EXECUTIVE SUMMARY

The Eureka County Rail Corridor Impact Study identifies construction and operation issues associated with development of the Carlin Alignment, a proposed U.S. Department of Energy (DOE) rail route that would transport high-level nuclear waste and spent nuclear fuel from the mainline Union Pacific Railroad to the proposed Yucca Mountain repository in southern Nevada. This alignment originates near Beowawe and continues southwest across Eureka County for approximately 18.5 miles before entering Lander County near the Cortez Gold Mine. The Department of Energy has conducted several studies of the potential transportation routes since 1990, with the most recent being the February 2002 Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada. This Department of Energy Environmental Impact Statement (FEIS) describes the general impacts of the entire 325 mile Carlin Alignment, as well as impacts associated with the state and national transportation systems and the Yucca Mountain repository. The FEIS also outlines potential approaches that could be considered by Department of Energy to mitigate environmental impacts.

In 2003 Lumos & Associates Inc., in conjunction with Parsons Brinkeroff, agreed in contract to prepare a Rail Corridor Impact Study to gather and evaluate detailed, on-the ground land use information about the potential impacts of rail corridor construction and operation on specific parcels as well as on the adjacent communities that may be affected by the project. The Rail Corridor Impact Study also identifies potential barriers to implementation and construction such as ground water flows, flood plains, existing and proposed wells, and air quality during construction and in the event of accidental release of radiation.

Several physical and environmental constraints could affect construction of the Carlin Alignment in Eureka County including floodplains and intermittent streams which are abundant throughout the corridor. In addition, alteration of ground water levels near the Cortez Gold Mine has caused ground subsidence, which has resulted in the formation of surface fractures. Existing infrastructure and public improvements in the area include up to ten unpaved roadway crossings, the airstrip at Crescent Valley, a power transmission line site bisecting the valley, and storage of hazardous materials near the Union Pacific Railroad mainline track east of Beowawe.

This report is meant to identify impacts and factors that may affect the area and communities near the rail corridor during the preliminary engineering process. While the physical elements appear to be limiting factors to development of the alignment, extensive land use, social, and economic factors have been identified. Land use activities, local traffic circulation, road crossings, wildlife migration and habitat, grazing patterns, noise, and view shed disturbance are some of the factors identified as impacted by this proposed project.

1.0 INTRODUCTION

The Yucca Mountain Project began in the 1970's when it was determined that nuclear waste disposal was going to be needed in the near future in the United States. Although many different sites throughout the United States were considered, by 1987 focus was directed toward the southern Nevada Site known as Yucca Mountain.

While the Yucca Mountain location and associated repository has been envisioned for many years, the methodology for transportation of the waste and routing has been under study only more recently. In 1990 a Preliminary Rail Access Study was completed evaluating ten separate corridors throughout Nevada that could supply rail access to the Yucca Mountain Site. The criteria for this study were based upon land use conflicts and access to regional rail carriers. Three routes were identified as having the least potential conflicts, the Carlin, Caliente and the Jean routes.

In 1996 the Nevada Potential Repository Preliminary Transportation Strategy was concluded, it evaluated four routes and included commercial and operational analysis of passenger and freight transportation.

In February 2002 the final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High Level Radioactive Waste at Yucca Mountain (FEIS) was released. The report described the repository as well as the transportation infrastructure that would be required to transport the waste to the site. This study was broad in scope and it did not detail the potential land use

The Carlin Rail Corridor is proposed in proximity to the townsite of Crescent Valley

conflicts that could be created by implementation of this rail corridor. It did however indicate the need for additional studies and analysis once a specific rail alignment was selected.

In the FEIS, the Department of Energy selected rail as its preferred mode of transportation. Because there is no rail access to the Yucca Mountain Site, a spur would have to be constructed from the Union Pacific mainline to Yucca Mountain. This sequence of events made the Carlin Corridor in Eureka County a potential route.

In the FEIS, the Department of Energy selected "mostly rail" as its preferred mode of transportation. Because there is no rail access to the Yucca Mountain site, a spur would be constructed from a mainline to Yucca Mountain. In the FEIS, the Carlin route is one of five rail corridors evaluated in the Nevada transportation analysis.

On December 29, 2003, the Department of Energy issued a Federal Register "Notice of Preferred Nevada Rail Corridor," which announced that the Caliente rail corridor is the Department's preferred corridor in which to construct a rail in Nevada. The Carlin route was identified as "a secondary preference."

On April 8, 2004, the Department of Energy issued Federal Register Notices announcing its decision to use "mostly rail" nationally and in Nevada, and its intent to prepare an Environmental Impact Statement on the Caliente rail corridor. If the Caliente rail corridor proves to be infeasible, the Carlin corridor, as the secondary preference, would be scoped and studied.

In 2001, consultants for Eureka County prepared an "Impact Assessment Report on Proposed Shipments of Spent Nuclear Fuel and High-Level Radioactive Waste through Eureka County, Nevada." This report examined the following items:

- Potential impacts of construction of the "Carlin Spur" rail corridor;
- Potential impacts of regular operation of nuclear waste shipments along the corridor, and
- Potential impact of accidents with release of radioactive materials on the human and natural environment of Eureka County.

Carlin Spur Corridor (Eureka County)

While the Impact Assessment Report identified and analyzed many potential impacts, it was meant to be a preliminary survey of anticipated impacts, effects and possible needs for mitigation, done within the constraints of available resources and information regarding the project. The Assessment Report identified an ongoing need to obtain and analyze updated information pertaining to the rail corridor and project area.

Eureka County was designated as an Affected Unit of Local Government under the Nuclear Waste Policy Act of 1982 and has received funding to perform additional studies to assess the characteristics associated with the construction and implementation of the Carlin Alignment to the area. The Rail Corridor Impact Study identifies potential barriers to implementation and operations including ground water flows, flood plains, existing and proposed wells, and air quality during construction and in the event of accidental release of radiation.

This Rail Corridor Impact Study has been conducted by a select group of professionals with differing areas of specific technical and scientific expertise in the related fields associated with the components of this report. The process began with extensive data collection and review of existing studies and analyses previously performed on the study area, further evaluation and consideration of the existing conditions and potential changes/impacts were then identified. After the research and data collection review and evaluation was completed, extensive fieldwork was undertaken to identify proposed elements and document findings and inventory resources. Following the completion of this analysis, the group's technical information and findings were compiled into this report for Eureka County.

The purpose of this Rail Corridor Impact Study is to gather and evaluate details, on-the-ground land use information about the potential impacts of the rail corridor construction and operation on specific parcels, as well as on the adjacent communities that may be affected by this project.

2.0 STUDY AREA

LOCATION & LIMITS OF STUDY AREA

The study area is located in northern Eureka County near the Lander County border. The proposed alignment originates near Beowawe and continues southwest across Eureka County for approximately 18.5 miles, just east of Crescent Valley. This area of the County exhibits relatively flat terrain with surrounding mountain ranges delineating valley areas. The entire Carlin Alignment is approximately 323 miles in length. (See map in Appendix G, Figure 12) For purposes of this study, an area of 1.5 miles on either side of the centerline has been delineated as study area, for a total width of 3 miles.

HISTORY

What is on the ground in Crescent Valley today does not necessarily indicate the level of past or future economic activity. The Crescent Valley area shares the distinctive economic conditions of much of central Nevada, in which mineral exploration and development lead to a "boom and bust" economic cycle, moderated by ranching and agriculture. In assessing the potential socioeconomic impact to Eureka County of the rail construction and operation within the Carlin corridor, it is necessary to take the cyclic nature of the local economy into account and to assess both historic activity and future plans.

Maiden's Grave adjacent to proposed rail corridor

Current work plans for Eureka County's ongoing Yucca Mountain impact assessment effort call for a detailed cultural resources survey along the potential rail corridor in fiscal year 2004-2005. This will include location, evaluation and assessment of historic and prehistoric cultural and archeological resources along the proposed corridor route, so this level of assessment is not offered here. Instead, the aim of the following is to offer a brief description of historical American activities in northern Eureka County and the Crescent Valley area as a basis for further work.

Mining, cattle and sheep ranching have been the principal economic activities in Eureka County from the beginning of Euro-American settlement up to the present. The development of railroads, both the intercontinental routes along the Humboldt River and a narrow-gauge line, the Eureka and Palisade Railroad, tied these endeavors together and allowed shipment of products. The following sections describe each of these activities.

RANCHING

Cattle ranching began in northern Eureka County in the mid-nineteenth century. Ranches originally were established to supply nearby mining camps with meat and produce. With the completion of the transcontinental railroad in 1869, cattle and sheep were shipped from the towns of Beowawe and Palisade on the intercontinental route to more distant markets.

In Nevada's dry climate the location of water determined the location of ranches. In an oral history interview [ECHP 1993] LeRoy Etchegaray, discussing the original ranches of Eureka County, says. "...They settled where there was water," and Molly Flagg Knutsen [Knutsen, p. 50] writes, "Homesteads were located in such a way as to include creeks and springs, for without water the land was worthless." Settlers took out Homestead Act claims on sections of land that had springs or running streams, which became the center of the ranch, with grazing carried out in the mountains and valleys surrounding the home ranch. The first cattle raised in central Nevada were Texas longhorns, a breed that can go without water for long periods. As ranches were settled and water sources developed, other breeds such as Hereford and Angus predominated.

Ranch in Eureka County in corridor area

Typical irrigated ranch & hay production in corridor area

In the days before automobiles and interstate highways, early ranches in Eureka County raised a much greater variety of livestock and crops than they do today, supplying food to ranch inhabitants and selling surplus to mining camps. Large vegetable gardens were a part of many homesteads, and some ranches had orchards. Early ranch life was quite self-sufficient: Pietrina Etchegaray [ECHP 1993] says that during childhood on the Damele Ranch, the family visited town (the town of Eureka) only twice a year.

Soon after the original establishment of cattle ranching in northern Eureka County, another industry, sheep herding, grew up to take advantage of the open range. Sheep herding became an important business in Eureka County in the early 20th century, and many ranches were consolidated into sheep raising operations. The history of the Eureka Land and Livestock Company, reported by Isadore Sara, Jr. [ECHP, 1993] describes this process. Bought by Isadore Sara, Sr., and a partner from a previous owner in 1910, the outfit had 28,000 sheep by 1928. The

company owned several ranches in Eureka County, and according to Albert Sara, Jr, "[sheep from the Eureka Land and Livestock Company] went right into Carlin, and they went every inch on their own ground." To the south, the company's herds ranged down into central Nye County. Lambs were driven to the railroad at Beowawe or Palisade in the fall; wool also was shipped from these points.

Sheep and cattle ranching reached their height as industries in northern Eureka County around the 1920's. After that, several factors led to the industries' decline. Over the early years of cattle and sheep grazing on the arid range of central Nevada, portions of the range were severely over-grazed. The passage of the Taylor Grazing Act in 1934 brought grazing on public land under the control of federal land management agencies, and in some areas, depending on range and forage conditions, this led to cutbacks in the number of grazing animals permitted. Climate changes or fluctuations also may have led to deterioration of the range: several of the ECHP interviewees describe the early twentieth-century environment in Eureka County as wetter than presently, describing springs and streams that have dried up within their lifetimes. [ECHP 1993 Etchegaray p.25]

But perhaps the greatest blow to the livestock industry in Eureka County in the early 20th century was the Great Depression. Leroy Etchegaray says that his family "[sold] all their cattle and just [hung] on." [ECHP, 1993] And in a memoir [ECHP1993, Baile p.56] Albert F. Baile writes,

> "Sheep raising on a large scale continued until the early 1930's, when it went into decline. The Depression of 1929 had caused wool and lamb prices to drop to the point that many of the sheep men went broke. Added to that was the fact that the ranges were badly depleted due to overgrazing. This was the reason that the Taylor Grazing Act was put into effect for the purpose of regulating the number of sheep and cattle that could be run on certain areas."

Some Eureka County ranches have now been operated continuously for over 130 years, and the livestock industry in Eureka County has continued to evolve. Ranches have changed hands many times, with some smaller ranches consolidated into larger operations. Eureka County ranches have served as investments for owners from outside the region. San Francisco financier Dean Witter owned the Horseshoe Ranch, in northern Crescent Valley near Beowawe, from 1936 to 1953. While sheep still graze Eureka County ranches in the summer, many of the animals are trucked to California's Central Valley in the winter [ECHP, Sara, p.46]. Agricultural endeavor in Diamond Valley, near the town of Eureka, has switched from cattle and sheep ranching to raising alfalfa and timothy hay on land irrigated by groundwater pumping. Some large ranches have been folded into mining operations: the TS Ranch in northern Eureka County north of the Humboldt River is owned by Newmont Gold, and Cortez Joint Venture grows hay on the Dean Ranch in southern Crescent Valley on land irrigated with water from the Cortez Mine's dewatering operation.

Ranches in the Crescent Valley area in the vicinity of the proposed rail corridor include the Horseshoe, Dean, Sansenina, Strickland, Roberts Creek, Horse Ranch, JD, Dewey Dann Ranch, Dull Ranch and others. In background information prepared

for the 2001 Impact Assessment Report, the potential effect of the corridor on the continued utilization of grazing allotments by these and other ranches is presented [Fletcher, 2001]. This historical sketch also creates a picture of the ranching industry and community in northern Eureka County, as well as the impacts of the proposed rail corridor could have on this industry. It is recommended, however, the upcoming cultural resources survey, further develop information about the cultural and historic resources potentially present on specific ranches.

Cortez mine

MINING

The convention of establishing mining districts to protect and legalize mining claims and transfers originated in California's Mother Lode during the California Gold Rush and was adopted in Nevada by miners on the Comstock, from which it spread to the rest of the state. There are six mining districts located in the Crescent Valley area: Cortez/Tenabo, Buckhorn, Beowawe, Modarelli-Frenchie Creek, Roberts, and Safford [Tingley 1998, np] See Appendix A, both Figure 1 and Figure 2. All of them have seen exploration and mining activity in the past. Principal products have been gold and silver, but mercury, iron, barite, copper, lead, zinc, turquoise and geothermal energy also have been extracted. Today gold mining continues in the Cortez District, and exploration activities are taking place in the Buckhorn and Beowawe Districts.

Buckhorn

The Buckhorn district is situated on the west slopes of the Cortez range in the eastern side of Crescent Valley, about five miles east of Cortez. Gold was discovered at Buckhorn in 1908, and in 1910 Nevada mining magnate, George Wingfield, purchased all holdings in the area. Between 1914 and 1916 ore was mined and milled onsite, with the mill powered by electricity from a 700-horsepower steam plant in Beowawe. [Bentz, 1983]

The district was described in 1983 by Bentz: "Mines, prospects and drill holes are scattered throughout the canyons and low ridges occupying the northwest quarter of the Horse Creek valley 15' quadrangle, but the extensive underground workings and glory holes which comprise the central district are located in section 31 T27N R49E. The entire property consists of 7,700 acres of patented and un-patented lode claims."

There was another surge of activity at the mine during the 1930's, Bentz reports that "since that time there has been sporadic mining of the deposit and some reworking of dump materials, " and additional exploration work also took place in the 1980's and 1990's. [Bentz, 1983: Dailey, 1994]. Bentz reports "the total known production for the deposit through 1950 is 39,024 oz.[silver] and 311,278 [gold] and some minor copper ." Currently, the Nevada Bureau of Mines and Geology [The Nevada Mineral Industry 2002, P. 14] reports that 1,498 mining claims were staked in the south Buckhorn District in 2002.

Cortez

The Cortez mining district is located in the Cortez Mountains above Crescent Valley. Silver was initially discovered at Cortez in 1862, then in 1863 Simeon Wenban led a prospecting party to the area and the party located a substantial silver ledge. In 1864 Wenban formed a partnership with George Hearst and the company became one of three operating in the mining district. A stamp mill was built in nearby Mill Canyon. Mining activity by various companies increased in the district through the 1920's [Hall,1994, p.81] and the mining camp had a population approaching 400 people. When silver prices dropped in the 1930's the mines were closed, the mill shut down, and the Consolidated Cortez Company folded. Sporadic mining activity by leaseholders continued, however, and in the 1960's new gold mining activity in the district began.

Cortez Mining Complex

Heap leach pad, Cortez complex

The Cortez Mining district is now the location of the Cortez Gold Mines, a joint venture of Kennecott Minerals Company and Placer Dome U.S. There are three units at the site, the Cortez open pit and the Pipeline and South Pipeline operations. The mine complex, described by Kennecott, is "a complex of several open pit mines that uses carbon-in-leach, oxide heap leach, and roasting technology for gold recovery. A new mill was constructed to process the Pipeline ore at a rate of 9,280 tons per

day. The new mill facility includes crushing, grinding, carbon-in-leach and carbon-in-column circuits and gold ore' casting."

The Nevada Division of Minerals reports production from the Cortez mine at 1,081,677 ounces of gold in 2002. Placer Dome reports that "at December 31, 2002, Cortez had a projected mine life of 10 years." Over 450 mining and production personnel work at the Cortez mine, commuting there primarily from Battle Mountain, Crescent Valley, Carlin and Elko.

Beowawe

Mining activity in the Beowawe district centers in and around the town of Beowawe. The geology of the area is characterized by extensive inactive and active hot springs systems and the mineralization associated with these systems. The Red Devil Mine, located about one mile south of Beowawe, produced more than 132 flasks of mercury between 1929 and 1932. The Sansenina Barite Mine, located about two miles east of the town of Beowawe, produced about 30,000 tons of barite through 1980 [Bentz, 1983]. Beowawe is also the location of the currently operating Oxbow Geothermal Power Plant, operated by CECI/CVG. This power plant came on line in 1985, and has a production capacity of 16.6 MW [The Nevada Mineral Industry 2002, P. 56]. The power plant is located about 5 miles southwest of the town of Beowawe.

The Nevada Bureau of Mines [The Nevada Mineral Industry 2002, p.56] reports that Atna Resources Ltd. has optioned a 100-claim (2,000 acres) Beowawe gold property. The property is located about 4 miles east of Newmont's Mule Canyon Mine, to the north of the town of Beowawe. Geochemical and geophysical investigations are taking place on the property, with drill testing planned.

Safford

The Safford mining district is located in the vicinity of Barth, west of the town of Palisade in Safford and Palisade Canyons. The major mine in the district is the Barth iron mine at the Barth railroad siding. An outcropping iron ore body was discovered here some time prior to 1869. The first major production of this mine was between 1903 and 1918; the American Smelting and Refining Company recovered approximately 550,000 tons of iron ore. The mine was abandoned for a number of years, then reopened in the 1960's when a new ore body was discovered and the Humboldt River was rechannelized, alleviating previous flooding problems at the site. Between 1960 and 1964 almost 600,000 tons of ore were shipped from the site. More than $200,000 worth of silver was produced from two other mines in the district, the Onondaga and Zenoli Mines. [Tingley, 1983 p. 179]

Modarelli-Frenchie Creek

This mining district is located in the Cortez Mountains, southeast of Frenchie Creek about 22 miles south of Palisade. The district is named for the Modarelli (Amarilla) iron mine, which stopped operations some time before 1953. It is reported, "The Modarelli and immediate area is one of the largest if not the largest potential iron area in Nevada." [Nevada Bureau of Mines and Geology ref. # 41000028 np]

Roberts

The Roberts Mining District is located on the western slope of the Simpson Park (Dry Creek) Mountains, south of McClusky Pass and north of Walti Hot Springs. The district was organized in 1870 with the discovery of the O'Dair Mine, later called the Keystone. Copper, silver, lead and zinc were produced in the district, but production never was large. Exploration in the district continued through the 1980's [Tingley 1983 np]

RAILROADS

The nation's first transcontinental railroad, the Central Pacific, runs along the Humboldt River in northern Eureka County. Central Pacific tracks reached the section of the Humboldt River meadowlands now a part of Eureka County, in 1868. The Western Pacific Railroad was completed through the area in around 1908: the two railroads maintained parallel tracks through the area until Union Pacific acquired both tracks.

Beowawe farm & ranch area

Beowawe

The arrival of the Central Pacific tracks in 1868 led to the formation of the town of Beowawe, which was established to serve as a camp for railroad construction workers. A post office came to Beowawe in 1870, and the town became a shipping point for ore from the Cortez, Buckhorn and Gold Acres mining districts. Beowawe's geothermal resources were utilized by 1916, in a steam plant that supplied power to a cyanide mill in Buckhorn. Beowawe also served as a shipping point for sheep and cattle from surrounding ranches. The town supported two grocery stores, a hotel, and a school, and the population reached a high of around 200 [Hall 1994, p.6] in the early twentieth century. Through the 1950's, Beowawe served as a home base for Southern Pacific and Western Pacific section crews and eventually a pump house was constructed there. Former resident Martin Milano reports a population of 75 to 100 people in Beowawe in 1951 [ECHP 1993, Milano]. The advent of diesel engines, however, and the railroads' switch to roving crews signalled the end of Beowawe's days as a railroad town.

Two miles east of Beowawe is a historical site, the "Gravelly Ford" where the Emigrant Trail and the Donner Party crossed the Humboldt River. There was a

railroad workers camp at Gravelly Ford for a short time with a population of about 42 that supported a store, restaurant, and telegraph station [Hall, p.22].

Another town, Palisade, was established about 18 miles east of Beowawe, at the mouth of the Palisade Canyon on the Humboldt River. Palisade served as a stop on the transcontinental railroad, and is described in an 1879 guidebook [Williams 1879 np] as "a growing little place between the wall rocks of the river, [that] has a population of from 150 to 200 souls. It has one or two hotels or lodging-houses, stores, saloons, and two large freight depots. The new station house, the finest on the road is used by both the Central Pacific and Eureka & Palisade Railroad."

Palisade was the terminus for an 84-mile-long narrow gauge railroad, the Eureka and Palisade, which ran through Pine Valley, to the east of Crescent Valley, to the town of Eureka. The railroad, completed in 1875, was built to carry ore from the Eureka mines and smelters for transfer to the Central Pacific in Palisade. The railroad also provided passenger, mail, and freight service to residents of Eureka and the remote ranches and mining camps along the route. Both the intercontinental tracks and the Eureka and Palisade were washed out in a "wet mantle" flood in 1910. Contemporary photographs show water up to five feet deep inundating the town of Palisade, and a 30-mile-long lake filled Pine Valley. [Myrick 1962, p.101] While the intercontinental railroads reopened soon after the flood, the Eureka and Palisade Railroad was closed for two years. The railroad's fortunes rose and fell with the mining industry in Eureka, and the line passed through several ownerships before suspending operations in 1938.

Palisade had a population close to 600 in the 1870's, and about 242 people lived there in 1915, but the closure of the Eureka and Palisade in 1938 signaled the end of the town. The post office closed in 1961, and today the town still exists with a few residents.

3.0 LAND USES

GENERAL LAND USE

Eureka County is approximately 4,182 square miles in size with 81% of that land managed by federal agencies (Bureau of Land Management and the United States Forest Service). The public lands are primarily used for grazing, mining, energy generation and recreation. Land use patterns within the County have evolved from economic activity such as mining and agriculture, with limited private land resources. See the Land Use map in Appendix B, Figure 3.

The single greatest land use within the County is open space agricultural. 90% of the land is utilized for grazing pastures or crops. Mining represents the second largest land use encompassing 23 mining districts, as seen in Appendix A, Figure 2.

CURRENT LAND USES

The communities involved in this rail corridor impact study are best described as rural in nature with pockets of population located in areas based upon services and community centers. As described within the previous historical section of this report the past development of this area was centered on the supply of water, its availability and quantity. While most historic settlement followed these criteria, little has changed today with development still centered on services and the ability to obtain them. The northern area of Eureka County is primarily described as an agricultural rural area with limited services and dispersed points of mining and support services. While this area was once agriculturally based, it is now strongly driven by mining and the associated products and services that support it.

Small communities like Crescent Valley and Beowawe have maintained their presence throughout the cyclic times of mining, providing differing services and uses to the surrounding communities over the years. While their specific needs have changed throughout history they have continued to maintain a residential base contributing to the population of the county.

Much of the county's private lands and subsequent tax base are located in this area of the county. While numerous parcels have been developed in this area, hundreds are in private ownership yet to be developed and occupied. People have come to this area over the years for a variety of reasons, including the seclusion, rural beauty and isolation of the area, or to retire.

The community of Crescent Valley was subdivided in the early 1950's and marketed to people throughout the United States as the perfect future retirement community. Flying individuals into the Crescent Valley airstrip and entertaining them at the local Ranch House Inn furthered this marketing effort. As the prospective buyers were treated to entertainment and amenities, they were

encouraged to select the perfect parcel from a map, with little down payment and a long-term payment schedule. While some would call this a "land scam," this process was very successful and hundreds of now retirement age individuals are coming to this area to locate their parcels and potentially retire there.

Over the years numerous individuals have come to the Crescent Valley area to claim their land and have fostered a unique and different development of the area. In a homestead like fashion, these pioneers have moved onto their sites, with little to no services or amenities, and have constructed their private utopias. The limited restrictive process for development that this area enjoys, creates tremendous appeal to individuals relocating from more populated, urbanized areas. Some have come to enjoy the seclusion and tranquility, while others have escaped from the pressure of everyday life to bask in the open serene environment that this area has to offer. The common element that is shared by all of these people, is a healthy respect for their individuality, independence, privacy and existing quality of life that they have in this area. See Property Owners map in Appendix B, Figure 4.

Of the general land use currently within the proposed rail corridor study area, there is a mixture of residential, agricultural, commercial, industrial and public land uses. These land use areas are:

RESIDENTIAL

The residential uses within the study area are best categorized as Single Family residential lots composed of mostly mobile home type structures with limited stick built houses. The Crescent Valley town also includes a mobile home parks/recreational vehicle park that supplies housing to the area. The remaining residential land use is associated with large parcel residential and agricultural residential uses in the area. These residential areas are single-family residences associated with ranches or large parcels that have been developed to provide seclusion and privacy to the owners. As indicated in the history section of this report, this region was originally settled as a ranching area with numerous agricultural activities and open range grazing, some of which remains today.

Residential agriculture area

AGRICULTURAL

Agricultural land uses occupy much of the study area. Large-scale ranching activities, used for the cultivation of crops, primarily hay and forage and also cattle and livestock grazing are scattered throughout the northern Eureka County area, and are found specifically in the study area. Limited residential uses are associated with these operations and usually include primary owner's residence, workers' quarters and accessory dwellings.

The area supports wetlands and a high water table

COMMERCIAL

Commercial uses located in the study area are primarily service oriented, supplying goods and services to the communities of Crescent Valley and Beowawe. These uses include a general store and gas station, automotive repair, bar with limited gaming, public hot springs, Postal Service contractor, and additional home businesses and services.

Rail area, Beowawe

INDUSTRIAL

Limited industrial uses are located within the study area, many of which are in support of the main industry of mining. While numerous small mechanical operations and services are located near these mining operations, this industry is strongly supported by the existing mine, extraction, exploration and milling(leaching) operations. Additional industrial uses in the area include oil extraction, propane and gas storage and distribution and rail operations.

PUBLIC

The public uses within the study area encompass a wide variety of facilities and services. These include: Eureka County's health clinic, justice facility (court, sheriff's substation), sheriff station, town hall complex (library, historical society, water billing and town administration office), fire station, airport, fairgrounds, senior center, elementary school and maintenance facility, all of which are located in Crescent Valley. Additional public facilities are also located in Beowawe, which include fire station, maintenance facility, closed school, library, and associated housing. Eureka County also operates a waste disposal transfer station north of Crescent Valley.

FUTURE LAND USES

Future land uses within the study area can best be described as a continuation of previous development and industry types. With mining claims and exploration on the rise in this area, additional industry and support services are envisioned to expand in this area in the years to come. Commercial services and support industry normally follow mining expansion as well.

Residential development will be required to meet the expansion demands of growth. This existing vacant residential stock will be acquired initially, followed by development of additional housing.

Public services were planned for this area with the anticipated future growth. The facilities and services are adequate to sustain additional growth and development through 2010 according to the Master Plan.

As a part of the Eureka County Master Plan 1997 update, the community identified specific key issues and goals. The communities of Crescent Valley and Beowawe identified the following critical items at a public meeting:

- Infrastructure
- Equitable investment throughout the county
- Control of electrical service prices
- Construction and maintenance of county roads
- A sewer plant

- A new water tank and associated wells
- Transportation (airport, ambulance and roadways)
- Improvement in Emergency Response

Additional concerns and comments were recorded with respect to retaining minimal regulation and/or zoning to manage growth, controlling density of developments, and their compatibility with adjacent land uses. Standards for development in specific areas were also a concern stated by the north county residents, focusing on the uniqueness of the area and the individuality of the communities. The Planning Commission of Eureka County acknowledged these concerns and further supported them by specifically encouraging infill development to limit sprawl, identification of population centers to give location of development and promotion of consistent land use patterns ensuring the compatibility of adjacent land use development.

As a significant component of the Eureka County Master Plan, numerous goals and policies were included to guide the future development of the County. These goals were focused on the development of land around and adjacent to the existing service areas and established communities. The goals further encouraged preservation of community character and quality of life through orderly and balanced development, and discouraged incompatible development and land uses. Development that minimizes impacts to sensitive areas was also included in the Master Plan Goals and Policies as well as the support of infill development and development within existing services areas and communities.

While the land uses in the study area have not changed significantly over time, it is clear through the existing development patterns and future land uses as prescribed in the Master Plan that future population expansions will be guided toward the existing rural communities, and immediately surrounding areas. As the communities of Beowawe and Crescent Valley continue to grow and expand, agriculture, ranching and mining will continue to take place, as will the associated fluctuations in the industry. These communities will grow and will supply those who choose to retreat to the seclusion of the area, telecommute, establish on line businesses, or just escape from the race of life, a quiet, serene rural community.

SUMMARY

It is apparent that continued migration to this area is historically based and will dictate future uses. People continue to come to this area for:

- Scenery
- View
- Isolation
- Rural Character
- Quality of Life
- Open Space of Valley
- Peacefulness
- Quietness

Scenery, view, isolation, rural character...

- Independence
- Individuality

If the rail line were to be placed on this route, many existing, as well as potential, property owners would be directly affected in numerous ways. While there are numerous physical impacts and associated factors that would be visible and apparent, there are even more socially disruptive impacts created. Listed below are a few factors identified:

- At-grade crossings – dangerous
- Separation of Land Uses & Communities
- Incompatibility of Land Uses
- Noise & Air Quality
- Visual Modification
- Wildlife Migration
- Ranching / Separation
- Reduction in Property Value
- Emergency Response time impact

Airstrip in Crescent Valley.

Separation of consistent land uses and community structure is damaging and fragmenting to a community. The entire social fabric is compromised by such acts and the community integrity can be potentially damaged, even lost. This combination of incompatible land use infringement and community fragmentation is not healthy for any community or area.

4.0 SOCIO-ECONOMIC

INTRODUCTION

As a part of the Impact Assessment Report on Proposed Shipments of Spent Nuclear Fuel and High Level Radioactive Waste through Eureka County, Nevada, prepared for the Board of Eureka County Commissioners in 2001, an Economic Impact Analysis was conducted by Robert R. Fletcher. This report evaluated the potential impact of corridor construction, operation, and accidents on current economic activity in the county.

Fletcher concluded that the rail corridor construction and operation would result in an estimated loss of $45,707 to the local economy through the loss of 852 AUM's of grazing, and a smaller loss of $89.93 per recreational visitor for every overnight recreational visitor no longer utilizing the area due to the rail corridor. The report further finds that location and operation of work camps for rail construction would have a small positive stimulus to the local economy while in operation, and permanent switching facilities built at Beowawe would have a permanent effect. The report recommends that further work be done to identify impacts of the project so that the county can plan for additional services, which might be required once the rail line becomes operational.

Private lands

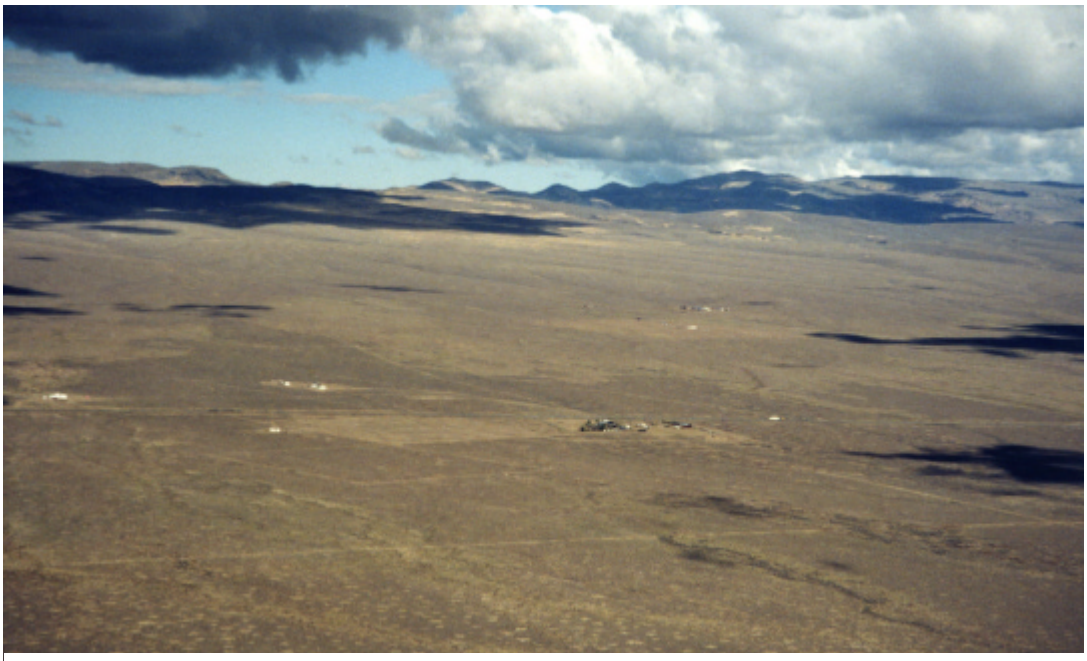
The purpose of this report is to review the Fletcher report, the 2001 Impact Assessment Report, and other documents and expand certain aspects of the impact evaluation in order to give Eureka County sufficient information to plan for the potential effects of the project.

The Department of Energy will need to purchase a presently unknown amount of private land in Crescent Valley in order to obtain a right-of-way for the railway. While property owners will presumably be fairly compensated for their land based upon federal policies and procedures, a secondary impact of this land purchase will be a loss of property tax revenue to Eureka County. Almost 81% of the land in

Eureka County is public land managed by various federal agencies [Eureka County Master Plan, 1997]. Private land in the county is concentrated in the north, much of it in the "checkerboard" pattern that resulted from the federal government's 19th century land grants to the transcontinental railroads. Crescent Valley contains a significant proportion of this private land: it is estimated that 54% of the land crossed by the Carlin Corridor within Eureka County is private [Fletcher, 2001].

If the corridor is constructed, the County will simultaneously lose property tax revenue from private lands purchased for the corridor, while at the same time potentially be required to provide additional county services such as enhanced emergency response at a radiological level. In the section below the potential loss of tax revenue to the county from land purchase for the rail corridor is estimated.

Private land adjacent to the corridor will suffer a diminution in value due to its proximity to the SNF and HLW shipments; this will in turn affect county revenues. Based on previous studies and reports, the Eureka County Assessor has estimated that "property values within a three-mile corridor of the rail line in Eureka County could be negatively impacted by three percent." [Fletcher, 2001] This potential diminution in value is explained and amplified below.



Crescent Valley

PROPERTY VALUE DIMINUTION

The Department of Energy maps indicate a route for the rail corridor that leaves the Union Pacific tracks at Beowawe, runs south through Crescent Valley, then passes into Lander County just south of the town of Crescent Valley. Much of the private land in Eureka County is in the "checkerboard" pattern that resulted from the federal government's 19th century land grants to the transcontinental railroads in order to encourage development of the transcontinental routes. Since Crescent Valley is immediately south of the transcontinental rail route, the area contains a significant proportion of this private land. The town of Crescent Valley is laid out on one square of the "checkerboard."

The Department of Energy will need to purchase private land in Crescent Valley in order to obtain a right-of-way for the railway: it is estimated that 54% of the land crossed by the Carlin Corridor within Eureka County is private (Fletcher, 2001). Further, the Impact Assessment Report on Proposed Shipments of Spent Nuclear Fuel and High-Level Radioactive Waste through Eureka County, Nevada (IAR), reports that**,** "60% of assessed private parcels in Eureka County are within 10 miles of the proposed tracks" (IAR, p. 61-62.) Even if it is assumed that property owners will be fairly compensated for land taken for the rail corridor based upon federal land acquisition policies and procedures, a secondary impact of this land purchase will be a loss of property tax revenue to Eureka County. In a county in which almost 81% of the land is public land managed by various federal agencies (Eureka County Master Plan, 1997) and not subject to taxation, this may mean a significant loss in tax revenue. Further, property not purchased for the corridor but adjacent to it may diminish in value due to the risk and perception of risk associated with the shipments, over a number of years, of nuclear materials. This would also lead to a loss of property tax revenue for Eureka County.

In order to offer an initial assessment of the range of loss of property tax revenue to the county, the following assumptions and rough calculations were made. To estimate the amount of private land that will be purchased for the railroad right-of-way, maps obtained from DOE showing the proposed rail alignment were merged with county assessor's maps and files showing land parcels, acreage, ownership, and assessed value. It was assumed that rail right-of-way would include a minimum of 100' on either side of the rail line, and that any privately owned parcel shown on the resulting map to be within this 100' of the rail line would be purchased in its entirety by the federal government. The accompanying map entitled, "Privately Owned Parcels Potentially to be Acquired for Right-of-Way" in Appendix Figure 5 shows these parcels. A GIS mapping process yielded a list of these parcels with their current (2003) assessed value. (Assessed value in Nevada is taxable value multiplied by the level of assessment, currently 35%). The FY 2003-04 property tax rate in Eureka County is 1.7773. The assessed valued of the parcels was multiplied by the tax rates in order to arrive at an estimated property tax loss to Eureka County of $4,837 at 2003 tax rates and at the current level of development of the parcels. Table 1 on page 23 shows more detailed results of these calculations. The third column in the table shows that most of the parcels are currently unimproved.

In addition to the loss from the tax rolls of private property purchased for the rail corridor right-of-way, private property close the corridor is also expected to diminish in value by up three percent. This estimated diminution in value of three percent was established by the procedure described below.

Assessing and estimating the effect of the proposed Yucca Mountain Repository on private property values throughout affected areas of Nevada has been a part of overall state efforts regarding the repository. In December, 2001, Urban Environmental Research, LLD, completed a Clark County Property Value Report on the effects of the Department of Energy's Proposal to Ship High level Nuclear Waste to a Repository at Yucca Mountain.(UER 2001) This study took a three-pronged approach to estimating the potential diminution in value to private property near the two freeways in Las Vegas along which HLW and SNF would be shipped to Yucca Mountain: a survey of existing (2001) literature regarding the range and magnitude of effects on property value of hazardous waste shipment and operations; a survey of Clark County real estate appraisers and lenders regarding their professional judgment of property value diminutions in several alternate scenarios, and a survey of Clark County residents.

This study found that Clark County could experience assessed property value diminutions "ranging from $75.2 million to $526.5 million for three types of properties – residential, commercial, and industrial. Within this range, the projection depends on the route selected and whether the shipment campaign proceeds without incident or whether an incident occurs but does not result in the release of radioactive material." (UER 2001) Similar studies were repeated in Washoe and Elko Counties, using percentage diminution estimates developed in the Clark County report.

In the "Impact Assessment Report on Proposed Shipments of Spent Nuclear Fuel and High-Level Radioactive Waste through Eureka County, Nevada" (IAR), impacts of construction and operation of the rail corridor are analyzed. As a part of this, the Eureka County Assessor's Office was asked to estimate the possible diminution in property values adjacent to the proposed rail corridor. The IAR reports:

> "Based on a review of a separate analysis prepared for the state of Nevada regarding Clark County (UER2000) Eureka County's assessor estimates that property values within three miles of the rail corridor and the UPRR tracks would be adversely affected by three percent (Fletcher, 2001). Thus, the net value of property in Eureka County within three miles of the UPRR tracks and the proposed spur would decrease from $8,893,521 to $8,626,715 (Mears, pers com 2001). In the absence of an accident, the diminution of property values would occur with the commencement of shipping SNF and HLW, and continue through the shipping period."

In the IAR, the Eureka County Assessor's Office was further asked to estimate potential diminution in property values if an accident occurred on the rail corridor during the shipment of waste. The IAR reports:

"Extrapolating from the study of Clark County, an accident without the release of radioactivity would significantly decrease property values (in the range of one to eight percent, depending upon the use of the property and its proximity to the accident), and an accident with the release of radioactivity would result in a much larger loss of property value (from ten to 34 percent, again depending upon use and proximity). Eureka County estimates that the net value of private property within three miles of the existing UPRR tracks and the proposed Carlin spur would decrease, in the event of an accident with a release of radioactivity, from $8,893,521 to $6,047,594 (32 percent) (Mears, pers. comm., 2001)"

The table below shows the range in potential diminution of property value and loss of property tax revenues to Eureka County with the construction and operation of the rail corridor. While the largest potential losses in value would be in the event of an accident, even regular operation of the rail corridor for the shipment of nuclear waste would result in diminution of property value.

Table 1 Potential Property Value and Property Tax

Potential Loss of Private Property Value And Property Tax Revenue in Eureka County with Construction and Operation of Carlin Rail Corridor			
2003 value of private parcels potentially to be purchased for alignment (see Table 1 in Appendix C)		**$**	**777,723**
Private parcels up to three miles from tracks:			
Eureka County Assessor's Office estimates reported in IAR	Estimated value diminution with regular operations	**$**	**266,806**
	Estimated value diminution in the event of an accident	**$**	**2,845,927**
Range of potential loss of private property value			
Est. value of purchased parcels plus est. value diminution of parcels w/in three miles	With regular operations	**$**	**1,044,529**
	In the event of an accident	**$**	**3,623,650**
Range of potential loss of property tax revenues to Eureka County			
est. assessed value of purchased parcels plus est assessed value of diminution times 2003 tax rate (.017773)	With regular operations	**$**	**6,498**
	In the event of an accident	**$**	**22,541**

5.0 FLOODPLAIN

DRAINAGE

The proposed Yucca Mountain Carlin rail corridor is located within a portion of Crescent Valley, characterized by mountain ranges to the east and west. The valley predominately slopes south to north and discharges into the Humboldt River. The lower portions of the valley have little vegetation and are mostly alkali flats or playas. The upper areas have moderated grass and sagebrush cover, vegetation conditions subject to frequent natural range fires.

SOILS

The Federal Emergency Management Agency

Eureka County is a member of the National Flood Insurance Program (NFIP) Management Program and has adopted regulations pertaining to construction within the Federal Emergency Management Agency (FEMA) designated 100-year floodplains.

FEMA has mapped this portion of Eureka County. A large area of flooding is indicated, flowing north and south on the current FEMA maps. The proposed rail corridor is located within or adjacent to the FEMA-mapped flood zones its entire length within Eureka County. See Appendix D, Floodplain Location maps Figures 6-9. FEMA designated A zones are areas inundated by the 100-year storm event where Base Flood Elevations (BFE's) have not been determined. Presumably waters entering this flood zone originate in the mountainous areas on both the east and west sides of the valley.

The existing Union Pacific Railroad through Beowawe parallels the Humboldt River. Portions of this track at the point of connection with the Yucca Mountain rail are located within the Humboldt River 100-year floodplain as defined by FEMA. This flood zone is also an A zone, therefore BFE's have not been determined.

Discussion with local residents reveals that the lower elevation areas of the valley are frequently flooded with standing water depths, up to two feet, during wet conditions.

The NFIP requires that the project obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source. Also the project, as it is greater than five acres in size, will be required to calculate the base flood elevations. Development within 100-year flood zones requires that the project be designed not to increase the BFE by more than one foot over existing conditions or significantly affect adjacent parcels.

SUMMARY

The project will parallel or cross two FEMA designated 100-year floodplains along the entire rail corridor in Eureka County. FEMA will require a detailed hydrologic analysis to determine 100- year design flows. Utilizing this data, a detailed hydraulic analysis is necessary to determine the base flood elevation prior to development of the project and estimate the changes in flood elevations for the proposed condition. This work should be conducted utilizing a sophisticated hydraulic model, such as the Army Corps of Engineers River Analysis System (HEC-RAS). Because detailed topography is not available, a detailed topographic map should be prepared extending laterally the entire width of the floodplain in order to conduct the hydraulic model.

Additionally the project will cross many defined and undefined individual drainages, where the alignment is between the basin headwaters (mountains) and the floodplain (valley). Each of these drainages should be studied to determine the runoff from each basin as well as a hydraulic analysis to size appropriate drainage structures, such as culverts and bridges. A study would be needed to explore these options, remembering this document was created to identify the issues, not to solve the problems the proposed alignment creates.

Eureka County Floodplain

6.0 GROUND WATER HYDROLOGY & WELL INVENTORY

INTRODUCTION

The purpose of this portion of the report is to develop a detailed water resource inventory within one and a half miles on each side of the proposed rail route. The inventory includes identification mapping of surface waters, wells, springs, seeps, reservoirs, and infiltration facilities at the Cortez Mine. We documented the pertinent water resource information that includes location, description of the resource, use, well depth, water level, reservoir capacity, seepage information, stream capacity, stream type, and recharge areas. Information was obtained through existing documentation, interviews, and field surveys. The end product is a Geographic Information System (GIS) spatial database that will be invaluable to analyze impacts of the proposed rail project.

Natural Springs in Crescent Valley

Major Documents researched for this investigation include:

Eureka County Water Resources Data Base

Converse Consultants prepared this study in 2002 for Eureka County and the Yucca Mountain Information Office consist of an Internet-based database for water resources in the County of Eureka. The study area includes sixteen Nevada Division of Water Resource (NDWR) ground water basins of which the rail corridor passes though the only one in Eureka County, the Crescent Valley Basin (Basin 54). The study primarily referenced existing well data from the NDWR and United States Geological Survey (USGS).

United States Geological Survey

We conducted database searches of available USGS information on wells, springs, hot springs, and streams.

Nevada Division of Water Resource (NDWR)

Well logs were searched in the NDWR office to supplement data contained in the Eureka County Water Resource Data Base.

Cortez Environmental Impact Study

The Cortez Gold Company prepared an Environmental Impact Study (CEIS) to expand their operations in 2002. This study included a list of wells and springs within the area of the Dean Ranch in Eureka County. The CEIS also included locations and description of recharge areas. The above data was incorporated into the GIS database.

FIELD WORK

GPS Survey

The Eureka county-owned Trimble Global Positioning System (GPS) was utilized from this field study, accurate to three feet in horizontal position to locate known (visible) wells, springs, and streams. Finding visible wells was accomplished by NDWR's well log information in addition to interviewing local residents were interviewed and areas actually visited where there were potential water wells. Most of the locations were taken within approximately 20 feet of the wellhead, although some wellheads were not accessible due to the wells being located on private property and the owners were not available. The locations were cross-referenced with NDWR data to the extent possible based on section, description, location, and ownership. The GIS database includes a column indicating whether the data point was field surveyed.

Springs

Springs were identified by the USGS quadrangle maps, visually inspected in the field, and surveyed. The hot springs identified in the GIS are currently utilized for individual residential uses such as heating homes and domestic hot water. Approximately five miles west of Beowawe is another geothermal area known as the Beowawe Geysers. The Geysers were developed into a geothermal plant in the mid 1980's and produced approximately 94,000 MWH in 2002 or approximately seven percent of commercial geothermal operation in the State of Nevada according to the Nevada Division of Minerals. It is not known if the hot springs in Crescent Valley could be developed into commercial geothermal resources, however given the proximity to the Beowawe Geysers, it may be possible.

Streams

Streams noted on the USGS quadrangle map were visually inspected and characterized as continuous or intermittent. Typical channel characteristics were noted and included in the database along with stream length and average slope as determined by USGS mapping. Where appropriate, culvert sizes are indicated in the database. The point where the stream was visually inspected is indicated spatially in the database.

An attempt was made to identify all streams shown on the USGS quadrangle maps entering the rail corridor. Identifying stream location and characteristics on the west side of the valley was easily accomplished due to the streams crossing under State Highway 306 and the relatively narrow stream channels. Streams entering the corridor from the east are much less defined and become shallow sheet

flow as the stream enters the alkali flat. While many streams are shown on the USGS quadrangle mapping, only a few streams were identified in the field.

SUMMARY

Results from the extensive record search and field survey are included within a GIS database that includes spatial and attribute data. We have provided a summary table in Appendix D, Table 4 that provides the data contained in the GIS database. This summary is provided to indicate the amount and type of data provided; we expect the database will only be utilized in a GIS environment. Spatial data includes well, stream, spring, and hot spring locations. Attribute data includes the following:

Wells: NDWR well log number, date well log received by NDWR, proposed use, drilling method, section, township, range, quarter, latitude, longitude, owner, well completion data, gravel pack information, surface seal, depth drilled, casing depth, casing diameter, depth to top of screen, depth to bottom of screen, static water level, test pump data, driller, and field surveyed.

Springs: Hot or Cold, latitude, longitude, and temperature.

Streams: Name, culvert diameter, length, average slope, typical width, and typical depth.

Seeps: All infiltration sites for the Cortez Gold Mine operations are located outside of Eureka County and therefore not included in the database. See Appendix A. Cortez does irrigate as many as a dozen quarter section agricultural fields near the Dean Ranch in Eureka County with dewatering water. We expect the application rates are in accordance with NDWR standard application rates.

7.0 WIND/AIR QUALITY

CLIMATE

Low precipitation and humidity characterize Crescent Valley's climate, which is similar to that of northern Nevada generally. Precipitation records at Cortez mine (elevation 5,000 feet) for the periods of 1967 through 1996 show an average annual precipitation of 8.37 inches. Records from Beowawe (elevation 4,696 feet) for the same period show an average annual precipitation of 8.77 inches. July through October are considered the driest months; April through June is the wettest period.

AIR QUALITY

An air quality analysis of Cortez Gold Mine's South Pipeline Project (in USDOI, 1999) identified sensitive air quality receptors at the following locations, Tenabo Ranch, Wintle Ranch, Dean Ranch, Dann Ranch, Crescent Valley School and Beowawe School. Presumably, these identified receptors would be affected by air pollution from the proposed action of construction/operation of the rail project.

In accordance with air quality standards, the construction of the proposed action would diminish existing air quality, and reduce the visual range in Eureka County and downwind areas by adding particulate matter and other light-scattering, absorbing pollutants into the air. Air quality will potentially be affected by the proposed action mainly during construction by means of particulate matter, dust from equipment, equipment exhaust, emissions, etc as well as continued operations. Primary exhaust wills greatly affect the air quality to residents and wildlife.

Eureka County does not know how the proposed action would be affected by the prevention of significant deterioration (PSD) requirements of the Clean Air Act. If this project construction triggered the Prevention of Significant Deterioration requirements in the Crescent Valley Air Basin, it could compete with other sources for authority to discharge particulate matter or other pollutants. Such a scenario could cause problems for existing industries and complicate economic development of the area potentially threatening the fiscal health of Eureka County.

WIND DATA

In October 2003 Eureka County, with the assistance of Lumos & Associates, installed two twenty-meter tall towers with anemometers and wind direction vanes. The system is manufactured by NRG Systems and consists of an NRG Wind Explorer data box, NRG #40 Anemometer, and a NRG #200P Wind Direction Vane. The system operates on two nine-volt batteries and records average wind speed and direction over individual 10-minute intervals. Wind data can be retrieved on a

monthly basis and imported into an Excel spreadsheet or the 'wind' software for analysis.

One wind system is located near the Crescent Valley Airport, in Section 22 T29N R48E, or latitude N 40º 25' 6", longitude W 116º 33' 08". The second location is on the Dean Ranch in Section 8 T28N R48E, or latitude N 40º 18' 16", longitude W 116º 35' 02".

We have received approximately three months of data from each system, beginning in the middle of October 2003 and ending in the middle of January 2004. We have summarized the data in Tables 3 though 6 provided in Appendix E for each location for the months of November and December. Tables 3 and 4 show number of 10-minute observations by direction and speed. Tables 5 and 6 show the percentage of time for each direction and speed.

Summarizing both locations indicate similar winds with light and variable conditions accounting for approximately 40 percent of the recorded time. The remainder of the time the wind is generally from the southwest. Average wind speed is between five and six miles per hour. Wind direction data from the Dean Ranch site is evenly distributed compared to the Crescent Valley Airport site, demonstrating that there may be an issue with the wind direction vane. Additional data will confirm or disprove this assumption.

Upon compilation of the wind data that will be available from recently constructed anometers and directional vanes, further studies can more adequately analyze potential impacts of construction and operations, and the effects of a hazardous accident associated with the proposed project. At this time wind speed and directional information is limited, making final analysis premature.

Typical terrain/ atypical wildlife

8.0 ANALYSIS OF RAIL CORRIDOR ENGINEERING & CONSTRUCTION

INTRODUCTION

The Eureka County Rail Corridor Impact Study addresses construction and operation issues associated with development of the Carlin Alignment, a proposed U.S. Department of Energy (DOE) railroad that would transport high-level nuclear waste from the mainline Union Pacific Railroad to the Yucca Mountain repository in southern Nevada. This alignment originates near Beowawe and continues southwest across Eureka County for approximately 18.5 miles before entering Lander County near the Cortez Gold Mine. DOE has conducted several potential transportation route studies since 1990, with the most recent being the February 2002 Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada. This DOE Environmental Impact Statement (EIS) describes the general impacts of the entire 323 miles Carlin Alignment, as well as impacts associated with the state and national transportation systems and the Yucca Mountain repository. The EIS also outlines potential approaches that could be considered by DOE to mitigate environmental impacts.

Several physical and environmental constraints could affect construction of the Carlin Alignment in Eureka County. Floodplains (with up to 2.6 linear miles of floodplain crossings) and intermittent streams are located throughout the corridor. In addition, alteration of ground water levels near the Cortez Gold Mine has caused ground subsidence, which results in the formation of surface fractures up to 150 feet deep. The extent of the subsidence is unknown and the Cortez Gold Mine is currently monitoring changes in ground conditions. Existing infrastructure in the area includes up to ten unpaved roadway crossings, the aviation facility at Crescent Valley, a transmission line under construction across the valley, and storage of hazardous materials near the UPRR mainline track east of Beowawe. Topography in Crescent Valley is generally flat.

Operation of the rail line would require construction of railroad sidings, a maintenance and storage center, and a crew change headquarters. These could be developed adjacent to the connection point with the Union Pacific Railroad (UPRR) near Beowawe. Signalization of the railroad, which would control train speeds and operations along the route, would enhance safety and allow higher train speeds.

This report identifies factors that should be further analyzed during the preliminary engineering process. No physical barriers that would prohibit construction have been identified along the proposed Carlin Corridor in Eureka County.

REVIEW OF DEPARTMENT OF ENERGY DOCUMENTS

The DOE has conducted a series of studies related to the Yucca Mountain Project. A summary of DOE studies identifying potential corridors, operational scenarios, and environmental impacts is provided below.

Preliminary Rail Access Study, January 1990

The 1990 DOE report, Preliminary Rail Access Study, evaluated ten corridors throughout Nevada that could potentially provide rail access to Yucca Mountain. The study evaluated potential land use conflicts and access to regional rail carriers for each option. The three routes with the least potential for substantial land use conflicts, the Carlin, Caliente and Jean routes, were recommended for further study. The Caliente and Jean corridors both originate in southern Nevada and were described as having no known conflicts with existing or planned land use activities. The Carlin route was characterized as having minimal conflict with Bureau of Land Management (BLM) land use plans and requiring acquisition of private property along approximately five miles of the alignment's length. The Carlin Alignment has been modified since the publication of the 1990 study. In 1990, the alignment began near S.R. 278 close to the Eureka County and Elko County border, crossed Pine Valley, and entered Lander County near U.S. 50.

Nevada Potential Repository Preliminary Transportation Strategy, Study 2, February 1996

Prior to publication of the FEIS, the DOE developed the 1996 Nevada Potential Repository Preliminary Transportation Strategy, which evaluates land use for four alignment routes, establishes design criteria and outlines a branch line operation plan. The report also discusses commercial access to the railroad, stating that there are no engineering or operational concerns that would prevent use by passenger or freight trains.

Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, February 2002.

In February 2002, the DOE released the Final Environmental Impact Statement (FEIS) for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada. The FEIS describes the proposed Yucca Mountain repository, the national rail corridors that could be utilized to transport waste to the repository, and the transportation infrastructure that would be required within Nevada to transport waste to Yucca Mountain. The report presents potential environmental impacts that could result from the proposed railway. The study is broad in scope, and does not include a refined level of detail about local impacts in Eureka County. The DOE selected mostly-rail as the preferred transportation mode using the FEIS, and will be instrumental in the selection of a preferred rail corridor. However, the FEIS states that selection of a specific rail alignment within a corridor would require additional field surveys, environmental and engineering analysis, state, local, and Native

American Tribal government consultation, and National Environmental Policy Act (NEPA) reviews. The national rail transportation network and the proposed Nevada rail corridors being studied by DOE are shown in Figure 10 in Appendix F. The proposed Nevada rail corridors, including the Carlin Alignment, are shown in Figure 11 in Appendix F.

DEPARTMENT OF ENERGY DESCRIPTION OF CARLIN RAIL CORRIDOR

The following description of the Carlin Alignment and associated design standards and operating scenarios are summarized from the DOE documents and outlined in the following sections.

Alignment

The Carlin Alignment would begin at the Union Pacific Railroad (UPRR) east of Beowawe in Eureka County. The alignment progresses in a southeasterly direction through Crescent Valley, and would be located east of the town of Crescent Valley. The alignment would enter Lander County north of Hilltop Road in the vicinity of the Cortez Gold Mine. The route continues toward Yucca Mountain through Nye County. The entire corridor is approximately 323 miles long, of which roughly 18.5 miles are located in Eureka County. A service road parallel to the rail line would also be constructed. In addition to the rail line, a secure rail yard would be constructed off of the mainline track. Railcars could remain at the yard for up to 48 hours before being transported to Yucca Mountain.

Avoidance Alternatives

The FEIS includes the Crescent Valley Alternate to the Carlin Alignment in Eureka County. This Alternate diverges from the Primary Alignment south of the town of Crescent Valley and follows a route east of the Dean Ranch and south of the Cortez Gold Mine. It is described in the FEIS as traveling "through nonagricultural lands adjacent to alkali flats but would affect larger area of private land." The Primary Alignment and Crescent Valley Alternate are shown in Figure 12 in Appendix G.

Rail Design Standards

In order to accommodate standard locomotive and freight vehicles, which weigh approximately 268,000 and 120,000 pounds, respectively, Carlin Alignment trackage would be designed as a heavy haul railroad following American Railway Engineering Maintenance of Way Association (AREMA) guidelines and design standards. The rail would be designed as a Class 4 Federal Railroad Administration (FRA) railroad, a designation that allows a maximum operating speed of 60 miles per hour for freight service and 80 miles per hour for passenger service[1]. Maximum

1 49 FRA Track Safety Standards Subpart F defines railroad track classes according to the maximum speed rail vehicles will be allowed to travel on that track. Different design standards apply to each class of railroad track: Class 1 10 mph (freight) 15 mph (passenger); Class 2 – 25 mph (freight) 30 mph (passenger); Class 3 – 40 mph

grade would be 2.5 percent, although a maximum of 1.5 is preferred when feasible[2]. Maximum curvature is 8°00 on main tracks, although the preferred curvature is 2°00 to allow for speeds of 60 miles per hour. The curvature is based on a 4.5-inch super-elevation and minimum unbalance. Right-of-way would include a minimum of 100 feet on each side of the rail line. Wider right-of-way would be required to accommodate cut and fill.

The railroad is expected to be constructed with 136-pound continuous welded rail, the industry standard for freight rail. The Nevada Potential Repository Preliminary Transportation Strategy report indicates that bridges with steel superstructures on concrete abutments and piers would be constructed as necessary, but no preliminary engineering has been conducted to identify locations of required structures. The report assumed that grade separated intersections would be constructed at all paved public road crossings.

Operations

Under the mostly-rail shipping scenario, up to 10,000 railcars of nuclear materials would travel to Yucca Mountain over a 24-year period. An estimated four trains containing nuclear materials would travel to and from Yucca Mountain each week, and one additional train per week would contain other materials. DOE would likely use legal weight trucks to transport waste to the repository from commercial nuclear sites without rail access.

The rail-operating plan in the 1996 Nevada Potential Repository Preliminary Transportation Strategy indicates that the DOE would own the railroad track and cars, but a private contractor could manage maintenance and operation of the rail line. According to the 1996 Nevada Potential Repository Preliminary Transportation Strategy, locomotives could be owned by either the DOE or a Class 1 (long-haul) carrier. Each train would include two locomotives, escort cars, buffer cars and between one and five cask cars. Maximum weight is estimated to be 2,500 tons and maximum train length is estimated at 800 feet.

The 1996 rail-operating plan anticipates a maximum speed of 50 miles per hour for DOE trains transporting nuclear material. The portion of the alignment in Eureka County is generally flat with no sharp curves, and speeds are expected to meet this maximum. The total Carlin route includes 65 miles of mountainous terrain that would limit DOE train speeds to 20 miles per hour upgrade and 25 miles per hour downgrade. The plan estimates that normal run times would be between nine and ten hours, depending on the crew change location.

Beowawe is a potential home terminal for Yucca Mountain train crews. Trains could stop at Beowawe to secure movement authority, undergo a security inspection, and change crews. Cask cars could be stored temporarily at the site. Perhaps an agreement could be reached with Union Pacific that would allow Carlin to be the crew change station. Crews would have a layover of at least ten hours at the repository site, including the required eight hours of rest and two hours to prepare for departure.

(freight) 60 mph (passenger); Class 4 – 60 mph (freight) 80 mph (passenger); Class 5 – 80 mph (freight) 90 mph (passenger).

It has not been determined if dedicated trains, general freight service, or a combination would be used. Dedicated trains would carry only rail cars that are going to the repository, and the transfer of rail cars at interim locations would not be necessary. General freight service could transport other commodities unrelated to the Yucca Mountain Project in addition to nuclear materials. It has not been determined if the DOE rail line would be available for commercial uses. However, the 1996 DOE study indicated that the DOE has historically permitted shared-use of rail spurs at other facilities and that no engineering or operational requirements would prohibit commercial use of the rail line.

Mitigation Measures in FEIS

Chapter 9 of the FEIS discusses the range of approaches that are being considered by the DOE to mitigate potential impacts. These mitigation measures provide a conceptual framework within which adverse impacts may be addressed. The measures do not contain a high level of specificity with regard to implementation and DOE does not commit to the use of any of these potential measures. We believe DOE is evaluating preparation of a Mitigation Action Plan, which would contain specific commitments for mitigating adverse impacts. Precise mitigation measures may be identified by DOE after the selection of an alternative alignment, and should be developed in coordination with local governments and Native American tribes. The potential mitigation measures that apply to Eureka County include the following:

1. Impacts to grazing allotments resulting from land disturbance, the division of property, or limitation of access could be mitigated by implementation of the following measures (Section 9.3.1 Land Use):
   - o Construct underpasses for access to grazing lands;
   - o Renovate disturbed land; and
   - o Assist in providing water sources for cattle.

2. Impacts to water resources resulting from contaminants, alteration of drainage patterns, or flood hazards could be mitigated by implementing the following policies and procedures (Section 3.3.3 Hydrology):
   - o Minimize disturbance of ground surface and vegetated areas to minimize changes to water infiltration and runoff rates;
   - o Design facilities that can withstand a 100-year flood;
   - o Locate the alignment away from floodplains, springs, wetlands, and other surface waters;
   - o Maintain natural contours to the maximum extent feasible and minimize off-road vehicle movements;
   - o Construct bridges or culverts where roadways intersect intermittent streams;
   - o Use secondary containment for fuel storage tanks to reduce the potential for release of hazardous materials into water bodies;
   - o Follow reclamation guidelines for site disturbance and construction in or near floodplains;
   - o Train employees in handling and storage of hazardous materials;
   - o Locate storage and refueling operations away from floodplains;
   - o Provide rapid response cleanup and remediation capability;

- o Do not locate construction wells in designated basins (basins designated by the Nevada State Engineer in which the quantity of appropriated water approaches or exceeds the perennial yield); and
- o Minimize water use during construction.

3. Impacts to wildlife resulting from dividing herd management areas and other habitat could be mitigated by use of the following measures (Section 9.3.4.2 General Biological Resources and Soils):
   - o Use dust suppression measures and minimize erosion;
   - o Conduct pre-construction surveys in floodplains to prevent impacts to important biological resources;
   - o Relocate sensitive species from floodplains that would be disturbed to other areas;
   - o Survey the corridor to identify potential habitat or environmentally sensitive areas;
   - o Avoid springs, wetlands, waterways, and riparian areas;
   - o If these areas cannot be avoided, minimize impacts by minimizing corridor width, locating fueling areas away from sensitive areas, conducting wetlands replacement activities, and carefully timing construction activities;
   - o Consider migratory patterns of wildlife in the design of the rail line and fencing;
   - o Locate construction activities in a way that minimizes habitat fragmentation;
   - o Minimize surface disturbance and use engineering practices to stabilize disturbed areas, including holding ponds and compacting disturbed ground; and
   - o Re-vegetate project areas no longer needed.

4. Impacts resulting from disturbance of cultural artifacts and degradation of traditional sites could be mitigated by implementing the following measures (Section9.3.5 Cultural Resources):
   - o Provide cultural resource sensitivity and protection training for employees;
   - o Continue to use the Yucca Mountain Project Native American Interaction Program to promote government-to-government relationships and protect important cultural resources; and
   - o Conduct pre-construction surveys to identify important archaeological resources.

5. Impacts resulting from traffic accidents involving vehicles associated with the project and exposure to radiation could be mitigated by use of the following practices (Section 9.3.6 Occupational and Public Health and Safety):
   - o Design task procedures to reduce the potential for accidents;
   - o Establish contract requirements to minimize worker exposure to radiation;
   - o Promote alternative transportation such as buses for workers;
   - o Implement a radiation protection plan for drivers and escort personnel; and
   - o Implement accident reduction measures, such as the Commercial Vehicle Safety Alliance procedures.

6. Noise impacts, which could interfere with Native American ceremonies or other community activities, could be mitigated by use of the following practices (Section 9.3.7 Noise and Vibration):
   - o Avoid areas with sensitive noise receptors;
   - o Avoid Native American ceremonial sites;
   - o Consider noise and vibration impacts when planning construction activities;
   - o Plan for noise abatement walls in areas near sites such as schools;
   - o Schedule vehicular traffic through communities during daylight hours;
   - o Intermodal transfers should occur during daylight hours; and
   - o Impose speed limits on trains to reduce noise in sensitive locations.

7. Construction could reduce the quality of views in key locations, measures to mitigate these impacts could include the following (Section 9.3.8 Aesthetics):
   - o Remove or shape construction spoil piles to reflect existing contours. Keep the height of spoil piles to a minimum;
   - o Reclaim disturbed areas using native vegetation;
   - o Plant native vegetation to screen views from key observation points;
   - o Use misting and spraying to minimize dust during construction;
   - o Use exterior lighting only where needed to accomplish facility tasks;
   - o Limit the height of exterior lighting units; and
   - o Use shielded or directional lighting.

PHYSICAL CONSTRAINTS

A field investigation of the proposed rail route was conducted during September 2003 to assess physical conditions that could impact rail construction. This study included an analysis of potential natural and man-made constraints to construction. Information and maps regarding natural resources and existing conditions have been provided by Eureka County, the Bureau of Land Management, the U.S. Geological Survey, the Natural Resources Conservation Service, and the 2000 U.S. Census.

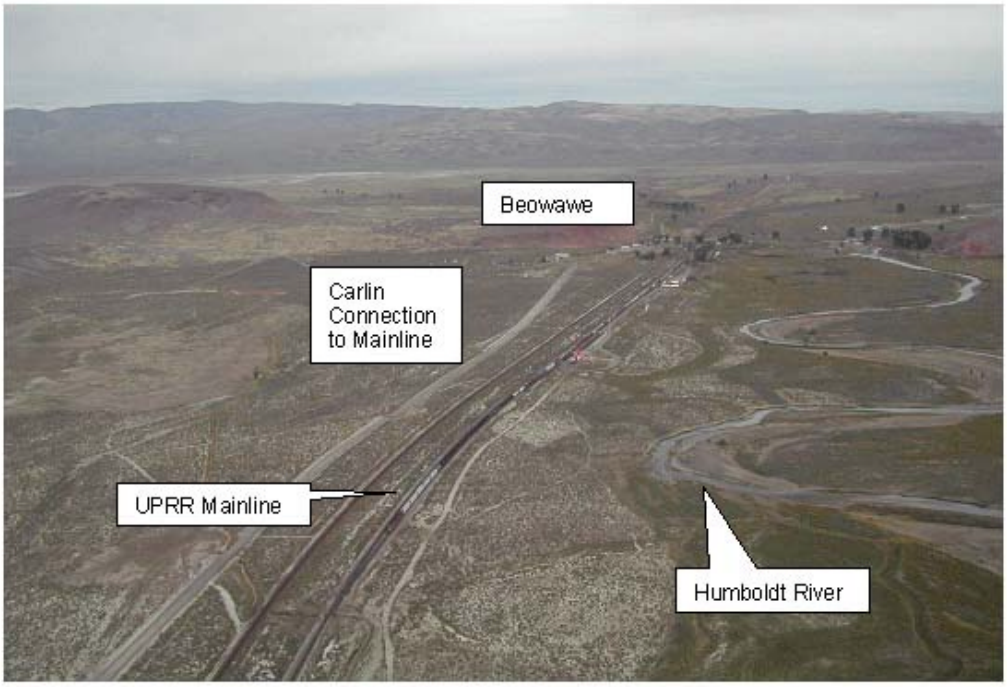
WATER RESOURCES

Floodplains and Intermittent Streams

Floodplains are lowland areas, which are inundated by water during a flood. In their flood storage function, floodplains reduce flood velocity, reduce flood peaks, and collect sediment. They also recharge groundwater and affect water quality by filtering sediment, nutrients and pollutants, processing organic waste, and moderating water temperature fluctuations. Construction in the floodplain reduces the flood plain's storage capacity and lowers ground water infiltration, resulting in the potential to increase flood crests.

The Carlin Alignment in Eureka County crosses the Crescent Valley hydrographic area, which is designated by the State Engineer as Basin No. 54. The geography has typical basin and range characteristics, including north to northeast trending mountain ranges separated by a wide alluvial valley floor. The center of the basin contains dry playa lakebeds, also called alkali flats. These lakebeds

typically contain water after substantial storm and snowmelt events and are subject to flooding. Flooding can also occur along the Humboldt River during winter and spring.



The Carlin Alignment begins near the Humboldt River

There would be approximately 2.6 miles of potential floodplain crossings in the Primary Carlin Alignment and an additional 2.2 miles of floodplain crossings in the Crescent Valley Alternate. Floodplain crossings are shown in Figure 7-9. It would be necessary to elevate the railroad tracks above the 100-year floodplain. Potential impacts to floodplains and seasonal flow volumes for intermittent waterways should be analyzed in a hydrology study. Because intermittent streams are located throughout the project area, the drainage study should also address the location and size of culverts that may be needed along the route. Design approaches for construction in areas affected by floodplains would be determined during the preliminary engineering phase of project development.

The naturally shallow water table typically reaches to within 15 to 20 feet of the surface in much of the project area. Ground water is 20 feet below the surface at Beowawe and 60 feet deep at Crescent Valley. Springs locations in Crescent Valley are shown in Figure 4.1. One spring, named Cold Springs, is located within 1.5 miles of the Carlin Alignment. Additional springs and Cortez Mine water recharge areas are located in the eastern side of the valley.

The white, dry playa lakebeds are subject to flooding

The Humboldt River near Beowawe is subject to flooding

Culvert and drainage near S.R. 306

Soils

Soils in the project area generally have a fine texture, indicating a slow rate of water infiltration and high runoff potential, and tend to have high levels of alkalinity. Much of the valley floor is covered with 8 to 12 inches of powdery, wind-blown sediment. Construction in dry playa lakes /alkali playas should be avoided because they hold water in wet conditions. Locating the track on the edge of the alluvial fan near the base of the mountains would allow for drainage. The lower elevation in the center of the valley should be avoided. A summary of the soil types present in the project area is shown in Table 10 and Figure 14 in Appendix G.

Table 9 Floodplain Impacts

Soil	Soil Moisture Content
Batan	Very deep, moderately well drained, moderately slowly permeable soils on alluvial flat remnants. These soils formed in alluvium that is high in content of loess and pyroclastic material. Slope is 0 to 2 percent. Typically a silt loam.
Beoska	Well drained on fan piedmonts and fan piedmont remnants. Typically a silty clay loam.
Brock	Shallow, well drained, moderately slowly permeable soils on the sides of dissected terraces and alluvial fans. These soils formed in mixed alluvium. Slopes are 4 to 30 percent. Typically a cobbly loam.
Coit	Very deep, poorly drained, moderately permeable soils on floodplains. These soils formed in mixed alluvium. Slopes are 0 to 1 percent.

Source: Soil Survey of Tuscarora Mountain Area, Nevada, Parts of Elko, Eureka, and Lander Counties, 1980. Soil Survey of Eureka County Area, Nevada, 1989.

GROUND SUBSIDENCE NEAR CORTEZ GOLD MINE

The Cortez Gold Mine is on the west side of Crescent Valley in the alluvial trough between the Shoshone and Cortez mountains. The mine obtained permission to build the existing operation, called the Pipeline project, on the east side of Crescent Valley in 1996. The majority of this gold mining operation occurs in Lander County, although the mine owns extensive property in Eureka County as well. An expansion of the Cortez Gold Mine, called the Pediment Project, is currently under development. The Pediment Project would require the transport of up to 15,000 tons of earth per day across the valley floor. A DEIS for the new project is expected to be published in 2004. Approximately 50 to 100 employees will be added to the current level of 385 employees for extraction of the newly discovered deposits. Mine operations are expected to continue for the next 20 to 30 years.

Vicinity of Carlin Connection to UPRR

Tower near Carlin Connection to UPRR

Operation of the Cortez Gold Mine affects both water levels and the ground surface. The mine pumps water from the bedrock out of the mine pit which

resulting in a change in ground water levels. The Cortez mine pumps over 24,000 gallons per minute, although this fluctuates according to mining needs. Ground subsidence is occurring around the mine as a result of dewatering activities and depressurization of the water table. The alignment of the proposed rail line would go through areas with actively subsiding ground and surface fractures in the alluvium that can be 100-150 feet deep. Water could erode these fissures further and cause 15-20 foot-wide gullies. It is unknown how much more the ground will subside. The fissure field is being surveyed and monitored for a three-year termine the extent of ground subsidence and the suitability of this land to support the weight of railroad operations. The area containing the Cortez Dean Ranch and Mine is shown in Figure 15.

The years 2005 through 2007 are expected to be the peak mining years and will require intensive dewatering and additional pipelines. It is expected that 20,000-30,000 gallons per minute will be pumped during peak mine usage over the next several years. Approximately 10,000 gallons per minute are currently used for irrigation, and 4,000 gallons per minute are used for mine processing. Less than 1,000 gallons per minute are used for dust control and the remaining water is channeled to recharge basins. The mine owns 95 percent of underground water rights in Crescent Valley and is seeking the acquisition of additional water rights. There is an infiltration system that replaces the water taken out of the mine area. The mine operates the Dean Ranch to the north of the mine in Eureka County, using it as an infiltration site for the water removed from the mine pit. The fifteen miles of pipe that have been constructed to the Dean Ranch provide water through irrigation.

Irrigation circles at the Dean Ranch

EXISTING INFRASTRUCTURE

Union Pacific Railroad

The Carlin Alignment would originate at the UPRR mainline. East of Beowawe, parallel UPRR tracks are located just south of the Humboldt River. Physical constraints near the interchange include a cemetery and communications tower, as shown in Figure 4.4a.

Roadway Crossings

The Federal Railroad Administration and the Nevada Department of Transportation regulate safety at railroad crossings. As shown on USGS quad maps in Figures 4.4 A through 4.4 D, the Primary Carlin Alignment includes 9 unpaved roadway crossings in Eureka County and the Crescent Valley Alternate includes 10. In addition, a new road not shown on USGS maps has been constructed to service the Sierra Pacific power lines that are currently under development. Signage should be provided for the unpaved roads that are crossed by the rail alignment.

Aviation

The airport at Crescent Valley, which includes two landing strips, is located approximately 0.4 miles west of the Carlin Alignment. A study of airport activity and the potential impacts of rail construction and operation should be conducted, including analysis of security issues.

Crescent Valley airstrip

Utilities

The Sierra Pacific Falcon-to-Gondor Project, a 345 kV transmission project, is under construction across the Crescent Valley basin in the project area. Power lines will also be constructed at the Cortez Gold Mine site from Mill 1 to the Pediment Project site in the Cortez Mine. The power lines, which will range between 75 feet and 130 feet in height, are high enough to be out of the train's path. The line is approximately halfway between Beowawe and Crescent Valley.

The Carlin Alignment would cross a water pipeline from the Cortez Gold Mine to the Dean Ranch. Section 6.3.2.2.1 of the FEIS states that the "pipeline right-of-way would have to be modified to include DOE or the property rights would have to be transferred to DOE...The pipeline could require modifications to allow the building of a rail line through the right-of-way."

HAZARDOUS MATERIALS

There is storage of hazardous materials, including propane, between the two mainline UPRR tracks east of Beowawe. Truck access to these sites and resulting traffic on roads crossing the proposed rail line should be considered in rail and roadway design. The location of these tanks is shown in Figure 4.4A.

Vicinity of Carlin Connection to UPRR

Storage Tanks near the Carlin Connection to UPRR

RECOMMENDATIONS

The following operational and design recommendations are based on an analysis of DOE documents, the site assessment and American Railway Engineering Maintenance of Way Association (AREMA) railroad standards.

RAIL OPERATIONAL ISSUES

Connection to UPRR Mainline

Because the Carlin line will be a spur from the UPRR mainline railroad, coordination with the rail company is an important part of the planning process. UPRR officials indicated that a double-ended track, also known as a wye track, would be suitable for the transition from UPRR to the Carlin line. UPRR actively uses the mainline track and expressed an interest in removing the DOE trains from UPRR tracks as quickly as possible.

At the Beowawe Mainline connection, No. 15 Power Operated Turnouts (POTO) should be utilized to comply with UPRR standards. The yard should be constructed entirely off UPRR property to allow for security fencing and necessary employee welfare maintenance and other facilities. A double-ended track would need to be located off of UPRR property to facilitate this quick transition. Figure 20 illustrates a possible configuration for the rail yard layout.

Maintenance/Storage Center

Operation of the rail line would require support facilities to service the trains and crews. A maintenance, service center, and crew change headquarters will be required to service mechanical and other needs of railway operation. Storage and refueling facilities will be needed, with potential sites including Yucca Mountain, Beowawe and an additional site between the two. Storage would include fuel, water and sand.

Based on standard railroad operating practice, a crew change area would be needed for railway employees. This facility would include a welfare room, which typically houses a shower, lockers, bathroom, and a place to eat. These relief stations are currently maintained at Elko and Winnemucca. Crew changes are generally located every 500 miles, which accommodates an 8 to 10 hour shift, although this would vary depending on the speed of the train. The maximum shift length allowed for rail workers is 12 hours. The southbound train travels through a primarily descending topography, while the return trip is primarily uphill. There may be a speed differential between the southbound downhill route and the northbound uphill route, resulting in a variation in trip duration. In addition, weather conditions such as snow or flooding could slow or stop the trains. An operational simulation study should be conducted to address these issues.

Inspections and Maintenance

Inspection and maintenance of the railroad tracks will be compliant with federal safety standards as described in the DOT Chapter 49 FRA Track Safety Standards Subpart F, Section 213.23 and the Track Safety Standards Compliance Manual.

DESIGN & CONSTRUCTION

Sidings

Sidings would need to be incorporated into railway and operations design. Sidings should be located on tangent every 30-40 miles. Sidings do not need to be power operated. As described in Figure 21, sidings and a rail yard would be needed near the Beowawe junction.

Signalization

Operational safety issues involve train speeds and train control. Signalization of the railroad track is a feature that includes red and green lights installed along the track to indicate to train operators whether they have permission to proceed. Signalization controls the distance between trains, their direction of travel, and operating speeds. It can be used, for instance, to warn engineers of damaged tracks or other hazards ahead. DOE estimates indicate that five trains per week would travel to and from Yucca Mountain between 2010 and 2033. Signalization would not normally be required on a track with this low volume of traffic if train speeds were limited to less than 50 miles per hour. However, the unique characteristics of the cargo, the presence of hazardous materials, the potential for additional commercial traffic, the length of the corridor, and potential track damage that may result from mine truck crossings may support the need for signalization. The train control system would consist of signals located approximately every two miles. Signalization would allow trains to travel at speeds higher than 50 miles per hour, depending on the type of trackage that is used. Additional operational analysis should be conducted to determine the need for signalization. UPRR would require signalization at the point of connection to the mainline railroad.

Railroad Design

The minimum railroad roadbed should be 31 feet on a minimum of 8 to 12 inches select subballast materials on a 95 percent compacted sub grade. Sub grade slope profile for the entire alignment should have a minimum of 40:1 ratio for drainage from the center of the main line. In certain conditions consideration should be given to using approved geo-technical fabrics to keep sub grade fine gravel from fouling sub ballast. For maintenance, inspection and security purposes, an access road should follow the alignment in its entirety, in addition to the railroad roadbed of

31 feet. Public grade crossings should be concrete with specialized ten-foot concrete crossties.2

Ballasted 136-pound continuous welded rail (CWR) on concrete ties should be used. A minimum of 12 inches of ballast should be placed below the bottom of the tie to sub grade. Approved rail plates utilizing spring clips should be used to assure proper gauge compliance standards. A typical railroad cross section is shown in Figure 5.2. Additional detail about railroad construction standards is included in the Appendix.

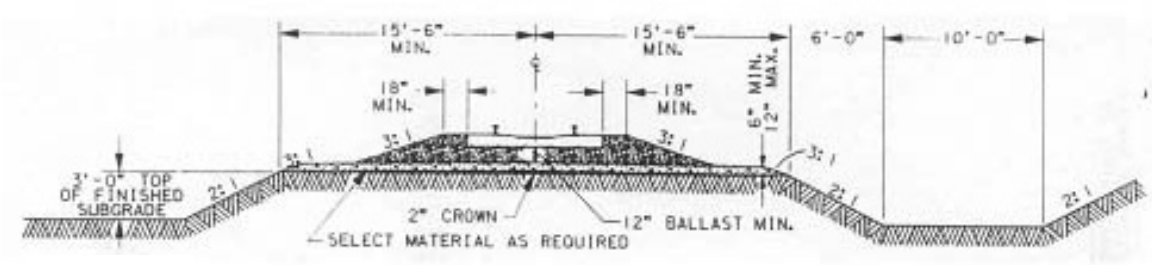


Figure 21

Figure 22

2 Additional information about federal railroad standards are available in 49 FRA Track Safety Standards.

9.0 SUMMARY & CONCLUSION

The Eureka County Rail Corridor Impact Study was conducted to identify and access the impacts and barriers to the development and operation of the proposed Carlin (18 mile) route through Eureka County.

While numerous constraints, both physical economical, social, andcultural, were identified and inventoried as part of this study, the majority of the issues that directly affect the area are the following:

Safety Issues:
- At grade rail crossing
- Emergency Response
- Exposure Issues & Accidents
- Storage of Casks

Quality of Life:
- Noise
- Air Quality
- Scenic Disturbance

Water Resources:
- Floodplains/ Streams
- Wells
- Wetlands

Land Use:
- Incompatibility
- Disruption of circulation
- Rail-activity affect on community
- Land value diminishment
- Community separation
- Economic Property Tax loss
- Property Value Diminution
- Economic Leakage = Visitor reduction

Wildlife:
- Wildlife habitat disturbance and migratory routes
- Separation of agricultural uses, Impacts to grazing allotments

While some of these factors are difficult to asses adequately in addition to impact analysis, further studies should be undertaken to address the aforentioned issues that will affect these communities. As stated in the historic sections of this study, the Beowawe and Crescent Valley Areas are rich in history and the roots of their existence are deep within the communities that occupy these areas today.

Separation of consistent land uses and community structure is damaging and fragmenting to a community. The entire social fabric is compromised by such acts and the community integrity can be potentially damaged, even lost. This combination of incompatible land use infringement and community fragmentation is not healthy for any community or area.

Key impacts relate to safety, crossings, storage of casks and emergency response to accidents are paramount to the operation of rail and its interaction with the communities. Physical impacts to construction include water resources, streams, wells, and wetlands. Social and cultural impacts are the largest negative influence to the interconnectivity of the communities. Land use compatibility, consistent with land uses, operation of use and wildlife and grazing all suffer disruption to this potential action.