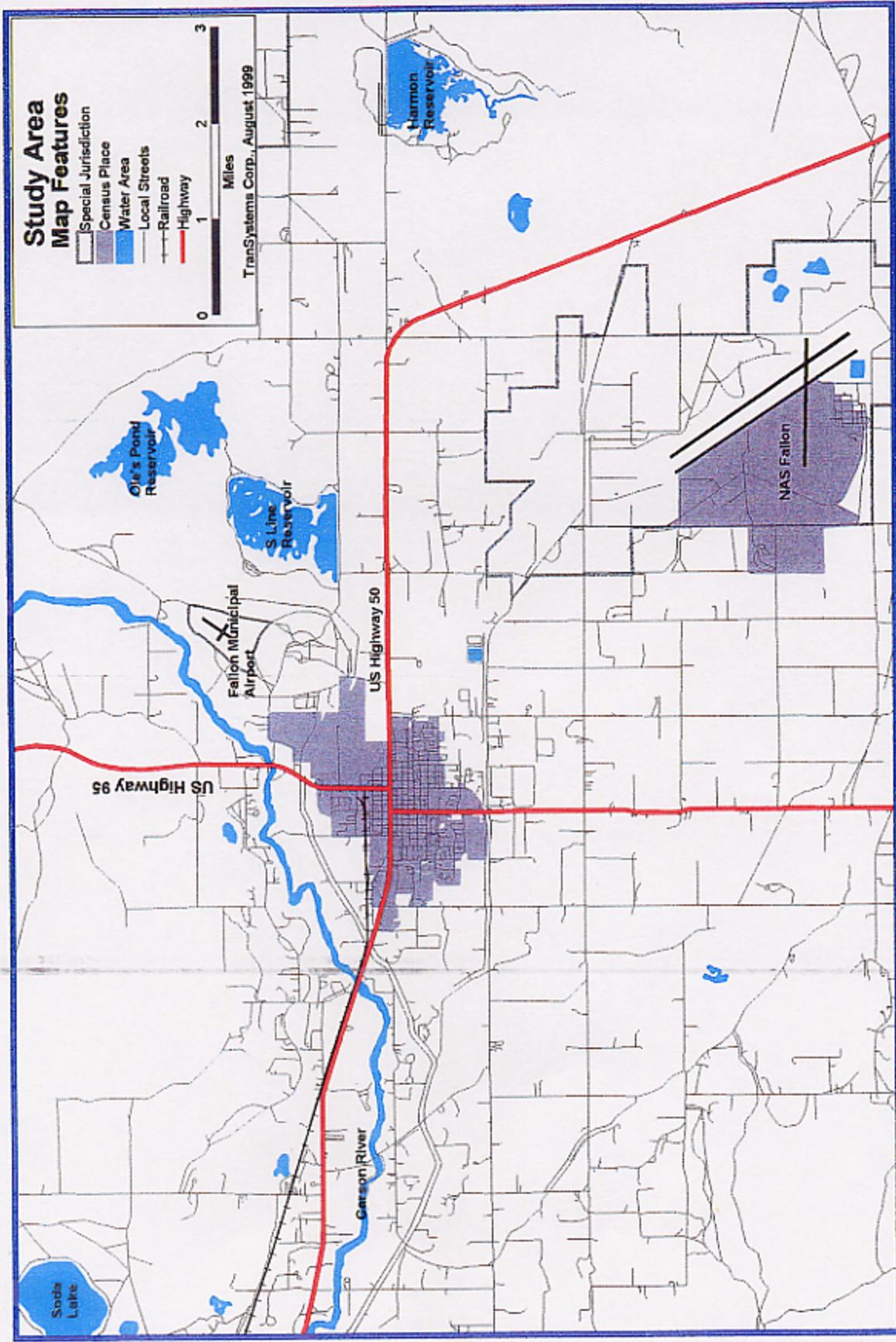


Figure 1-2 Project Study Area



In two DOE shipping campaigns including the Waste Isolation Pilot Project in New Mexico and the Nevada Test Site, western states have been very active in the selection of transportation routes. A similar situation will likely occur with Yucca Mountain where states become active in route selection in order to avoid major population centers. U.S. 95 provides a logical substitute for certain generator sites throughout West and Northwestern areas of the country. As a result, Churchill County could experience a sizeable number of waste shipments to the Yucca Mountain site. Rail shipments are currently not being considered as a transportation option to Yucca Mountain through Churchill County.

Organization of the Report

This report contains two major sections. Section 2.0 discusses existing and projected transportation activities and highway corridor characteristics associated with U.S. 95 in Churchill county. It identifies critical features of the corridor that could be adversely impacted by highway shipments to Yucca mountain. Section 3.0 focuses primarily on the potential economic and fiscal implications of Yucca Mountain and the transportation program on Churchill County.

2.0 DIRECT TRANSPORTATION IMPACTS

Purpose

The purpose of this section is to identify potential radioactive waste transportation scenarios associated with the Yucca Mountain project that may affect Churchill County in the future. One such scenario represents a distinct possibility for impacting the County. This report identifies the generators sites and prospective routes connecting to U.S. 95 through Churchill County. Currently, this route is being used by the U.S. Department of Energy for low-level waste shipments to the Nevada Test Site. Use of rail through Churchill County is not considered a viable transportation option at this time. Specifically, the DOE in its Draft Environmental Impact Statement identified the Mina Route as no longer being under consideration for Yucca Mountain shipments.

2.1 Transportation Routes Through Churchill County

Periodically, low-level waste (LLW) shipments from Lawrence Livermore and Sandia National Laboratories have entered Nevada on I-80 at Verdi and connected to U.S. 95 at Fallon in route to the Nevada Test Site (NTS). Previously, shipments from the California generators moved south through Los Angeles to southern Nevada and then to the Nevada Test Site (NTS). Use of a northern route has probably been influenced by Clark County's desire to eliminate all radioactive material shipments through their area. Similar rerouting is occurring around the state. Interstate 80 and U.S. 93 are becoming the principal points of entry for LLW shipments from eastern generators to NTS. The routes used for LLW shipments could become high-level waste/spent nuclear fuel (HLW) shipments to Yucca Mountain.

To avoid Las Vegas Valley, shipments from southern generators now use I-40 and enter California near Lake Havasu and then travel north on Highway 127 and 373 to Amargosa Valley. Shipments have even been made over the Spring Mountains west of Las Vegas on Highway 160, a two-lane highway passing through mountainous terrain. Utilization of a southern route makes southeastern California a point of entry for LLW and Yucca Mountain HLW shipments from generator sites across the U.S. As a result, both

California and Clark County probably prefer northern points of entry (I-80 at Reno and I-80 at West Wendover).

The Waste Isolation Pilot Project in Carlsbad, New Mexico stands as another example of likely route selection to be enacted by states and the DOE. WIPP shipments occur primarily through the mountain and Midwestern states. The central theme of the WIPP transportation program is the avoidance of major metropolitan areas. As a result, transportation routes to WIPP have become a patchwork of roadway segments creating essentially a "bubble" around major metropolitan areas and regions. For the low-level program a variety of routes have been utilized in order to avoid the Las Vegas Valley. Such routes are shown on Figure 2-1.

Even low-level waste shipments from northern California generator sites that originally traveled through the Los Angeles area in the past several years have been rerouted to Interstate 80 and U.S. 95. The low-level waste transportation routing process appears to be unfolding in a manner very similar to the WIPP shipments where the avoidance of major metropolitan areas is the primary objective. Given the experience at WIPP and more recently with the low-level waste program, the Churchill County area stands a good chance of seeing radioactive waste shipments to the Yucca Mountain Site.

Department of Transportation regulations specify that states and tribes can designate preferred routes that are alternatives, or in addition to, Interstate System highways including bypasses or beltways for the transportation of Highway Route-Controlled Quantities of Radioactive materials. Highway route controlled quantities include spent nuclear fuel and high-level radioactive wastes in quantities that would be shipped on a truck or railcar to the repository. Nevada has not yet designated alternative preferred routes for Highway Route-Controlled Quantities of Radioactive Materials.

LLW waste routes are being treated as a precursor for high-level waste shipments to Yucca Mountain. If and when Yucca Mountain shipments begin, the State of Nevada will probably designate alternatives routes similar to those now being used by the LLW

program. As a result, Churchill County will be impacted by radioactive waste shipments as described in the following section.

2.1.1 Potential Yucca Mountain Shipments through Churchill County

There are a number of generator sites in the Western United States that will be shipping spent nuclear fuel and high-level waste to Yucca Mountain. These sites are comprised of commercial reactor sites, and DOE facilities in four western states. Figure 2-2 shows the location of generator sites and the likely routes connecting to U.S. 95 and Yucca Mountain. Table 2-1 lists the generator site and the number of truck shipments likely to occur. The greater amounts shown in modules 1 & 2 generally reflect continued operations at nuclear power plants across the country and other projected waste generation volumes at DOE facilities.

2.1.2 Private Fuel Storage-Skull Valley, Utah

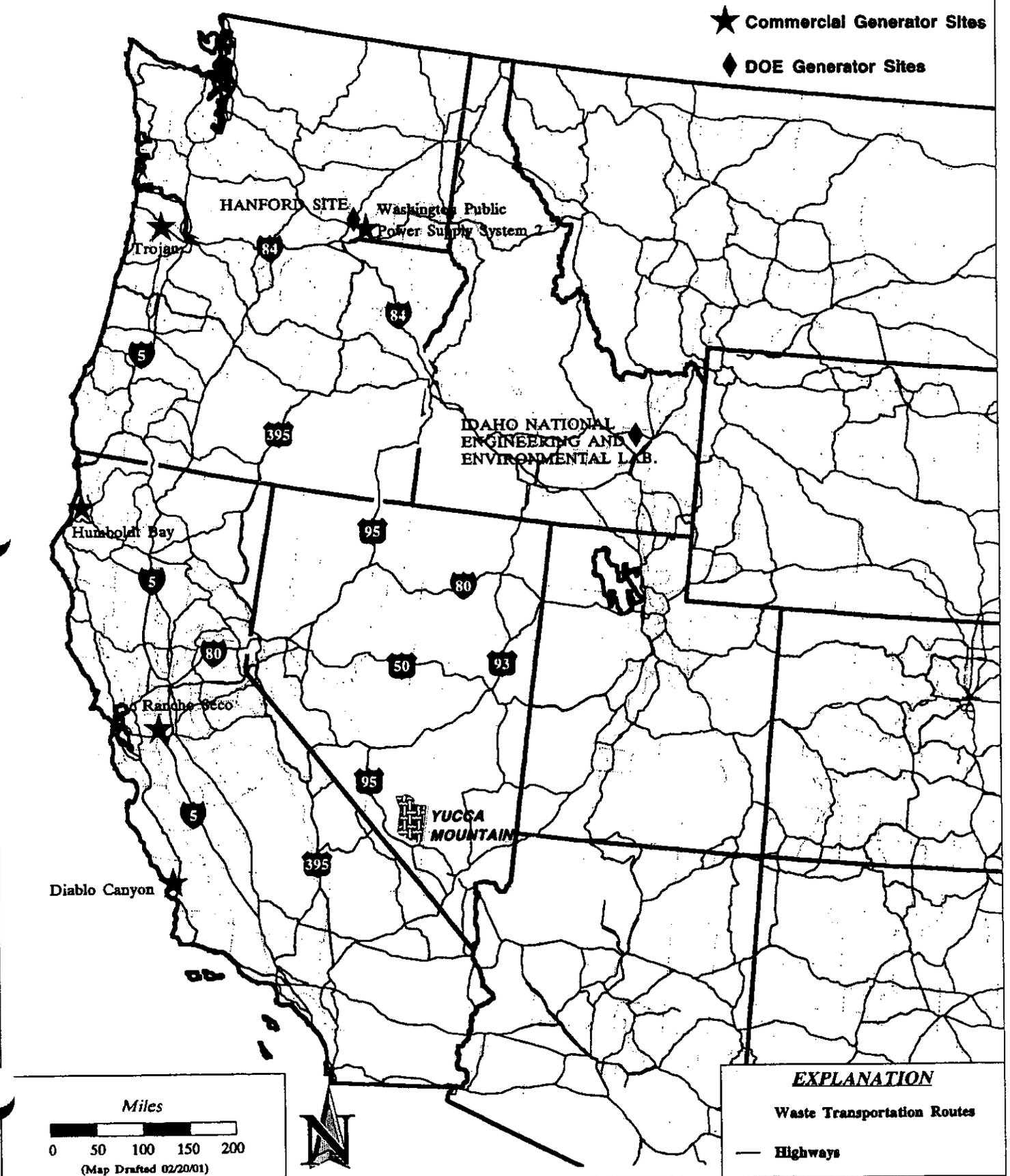
It should be noted that rail shipments could occur through Churchill County in the event a private fuel storage facility opens in Skull Valley, Utah. This facility being proposed by eight utilities is scheduled to open in 2003. Shipments will be made principally by rail. California reactors could use the northern Branch of the Union Pacific mainline. A portion of that rail line passes through Churchill County.

**Table 2-1
Potential Generator Sites and Shipment Volumes To Utilize U.S. 95**

Reactor Site	Yucca Mountain Shipments	
	(2010 – 2033) Proposed Action	(2010 – 2048) Modules 1 & 2
Humboldt Bay (Eureka, CA.)-SNF	44	44
Rancho Seco (Sacramento, CA)-SNF	124	124
Diablo Canyon I (San Luis Obispo, CA)-SNF	327	617
Diablo Canyon II (San Luis Obispo, CA)-SNF	305	691
INEEL (Twin Falls, ID)-SNF	1,388	1,467
INEEL (Twin Falls, ID)-HLW	0	1,300
Trojan (Astoria, OR.)-SNF	195	195
Hanford (Hanford, WA.)-SNF	754	809
Hanford (Hanford, WA.)-HLW	1,960	14,500
WPSS 2 (Kenwick WA.)-SNF	353	736
Total	5,450	19,193

Source: Shipment Volumes shown provided by DOE 1999, Draft EIS Yucca Mountain Project. *SNF-Spent Nuclear Fuel, *HLW-High-Level Waste.

Figure 2-2 Transportation Routes to Yucca Mountain from Western Generator Sites Using US95



One unknown is the influence that an interim storage facility will have on transportation routes. A consortium of nuclear power utilities and the Goshute Indians are seeking a license to construct and operate an interim storage facility for spent nuclear fuel. Private Fuel Storage L.L.C (PFS) is a limited liability company owned by eight US power utilities. PFS has applied to the Nuclear Regulatory Commission (NRC) for a license to receive, transfer, and possess spent nuclear fuel (SNF) from commercial nuclear power plants at a privately owned independent spent nuclear fuel storage facility. PFS has identified a location for this facility on the Reservation of the Skull Valley Band of Goshute Indians approximately 27 miles west-southwest of Tooele, Utah. Skull Valley lies just south of Interstate 80 approximately one hour from the Nevada border.

The Skull Valley proposal involves the construction and operation of a storage facility that would be designed to store up to 40,000 metric tons of uranium (MTU) of SNF. The capacity of the facility would be sufficient enough to store all the SNF from the PFS member utilities, as well as SNF from utilities that are not members of PFS. The proposed repository at Yucca Mountain is currently allowed to store up to 70,000 MTUs.

Interim storage at Skull Valley creates a new point of departure for waste shipments to Yucca Mountain. Even utilities in California and those in southern portions of the country could utilize the MRS at Skull Valley. Many of these generator sites would not have utilized Interstate 80 for shipments to Yucca Mountain. As a result, the highway route through Churchill County could experience even more shipments than would be expected if shipments were made directly from generator site to Yucca Mountain.

2.1.3 Other Hazardous Waste Shipments

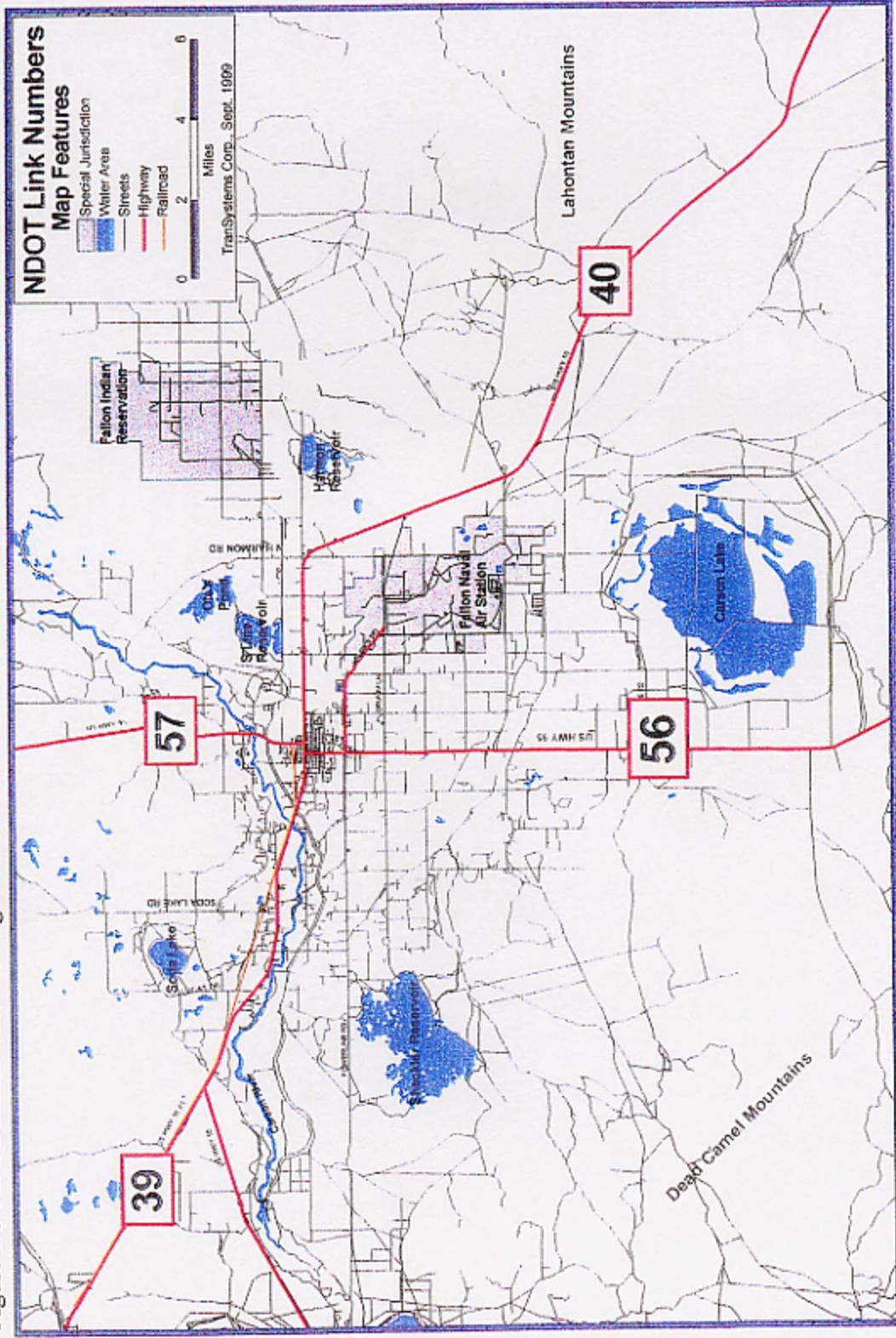
In addition to potential radioactive waste shipments moving through Churchill County to the proposed repository site, there are other hazardous waste shipments to occur on area highways. NDOT, in their Commodity Report, have documented freight shipments on state highways. Data is tabulated by highway "links." Data relevant to this Route Study is tabulated in Table 2-2. Numbered highway links are shown in Figure 2-3.

As indicated in Table 2-2, no radioactive material shipments were made through the project study area as of 1993. However, low-level radioactive waste shipments originating in the San Francisco Bay area routinely pass through the area enroute to the Nevada Test Site. Flammable liquids are by far the predominate material shipped on both U.S. 50 & U.S. 95 explosives are the second highest HAZMAT quantity type shipped on U.S. 95, while gasses and poisonous/infectious materials were shipped in significant quantities on U.S. 50/50A.

In 1993, an average daily volume of 30 trucks carrying hazardous materials were noted on U.S. 50A west of Fallon, the highest number for highways in the study area. East of Fallon the number of trucks carrying HAZMAT cargo dropped to 7. U.S. 95 south of Fallon experiences an average of 17 daily HAZMAT shipments while U.S. 95 to the north of Fallon sees an average of only 6 HAZMAT cargo shipments each day. The 1993 data indicates that the majority of HAZMAT shipments utilize U.S. 50 to the west and U.S. 95 to the south of Fallon. Although hazardous material shipment data has not been updated since 1993, general traffic on U.S. 50 and U.S. 95 has grown at the rate of approximately 1-1/2 percent per year. Utilizing generalized growth we can expect to find shows the location of generator sites and the likely routes connecting to U.S. 95 and Yucca Mountain trucks carrying hazardous materials on U.S. 50A west of Fallon, up to 9 shipments per day on U.S. 50 east of Fallon. Nineteen trucks per day and 8 trucks per day carrying hazardous cargo may be expected on U.S. 95 south and north of Fallon, respectively. Hazardous cargo truck volumes on highways in the study area are illustrated in Figure 2-4.

The primary HAZMAT generated by Fallon Naval Air Station is hydraulic waste (flammable liquid). Jet fuel is not trucked to the airfield, but rather is delivered via a pipeline from Sparks. The pipeline lies within the Southern Pacific Railroad right-of-way to the Fallon terminal, where it turns south to continue to the Naval Air Station. No radioactive materials are shipped to or from the base.

Figure 2-3 NDOT Link Number Designations

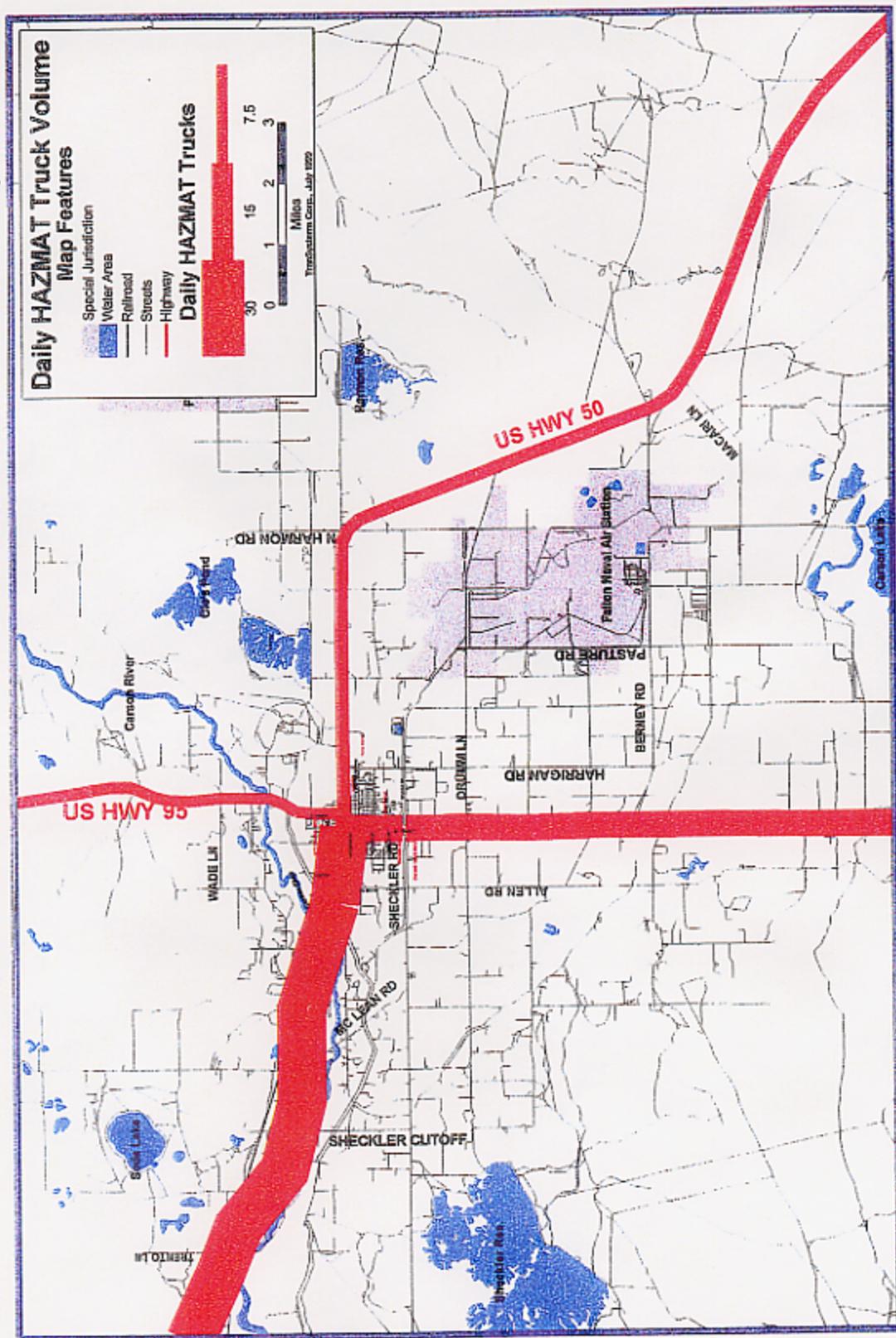


The corridor profile focuses specifically on characteristics of the proposed highway transportation corridor through Fallon, Nevada. The highways, U.S. 95 and U.S. 50, could be used to ship radioactive wastes to the proposed repository sites at Yucca Mountain. The vast majority of Churchill County's population lives in this area. Population estimates for the affected areas are shown in Table 2-3.

2.2 Corridor Population

Population estimates were made for a corridor width of 2-miles (1 mile on each side of the centerline). Total population in the corridor area (U.S. 50 and U.S. 95) is estimated to be 19,014 (Table 2-3). The U.S. 50 corridor is approximately 10 miles in length from Churchill County line to Maine Street. Nearly all the population along the highway can be found west at the intersection of U.S. 50A and U.S. 50. Most of the population along U.S. 95 can be found four miles north and 4 miles south of Fallon. Otherwise, U.S. 50 and U.S. 95 pass through areas with very limited population. Population growth for Churchill County is forecasted to reach 46,287 in 2010. With this increase in population, the corridor area could grow to 33,650 (Table 2-3).

Figure 2-4 Current Hazardous Material Truck Volume On Study Area Highways



**Table 2-2
Average Daily HAZMAT Truck Traffic and
Tonnage 1993 NDOT Commodity Report**

Percent Distribution by HAZMAT Class	Link Number			
	39	40	56	57
Average Daily HAZMAT Trucks	30	7	17	6
Percent of Avg. Annual Daily Truck Traffic	4.7%	6.9%	4.1%	3.7%
Explosives	8.7%	0.0%	23.5%	33.3%
Gasses	18.8%	6.7%	5.9%	8.3%
Flammable Liquids	60.9%	53.3%	60.8%	41.8%
Flammable Solids	0.0%	0.0%	2.0%	0.0%
Oxidizers/Organic Peroxides	1.4%	0.0%	3.9%	8.3%
Poisonous/Infectious Material	5.8%	26.7%	2.0%	8.3%
Radioactive Materials	0.0%	0.0%	0.0%	0.0%
Corrosives	4.3%	13.3%	2.0%	0.0%
Miscellaneous Materials	0.0%	0.0%	0.0%	0.0%
Average Daily HAZMAT Tonnage by Route	Route			
	50	50A	95	
Explosives	0.00	111.03	49.20	
Gasses	20.18	86.03	17.60	
Flammable Liquids	61.53	528.79	135.35	
Flammable Solids	1.81	0.00	10.59	
Oxidizers/Organic Peroxides	5.44	27.80	22.51	
Poisonous/Infectious Material	39.99	80.25	14.26	
Radioactive Materials	0.00	0.00	1.75	
Corrosives	7.05	21.09	44.54	
Miscellaneous Materials	0.00	0.00	0.00	
Average Daily Tons	136.00	855.00	295.80	

Note: Route statistics include all links on a route and are not limited to project study area

**Table 2-3
Churchill County Population 1999 Estimate and 2010 Projection**

Area	1999 Population Estimate	Percent of County	2010 Projected Population
Churchill County	26,247	100%	32,596
City of Fallon	7,962	30%	11,022
Corridor Area			
US 95, 1-mile Corridor	11,483	43%	14,261
US 50, 1-mile Corridor	7,531	29%	9,353

Source: Nevada State Demographer, 1999 and GIS Department

Table 2-4 shows population density for various population zones across the United States. Population density along the Fallon Corridor varies by location. Within the City of Fallon population density is about 4,000 persons per square mile. This density is similar to the urban population densities used by RADTRAN. Overall, most of the population in Churchill County lives adjacent to approximately 18 miles of U.S. 50 and U.S. 95 combined. The overall average population density in 2001 is approximately 1,056 persons per square mile. Two highways, U.S. 95 and U.S. 50, could be used to ship radioactive wastes to the proposed repository site at Yucca Mountain.

**Table 2-4
Comparison of Population Density Data
Persons/km2 By Density Zone for the United States
Persons/square mile shown in ()**

Pop. Zone	Average Route Truck-a	Average Route Rail-b	NUREG 0170-c	1990 Census
Urban	2,260 (8,725)	2,390 (9,228)	3,861 (14,907)	1,282 (4,950)
Suburban	349 (1,347)	361 (1,394)	719 (2,776)	766 (2,957)
Rural	10 (39)	10 (39)	6 (23)	7 (27)

Sources: Average population density from 1,258 routes generated using Highway, b-Average population density from 1,088 routes generated using interline, c- NRC 1977

For this assessment, estimates of population within a potential impact zone – the potential range of effects in the event of a release, and special populations such as schools, hospitals, prisons, and senior citizen homes are considered. Population growth potential is also considered. Figure 2-5 shows the location of special populations within the study area.

The effective population density within the corridor is somewhat higher due to hotel/motel occupancy in the Fallon area. On average, approximately 200,000 visitors stay overnight in local motels and RV Parks in Fallon each year.

2.3 Corridor Land Use

Appendix A shows land use along the corridor in Churchill County. Outside the 18-mile corridor the highway segments in Churchill County pass through primarily rural open

space where the population density is extremely low. Most land is public land used for livestock grazing, mining, and recreation.

Just over 90 percent of the Churchill County population is located in the Fallon urban area. One of the primary agricultural regions in the state, the Fallon area is also home to Fallon Naval Air Station (NAS Fallon). NAS Fallon is the primary training facility for the U.S. Navy's advanced fighter Weapons School.

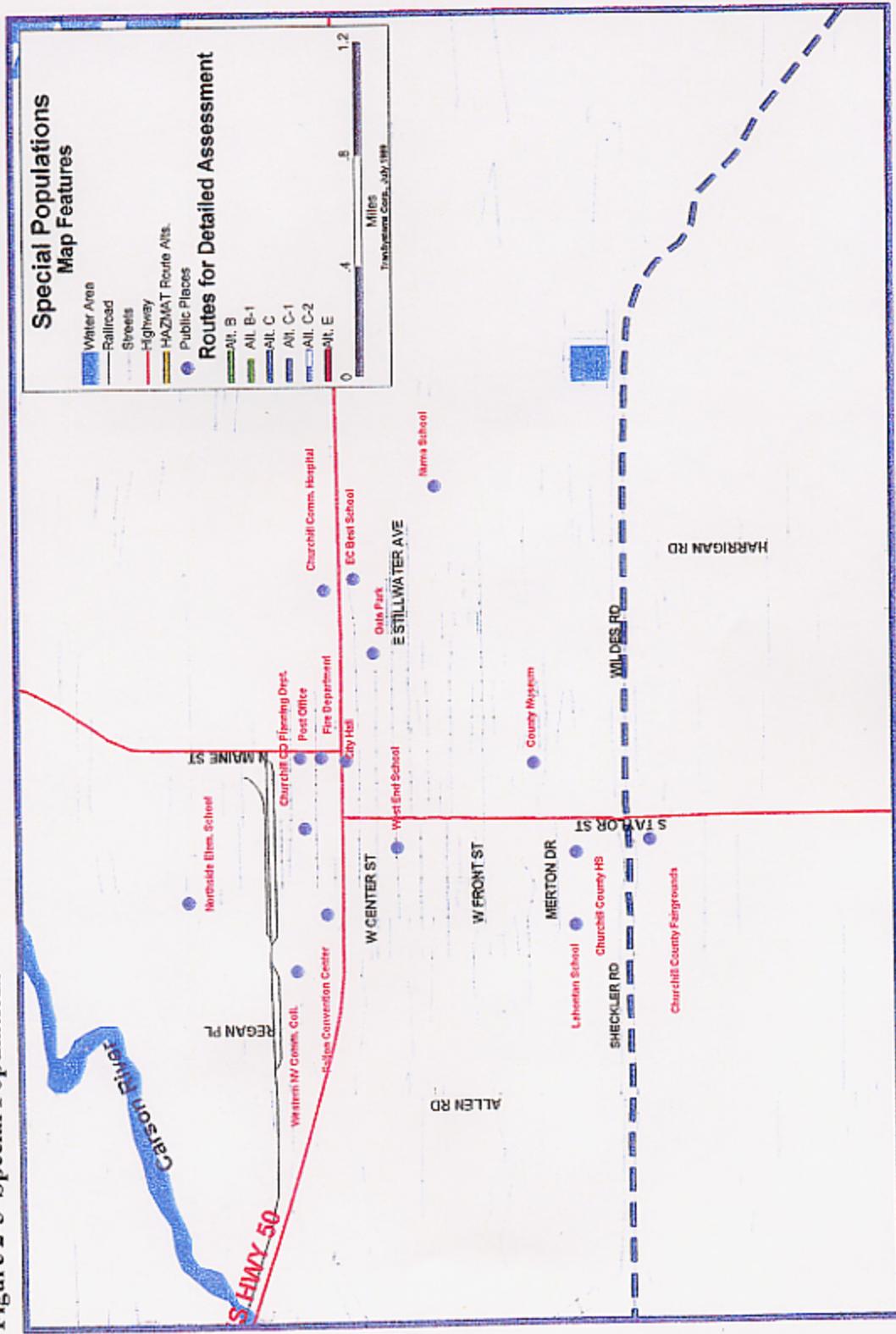
Within the 18-mile corridor, land use varies among commercial, industrial, and residential uses. There are some open vacant lands, however, these lands are currently zoned for highway commercial, industrial park development and open range, and low-density residential development.

In the City of Fallon, land uses are mixed being primarily commercial and residential development on the highway corridor. Development encroaches upon the highway corridor in some areas at a distance of less than 30 feet and sometimes less than 15 feet. Several of the commercial establishments along the corridor are motels

There are also a number of RV parks along the corridor. Most of these parks are adjacent to the highway. Their presence, particularly in the summer and fall months effectively increases the permanent population along the corridor. In all there are approximately 100 RV spaces in the corridor. Most are located west of Fallon on U.S. 50.

The location of many residential and commercial establishments within the corridor is much closer than default assumed distances for the Radtran Analysis used in the Yucca Mountain DEIS.

Figure 2-5 Special Populations



2.3.1 Public Facilities

The effective population density within the corridor generally increases due to a number of public facilities (Table 2-7). There are six elementary schools, one middle school, and one high school within 1-mile of the highway. There are approximately 4,500 children enrolled in schools within 1-mile of the highway centerline. Of the 21 facilities listed in Table 2-5 most are located within one-quarter mile of the highway corridor.

**Table 2-5
Public Facilities Adjacent to Highway Corridor**

Fallon Urban Area	Number in Corridor
Elementary Schools	6
Middle/Secondary Schools	1
High School	1
Fire Station	1
Library	1
Community College	1
Hospital	1
Courthouse & City Planning	2
Community Center	1
Museum	1
County Fairgrounds	1
Parks	3
Total Facilities	21

2.3.2 Route Profiles

To put the route profile into context, a series of transportation system maps are shown on the following pages. Figure 2-6 shows the Fallon Urban Area relative to western Nevada and shows the interstate and primary highway system. Also shown are regional rail facilities.

Located at the crossroads of U.S. 50 and U.S. 95, Fallon is subject to a significant amount of through traffic, including a significant percentage of truck traffic on these highways. Located at a key crossroads of regional transportation facilities, these highways provide important connections from eastern and southern portions of Nevada to the Reno/Sparks urban area. Figure 2-7 shows traffic volumes (average daily traffic based on actual counts) on all the major roadways in the Fallon Urban Area for 1998.

US Highways 50 & 95 are included in the SHELL (Sub-system of Highways for the movement of Extra Legal per Loads) system, and is a designated route under the Federal Surface Transportation Assistance Act (STAA) authorizing use to larger trucks an access to off route facilities. It is also designated to carry the new "Interstate Trucks." These two classifications add up to a high volume of truck use that can accelerate the deterioration of the highway resulting in high maintenance and rehabilitation costs.

The community of Fallon is subject to significant volumes of truck and oversized vehicle traffic due to the junction of the two US Highways (U.S. 50 and U.S. 95). Much of this traffic has neither a trip origin or destination in the Fallon area, but is merely passing through. Highways traversing Fallon carry up to 27 percent heavy vehicle traffic. Average daily highway truck traffic volumes present in the Fallon area are illustrated in Figure 2-8.

The intersection of these two highways occurs in the downtown area, a physically confined and busy center of urban commerce. The geometry of the Williams Avenue/Taylor Street and Williams Avenue/Maine Street intersections is not adequate to handle semi tractor-trailer vehicle types. Curb return raddi are not large enough, and lanes are not wide enough to safely accommodate turning trucks without blocking other travel lanes or climbing the curb and utilizing sidewalk areas. Roadway width and intersection geometry are inadequate for oversized vehicle traffic, and the pavement structural section was not designed to accommodate the significant load frequency it experiences. For instance, adequate breakdown lanes (shoulders) do not exist to hold large trucks and intersection curb return radii are not large enough to accommodate turning trucks (40 and 50 ft. semi tractor/trailer vehicles).

Figure 2-6 Regional Vicinity Map

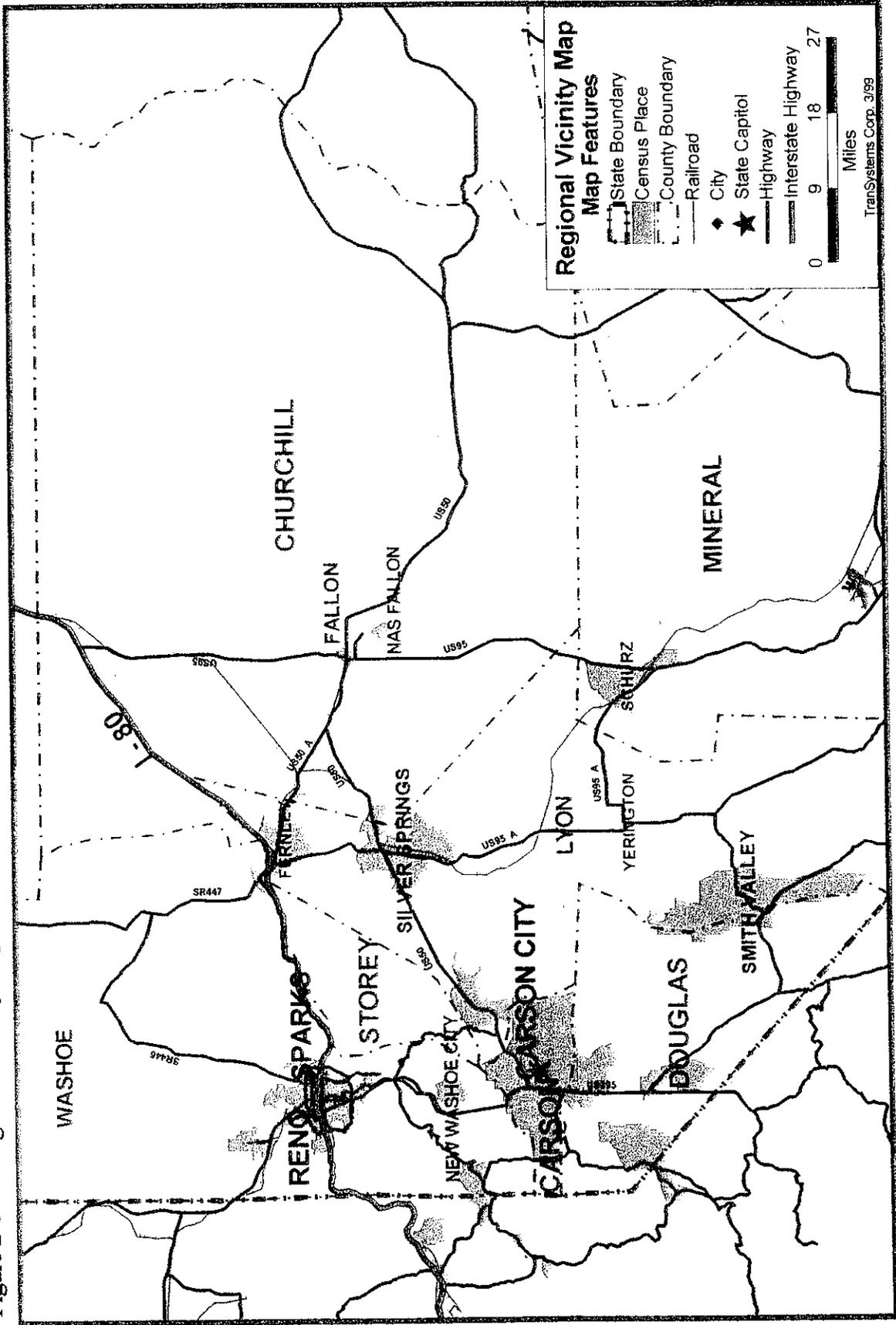


Figure 2-7 Fallon Urban Area Transportation System

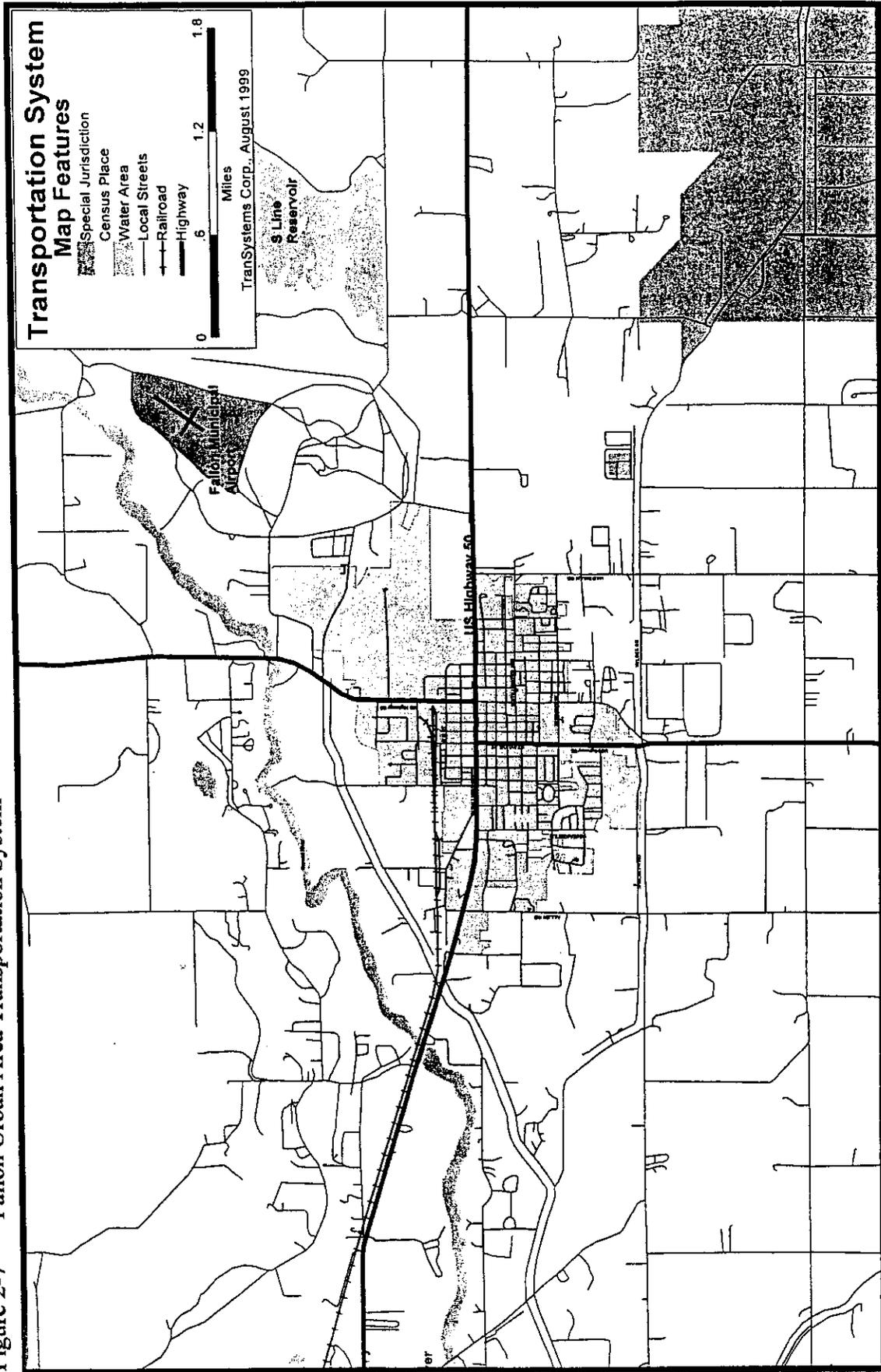
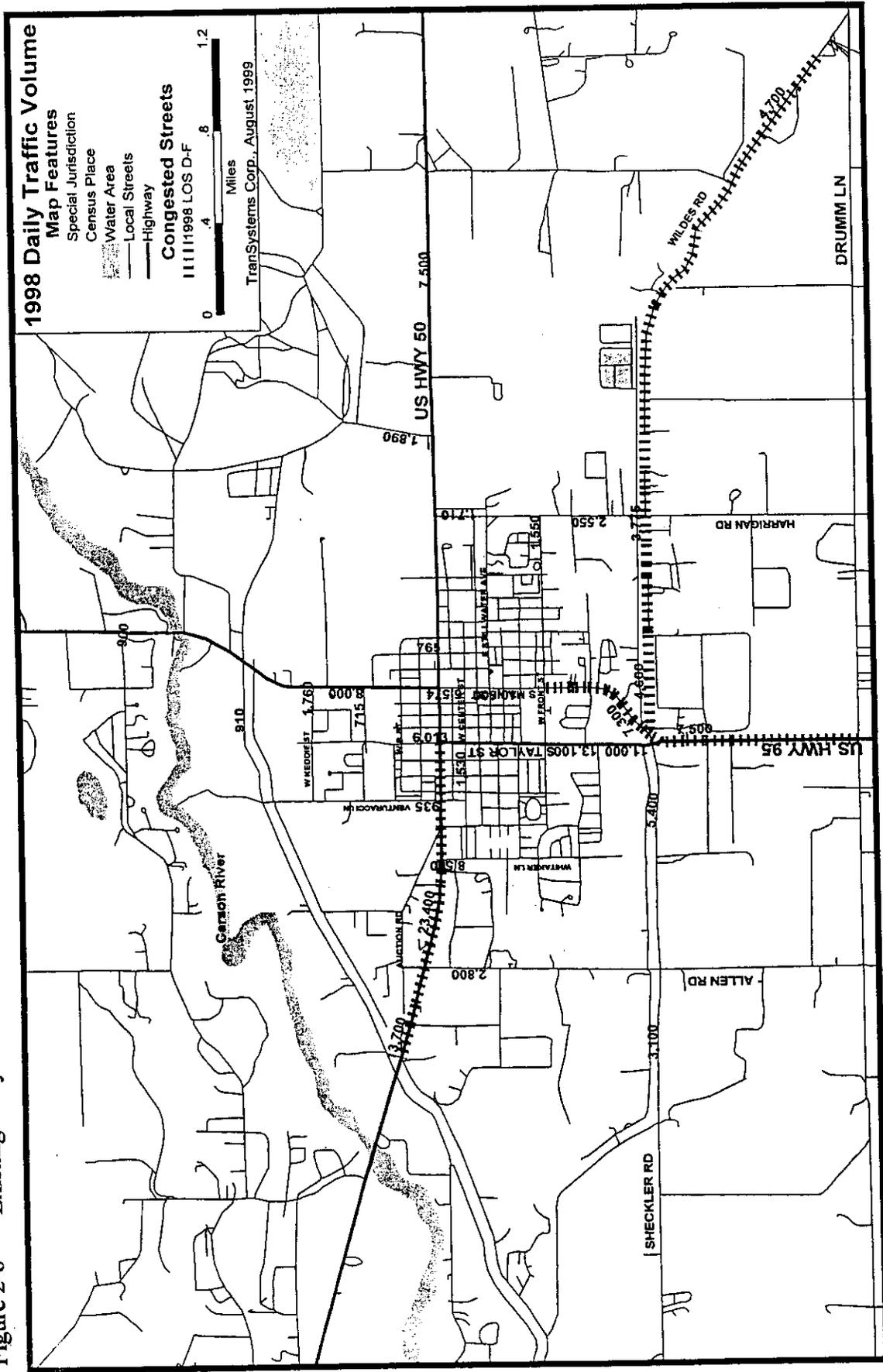


Figure 2-8 Existing Daily Traffic Volume



- **US Highway 50**

US Highway 50 from Churchill County line to the intersection of U.S. 95 is approximately 10-miles in length and is generally a two-lane facility with limited shoulders (about 4 feet or less) throughout the length of the corridor. Within the Fallon city limits lanes widen to 4 lanes. Posted speed limits are 65 mph along U.S. 50 until 6.3 miles from the center of Fallon. Speed limits incrementally decrease down to 25 mph (see Table 2-5). Highway traffic counts reflect that recreational vehicles, buses, and truck traffic along U.S. 50 corridor currently represents a range of 3 percent to 19 percent of total traffic. Truck traffic along most of U.S. 50 is fairly constant in numbers. Percentages are low in areas of high volume ADT (Average Daily Traffic) and climb about 10 percent in areas of low ADT. Most trucking on U.S. 50 reflects the service needs of the communities along the route.

- **US Highway 95**

US Highway 95 is a north-south corridor connecting Interstate 80 on the north and intersects Highway 50 in Fallon. The southern corridor reaches to Las Vegas. U.S. 95 is a two-lane facility with limited shoulders (about 4 feet or less) throughout the length of the corridor until reaching Fallon city limits where lanes widen to 4 lanes. Posted speed is generally 70 miles per hour and decrease through the city (see Table 2-6). There are no major elevation changes on U.S. 95 until the route reaches the southern most portion of the County.

2.3.3 Congestion and Accident History

Traffic conditions unique to a highway routing, such as congestion, accident experience, or other traffic considerations that could affect the potential for an accident, exposure to the public of a release, ability to perform emergency response operations, or temporary closing of a highway for cleaning up any release are required to be given appropriate consideration. In the case of this route study, an accident and congestion investigation conducted as part of the Fallon Churchill County Transportation Plan Study was utilized. High accident locations were determined utilizing data provided by NDOT for highways and streets. High accident locations for the study are shown in Figure 2-9.

Figure 2-10 shows expected future (2020) daily traffic volumes. Also shown in the figure are roadway segments that are expected to operate under congested conditions LOS C with projected future traffic loads. Significant portions of U.S. 95 and U.S. 50 project to be operating at a level of Service D or F soon after waste shipments begin.

Accident data, when stratified according to a weighted severity index using accident types (Fatal, Injury, or Property damage Only [PDO]) is a strong indicator of problem locations. Of the 88 total accident locations assessed, the worst five locations, those with the highest weighted* accident index, are:

1. Williams Avenue & Taylor Street severity index = 36
2. Williams Avenue & Allen Road – Severity Index = 22
3. Sheckler Road & Allen Street – Severity Index = 21
4. U.S. 50 & McLean Road – Severity Index = 20
5. Maine Street & Stillwater Avenue – Severity Index = 19

*Severity Index Weighting: Fatal = 8x, Injury = 3x and PDO=1x
Source: Fallon Urban Area 2020 Transportation Plan, Final Report, January 2000

Three fatal accidents occurred during the two years examined, including a fatal pedestrian accident at U.S. 50 & McLean Road.

Three of the five worst accident locations operate under traffic signal control and carry significant volumes of traffic with high numbers of turning vehicles. Accident types recorded for these locations indicate a predominance of rear-end type accidents. Typical of signalized intersections.

In addition to intersection accidents, mid-block accidents were also researched to identify roadway segments exhibiting the highest accident history. Two roadway segments exhibited clusters of accidents. Of these two, Maine Street is the access connecting U.S. 95 North to U.S. 95 south.

Figure 2-9 Highway Accident Locations

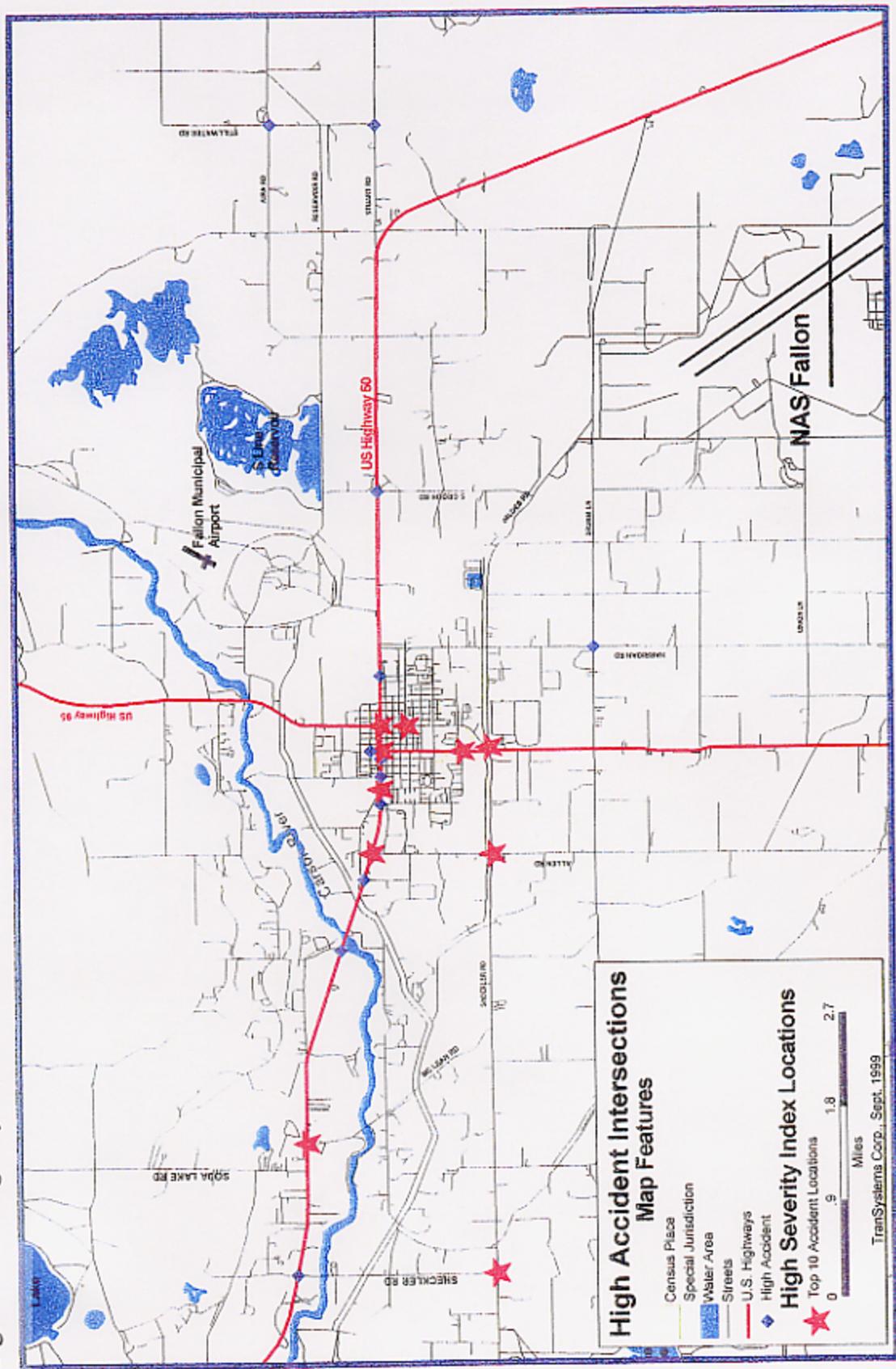
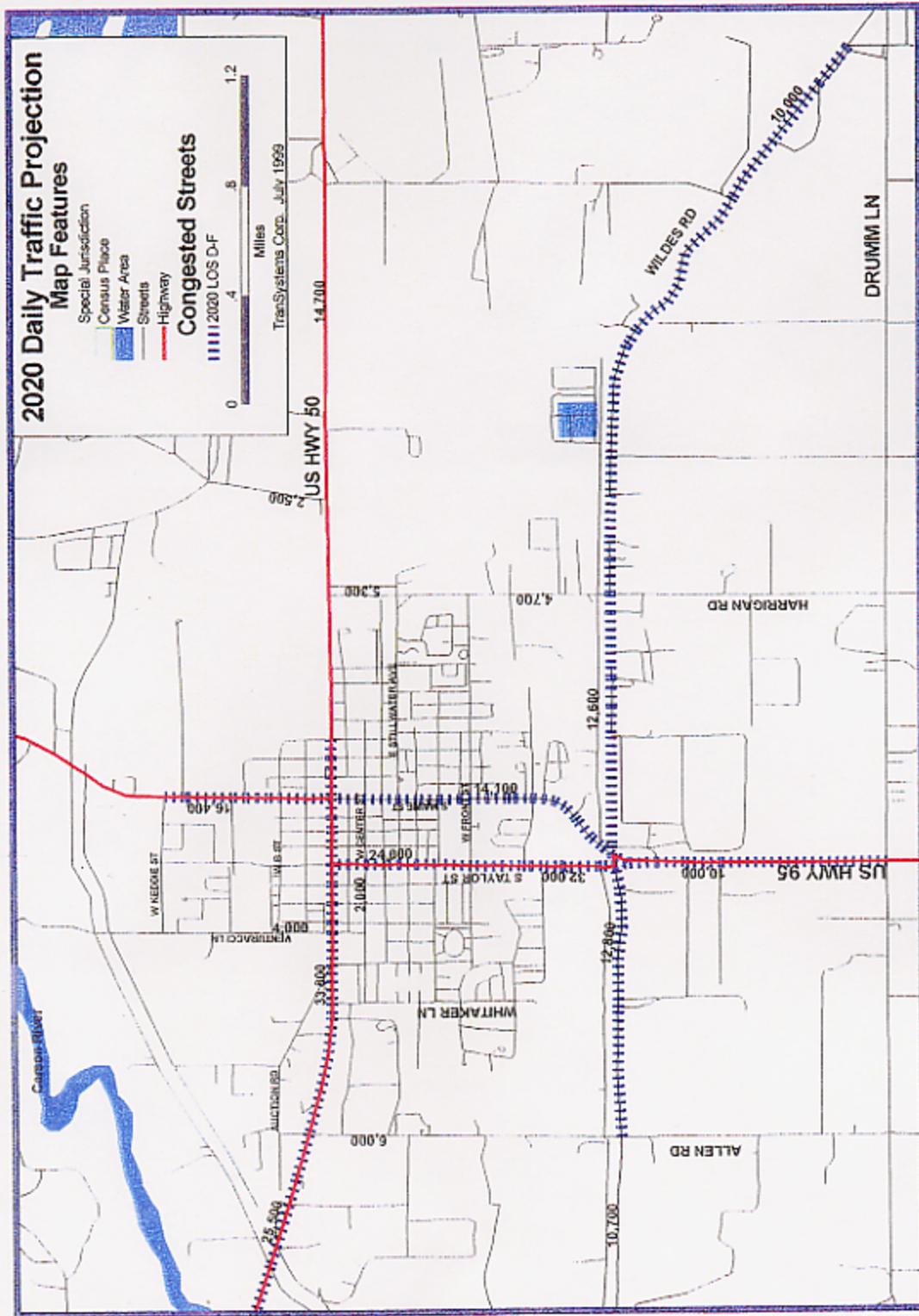


Figure 2-10 Expected Congestion



1. Williams Avenue between Dalton Road & Allen Road (14 accidents in 2 years)
2. Maine Street between Williams Avenue & center Street (4 accidents in 2 years)

Based on traffic volumes present on these two roadway segments, the accident experience shows an accident rate of 174/100 million vehicle miles (MVM) for the Williams Avenue section and 83/100 MVM for the Maine Street section. National “averages” of $\sqrt{200/100}$ MVM are expected of urban state highway sections.

2.3.4 Corridor Characteristics by Segment

Corridor characteristics are summarized in Table 2-6. The Fallon corridor is further broken down into three segments, U.S. 50 West, U.S. 95 North and South. U.S. 50 West extends from Churchill County line to Maine Street (U.S. 95) approximately 10 miles. U.S. 95 North corridor extends from approximately Tarzyn lane crossing Williams Avenue (U.S. 50) and continues south toward Las Vegas. The north-south corridor is determined by habitation along the route and is approximately 7 miles in length. The combined segments (U.S. 50 and U.S. 95) cover a distance of over 20 miles of which 18 miles passes through relatively high-populated areas.

The level of service (LOS) for the segment of corridor of US 50 to the west city limits of Fallon falls in a LOS of “A”, where more traffic and speed restraints (city center) reduce the LOS to “D. Once past city center, heading east, US 50 returns to a two-lane facility, LOS “A” to Lander County.

2.3.5 Collective Population Dose

The RADTRAN calculations of risk for routine highway and rail transportation include exposures of the following population groups:

- *Persons along the route (off-link population).* Collective doses are calculated for all persons living and working within 32 km (2 miles) on each side of a transportation route.

- *Persons sharing the route (on-link population).* Collective doses are calculated for persons in all vehicles sharing the transportation route.
- *Persons at stops.* Collective doses are calculated for people who may be exposed while a shipment is stopped en route.
- *Crewmembers.* Collective doses are calculated for truck and rail transportation crewmembers.

The RISKIND model is used to estimate risk to maximum exposed individual (MEI) for a number of hypothetical exposure scenarios. The dose to each MEI considered is calculated with RISKIND for an exposure scenario defined by a given distance, duration, and frequency of exposure to that receptor. A very common exposure scenario in the Fallon corridor is a resident or person working at a business adjacent to a transportation route. There are areas where the distance of residential housing and business are less than 30 feet from the highway route. Shipments in these areas will generally travel at a speed that would not exceed 25 mph.

2.3.6 Vehicle Speeds

Table 2-7 includes RADTRAN 4 default vehicle speeds. Along the Fallon corridor posted vehicle speeds range from 25 mph to 70 mph. The overall average speed for a legal weight truck moving through the corridor is estimated to be just under 40 mph due to signalized intersections, and the time required to accelerate and decelerate. Much of the posted speed limit through the City of Fallon is 25 to 35mph. Outside of the city limits speeds for U.S. 95 north and south are 70 mph.

**Table 2-6
Corridor Characteristics**

Characteristics	U.S. 50/50A To County Line	US 50/50 To Taylor US 95	US 95 North	U.S. 95 South
Travel Time (Min.)	10.5	8.34	7.36	3.8
Total with Stops (min)	11.25	8.83	7.86	4.2
Distance (miles)	10	10	4	4
Distance (mi) at Posted Speeds				
70 mph	-	-	-	-
65 mph	10	-	-	-
55 mph	-	1.4	-	-
45mph	-	.9	-	-
35mph	-	.8	-	2.8
25mph	-	.9	4	1.2
Lanes	2	2 and 4	2 and 4	2
Fallon City Limits	4	4	4	4
Travel Lane Width	12	12	12	12
Shoulder Width	4	4	4	4
2000-NDOT Estimate	A	A	A	C
2015-NDOT Estimate	A	C-F	C-F	C-F
Signalized Stops	0	4	1	0
Stop Time (min)	0	.50 sec.	.50 sec	.50 sec
Avg. Peds @ stop	0	5	4	6
Avg. Cars @ Stop	3	10	13	3
Population Density				
2-mile Centerline-2000	114	8,635	9,160	1,105
Average Daily Traffic (ADT) Estimated				
For Year	1999		2020	
U.S. 50 West of Fallon	13,700		25,500	
U.S. 50 Center of Fallon	23,400		33,800	
U.S. 50 Outside of Fallon	8,900		16,600	
U.S. 95 Center of Fallon South	13,100		37,000	
U.S. 95 Center of Fallon North	8,000		16,400	
U.S. 95 Outside of Fallon South	7,600		10,000	
U.S. 95 Outside of Fallon	2,250		3,000	

Source: Fallon Urban Area 2020 Transportation Plan & Churchill County Assessors Office

2.3.7 Average Daily Traffic Volumes

Average daily traffic volumes on the US Interstate System are shown in Table 2-8 and one-way traffic volumes for population zones are shown in Table 2-9. Most interstate systems have at least two lanes in each direction. The one-way traffic volumes represent two lanes of traffic. In comparison, portions of the corridor have average daily traffic volumes in the City of Fallon similar to those used for RADTRAN for suburban areas and even urban areas.

**Table 2-7
RADTRAN 4 Default Vehicle Speeds
And Average Speeds in the Fallon Corridor (Legal Weight Trucks)**

Population Zone	Truck (MPH)	Average Speeds (MPH)
Rural	55	38.5
Urban	15	13

**Table 2-8
Average Traffic Volumes on the US Interstate System**

Population Zone	Average AADT Per Lane		Hourly Average per Lane Based on a 17 Hour Day	
	1993	1994	1993	1994
Rural Area	4,329	4,511	255	265
Small Urban Area	6,252	6,269	368	369
Urbanized Area (pop.50,000-199,999)	10,341	8,435	608	496
Urbanized Area (pop.200,000+)	14,446	14,489	850	852
Urbanized Area (pop. 50,000+)	13,243	13,508	779	795

Source: US DOT

**Table 2-9
One-Way Traffic Volumes for Truck Transport**

Population Zone	NUREG-0170
Urban	2,800/hr.
Suburban	780/hr.
Rural	470/hr.

Source: Nuclear Regulatory Commission, 1977

Traffic volumes will probably increase by the year 2010 and beyond due to population increases in the Fallon area. Using a ratio of traffic volume to population, the average

annual daily traffic for locations in Table 2-10 could increase somewhat, but traffic is not projected to increase to a point where the total number of cars would near the urban thresholds by the time shipments would begin in 2010.

Table 2-10
Average Daily Traffic Locations along the Fallon Corridor 1990-99

Location	AADT 1990	AADT 1999	AADT 2020	Cars Per hour (17h-day) 1999/2020
U.S. 95 South	7,950	10,650	44,000	626/2,588
U.S. 95 North	6,170	8,000	16,400	471/964
U.S. 50 City of Fallon	16,450	21,600	33,800	1,270/1,988
U.S. 95 City of Fallon	8,280	10,750	16,400	632/964
U.S. 50 West	5,980	8,900	25,500	524/1500

Source: Fallon Urban Area 2020 Transportation Plan

2.3.8 Accidents Involving Yucca Mountain Shipments

The total number of Yucca Mountain shipments under Scenario I and II is expected to range from approximately 5,450 to 19,193. Using the three corridor segments and current traffic volumes, the total number of accidents involving Yucca Mountain shipments is expected to range from .3 to 1.1 over the life of the campaign.

2.3.9 RadTran and Riskind Inputs

Table 2-11 summarizes some of the important risk analysis parameters for the Fallon Corridor.

Maximally Exposed Individual

The maximally exposed individual in the corridor at 2010 will be exposed to all shipments and will probably reside at a location within 30 feet of the highway and sometimes as close as 15 feet to the highway. There are several locations in the corridor where this situation is likely to happen. An individual living and working in and around the signalized intersection in Fallon could be exposed for as long as 30 seconds to one minute per shipment plus exposure due to accident delays.

**Table 2-11
Summary of Risk Analysis Inputs
2-Miles of the Highway Route**

	U.S. 50/U.S. 50A	U.S. 95 North	U.S. 95 South
Roadway Classification	Rural Highway	Suburban Arterial	Suburban Arterial
Land Use			
Current	Suburban/Urban	Suburban/Urban	Rural
2010	Suburban/Urban	Suburban/Urban	Suburban
Population			
Current	8,675	2,998	1,105
2010	11,542	3,340	1,152
2020	16,616	3,765	1,203
Employment			
Current	2,994	1,042	1,762
2010	4,327	1,444	2,205
2020	5,532	1,743	2,317
School Enrollment			
Current	683	230	697
2010	972	481	998
2020	1,559	624	1,616
Vehicle Speed	35mph	24.5mph	40mph
Routine Delays	Snow/ice	Snow/ice	Snow/ice
Distance to Receptors	NA	15ft-1/2 mile	30 feet
Traffic Density			
Current	44,622	9,474	19,113
2010	51,961	12,937	31,556
2020	59,300	16,400	44,000

2.3.10 Summary of Potential Impacts

As discussed throughout this section, the transportation of waste through Churchill County has the potential for significant adverse impacts. Although the DOE considers the area rural for purposes of its risk assessment, transportation characteristics show that Churchill County has numerous features that are more similar to suburban and even urban areas. Approximately 20 miles of highway corridor passes populated areas in

Churchill County. Population densities within the 20 miles of corridor are similar to suburban and urbanized areas.

There are relatively heavy traffic volumes through the corridor particularly within the Fallon area. Traffic volumes within the most heavily populated areas in the corridor generally exceed suburban corridors and in several areas of the corridor exceed the urban traffic flows. Not surprisingly those same areas currently operate at a level of service of D or worse and is projected to remain so up to the shipment period. There are also a number of high accident locations (See Figure 2-9). Three of the five worst accident locations operate under traffic signal control and carry significant volumes of traffic with high numbers of turning vehicles. Accident types recorded for these locations indicate a predominance of rear-end type accidents. Typical of signalized intersections.

In addition to the relatively high traffic volumes and accidents along the segments of U.S. 95 and 50, the route is characterized by relatively low speeds, cross traffic movements, and signalized intersections. The major intersection at Taylor and U.S. 50 that is used by commercial truck transportation is not suitable to handle current transportation needs.

The intersection of these two highways occurs in the downtown area, a physically confined and busy center of urban commerce. The geometry of the Williams Avenue (U50) Taylor Street and Williams Avenue/Maine Street intersections is not adequate to handle semi tractor-trailer vehicle types. Curb return radii are not large enough, and lanes are not wide enough to safely accommodate turning trucks without blocking other travel lanes or climbing the curb and utilizing sidewalk areas. Roadway width and intersection geometry are inadequate for oversized vehicle traffic, and the pavement structural section was not designed to accommodate the significant load frequency it experiences. For instance, adequate breakdown lanes (shoulders) do not exist to hold large trucks and intersection curb return radii are not large enough to accommodate turning trucks (40 and 50 ft. semi tractor/trailer vehicles.)

There are a total of 6 signalized intersections in the corridor. Trucks using U.S. 95 would be required to move through two signalized intersection while trucks using U.S. 50 and

U.S. 95 would encounter 4 signalized intersections. Most of the speeds in the 18 miles of corridor are at speeds of 55 miles an hour or less to as low as 25 mile per hour. Slow speeds and signalized intersections increase the amount of time trucks carrying spent nuclear fuel would be in the corridor. Many businesses and residential housing units are within 15 to 30 feet of the highway. All of these factors contribute to non-accident radiation exposure. Additionally, most major public facilities including schools in Churchill County are generally located within .5 miles of the highway corridor. There are also several major hotels located adjacent to the highway route.

All of the aforementioned conditions makes the U.S. 95 and U.S. 50 corridors through the Fallon area an undesirable place to move radioactive waste and spent nuclear fuel. The interstate system even through urban areas is more preferable than the U.S. 50 and U.S. 95 corridor through the Churchill County and Fallon areas. As a result, any shipments through Churchill County should be done on a hazardous materials by-pass route. In 2000, the County prepared a preliminary examination into an alternate by-pass route. Several preliminary route options were considered. Additionally, preliminary estimates of construction costs were determined for various alternatives.

3.0 SOCIOECONOMIC IMPACTS

The analysis in this section focuses on local community fiscal, and economic impacts to Churchill County as a result of the construction and operation of a proposed repository at Yucca Mountain. In general, the analysis considers both direct impacts and impacts occurring as a result of special or risked induced behavior. The State of Nevada has conducted several research efforts in the area of risk-induced behaviors. Their findings shows that a high-level nuclear waste repository will be colored by the very powerful negative imagery historically associated with radioactivity. From this, it follows that the repository site, the waste transport routes, and other locations linked to the repository may become affected by the negative perceptions and imagery associated with nuclear waste, if this occurs, these places could become less desirable in the eyes of both residents and nonresidents of Nevada. Some of the principal concerns raised by the State include potential reduction in short-term visits to the region by vacationers, gamers, and convention-goers; effects on potential migrants to the state; and reduced ability to attract new business (Nevada Nuclear Waste Project Office, 1989).

3.1 Economic Impacts

Churchill County could incur economic impacts as a result of Yucca Mountain shipments. Economic impacts, which include reduced economic activity and the loss of income and jobs, are the result of:

- A decline of visitors to the area
- A decline of property value along the waste transportation route through Churchill County.

3.1.1 Loss of Local Visitors

Risk induced behavior can occur locally as a result of Yucca Mountain shipment through Churchill County. In addition to loss of economic activity, there are a host of state and

local taxes generated in Churchill County that can be reduced in the event of risk-induced behavior by visitors occurs in the area.

There are approximately 350 motel rooms in Fallon. Based upon discussions with local operators, the overall occupancy rate could be as high as 55 percent resulting in as many as 70,518 room nights per year. The average number of persons per room is assumed to be 2 based upon the Reno/Sparks Visitor Convention Authority's Annual Survey of Visitors. Therefore, the total number of estimated visitor days in the Churchill County is 141,036 annually. A portion of those visitors attend special events in the Fallon area each year. It is important to make this distinction because, those who attend special events tend to spend more and stay longer as compared to overnight travelers passing through the area.

Special Events

Table 3-1 shows the estimated number of special event visitors to the Fallon area based upon attendance estimates by the Churchill County Chamber of Commerce.

RV Park Visitors

There are approximately 100 RV spaces in the Fallon area. Average cost per night is approximately \$12.00. Assuming average occupancy is similar to the hotel/motel rate, there would be approximately 20,075 RV space rentals per year. An average of 2 persons per RV rental would result in 40,150 visitors per year.

- **Total Visitation**

Total visitation and expenditures by type of visitor are shown in Table 3-2. Fiscal impacts could also occur as a result of special or risk induced behavior in Churchill County. Risk induced behavior could directly affect Churchill County as a result of transportation of high-level nuclear waste through the area.

**Table 3-1
Special Event Visitors (Room Nights)
Churchill County: 2000**

Event	Date	Room Nights Generated
Churchill Arts Council	Season	200
Top Gun Raceway	Season	2,125
Rattlesnake Speedway	Season	250
Spring Wings	2 nd Weekend/May (5/11-13)	150
Fallon Air Show	Spring (June 2-3)	1,000
Silver State Int'l Rodeo	July (July 4-9)	2,500
Hearts O' Gold Cantaloupe Festival	Labor Day Weekend	700
Desert Oasis Music Festival	Sept 28-30	300
Desert Challenge Motorcycle Race	Sept 28-30	50
Facilities		
Churchill County Fairgrounds	Annually	2,500*
Fallon Convention Center	Annually	2,500
Attractions		
Sand Mountain	Annually	**
Stillwater Wildlife Refuge	Annually	**
Carson Lake	Annually	**
Lake Lahontan	Annually	**
Museum	Annually	**
History	Annually	**

* Estimate **Unknown

**Table 3-2
Total Visitation-Churchill County
Per Capita Day Expenditures**

	Travelers	RV Parks	Special Events
Visitor Days	116,486	40,150	24,550
Expenditures:			
Gaming	\$30	\$25	\$100
Food/Drinks	\$30	\$25	\$ 35
Shows/Ent.	\$ 2	\$ 2	\$ 2
Shopping/gifts	\$10	\$30	\$ 5
Sightseeing	\$ 5	\$ 5	\$ 1
Recreation	\$10	\$ 1	\$ 1
Lodging	\$25	\$ 6	\$ 25
Fuel	\$ 5	\$ 15	\$ 10

Results

The analysis simulates the fiscal and economic impacts due to the loss of visitors to the Churchill County area. Table 3-3 shows 10 percent decline in visitor volume annually over the course of the shipment campaign through Churchill County. Total economic activity could be reduced by \$283.4 to \$726.4 million. Total labor income would be reduced by nearly \$79.8 to \$202.2 million during the shipment campaign. State and local taxes generated locally would be reduced a total of \$11.9 to \$30.2 million.

Table 3-3
10 Percent Loss of Visitors Volume
Economic Impacts to Churchill County
During the Shipment Campaign in \$Millions

	2010-2033	2010-2048
Total Industry Impact-loss	\$204.5	\$524.2
Labor Income-loss	\$ 78.9	\$202.2
Employment-loss	98 to 301	98 to 626
Total Economic-loss	\$283.4	\$726.4
State/Local Taxes-loss	\$ 11.9	\$ 30.2

If Churchill County were to suffer even greater losses in visitor volume such as 20 percent or more, the results in Table 3-3 would be doubled.

Risk induced behavior could also affect the desirability of the area for current and future residents. No attempts were made to quantify this impact for Churchill County. However, the State of Nevada attempted to address this issue in its *Yucca Mountain Socioeconomic Project An Interim Report The State of Nevada Socioeconomic Studies, 1989*. The analysis in the report made it clear that the repository could have "special impacts" (i.e. those resulting from the hazardous characteristics of radioactive waste) on the Nevada economy. More over, the studies indicate that populations important to Nevada's economic well-being may be highly sensitive to the radioactive characteristics of the repository, and that the attractiveness of the state as a place to visit, move to, or invest could be reduced. The same can be said for Churchill County.

3.1.2 Property Value Diminution

Studies have been sponsored by the State of Nevada's Nuclear Waste Project Office (NWPO) as part of its ongoing activities to assess the impacts of the United States Department of Energy's DOE's program to transport High-Level Nuclear Waste (HLNW) and Spent Nuclear Fuel (SNF) from civilian nuclear power plants and the nation's weapons complex to a repository at Yucca Mountain, Nevada. The study sought to determine the extent of property value diminution that may occur in Clark County, Nevada as a result of the Yucca Mountain and associated transportation activities. The results and methodology have been applied to Churchill County property values to determine the potential overall impact both in terms of potential property value and property tax revenue loss (State of Nevada, 2001).

Methodology

Recent work on property value diminution has been completed for the Las Vegas area. Stigma resulting from an amplified perception of risk has been associated with all aspects of nuclear energy including nuclear waste transport and it's also been associated with a decline in property values (Gawande and Jenkins-Smith 1999). In order to evaluate the range of potential property value diminution that may result from the transportation of HLNW and SNF, a face-to-face survey was conducted of real estate appraisers and lenders for residential, commercial, and industrial property in Clark County. Results of the survey provide a potential range of property value diminution that real estate appraisers and lenders indicate may occur under various scenarios if the DOE proceeds with its plans to transport SNF and HLNW through Clark County, Nevada (see Table 3-4). Results of the survey were also used as variables in an income capitalization model to determine the range of potential impacts on commercial and industrial properties.

The survey results indicate that even under the most benign non-event scenario, property value losses are likely along the corridor, as well as, at distances of up to three miles. The survey results indicate that an accident even without a release of radioactive waste will significantly increase the rate of property value diminution. Further, if a major accident were to occur, the property value loss would be devastating according to those surveyed

in Clark County. The results of the Clark County survey were then applied to private property ownership along the transportation corridor in Churchill County.

Findings Related to Lenders and Appraisers Evaluations Under Three Scenarios

One important observation in the survey responses is the strong consistency in the estimates of property value changes provided by the two professional groups. For example, the largest difference in percent diminution of a property within the residential sector between the two groups is only 5.5 percent. The fact that two different groups, both with strong expertise in the real estate market, could be so consistent in their estimation of likely diminution effects for three different scenarios and for three different types of properties is significant. It provides one check for internal validity and lends credibility to the results.

**Table 3-4
Scenario Summaries**

Scenarios	Description
1	No accident of any kind has occurred. However, anti-nuclear environmental groups and property owners along the route (who claim that their property values will decrease) have generated considerable publicity.
2	Shipments of nuclear waste to the Yucca Mountain repository site have progressed for several years without incident. Three days after New Year's Day 2010, the driver of a truck transporting nuclear waste loses control of the vehicle and runs into the median of Interstate 15. The cask containing the nuclear waste breaks away from the trailer and skids 50 yards along the median of I-15 in North Las Vegas. The cask remains intact and no radiation is released, but the national media covers the event heavily.
3	An accident involving a truck carrying spent nuclear fuel and a gasoline tanker on I-15 near the Las Vegas Strip. The accident triggers a chain reaction collision Twenty-seven civilians, four sheriff's deputies, and seven firefighters are hospitalized after exposure to radiation at the site of the accident. Another 1,000 or more persons are exposed to radiation from the fire's radioactive plume. Experts indicate that 5 to 200 latent cancer fatalities may result from the accident. The affected highway and several access ramps are closed for four days. The two drivers of the spent fuel hauler and the gasoline tanker, and one driver-escort, died from head injuries and burns. Six months later the cleanup effort is still under way, and thousands of lawsuits have been filed. Preliminary reports estimate cleanup costs and economic losses in excess of \$1 billion.

Source: State of Nevada, 2001

The following tables show, even under Scenario 1, a no-event characterization, diminution will likely result in all three market segments of the economy—residential, commercial, and industrial (Table 3-5 and Table 3-6). The largest declines (around 4 percent) will be experienced in the residential sector within one mile of shipment routes. Declines will also be realized in both commercial and industrial properties, but less than what is likely in the residential sector. Based on survey results, property value diminution will result from the implementation of the shipment program alone along designated routes even without accident events.

Amplification of the transportation risks through heightened media attention and non-serious transportation mishaps as shown in Scenario 2 will have the effect of further increasing losses in property values of up to eight percent for residential properties, but up to seven percent for commercial office properties. Under Scenario 3 conditions, property declines may reach up to 30 percent for residential properties in the shipment corridors, but large diminution factors between 20 and 30 percent can also be anticipated for commercial office and industrial buildings as well.

For the residential property sector, appraisers and lenders suggested fear, risk, and stigma factors as principal reasons for the diminution. While worker fear may be partly responsible for some loss in property values, other factors including higher risk premiums, loss of prestige location, product tainting, and the loss of productivity in case of accidents was recognized as influencing the value of office and industrial properties according to the real estate professionals interviewed.

Table 3-5
Property Value Diminutions Under Three Scenarios, Within One-Mile Distance of a Shipment Route, and by Professional Groups

Groups	Residential		Commercial		Industrial	
	Lenders	Appraisers	Lenders	Appraisers	Lenders	Appraisers
Scenario 1	2.00%	3.50%	.56%	3.21%	0.56%	1.25%
Scenario 2	6.18%	7.96%	4.00%	7.39%	4.00%	5.29%
Scenario 3	29.00%	33.79%	22.00%	31.88%	21.25%	25.54%

Source: State of Nevada, 2000

Table 3-6
Property Value Diminutions Under Three Scenarios, Within One to Three -Mile
Distance of a Shipment Route, and by Professional Groups

Groups	Residential		Commercial		Industrial	
	Lenders	Appraisers	Lenders	Appraisers	Lenders	Appraisers
Scenario 1	.50%	1.46%	0.56%	1.25%	0.56%	0.83%
Scenario 2	1.64%	4.00%	1.00%	3.04%	1.00%	2.08%
Scenario 3	20.00%	23.65%	16.67%	20.50%	10.00%	16.73%

Source: State of Nevada, 2000

Property Value in Churchill County

Using information from the County Assessor, all parcels within approximately three miles of proposed transportation routes were identified. The Assessor's database contains appraised values for land and improvements. Because there is no depreciation schedule for land, appraised values are actual market values. Improvements (housing and buildings) on the other land decline in value each year based upon a schedule set forth in Nevada Revised Statutes. In order to adjust the appraised values back to market value, the County Assessor and appraisers provided rough estimates of average adjustments need to bring improvements in line with actual market conditions. In general, appraised values in Churchill County are about .85 percent of market value. Total appraised value was divided by .85 to create total market value. Table 3-7 shows the total amount of property value within three miles of either side of the U.S. Highway 95 in Churchill County, which is estimated to be nearly \$1.36 billion.

Table 3-7
Property Values within 3-Miles of US 95/50
Churchill County: April 2001

Land Use	Land	Improvements	Appraised Value-Land	Appraised Value-Improvements	Market Value
Residential	\$ 90,549,944	\$200,354,524	\$258,714,125	\$572,441,498	\$932,174,710
Commercial	\$ 36,917,707	\$ 73,131,048	\$105,479,163	\$208,945,851	\$351,297,812
Industrial	\$ 7,445,567	\$ 18,600,903	\$ 21,273,048	\$ 44,340,481	\$ 73,438,321
Total	\$134,918,218	\$292,086,475	\$385,466,336	\$825,727,830	\$1,356,910,843

Source: Churchill County Assessor, 2001

Most development currently is centered in and around U.S. Highway 95/50 and the City of Fallon. Future development is likely to continue to be concentrated along the highway corridor. As a result, future property values are expected to grow in relation to the population growth of Churchill County. Property values were inflated 3 percent per year throughout the shipment campaign.

Property Value Loss

Using estimated losses in Table 3-5 and 3-6, property value loss in Churchill County could be significant. Under scenario I property value loss would occur with the commencement of shipping and continue throughout the shipment period. In addition to the initial loss incurred at the beginning of the shipment campaign, other property losses occur as well each year. New development along the route would not reach its full value until the shipment campaign has ended. Table 3-8 shows projected property value loss for Churchill County for the period of the shipment campaign. Loss in property value is determined by appreciating existing property at approximately 3 percent per year. The forecasted value is then multiplied by the estimate of property value diminution in Tables 3-5 and 3-6.

Scenario I

The cumulative loss under Scenario I (Table 3-8) amounts to \$118.9 million to \$18.7 million for a shipment campaign extending from 2010 to 2033, and a loss of \$185.2 million to 29.09 million for a campaign shipment from 2010 to 2048.

Scenario II

The losses in Scenario II are significantly higher. The methodology used to calculate such loss is the same as used in Scenario I. The Churchill County area might see one accident as involving Yucca Mountain shipments over the course of the shipping campaign. Because such an accident could occur at any time, Scenario II could affect property value throughout the life of the shipment campaign. Projected property value loss and the resulting loss in property taxes under a non-release accident scenario (Scenario II) are shown in Table 3-8.

Table 3-8
Property Value and Tax Loss
Resulting from Property Value Diminution
Churchill County

	Shipping Campaign 2010-2033		Shipping Campaign 2010-2048	
Scenario I	High	Low	High	Low
Value Loss	\$ 118.9 million	\$18.7 million	\$185.7 million	\$29.09 million
Tax Loss	\$ 18.5 million	\$ 2.91 million	\$ 38.8 million	\$ 6.1 million
Scenario II				
Value Loss	\$276.0 million	\$51.8 million	\$430 million	\$80.7 million
Tax Loss	\$ 43.0 million	\$ 8.1 million	\$ 90.2 million	\$16.9 million

Property Tax Revenue

In addition to the loss in property value, Churchill County would incur declines in property tax revenues. The total estimated loss of property tax revenues from the beginning of the shipment campaign and covering a period of 24 to 39 years is shown in Table 3-8 for Scenario I and II.

The losses in property value and hence property tax revenue could be significantly higher if an accident situation as described under Scenario III were to occur. The extent of the losses is difficult to estimate without knowing when an accident might occur.

The total number of Yucca Mountain shipments through Churchill County is expected to range from approximately 5,450 to 19,193. As a result, there could be at least one accident involving Yucca Mountain shipments over the life of the campaign. Because an accident could occur at any time, it is reasonable to assume that Scenario II as described in Table 3-4 could apply throughout the shipment campaign. It is uncertain as to how many, if any, accidents would result in a release of radioactivity. Therefore, it is difficult to make any estimates at all for Scenario III. It should also be noted that accidents in other locations could have the same affect along other transportation routes throughout Nevada.

3.2 Fiscal Impacts

Direct and Indirect Impacts from Transportation Activities

There are five general categories of fiscal impacts. They include: (1) costs incurred by Churchill County for emergency management and response capabilities, (2) general governmental and administrative impacts, (3) losses in state services due to resources allocated to oversee and monitor Yucca Mountain related activities, (4) losses in visitors and declines in visitor related tax revenues, and (5) losses in property value and associated declines in property tax revenues.

3.2.1 Emergency Management and Response

With the total number of radioactive waste shipments possibly ranging from 5,450 to 19,200, local emergency response personnel need to be adequately trained and equipped to handle potential accident situations. This analysis focuses on emergency response capabilities of local agencies in Churchill County and the financial resources required to develop and maintain adequate capabilities throughout the life-time of the Yucca Mountain shipping campaign. It identifies the type of equipment, personnel needs, and planning and coordination requirements. Currently, Churchill County is not adequately equipped or trained to respond to incidents involving radioactive materials.

Information contained within this cost analysis is intended to provide a realistic future cost estimate to adequately equip and maintain emergency response capabilities for Churchill County over the life of the Yucca mountain shipping campaign. Additionally, the analysis provides a suggested inventory of the types of equipment, personnel and training needs for Churchill County.

There are three principal cost categories considered in this analysis. They include communications, response equipment, and management, and training.

Equipment and Costs

Table 3-9 summarizes the type of communications equipment needed, the quantity or number of units required, estimated cost per unit and total costs for acquisition.

Additionally, a replacement estimate is made for each type of communications equipment. The replacement period generally ranges from 3 to 7 years depending on the type of equipment. Local emergency management personnel made cost estimates for communications and response equipment. The quantity of equipment required is generally based upon estimates of the number of response personnel likely to be involved in a situation or who will likely utilize such equipment during an emergency. Other miscellaneous communications equipment generally includes service charges, equipment maintenance and repair, battery reconditioning, and various minor equipment needs.

Table 3-9
Churchill County
Communications Equipment Requirements (in 2000 dollars)

Equipment	Quantity	Cost/Unit	Total Cost	Replacement
Pagers with service	50	\$500	\$25,000	5yrs
Satellite Phone	4	\$14,000	\$56,000	5yrs
Radio Repeaters	2	\$15,000	\$30,000	Life Time
Hand Held Multi-Ch. Radios	30	\$1,400	\$42,000	7yrs
Portable Computers	4	\$2,500	\$10,000	3yrs
Vehicle Radios	20	\$2,000	\$40,000	5yrs
Cellular Phone-service charge	40	\$300	\$12,000	Annual
Other Miscellaneous			\$2,500	Annual

Table 3-10 shows specialized response equipment needed for emergency situations involving radioactive wastes. This table generally includes the types of equipment that Churchill County either currently does not have or must spend additional funding in order to acquire and maintain adequate response capabilities. The cost estimate in Table 3-10 assumes that Geiger counters and dosimeters will be donated and maintained by DOE.

To acquire a sufficient number of dosimeters may cost an additional \$100,000. Other miscellaneous equipment and supplies include traffic control equipment, foam, spill containment supplies, and other minor items needed to adequately equip emergency responders.

**Table 3.10
Churchill County Response Equipment**

Equipment	Quantity	Cost/Unit	Total Cost	Replacement
Vehicles/Trailer	1	\$60,000	\$60,000	7yrs
Ion Chamber Survey Meter	4	\$1,585	\$6,340	5yrs
Confined Space Gas Detector	4	\$1,845	\$7,390	5yrs
CMS Chemical Analyzing Kits	1	\$2,641	\$2,641	5yrs
Binoculars	20	\$150	\$3,000	7yrs
Geiger Counters	20	NA	DOE	NA
Dosimeters	350	NA	DOE	NA
Personal Protective Eq. II Suits	30	\$750	\$22,500	3yrs
Personal Protective Eq. I Suits	10	\$5,250	\$52,500	3yrs
Air Cylinders 60 minutes	40	\$1,000	\$40,000	5yrs
Other Miscellaneous			\$25,000	5yrs

Table 3-11 shows related planning, management and training expenditures. The analysis assumes that approximately .5 FTE of the emergency management director's position will be dedicated to the management of Yucca Mountain related shipments. Local law enforcement will provide a smaller planning and management effort, about .1FTE, respectively. Costs for these positions are based upon current wages and benefits paid by Churchill County. The planning and supply category contains expenditures related to notification and coordination of exercises, reproduction of printed materials, public awareness programs, and plan updates and revisions. The cost for training instructors for courses held in Churchill County is estimated to be \$45,000 annually.

This analysis also assumes that reimbursement of lost wages and benefits due to training requirements will occur. The analysis contains an estimated number of training days for local emergency response personnel. For awareness level training its is assumed that 2 training days for approximately 100 volunteers will be required annually. The number of training days (615) multiplied by the average wage per day (\$130 per day) results in the total training cost reimbursement required. The average wage per day is provided by the Nevada Employment Security Department, Research Division. Annual per diem expense is calculated by multiplying the total number of training days (615 days) by \$100 per day. Per diem includes mileage, meals, and accommodations.

**Table 3-11
Planning/Management and Training Requirements
Churchill County-Annual Expenditures**

Equipment	Quantity	Cost/Unit	Total Cost
Emergency Management Dir.	.5	\$64,900	\$32,450
Sheriff's Department	.10	\$52,250	\$5,250
Planning-Supplies			\$15,000
Training Requirements:			
Training Course Instructors			\$45,000
Awareness Level Training Days	100 Training days	\$130/day	\$13,000
Operations Level Training Days	100 Training days	\$130/day	\$13,000
Technician Level Training Days	150 Training days	\$130/day	\$19,500
Radiology	80 Training days	\$130/day	\$10,400
Hospital/EMS	40 Training days	\$130/day	\$5,200
Other	20 Training days	\$130/day	\$3,040
Exercises	50 Training Days	\$130/day	\$6,500
Per Diem/travel	615 Training days	\$100	\$61,500

Results

Current cost estimates in Table 3-9, 3-10 and 3-11 were inflated by 3 percent annually throughout the life of the proposed shipment campaign to determine an annual costs beginning in 2010 through 2048. The three percent inflation rate was also used to inflate replacements items. Table 3-12 shows the results of the analysis both in terms of the total amount of funding required of the shipment campaign and as a discounted current dollar amount. Total annual expenditures were discounted by 5 percent over the life of the shipment campaign to derive a current dollar amount. In other words the current dollar amount would be a one-time payment made at the beginning of the shipment campaign which would provide a sufficient level of funding to meet the expenditure requirements over the life of the shipment campaign.

**Table 3-12
Funding Requirements
Churchill County Emergency Response**

	2010-2030	2010-2048
Total Expenditures	\$15.9 million	\$30.2 million
Current Dollar @5%	\$10.0 million	\$13.1 million

3.2.2 General Government

In addition to the emergency response functions required, Churchill County is likely to incur costs related to general administrative functions. It is uncertain as to what extent such impacts will occur, but they could be substantial over time. Many of the governmental impacts are captured in the emergency response cost analysis described in the previous section.

3.2.3 Loss of State Services

Increases in state expenditures have already occurred and will likely continue to occur in the future. The State has prepared initial estimates of expenditures incurred by various state agencies including NDOT, NDMV, and the Public Service Commission, etc. Nevada residents will forgo benefits in the form of services, state funded programs, and capital improvements in order to fund additional oversight activities associated with the repository program. Since most of Nevada's tax revenues are distributed based on population estimates and population growth, it is appropriate to use a per capita method to allocate lost benefit to Churchill County residents.

Recent estimates made by the State of Nevada in a report entitled *The Fiscal Effects of Proposed Transportation of Spent Nuclear Fuel on Nevada State Agencies, 1998* calculated the estimated cost for four state agencies for the first three years of an accelerated shipment campaign which was approximately \$498 million. Many of the cost incurred by these state agencies are recurring costs. As a result, they were projected forward through the shipment campaign period at an appreciated rate of 3 percent resulting in a total estimated cost of \$1.2 to \$1.66 trillion over the life of the shipping

campaign. The Churchill County portion of the estimated cost based upon the per capita method of allocation is \$47.1 to \$92.2 million in lost benefit.

Additionally, the State could incur fiscal impacts as a result of risk-induced behavior associated with repository transportation through Clark County and the proximity of the repository to this growing urban area. Because the State relies heavily upon gaming related revenues, substantial losses to the State's revenue resources could occur from risk induced behavior and the decline in the number of visitors willing to come to Clark County. State government operations (general fund) are highly dependent upon sales and gaming tax.

3.2.4 Fiscal Impact from Special Effects

3.2.4.1 Property Tax Revenue

In addition to the loss in property value described in Section 3.1, Churchill County could incur declines in property tax revenues as well. The total estimated loss of property tax revenues from the beginning of the shipment campaign and covering a period of 24 to 48 years is shown in Table 5. Total property tax revenue losses to Churchill County could be as high as \$90.2 million over the course of the shipment campaign.

The losses in property value and hence property tax revenue could be significantly higher if an accident situation as described under Scenario III were to occur. The extent of the losses is difficult to estimate without knowing when an accident might occur and or the prolonged effects of a release scenario.

3.2.4.2 Fiscal Linkages to other Local Governments (Clark County) and State of Nevada

Waste transportation in other areas of the State, particularly Clark County has the potential to affect Churchill County if risk induced behavior actually occurs. There are a number of tax revenue sources that are collected local and redistributed or shared through formula allocation. In cases where tax revenues are exported from Clark County, a decline in economic activity and visitor volume as a result of risk induced and stigma

affects has the potential to impact other areas of the State. Five local tax revenues sources have been identified as potential exports from Clark County to Churchill County and other counties in Nevada.

Sales Taxes

This tax is based on 1.75% of gross receipts from taxable sales and on sales price of taxable items purchased out of state. This tax is mandatory statewide. The revenue distribution to each county and city is based on statutory formula that consist of guaranteed and non-guaranteed counties. In accordance with the statutory formula, the guaranteed counties are guaranteed their current level of receipts plus the lesser of the increase in statewide SCCRT collections or the sum of the growth in population and the change in CPI. The non-guaranteed counties share in the remaining distribution basis on their proportionate share of collections. As such, it is expected that the percentage of the rural guarantee payment is likely to increase as a percentage. It has averaged 6.72% of the total collection over the past four years. If there were a significant decrease in SCCRT collections, the non-guaranteed counties distributions would directly bear the financial burden. The non-guaranteed counties would be frozen at their current distribution and feel the effects of the loss of purchasing power due to the change in CPI.

Churchill County's proportionate share of SCCRT distributions has been declining, as our local growth in taxable sales has not kept pace with the statewide growth. The County's proportionate share in FY 99 was 0.722% compared to the estimated FY 02 amount of 0.648%. The average over the four-year period is 0.678%.

Assuming an annual growth factor of 2.5% of SCCRT collections over the period of analysis and the Clark County tourist/gaming factors 50% of the Clark County collection, would impact the estimated SCCRT revenues and result in the following losses

SCCRT Tax

- Projected loss 2010-2033 \$7,406,102
- Projected loss 2010-2048 \$14,831,642

School Distributive Fund

Under the Nevada Plan the State guarantees basic support to school districts to insure each Nevada child receives a reasonably equal educational opportunity. The formula allows a guaranteed amount of basic support. Simplified, the districts receive a fixed dollar amount per pupil. The amount is established by the state legislature. The amount has increased on average 2.83% for the past six years. The FY 2002 per pupil amount is \$4,894 and \$5,017 for FY 2003. In order to determine the estimated fiscal linkage of negative impacts for the period under review, an enrollment growth rate of 2.5% was used for the next four years and no growth in enrollment thereafter. In light of the average increase of 2.83% in the per-pupil funding, the model assumes an annual increase of 2.5%. Gaming and visitors to Clark County provide an estimated 35 percent of all revenues for k-12 schools in Nevada. A 10 percent reduction (3.5%) in the amount provided by visitors/gaming to Clark County could have significant impacts on all school districts in Nevada. To estimate individual impacts to the Churchill County school district, it is assumed that the ratio of Churchill County students to all students would remain the same of the course of the shipment campaign. Students enrolled in Churchill County schools comprise about 1.43 percent of all students in K-12 public schools in Nevada. Therefore, the loss to Churchill County schools would be approximately 1.43 percent of the total projected loss to the Distributive School Account.

Churchill County Schools

- Projected loss 2010-2033 \$30,825,842
- Projected loss 2010-2048 \$64,679,330

Cigarette and liquor tax

Cigarette Tax: This tax is levied upon the purchase or possession of cigarettes by a consumer in the State of Nevada at the rate of 17.5 mills per cigarette as allowed in N.R.S. 370.165. This revenue is remitted to the Department of Taxation and apportioned to the first tier based on population. Based on projected growth of Cigarette Tax revenue at 3% annually and Mineral County maintaining a proportionate share of population to the state at 1.3 % for the period of analysis the following is the estimated loss in cigarette tax revenue:

Liquor Tax: This tax is levied upon the purchase or possession of liquor as outlined in chapter 369 of the N.R.S. This revenue is remitted to the Department of Taxation and apportioned to the County in proportion to their respective populations. This tax is levied upon the purchase or possession of cigarettes by a consumer in the State of Nevada at the rate of 17.5 mills per cigarette as allowed in N.R.S. 370.165. This revenue is remitted to the Department of Taxation and apportioned to the first tier based on population. Based on projected growth of Cigarette Tax revenue at 2.25% annually and Churchill County maintaining a proportionate share of population to the state at 1.25% for the period of analysis. The following is the estimated loss for cigarette and liquor tax revenue:

	Cigarette/Liquor Tax
• Projected loss 2010-2033	\$486,196
• Projected loss 2010-2048	\$533,949

State Games License

State Games License is distributed equally to all Nevada Counties. State Games License is an annual fee on all games to be operated in any calendar year. Clark County is estimated to provide about 78 percent of gaming revenues in the State. As a result, an equal distribution of State Games License creates a situation where Clark County exports tax revenues to other counties. Therefore a 10 percent reduction in gaming activity could result in a loss to Churchill County of \$463,386 to \$854,743 over the course of the shipping campaign.

Fuel Taxes

Gas taxes are levied at the Federal, State and Local level. Currently, there is 51.5 cents per gallon excise tax on the purchase of gasoline in the State of Nevada in Mineral County. This excise tax can be broken down as follows: Federal Tax of XY cents, State Tax of YX cents and the Local options of 9 cents. Various laws govern the collection and distribution of this tax.

State 5.35 cents:

Of the total gas taxes levied at the state level, 5.35 cents is apportioned back to the counties. The apportionment of the 5.35 cents is broken down into three separate levies: 1.25 cents, 2.35 cents and 1.75 cents. The 1.25 and 2.35 cent levies are governed by N.R.S. 365.180 as to creation, and 365.550 for distribution. The current distribution formula is based on ¼ of proportionate Area, Population, Vehicle Miles traveled, and Road Miles. The 1.75-cent levy is created in N.R.S. 365.190. The distribution in accordance with N.R.S. 365.560 is based upon proportionate Assessed Value. For the sake of this fiscal linkage study, these three tax sources were blended using historical data to determine the proportionate share of County to the overall state wide collection based on the current formulas. As such, Churchill County's proportionate share is 2.44% to the state total. Applying a historical growth rate of 2.5% annually to the total collections, Churchill County would experience a reduction in gas tax over the course of the shipping campaign:

	Fuel Taxes
• Projected loss 2010-2033	\$2,346,800
• Projected loss 2010-2048	\$4,669,750

3.2.5 Highway By-Pass Construction

Preliminary estimates of construction costs for the highway by-pass include design and construction for the screened routes involved and utilize measures of significant cost features and typical "unit costs." The most significant cost elements of roadway construction are the roadway surface itself, the earthwork required for construction of the

roadway surface, the right-of-way necessary for the right to construct the necessary roadway section, and the structural features necessary along the roadway alignment.

The preferred 40-ft. roadway section, suitable for supporting significant truck traffic, was used to develop unit costs where new construction was required. Removal of the structural section, embankment material, and replacement of the structural section was assumed, but costs for moving earth within the right-of-way were included. Roadway drainage requirements were estimated on a per-mile basis, as were utility impact costs. Irrigation ditch or canal crossings were tabulated for each alternative, and structure costs were assigned based on the tabulations. Cost to a typical mile of route results with costs of approximately \$1,200,000 per mile for new construction \$1,400,000 per mile for reconstruction along existing routes. Right-of-way costs proved a significant element when route costs were estimated. For purposes of this initial cost estimate, right-of-way along existing, more developed routes was assumed to cost \$0.50 per square foot to acquire. Cost of right-of-way for new alignment, in less developed areas, was assumed to be \$0.10 per square foot (Table 3-13). The preferred HAZMAT Route is shown in Figure 3-1.

Summary of Fiscal Impacts

Table 3-14 summarizes the various fiscal impacts expected to occur in Churchill County as a result of waste being shipped directly through Churchill County as well as other areas of the State, and the construction and operation of a repository. The fiscal impacts are calculated for the length of the shipping campaign. Certain impacts such as those described in the fiscal linkages discussion could continue beyond the shipping campaign because they are also tied to the operation of a repository. Such impacts could continue indefinitely.

**Table 3-13
Alternate Cost Estimates**

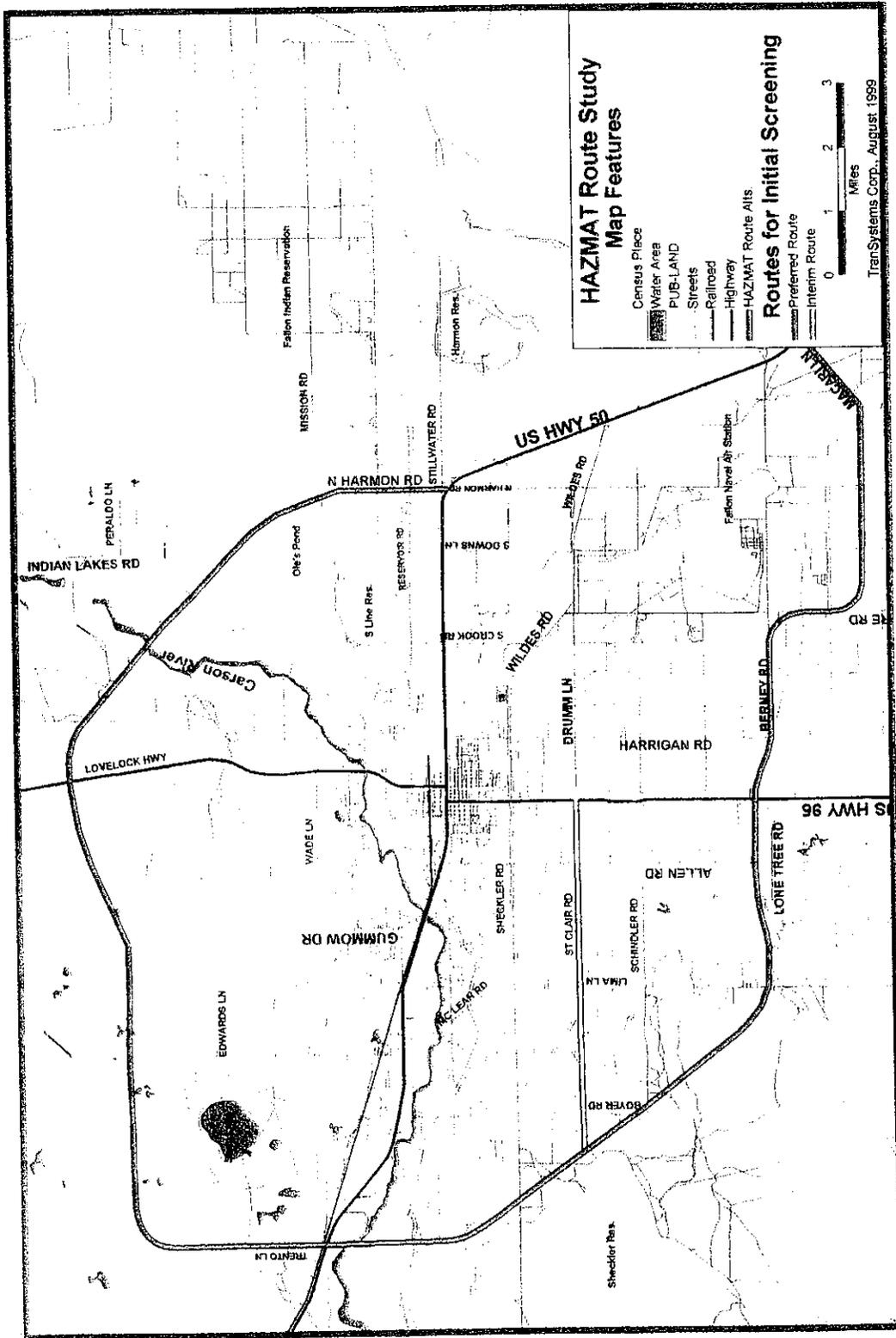
Route Alternative	Length of Existing Road (mi)	Length of New Road (mi)	Estimated Quadrant Cost
Southwest Quadrant			
Alternative B	0.3	13.5	\$16,284,494
Alternative C	5.7	0.0	\$8,054,893
Alternative C1	7.0	0.2	\$10,068,988
Alternative E	2.0	6.5	\$10,496,861
Northwest Quadrant			
Alternative B	3.7	6.5	\$12,899,197
Alternative C	4.0	4.6	\$11,080,969
Northeast Quadrant			
Alternative C	5.2	2.5	\$10,298,548
Southeast Quadrant			
Alternative B	6.5	2.6	\$12,253,638
Alternative C	6.3	0.0	\$8,902,777
Alternative C1	3.8	0.0	\$5,369,929
Alternative E	7.5	1.4	\$12,250,669

Source: Fallon/Churchill Count Regional Intermodal Bypass Route Study

**Table 3-14
Total Fiscal Impacts**

Type of Impact	2010-2033	2010-2048
Emergency Management	\$16.0 million	\$ 30.0 million
Loss of State Services	\$47.1 million	\$92.2 million
Fiscal Linkages	\$41.54 million	\$85.59 million
Property Diminution		
Scenario I	\$2.91- \$18.5 million	\$38.8-\$6.1 million
Scenario II	\$8.1-\$43.0 million	\$16.9-\$90.2 million
Visitor Spending	\$11.6 million +	\$29.8 million +
Total Fiscal Impacts	\$119.11-\$159.24 million	\$243.69-\$327.8

Figure 3-1 Preferred HAZMAT Route



In summary, there are five categories of fiscal impacts associated with the repository program. Emergency management identifies the total cumulative costs incurred by Churchill County every year during the course of the shipping campaign. The loss of State services relates to the lost benefit Churchill County would have received because State resources are being used to monitor, oversee and mitigate certain elements of the repository. Fiscal linkages identify current tax revenues received by Churchill County that are in part generated in Clark County. As a result, transportation through Clark County and the operation of a repository could limit economic activity. In turn reduced economic activity will produce lower tax revenues. Property value loss as a result of waste shipments along Nevada corridors will result in a temporary reduction in property tax revenues. Finally, risk induced behaviors could reduce the number of visitors willing to stay in the Churchill County area. As a result, both economic activity and generation of tax revenues could result.

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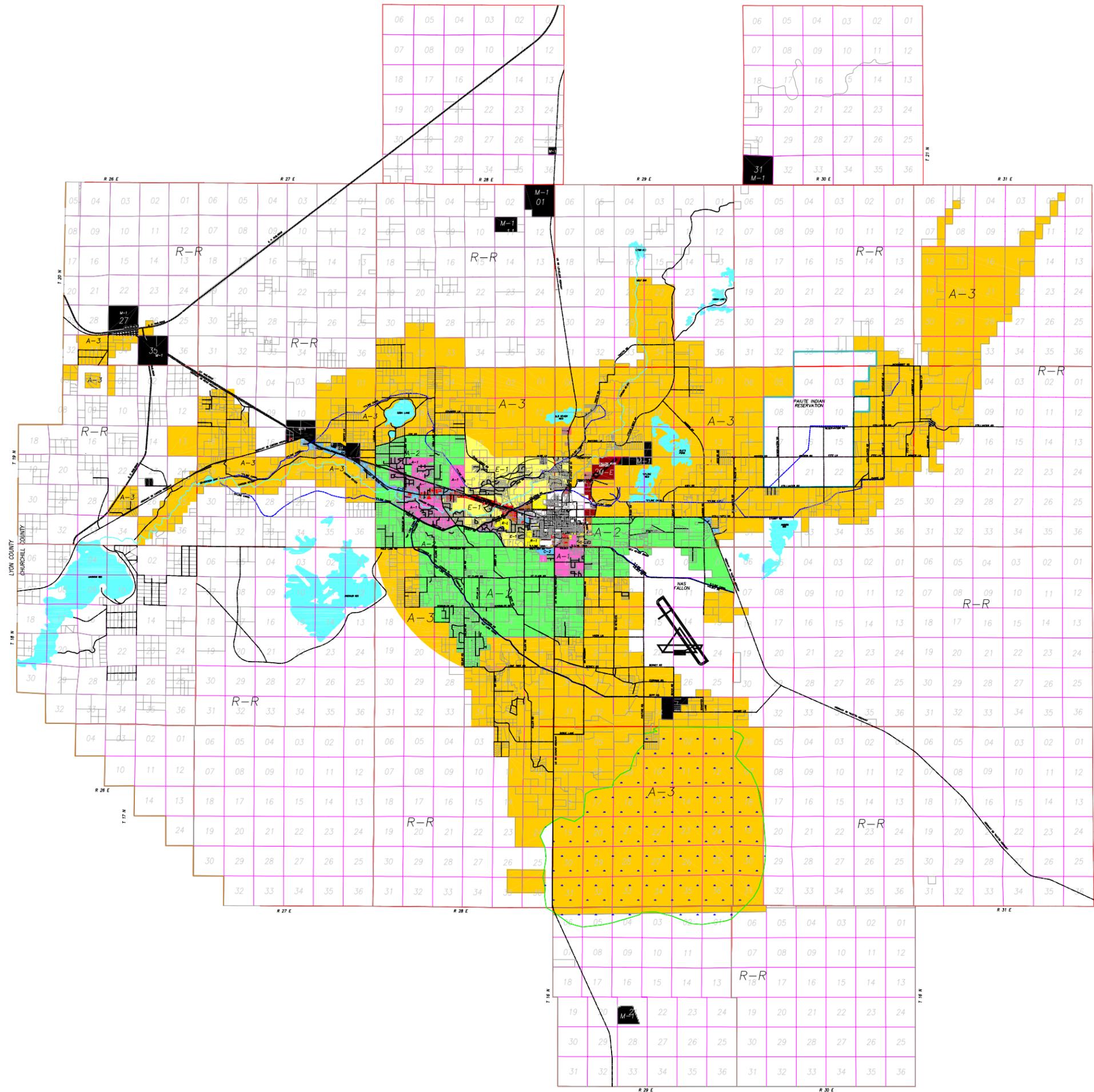
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ZONE LEGEND

[White Box]	R-R	Rural Resource
[Yellow Box]	A-3	Third Agriculture
[Green Box]	A-2	Second Agriculture
[Pink Box]	A-1	First Agriculture
[Light Green Box]	A-1-E	Extended First Agriculture
[Orange Box]	E-1	First Estates
[Light Blue Box]	R-1	Single Family Residential
[Light Purple Box]	R1-MH	Single Family Mobile Home
[Red Box]	R-2	Multiple Residential
[Dark Red Box]	C-1	Residential Commercial
[Blue Box]	C-2	General Commercial
[Black Box]	M-1	General Industrial
[Dark Red Box]	M-E	Limited Industrial
[Blue Line]		Canal
[Black Line]		Road
[Wavy Blue Line]		Rivers & Lakes

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