3.6 Range Resources

3.6.1 Affected Environment

The project area lies entirely within the Copper Canyon livestock grazing allotment (***Figure 3.6-1***), in the northwestern corner of Lander County. This allotment is about 106,430 acres in size and is composed of 44,700 acres of private land and 61,730 acres of public land administered by the BLM. The allotment has been categorized as "I" (Improve the current unsatisfactory condition) as opposed to "M" (Maintain) or "C" (manage in a Custodial fashion) (BLM 1988). "I" category areas may have the following characteristics (JBR 1995b):

C1 Ecological conditions are poor to fair.

C2 Vegetation types have the capability of increased production.

C3 The range trend is declining or static.

C4 A high potential exists for positive economic return of public investments.

C5 The degree to which social/political controversy or interest conflict with present management is moderate to high.

C6 Resource management objectives are not being met; the allotment is in need of an allotment management plan or grazing system, or major revisions are needed to an existing allotment management plan.

C7 Additional range improvements are required to meet management objectives.

C8 Land status, exchange-of-use agreements, and size are not prohibitive factors for future management practices if there is a history of prior trespass.

C9 It is feasible to implement more intensive grazing management and to further develop range improvements (as compared to other allotments considering constraints of 10-year projections of funding and manpower availability).

C10 One or more major resource conflicts are present with critical wildlife habitat, wild horse and burro/livestock use areas, recreation, water rights, mining, lands action, Areas of Critical Environmental Concern, reintroduction of plants and animals, soil, water, and air quality.

"I" category allotments receive the highest priority for development because grazing management is most needed to improve the basic resources and/or resolve serious resource use conflicts (BLM 1988). In this regard, objectives for the Copper Canyon allotment are as follows:

O1 Do not exceed 50 percent use on key species by seed dissemination and 60 percent by the end of the grazing year.

O2 In the long-term, improve 10,750 acres to good condition and 413 acres to excellent condition; stop downward trends on 2,870 acres, and manage for upward trends on 11,118 acres. Maintain at least static conditions on remaining acreage.

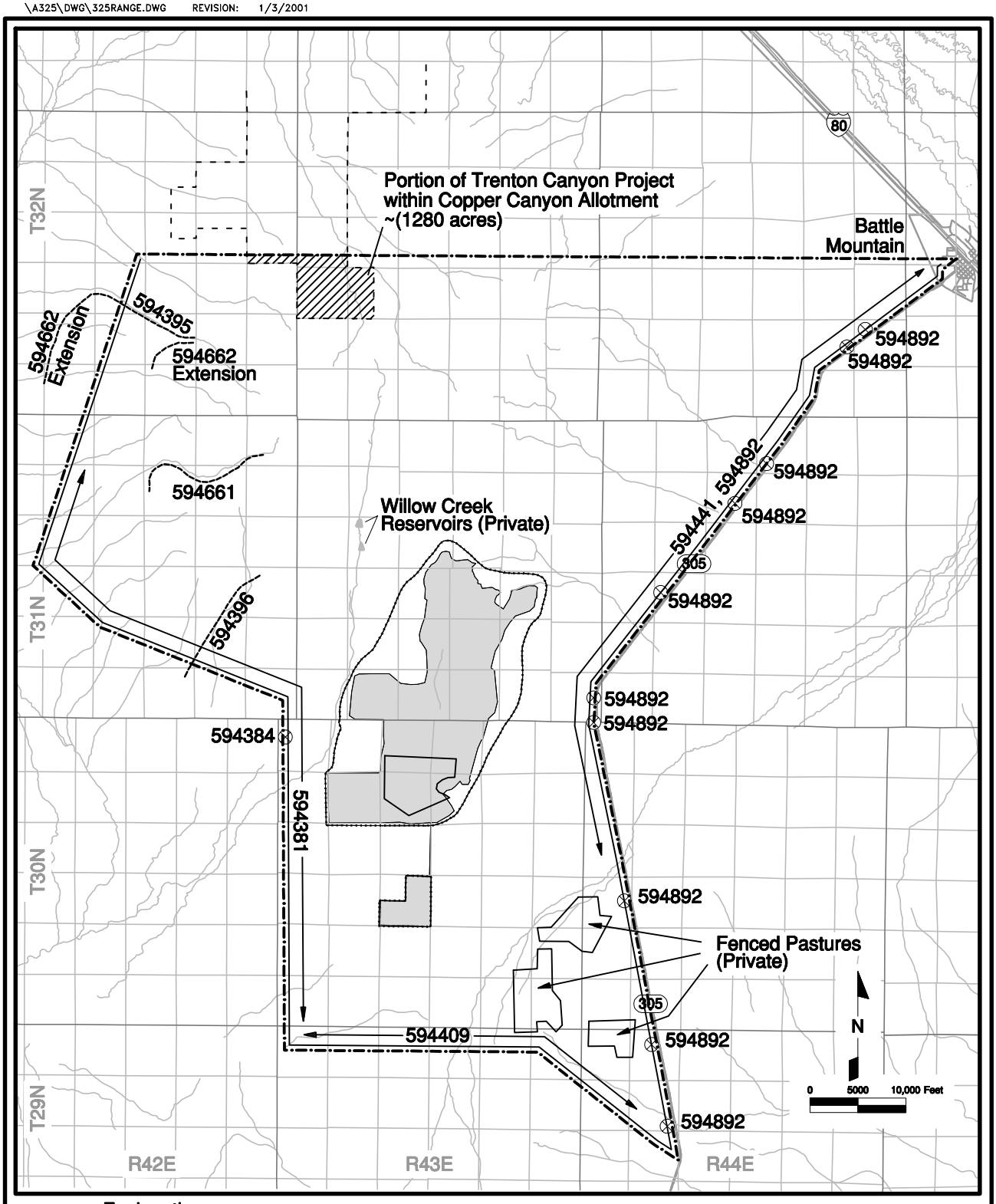
O3 Maintain the average existing use of 4,248 animal unit months for both cattle and sheep. Livestock use may be licensed up to the active preference; however, it is not anticipated that use will exceed the 5-year average animal unit months (existing use).

O4 In the long-term, manage use at 4,630 animal unit months in conformance with other objectives of the Resource Management Plan.

O5 Do not exceed 30 percent on key species in riparian habitat to be improved (by all herbivores); improve 1 mile of riparian/aquatic habitat to good condition on Willow Creek, including 12 acres of associated riparian habitat and 33 acres of other riparian habitat in the allotment.

O6 Do not exceed 50 percent of key browse species in terrestrial big game habitat areas (by all herbivores). Existing big game use is 513 animal unit months; provide for the long-term goal of 729 animal unit months in conformance with other objectives of the Resource Management Plan.

O7 Manage rangeland habitat to maintain or enhance sage grouse strutting and nesting areas in conformance with other objectives of the Resource Management Plan.



Explanation

- Drainage
- Road
- Grazing Allotment Boundary
- Existing Fence
- Water Pipeline
- Proposed Fence
- Project Facility Boundary
- Trenton Canyon Project
- Cattleguard

Phoenix Project

Figure 3.6-1

Copper Canyon Livestock Grazing Allotment

O8 Make the following improvements: 4 spring developments, 1 reservoir, 4 miles of pipeline, 40 miles of fencing, and 12 cattleguards.

At present, the Copper Canyon allotment involves four grazing permits held by three permittees (***Table 3.6-1***). The Ellison Ranching Company, a sheep operation, holds 1 permit with an active preference for 384 animal unit months, 100 percent of which is on public land. The owner of the Badger Ranch and Chiara Ranch holds two permits for cattle. The Badger Ranch, 61 percent of which operates on public land, holds a permit for an active preference of 3,587 animal unit months. The Chiara Ranch, 42 percent of which operates on public land, holds a permit for an active preference of 50 animal unit months. Finally, the Agri-Beef Company, a sheep operation of which 100 percent operates on public land, holds a permit for an active preference of 1,002 animal unit months.

There are 10 livestock range improvements within the Copper Canyon allotment, none of which are within the project area. A description of these improvements is provided in ***Table 3.6-2***. As indicated, the majority of these improvements are perimeter fencing and spring/water development pipelines in the western portion of the allotment (***Figure 3.6-1***). The remaining improvements are cattleguards.

As presented in ***Table 3.6-3***, vegetation production for the Black Sagebrush - Mountain Sagebrush/ Grassland community was determined from two sample points, both within Soil Conservation Service range site number 024XY016NV (WESTEC 1996). Total production was determined to be 921 pounds per acre (dry weight) with the vast majority from shrubs (***Table B-2*** in Appendix B). In comparison to the other seven communities, this level of production ranks as moderately low. The calculation of palatable forage, averaged for both cattle and sheep, is indicated in ***Table B-3***. Given an average consumption rate of 1,050 pounds of forage for a standard animal unit month, the Black Sagebrush-Mountain Sagebrush/ Grassland community exhibits a carrying capacity of 0.060 animal unit month per acre or 16.8 acres per animal unit month. This capacity is third highest (on a per acre basis) among the eight upland communities. However, on an overall average basis this community ranks second among project area vegetation types with a total of approximately 137 animal unit months available. Typically, stocking rates are adjusted to reflect physical factors and distance to water that limit grazing of certain areas. Adjustment of grazing capacity to levels below that indicated by forage production estimates is necessary to reflect limitations imposed by landscape features.

Vegetation production for the Mountain Sagebrush/Grassland community was determined from two sample points, both within Soil Conservation Service range site number 025XY015NV (WESTEC 1996). Total production was determined to be 1,342 pounds per acre (dry weight) with a large majority from shrubs (***Table B-2***). In comparison to the other seven communities, this level of production ranks third highest. The calculation of palatable forage, averaged for both cattle and sheep is indicated in ***Table B-3***. Given the average consumption rate mentioned previously, the Mountain Sagebrush/ Grassland community exhibits a carrying capacity of 0.092 animal unit month per acre or 10.9 acres per animal unit month. This capacity is second highest (on a per acre basis) among the eight upland communities. Similarly, on an overall average basis this community ranks third among project area vegetation types with a total of 89 animal unit months available.

Vegetation production for the Shadscale - Budsage/Grassland community was determined from two sample points, both within Soil Conservation Service range site number 024XY002NV (WESTEC 1996). Total production was determined to be 714 pounds per acre (dry weight) with the vast majority from shrubs (***Table B-2***). In comparison to the other seven communities, this level of production ranks as third lowest. The calculation of palatable forage, averaged for both cattle and sheep (***Table B-3***), indicates 13.5 pounds per acre of palatable grasses, 0.7 pound of palatable forbs, and 22.4 pounds of palatable shrubs for a total of 36.6 pounds per acre of palatable forage. Given the average consumption rate mentioned previously, the Shadscale - Budsage/Grassland community exhibits a carrying capacity of 0.035 animal unit month per acre or 28.7 acres per animal unit month. This capacity is median (on a per acre basis) among the eight upland communities. However, on an overall average basis this community ranks first among project area vegetation types with a total of 139 animal unit months available.

Table 3.6-1
Livestock Grazing Permits for the Copper Canyon Allotment

Permittee	Kind of Live-stock	Numbers of Live-stock	Grazing Period and Dates	Month												Percent Public Land	Active Preference (animal unit months)
				J	F	M	A	M	J	J	A	S	O	N	D		
Ellison Ranching Company	Sheep	300	3/1 - 4/30			X	X									100	120
	Sheep	335	11/1 - 2/28	X	X									X	X	100	264
Badger Ranch[1]	Cattle	490	3/1 - 2/28	X	X	X	X	X	X	X	X	X	X	X	X	61	3,587
Chiara Ranch[1]	Cattle	30	11/1 - 2/28	X	X									X	X	42	50
Agri-Beef Company	Sheep	1,009	3/1 - 3/31			X										100	206
	Sheep	1,009	11/1 - 2/28	X	X									X	X	100	796

Source: JBR 1997a, 1999a.
[1]Though these are separate ranches, the owner is common to both.
These data were verified to be current as of January 1999 (Bell 1999).

Table 3.6-2
Livestock Range Improvements for the Copper Canyon Allotment

Improvement Number	Name	Location
594381	Copper Canyon Fence	Township 31 North, Range 42 East, Section 20
594395	Mill Spring Improvement and Pipeline	Township 32 North, Range 42 East, Section 27
594396	Rocky Spring Improvement and Pipeline	Township 31 North, Range 42 East, Section 24
594409	Harry Canyon Division Fence	Township 29 North, Range 43 East, Section 9
594441	Shoshone Highway 8A Fence – 1979	Township 30 North, Range 44 East, Section 5
594661	Timber Canyon Pipeline	Township 31 North, Range 42 East, Section 1
594662	Mill Creek Pipeline Extension	Township 32 North, Range 42 East, Section 27
594384	Copper Canyon Cattleguard	Township 30 North, Range 42 East, Section 1
594892	State Highway 305 Fence and Cattleguards (10) – 1988	Township 31 North, Range 44 East, Section 24
594893	State Highway 305 Cattleguards (4) – 1988	Township 31 North, Range 44 East, Section 24

Source: JBR 1997a.

Table 3.6-3
Estimated Carrying Capacity by Plant Community

Plant Community	Fenced Area (acreage)	Estimated Vegetation Production (lbs/acre dry weight)	Palatable Forage (lbs/acre)				Carrying Capacity[1]	
			Grasses	Forbs	Shrubs	Total	AUMs/ acre	Acres/ AUM
Black Sagebrush – Mountain Sagebrush/ Grassland	2,302	921	22.4	0.0	40.2	62.5	0.060	16.8
Mountain Sagebrush/ Grassland	965	1,342	45.2	0.8	50.5	96.5	0.092	10.9
Shadscale Budsage/Grassland	3,980	714	13.5	0.7	22.4	36.6	0.035	28.7
Big Sagebrush – Rubber Rabbitbrush/ Grassland	0	3,368	15.6	0.4	0.0	16.0	0.015	65.6
Mixed Brush	35	4,159	29.2	0.0	157.4	186.7	0.178	5.6
Low Sagebrush/Grassland	4	499	17.2	1.5	25.4	44.1	0.042	23.8
Black Greasewood/ Shadscale	424	972	2.6	0.6	8.0	11.2	0.011	93.6
Disturbed Area	2,783	449	3.8	0.1	0.0	4.0	0.004	263.7
Total Weighted Average	10,493	937	17.07	0.39	27.97	45.4	0.043	23.1

Source: WESTEC 1995a, 1995f, 1996; SRK 1999c.
[1]Based on average consumption rate of 1,050 pounds of palatable forage for a standard animal unit month (AUM).

Vegetation production for the Big Sagebrush - Rubber Rabbitbrush/Grassland community was determined from two sample points, both within Soil Conservation Service range site number 024XY041NV (WESTEC 1996). Total production was determined to be 3,368 pounds per acre (dry weight) with the vast majority from shrubs (***Table B-2***). In comparison to the other seven communities, this level of production ranks as second highest. The calculation of palatable forage, averaged for both cattle and sheep (***Table B-3***), indicates 15.6 pounds per acre of palatable grasses, 0.4 pound of palatable forbs, and 0.0 pound of palatable shrubs for a total of only 16 pounds per acre of palatable forage. Given the average consumption rate mentioned previously, Big Sagebrush-Rubber Rabbitbrush/ Grassland community exhibits a carrying capacity of 0.015 animal unit month per acre or 65.6 acres per animal unit month. This capacity is third lowest (on a per acre basis) among the eight upland communities.

Vegetation production for the Mixed Brush community was determined from two sample points, both within Soil Conservation Service range site number 025XY015NV (WESTEC 1996). Total production was determined to be 4,159 pounds per acre (dry weight) with the vast majority from shrubs (***Table B-2***). In comparison to the other seven communities, this level of production ranks as the highest. The calculation of palatable forage, averaged for both cattle and sheep (***Table B-3***), indicates 29.2 pounds per acre of palatable grasses, and 157.4 pounds of palatable shrubs for a total of approximately 187 pounds per acre of palatable forage. Given the average consumption rate mentioned previously, the Mixed Brush community exhibits a carrying capacity of 0.178 animal unit month per acre or 5.6 acres per animal unit month. This capacity is the largest (on a per acre basis) among the eight upland communities. On an overall average basis this community ranks fifth among project area vegetation types with a total of approximately 6 animal unit months available.

Vegetation production for the Low Sagebrush/ Grassland community was determined from two sample points, both within Soil Conservation Service range site number 024XY016NV (WESTEC 1996). Total production was determined to be only 499 pounds per acre (dry weight) with the vast majority from shrubs (***Table B-2***). In comparison to the other seven communities, this level of production ranks second

to last. The calculation of palatable forage, averaged for both cattle and sheep (***Table B-3***), indicates 17.2 pounds per acre of palatable grasses, 1.5 pounds of palatable forbs, and 25.4 pounds of palatable shrubs for a total of approximately 44 pounds per acre of palatable forage. Given the average consumption rate mentioned previously, the Low Sagebrush/ Grassland community exhibits a carrying capacity of 0.042 animal unit month per acre, or 23.8 acres per animal unit month. This capacity ranks fourth (on a per acre basis) among the eight upland communities. However, on an overall average basis this community ranks last among project area vegetation types with a total of only 0.2 animal unit month available.

Vegetation production for the Black Greasewood/ Shadscale community was determined from two sample points, both within Soil Conservation Service range site number 024XY003NV (WESTEC 1996). Total production was determined to be 972 pounds per acre (dry weight) with the vast majority from shrubs (***Table B-2***). In comparison to the other seven vegetation types, this level of production ranks as the fourth lowest of the natural communities. The calculation of palatable forage, averaged for both cattle and sheep (***Table B-3***), indicates 2.6 pounds per acre of palatable grasses, 0.6 pound of palatable forbs, and 8.0 pounds of palatable shrubs for a total of approximately 11 pounds per acre of palatable forage. Given the average consumption rate mentioned previously, the Black Greasewood/ Shadscale community exhibits a carrying capacity of 0.011 animal unit month per acre or 93.6 acres per animal unit month. This capacity is the second lowest (on a per acre basis) among the eight upland communities. On an overall average basis this community ranks sixth among project area vegetation types with a total of 4.5 animal unit months available.

Vegetation production for the disturbed area designation was determined from two sample points in revegetated areas. One of these was reclaimed mine-related material; therefore, it has no Soil Conservation Service range site number. The other area was from within Soil Conservation Service range site number 025XY017NV (WESTEC 1996). Total production was determined to be 449 pounds per acre (dry weight) with the majority from shrubs, but a large proportion from herbaceous material (***Table B-2***). In comparison to the other seven vegetation types, this level of production ranks as the lowest. The calculation of palatable forage, averaged for both cattle and sheep (***Table B-3***), indicates 3.8 pounds per acre of palatable grasses, 0.1 pound of palatable forbs, and 0.0 pound of palatable shrubs for a total of 3.9 pounds per acre of palatable forage. Given an average consumption rate of 1,050 pounds of forage per animal unit month, the disturbed area exhibits a carrying capacity of 0.004 animal unit month per acre or 263.7 acres per animal unit month. This capacity is the lowest (on a per acre basis) among the eight upland communities. However, on an overall average basis this designation ranks fourth among project area communities with a total of 10.6 animal unit month available.

Based on an overall average without regard to proximity to water or physical barriers (which are typically taken into account when setting stocking rates), the average existing use in the Copper Canyon allotment is approximately 0.034 animal unit month per acre or 29.2 acres per animal unit month. As indicated in ***Table 3.6-3***, the project area weighted average carrying capacity was calculated to be 0.043 animal unit month per acre or 23.1 acres per animal unit month.

3.6.2 Environmental Consequences

3.6.2.1 Proposed Action

The primary issues associated with range resources include 1) impacts to plant communities that would substantially interfere with the land use of livestock grazing and 2) impacts to range features that would substantially interfere with the management of livestock grazing.

Impacts to range resources would be considered significant if the Proposed Action or No Action alternative result in the following:

- Disturbance of grazing areas sufficient to result in a short-term forage (or Animal Unit Months) loss (during the life of the mine) of 25 percent or greater or a long-term forage loss (exceeding the life of the mine plus the reclamation period) of 10 percent or greater on the allotment.

- Loss of key grazing areas that would necessitate major revisions in the grazing management approach for the remainder of the allotment.

- Mine-caused wildfires or excessive grazing pressures on local plant communities or areas (greater than 100 acres) that would lead to

irreparable degradation of the range resource in terms of plant community composition or productivity (e.g., establishment of permanent stands of annual grassland).

- Loss of stock water sources in one or more pastures necessitating water hauling or non-usage of these areas.

- Prevention of livestock movement within the allotment.

The potential effects of the Proposed Action on range resources can be characterized as follows: 1) lost carrying capacity resulting from disturbance of existing plant communities; 2) unavailable forage during the life of mining resulting from installation of the perimeter fence; 3) potential increases in livestock mortality as a result of collisions with vehicles; 4) interference with ranch management activities; 5) interference with or disturbance to existing range improvements; and 6) interference with BLM management as described in Section 3.6.1.

Based on a comparison of the Proposed Action with current livestock management, no significant adverse effects are anticipated to key grazing areas, stock watering sources, or livestock movement corridors. Increases in the mining disturbance area are not anticipated to significantly affect these resources.

As indicated at the beginning of Section 3.6.1 Affected Environment, the BLM has classified the Copper Canyon allotment as an "I" (Improve) category area. In general, the proposed project would have adverse short-term (life of mining) impacts to a majority of the listed characteristics and objectives (see ***Table 3.6-4***). Following revegetation success, long-term impacts would become beneficial. For example, the current range trend is identified as declining or static (characteristic 3). Given the Proposed Action and no reduction in stocking rates, grazing pressure on non-project portions of the allotment would increase proportionately, resulting in short-term adverse impacts. However, once successful reclamation has occurred, the allotment's overall carrying capacity should increase, providing an overall long-term beneficial effect. In a few instances, characteristics and objectives would be beneficially impacted by the Proposed Action in the both the short term and long term. For example, characteristic 7 calling for "additional range improvements … to meet objectives" would be met by additional stock watering facilities to be developed as a result of project implementation. Since these actions would typically remain postclosure, impacts would be beneficial both during and after mining operations. In other instances, several characteristics and objectives would not be impacted by the Proposed Action (in either the short term or long term). For example, characteristic 6 calling for a revision to the allotment management plan, would be unaffected by implementation of the Proposed Action. In no case are long-term impacts to the characteristics or objectives expected to be adverse.

There may be impacts to water availability in portions of lower Willow Creek; however, water would still be available to livestock upstream. Also, as indicated in ***Figures 3.2-13 through 3.2-15***, there may be impacts to several perennial springs in the headwaters of Galena Canyon as a result of ground water drawdown. This area could support an estimated maximum of 170 animal unit months of use. However, grazing use in this area has been determined by the BLM to be light to moderate. Assuming half of the capacity is utilized, this would equate to approximately 20 animal units for 4 months. If all springs were lost in this area, livestock could still obtain natural water within 2 miles (effective travel distance for cattle). However, such travel would effectively preclude at least a portion of the livestock use of the upper Galena Canyon watershed, and/or place some additional stress on the neighboring water sources. With the implementation of mitigation measure R-1, impacts to range resources are not anticipated.

With regard to a potential reduction in carrying capacity, ***Table 3.6-5*** indicates the loss of carrying capacity in animal unit months by plant community.

The direct impact of the Proposed Action would be the loss of approximately 197 animal unit months annually during the life of mining or 3.9 percent of the Copper Canyon allotment's capacity. Similarly, as indicated in ***Table 3.6-5***, completion of the perimeter fence would preclude grazing animals from an estimated 3,419 acres of undisturbed vegetation which provide palatable forage sufficient to provide approximately 189 animal unit months of carrying capacity or an additional 3.8 percent of the Copper Canyon allotment's capacity. In total, lost or displaced forage would account for 386 animal unit months or 7.7 percent of the allotment's capacity on an annual basis. Over the course of the mine life, these losses of carrying capacity would not be considered significant.

Table 3.6-4
Impacts on BLM Range Management of the Copper Canyon Allotment

Characteristic or Objective[1]	EIS Section Reference	Short-term Impact Rationale[2]		Long-term Impact and Rationale[2]	
C1	3.2, 3.3, 3.4, & 3.5	Negative	A	Positive	B
C2	3.5	Negative	A	Positive	B
C3		Negative	A	Positive	B
C4		Positive	C	Positive	D
C5		Negative	A	Positive	B
C6		None	--	None	--
C7	3.3	Positive	E	Positive	F
C8		None	--	None	--
C9		Positive	E	Positive	F
C10	3.2, 3.3, 3.4, & 3.5	Negative	A	Positive	B
O1		Negative	A	Positive	B
O2		Negative	A	Positive	B
O3		None	--	None	--
O4		None	--	Positive	B
O5	3.4	Negative	A	Positive	G
O6	3.5	Negative	A	Positive	B
O7	3.5	Negative	A	Positive	B
O8	3.3	Positive	E	Positive	F

[1]Characteristics and objectives are those listed at the beginning of Section 3.6.1.
[2]Rationale:
A Loss of resources and increased off-site use
B Return of resources and decreased off-site use
C Increase due to private investment upon public land
D Return of resources and improved condition
E See mitigation measures R-1, S-1, and S-2
F Revegetation (Section 3.3) and mitigation measures R-1, S-1, and S-2
G Return of resources in 33+ years and decreased off-site use

Table 3.6-5
Carrying Capacity Effects by Plant Community

Project Alternative	Plant Community								Total Acres or AUMs
	BSMSG	MSG	SBG	BSRRG	MB	LSG	BGS	D	
Proposed Action									
Acres of disturbance	746	448	2,770	0	1.8	0	398	2,709	7,073
AUMs/acre	0.060	0.092	0.035	0.015	0.178	0.042	0.011	0.004	
Lost AUMs	44.4	41.2	96.7	0.0	0.3	0.0	4.3	10.3	197.1
Non-disturbed fenced area acres	1,556	517	1,210	0	32.9	3.7	26	74	3,419
AUMs/acre	0.060	0.092	0.035	0.015	0.178	0.042	0.011	0.004	
Lost AUMs	92.6	47.5	42.2	0.0	5.8	0.2	0.3	0.3	188.9
No Action Alternative									
Acres of permitted disturbance	0.0	0.0	40	0.0	0.0	0.0	0.0	2,783	2,823
AUMs/acre	0.060	0.092	0.035	0.015	0.178	0.042	0.011	0.004	
Lost AUMs	0.0	0.0	1.4	0.0	0.0	0.0	0.0	11.1	12.7

BSMSG = Black Sagebrush – Mountain Sagebrush/Grassland
MSG = Mountain Sagebrush/Grassland
SBG = Shadscale – Budsage/Grassland
BSRRG = Big Sagebrush – Rubber Rabbitbrush/Grassland
MB = Mixed Brush
LSG = Low Sagebrush/Grassland
BGS = Black Greasewood/Shadscale
D = Disturbed Area
Note: AUMs = animal unit months

Given that the Proposed Action is a continuation of an existing mining operation, the potential for livestock vehicle collisions would logically increase proportionally with anticipated increases in vehicle traffic at both single points in time as well as increases over the expected life of mining. It is reasonable to assume that the operator and local ranchers have reached mutual agreement regarding compensation for any mine-related livestock losses from vehicle collisions and that such agreements would continue.

With regard to the last two potential effects upon range resources, proposed increases in the amount of disturbance are not anticipated to result in a significant adverse effect. A comparison of known range improvements with the Proposed Action footprint reveals no conflicts or other adverse impacts.

The short-term direct loss of carrying capacity associated with project disturbance during the mining and reclamation phases of the project would be offset following successful revegetation efforts assuming proper postmining land management.

Once offset, expected gains in site-specific carrying capacities would result in a long-term positive impact. This finding is based on the following analysis.

At present the average carrying capacity of the project area is 0.043 animal unit months per acre. Postmining, a carrying capacity of 0.257 animal unit months per acre should be achievable. This is based on the following assumptions: 1) replacement of 600 pounds per acre of annual production, 2) 90 percent of this production would be composed of usable forage and could be properly used at the 50 percent level, and 3) herbivore consumption would be 1,050 pounds of forage per animal unit month. Furthermore, assuming that historic disturbance is 30 years old and new disturbance and fenced areas under the Proposed Action would not be entirely revegetated for another 30 years, then lost carrying capacity over this 60-year period would total an estimated 13,535 animal unit months. Once revegetated communities are established on 6,497 acres of disturbance, it would take an estimated 8 years at 0.257 animal unit months per acre to reach a break even level regarding lost carrying capacity. After this point in time, carrying capacity of the revegetated project area should provide six times greater capability than the premining native communities, assuming proper postmining land management.

As described in Section 3.3.2, a screening-level analysis was conducted to determine the potential risk to plants and wildlife of chemical constituents in the capping material used for reclamation and revegetation of project facilities. The risk to wildlife or livestock utilizing forage on the reclaimed facilities was determined to be low to moderate.

3.6.2.2 No Action Alternative

Potential impacts under the No Action alternative would be the same as described for the Proposed Action with the following exceptions. As indicated in ***Table 2-1***, approximately 2,783 acres of the 2,823 acres permitted for disturbance under the No Action alternative have already been affected. This totals to 99 percent of the currently permitted acreage. The remaining 40 acres (1 percent) would involve expansion to the final permitted size of the Midas Pit.

Under the No Action alternative, 2,332 acres would be reclaimed and revegetated. There would be a loss of approximately 21 animal unit months per year associated with 492 acres of unreclaimed pit areas based on the estimated premining carrying capacity of 0.043 animal month units per acre. As for the Proposed Action, lost carrying capacity over a 60-year period would total an estimated 7,180 animal unit months.

3.6.3 Cumulative Impacts

The cumulative effects area for range resources encompasses the Copper Canyon grazing allotment (***Figure 3.6-1***), which is comprised of 106,430 acres, as well as the North Buffalo grazing allotment, which encompasses an additional 98,880 acres. Active preference livestock capacity for the Copper Canyon and North Buffalo allotments is currently set at 5,023 and 3,447 animal unit months, respectively (see ***Table 3.6-6***). Past, present, and reasonably foreseeable future projects within these two allotments (except the Phoenix Project) have resulted in the short-term loss of 12 and 617 animal units months from the Copper Canyon and North Buffalo allotments, respectively (see ***Table 3.6-6***). This accounts for 0.2 percent and 17.9 percent of the active preference animal unit months from the two allotments, respectively. Given that all permittees are common to both allotments, the documented overall reduction in carrying capacity (animal unit months) is 7.4 percent for all past, present, and reasonably foreseeable future projects except the Phoenix Project.

With the addition of the Phoenix Project, an additional 386 animal unit months would be displaced from the Copper Canyon allotment in the short-term. This cumulative short-term loss brings the total displaced animal units months to 1,015 or 12.0 percent for the two allotments combined. This would be an increase of 4.6 percent for the two allotments combined (see ***Table 3.6-6***). In the long-term, it can be reasonably assumed that most (i.e., over 90 percent) of the disturbed acreage would be reclaimed and revegetated. As indicated previously, revegetated areas typically exhibit elevated carrying capacity (for livestock) over predisturbance conditions. Therefore, it is probable that in the long-term, carrying capacity losses would be mitigated by successful revegetation efforts.

3.6.4 Monitoring and Mitigation Measures

Monitoring and mitigation measures applicable to range resources are associated with water resources and geochemistry, as discussed in Section 3.2.4; soils and reclamation, as discussed in Section 3.3.4; and vegetation, as discussed in Section 3.4.4.

The following mitigation measure addresses the potential loss of stock water sources due to ground water drawdown.

R-1: Water Development. BMG would work with the BLM and permittee to develop short-term (life of mine) stock water at three locations on the periphery of the project perimeter fence to improve livestock distribution and forage utilization. No salting would be allowed within 0.25-mile of new water developments. Consideration would be given for wildlife access to these facilities. These developments would not necessarily be in conjunction with mitigation measure WR-3 (replacement water for loss of springs due to drawdown). Mitigation measures WR-1 and WR-2 provide for monitoring to identify potential losses in surface water sources; see Section 3.2.4, Monitoring and Mitigation Measures (Water Resources and Geochemistry).

3.6.5 Residual Adverse Effects

As indicated in Section 3.4.5, residual adverse vegetation effects would be limited to those areas (e.g., the pit highwalls) that cannot be reclaimed and revegetated. Therefore, there would be an annual loss of approximately 25 animal unit months associated with 576 acres of unreclaimed pit areas, based on the average premining carrying capacity of 0.043 animal unit months per acre. The remainder of the area (approximately 6,497 acres) would be recontoured and reclaimed as indicated on the postreclamation topography map (***Figure 2-5***) and revegetated. Following successful reclamation and revegetation of the disturbed areas, the long-term effect on range resources, especially forage, would be positive.

As indicated in Section 3.2.5, no residual adverse effects to water resources, including surface water flows, are anticipated with the implementation of mitigation measures. Therefore, there would be no residual adverse effects to stock water sources.

Table 3.6-6
Past, Present, and Reasonably Foreseeable Cumulative Effects on Carrying Capacity (Animal Unit Months) of the Copper Canyon and North Buffalo Range Allotments and Permittees

	Copper Canyon Allotment		North Buffalo Allotment		Combined Allotments	
Permittee	**Current Active Preference AUMs[1]**	**Percent of Allotment**	**Current Active Preference AUMs**	**Percent of Allotment**	**Total Active AUMs for Both Allotments Combined**	**Percent of Total**
Ellison Ranching Co.	384	7.6	1,194	34.6	1,578	18.6
Badger/Chiara Ranches	3,637	72.4	153	4.4	3,790	44.7
Agri-Beef Co.	1,002	19.9	2,100	60.9	3,102	36.6
Total	5,023	100.0	3,447	100.0	8,470	100.0
Project	**Copper Canyon Allotment Displaced AUMs**		**North Buffalo Allotment Displaced AUMs**		**Displaced AUMs for Both Allotments Combined**	
Lone Tree Mine			243	7.0	243	2.9
Marigold Mine			252	7.3	252	3.0
Trenton Canyon Mine	12	0.2	123	3.6	135	1.6
Phoenix Project (Direct Disturbance)	197	3.9			197	2.3
Phoenix Project (Perimeter Fence)	189	3.8			189	2.2
Total	398	7.9	617	17.9	1,015	12.0
Cumulative portion of total due to addition of Phoenix Project =						4.6

[1]AUMs = Animal Unit Months

Note: Data presented for North Buffalo Allotment was taken from BLM files.

3.7 Paleontological Resources

3.7.1 Affected Environment

No known paleontological resources have been identified in the project area. A review of the potential for paleontological resources in the project area was conducted by Dr. James Firby. Firby (1995) notes that the potential for paleontological resources is subjectively determined by 1) the presence of fossil material recorded in the literature within the project area, 2) the presence of fossils elsewhere within a stratigraphic unit mapped or recorded as present within the project area, and 3) the favorability of a stratigraphic unit to contain fossil material based on its assumed depositional environment. Firby (1995) further states that:

> Significance of an area or resource is subjectively judged on 1) the kind of fossil material (e.g., all vertebrate fossils are said to have significance), 2) the uniqueness of the source (e.g., the type area of a particular species), 3) the presence of localities which are the source of species new to science (e.g., type area), and 4) whether an assemblage is critical to understanding or defining a certain time horizon.

Firby (1995) rated the potential for, and significance of, paleontological resources in the ten lithostratigraphic units within the project area. The potential for seven of the ten units to contain paleontological resources was rated low, as was their significance. The potential for three units (Havallah, Pumpernickle, and Scott Canyon formations) to contain paleontological resources was rated as moderate; however, the significance of any of these resources was rated low.

3.7.2 Environmental Consequences

To be considered significant, a paleontological resource must retain integrity and satisfy at least one of the following criteria:

- The resource is a unique or site-specific invertebrate, vertebrate, or paleobotanical fossil occurring in formations found in the proposed project site.
- The resource qualifies as significant or critical and requires protection under the Antiquities Act of 1906.

3.7.2.1 Proposed Action

Potential direct effects to paleontological resources from implementation of the Proposed Action would be limited to areas of disturbance; potential indirect impacts could result from potential increased accessibility to fossil beds from improved access to remote areas and subsequent illegal collecting. However, as there are no known or suspected significant paleontological resources in the project area, there would be no adverse impacts to paleontological resources under the Proposed Action.

3.7.2.2 No Action Alternative

There are no known significant paleontological resources in the project area; therefore, there would be no adverse impacts to paleontological resources as a result of implementation of the No Action alternative.

3.7.3 Cumulative Impacts

The cumulative effects area for paleontological resources extends north from the Phoenix Project to Interstate 80, east to State Highway 305, west to Willow Creek, and south to include the clay borrow area. Interrelated projects within this cumulative effects area included the Battle Mountain Complex, Trenton Canyon Mine, and Marigold Mine.

As no direct or indirect adverse impacts to paleontological resources would occur under the Proposed Action, no cumulative impacts to paleontological resources would occur.

3.7.4 Monitoring and Mitigation Measures

No monitoring or mitigation is recommended for paleontological resources as no significant paleontological resources have been identified in the project area. Because fossils are usually buried, their locations cannot be confirmed until excavation occurs. It is unlikely that significant fossiliferous deposits (i.e., vertebrate fossil deposits) would be located during construction, operation, or reclamation. Therefore, measures would not likely be required to identify and preserve the fossils.

3.7.5 Residual Adverse Effects

Since there are no known significant paleontological resources in the project area, there would be no adverse impacts to the resource; therefore, no residual adverse effects would occur.

3.8 Cultural Resources

3.8.1 Affected Environment

The goal of cultural resource management is to maintain and enhance historic and prehistoric cultural resource values. Cultural heritage resources consist of prehistoric and historic archaeological deposits; structures of historic or architectural importance; and Native American traditional ceremonial, ethnographic, religious and burial sites. Prehistoric resources are physical locations with a cluster of features and/or artifacts that are a result of human activities occurring prior to written records. Historic resources are clusters of features and/or artifacts left by human activity occurring after written records were common.

The area of potential effect (APE) for cultural resources (i.e., the project area or project facility boundary) is the proposed area of disturbance. A limited variety of site types occurs in the project area. Prehistoric site types found in the project area include lithic scatters, isolated features, and rock shelters. Historic sites include habitations, mines, mills, trash scatters, roads, trails, and isolated features. Several sites found in the project area have more than one component and include evidence of both historic and prehistoric activities. These sites include a habitation with lithic scatter, a trash and lithic scatter, a corral and lithic scatter, and a tent platform and lithic scatter.

3.8.1.1 Prehistoric Background

The project area is located within the Central Subregion of the Western Subarea of the Great Basin (Jennings 1986; Elston 1986). Archaeological surveys and excavations in this subregion undertaken between 1963 and the late 1970s explored cultural and environmental relationships resulting in a cultural chronological sequence for nearby Monitor Valley extending from approximately 3500 B.C. to the arrival of Euro-Americans in the mid-nineteenth century (Thomas 1982). Archaeological patterns are seen by Thomas (1982) to indicate that small, seasonally mobile groups subsisted on a wide variety of plants and small and large animals, and relied heavily on pine nuts as a winter staple. This closely conforms to Steward's (1938) ethnographic findings. Pre-Archaic sites have been found to the south of the project area; however, relatively little cultural change appears to have occurred during the past 6,000 years in the vicinity of the project area (McCabe and Clay 1999)

3.8.1.2 Historic Background

The main general sources for the historic background of the project area are Bowers and Muessig (1982) and Mordy and McCaughey (1968). Studies with extensive historical information on the Battle Mountain Mining District include Hill (1915), Vanderburg (1936, 1939), and Roberts and Arnold (1965). Because the specific historic background has been covered in overviews (Resource Concepts, Inc. and Archaeological Research Services, Inc. 1993) inventory reports (Peak and Associates 1991), and mitigation reports (Archaeological Research Services, Inc. 1999b; JRP Historical Consulting Services 1997), only a brief summary is included below.

The first Euro-American penetration into the area was by fur trapper Peter Skene Ogden in 1828 and explorer Joseph Walker in 1833-34. The route along the Humboldt River explored by Walker would eventually become part of the Emigrant Trail. By the middle of the 19th century there was a low level of Euro-American settlement and a transient population in the general area focused around the Emigrant Trail. The 1860s brought increased occupation by farmers and ranchers in response to the mining discovery at Battle Mountain. Small-scale mining of gold, silver, and copper occurred at several locations in the Battle Mountain District, but mining did not become intensive until the Nevada Central Railroad was completed in the late 1860s. The modern town of Battle Mountain (as opposed to the Old Battle Mountain mining camp) was originally founded as Battle Mountain Station, a station and stop on the railroad.

The Battle Mountain Mining District has a history of mining activity that dates to the 1860s. The exact dates that the first claims were staked is uncertain, but in 1866 the mining district officially was formed, and the next year the Little Giant Mine was located. This mine became one of the most important early producers in the district. From 1867 to 1870 the district grew to include 32 mines and 2 smelters. Many of the mines were consolidated into the Battle Mountain Mining Company, an English concern. That company shipped more than 40,000 tons of ore to Swansea, Wales, for refining. Despite these encouraging returns, the district entered a period of lessened activity during the 1880s. Activity in the district remained limited until the early twentieth century, with copper ore becoming the biggest commodity produced, primarily from Copper Canyon. After the

end of World War I (1919), the copper market fell, and the district entered another period of lessened activity that lasted for many years.

Local mining increased in 1933 with improved metal prices. World War II caused an increase in copper and zinc production centered on the Copper Canyon Lease operated by International Smelting and Refining Company (ISARCO), a subsidiary of Anaconda Copper Mining Company. In addition to expanded facilities at the mine, a mill and small company camp were established. Base metal production in this area ended with the war, but this was replaced in the 1950s by the largest-scale placer operations yet seen in the district, centered on dredging at the mouth of Copper Canyon. Throughout the era of industrial-scale mining there has been a continuous level of small-scale subsistence lode and placer mining that has contributed to a core of individual miners and families that have retained close ties with the district.

3.8.1.3 Cultural Resources Identified in the Project Area

The cultural resources of the proposed Phoenix Project area have been collectively studied through a series of cultural resource inventories conducted between 1977 and 1999. These inventories (see ***Table 3.8-1***) documented 103 cultural sites in the project area. The number of total sites does not include isolated artifacts (single artifacts or single features without associated artifacts that are not assigned site numbers).

Of the 103 sites identified in the APE, all but 10 sites have had final National Register of Historic Places (NRHP) determinations made by the BLM with the concurrence of the State Historic Preservation Officer (SHPO) or by the BLM under the stipulations of the State Programmatic Agreement (PA) developed between the SHPO and the BLM in 1999. The 10 sites without final NRHP determinations include: CrNV-62-5926, -5931, -7004, -7005, -7022, -7031, -7032, -8152, -8156, and -9423). In addition, evaluations conducted for two potential Traditional Cultural Property (TCP) sites (CrNV-62-7027 and -7028) were inconclusive. BMG has committed to avoiding the sites.

Twenty-one of the 103 sites in the APE have been found eligible to the NRHP with concurrence from the SHPO or as recommended by the BLM in compliance with the State PA. Seventy sites have been determined ineligible to the NRHP with SHPO concurrence, and 6 sites have been determined ineligible pending SHPO concurrence. One gravesite has been mitigated under applicable state and federal regulations. Two sites have been identified as potential TCPs; they have not been found eligible to the NRHP. Three sites (CrNV-62-7032, -8152, and -9423) are unevaluated or undetermined in relation to their NRHP status; Phoenix has committed to avoiding sites CrNV-62-7032 and -9423. Site CrNV-62-8152 has been mitigated.

Thirty of the 103 sites in the APE have been previously disturbed under the existing operations; an additional 12 sites would be disturbed under activities previously permitted for the No Action alternative. All but 5 of the NRHP-eligible sites, potentially eligible sites, or potential TCP sites (CrNV-62-5926, -5931, -7027, -7028, and -9423) located within the APE have had mitigation completed as directed under a PA developed between the BLM Battle Mountain Field Office, the Nevada SHPO, the Advisory Council on Historic Preservation (the Advisory Council), and BMG or as part of other operation approvals. BMG has committed to avoiding any disturbance to the 5 prehistoric and TCP sites. Mitigation was conducted as authorized under approved treatment plans and included data recovery at selected sites, recordation of oral histories, and preparation of interpretive documents that discuss the history of the mining district.

The PA between BMG, the BLM Battle Mountain Field Office, the SHPO, and the Advisory Council was entered into in 1994 to address the treatment of historic properties during development of mining operations in the Battle Mountain Mining District. This cooperative agreement established the methodology for development and finalization of data recovery and treatment plans (DRTPs) for historic cultural sites associated with the BMG Reona Project and the proposed BMG Phoenix Project. The PA and the DRTPs defined general and specific obligations that would be undertaken to ensure that the objectives and requirements of the National Historic Preservation Act (NHPA) would be fulfilled. These actions included specific employee cultural education requirements, reporting procedures, and surety bond obligations identified to ensure that the DRTP would be completed and that archaeological resources within the area would be protected. With the PA as a base, the cooperative parties also established how the consultation process would be implemented under Section 106 of the NHPA.

Table 3.8-1
Cultural Resource Inventories in the Project Area

BLM Report No.	Date	Author
CRR6-54 (no final report completed)	1977	McGonagle
CRR6-1119	1988	Burke
CRR6-1329	1989	McCabe
CRR6-1331, CRR6-1331-1	1990	McCabe
CRR6-1359	1990	Nielson et al.
CRR6-1370, CRR6-1370-1	1991	Nielson and Southworth
CRR6-1399	1991	Peak and Associates, Inc.
CRR6-1538	1993	Resource Concepts, Inc. and ARS
CRR6-1538-1	1993	Reno
CRR6-1705, Part 1	1994	Johnston and Marmor
CRR6-1705, Part 4	1994	Marmor
CRR6-1718	1994	Marken
CRR6-1722	1995	McCabe
CRR6-1786	1995	McCabe
CRR6-1901-5	1996	Archaeological Research Services
CR6-1329(P)	1998	McCabe
ARS 964[1]	1998	McCabe
CR6-1989(P)	1998	Reno
CRR6-2107(P)	1999	McCabe
CRR6-2162(P)	1999	McCabe and Clay

[1]Archaeological Research Services, Inc. report number. Survey was conducted on private land; no BLM report number was issued.

Methodologies identified in the DRTPs were based upon the historic period or thematic approach presented in the Battle Mountain Mining District historic overview prepared by Resource Concepts, Inc. and Archaeological Research Services, Inc. (ARS) (1993). This overview focused on three important mine production eras (i.e., the individual prospector period, the small miner period, and the corporate ownership period) associated with mineral exploration, mineral development, and human habitation in the district. Under the PA, all identified historic cultural properties were examined in relation to one or more of the mine production eras identified in the report prepared by Resource Concepts, Inc. and ARS, Inc. Although 91 historic properties in the Phoenix Project area had been identified during BLM-authorized Class III field surveys, the Phoenix Project PA and the DRTP did not require mitigation of all sites. Representative historic sites believed to contain the most important archaeological values associated with the identified themes or mining eras were selected by the cooperating parties for specific data recovery and treatment. The selection criteria were not limited by location or potential direct or indirect impact but were based solely on the archaeological value of the specific site. Some of the sites identified for mitigation by the DRTP would be directly or indirectly impacted by the proposed Phoenix Project, such as the Copper Canyon mine and camp site, while others were located far outside of the areas of the Phoenix Project influence, such as the Butte mill site. Mitigation has been completed on all sites selected for intensive examination under the PA and DRTPs.

Prehistoric Resources

Fifteen of the 103 sites recorded in the project area are prehistoric or include aboriginal cultural resources (see ***Table 3.8-2***). Eleven of the prehistoric or aboriginal sites are lithic scatters and one is a rock shelter. Three sites are multicomponent historic and prehistoric/aboriginal resources; one is a historic tent platform and lithic scatter; one is a lithic scatter, petroglyph, and historic artifact scatter; and one is a rock shelter, lithic scatter, and historic rock alignment.

Historic Resources

A total of 88 historic sites have been recorded within the project area (***Table 3.8.2***). The majority of these sites are mines, and most, if not all, are related to mining. Of the 57 historic mining complexes or mines located in the APE, many are loci of larger entities.

Table 3.8-2
Site Types in the Project Area

Resource Type	Number
Prehistoric Resources	
Rock shelter	1
Lithic scatters	11
Subtotal	12
Historic Resources	
Historic habitations	3
Historic mines and mine complexes	57
Historic artifact scatters	9
Historic cemetery	1
Historic road or trail with trash scatter	1
Prospect	11
Road or road segment	6
Subtotal	88
Multicomponent Resources	
Historic artifact scatter, petroglyph, and lithic scatter	2
Rock shelter, lithic scatter, and historic rock alignment	1
Subtotal	3
TOTAL	**103**

3.8.1.4 Ethnography and Ethnohistory

The ethnographic and ethnohistoric background of the project area and cumulative effects area are essentially the same. The information presented below and the issues discussed are based on a review of relevant literature and discussions with Western Shoshone and Northern Paiute governments and organizations.

Project and Cumulative Effects Areas in Relation to Traditional Tribal Lands

The project area is situated southwest of the Humboldt River on the southern flank of Battle Mountain. Neighboring ethnic groups and subgroups maintained joint use of lands near their traditional boundaries, but the principal occupants of the project and cumulative effects areas and their vicinity were local bands of the Newe, or Western Shoshone, ethnic group. The Northern Paiute (Numa) ethnic group lived a relatively short distance to the west of the project and cumulative effects areas. The Western Shoshone subgroup that lived nearest the project area wintered at Tonomudza (Greasewood Point) below the confluence of the Reese and Humboldt rivers. Local subgroups of the Northern Paiute, which are most likely to be familiar with the project area, wintered along the Humboldt River as far east as Winnemucca.

Newe/Western Shoshone History and Ethnography

The Newe (people), now known as the Western Shoshone, occupied much of the central and northwestern part of Nevada as far west in the Humboldt Valley as Golconda. The subgroups that lived nearest the project area occupied settlements near Tonomudza, and the Tosawihi (whiteknives) wintered between just east of Battle Mountain and 25 miles down-river at Iron Point. The people spoke dialects of the Western Shoshone (Central Numic) language.

By the time of their initial contact with Euro-Americans, the Western Shoshone had occupied the Great Basin for many centuries. Several linguists have hypothesized, on the basis of dialect similarities, that a population movement, which began approximately 2,000 years ago from the southwest Great Basin, brought the first Numic speakers to central Nevada by approximately A.D. 800. This is not clearly supported by archaeological evidence, and according to Western Shoshone oral tradition, the Newe view themselves as the original human occupants of their present territory.

The Western Shoshone lived in small mobile kin-based groups, forming inter-group kinship networks that enlarged the area with which they were familiar and were granted access. Small households, usually consisting of a nuclear family, other close relatives, or friends were the basic

socioeconomic unit. These households traveled and camped together on their annual treks for specific resources. In the winter, settlements often included several such households. The location, size, and composition of the winter camp or village varied from year to year depending upon the amount of food present in specific areas.

The Newe practiced a religion based on supernatural power (Puha or Buha). Special powers were granted through dreams to individuals, who then were recognized as men of power who called and conducted communal hunts, dances, and other rituals. Although there may be fewer of these religious specialists today, there is a persistence of many rituals. For example, spiritual beings, Little Men, remain an important element in Western Shoshone traditional religion. If treated well and asked for assistance by individuals, Little Men are believed to help in hunting and other activities. If not treated well, they are harmful. For this reason many traditionalists believe that:

> "...It's important not to do anything to change the land because if the land is changed, those Little Men will go away and there will be no deer to hunt" (Dufort 1995:7, citing Clemmer 1990:73).

Newe dead were buried, placed in caves or rock crevices, or placed on the surface covered with rocks. Specific burial sites may be difficult to find because beliefs in the power of the dead caused graves to be avoided. They were often purposely forgotten and rarely visited. Locations of some graves are known, however, within the general vicinity of the project area.

Native American Coordination

This section summarizes the process to gather information from Native Americans potentially affected by the proposed project. The process was conducted to comply with federal and state laws that apply to resources with traditional and/or religious significance to Native Americans. The following laws either provide resource protection and/or require Native American consultation: the National Environmental Policy Act, Federal Land Policy and Management Act, American Indian Religious Freedom Act, Religious Freedom Restoration Act, Archaeological Resources Protection Act, Native American Graves Protection and Repatriation Act (PL 101-601), Nevada Indian Burial Protection legislation, and National Historic Preservation Act (PL-89-665, as amended). Under the NHPA, federal undertakings must be assessed to determine if historic properties, traditional cultural places, or use areas will be affected by a proposed undertaking.

Traditional cultural places or use areas could include known burial sites, areas where edible and medicinal plants and minerals are gathered, temporary and permanent villages or living areas used by ancestors or predecessors of the Western Shoshone or Northern Paiute people, petroglyphs, pictographs, and areas considered by local tribal groups to be sacred locations, such as prominent outcroppings, mountain peaks, or hot springs, rivers, or lakes. No traditional cultural properties or use areas were identified during evaluation of the project area.

Formal contact and notification of the proposed mining project was initiated by the BLM with letters to 25 Northern Paiute and Western Shoshone tribal governments and organizations whose lands may be affected. In 1995, the project's consulting ethnographer made follow-up telephone calls and conducted an on-site tour of the project area. In addition, interviews were held with Western Shoshone elders. A total of 20 individuals participated in a 2-day tour and three dinner meetings. Represented were the Battle Mountain Band, the Lovelock Paiute Colony, the Shoshone-Paiute Tribes of Duck Valley, the Wells Band, the Western Shoshone Defense Project, and the Western Shoshone Historic Preservation Society, which also represented the Elko Band and the South Fork Band under an agreement with the Te-Moak Tribe of Western Shoshone.

The 1995 tour of the project area involved a visit to mine headquarters and a pit, followed by an on-foot inspection of several archaeological sites, including two petroglyph sites and a possible rock shelter. BMG has committed to avoidance at the two petroglyph sites.

Because the Plan of Operations was revised, BLM again solicited Native American participation during the 1999 rescoping process. At that time, the project's consulting ethnographer contacted 13 Native American groups with information concerning a second on-site tour of the project area. The tour of the proposed project area included site visits to the Fortitude Pit in Copper Canyon, three archaeological sites, a waste rock facility, the heap leach pad, the tailings area, and a reclaimed area. Breakfast and dinner meetings also were held in conjunction with the tour. Represented were the Battle Mountain Band, Elko

Band of Te-Moak Tribe of Western Shoshone, Ely Shoshone Tribe, Shoshone-Paiute Tribes of Duck Valley Reservation, South Fork Band of Te-Moak Tribe of Western Shoshone, Wells Band of Te-Moak Tribe of Western Shoshone, Western Shoshone Defense Project, and Yomba Shoshone Tribe. In addition, three Native American representatives attended the 1999 public scoping meeting.

A summary of Native American issues relevant to the proposed project and the recommendations made by tribal government and organization representatives has been compiled by the BLM (Dufort 2000), based on discussions held during the 1995 and 1999 site tours and meetings, as well as comments made by four elders of the Battle Mountain Band who were subsequently interviewed by the consulting ethnographer. A copy of this report is available at the BLM Battle Mountain Field Office.

3.8.2 Environmental Consequences

The significance of a cultural resource is a measure of the importance of the resource to the citizens of the United States. Cultural resources determined to be significant possess attributes that qualify them for inclusion in the NRHP. To be considered eligible for inclusion in the NRHP, a cultural resource must retain integrity and satisfy at least one of four criteria for significance as defined in 36 CFR Part 60.4 These criteria are listed below:

- 36 CFR 60.4a - Associated with events of significance to broad patterns of history
- 36 CFR 60.4b - Associated with the lives of persons significant in the past
- 36 CFR 60.4c - Embody distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic values; represent a distinguishable entity who lacks individual distinction
- 36 CFR 60.4d - Yielded or may yield information important to history or prehistory

Ethnographic impacts would be considered significant if the Proposed Action or No Action alternative would result in adverse effects to the following:

- National Register-eligible traditional cultural properties
- Native American grave sites
- Natural elements of traditional lifeways, including flora, fauna, and surface and ground water. Significance would be determined using the same criteria described for water, vegetation, and wildlife and fisheries resources.

Table 3.8-3 summarizes the number of cultural resource sites located in the APE that would be impacted under the Proposed Action and the No Action alternative.

3.8.2.1 Proposed Action

Cultural Resources

Under the Proposed Action, direct physical impacts could occur to cultural resources as a result of ground-disturbing activities associated with the development of the open pits, tailings facilities, topsoil storage areas, access and haul roads, ancillary facilities, and implementation of reclamation activities.

Physical modification of prehistoric and historic archaeological sites would affect the physical integrity of the resource; modification of the surroundings could affect integrity with respect to site setting. An undertaking is considered to have an effect on a cultural property if it alters any of the attributes that may qualify the resource for inclusion in the NRHP. Adverse impacts can occur at any cultural site; however, any physical alteration that results in an adverse impact to a cultural resource that is eligible for inclusion in the NRHP is considered a significant impact. A determination of no adverse effect or no effect is applied to undertakings if all cultural resources in the area have been shown to be not significant and not eligible for inclusion in the NRHP, or the impacts to the qualities that make the resource significant are mitigated as defined in 36 CFR 800.9(c)1.

Table 3.8-3
Cultural Resource Site Impact Summary

	Proposed Action	No Action	Existing Conditions
Total Number of Cultural Sites Directly Affected			
NRHP-eligible	17	9	9
Potentially eligible or unevaluated	4	3	1
Not eligible	64	24	19
Subtotal	85	36	29
Total Number of Cultural Sites Indirectly Affected			
NRHP-eligible	2	3	3
Potentially eligible or unevaluated	2	1	2
Not eligible	4	11	10
Subtotal	8	15	15
Potential TCP Sites Directly or Indirectly Affected	0	0	0
Total Number of Cultural Sites in APE Not Affected	8	51	58
Total Number of Cultural Sites in APE	103	103	103

BMG, in conjunction with the BLM, and in coordination with the SHPO and the Advisory Council, has completed treatment plans and conducted data recovery and other recommended mitigation within the project area. Prior to initiation of any additional disturbance on-site, Section 106 consultation between the BLM and SHPO would be completed, as required under 36 CFR 800 and as defined in the State PA agreement.

Review of previous cultural inventories in the project area indicates that the entire APE has been surveyed for cultural resources, with the exception of portions of the proposed fenceline in Sections 15, 23, 29, 31, 32,and 35 of Township 31 North, Range 43 East, and Sections 2, 5, 10, and 16 of Township 30 North, Range 43 East. Cultural resources that may occur within the unsurveyed areas cannot be identified at this time, and impacts that may be associated with operations in these areas cannot be assessed.

Based upon the previously completed surveys in the APE, 85 cultural sites would be directly affected by the Proposed Action (see ***Table 3.8-3***). This includes 17 NRHP-eligible sites, 4 potentially eligible or unevaluated sites, and 64 sites that have been found ineligible to the NRHP with SHPO concurrence. Of the 21 eligible or potentially eligible or unevaluated sites directly affected, 7 sites have been previously disturbed to varying degrees by existing operations in the Battle Mountain Complex. All of the 21 eligible or potentially eligible or unevaluated sites have been previously mitigated under the PA established between BMG, the BLM, and SHPO.

Mitigation for sites potentially affected by the Proposed Action has involved archaeological, historical, architectural, and oral history studies as directed under the PA and approved treatment plans. Most of the results from mitigation are addressed in ARS (1996, 1997, 1999a,b) and in JRP Historical Consulting Services' report (1997) on file at the BLM Battle Mountain Field Office. A mitigation report on two sites, CrNV-62-9440 and -9441, is currently in process (Reno et al. 2001).

BMG has committed to avoiding two potential TCP properties, CrNV-62-7027 and -7028, which lie within the project area. The TCP status of these properties has not been conclusively established; however, Native American representatives have indicated that they would have no further concerns if the sites are avoided.

Proposed operations in the APE could result in indirect effects to eight cultural sites (see ***Table 3.8-3***). Two of these sites are eligible to the NRHP with SHPO concurrence, two sites are potentially eligible or unevaluated, and four sites are not eligible to the NRHP with SHPO concurrence. Of the four eligible or potentially eligible sites, (CrNV-62-428, 594b7, -429,594b2-3, -5931, and -9423), none have been identified as being disturbed by existing mine operations. Sites CrNV-62-428, 594b7 and CrNV-62-429, 594b2-3 are eligible to the NRHP and have been previously

treated as stipulated by the PA between BMG, the BLM, and the SHPO. Sites CrNV-62-5931 and -9423 have prehistoric components. They are recommended ineligible and are unevaluated, respectively.

Indirect impacts to the four potentially eligible sites could result from changes in topography due to construction that could alter the amount or patterns of erosion in the vicinity of the sites. Human activity also would increase in the disturbance area, resulting in an increase in accidental or intentional disturbance, vandalism, and illegal collecting. BMG has agreed, as stipulated in the PA, to ensure that its personnel and contractors are directed not to engage in illegal collecting of cultural resources. This protection measure should reduce, but not completely eliminate, the potential for indirect effects from the Proposed Action. Indirect effects to cultural sites from erosion would be reduced, but not eliminated, by implementing the erosion control measures identified in Section 2.4.20.

If previously undocumented sites or subsurface components of documented sites are discovered within the project area during construction, BMG has agreed, as stipulated in the PA, to halt construction in the area until the site can be reviewed by the BLM's authorized officer. If the previously unidentified resources are determined to be eligible to the NRHP or protected under other state and federal statutes, impacts would be mitigated as outlined in the PA.

Native American Concerns

The following concerns regarding the proposed action were identified by Native Americans during meetings and site visits. The BLM has considered the Native Americans' issues and concerns relative to the proposed project and has developed the following responses to the recommendations.

1) Native Americans are concerned about potential impacts to springs, creeks, ponds, ground water, and other water sources in terms of Western Shoshone cultural and spiritual concerns.

Response: Effects of the Proposed Action on water resources are discussed in Section 3.2 (Water Resources and Geochemistry) of the EIS. Section 3.2.4 identifies recommended measures to mitigate potential impacts to surface water resources from ground water drawdown associated with the Proposed Action.

2) Where possible, the Native Americans would like documented archaeological sites to be protected through avoidance of mine activities in those areas and site monitoring.

Response: Mitigation requesting that BMG avoid significant known cultural sites, wherever possible, has been incorporated into the EIS; refer to Section 3.8.4, Monitoring and Mitigation Measures.

3) Native Americans encourage BMG to maintain an on-going dialogue with the Western Shoshone regarding cultural resources and environmental issues, including providing tribal representatives with information on documented sites prior to field tours.

Response: BMG and the agencies coordinated informational site visits and meetings for Native Americans during the preparation of this EIS. Prior to any future expansions, BMG would request input from tribal representatives and interested parties.

4) Native Americans indicated that ethnobotanical studies of the project area should be conducted with tribal elders. In the future, plants of ethnobotanical value should be considered in the baseline vegetation data.

Response: Evaluation of vegetation in the project area was conducted as part of the EIS preparation process and considered plants with ethnobotanical relevance to Native Americans (see Section 3.4, Vegetation).

5) Native Americans were concerned about the Proposed Action's potential to limit access to hunting, plant gathering, and religious areas in the vicinity of the Proposed Action.

Response: Access would remain similar to what is currently allowed. Refer to Section 3.10, Land Use Authorizations, for a discussion on access in the project area.

6) Comments from Native Americans indicated that reclamation should consider Native American traditional lifeway values (i.e., the use of plant species native to the area) and that tribal representatives should be given the opportunity to tour reclaimed areas.

Response: The Reclamation Plan would incorporate native plant species into the reclamation mix. A list of ethnobotanical plants is

included in ***Table 3.4-2***. As discussed previously, BMG and BLM have conducted Native American tours of the project area during the EIS process.

No Native American traditional use areas, religious sites, or cultural places have been identified within the project area either during cultural resource literature review, ground inventories, or discussions with Native Americans during preparation of this EIS. Studies associated with Sites CrNV-62-7027 and -7028 have been inconclusive relative to the sites' potential as TCP; however, BMG has committed to avoiding disturbance to these two sites. Both sites have been visited by interested tribal representatives and no concerns have been expressed by these parties if the sites are avoided.

3.8.2.2 No Action Alternative

Cultural Resources

Potential impacts to cultural resources under the No Action alternative would be similar to those discussed for the Proposed Action with the following exceptions. Implementation of the No Action alternative potentially would result in direct impacts to 9 sites that have been found to be NRHP-eligible with SHPO concurrence and 3 potentially NRHP-eligible (recommended eligible, unevaluated, or recommended not eligible pending SHPO concurrence) cultural sites (see ***Table 3.8-3***). Eight of these 12 sites have been previously affected by existing operations at the Battle Mountain Complex. All of the sites have been treated as stipulated under the PA. Three NRHP-eligible sites and 1 potentially eligible site could be indirectly impacted by the No Action alternative. Two of these 4 sites have been previously disturbed under existing operations. All of the 4 eligible or potentially eligible sites have been treated as stipulated under the PA.

Native American Concerns

Concerns expressed by Native Americans regarding the No Action alternative are similar to those identified for the Proposed Action; however, the amount of disturbance that would occur under the No Action Alternative and the resultant impacts would be less. No traditional use areas, cultural places, or religious sites have been identified in the No Action alternative area. Studies associated with Site CrNV-62-7028 have been inconclusive relative to the site's potential as a TCP. BMG has committed to avoiding disturbance to this site.

3.8.3 Cumulative Impacts

The cumulative effects area for cultural resources extends north from the Phoenix Project to Interstate 80, east to State Highway 305, west to the Buffalo Valley Road, and south to include the clay borrow area and includes the ethnographic study area associated with the Western Shoshone.

3.8.3.1 Cultural Resources

Effects of the proposed Phoenix Project on cultural resources would be cumulative with effects to cultural resources associated with the Battle Mountain Complex, Trenton Canyon Mine, the Lone Tree Mine, and the Marigold Mine areas. These include past and present effects from projects in these areas, as well as reasonably foreseeable future effects from the expansion of these projects through the life of the proposed Phoenix mine development.

Including surveys completed within the proposed Phoenix Project APE, more than 60 cultural resource inventories associated with past, present, and reasonably foreseeable future actions have been conducted in the cumulative effects area. These inventories have identified over 470 known cultural sites. These sites have included approximately 76 sites that are eligible to the NRHP with SHPO concurrence, 266 sites not eligible to the NRHP with SHPO concurrence, and 135 unevaluated sites that require concurrence from the SHPO or additional data collection.

Current disturbances have been subject to cultural heritage resource protection laws. The majority of the areas have been surveyed to Class III standards for cultural resources, and, in the case of future projects, sensitive sites would be avoided or impacts would be mitigated.

The majority of past disturbance in the cumulative effects area has consisted of historic mining operations or associated activities; they have impacted an unidentified number of prehistoric and proto-historic sites. Historic and existing projects in the cumulative effects area have impacted approximately 17 percent of the known cultural sites within the area. This includes 21 sites previously affected by the Trenton Canyon Project, including 4 eligible sites, and 27 sites affected by the Lone Tree Mine Project, including 4 eligible sites (BLM 1995, 1998). The Marigold Mine Project has impacted at least 3 sites, and

proposed expansion at the Marigold Mine could impact 1 additional eligible site (BLM 2000).

Past operations at the Battle Mountain Complex appear to have disturbed at least 29 sites, including at least 9 eligible sites. The proposed Phoenix Project could directly impact 11 additional eligible sites and at least 44 additional ineligible sites. With the addition of the sites affected under the Proposed Action, approximately 18 percent of the total number of sites identified in the cumulative effects area would be affected by activities associated with the Battle Mountain Complex.

Current disturbances, including ongoing BMG operations in the Phoenix Project area, have been subject to cultural heritage resource protection laws. The majority of the areas have been surveyed to Class III standards for cultural heritage resources, and, in the case of current work, sensitive sites were avoided or impacts were or are being mitigated. All mitigation actions associated with the Proposed Action would be in accordance with established legal guidelines and the PA between BMG, the BLM, and the SHPO.

Future mining or other ground-disturbing activities within the cumulative effects area could impact NRHP-eligible or unevaluated sites. As directed by law, cultural heritage resource inventories and consultations would be conducted for any projects involving public lands, and impacts would be avoided or mitigated, as appropriate. Additional cultural inventories and consultations required for future expansions would add to the information base for cultural heritage resources within the cumulative effects area. Compliance with Sections 106 and 110 of the NHPA would result in evaluation and mitigation or development of treatment plans for impacts to significant properties identified during the inventories for future actions and also would increase the overall knowledge of cultural heritage resources in the cumulative effects area.

In any federal undertaking, direct impacts to cultural heritage resources would be considered. Even with mitigation, physical destruction of sites could still occur in the future, and there could be a permanent loss of some cultural heritage sites. Permanent loss of sites also has occurred within the areas disturbed by past and present actions. Indirect impacts, such as vandalism and illegal collecting, have and could continue to occur to cultural heritage resources through increased access and development, as a result of past, present, and future activities. Indirect effects to cultural resources by existing and future actions may be reduced, but not eliminated by implementing environmental protection measures or mitigation, such as those identified in Section 3.8.4, Monitoring and Mitigation Measures.

3.8.3.2 Native American Concerns

Disturbance to traditional lifeway values and the cultural identity of Native Americans and other ethnic groups have occurred as a result of developments associated with past projects and previous actions in the region. No Native American religious or traditional use areas have been currently identified within the Proposed Action area; consequently, the Proposed Action would not contribute cumulatively to effects to traditional use or religious areas.

3.8.4 Monitoring and Mitigation Measures

CR-1: Indirect Impact Mitigation. Employee and equipment access would be limited to minimize the potential for direct impacts to resources. Mine exploration and operations equipment would be prohibited outside of the proposed permit boundary, which would be clearly marked. Employee access to known archaeological and paleontological sites on private land in the vicinity of the mine would be limited.

CR-2: Additional Survey Requirements. Previously unsurveyed portions of the proposed fenceline would be surveyed for cultural resources prior to construction. If significant sites are found in these locations, attempts would be made, as identified in the PA, to avoid the sites. If avoidance is not possible, mitigation would be implemented as stipulated in the PA.

3.8.5 Residual Adverse Effects

Residual adverse effects of the Proposed Action would include the loss of historic resources and landscapes through mining. While the majority of this impact would be mitigated, it may not be possible to fully mitigate the loss of these elements of the past.

3.9 Air Quality

Air quality and pollutant emissions to the air are regulated under both federal laws (Clean Air Act) and regulations and Nevada state laws and regulations implemented by the Nevada Bureau of Air Quality. A fundamental requirement of both federal and state regulations is that ambient concentrations for specific criteria pollutants not exceed allowable levels, referred to as ambient air quality standards (AAQS). These standards have been established by the U.S. Environmental Protection Agency (EPA) and the State of Nevada at levels deemed to preclude adverse impacts on human health and welfare. The applicable federal and Nevada AAQS are shown in ***Table 3.9-1***.

States are required to designate all areas within their borders as being in "attainment" or "non-attainment" with the federal AAQS. The area of the Phoenix Project is classified as attainment, or unclassified, for all criteria pollutants. The only non-attainment areas in Nevada are the Central Steptoe Valley for sulfur dioxide (SO_2); the Lake Tahoe, Las Vegas, and Reno areas for carbon monoxide (CO); the Reno area for ozone (O_3); and portions of Clark and Washoe counties for particulate matter (PM_{10}). These areas are all distant from the project area and would not affect permit requirements or potential impacts from the Phoenix Project.

Under requirements of the Clean Air Act, EPA has established Prevention of Significant Deterioration (PSD) rules, the purpose of which is to prevent deterioration of air quality in areas that are in attainment with the national AAQS. Increases in ambient concentrations of nitrogen dioxide (NO_2), SO_2, and PM_{10} (particulate matter less than 10 microns in diameter) are limited to modest increments in Class II areas (most of the country), and to very small increments in Class I areas (national parks and other designated pristine areas). Compliance with the PSD regulations requires new major sources of air pollutants to undergo specific permitting reviews, to demonstrate that increments will not be exceeded, and to ensure best available controls will be applied. The closest Class I area to the project site is the Jarbidge Wilderness Area, located 115 miles northeast of the site.

A new mining source is classified as a major source, subject to PSD requirements, if potential emissions of any regulated pollutant equal or exceed 250 tons per year. Fugitive emissions are not included in the definition of potential emissions except for certain specified source types [40 CFR 52.21, (b)(1)(iii)]; the Phoenix Project is not among the specified source types for which fugitive emissions are counted in the potential to emit.

Potential emissions for the Phoenix Project range from ***0.012*** tons/year for SO_2 to ***84.21*** tons/year for PM_{10} ***(see Table 3.9-7 in Section 3.9.2.1)*** (Environmental Management Associates 1999a). Thus, the project would not be classified as a major source and is not subject to PSD review. The only regional source that has been subject to PSD review in the past is the Valmy Generating Plant, located 25.3 miles north of the project site. Modeling analyses (Environmental Management Associates 1999a,b) indicate that the combined impacts of the Valmy Generating Plant and the Phoenix Project are below any state or federal AAQS (see Section 3.9.3).

The Clean Air Act regulations also include New Source Performance Standards. The standards are applied to new or modified air pollutant sources, requiring best demonstrated emissions control technology and setting specific limitations on pollutant emissions. Some facilities at the Phoenix Project, such as crushers and related processing equipment, would be subject to New Source Performance Standards (40 CFR Part 60, subpart LL) for Metallic Mineral Processing Plants.

BMG has obtained a Class II Air Quality Permit to Operate (for projects that emit less than 100 tons per year of any regulated air pollutant) from the Nevada Bureau of Air Quality for the proposed Phoenix Project. The Nevada Bureau of Air Quality is responsible for ensuring compliance with all applicable air quality regulations and for establishing permit limits and conditions necessary to ensure compliance.

3.9.1 Affected Environment

The project site is located within the Lower Reese River Valley airshed, which comprises approximately 1,500 square miles in a rectangular area extending from the town of Battle Mountain to the south for 30 miles and approximately 20 miles to the east and west. Information on the climate and meteorology of the area, as presented in this section, is available from the town of Battle Mountain, the Phoenix Project site, and weather stations in surrounding airsheds. The air quality, air pollutant emissions, and local atmospheric dispersion characteristics of the project area are described on the basis of site-specific data and information from other mining or industrial sources

Table 3.9-1
Federal and Nevada Ambient Air Quality Standards
(micrograms per cubic meter [µg/m^3])

Pollutant	Averaging Period	Nevada Standard	Federal Standards	
			Primary	Secondary
Particulate Matter Less than 10 Microns Diameter (PM_{10})	24 hours annual	150 [1] 50	150 [1] 50	Same as primary Same as primary
Sulfur Dioxide (SO_2)	3 hours 24 hours annual	1,300 [1] 365 [1] 80	---- 365 [1] 80	1,300 [1] ---- ----
Nitrogen Dioxide (NO_2)	Annual	100	100	Same as primary
Carbon Monoxide (CO)	1 hour 8 hours	40,000 [1] 10,000 [1,2]	40,000 [1] 10,000 [1]	---- ----
Ozone (O_3)	1 hour	235	235	Same as primary
Lead (Pb)	Calendar quarter	1.5	1.5	Same as primary

Source: State of Nevada and U.S. Environmental Protection Agency air quality regulations.
[1]Must not be exceeded more than once per year.
[2]For elevations above 5,000 feet, the standard is 6,670.

within and surrounding the Lower Reese River Valley airshed.

3.9.1.1 General Climate

Table 3.9-2 contains summaries of temperature and precipitation measurements from Elko, Battle Mountain, and Winnemucca, Nevada, which are the three closest National Weather Service monitoring stations to the Phoenix Project site. Elko is located approximately 70 miles east of the site, Battle Mountain is located approximately 12 miles to the north, and Winnemucca is located approximately 40 miles to the northwest (see ***Figure 1-1***). All three sites are similar in elevation and terrain to the project site; therefore, data from these stations are considered representative of the immediate project area. Temperature measurements taken on the site at the Placer monitoring station for 1995-1996 also are listed in ***Table 3.9-2***.

Temperature data indicate a relatively large amount of diurnal and seasonal variability, which is typical of dry climates. The warmest temperatures occur in July and August and the coldest in January. Temperatures range from average lows of 13ºF in the winter to average highs of 93ºF in the summer.

The on-site data for 1995-1996 show a maximum hourly average temperature of 97ºF in July and August and a minimum hourly average temperature of 12ºF in January. During the data collection period, the annual mean temperature was 52ºF. This mean temperature is slightly higher than the climatological mean temperatures collected from Elko, Battle Mountain, and Winnemucca, possibly indicating a warmer than normal period during 1995-1996.

Precipitation in this portion of Nevada is normally sparse, averaging between approximately 5 and 10 inches annually, with increasing amounts of precipitation at higher elevations. The average annual precipitation at Elko, Battle Mountain, and Winnemucca is between 7 and 10 inches.

3.9.1.2 Local Winds and Atmospheric Dispersion

The proposed Phoenix Project would be located in complex terrain where winds are affected by local topographic features. Wind data have been collected and analyzed from three sites near the proposed project site. The locations of the three BMG meteorological monitoring sites are shown in ***Figure 1-2***. All data were collected in accordance with EPA Quality Assurance Guidelines, including the performance of annual sensor audits (Environmental Management Associates 1999a). Annual wind roses for the year 1998 for these sites are shown in ***Figures 3.9-1*** through ***3.9-3*** (BMG 1999b).

The Copper Basin Surprise site (***Figure 3.9-1***) is located in relatively open topography near the offices at the Copper Basin (Surprise) operations; the Copper Canyon Placer site (***Figure 3.9-2***) is located along the southern edge of BMG's

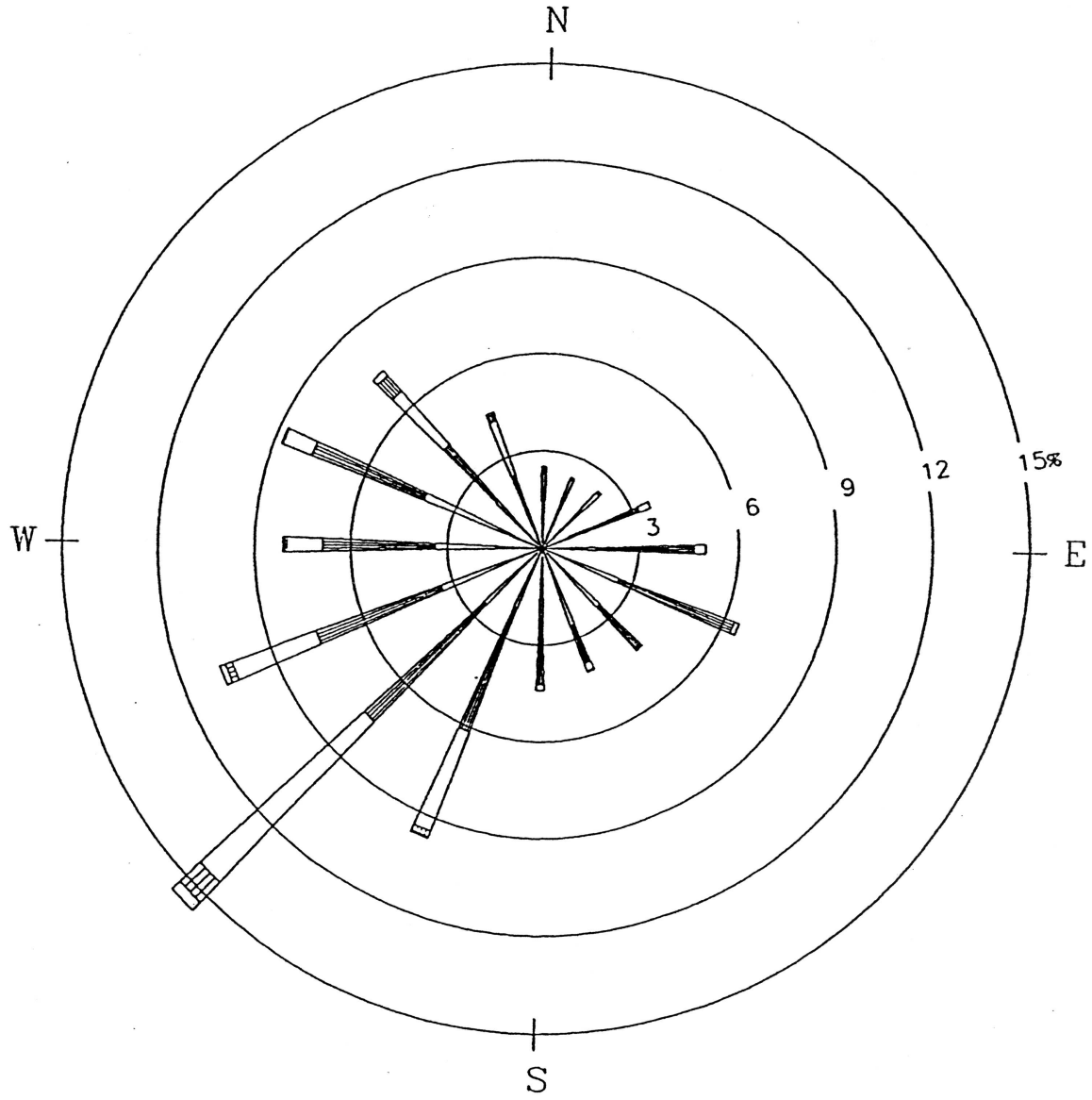
Table 3.9-2
Regional Temperature and Precipitation Data

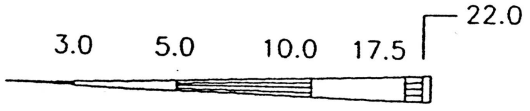
Station	Elevation (feet-amsl)	Years		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Maximum, Minimum, and Mean Temperature (°F)																
Elko, NV	5,077	1961-90	Max	36.8	43.3	49.5	57.8	69.8	80.0	90.5	88.6	79.9	65.8	48.4	37.3	62.8
			Min	13.3	20.4	25.4	30.0	37.3	44.3	49.9	48.4	38.8	29.5	22.9	13.0	30.8
			Mean	24.6	31.6	37.3	44.3	52.6	61.9	70.6	69.0	59.0	47.3	36.1	26.2	46.3
Battle Mtn, NV	4,531	1961-90	Max	40.9	48.1	54.1	62.6	73.1	82.8	93.1	91.1	81.6	68.9	52.7	41.2	65.8
			Min	16.9	21.6	25.6	29.5	38.3	45.8	51.7	48.6	39.0	29.4	23.8	15.8	32.1
			Mean	29.1	35.0	40.0	46.3	55.2	64.3	72.4	70.0	60.8	49.4	38.7	29.5	49.2
Winnemucca, NV	4,314	1961-90	Max	42.3	49.7	54.4	62.8	72.8	83.8	93.3	90.8	80.8	68.1	52.4	41.3	66.2
			Min	17.2	22.6	25.0	29.0	37.0	45.4	51.6	48.1	38.7	28.8	23.3	17.0	32.1
			Mean	30.0	36.3	39.9	46.3	54.5	64.4	72.6	70.0	59.9	48.8	38.3	30.0	49.2
Placer Station[1]	4,958	1995-96	Max	57.2	62.6	69.8	68.0	78.8	89.6	96.8	96.8	93.2	82.4	68.0	62.6	77.2
			Min	12.2	5.0	23.0	24.8	33.8	30.2	46.4	48.2	35.6	28.4	19.4	12.2	26.6
			Mean	33.8	35.6	42.8	44.6	51.8	60.8	73.4	75.2	66.2	53.6	46.4	35.6	51.7
Mean Monthly Precipitation (inches)																
Elko, NV	5,077	1948-95		1.07	0.79	0.94	0.77	0.99	0.82	0.35	0.49	0.54	0.58	0.99	1.05	9.52
Battle Mtn, NV	4,531	1931-95		0.73	0.62	0.68	0.80	0.96	0.82	0.28	0.28	0.46	0.66	0.69	0.75	7.54
Winnemucca, NV	4,314	1950-95		0.82	0.62	0.78	0.77	0.89	0.81	0.25	0.35	0.39	0.59	0.87	0.87	8.01

Source: U.S. Department of Commerce National Climatic Data Center and Battle Mountain Gold Company Placer meteorological station.

[1]Data obtained from BMG – 12 months total data.

All other data obtained from the National Climatic Data Center.





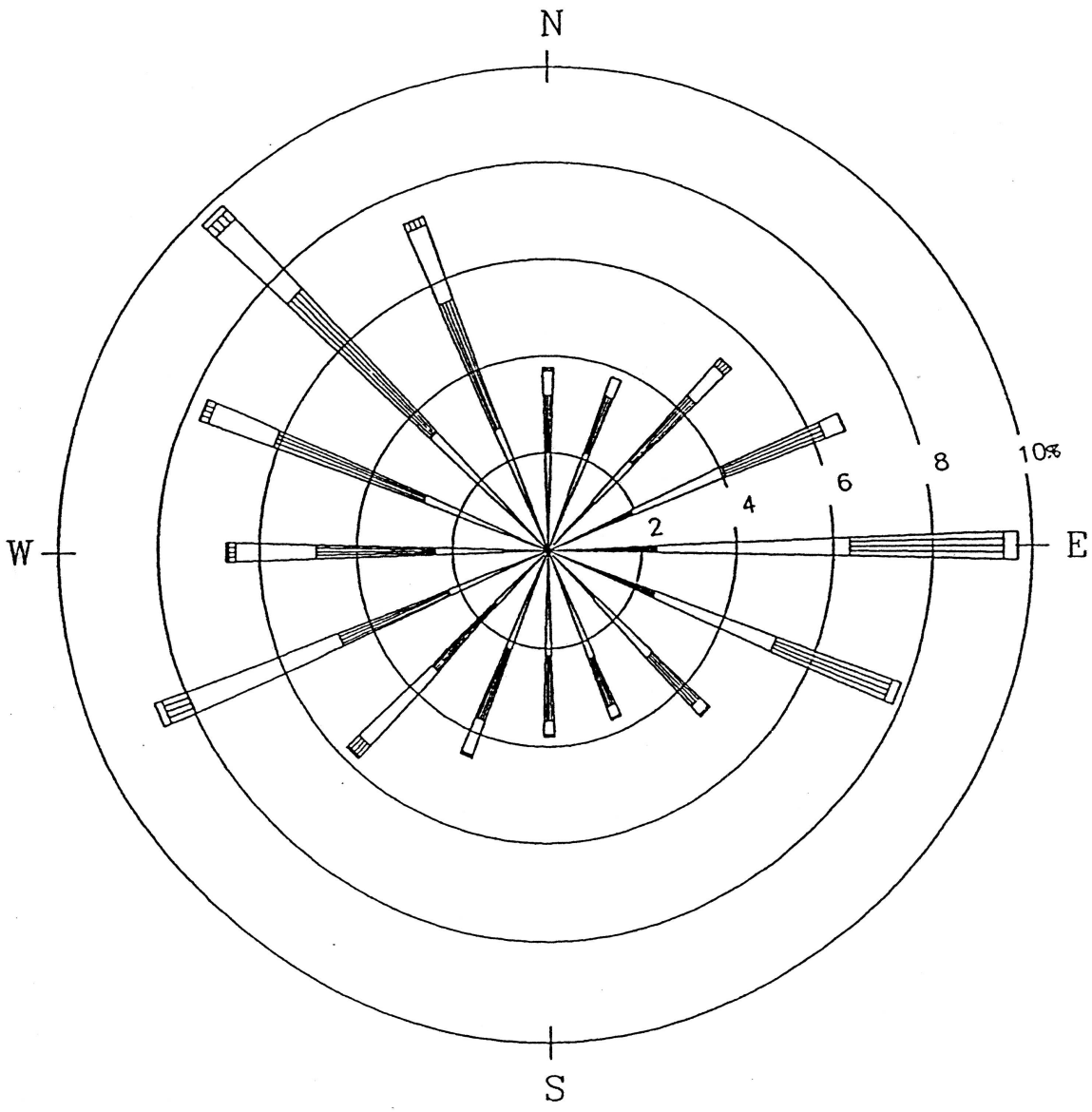
WIND SPEED CLASS BOUNDARIES
(MILES/HOUR)

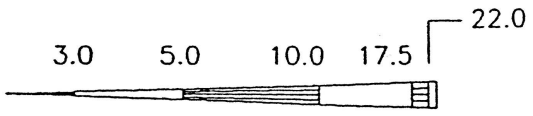
NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 2.5 PERCENT OF THE TIME.

Phoenix Project

Figure 3.9-1

Wind Rose - Copper Basin
Surprise Site
10-Meter Height (1998)





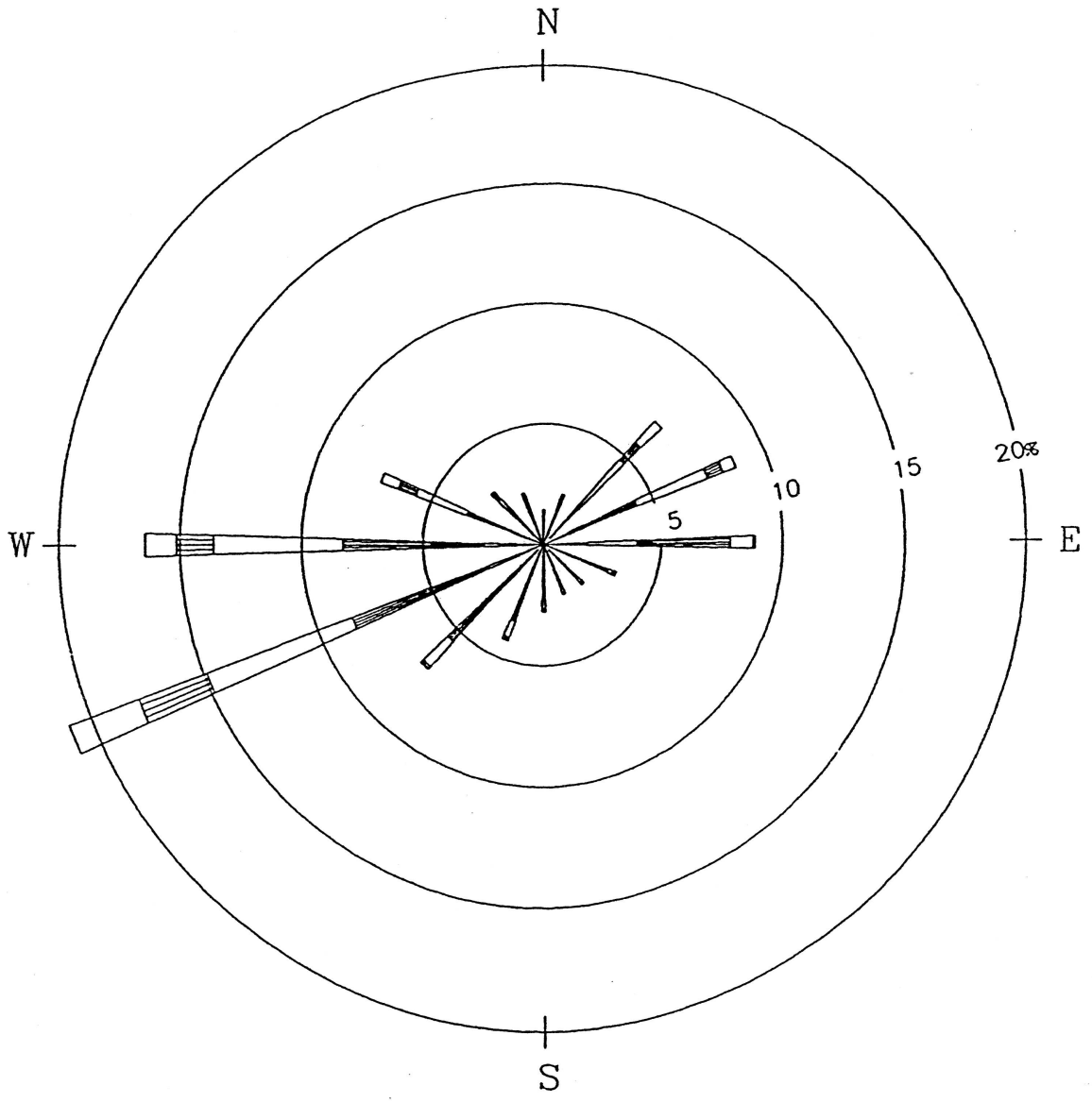
WIND SPEED CLASS BOUNDARIES
(MILES/HOUR)

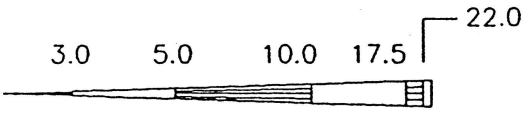
NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 3.8 PERCENT OF THE TIME.

Phoenix Project

Figure 3.9-2

Wind Rose - Copper Canyon Placer Site
10-Meter Height (1998)





WIND SPEED CLASS BOUNDARIES
(MILES/HOUR)

NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 1.4 PERCENT OF THE TIME.

Phoenix Project

Figure 3.9-3

Wind Rose - Copper Canyon
Tomboy Site
10-Meter Height (1998)

operations; and the Copper Canyon Tomboy site (***Figure 3.9-3***) is located on a ridge directly above the Tomboy Mine. The on-site data document that winds are highly variable, even across a relatively small geographic area. The on-site wind data collected at the Copper Basin site show predominate winds from the southwest, while the Placer site data show west to northwest winds predominate, with relatively high frequencies also from the east.

The Tomboy site in particular shows the influence of nearby terrain. This site is located farther to the north than the Placer site, in proximity to BMG's existing mining operations in Copper Canyon. Terrain to the north of this location acts to block north-south winds, and the data show a predominate east-west orientation to the winds. Also, the ridgeline exposure of the Tomboy site results in higher wind speed being measured there than at the other sites.

Data from the Placer site probably are most representative of the Phoenix Project area and the locations of predominant proposed Phoenix emission sources. The Placer wind rose generally is consistent with similar data from the Sierra Pacific Power Company's Valmy Generating Plant approximately 25 miles to the north and also with data from Echo Bay's McCoy/Cove mine approximately 12 miles to the south-southwest. Thus, the Placer wind information is considered the most appropriate for modeling to estimate both local and regional air quality impacts. It should be recognized, however, that highly localized wind variations exist in the region, particularly near unique terrain features, such as steep slopes and narrow valleys.

Dispersion conditions at the proposed Phoenix Project are affected by two parameters: stability and mixing depth. Stability is defined as the ability of the atmosphere to disperse a given pollutant concentration. Unstable conditions represent maximum dispersion, while minimum dispersion occurs during stable conditions. Mixing depth defines the vertical extent of the atmospheric volume through which dispersion may take place.

Atmospheric stability was evaluated for each hour of BMG meteorological data using the measured standard deviation of horizontal wind direction (sigma theta) at 10-meter height. These data indicate that approximately 20 percent of the observations were associated with unstable conditions, 60 percent with neutral conditions, and 20 percent with stable conditions. Atmospheric stability distributions were approximately equal at all three on-site monitoring locations. Average wind speeds are highest for neutral conditions and decrease as the stability and/or instability increases. Mixing depths are greatest during the afternoon hours and during the summer, when incoming solar radiation is strongest.

3.9.1.3 Air Quality

Since 1997, BMG has been permitted to operate air emission units associated with existing and previously planned operations at the site of the Phoenix Project. These existing operations, which are distinct from the Phoenix Project and comprise the No Action alternative, were governed by a Nevada Bureau of Air Quality Class II Air Quality Permit to Operate (No. AP1041-0220). ***Table 3.9-3*** summarizes the air emissions allowed under the 1997 air quality permit. These emissions do not include fugitive dust and vehicle exhaust from mining activities or equipment, as such emissions are not regulated under the Nevada Bureau of Air Quality Class II operating permit process. Particulate matter (PM_{10}) is the primary emission of air pollution from mining and minerals operations. Total emissions from existing ore processing equipment are approximately 16 pounds per hour and 47 tons per year of PM_{10}. Most of the PM_{10} from existing processing equipment comes from the crushing system. Though some of these previously permitted operations may not have been implemented, they are considered to contribute to existing air quality conditions since they comprise allowable pollution sources during recent years.

Other permitted air pollutant sources in the vicinity of the proposed Phoenix Project are listed in ***Table 3.9-4*** (see ***Figure 2-7***). The emissions include all permits for sources within 50 km (31 miles) of the Phoenix Project. This distance exceeds the areal extent of the Lower Reese River Valley and Buffalo Valley airsheds and represents the nominal distance within which sources are typically modeled to define cumulative impacts associated with a new source. ***Table 3.9-4*** indicates that most of the mining and industrial sources in the region emit PM_{10} as their primary pollutant. The main exception is the Valmy Generating Station, which also emits large quantities of sulfur dioxide and nitrogen oxide.

Ambient concentrations of air pollutants in the vicinity of the project site generally are quite low and far below applicable AAQS. For gaseous pollutants (SO_2, CO, O_3, and NO_2), concentrations

Table 3.9-3
Battle Mountain Gold Company
Allowable PM_{10} Emissions Based on Operating Permit #AP1041-0220
(Permit Effective May 8, 1997)

Emission Unit	Allowable PM_{10} (pounds/hour)	Annual Operating Limit (hours)	Allowable PM_{10} (ton/year)
Apron feeder	0.51	5,600	1.43
Crushing system	8.42	5,600	23.58
Lime silo/loading	0.11	3,285	0.18
Lime silo/discharge	0.2	8,760	0.88
Conveyor system	4.27	5,600	11.96
Lime silo/loading	0.11	3,285	0.18
Lime silo/discharge	0.32	8,760	1.40
Induction furnaces	0.35	5,846	1.02
Carbon kiln	2.13	6,000	6.39
Total allowable PM_{10}	16.42		47.01

Source: Nevada Bureau of Air Quality Operating Permit #AP1041-0220.

Table 3.9-4
Permitted Air Emissions from Sources Within 50 Kilometers (31 miles) of the Phoenix Project

Source	Permitted Annual Emissions (tons per year)				Direction/Distance from Phoenix
	PM_{10}	SO_2	NO_2	CO	
Paiute Pipeline Battle Mountain Compressor Station	3.4	0	23.3	39.0	SSE / 0.8 mile
Santa Fe Pacific Trenton Canyon Mine	49.4	0	0	0	NNW / 10.9 miles
MI Drilling Fluids Battle Mountain Plant	0.3	0	0	0	NE / 12.3 miles
Echo Bay McCoy/Cove Mine	87.2	51.4	23.1	5.6	SSW / 12.9 miles
MI Drilling Fluids Mountain Springs Plant	21.2	0	0	0	SSE / 14.5 miles
Marigold Mine	26.2	0	0	0	N / 16.7 miles
Coastal Chemical Battle Mountain	98.1	0	95.9	93.2	NE / 18.6 miles
Sierra Chemical	1.9	0	0	0	NE / 18.8 miles
Santa Fe Pacific Lone Tree Mine	48.5	0.5	25.3	23.5	NNW / 22.3 miles
Baker Hughes Inteq Plant	21.5	0.1	1.0	0.2	ENE / 24.5 miles
Sierra Pacific Valmy Generating Station	1,464.4	20,082.8	13,321.8	0	N / 25.3 miles
Western Ash Valmy Plant	0.3	0	0	0	N / 25.3 miles

Source: Environmental Management Associates 1999a.

are representative of typical background for remote areas of the West because of the scarcity of major sources and the great distance between the few sources that do exist. Concentrations of PM_{10} tend to be higher, which also is typical for arid regions subject to periodic high wind speeds. The primary natural source of PM_{10} is wind erosion from unvegetated areas during high wind speed episodes.

PM_{10} also is generated by vehicle traffic on unpaved roads, agriculture, natural and man-made fires, and mining and industrial operations. Based on data compiled by BMG from Nevada Bureau of Air Quality files, ***Table 3.9-5*** shows PM_{10} monitoring data for a number of locations for the most recent 3-year period of available data. In a few cases, less than 3 years of data exist, and the compilation includes 2 years or less.

The locations included in ***Table 3.9-5*** are the State of Nevada station in the town of Battle Mountain, a number of mining or industrial monitoring sites near active operations, and two remote sites operated by the National Park Service.

Data from the town of Battle Mountain would be expected to show concentrations higher than regional background because of local traffic and activity. Similarly, the mining/industrial monitoring sites are generally operated to monitor local impacts of the particular source and reflect contributions from those source emissions. It is clear from ***Table 3.9-5*** that maximum daily and annual average concentrations are higher at these monitor sites than in remote areas. Nonetheless, all measured PM_{10} concentrations throughout the region, including those at operating mines or industrial sites, are well below the AAQS of 150 $\mu g/m^3$ 24-hour average and 50 $\mu g/m^3$ annual average.

3.9.2 Environmental Consequences

The primary issue related to air quality is increased pollutant concentrations. Impacts to air quality would be significant if the Proposed Action or No Action alternative result in the following:

- Exceedence of the National or Nevada Ambient Air Quality Standards within the local or regional area impacted by total project pollutant emissions.

Impacts that may be near, but below, the significance criteria levels also may be of concern in terms of the potential for restricting future growth and development in the area, and contributing to the overall level of air quality degradation in the region.

Ambient air concentrations resulting from the emissions of four criteria air pollutants (PM_{10}, SO_2, NO_x, and CO) were calculated using the EPA's Industrial Source Complex Short Term 3 (ISCST3) computer model. Model predictions were then compared to the significance criteria. The numerical values of the significance criteria are defined in ***Table 3.9-6*** (Environmental Management Associates 1999a).

In order to calculate an ambient air concentration, the model requires three types of input data. These include meteorological, receptor, and source data.

Surface meteorological data from measurements at 10-meter height at the Copper Canyon Placer site were combined with mixing height data from Elko, Nevada, to obtain a data set suitable for modeling. The period of record for the data set is 3 years, spanning January 1, 1996, through December 31, 1998.

Modeling receptors were placed along the entire fenced boundary of the project and in a series of nested grids beyond the fenced boundary. The receptor grids effectively covered an area greater than 1,000 km^2 (386 mi^2) surrounding the project. In addition, receptors also were placed at sensitive areas, including the nearest Class I area (Jarbidge Wilderness Area) and the town of Battle Mountain. All receptors were further defined using terrain elevations from U.S. Geological Survey digital elevation models.

A comprehensive criteria pollutant emission inventory and source data set was compiled for each individual source of emissions at the project for a reasonable worst-case operational year (Environmental Management Associates 1999a). It reflects the use of control devices and dust suppression activities to mitigate PM_{10} emissions as required in the recently issued Nevada Bureau of Air Quality Permit to Operate and the Fugitive Dust Control Plan (BMG 2000b) for the Phoenix Project, and includes point, fugitive, and mobile sources. In all, over 200 individual sources were identified; emissions were quantified and incorporated into the modeling analysis.

After entry of all of the required data, ISCST3 was executed to obtain estimated emission concentrations. Before concentrations were

Table 3.9-5
PM_{10} Monitoring Data from Monitors in the Vicinity of the Phoenix Project and Remote Areas

Site Name	Data Period	Highest Annual Average (micrograms/cubic meter [µg/m³])	24-Hour Concentration [1] (micrograms/cubic meter [µg/m³])	Distance/ Direction From Phoenix Project (distance in miles)
State of Nevada Site				
Town of Battle Mountain	10/95-9/98	37	76	NE/14
Nearby Mining / Industrial Sites				
Cortez Placer Dome Mine	1/96-9/98	49 [2]	127	SE/37
Santa Fe Pacific Lone Tree Mine	1/95-6/96	14	50	NNW/22
Echo Bay McCoy / Cove Mine	1/94-12/95	26	64	SSW/13
Coastal Chemical	10/95-9/98	26	64	NE/19
Sierra Pacific Valmy Generating Station	4/96-12/97	17 [2]	68	N/25
Remote Areas				
Great Basin National Park	12/95-11/98	8	22	SE/177
Jarbidge Wilderness	6/94-10/96 4/97-11/98	10	32	NE/115

Source: JBR Environmental Consultants, Inc. 1999d.
[1]The standard is violated if the average number of exceedences over 3 years is greater than one per year. Data shown are the fourth highest over 3 years (or third highest if only 2 years of data are available). Thus, they indicate whether a violation is likely to have occurred over the sampling period.
[2]Annual average represents an incomplete year of data.

Table 3.9-6
Significance Criteria

Criteria Pollutant	State and Federal Ambient Air Quality Standard (µg/m³)	Design Value
PM_{10}		
24-hour	150	Fourth high over 3 years
Annual	50	First high each year
SO_2		
3-hour	1,300	Second high each year
24-hour	365	Second high each year
Annual	80	First high each year
NO_2		
Annual	100	First high each year
CO		
1-hour	40,000	Second high each year
8-hour	10,000	Second high each year

compared with AAQS significance criteria, background pollutant concentrations were added to the model-predicted concentrations. PM_{10} background concentrations for unpopulated areas were assumed to be 10.2 and 9.0 micrograms per cubic meter ($\mu g/m^3$) for the 24-hour and annual averaging times, respectively. The assumed background PM10 concentrations are recommended by the Nevada Bureau of Air Quality as representative of clean unpolluted areas of the state. They are based upon extended monitoring at a state-operated remote site in northern Nevada. In the town of Battle Mountain, the PM_{10} background concentration was estimated to be 32.2 $\mu g/m^3$ for both averaging times based on monitoring data collected from 1994 through 1998 in the town of Battle Mountain (Environmental Management Associates 1999a). Background concentrations for CO, SO_2, and NO_2 were assumed to be negligible. These background pollutant concentrations are consistent with State of Nevada practice.

3.9.2.1 Proposed Action

The Proposed Action would comprise an expansion of the facilities and operations currently authorized by the BLM and/or the State of Nevada for the Reona Project. It would involve changes in mining, waste rock facilities, haul roads, milling, and metals recovery. The Proposed Action would result in increased PM_{10} and combustion emissions.

BMG has recently been issued a permit to operate the air emission units associated with both existing and proposed operations for the Phoenix Project. Those operations will be governed by Nevada Bureau of Air Quality Class II Air Quality Permit to Operate AP1041-0220.01. ***Table 3.9.7*** summarizes the point source air emissions allowed under this air quality permit. Fugitive dust and vehicle exhaust from mining activities and equipment are not included in quantitative permit limits under NDEP regulations, but must also be managed under the Class II operating permit.

Total PM_{10} emissions from Phoenix Project permitted (process) equipment are approximately 84 tons per year. Most of the permitted PM_{10} comes from the heap leach and mill crushing systems and associated systems. Relatively small quantities of the other criteria air pollutants would be emitted from the Phoenix Project.

Total emissions, after application of pollution controls as specified in the Phoenix Plan of Operations and Fugitive Dust Control Plan (BMG 2000b) were used for the air modeling impact analyses (see Section 2.4.19). These total controlled emissions were calculated (Environmental Management Associates 1999a) to be 535 tons per year of PM_{10}, 62.5 tons per year of SO_2, and 615 tons per year of NO_x. The totals include mobile sources (light-duty trucks and heavy-duty mining equipment), process equipment, and fugitive dust from mining, material handling, traffic on roads, and wind erosion.

The maximum modeled pollutant concentrations (design values) for the Proposed Action are presented in ***Table 3.9-8***. The total design value concentrations reflect the inclusion of background concentrations as discussed above. By comparing these values to the AAQS in ***Table 3.9-6***, it is evident that the Proposed Action would be in compliance with those standards.

In addition, the pollutant design value concentrations for the Proposed Action at the sensitive receptors (town of Battle Mountain and the Jarbidge Wilderness Area) also were calculated. Results for those receptors are presented in ***Table 3.9-9***. The total design value concentrations reflect the inclusion of the background concentrations. These values would be in compliance with the AAQS.

The background PM_{10} concentrations that were applied in the air modeling assessment are representative of clean conditions in remote areas (except for the town of Battle Mountain background concentrations). It is reasonable to expect that on specific days, background concentrations could be higher at the Phoenix Project site, due to poor dispersion of emissions from regional sources or to natural sources such as wind erosion during high wind events. To determine a conservative upper-limit 24-hour background concentration, an independent assessment was conducted using ambient PM_{10} monitoring data collected in northern Nevada (JBR 1999d).

A review was carried out of data from 18 Nevada ambient monitoring sites spanning the years 1994 through 1998. The year 1995 represented the most complete year of data (fewest large data gaps) when all 18 sites were considered. The data represent the range of ambient conditions relevant to the proposed Phoenix Project, including areas impacted by mining, those unaffected by mining but instead impacted by other industry or population centers, and clean areas such as

Table 3.9-7
Battle Mountain Gold Company
Permitted Criteria Air Pollutant Emissions for the Phoenix Project
Operating Permit No. AP1041-0220.01[1]

Emissions Unit	Annual Permitted Emissions (Tons)			
	PM_{10}	SO_2	NO_x	CO
Apron Feeder	0.29			
Heap Leach Crushing System	14.49			
ROM Lime Silo Loading	0.18			
ROM Lime Silo Discharge	0.74			
Heap Leach Conveyor System	13.24			
Heap Leach Radial Stacker	1.89			
Heap Leach Crushing Lime Silo Loading	0.18			
Heap Leach Crushing Lime Silo Discharge	1.48			
Induction Furnaces	1.15			
Carbon Regeneration Kiln	9.44	0.012	2.06	23.41
Pit Backfill Lime Silo Loading	1.77			
Pit Backfill Lime Silo Discharge	1.06			
Mill Primary Crusher Apron Feeder	1.18			
Mill Primary Crusher	17.58			
Mill Coarse Ore Stockpile Conveyor	1.45			
Mill Coarse Ore Stockpile Feeder and Recycle Crusher	10.55			
SAG Mill Conveyor	0.95			
SAG Mill Oversize to Recycle Crusher	1.72			
Recycle Crusher Conveyor	2.45			
Mill Lime Silo #1 Loading	0.38			
Mill Lime Silo #1 Discharge	0.26			
Mill Lime Silo #2 Loading	0.38			
Mill Lime Silo #2 Discharge	0.26			
INCO Lime Silo Loading	0.79			
INCO Lime Silo Discharge	0.35			
Total Permitted Emissions	**84.21**	**0.012**	**2.06**	**23.41**

Source: Nevada Bureau of Air Quality Operating Permit #AP1041-0220.01.
[1]Effective September 20, 2000.

Table 3.9-8
Modeled and Total Design Value Concentrations for the Proposed Action

Criteria Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)	Total Design Value Concentration ($\mu g/m^3$)[1]
PM_{10}	24-hour	78.6	88.8
	Annual	14.1	23.1
SO_2	3-hour	83.4	83.4
	24-hour	10.9	10.9
	Annual	1.5	1.5
NO_2	Annual	28.2	28.2
CO	1-hour	11,400.0	11,400.0
	8-hour	556.0	556.0

Source: Environmnetal Management Associates 1999a.
[1]Maximum modeled concentration plus background concentrations. Data from Environmental Management Associates 1999a.

Table 3.9-9
Sensitive Receptor Modeled and Total Design Value Concentrations for the Proposed Action

Criteria Pollutant	Averaging Period	Battle Mountain Maximum Modeled Concentration ($\mu g/m^3$)	Battle Mountain Total Design Value Concentration ($\mu g/m^3$)[1]	Jarbidge Maximum Modeled Concentration ($\mu g/m^3$)	Jarbidge Total Design Value Concentration ($\mu g/m^3$)[1]
PM_{10}	24-hour	4.8	37.0	0.5	10.7
	Annual	0.2	32.4	0.01	9.01
SO_2	3-hour	6.7	6.7	0.91	0.91
	24-hour	0.5	0.5	0.06	0.06
	Annual	0.0	0.0	0.0	0.00
NO_2	Annual	0.3	0.3	0.02	0.02
CO	1-hour	1,764.0	1,764.0	158.7	158.7
	8-hour	29.8	29.8	2.9	2.9

Source: Environmental Management Associates 1999a.
[1]Maximum modeled concentration plus background concentrations.

wilderness areas and national parks. For the 1995 year, the average of the highest second-high PM_{10} concentrations, considering all sites, was 40 $\mu g/m^3$.

If a 24-hour background PM_{10} concentration of 40 $\mu g/m^3$ is applied to the Phoenix Project modeling results, the total design value 24-hour concentration is 118.6 $\mu g/m^3$. This conservative maximum predicted PM_{10} impact is still well below the applicable AAQS.

In summary, modeled criteria pollutant concentrations show levels below the state and federal AAQS. Therefore, these impacts are considered less than significant.

3.9.2.2 No Action Alternative

The No Action alternative comprises the facilities and operations that are currently authorized by the BLM and/or the State of Nevada. The No Action alternative is described and the impacts disclosed in the Battle Mountain Gold Company Five Exploration Areas Environmental Assessment (EA N64-EA1-14) (BLM 1991b) and in the Battle Mountain Gold Company Reona Project Environmental Assessment (EA N64-EA3-61) (BLM 1993). Subsequent to the Reona Project EA, the BLM approved several modifications, which are included in the No Action alternative.

For the Reona Project, worst-case PM_{10} emissions were estimated to be about 209 tons per year.

Other past, present, and reasonably foreseeable future mining and exploration activities were estimated to produce about 103 tons per year of additional PM_{10}, for a total worst-case emission rate of 312 tons per year.

This total includes all point source and fugitive emissions, after application of planned emission controls. Total emissions under the No Action alternative would therefore be less than those for the Phoenix Project, and impacts to ambient air would be correspondingly lower.

In summary, criteria pollutant concentrations would be at levels below the state and federal ambient air quality standards. Therefore, these impacts are considered less than significant.

3.9.3 Cumulative Impacts

The air quality cumulative effects area comprises the area within a 25-mile radius of the Phoenix Project and includes 12 regional air pollutant emission sources (see ***Figure 2-7***).

Four criteria pollutants (PM_{10}, SO_2, NO_x, and CO) were evaluated using the EPA's ISCST3 model. Based on the modeling results for the Phoenix Project alone, PM_{10} was identified as the pollutant of most concern and was therefore scrutinized more intensely than SO_2, NO_2, or CO.

Because Sierra Pacific Power Company's Valmy Generating Station is by far the largest regional emitter of SO_2, NO_x, and CO, it was modeled by itself to determine the extent of impacts for these pollutants. It was determined that the maximum cumulative concentrations for these pollutants would be much less than any state or federal AAQS and would occur at locations far from the high-concentration locations modeled for the project itself (Environmental Management Associates 1999a). Given that the Valmy Generating Station is by far the largest source of each of these pollutants, it is reasonable to conclude that the cumulative impact of these air pollutants from all of the regional sources also would be small and not significant, and no additional cumulative impact assessment is warranted.

PM_{10} modeling, including the Proposed Action and all of the regional sources, indicated only slightly higher concentrations than those predicted for the project alone. The cumulative PM_{10} impact, 78.7 $\mu g/m^3$, is 0.1 $\mu g/m^3$ higher than the total impact for the project alone and is well within the state and federal ambient air quality standards (background concentration not included). Regarding sensitive receptors, the cumulative impacts were modeled as 0.7 $\mu g/m^3$ at the Jarbidge Wilderness Area and 5.3 $\mu g/m^3$ at the town of Battle Mountain (Environmental Management Associates 1999a).

An additional PM_{10} modeling analysis evaluated the impact area of each regional source (defined as the area of the 10 $\mu g/m^3$ concentration contour) and whether any such area interacted with the Proposed Action impact area. The modeling analysis (Environmental Management Associates 1999b) demonstrated that there was no interaction of any regional source impact area with the Proposed Action impact area.

3.9.4 Monitoring and Mitigation Measures

As described in Section 2.4.19 (Air Emission Controls) and Section 3.9.2 (Environmental Consequences), the Proposed Action includes the use of control devices and dust suppression methods to mitigate PM_{10} emissions. BMG has committed to the implementation of these air emissions controls in the Nevada Bureau of Air Quality Permit to Operate and in the Fugitive Dust Control Plan (BMG 2000b) for the Phoenix Project. Due in part to these emission controls, air quality analyses have demonstrated that significant impacts are not predicted. As the permitting process continues, the State of Nevada may require monitoring or mitigation measures as required by applicable regulations, if such regulations are triggered. To ensure that BLM is informed of air quality impacts and the steps taken to mitigate impacts and comply with Nevada's regulatory requirements, BLM is requiring that BMG submit copies of all air quality reports delivered to the State of Nevada to the BLM Battle Mountain Field Office, and also report annually to BLM on measures taken to control emissions of fugitive dust.

AQ-1: Air Quality Reporting. BMG ***would*** ensure that BLM receives copies of all air quality data and reports submitted to the State of Nevada under the requirements of the Phoenix air quality permit or other Nevada air quality regulations. In addition, BMG ***would*** report annually to BLM on source-specific measures taken to control fugitive dust emissions and the effectiveness of those measures in controlling sources of fugitive dust.

3.9.5 Residual Adverse Effects

Increases in emissions of air pollutants (i.e., PM_{10}, SO_2, NO_x, CO) associated with the Proposed Action would be temporary (life-of-mine) and transitory in nature and would be within state and federal AAQS. Following the completion of mining and subsequent reclamation, air quality would return to background levels determined by emissions from other regional source operations and/or natural background pollutant concentrations. As a result, there would be no residual adverse air quality effects.

3.10 Land Use and Access

3.10.1 Affected Environment

Mining constitutes the dominant land use in the Battle Mountain Range, which includes the project area. In addition to the BMG operations, at least a dozen other mining companies have conducted exploration activities in the Battle Mountain Range since January 1981, when the federal surface mining regulations became effective.

The BLM land use plan for the Shoshone-Eureka Resource Area (BLM 1986a), which includes the entire project area, provides that the public lands therein will be open for mining and prospecting unless withdrawn or restricted from mineral entry (see Section 1.2, Relationship to BLM and Non-BLM Policies, Plans, and Programs). No such withdrawals or restrictions occur within the project area. There are no recorded Indian Reservations within the project area (JBR 1997a).

Though of lesser economic consequence than mining, livestock grazing by both cattle and sheep is an established use within the project area (see Section 3.6, Range Management). Additionally, outdoor recreation, consisting of hunting, fishing, camping, limited off-road vehicle use, mountain biking, sightseeing, photography, hiking, rock climbing, and visiting old mining camps occurs on a seasonal basis. There are three Wilderness Study Areas within a 50-mile radius of the project area, but none of them were recommended for wilderness status (see Section 3.11, Recreation and Wilderness). There are no prime or unique farmlands in the project area (JBR 1997a).

The project area lies within the corridor of the original checkerboard railroad lands wherein the land ownership pattern comprised alternate sections of private and public lands. Some private and public lands have been consolidated into larger blocks. ***Figure 3.10-1*** depicts the ownership status of lands in the project area. As this figure shows, land ownership in the area reflects both checkerboard ownership and patented mineral claims.

A number of rights-of-way cross the project area. ***Table 3.10-1*** lists the various rights-of-way that exist in the area (see ***Figure 3.10-1***) based on BLM Master Title Plats. This table also presents right-of-way widths, where applicable.

The Phoenix Project area is served by a network of roadways typical of rural Nevada. Interstate 80 (I-80) is the primary east-west traffic artery across northern Nevada, connecting northern Lander County with Reno to the west and Elko and Salt Lake City, Utah to the east. I-80 passes through the edge of the town of Battle Mountain approximately 12 road miles northeast of the project site.

State Highway 305 (SH-305) provides access to the project vicinity from I-80 and Battle Mountain. SH-305 is a paved, two-lane highway designated a rural major collector by the Nevada Department of Transportation (NDOT) (NDOT 2000).

Existing traffic conditions on SH-305 near the Phoenix Project turn-off are at level of service (LOS) A. (See Section 3.10.2.2 for a discussion of levels of service.) Traffic volumes on that section of roadway averaged 760 vehicles per day in 1999, 20 percent below the peak levels experienced from 1994 through 1996 (NDOT 2000). Peak hour traffic volumes are estimated at less than 5 percent of hourly roadway capacity.

Existing traffic conditions on SH-305 just south of Carson Road on the edge of Battle Mountain also are at LOS A. Traffic volumes on that section of roadway averaged 2,300 vehicles per day in 1999, approximately 20 percent below the peak levels experienced from 1995 through 1997 (NDOT 2000). Peak hour traffic volumes are estimated at approximately 11 percent of hourly roadway capacity.

3.10.2 Environmental Consequences

The Proposed Action or No Action alternative could affect land use both directly and indirectly. Direct impacts may include the termination or modification of existing land uses or rights-of-way in the project area. Indirect impacts may result in altered land use patterns to other use areas adjacent to or within proximity to the mine. Indirect impacts also would occur if the Proposed Action or No Action alternative stimulated or encouraged the development of land uses not presently anticipated, or conversely, precluded other planned or proposed uses.

Impacts to land use authorizations would be significant if the Proposed Action or No Action alternative results in one or more of the following:

Table 3.10-1
Land Use Authorizations Pertaining to Lands and Minerals in the Project Area from BLM Master Title Plats

Number	Applicant	Description[1]	Total Row Width[2]
NEV065084	Southwest Gas Corporation	ROW Oil and Gas Pipelines	50 feet
NEV066582	Nevada Bell	ROW Telephone-Telegraph	20 feet
NEV067373	BMG	ROW Water Plants	50 feet
N1608	Nevada Bell	ROW Telephone-Telegraph	20 feet
N244	BMG	ROW Power Facilities	25 feet
N46266	AT&T	ROW Telephone-Telegraph	20 feet
N48143	Lander County	ROW Roads	60 feet
CC021089	Nevada Bell	ROW Telephone	40 feet
N48871	Sierra Pacific Power Co.	ROW Power Transmission	80 feet
N57376	Sierra Pacific Power Co.	ROW Power Transmission	40 feet
NEV066619	Sierra Pacific Power Co.	ROW Transmission	40 feet
N31233	Independence Gold	ROW Water Facility	25 feet
N36643	BMG	ROW Water Facility	60 feet

Source: JBR 1999a.
[1]ROW = right-of-way.
[2]By convention, rights-of-way widths are recorded on title plats as the distance from the centerline of the right-of-way to the outer edge of the right-of-way. This width actually is equal to one-half the total width of the right-of-way. Widths used in this table are the total right-of-way width as these widths will be used to determine acreages.

- Incompatibility or inconsistency with land use plans, regulations, or policies adopted by local, state, or federal governments

- Changes to land use patterns that would threaten the economic viability of existing private enterprises or uses of public lands (e.g., livestock grazing) operating under existing land use authorizations

- Elimination or severe restriction of access to isolated parcels of private land or to public lands that are known to be used in support of private enterprises or are considered critical for established recreational activities.

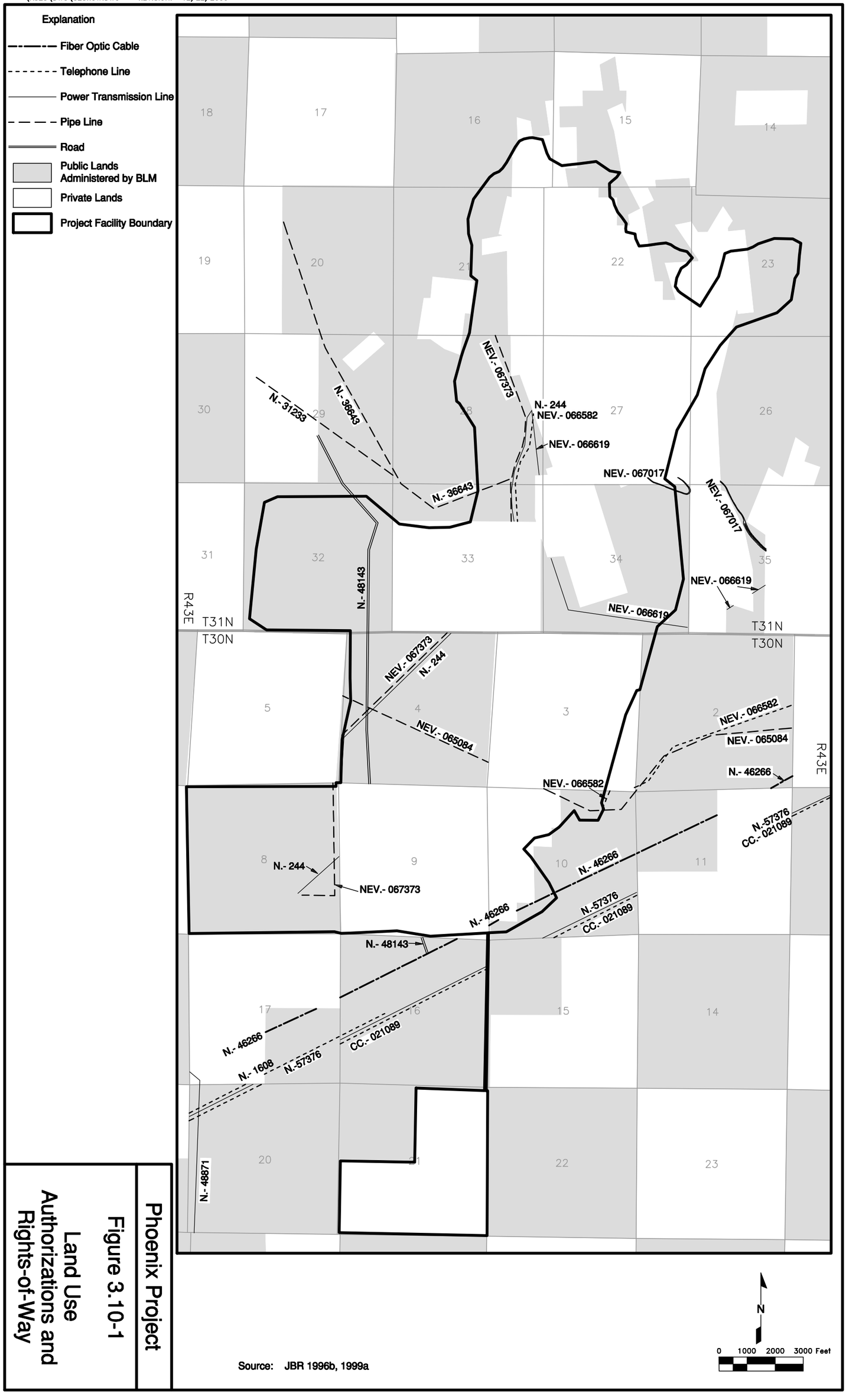
Transportation impacts are evaluated relative to two criteria: compliance with applicable LOS planning standards, and protection of safety conditions for the traveling public. Level of service is a method of qualitatively measuring the operational conditions of traffic flows on roadways, and the perception of those conditions by motorists and passengers (TRB 1985). Levels of service are rated A through F; A generally represents free-flowing traffic conditions with few restrictions, and F represents a "forced or breakdown" flow with queues forming and traffic volumes exceeding theoretical capacity of the roadway (TRB 1985). Generally, level E represents traffic volumes at the capacity of the roadway. The relevant LOS standard for evaluating traffic conditions near the Phoenix Project is the commonly used criterion for rural highways of LOS C during peak hour periods. At LOS C, traffic flows are in the stable range, but most drivers are becoming restricted in their freedom to select speed, change lanes, or pass.

Use of safety is a less well-defined concept as a significance criterion. Many different factors come into play in highway safety, including sight distances, road conditions, roadway geometry, and even weather conditions. Particular factors of interest are those that might be modified by development of a mining project, such as the mix of different types of vehicles in the traffic stream, availability of gaps in the dominant traffic flow to accommodate traffic entering the highway from a side road, and introduction of unusually large numbers of oversized vehicles.

3.10.2.1 Proposed Action

The Proposed Action would involve both public and private lands. Total new surface disturbance would be 2,382 acres on public land and 1,913 acres on private land, resulting in a total of 4,295 acres of new surface disturbance (see ***Table 2-1***).

\A325\DWG\325ROW.DWG REVISION: 12/22/2000



Source: JBR 1996b, 1999a

0 1000 2000 3000 Feet

Phoenix Project

Figure 3.10-1

Land Use Authorizations and Rights-of-Way

The Proposed Action would be consistent with plans and policies of the BLM that designate land use within the project area as open for mineral exploration and development. Proposed mining activities on private lands would be consistent with the Lander County Master Plan and Zoning Ordinance. The Proposed Action would not conflict with adopted plans and policies and, therefore, would not result in a significant impact.

Public use of the existing project area is currently precluded. The Proposed Action would continue to preclude any public use of the affected lands for the life of the project for both safety and security reasons. Access to public and private areas outside of the mine site would continue. As a result, there would be no significant impact to private or public land access as a result of the Proposed Action.

The principal land uses in the vicinity of the Proposed Action include livestock grazing, wildlife habitat, dispersed recreation, and mineral exploration and development. The potential significance of the loss of 2,382 acres of public land to these land uses are described in Section 3.5.2.2, Wildlife and Fisheries Resources, Section 3.6.2.2, Range Management, and Section 3.11.2.2, Recreation and Wilderness, respectively. The 4,295 acres of new disturbance would constitute approximately 4 percent of the total 105,000-acre Copper Canyon grazing allotment.

All rights-of-way necessary to support the Proposed Action are currently in place except the 1) 120-kilovolt power line, 2) 69-kilovolt power line, and 3) Willow Creek Road re-alignment. The 120-kilovolt power line would consist of installing a tap on Sierra Pacific Power Company's existing 152-kilovolt power line in Buffalo Valley, then constructing a single pole, staggered tangent power line northeasterly to the mine site (***Figure 2-4***). The 69-kilovolt power line would consist of installing a tap on Sierra Pacific Power Company's 69-kilovolt power line near the mouth of Philadelphia Canyon, and constructing a single pole, staggered tangent power line along Philadelphia Canyon Road to the mine site (***Figure 2-4***). Although the party responsible for constructing and operating the power lines has not yet been determined, the impacts associated with the power lines are examined in this EIS.

The Willow Creek Road re-alignment is anticipated to be a two-phase operation. Phase one would be constructed along existing roads as shown in ***Figure 2-4***. If necessary for facility expansion, phase two would be constructed as shown in ***Figure 2-4***. The road(s) would be constructed in accordance with Lander County and BLM specifications. It is anticipated that BMG would be responsible for securing the right-of-way permits and agreements for both phase one and phase two from the BLM and private landowners, respectively, and would assign the road to Lander County at a later date. Although the party responsible for constructing the road has not yet been determined, the impacts associated with the Willow Creek Road Re-alignment are examined in this EIS.

Three existing rights-of-way and land use authorizations would be crossed by the proposed alignment of the new power line and four would be parallel to it. Rights-of-way that would be parallel to the new line include Sierra Pacific Power Company's power line right-of-way (CC-021089); Sierra Pacific Power Company's 40-foot-wide power line right-of-way (N57376); and BMG's two 25- and 50-foot-wide water plants rights-of-way (N244 and NEV067373). Rights-of-way that would be crossed by the new power line include AT&T's 20-foot-wide underground fiber optic telephone line right-of-way (N-46266); Southwest Gas Corporation's buried high pressure gas pipeline right-of-way (NEV-065084); and Lander County's 60-foot-wide road right-of-way (N48143) for Willow Creek Road. Permission to encroach on these rights-of-way would be obtained from the holders. Construction within the new right-of-way would not be expected to adversely affect these existing land use authorizations and rights-of-way.

Of the 13 land use authorizations identified in ***Table 3.10-1*** and depicted in ***Figure 3.10-1***, 5 would be affected by the Proposed Action.

- BMG's 50-foot-wide water pipeline right-of-way (NEV-067373) would be affected by development of the Reona Pit, the Midas Pit and backfill, and the Natomas Waste Rock Facility.

- Southwest Gas Corporation's 50-foot-wide, buried, high pressure gas pipeline right-of-way (NEV-065084) would be affected by the Phoenix Tailings Facility #1 and possibly by growth medium stockpiles.

- Sierra Pacific Power Company's 40-foot-wide power line right-of-way (NEV-066619) would be affected by the Box Canyon waste rock facility, the Midas Pit backfill and the Heap Leach Pad.

- The Lander County 60-foot-wide road right-of-way (N-48143) for Willow Creek Road would be affected by the Natomas waste rock facility and Tailings Facility #1.

- Nevada Bell's 20-foot-wide telephone-telegraph right-of-way (NEV066582) would be affected by expansion of the Midas Pit and backfill.

The facilities using these rights-of-way would have to be moved. BMG plans to reroute the Willow Creek Road and the water pipeline around project features. BMG also would coordinate with Sierra Pacific Power Company, Nevada Bell, and Southwest Gas Corporation to facilitate the relocation of the power line, telephone line, and gas pipeline, respectively. As a result, the conflicts would not be considered significant.

Closure and reclamation following the Proposed Action would return public lands to their premining land uses, including livestock grazing, wildlife habitat, dispersed recreation, and mineral exploration and development. The required reclamation of the project area would include the reseeding of disturbed acreages except for the open pits. Safety berms and warning signs would be placed around the perimeter of the pits to prevent public access. Reseeding would increase vegetative cover and make the area suitable for livestock grazing. Livestock grazing may be resumed only after re-established vegetation is capable of supporting grazing, as determined by the BLM.

Two primary categories of traffic would be generated by the proposed Phoenix Project: worker commuting traffic, mainly automobiles and pickup trucks, and material deliveries and hauling of beneficiated products off-site, mainly heavy trucks and tractor-trailer rigs.

Maximum commuting traffic generated by the proposed project during construction would be approximately 350 vehicles inbound to the site at the beginning of the shift and 350 outbound at the end of the shift, assuming a single construction shift and a worst case of every worker driving separately. For purposes of analysis, shift changes are assumed to occur concurrently with morning and afternoon peak traffic flow hours on the highway. The amount of delivery traffic during construction is unknown, but it is assumed that very little of it would arrive during the peak traffic periods, so it would have little effect on traffic performance on SH-305. Under this construction scenario, peak hour traffic would operate at LOS B near the Phoenix Project turn-off, well above the significance criterion noted above. Peak hour traffic near Carson Road would be at LOS C, but would still operate well below the upper limit of the range. As a result, the traffic impact from construction would not be considered significant at either location.

During operations, commuting traffic volumes would be lower, but there would likely be more truck traffic during the peak traffic hours than the construction period would generate. Under the proposed scenario of two operating shifts, there would be up to 250 additional vehicles traveling to or from the site during the afternoon peak hour. Approximately 135 would be departing the site at the end of the first shift, and the remaining 115 would be entering the site at the beginning of the second shift. As before, shift changes are assumed to occur concurrently with morning and afternoon peak traffic flow hours on SH-305.

Total truck traffic is estimated to average 25 loads daily, making one inbound trip and one outbound trip each for a total of 50 trips. A maximum of 20 percent, or 10 trips, are assumed to occur during the peak hours. The combined commuting and delivery truck traffic during operation of the proposed project would result in traffic on SH-305 remaining at LOS A near the Phoenix Project turn-off and operating at LOS B near Carson Road.

Level of service B conditions indicate traffic flows are stable. Motorists are noticing the presence of other traffic, although freedom to maneuver and select desired speed is only slightly affected (TRB 1985). Level of service effects of the project for both construction and operations traffic would be at or above the common rural standard of LOS C, so the traffic impact would not exceed the significance threshold.

Transportation safety concerns related to the proposed project are unlikely to be a problem. Lines of sight at intersections are unobstructed, and sight distances are ample. Development of the proposed project would have no effect on the physical characteristics of the intersection or the highway. The increase in traffic would be modest, remaining well within the capacity of the roadway as noted above. The mix of heavy vehicles in the traffic stream would not change substantively. As such, any increase in the risk of traffic accidents would be minor and proportional to the overall increase in traffic.

Based on the analysis described, development of the proposed Phoenix Project would not significantly affect highway traffic and safety conditions in the site vicinity.

3.10.2.2 No Action Alternative

Impacts to land use authorizations under the No Action alternative would be the same as described for the Proposed Action, with the exceptions described below.

The components of the No Action alternative were described and the impacts disclosed in the Battle Mountain Gold Company Five Exploration Areas Environmental Assessment (EA N64-EA1-14) (BLM May 1991b) and the Battle Mountain Gold Company Reona Project Environmental Assessment (EA N64-EA3-61) (BLM October 1993).

As currently planned and permitted, approximately 45 acres of new surface disturbance would occur on private land; public land disturbance would be reduced by 1 acre. No additional disturbance would occur on public lands (see Section 2.3). Total surface disturbance would be approximately 2,823 acres (WESTEC 1993).

The principal land uses under the No Action alternative would not change during the life of the project. Therefore, the No Action alternative would not result in a significant impact to these land uses and existing land use patterns. However, the level of activity could change. For example, dispersed recreational use of the affected area would be precluded (see Section 3.11.2.1, Recreation and Wilderness). In addition, the No Action alternative would disturb an additional 45 acres of private lands in the Copper Canyon grazing allotment. The potential significance of this impact to wildlife habitat and livestock grazing are described in Section 3.5.2.1, Wildlife and Fisheries Resources, and Section 3.6.2.1, Range Management, respectively.

All rights-of-way necessary to support operation of the No Action alternative are currently in place. Of the 13 land use authorizations identified in ***Table 3.10-1*** and depicted in ***Figure 3.10-1***, 3 would be affected by surface disturbance associated with the No Action alternative. Portions of Sierra Pacific Power Company's 40-foot-wide power line right-of-way (NEV-066619), Nevada Bell's 20-foot-wide telephone-telegraph right-of-way (NEV066582), and BMG's 50-foot-wide water plants right-of-way (NEV067373) would be impacted by the North Midas Pit highwall pushback in the E1/2, SE 1/4, Section 28, Township 31 North, Range 43 East.

The facilities using these rights-of-way would have to be moved. BMG would coordinate all such moves with the rights-of-way owners. Consequently, the conflicts would not be considered significant.

The No Action alternative would increase the mine site employment by 80 workers for approximately 6 months during the brief resumption of the mining period. Employing similar assumptions as those noted for the Proposed Action, commuting traffic would increase by 40 vehicle trips to the site during the morning peak hour and 80 trips (half inbound and half outbound) during the evening peak hour.

Total truck traffic is estimated to average 12 loads daily, making one inbound trip and one outbound trip each for a total of 24 trips. A maximum of 20 percent, or 5 trips, are assumed to occur during the peak hours. The combined commuting and delivery truck traffic from the resumption of mining portion of the No Action alternative would result in traffic on SH-305 operating at LOS A at both the Phoenix Project turn-off and near Carson Road, the same levels that currently exist on the highway. After completion of mining, traffic would return to current levels.

Traffic safety would not be noticeably degraded by the No Action alternative.

3.10.3 Cumulative Impacts

The area of analysis for cumulative impacts to land use authorizations is the Copper Canyon livestock grazing allotment (see ***Figure 3.6-1***). Cumulative impacts to land use identified as a result of the Proposed Action are limited to the incremental increase in disturbance of public lands suitable for livestock grazing, wildlife habitat, dispersed recreation, and mineral exploration and development. No cumulative impacts have been identified in relation to land use authorizations.

Of all the reasonably foreseeable future actions listed in Section 2.6, only the ongoing mineral exploration by BMG has the potential to disturb additional public lands in the Copper Canyon grazing allotment. According to BMG, surface disturbance associated with exploration activities would not exceed 50 acres at any one time.

Traffic from past and present activities in the project vicinity is included in the existing traffic conditions discussion above. Among the projects included in the cumulative projects list, only the McCoy/Cove Mine and the M-1 Drilling Fluids Plant share access routes and are close enough to generate traffic that would interact with Phoenix Project traffic on SH 305. No major changes are anticipated for those projects, however, so traffic levels are not expected to change, and there would be no cumulative traffic effects beyond those described for the Proposed Action.

3.10.4 Monitoring and Mitigation Measures

No significant impacts to land use authorizations were identified; therefore, monitoring and mitigation measures are not recommended.

No significant traffic or highway safety impacts have been identified; therefore, monitoring and mitigation measures are not recommended.

3.10.5 Residual Adverse Effects

The only residual adverse effect on land use would be the loss of future use of public lands associated with the open pits. There would be no residual adverse effects on land use authorizations, and there would be no residual adverse effects on traffic.