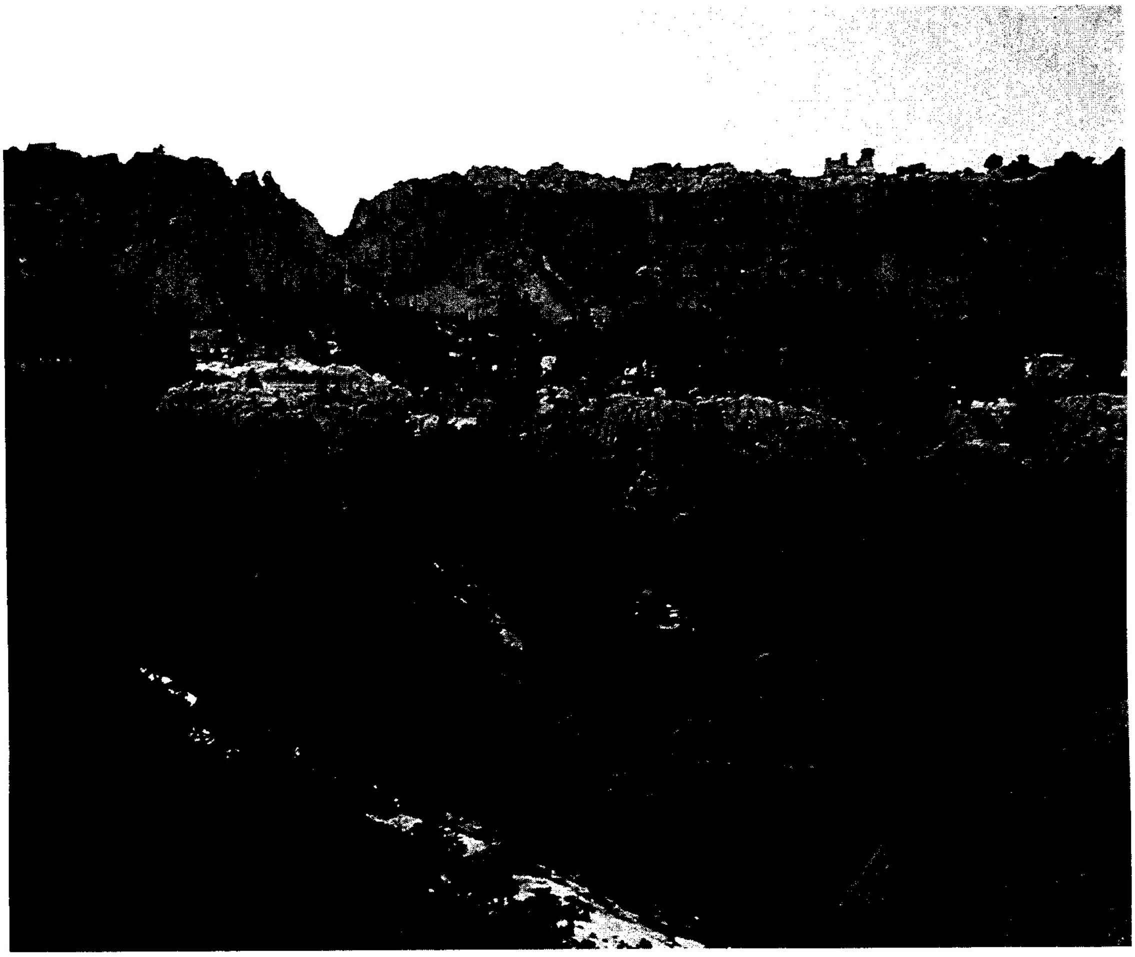
CHAPTER 3.3 EXCERPTED FROM:

Ely Proposed Resource Management Plan/Final Environmental Impact Statement



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COOPERATING AGENCIES:

Great Basin National Park
Humboldt-Toiyabe National Forest
Nellis Air Force Base
Nevada Department of Transportation
Nevada Division of Minerals
Nevada Department of Wildlife
Nevada State Historic Preservation Office

Lincoln County
Nye County
White Pine County
Duckwater Shoshone Tribe
Ely Shoshone Tribe
Moapa Band of Paiutes
Yomba Shoshone Tribe

BLM

Ely Field Office / Nevada

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

3.3 Water Resources

3.3.1 Existing Conditions

Groundwater

Carbonate Rock Aquifer Province. Groundwater of the Carbonate Rock Aquifer Province is stored in ancient consolidated marine sediments, which underlie much of southern and eastern Nevada and extend into western Utah, eastern California, and southeastern Idaho (Dettinger et al. 1995). The carbonate rocks consist of thick discontinuous sequences of limestone and dolomite of Paleozoic age, underlain by clastic and crystalline rocks of Cambrian and Pre-Cambrian age. Some major springs found along faults, such as Murry Springs, may represent the surface expression of these deep carbonate aquifers. The extensive springs along the western side of Ruby Lake in northern White Pine County are another example of such springs.

Currently, the carbonate aquifer systems are not extensively utilized. The occurrence and availability of groundwater in the carbonate province varies with location, and water quality is generally good. Although large amounts of groundwater are stored within the carbonate aquifer province regionally, the supply of groundwater to wells varies according to the distribution and alignment of fractures, faults, and other geologic factors. In many places, groundwater flows between these deeper carbonate bedrock aquifers and overlying unconsolidated basin-fill aquifers.

Basin-Fill (alluvial) Aquifers. In Nevada, the Great Basin is divided into 14 closed or semi-closed hydrographic areas. Each hydrographic area in the region is underlain by a structural basin partially filled with clastic material eroded from adjacent mountains. These deposits form basin-fill aquifers that are bounded by the consolidated rocks of the structural basin. Most are connected to adjacent or underlying carbonate-rock aquifers (Harrill and Prudic 1998). Alluvial aquifers of the Great Basin typically consist of two distinct units: a deep older unit and a younger shallow aquifer separated by a clay layer of Pliocene age. These alluvial aquifers have a wide range of beneficial uses.

Table 3.3-1 summarizes water availability in the shallow alluvial aquifers of the planning area. The perennial yield values shown in **Table 3.3-1** were derived by the state to estimate the water in shallow alluvial aquifers that can be withdrawn without creating substantial drawdown in the water table. Perennial yield is a hydrologic concept; it generally is about equal to the estimated net annual recharge. It should be noted that values for perennial yields are subject to change, and represent estimates from Nevada Division of Water Resources at the time this document was prepared. Other values exist from other sources. Estimates between sources may differ considerably, based on the scope and intensity of investigations, the availability and interpretation of data, and when studies were conducted. Additional investigations of perennial yield and potential pumping effects are being undertaken for water development projects and NEPA actions involving the planning area. These are mentioned in Section 3.3.2.

Table 3.3-1
Water Availability in Shallow Alluvial Aquifers[1] in the Planning Area

Hydrographic Area	Basin Number	Perennial Yield (acre-feet/year)	Committed Resources (acre-feet/year)	Designated Groundwater Basin[2]
White Pine County				
Humboldt River Basin				
Huntington Valley	47	25,000	8,124	Yes
Central Region				
Newark Valley	154	18,000	12,035	No
Little Smokey Valley-north	155A	5,000	3,484	No
Railroad Valley-north	173B	75,000	40,820	No
Jakes Valley	174	12,000	54	No
Long Valley	175	6,000	3,307	No
Ruby Valley	176	53,000	33,822	Yes
Butte Valley-south	178B	14,000	318	No
Steptoe Valley	179	70,000	78,531[3]	Yes
Cave Valley	180	2,000	13	No
Lake Valley	183	12,000	28,981[3]	Yes
Spring Valley	184	100,000	24,778	No
Tippett Valley	185	3,500	472	No
Antelope Valley-south	186A	800	637	No
Antelope Valley-north	186B	1,700	613	No
Great Salt Lake Basin				
Deep Creek Valley	193	2,000	0	No
Pleasant Valley	194	1,500	976	No
Snake Valley	195	25,000	12,389	No
Hamlin Valley	196	5,000	368	No
Colorado River Basin				
White River Valley	207	37,000	25,007	No
Lincoln County				
Central Region				
Emigrant Valley-Groom Lake	158A	2,800	12	No
Emigrant Valley-Papoose	158B	10	0	No
Frenchman Flat	160	16,000	0	No
Three Lakes Valley-north	168	4,000	0	No
Tikapoo Valley-north	169A	1,300	7	No
Tikapoo Valley-south	169B	3,000	0	No
Penoyer Valley	170	4,000	19,768[3]	Yes
Coal Valley	171	6,000	25	No
Garden Valley	172	6,000	366	No
Railroad Valley-north	173B	75,000	40,820	No
Cave Valley	180	2,000	13	No
Dry Lake Valley	181	2,500	56	No
Delamar Valley	182	3,000	7	No
Lake Valley	183	12,000	28,981[3]	Yes
Spring Valley	184	100,000	24,778	No

Table 3.3-1 (Continued)

Hydrographic Area	Basin Number	Perennial Yield (acre-feet/year)	Committed Resources (acre-feet/year)	Designated Groundwater Basin[2]
Great Salt Lake Basin				
Hamlin Valley	196	5,000	368	No
Escalante Desert Basin				
Escalante Desert	197	1,000	2	No
Colorado River Basin				
Dry Valley	198	1,000	7,207[3]	No
Rose Valley	199	100	1,660[2]	No
Eagle Valley	200	300	297	No
Spring Valley	201	4,100	1,164	No
Patterson Valley	202	4,500	5,435[3]	No
Panaca Valley	203	900	28,134[3]	Yes
Clover Valley	204	1,000	3,690[3]	No
Lower Meadow Valley Wash	205	5,000	29,680[3]	Yes
Kane Springs Valley	206	0	0	No
White River Valley	207	37,000	25,007	No
Pahroc Valley	208	21,000	7	No
Pahranagat Valley	209	25,000	9,714	No
Coyote Springs Valley	210	18,000	0	Yes
Muddy River Springs	219	37,000	8,328	Yes
Lower Moapa Valley	220	16,500	5,660	Yes
Tule Desert	221	1,000	4	No
Virgin River Valley	222	3,600	13,307[3]	Yes
Nye County				
Central Region				
Little Smokey Valley-north	155A	5,000	3,484	No
Little Smokey Valley-central	155B	100	2	No
Little Smokey Valley-south	155C	1,000	17	No
Hot Creek Valley	156	5,500	4,219	No
Coal Valley	171	6,000	25	No
Garden Valley	172	6,000	366	No
Railroad Valley-north	173B	75,000	40,820	No
Colorado River Basin				
White River Valley	207	37,000	25,007	No
Pahroc Valley	208	21,000	7	No

[1] Source: Nevada Division of Water Resources 2003. The information is as published as of August 2003, but may be revised by the Division as necessary in ongoing water resources administration. Information from other sources or studies may differ.

[2] Designated groundwater basins are basins where permitted ground water rights approach or exceed the average annual recharge and the water resources are being depleted or require additional administration. State-declared preferred uses may include, among others, municipal and industrial, domestic, and/or agriculture. The Nevada State Engineer has additional authority to administer water resources in a designated groundwater basin.

[3] The shallow alluvial groundwater resource currently is fully allocated by the Nevada Division of Water Resources.

The committed resources represent the total volume of permitted, certificated, and vested groundwater rights recognized by the Nevada Division of Water Resources in each basin (Nevada Division of Water Planning 1992). Committed resources are administratively determined, and values are subject to change as existing permits and applications are approved, denied, forfeited, or undergo other administrative actions involving the Nevada Division of Water Resources, State Engineer.

Groundwater quality in shallow alluvial aquifers of the planning area is highly variable (Thompson and Chappell 1984). Most basins have groundwater chemistry dominated either by calcium bicarbonate or sodium bicarbonate. Often, a basin would grade from calcium bicarbonate water along the mountain front recharge area to sodium bicarbonate water in the interior of the basin. Springs in the alluvial basins are usually the surface expression of the shallow alluvial groundwater table. Alluvial basin recharge generally occurs year-round due to springtime mountain runoff and storms during other seasons. This runoff percolates through the alluvial pediment gravel at the mountain fronts, recharging the shallow groundwater table. This recharge maintains the water table and is expressed as springs near the interior of the basins. These springs are used by wildlife and by ranchers. Flow rates in the springs are variable. During the summer months and especially during periods of drought, the springs cease to flow. The water quality in the springs reflects the water quality in the shallow alluvial aquifer.

Groundwater evapotranspiration losses have been studied in Nevada since the 1940s. More recent research using current data and techniques has been carried out to revise regional groundwater evapotranspiration and groundwater budgets in the Great Basin of eastern Nevada (Nichols 2000). As Nichols' estimates indicate, evapotranspiration by phreatophytic plant communities accounts for a significant consumption of groundwater recharge resources. In the Great Basin, plants considered phreatophytes (basically, those that normally reach and consume groundwater by root system adaptations) consist of riparian-area trees, shrubs, grasses, and grass-like plants; and some salt-desert shrubs and grasses.

In addition to groundwater consumption by phreatophytes, shrubs and tree species common to the planning area develop extensive near-surface lateral root systems that capture rainfall and snowmelt. Although they may generate deep taproot systems, pinyon, juniper, and big sagebrush frequently have a high proportion of active roots at shallow soil depths (Evans 1988; Flanagan et al. 1991; Gedney et al. 1999). In addition to their winter transpiration demand, pinyon and juniper are particularly efficient at utilizing summer precipitation (Flanagan et al. 1991). This may result in the increased growth and competition of these species in areas where such seasonal rainfall forms an important part of the annual average.

Consumptive use of soil moisture and groundwater by plant transpiration is one of the major factors affecting water availability in the planning area. Numerous studies have been made of evapotranspiration rates in arid and semi-arid settings. The research is useful for comparative purposes. Annual water use by pinyon-juniper woodlands ranges from about 14.5 to 27.5 inches (American Society of Civil Engineers 1989). Big sagebrush consumes on the order of 8 to 12 inches per year, and tamarisk water consumption generally ranges from 30 to 70 inches per year. Upland grass communities utilize about 6 to 12 inches per year (American Society of Civil Engineers 1989).

Canopy cover and interception losses also affect water availability in the planning area. Interception is the component of precipitation captured by the vegetation canopy or underlying debris. Rangeland interception losses are generally between 20 and 40 percent of precipitation, but may have a wider range in juniper (Wilcox et al. 2003; Gedney et al. 1999). Subsequent evaporation prevents much of this water from reaching the soil surface and, therefore, it is not available for other plant species. Pinyon and juniper stands intercept large quantities of precipitation and, thus, reduce water available for groundwater recharge.

Surface Water

Surface water resources in the eastern Great Basin include perennial, intermittent, and ephemeral streams, marshlands and small lakes, intermittently inundated playas, and manmade impoundments. Springs, which are an expression of the groundwater/surface water interface, are discussed above under "Groundwater." The overall combination of limited precipitation, upstream agricultural diversions, soil and geologic conditions, and evapotranspiration demand in the planning area has resulted in limited streamflows in general, and few intermittent or perennial streams. Most streams in the planning area are ephemeral and flow from the mountains to the alluvial basins in response to spring snow melt or heavy rains. Most perennial streams that flow from the mountain fronts seep into unconsolidated deposits or are diverted for irrigation. **Map 3.3-1** shows the approximate location of perennial streams and mapped springs within the overall boundary of the planning area. Water data are available from the U.S. Geological Survey for perennial streams in the planning area by accessing the U.S. Geological Survey water data web site: http://www.water.usgs.gov.

Approximately 6,800 square miles occur within the Colorado River drainage of the planning area (Nevada Division of Water Resources 2003). The primary streams in the planning area that historically drained into the Colorado River system include Lower Meadow Valley Wash and the White River. The southernmost reaches of these streams are ephemeral, and flow only during extreme runoff events. When flowing, they empty into the Muddy River and then into the Colorado River by way of Lake Mead. Over the last several decades, salinity in the Colorado River has become a primary water quality concern.

National, state, and local programs based on the Clean Water Act and the Colorado River Basin Salinity Control Act have been developed to regulate water quality in the Colorado River Basin. In 1994, the BLM was directed (by amendment to the Colorado River Basin Salinity Control Act) to develop a comprehensive program for minimizing salt contributions from lands it administers (U.S. Bureau of Reclamation 2004). The agency objective is to reduce the salt load of the Colorado River by 89,000 tons per year by 2015 (National Applied Resource Sciences Center 1999). Land management activities within the Colorado River watershed must consider the agency's role and objectives as a member of the multi-agency Colorado River Basin Salinity Control Forum.

In addition, an objective within BLM is to reduce the density and distribution of tamarisk (salt cedar) along drainages (Medlyn 2004). As tamarisk displaces native vegetation, the original habitat values for many native wildlife species are reduced (Lovich 1996). In addition to being an aggressive invasive plant, the biological characteristics of tamarisk can cause undesirable modifications in the surrounding environment. Common changes include increased soil salinity that inhibits native plant germination and growth, and increased water consumption (Wiesenborn 1996). Additional noxious weeds present in several riparian areas include whitetop and tall whitetop. In areas where vegetation has declined because of overgrazing, wildland fires, or other land disturbing activities, soil erosion has caused an increase in the total suspended sediments in streams. Springs attract cattle and wildlife. Water quality immediately downgradient of ephemeral or intermittent streams or flowing springs may exhibit a decline due to physical site alteration and concentration of animal fecal material (Tippets et al. 2001; Rockwell 2002; Health Effects Review 1996).

The Nevada Division of Environmental Protection classifies water bodies based on the degree of impact from human activities, such as urban drainage, industrial activity, agricultural irrigation, and waste disposal. These classes are used by the State Environmental Commission to generally describe the waters and their beneficial uses, and to assign water quality standards. Class A waters are those least affected by human activity, while Class D waters are substantially affected. The classification of waters in White Pine, northeastern Nye, and Lincoln counties (Nevada Administrative Code 445A.124 to 445A.127) are presented in **Table 3.3-2**. This table shows that many reservoirs are Class B or Class C waters, while most streams in the planning area are Class A waters.

3.3.2 Trends

Groundwater

Current trends in Nevada have been toward the development of groundwater for municipal, industrial, and agricultural uses. Nevada, especially eastern Nevada, has seen increasing demand for groundwater appropriations that involve interbasin transfer of water. As in other regions that are undergoing significant population increases, these transfers are from primarily agricultural areas to large municipalities, or to areas of residential and recreational development adjacent to municipalities. Areas around Reno, Carson City, and especially Las Vegas have experienced an increasing demand for water that only can be met by greater conservation, implementation of other technologies (e.g., desalinization), revised interstate agreements, or further water resources development (including groundwater development) in agricultural areas, river systems, or undeveloped basins, and transfer of the water to the more populated regions. Interstate and intrastate infrastructure and agreements may be necessary to address water supply issues in the region and elsewhere. In the past decade or so, the Las Vegas metropolitan area has experienced record population growth and associated water demand increases. This trend is projected to continue, with an additional approximately one million residents predicted for Clark County by 2030 (Southern Nevada Water Authority 2004). The Southern Nevada Water Authority has identified several water supply options to address current and future water supply issues in the area (Southern Nevada Water Authority 2004). Groundwater diversion applications for between 125,000 and 200,000 acre-feet per year from White Pine, Nye, and Lincoln counties have been filed with the Nevada Division of Water Resources by the Southern Nevada Water Authority (Southern Nevada Water Authority 2004). Groundwater would be piped from the source regions into the Las Vegas metropolitan area. Additional groundwater development projects are proposed in the planning area, including those by White Pine County, Lincoln County, and private parties.

Table 3.3-2
Classification of Waters in the Planning Area[1]

Water Body	Hydrographic Region	Hydrographic Area
Class A Waters (Relatively pristine waters not affected by industrial or agricultural activity)		
Nye County		
Bailey Creek	10	140
Currant Creek	10	173
Pine Creek	10	140
Stoneberger Creek	10	140
White Pine County		
Huntington Creek	4	47
Lehman Creek	11	195
Silver Creek	11	195
Berry Creek	10	179
Bird Creek	10	179
Cave Creek	10	179
Cleve Creek	10	184
Currant Creek	10	173
Duck Creek	10	179
East Creek	10	179
Goshute Creek	10	179
North Creek	10	179
Pine Creek	10	184
Ridge Creek	10	184
Silver Creek	10	195
Timber Creek	10	179
Baker Creek	11	195
Hendry's Creek	11	195
White River	13	207
Class B Waters (Waters with light-moderate human habitation, light industrial activity, light-moderate agricultural use, and moderate influence of human activity on the watershed)		
Lincoln County		
Clover Creek	13	204
Eagle Valley	13	200
Eagle Valley Reservoir	13	201
White Pine County		
Cave Lake	10	179
Illipah Reservoir	10	174
Silver Creek Reservoir	11	195
White River[2]	13	207
Nye County		
Currant Creek	10	177

Table 3.3-2 (Continued)

Water Body	Hydrographic Region	Hydrographic Area
Class C Waters (Waters with moderate urban use, moderate industrial activity, intensive agricultural use, and a watershed altered by man)		
Lincoln County		
Echo Canyon Reservoir	13	199
Nesbitt Lake	13	209
Pahranagat Reservoir	13	209
Schroeder Reservoir	13	222
White Pine County		
Comins Reservoir	10	179
Gleason Creek[3]	10	179
Snake Creek	11	195
Willow Reservoir	10	179
Class D Waters (Waters in industrial areas, agricultural waters, and waters subject to multiple discharge of wastes)		
White Pine County		
Gleason Creek[4]	10	179
Murry Creek[5]	10	179

[1] Based on ongoing Nevada Division of Environmental Protection investigations regarding potential sources of potable waters of the state. Additional information regarding aquatic and stream resources for fisheries and wildlife is presented in Section 3.6. Per Nevada Administrative Code Chapter 445A.123, existing stream standards and classifications do not preclude the State Environmental Commission from establishing standards and classifications for additional public waters, nor reclassifying the waters covered by Nevada Administrative Code Chapter 445A.123-127 inclusive.
[2] National Forest to Ellison Creek.
[3] From its origin to State Highway 485.
[4] State Highway 485 to Murry Creek confluence.
[5] Gleason Creek to south line of Section 35, T17N, R63E.

Source: Nevada Administrative Code Chapter 445A.124-127.

Table 3.3-1 shows the groundwater demands and estimated perennial yield in the planning area. In some hydrographic areas, the estimated perennial yield is fully committed to existing uses. In White Pine County, these areas are Steptoe Valley, and Lake Valley. In Lincoln County, these areas are Indian Springs Valley, Penoyer Valley, Railroad Valley (south) Lake Valley, Dry Valley, Rose Valley, Patterson Valley, Panaca Valley, Clover Valley, Lower Meadow Wash Valley, and the Virgin River Valley. Many of these hydrographic areas are designated basins, indicating that the Nevada Division of Water Resources would closely monitor future groundwater use and may not issue new groundwater permits.

Surface Water

All surface waters within the planning area, with the exception of some small springs and seasonal streams, have been appropriated.

3.3.3 Current Management

Water Rights

The State Engineer administers water rights for both surface water and groundwater. In addition to considering if sufficient water is available for a proposed appropriation or reallocation, the State Engineer also must consider other criteria when reviewing a permit application. Examples of these criteria include whether the appropriation or reallocation would benefit the public interest or prove detrimental to it, relevant protests or court actions, or if a proposed appropriation or reallocation conflicts with existing water rights. Applications for permits to appropriate water rights must be approved by the State Engineer.

In general, surface water in Nevada is fully appropriated (Nevada Division of Water Resources 1999). New applications for permits to appropriate groundwater resources may be made. Springs and small streams exist throughout the state for which no determination of water quantity has been made by the State Engineer's office. One must make application on a particular source before this determination of water quantity is made. The State Engineer may approve an application if it is determined that there is sufficient water for the proposed use. There may be vested claims on various sources. Vested claims are those in which a beneficial use of the water can be established before the establishment of Nevada water law. It is not necessary for vested claims to be filed until such a time as so ordered by the State Engineer. Federal reserved water rights are water rights reserved by applicable Executive Orders or legislation. The doctrine of federal reserved rights evolved to ensure that public lands would have sufficient water to meet the purposes for which they were reserved. The priority date for federal reserved rights is the signing date of the reservation. If the BLM identifies a need for a new water development on public lands, the BLM would apply to the Nevada State Engineer for a permit to appropriate water for beneficial use recognized in Nevada Regulatory Statute 533. Public Water Reserves are federal reserved rights created by Presidential Executive Order to preclude monopolization of water sources on arid rangelands of the west. They reserve water from springs and water holes specifically for livestock watering or domestic use only. By agreement, the BLM notifies the State Engineer of all claimed Public Water Reserves. All other beneficial uses of springs or water holes require application for a state appropriative right.

Water Quality

The Nevada Division of Environmental Protection administers the Clean Water Act as amended (P.L.10 0-4) for waters of the State of Nevada, including those in the Ely RMP decision area. A Memorandum of Understanding for Water Quality Management Activities (dated September, 2004) was approved by the Nevada Division of Environmental Protection and BLM which identified opportunities for cooperation to administer the Clean Water Act to the extent practical and as allowed by other applicable laws and available resources. The Memorandum of Understanding is limited to identifying responsibilities and activities to be performed by each agency in carrying out water quality programs on lands administered by the BLM. These opportunities include: development of best management practices, coordinated water quality monitoring programs, review of policies and procedures, and cooperative efforts to establish water quality objectives and requirements. Further, the BLM agrees to recognize the state's beneficial uses of water, water quality standards, and monitoring and nonpoint source program objectives. The state acknowledges the BLM's role and responsibility for the maintenance of water quality consistent with the Clean Water Act and state regulations.

Wellhead Protection

Wellhead protection is one way communities in the planning area can protect their current and future drinking water supply. Since the majority of public drinking water supply systems in Nevada rely upon groundwater, preventative action such as wellhead protection is important because remediation of contaminated groundwater is expensive and, in some cases, it may be impossible to return the water to drinking water quality. Many of the communities in the planning area have begun wellhead protection programs. In Nevada, wellhead protection programs are developed and managed at the local level (town or city). The state may provide guidance and technical assistance with the various program elements.

The state encourages communities to submit their wellhead protection programs to the state. The state endorses wellhead protection programs that provide adequate protection to the community drinking water supply. Criteria for state endorsement are outlined in the U.S. Environmental Protection Agency-approved Nevada Wellhead Protection Program.

The goal of wellhead protection is to protect the water flowing to the well. The wellhead protection area is represented on the land surface generally as a circular or elliptical shape around the well. In some cases, it also may be necessary to manage the activities in a rechange zone located some distance from the well.

Potential contamination sources are land uses or activities that could release toxic substances onto the ground surface or into the soil. These substances potentially could travel down through the soil to the water table, contaminating the ground water. Some examples of potential contaminant sources are:

- Landfills;
- Leaking underground storage tanks;
- Septic systems;
- Fertilizers and pesticides;
- Poorly constructed or improperly abandoned wells; and
- Household hazardous waste.

Communities within or near the planning area that have state-endorsed wellhead protection plans, or are in the endorsement process, include (Nevada Division of Environmental Protection, Bureau of Water Pollution Control 2005, Nguyen 2007):

Ely;
Ruth (plan in process);
McGill (plan in process);
Baker
Pioche
Caliente
Alamo
Eureka