

R645-301-121.200, Table of Contents for Chapter 3 is not completed for Appendices and Drawings.

A new Table of Contents for Chapter 3 has been created for this submittal.

Chapter 3 Table of Contents included in this submittal replaces Chapter 3 Table of Contents of the current MRP.

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R645-301-300

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R645-301-321.200, Vegetation information pertaining to the county road realignment should be included in the application as adjacent area. [JH]

A new vegetation map has been prepared that shows the plant communities and wildlife habitats to be impacted by the mine including the new county road alignment.

Drawing: 3-1 of this submittal replaces

Drawing: 3-1 of the current MRP.

12/18/08

R645-301-322, Threatened, Endangered, and Candidate plant and animal species for Kane County are included in Table 3-35. For each species listed in Table 3-35, provide a brief narrative describing surveys and the rationale for each species absence from the permit area. i.e. MSO protocol and survey results. [JH]

A new table has been prepared that shows rationale for the findings of specific threatened and endangered species in the Alton project area.

To insert the table, the entire section of the MRP has been replaced to keep pages in consecutive order. **The pages that have changes are dated 12/15/08. The pages with no changes (other than the page numbers) are dated 1/15/08.**

Chapter 3, pp. 3-34 *thru* 3-80 of this submittal replaces
Chapter 3, pp. 3-34 *thru* 3-74 of the current MRP.

Table 3-35: List of Threatened, Endangered, and Candidate Plant & Animal Species in Kane County, Utah

SCIENTIFIC NAME	COMMON NAME	STATUS*	NOTES SPECIFIC TO PROJECT AREA
PLANTS			
<i>Asclepias welshii</i>	Welsh's Milkweed	T	Welsh's milkweed, occurs in Kane County, Utah, as well as in immediately adjacent Coconino County, Arizona. This plant grows on dunes derived from Navajo Sandstone. This formation and habitat is not found within the permit area or adjacent areas. There should be no impacts to this species as a result of Alton Coal Mine.
<i>Cycladenia humilis</i> <i>var. jonesii</i>	Jones Cycladenia	T	Jones' cycladenia, is a Federally listed threatened plant found only in the canyonlands of the Colorado Plateau in Emery County, Garfield County, Grand County, and Kane County, Utah (also found in adjacent Coconino County, Arizona). This plant occurs in gypsiferous soils that are derived from the Summerville, Cutler, and Chinle formations; they are shallow, fine textured, and intermixed with rock fragments. These formations and habitats are not found within the permit area or adjacent areas. There should be no impacts to this species as a result of Alton Coal Mine.
<i>Lesquerella tumulosa</i>	Kodachrome Bladderpod	E	Kodachrome bladderpod, is a federally listed endangered plant that is an endemic found only in Kane County, Utah. This species is found on shallow soils that are fine textured, intermixed with shale fragments, and derived from the Winsor Member of the Carmel Formation, where it grows on bare shale knolls and slopes in scattered pinyon-juniper communities. These formations and habitats are not found within the permit area or adjacent areas. There should be no impacts to this species as a result of Alton Coal Mine.
<i>Pediocactus sileri</i>	Siler Pincushion Cactus	T	This plant is federally listed as threatened. It occurs in Kane and Washington counties in Utah, plus adjacent Coconino and Mohave counties in Arizona. The cactus is usually found on the white, occasionally red, gypsiferous and calcareous sandy or clay soils derived from the various members of the Moenkopi Formation, but it is sometimes found on the Kaibab Formation. Siler pincushion cactus occurs in warm desert shrub, sagebrush-grass, and at its upper limits, in pinyon-juniper communities, at lower elevations that are present in the Alton area. Additionally, these formations and habitats are not found within the permit area or adjacent areas. There should be no impacts to this species as a result of Alton Coal Mine.
ANIMALS			
<i>Cicindela limbata</i> <i>albissima</i>	Coral Pink Sand Dunes Tiger Beetle	C	The only known populations in the world for this species are located at the Coral Pink Sand Dunes in the extreme southwest corner of Kane County, Utah. The species occupies dune habitat, which is not found in the Alton area. There should be no impacts to this species as a result of Alton Coal Mine.

Table 3-35: List of Threatened, Endangered, and Candidate Plant & Animal Species in Kane County, Utah

<i>Coccyzus americanus</i>	Yellow-billed Cuckoo (possible)	C	DWR database information states that historically, cuckoos were probably common to uncommon summer residents in Utah and across the Great Basin. The current distribution of yellow-billed cuckoos in Utah is poorly understood, though they appear to be an extremely rare breeder in lowland riparian habitats statewide. DWR information also states that currently, the range of the cuckoo is limited to disjunct fragments of riparian habitats from northern Utah, western Colorado, southwestern Wyoming, and southeastern Idaho southward into northwestern Mexico and westward into southern Nevada and California. Although the possibility exists that historically this species could be seen in Kane County, it is highly extremely unlikely that it occurs within the Alton Mine permit area due to the lack of habitat for this species. There should be no impacts to this species as a result of Alton Coal Mine.
<i>Cynomys parvidens</i>	Utah Prairie-dog	T	Like other prairie dog species, the Utah prairie dog form colonies in burrows for underground activities. DWR distribution maps do not show the habitat for this species to occur in Kane County, but "high-value" habitat does occur in adjacent counties. No prairie dog burrows have been located within the permit or adjacent areas. There should be no impacts to this species as a result of Alton Coal Mine.
<i>Empidonax traillii extimus</i>	Southwestern Willow Flycatcher	E	This species breeds in southwestern U.S. and winters in southern Mexico and Central America. It is a rare visitor of southern Utah. Its habitat is primarily riparian and the bird most frequently occurs in dense willow stands. This habitat does not occur in the project area; the adjacent areas have also been surveyed where suitable habitat for this species was not found.
<i>Gila cypha</i>	Humpback Chub (historical)	E	Humpback chub in Utah are now confined to a few white-water areas in the Colorado, Green, and White Rivers. These rivers do not occur in the study area. The project area is not within the Upper Colorado River Basin, a specific area delineated and directed to comply to the Recovery Program for this species. There should be no impacts to this species as a result of Alton Coal Mine.
<i>Gilia elegans</i>	Bonytail (historical)	E	The bonytail is a very rare minnow originally native to the Colorado River system. The project area is not within the Upper Colorado River Basin, a specific area delineated and directed to comply to the Recovery Program for this species. There should be no impacts to this species as a result of Alton Coal Mine.
<i>Oxyloma kanabense</i>	Kanab Ambersnail	E	The only known locations for this species are in wetlands, springs and seeps approximately 6 mi. from Kanab, UT. This habitat is not found on or adjacent to the permit area for the proposed mine. There should be no impacts to this species as a result of Alton Coal Mine.

Table 3-35: List of Threatened, Endangered, and Candidate Plant & Animal Species in Kane County, Utah

<i>Strix occidentalis lucida</i>	Mexican Spotted Owl	T	In Utah the Mexican spotted owl is rare, but when it does occur it is sometimes in various forest types, but more commonly in steep rocky canyons, nesting in caves or cliffs of steep walled canyons. This habitat does not occur in the permit area, but does occur in the Dixie National Forest to the east and west of the Alton area. DWR has conducted raptor surveys for all potential raptor species in the project area and did not find habitat for the Mexican spotted owl. There should be no impacts to this species as a result of Alton Coal Mine.
<p>* T=Threatened, E=Endangered C=Candidate, Exp=Experimental</p>			

In summary, based on the information provided above and studies conducted to-date, no threatened or endangered species have been located in the permit area.

322.220. High Value Habitats

The State of Utah, Division of Wildlife Resources (DWR) geographic information system (GIS) database was consulted for high-value habitats. Of the species maintained on the database, important habitat of four species have been mapped by DWR within or adjacent to the Coal Hollow Project area. These habitats are described below.

First, black bear (*Ursus americanus*) habitat was located on the east side of the permit area and continues east for some distance (Drawing 3-2). This habitat has been listed as “year-long” and classified as having “substantial” habitat by DWR.

Next, Rocky Mountain elk (*Cervus canadensis*) habitat was located in the area. “High-value” summer range was mapped throughout the entire area from the town of Alton south into Sink Valley. Additionally, year-long “substantial” habitat was located in areas southeast of the permit area (Drawing 3-3).

Mule deer (*Odocoileus hemionus*) habitat has also been mapped in the area by DWR. The habitat has been classified as “high-value” summer range and was located throughout the permit and adjacent areas (Drawing 3-4).

Finally, sage-grouse (*Centrocercus urophasianus*) habitat has been documented in the project area. DWR has mapped much of the area to be brood habitat (Drawing 3-5). Sage-grouse populations continue to be monitored in the area by biologists from DWR, Bureau of Land Management (BLM), Southern Utah University (SUU), and the Coal Hollow Project. The only lek in the vicinity including those areas around Alton and Sink Valley was located west of the Swapp Ranch. This lek was within the permit area boundary. A site-specific study called “*Alton Sage-Grouse Habitat Assessment and Mitigation Plan*” has been conducted for the Coal Hollow Project and has been included in this document (see **Appendix 3-1**). Follow-up studies of the sage-grouse in the area are described in a report called “*Sage-grouse Distribution and Habitat Improvement in Alton, Utah*” (see **Appendix 3-3**).

In 2006 to the present, biologists representing the Coal Hollow Project have been involved with a previously assembled team of biologists that have been studying the populations in the area. In 2007, the team captured, took blood samples for DNA analyses, and placed radio collars on several birds. For more details refer to **Appendix 3-3**.

In addition to studying the sage-grouse birds as described above, techniques to improve habitat for the birds is currently being conducted. An effort by the U.S. Department of Interior, Bureau of Land Management (BLM) and the State of Utah, Division of Wildlife Resources (DWR) removed many of the juniper trees that have encroached the valley by grinding them up by chipping equipment. These areas can be easily seen on the new *Vegetation Map, Drawing: 3-1*. These areas are delineated as “SB (chipped)” on the map.

Because they provide perching structure for predatory species, single juniper trees scattered throughout sagebrush communities are known to discourage nesting by sage-grouse. To enhance sage-grouse nesting habitat within the permit area, juniper trees that have encroached some of the sagebrush communities in the valleys of the permit area have been removed by a track hoe using a large grapple claw. This equipment can pull the trees out of the ground, including the roots. To date, it has been estimated that 8,000 juniper trees have been removed by this technique. In doing so, the technique causes relatively minor impacts to the sagebrush component of the community.

In addition to the habitat improvements mentioned above for sage-grouse, seed mixtures to restore pasture lands disturbed by mining will include plant species that are used by the birds for food, cover and breeding. Moreover, one area that is presently dominated by grass species for domestic livestock use, will be seeded with plants that include species known to provide nesting habitat for sage-grouse such as big sagebrush and black sagebrush (see Postmining Land Use, Chapter 4, for more detailed information).

322.230. Other Species or Habitats

To date, no other species or habitats have been identified through agency consultation or field studies that require special protection under state or federal law, however, if they are found through the permitting process, they will be appropriately addressed and monitored.

A vegetation map has been prepared that delineates the plant communities in the permit area. The map also shows adjacent areas including those plant communities that will be impacted by the proposed county road realignment (Drawing: 3-1).

322.300. Fish and Wildlife Service Review

Upon request, the State of Utah, Division of Oil, Gas & Mining (DOG M) will provide the resource information required under R645-301-322 and the protection and enhancement plan required under R645-301-333 to the U.S. Fish and Wildlife Service Regional or Field Office for their review. This information will be provided within 10 days of receipt of the request from the Service.

323. MAPS AND AERIAL PHOTOGRAPHS

323.100. Reference Area Maps

Several vegetation maps have been prepared for the Coal Hollow Project. A revised vegetation map has been prepared that includes all vegetation sample areas, plus other updated map information [Vegetation Map, Drawing 3-1, (12/26/07)]. The new map replaces the previous vegetation maps. This new map includes reference areas, or plant communities sampled that are similar to those that have been proposed for disturbance by mining activities. These reference areas will be compared to those areas proposed for disturbance during the initial studies for the mine site and will consequently be used as revegetation success standards at the time of final reclamation of mined areas. Reclamation is planned immediately after portions of the land are mined (see Chapter 5).

323.200. Sample Area Maps

Elevations, locations of monitoring stations, proposed disturbed areas, reference areas, and other areas used to gather data for fish and wildlife, and any special habitat features, have been delineated on the aforementioned new vegetation map.

323.300. Protection and Enhancement of Fish & Wildlife Maps

Each facility to be used to protect and enhance fish and wildlife and related environmental values have been represented on the new maps.

323.400. Plant Communities Map

An initial vegetation map was prepared that delineated the plant communities that existed within the Coal Hollow Project permit area. This **first** map was prepared by delineating the plant communities from an existing vegetation map to a permit quadrangle map (see Section 321.100 for more details). However, a new flight was conducted in 2006 that provided aerial photography with more detailed information to be used to update many maps of the project area. Consequently, a **second** vegetation map was prepared using the new aerial photography (along with ground-truthing), and submitted along with the first map to DOGM (MRP submittal dated May 25, 2007). Finally, a **third** vegetation map was prepared to reflect information and to show new sample areas within the plant communities of the permit and adjacent areas [see *Vegetation Map, Drawing 3-1, (12/26/07)*]. This map **replaced** the first and second maps and was submitted to DOGM (MRP submittal dated January 15, 2008).

330. OPERATION PLAN

331. MINE PLAN & RECLAMATION TIMING

In each mined segment, the mine plan includes redistributing subsoil and topsoil followed by seeding this segment with the final seed mix contemporaneously, or at the same time the mining begins in the next segment. The mine plan has been engineered to disturb the smallest practicable area at any one time. With prompt establishment and maintenance of vegetation, immediate stabilization of disturbed areas will minimize surface erosion. Details of the plan have been provide in Chapter 5 of this document.

332. SUBSIDENCE

Because mining in the Coal Hollow Project area will be a surface operation, and subsidence is usually associated more with underground mining, it is not considered a factor for the Coal Hollow Project. However, current elevation of the existing topography may be slightly altered in the mining and reclamation operations. Reclamation has been planned to minimize the impact to the renewable resources identified in this section by promptly reclaiming each mine segment contemporaneously by controlling erosion and re-seeding with a mixture of native plant species that will re-establish the plant communities to vegetative cover that will be diverse, effective, permanent, and consistent with the postmining land use. More details regarding postmining land and topography have been provided in Chapter 4 and Chapter 5 of this document, respectively.

The mine plan is not expected to negatively impact the plants and wildlife in the Coal Hollow Project area. Onsite revegetation research and sage-grouse mitigation plans have been designed. Details of this work have been made available to DOGM specialists for their comments and participation in the process.

333. PROCEDURES TO MINIMIZE ADVERSE IMPACTS TO FISH & WILDLIFE

The Coal Hollow Project will minimize disturbances and adverse impacts to fish and wildlife and related environmental values during coal mining and reclamation operations. The project will comply with the Endangered Species Act of 1973 during coal mining and reclamation operations. The location and operation of haul and access roads and support facilities will be placed to avoid or minimize impacts on important fish and wildlife species or other species protected by state or federal law. Enhancement of such resources will be achieved, where practicable. An example is provided below for sage-grouse habitat.

After consultation with appropriate agencies and biologists regarding habitats and sensitive species, the sage-grouse and its habitat were of greatest concern in the area. There has been a decreasing trend in the populations of this species since 1964 (see **Appendix 3.1** and **Appendix 3-3** for more details). There was a general consensus among the biologists and agencies consulted that due to the marginal habitat in the Alton Amphitheater area, the loss of habitat in recent years for nesting and brood-rearing and the relatively low population numbers in the area, that the local population of sage-grouse is vulnerable to elimination, regardless of mining activities proposed by the Coal Hollow Project. Accordingly, the following measures to minimize impacts and enhance habitat for this species have been proposed and are subject to further consideration by the operator and regulatory agencies.

Biologists representing the regulatory agencies, land managers, academia and the coal mine operator, the primary goals for the Alton sage-grouse population includes:

- Minimize impacts to the birds from the mining activities.
- Enhance current sage-grouse habitat.
- Create a conservation area for the sage-grouse that will never be mined.
- Provide a corridor between north (Hoyt's Ranch) and south (Alton Sink Valley) populations to promote gene transfer and increase population numbers.
- Restore land disturbed by mining activities to enhance sage-grouse habitat.

Sage-Grouse Short-Term Mitigation Plan

The following information was taken directly from the “*Alton Sage-Grouse Habitat Assessment and Mitigation Plan*” (**Appendix 3-1**) and the followup document called “*Alton Sage-Grouse Habitat and Mitigation Plan*” (**Appendix 3-5**).

In addition to ensuring the protection of nearby grassland and shrubland for alternate breeding and nesting areas, mining activities will be minimized so that the lowest disturbance will be created during the breeding season at areas adjacent to the original lek. A lek area will be disturbed during mining activities that could potentially displace birds from typical mating activities. To encourage mating behavior during the breeding season, decoys and mating calls will be used to lure birds to nearby alternative sites positioned away from the disturbed area. Research has shown that birds will shift mating activities toward decoys and recorded bird calls. Both silhouette and 3-dimensional decoys (with bright white coloration) will be used to encourage sage-grouse mating activity (see **Appendix 3-5**)

After mining has been completed, reclamation specialists will return the original grade and valley form to pre-disturbance conditions. Reclamation will include seeding similar plant species with comparable plant composition, structure and function as those of the original plant community. In sites used by sage-grouse for breeding and roosting that had previous livestock grazing, livestock will be used post-reclamation to maintain similar vegetation characteristics as pre-mining conditions.

Intact sagebrush stands will be avoided for storing mined subsoil and topsoil piles when possible. Intact sagebrush sites will be cleared of all young juniper trees with the use of a compact excavator with a grappling claw or hand tools such as chainsaws. Trees will be removed from these stands. Juniper woodlands surrounding intact stands can be cut back to increase patch size and increase the amount of area that has the potential for nest site selection by hens.

Sage-Grouse Long-Term Mitigation Plan

The following information was taken directly from the “*Alton Sage-Grouse Habitat Assessment and Mitigation Plan*” (Appendix 3-1), “*Sage-grouse Distribution and Habitat Improvement in Alton, Utah*” (Appendix 3-3) and “*Alton Sage-Grouse Habitat and Mitigation Plan*” (Appendix 3-5).

Juniper Removal

A significant contribution that mining can provide for enhanced sage-grouse habitat is the removal of juniper from the Alton valley. The removal of trees during mining operations with subsequent reclamation activities will create conditions that promote grass, forb and eventually sagebrush establishment. Two years after juniper was removed from plots located in eastern Oregon, Bates et al. (2000) recorded a 200-300% increase in percent cover and production of herbaceous vegetation. Increased plant community vigor results from decreased competition with juniper for subsurface resources (water, nutrients) and space. As a result, transpiration rates and soil surface evaporation rates will decrease and higher soil moisture will be available for plant growth and survival. Based on anecdotal evidence, it is also possible that spring discharge will increase and seeps and springs may emerge that were lost with initial encroachment. This would provide more sites where birds would be able to obtain water during the summer and fall months.

Removing trees from extensive areas creates greater connectivity of suitable habitat. In 2005, the BLM cleared portions of the land to increase sagebrush habitat. This improvement was beneficial for improving relatively small site conditions, however, the amount of land treated was minimal compared to the level needed to sustain the sage-grouse population in the Alton area. In 2007, the Coal Hollow Project removed over 8,000 juniper trees that had encroached the sagebrush open areas. Long-term plans could include removal of hundreds of acres of juniper woodlands in a specific area adjacent to the Coal Hollow Project which would significantly increase conditions that are more suitable to sage-grouse nesting and post-nesting requirements. Current plans have been designed to provide a corridor for the sage-grouse in the Alton to intermix with the larger population located to the north, called the Heut's Ranch Lek (see below). This landscape-level operation could greatly enhance sagebrush restoration objectives by the BLM that is currently limited by constrained budgets and manpower.

Reestablishing Connectivity Between Alton and Heut's Ranch

Over time, juniper encroachment has likely been the primary factor in isolating the Alton sage-grouse population from nearby populations. There is a larger sage-grouse population located approximately 6 miles north of Alton. It is likely that migration once occurred between these populations allowing an exchange of individuals and genes between the two populations. Fragmentation of the landscape by juniper has likely resulted in minimal or no movement of birds between the two populations. Similarly, two populations that once occurred further south (near Kanab) have become locally extinct, likely due to the lack of connectivity with more northern populations. According to Fuhlendorf (2001), small populations of prairie chickens became disconnected from other larger populations with increased croplands and juniper invasion. These small populations became locally extinct due to the lack of migration and gene flow potential. Therefore, by reducing the degree of fragmentation caused by expanding juniper, the potential for migration and population sustainability is increased.

A plan has been made to restoring connectivity can be accomplished by removing juniper trees between these two populations on both private and public land. An area that is approximately 1,700 acres has been delineated that, with treatment, could provide connectivity between the two populations (**Appendix 3-5**). Funds will be provided by ACD to work with DWR to hire crews to cut and remove trees for a corridor through the 1,700 acres. It is anticipated that this habitat improvement will create access for birds to migrate between the two populations.

Establishment of a Core Sage-Grouse Conservation Area

The east end of the valley maintains one of the few remaining intact sagebrush stands in the valley. This area is located northeast of the lek and provides sites for roosting during the mating season (see Drawings 3-1 and 3-5). This area will not be mined, rather, it will be preserved to create a harbor area for bird breeding, nesting, and brood rearing. Within this "Conservation Area", habitat will be protected and enhanced for sheltering displaced sage-grouse, especially during the breeding and brood-rearing seasons (see also Appendix 3-1). All juniper trees that encroach into sagebrush communities within the permit area will be removed. This will be accomplished by felling and removing individual juniper trees while minimizing the impacts to the sagebrush community (see "Juniper Removal" above). In addition to juniper, Gambel oak (*Quercus gambelii*) may also be removed (in particular along the eastern foothills) to expand the sagebrush community and provide greater suitable habitat for sage-grouse. In addition to juniper and oak removal, sagebrush treatments (mechanical) can be applied to reduce shrub density in small areas (patches). Within these areas, forb species that are known to be important sage-grouse food will be seeded and established to provide an additional food source for hens and chicks, primarily during the brood rearing period. Grasses will also be seeded to provide additional hiding cover and a potential source of insects for chick foraging. These treatments will initially be done in a few, relatively small areas to determine whether forb and grass densities actually do increase and if birds are observed using these areas for foraging. If successful, these treatments can then be used in other areas where benefits are expected. Maintaining optimal shrub cover for nesting, brood rearing, predator avoidance, roosting, and as a source of shelter will remain the highest priority for these sites.

Habitat Reclamation Plan

Seed mixes that are used for reclamation will consist of native shrub, grass and forb species that provide cover and food. In order to accelerate shrub re-establishment, bareroot or containerize sagebrush and bitterbrush transplants will be planted. To ensure the integrity of the planting materials, indigenous seed and cuttings could be collected for reclamation. At Bryce Canyon National Park, seed and transplants obtained from indigenous materials had greater long-term survival and higher cover and production than commercial varieties of the same species (**Appendix 3-1**).

Cursory surveys conducted on April 30, 2006 found that there is a low probability that a dominant invasive species (i.e. cheatgrass, medusahead) could establish on reclaimed sites. However, post-reclamation surveys will be conducted for undesirable invasive plants. If a breakout does occur, mechanical and/or chemical treatments will be applied.

Primary brood-rearing habitat in the Alton valley is associated with alfalfa fields near the town of Alton. Birds likely utilize these areas due to the availability of forbs, insects, and water. To reduce the dependency of the birds on these areas, areas that are currently pasture lands will be returned to sagebrush/grass/forb communities. Seed mixtures for final reclamation have been created with this goal in mind.

Seeding and planting will occur in the fall season following the growing season and into dormancy, or in the spring if timing and conditions appear more favorable. During the following growing season, vegetation sampling will be conducted to monitor reclamation success. Measurements will be continued each year until the reclamation goals have been achieved. Additional seeding can be applied during subsequent years if the minimum standards of acceptance have not been achieved. Juniper seedlings found in reclaimed areas will be removed.

Monitoring Plan

Reclaimed sites will be monitored to assess restoration success and plant establishment to determine if problem areas exist. Qualitative and quantitative data will be recorded at regular intervals. The qualitative data will include: site location, sample date, observers, slope, exposure, acreage, animal disturbance, erosion damage, dominant plant species observed, and other pertinent notes. Quantitative data recorded will include: total cover (living cover, rock, litter, bare ground), cover by species, composition, frequency, and woody species density.

Methods for quantitative monitoring will be as follows. Transect lines will be placed randomly on each of the revegetation sites. Random sample locations will then be placed from these transect lines and the aforementioned data will be recorded. Ocular methods with square meter quadrat will be used to provide cover and frequency data, whereas, point quarter and/or belt transects will be used to estimate woody species densities.

Weed surveys will also be conducted on the reclaimed areas on a yearly basis or during the revegetation monitoring studies. If undesirable, exotic or "weedy" plant species are present at a density that they could impede revegetation or out-compete desirable plant species, a certified or trained specialist will spray herbicide, kill or remove the weeds mechanically (by shovel or other means).

Other Wildlife Enhancement Information

The active mine areas will usually be less than 120 acres. Once an active area is mined, reclamation will begin immediately by replacing overburden and topsoil. Seeding will then be implemented in the late-fall (or early spring if conditions are deemed favorable). In other words, reclaimed pits will be seeded with the final seed mixture less than one year following redistribution of overburden topsoil, and in many cases these activities will occur within months. If the seeding window is not appropriate following re-distribution of the soils, the area will be treated with a tackifier to control erosion by wind and water.

Sagebrush and Other Habitats

With the establishment of desirable plant species for sage-grouse in the sagebrush communities, sagebrush obligate species habitat will also be improved. Birds that depend on these communities include sage sparrows (*Oreoscoptes montanus*), sage thrasher (*Amphispiza belli*), and Brewer's sparrow (*Spizelis breweri*). Also, mule deer habitat will increase, especially with the establishment of antelope bitterbrush (*Purshia tridentata*) and other palatable browse species that have been added to the seed mixtures. Grassland

development will also increase forage for elk (*Cervus canadensis*). Other species such as snowberry (*Symphoricarpos oreophilus*) and serviceberry (*Amelanchier utahensis*) have been included in final revegetation seed mixtures at the mine site and should prove beneficial for black bear (*Ursus americanus*).

The total number of acres of the sagebrush community that will be disturbed by the Coal Hollow Project is 139 acres. As mentioned, this acreage will be restored to sagebrush communities. Moreover, there will be 157 acres of pasture lands that were once sagebrush communities, but have been altered by past land management practices, will be returned to sagebrush. In summary, the Coal Hollow Project area **currently has 139 acres of sagebrush** communities, plus approximately 35 acres that will remain undisturbed by mining that are located in the Conservation Area. Following final reclamation, there will be nearly **300 acres that are returned to sagebrush**, the community so important of the sage-grouse and other wildlife species.

Wet Meadow Habitat

There are a variety of wildlife species that utilize the wet meadow habitat of the area. There is a total of 56 acres of this habitat in the permit area. About half, or 28 acres, of this habitat will be disturbed by mining operations. Additionally, 6 acres of this habitat will be left undisturbed and is located in the Conservation Area described above.

Because the water source and recharge area for the wet meadows will not be impacted by mining, and the same soils and overburden that was removed by mining activities will be replaced for the root zone (or approximately the top 4 ft) at the time of final reclamation, it is expected that the soil moisture necessary to restore and maintain this habitat will soon return to its present conditions. Additionally, the reclaimed areas will be seeded with the same species currently found in these meadows, some of which could be collected onsite. Also, these plant species are known to easily disperse and reestablish naturally if similar soils and hydrology have been restored.

340. RECLAMATION PLAN

341. REVEGETATION

This document contains the revegetation plan for final reclamation of all lands disturbed by coal mining and reclamation operations, except water areas and the surface of roads approved as part of the postmining land use, as required in R645-301-353 *through* R645-301-357. It also shows how the Coal Hollow Project will comply with the biological protection performance standards of the State Program.

341.100. Reclamation Timetable

A detailed schedule and timetable for the completion of each major step in the mine plan has been included in Chapter 5 of the MRP. Briefly, the mine will conduct operations in one area (segment) at a time. No more than 40 acres will be disturbed at one time for mining. Once mined, the plan includes redistributing subsoil and topsoil followed by seeding this segment with the final seed mix contemporaneously, or at the same time the mining of the next segment begins. However, seeding will be accomplished only in appropriate periods (usually late-fall, but early-spring could also be an option). The mine plan has been engineered to disturb the smallest practicable area at any one time. With prompt establishment and maintenance of vegetation, immediate stabilization of disturbed areas will minimize surface erosion. Details of the plan has been included in Chapter 5 of this document.

341.200. Reclamation Description

The Coal Hollow Project will be reclaimed and revegetated to meet the appropriate postmining land use. Most areas will be reclaimed to the native plant communities that existed prior to mining conditions. Other areas will be reclaimed to enhance habitat for sage-grouse or other wildlife species. Finally, in those areas where the landowner requests a change in the plant community to increase productivity for domestic livestock, they will be reclaimed accordingly.

341.210. Seed Mixtures

Revegetation seed mixtures for each plant community disturbed by mining activities in the Coal Hollow Project area are given in this section. Table 3-36 shows the plant communities that may eventually be disturbed by mining operations at the Coal Hollow Project area.

Table 3-36: Vegetation Communities of the Coal Hollow Permit Area Proposed for Disturbance	
MAP SYMBOL <i>(see Vegetation Map, Drawing 3-1)</i>	PLANT COMMUNITY
S/G	Sagebrush/Grass
P	Pasture Land
P-J	Pinyon-Juniper
M	Meadow
OB	Oak brush
RB/SB	Rabbitbrush/Sagebrush

Seed mixtures for each disturbance type are shown on Tables 3-37 through 3-42. These rates have been based on drill seeding methods described in this document. When broadcast seeding is employed these rates will be doubled.

Table 3-37: Revegetation Seed Mixture for the Sagebrush/Grass Community at the Coal Hollow Project

	Rate** (# PLS/Ac)	Seeds/ft ²
SHRUBS		
<i>Artemisia nova</i> *	0.20	4.16
<i>Artemisia tridentata</i> *	0.10	5.74
<i>Ceratoides lanata</i>	3.00	3.79
<i>Purshia tridentata</i>	15.00	5.17
<i>Symphoricarpos oreophilus</i>	3.00	5.17
FORBS***		
<i>Achillea millefolium</i>	0.03	1.91
<i>Hedysarum boreale</i>	5.00	3.86
<i>Linum lewisii</i>	0.70	4.47
<i>Lupinus argenteus</i>	15.00	4.30
<i>Penstemon palmeri</i>	0.30	4.20
<i>Sphaeralcea grossulariifolia</i>	0.40	4.59
<i>Viguiera multiflora</i>	0.20	4.84
GRASSES		
<i>Elymus smithii</i>	1.50	4.34
<i>Elymus trachycaulus</i>	1.50	5.51
<i>Poa pratensis</i>	0.10	5.00
<i>Poa secunda</i>	0.20	4.25
<i>Stipa hymenoides</i>	1.00	4.32
TOTALS	47.23	75.60

* This species could also to be planted by containerized seedlings at a rate of 200 plants per acre to enhance sage-grouse habitat.

** Based on drill seeding methods. The number reflects the pounds of pure live seed (PLS) per acre.

*** Seeds used may be based on commercial availability. Other forb species that would be beneficial for sage-grouse enhancement include: *Achillea millefolium*, *Agoseris glauca*, *Crepis acuminata*, *Gayophytum spp.*, *Lomatium spp.*, *Tragopogon dubius*, *Trifolium spp.*

Table 3-38: Revegetation Seed Mixture for the Pasture Lands at the Coal Hollow Project

(Final determination to be made by landowners)	Rate* (# PLS/Ac)	Seeds/ft ²
SHRUBS		
FORBS**		
<i>Achillea millefolium</i>	0.04	2.54
<i>Astragalus cicer</i>	1.50	4.99
<i>Hedysarum boreale</i>	6.00	4.63
<i>Linum lewisii</i>	1.00	6.38
<i>Medicago sativa</i>	1.00	4.82
GRASSES		
<i>Bromus inermis</i>	1.00	2.87
<i>Dactylis glomeratus</i>	0.20	3.00
<i>Elymus smithii</i>	1.50	4.34
<i>Elymus lanceolatus</i>	1.50	5.30
<i>Elymus junceus</i>	1.00	4.02
<i>Elymus hispidus</i>	2.00	4.27
<i>Phleum pratensis</i>	0.20	5.97
<i>Poa pratensis</i>	0.10	5.00
TOTALS	17.04	58.14

* Based on drill seeding methods. The number reflects the pounds of pure live seed (PLS) per acre.

** Seeds used may be based on commercial availability. Other forb species that would be beneficial for sage-grouse enhancement include:
Achillea millefolium, *Agoseris glauca*, *Crepis acuminata*, *Gayophytum spp.*, *Lomatium spp.*, *Traopogon dubius*, *Trifolium spp.*

Table 3-39: Revegetation Seed Mixture for the Pinyon-Juniper Community at the Coal Hollow Project

	Rate* (# PLS/Ac)	Seeds/ft ²
SHRUBS		
<i>Amelanchier utahensis</i>	5.00	2.96
<i>Artemisia nova</i>	0.20	4.16
<i>Artemisia tridentata vaseyana</i>	0.07	4.02
<i>Ceratoides lanata</i>	3.00	3.79
<i>Purshia tridentata</i>	12.00	4.13
<i>Symphoricarpos oreophilus</i>	2.50	4.30
FORBS		
<i>Artemisia ludoviciana</i>	0.04	4.13
<i>Eriogonum umbellatum</i>	1.00	4.80
<i>Hedysarum boreale</i>	5.00	3.86
<i>Lupinus argenteus</i>	15.00	4.30
<i>Sphaeralcea coccinea</i>	0.50	5.74
<i>Viguiera multiflora</i>	0.20	4.84
GRASSES		
<i>Elymus spicatus</i>	1.00	3.21
<i>Elymus smithii</i>	1.50	4.34
<i>Elymus trachycaulus</i>	1.50	5.51
<i>Poa pratensis</i>	0.10	5.00
<i>Poa secunda</i>	0.20	4.25
<i>Stipa hymenoides</i>	1.00	4.32
TOTALS	49.81	77.67

* Based on drill seeding methods.
The number reflects the pounds of
pure live seed (PLS) per acre.

Table 3-40: Revegetation Seed Mixture for the Meadow Community at the Coal Hollow Project

	Rate* (# PLS/Ac)	Seeds/ft ²
SHRUBS		
FORBS**		
<i>Iris missouriensis</i>	15.00	7.23
<i>Achillea millefolium</i>	0.10	6.36
GRASSES (or Grass-likes)		
<i>Carex microptera</i>	0.40	7.78
<i>Carex nebrascensis</i>	0.50	6.13
<i>Elymus trachycaulus</i>	2.00	7.35
<i>Phleum pratensis</i>	0.20	5.97
<i>Poa pratensis</i>	0.10	5.00
<i>Poa secunda</i>	0.30	6.37
<i>Scirpus americanus.</i>	2.00	8.26
<i>Sporobolus airoides</i>	0.20	8.03
TOTALS	20.80	68.47

* Based on drill seeding methods.
The number reflects the pounds of pure live seed (PLS) per acre.

** Seeds used may be based on commercial availability. Other forb species that would be beneficial for sage-grouse enhancement include:
Achillea millefolium, Agoseris glauca, Crepis acuminata, Gayophytum spp., Lomatium spp., Tragopogon dubius, Trifolium spp.

Table 3-41: Revegetation Seed Mixture for the Oak Brush Community at the Coal Hollow Project

	Rate* (# PLS/Ac)	Seeds/ft ²
SHRUBS		
<i>Amelanchier utahensis</i>	10.00	5.92
<i>Artemisia nova</i>	0.20	4.16
<i>Artemisia tridentata</i> var. <i>vaseyana</i>	0.07	4.02
<i>Cercocarpus montanus</i>	3.00	4.06
<i>Purshia tridentata</i>	12.00	4.13
<i>Symphoricarpos oreophilus</i>	3.00	5.17
<i>Ephedra viridis</i>	8.00	4.59
FORBS		
<i>Artemisia ludoviciana</i>	0.04	4.13
<i>Sphaeralcea coccinea</i>	0.40	4.59
<i>Vicia americana</i>	12.00	5.51
<i>Viguiera multiflora</i>	0.20	4.84
GRASSES		
<i>Bromus carinatus</i>	2.00	4.59
<i>Elymus spicatus</i>	1.50	4.82
<i>Elymus trachycaulus</i>	1.50	5.51
<i>Poa pratensis</i>	0.10	5.00
<i>Poa secunda</i>	0.20	4.25
<i>Stipa hymenoides</i>	1.00	4.32
TOTALS	55.21	79.62

* Based on drill seeding methods. The number reflects the pounds of pure live seed (PLS) per acre.

Table 3-42: Revegetation Seed Mixture for the Rabbitbrush/Sagebrush Community (*disturbed Sagebrush/Grass Community*) at the Coal Hollow Project

	Rate** (# PLS/Ac)	Seeds/ft ²
SHRUBS		
<i>Artemisia nova</i> *	0.20	4.16
<i>Artemisia tridentata</i> *	0.10	5.74
<i>Ceratoides lanata</i>	3.00	3.79
<i>Purshia tridentata</i>	15.00	5.17
<i>Symphoricarpos oreophilus</i>	3.00	5.17
FORBS***		
<i>Achillea millefolium</i>	0.03	1.91
<i>Hedysarum boreale</i>	5.00	3.86
<i>Linum lewisii</i>	0.70	4.47
<i>Lupinus argenteus</i>	15.00	4.30
<i>Penstemon palmeri</i>	0.30	4.20
<i>Sphaeralcea grossulariifolia</i>	0.40	4.59
<i>Viguiera multiflora</i>	0.20	4.84
GRASSES		
<i>Elymus smithii</i>	1.50	4.34
<i>Elymus trachycaulus</i>	1.50	5.51
<i>Poa pratensis</i>	0.10	5.00
<i>Poa secunda</i>	0.20	4.25
<i>Stipa hymenoides</i>	1.00	4.32
TOTALS	47.23	75.60

* This species could also to be planted by containerized seedlings at a rate of 200 plants per acre to enhance sage-grouse habitat.

** Based on drill seeding methods. The number reflects the pounds of pure live seed (PLS) per acre.

*** Seeds used may be based on commercial availability. Other forb species that would be beneficial for sage-grouse enhancement include: *Achillea millefolium*, *Agoseris glauca*, *Crepis acuminata*, *Gayophytum spp.*, *Lomatium spp.*, *Trigonopogon dubius*, *Trifolium spp.*

Seedbed Preparation & Analyses

The final seedbed of the reclaimed areas will be prepared by first replacing the subsoil and topsoil in the same order it existed prior to removal by the mining activities. Next, a basic topsoil (top 8 inches of reclamation profile) sampling regime will be implemented prior to seeding that should identify fertility problems and will provide a basis for determining necessary soil amendments. The parameters analyzed will be:

- Available phosphorus (P)
- Soluble Potassium (K)
- Nitrate-Nitrogen

One composite sample will be collected from approximately every 2 to 5 acres based on soil types and variability. Each composite will be comprised of at least 4 su-samples.

Pre-testing of the soils has been conducted as part of the soils survey. Results from the pre-testing of topsoil and subsoil can be viewed in Table C-1 of Appendix 2-1 (native topsoil and subsoil) and Table C-2 (samples from core hole/overburden pits) of Appendix 2-1.

If heavy equipment operation results in excessive soil compaction at the surface of the reclaimed areas, they will then be ripped, disked, and harrowed to loosen the seedbed prior to seeding. Excessive compaction that could impact seeding success will be determined by observation and judgment of an environmental professional. In other areas where less compaction has occurred, the areas will be disked and harrowed. The disking and harrowing of all areas will be done parallel with the contour wherever possible to decrease the potential for water erosion downslope. In other areas where compaction is not a problem, dozer tracking can be used to roughen the surface, and to trap seed, fertilizer, mulch, and other amendments as well as decrease erosion by wind and water. In such cases, seeding will be done immediately after this treatment, whereas soil amendments, where required, would be applied over the surface during seedbed preparations. Seeding will mainly occur in the early spring and late fall.

Seeding & Transplanting

Seeding will be accomplished using different methods depending on the area to be seeded. In the more flat areas such as the meadows and existing pasture lands, a typical farmland drill will be used for seeding. In other areas where the surface may be more rough, a modified rangeland drill or "rough terrain seeder" will be used. Finally, in the areas where access is more difficult to reach by heavy equipment due to slope steepness or other limiting factors, broadcast seeding or hydro-seeding will be employed. For a list of plant species to be seeded refer to Tables 3-37 *through* 3-42.

Containerized plants will be planted in those areas proposed for sage-grouse habitat enhancement. These plants will be planted from containers at least 10 cubic inches in size and inoculated with appropriate site-specific or commercial mycorrhizal inocula at specified infection rates. The containerized plants will be planted at a rate that totals at least 400 individuals per acre. For a list of the species to be planted, refer to Table 3-37.

Containerized plants should be dormant when they arrive at the site in the spring or fall and will be planted as soon after delivery as possible. Plants will be planted in a fashion to simulate a natural habitat. If competing vegetation is present at the time of planting, this vegetation will be removed by scalping the area or herbicide application beforehand that provide a time period ample as to not affect the containerized seedling. A small depression will be created in the seedbed around the seedling at the time of planting to increase survivability by harvesting and holding water. The plants will be "watered-in" when they are planted by adding water to the depression. If possible, the plants will be watered during dry periods for the first growing season.

341.230. Mulching Techniques

Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished. Mulching will occur by one of the following methods:

- Certified noxious weed free straw applied at a rate of 1 ton/acre anchored by crimping or a chemical binder.
- Wood fiber hydromulch at a rate of $\frac{3}{4}$ ton per acre for slopes flatter than 3:1 and 1 ton per acre for slopes at 3:1 which is the steepest slope planned at the project. This hydromulch would be anchored with a chemical binder at the manufacturer's suggested rate.

The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Since there is only one post mining land use, mulching will follow one of the above described methods for all reclaim areas.

341.240. Irrigation

Irrigation has not been planned for the reclaimed area with the exception of watering the containerized plants as mentioned above.

341.250. Revegetation Monitoring

Vegetation of the reclaimed areas will be monitored regularly to measure the success of plant establishment and to determine if problem areas exist. Qualitative and quantitative data will be recorded at regular intervals. The qualitative data will include: site location, sample date, observers, slope, exposure, acreage, animal disturbance, erosion damage, dominant plant species observed, and other pertinent notes. Quantitative data recorded will include: total cover (living cover, rock, litter, bare ground), cover by species, composition, frequency, and woody species density.

Methods for quantitative monitoring will be as follows. Transect lines will be placed randomly on each of the revegetation sites. Random sample locations will then be placed from these transect lines and the aforementioned data will be recorded. Ocular methods with square meter quadrat will be used to provide cover and frequency data, whereas, point quarter and/or belt transects will be used to estimate woody species densities.

Weed control through chemical means will follow the current Weed Control Handbook (published annually or biannually by the Utah State University Cooperative Extension Service) and herbicide labels.

Weed surveys will also be conducted on the reclaimed areas on a yearly basis or during the revegetation monitoring studies. If undesirable, exotic or "weedy" plant species are present at a density that they could impede revegetation or out-compete desirable plant species, a certified or trained specialist will spray herbicide, kill or remove the weeds mechanically (roguing, grubbing and mowing).

341.300. Mining, Reclamation & Revegetation Research

Mining, reclamation & revegetation research has been planned and is in the process of being submitted to DOGM. Additionally, DOGM may require greenhouse studies, field trials, or equivalent methods of testing proposed or potential revegetation materials and methods to demonstrate that revegetation is feasible pursuant to R645-300-133.710.

342. FISH AND WILDLIFE ENHANCEMENT

This application includes a fish and wildlife plan for the reclamation and postmining phase of the operation consistent with R645-301-330, the performance standards of R645-301-358 and include the following (for details see section 330, OPERATION PLAN).

342.100. Measures for Enhancement of Habitat

Enhancement measures that will be used during the reclamation and postmining phase of the operation to develop aquatic and terrestrial habitat. Such measures may include restoration of streams and other wetlands, retention of ponds and impoundments, establishment of vegetation for wildlife food and cover, and the replacement of perches and nest boxes (see also section 330, OPERATION PLAN).

342.200. Reclamation Plants for Enhancement

Where fish and wildlife habitat is to be a postmining land use, the plant species to be used on reclaimed areas have been selected on the basis of the criteria described below.

342.210. Nutritional Values of Plant Species

Among other qualities (e.g. erosion control qualities, establishment capabilities, and seed availability), plant species for revegetation of the Coal Hollow Project have been chosen for their proven nutritional value for wildlife (see Table 3-37 through 3-42).

342.220. Cover Quality of Plant Species

Among other qualities (e.g. erosion control qualities, establishment capabilities, and seed availability), plant species for revegetation of the Coal Hollow Project have been chosen for their cover qualities for wildlife (see Table 3-37 through 3-42).

342.230. Habitat Enhancement & Plant Species

Among other qualities, plant species for revegetation of the Coal Hollow Project have been chosen for their proven habitat enhancement qualities for wildlife (see Table 3-37 through 3-42). The plants have also been chosen for their ability to support and enhance fish or wildlife habitat after the release of performance bonds. At final revegetation, the selected plants will be grouped and distributed in a manner which optimizes edge effect, cover, and other benefits to fish and wildlife.

After consultation with appropriate agencies and biologists regarding habitats and sensitive species, the sage-grouse and its habitat were of greatest concern in the area. There has been a decreasing trend in the populations of this species since 1964 (see **Appendix 3-1** and **Appendix 3-3** for more details). There was a general consensus among the biologists and agencies consulted that due to the: 1) marginal habitat in the Alton Amphitheater area, 2) loss of habitat in recent years for nesting and brood-rearing and 3) relatively low population numbers in the area, that the local population of sage-grouse is vulnerable to elimination, regardless of mining activities proposed by the Coal Hollow Project. Accordingly, the several measures to minimize impacts and enhance habitat for this species have been proposed and are subject to further consideration by the operator and regulatory agencies (see Section 333 above).

342.300. Cropland & Revegetation

Where cropland is to be the postmining land use, where appropriate for wildlife- and crop-management practices, and with approval from the private landowners, the Coal Hollow Project will intersperse the fields with trees, hedges, or fence rows throughout the harvested area to break up large blocks of monoculture and to diversify habitat types for birds and other animals.

342.400. Residential & Industrial Reclamation

Where residential, public service, or industrial uses are to be the postmining land use, and where consistent with the approved postmining land use, the Coal Hollow Project will intersperse reclaimed lands with greenbelts utilizing species of grass, shrubs, and trees useful as food and cover for wildlife. No residential or industrial areas have been planned at this time.

350. PERFORMANCE STANDARDS

351. GENERAL REQUIREMENTS

All coal mining and reclamation operations will be carried out according to plans provided under R645-301-330 *through* R645-301-340.

352. CONTEMPORANEOUS RECLAMATION

Revegetation on all land that is disturbed by coal mining and reclamation operations, will occur as contemporaneously as practicable with mining operations, except when such mining operations are conducted in accordance with a variance for combined Surface and Underground Coal Mining and Reclamation Activities issued under R645-302-280. DOGM may establish schedules that define contemporaneous reclamation.

353. REVEGETATION: GENERAL REQUIREMENTS

Operators of the Coal Hollow Project will establish on re-graded areas and on all other disturbed areas, except water areas and surface areas of roads that are approved as part of the postmining land use, a vegetative cover that is in accordance with the mine permit and reclamation plan.

353.100. Vegetative Plant Cover Qualities

353.110. Diverse, Effective, & Permanent

The vegetation cover established at final reclamation will be diverse, effective and permanent.

353.120. Native Plant Species

The cover will be comprised of species native to the area, or of introduced species where desirable and necessary to achieve the approved postmining land use and approved by the DOGM (see Table 3-37 *through* 3-42).

353.130. Final Vegetation Cover & Quantities

The final cover will be at least equal in extent of cover to the natural vegetation of the area, or those standards set for final revegetation success.

353.140. Vegetation Cover and Soil Stabilization

The cover will be capable of stabilizing the soil surface from erosion.

353.200. The reestablished plant species will also contain the qualities listed below.

353.210. (a) Be compatible with the approved postmining land use.

353.220. (b) Have the same seasonal characteristics of growth as the original vegetation.

353.230. (c) Be capable of self-regeneration and plant succession.

353.240. (d) Be compatible with the plant and animal species of the area.

353.250. (e) Meet the requirements of applicable Utah and federal seed, poisonous and noxious plant; and introduced species laws or regulations.

353.300. Vegetative Cover Exceptions

DOG M may grant exception to the requirements of R645-301-353.220 and R645-301-353.230 when the species are necessary to achieve a quick-growing, temporary, stabilizing cover, and measures to establish permanent vegetation are included in the approved permit and reclamation plan.

353.400. Cropland Exceptions

When the approved postmining land use is cropland, DOGM may grant exceptions to the requirements of R645-301-353.110, R645-301-353.130, R645-301-353.220 and R645-301-353.230.

354. TIMING OF REVEGETATION

Disturbed areas will be planted during the first normal period for favorable planting conditions after replacement of the plant-growth medium. The normal period for favorable planting is that planting time generally accepted locally for the type of plant materials selected (see section 341.100, Reclamation Timetable).

**355. MULCHING & OTHER SOIL STABILIZING PRACTICES
FOR REVEGETATION**

Suitable mulch and other soil stabilizing practices will be used on all areas that have been re-graded and covered by topsoil or topsoil substitutes (see section 340, RECLAMATION PLAN).

356. STANDARDS FOR REVEGETATION SUCCESS

356.100. Success Criteria

Success of revegetation will be judged on the effectiveness of the vegetation for the approved postmining land use, the extent of cover compared to the extent of cover of the reference area or other approved success standard, and the general requirements of R645-301-353.

356.110. Vegetation Information Guidelines

Standards for success, statistically valid sampling techniques for measuring success, and approved methods are identified in the DOGM's "Vegetation Information Guidelines, Appendix A." The approved techniques in that document will be used for the Coal Hollow Project.

As stated above, the reclaimed plant communities at the site will be diverse, permanent, capable of stabilizing the soil surface for erosion, and will be compatible with the postmining land use. The reclaimed areas will be compared to the reference areas. Methods to be employed to determine that the standards have been met follow:

Cover	Ocular methods by meter square quadrats.
Shrub Density	Point quarter method and/or belt transects
Frequency	Relative number of times that it occurred in the square meter quadrats.
Production	Total annual biomass production will be estimated by clipping, drying and weighing current annual growth. Herbaceous and woody species will be summarized separately. "Double sampling" using four quadrats will be estimated around the clipped plots.
Diversity	Diversity will be measured by several methods. The average number of vascular species per meter square quadrat will be obtained by summing the frequency of all species in an area and dividing by 100.

Another diversity measurement will be species richness or simply the total number of species encountered in the quadrats for each area.

Finally, total diversity will be measured by using the MacArthur and Wilson's (1967) formula where the proportion of the sum frequency of each species of an area was calculated. The proportion of each species will be squared and the values for all species in the area are to be summed. This index integrates the number of species encountered and the degree to which frequency of occurrence is equitably distributed among those species. The formula is given below:

$$\text{Total Diversity} = \frac{1}{\sum P_i^2}$$

where,

P_i = the proportion of the sum frequency for a community contributed by the i^{th} species.

356.120. Revegetation Success Standards

Standards for revegetation success will include comparisons of unmined lands (reference areas) with the areas being reclaimed to evaluate the appropriate vegetation parameters of ground cover, production, or stocking. Ground cover, production, or stocking will be considered equal to the approved success standard when they are not less than 90 percent of the success standard. The sampling techniques for measuring success will use a 90-percent statistical confidence interval (i.e., one-sided test with a 0.10 alpha error).

356.200. Postmining Land Use

Standards for success will be applied in accordance with the approved postmining land uses (see Chapter 4).

356.210. Grazing or Pasture Land

Some areas will be reclaimed as pasture and grazing land (see *Vegetation Map, Drawing 3-1*). For these and other areas determined by the landowners, the ground cover and production of living plants on the revegetated area will be at least equal to that of a reference area or other success standards approved by DOGM.

356.220. Cropland

For areas developed for use as cropland, crop production on the revegetated area will be at least equal to that of a reference area or such other success standards approved by DOGM. The requirements of R645-302-310 through R645-302-317 apply to areas identified as prime farmland (*no areas have been identified as prime farmland in the Coal Hollow Project Area*).

356.230. Wildlife Habitat

Several areas will be returned to wildlife habitat. For these areas success of vegetation will be determined on the basis of tree and shrub stocking and vegetative ground cover (see also section 356.100, Success Criteria).

356.231. Consultation & Approval

Minimum stocking and planting arrangements will be specified by DOGM on the basis of local and regional conditions and after consultation with and approval by Utah agencies responsible for the administration of forestry and wildlife programs. Consultation and approval will be on a permit specific basis.

356.232. Woody Species Success Criteria

Trees and shrubs that will be used in determining the success of stocking and the adequacy of plant arrangement will have utility for the approved postmining land use. At the time of bond release, such trees and shrubs will be healthy, and at least 80 percent will have been in place for at least 60 percent of the applicable minimum period of responsibility. No trees and shrubs in place for less than two growing seasons will be counted in determining stocking adequacy.

356.233. General Vegetative Cover

Vegetative ground cover will not be less than that required to achieve the approved postmining land use.

356.240. Industrial, Commercial or Residential Success Criteria

For areas to be developed for industrial, commercial, or residential use less than two years after regrading is completed, the vegetative ground cover will not be less than that required to control erosion. At this time, no areas have been proposed to be reclaimed as industrial, commercial or residential for the Coal Hollow Project.

356.250. Previous Disturbed Areas Success Criteria

For areas previously disturbed by mining that were not reclaimed to the requirements of R645-200 through R645-203 and R645-301 through R645-302 and that are re-mined or otherwise redisturbed by coal mining and reclamation operations, at a minimum, the vegetative ground cover will be not less than the ground cover existing before redisturbance and will be adequate to control erosion. Other than those lands where the native plant communities have been disturbed for rangeland improvements or pasture lands, no areas would be considered "previously disturbed" in the project area.

356.300. Sediment Control Structures

Siltation structures will be maintained until removal is authorized by the DOGM and the disturbed area has been stabilized and revegetated. In no case will the structure be removed sooner than two years after the last augmented seeding.

356.400. Removal of Sediment Control Structures

When a siltation structure is removed, the land on which the siltation structure was located will be revegetated in accordance with the reclamation plan and R645-301-353 *through* R645-301-357.

357. REVEGETATION RESPONSIBILITY PERIODS

357.100. Beginning Date

The period of extended responsibility for successful vegetation will begin after the last year of augmented seeding, fertilization, irrigation, or other work, excluding husbandry practices that are approved by DOGM in accordance with paragraph R645-301-357.300.

357.200. Duration

Vegetation parameters identified in R645-301-356.200 will equal or exceed the approved success standard during the growing seasons for the last two years of the responsibility period. The period of extended responsibility will continue for five or ten years based on precipitation data reported pursuant to R645-301-724.411 based on the following conditions.

- 357.210. (a). In areas of more than 26.0 inches average annual precipitation, the period of responsibility will continue for a period of not less than five full years.
- 357.220. (b). In areas of 26.0 inches or less average annual precipitation, the period of responsibility will continue for a period of not less than ten full years.

357.300. Husbandry Practices

357.301. Approval Information

DOGM may approve certain selective husbandry practices without lengthening the extended responsibility period. Practices that may be approved are identified in R645-301-357.310 *through* R645-301-357.365. The operator may propose to use additional practices, but they would need to be approved as part of the Utah Program in accordance with 30 CFR 732.17. Any practices used will first be incorporated into the mining and reclamation plan and approved in writing by DOGM. Approved practices are normal conservation practices for unmined lands within the region which have land uses similar to the approved postmining land use of the disturbed area. Approved practices may continue as part of the postmining land use, but discontinuance of the practices after the end of the bond liability period will not jeopardize permanent revegetation success. Augmented seeding, fertilization, or irrigation will not be approved without extending the period of responsibility for revegetation success and bond liability for the areas affected by said activities and in accordance with R645-301-820.330.

357.302. Demonstration of Appropriate Reclamation Techniques

The Coal Hollow Project will demonstrate that husbandry practices proposed for a reclaimed area are not necessitated by inadequate grading practices, adverse soil conditions, or poor reclamation procedures.

357.303. Bonded Area & Husbandry Practices

DOGM will consider the entire area that is bonded within the same increment, as defined in R645-301-820.110, when calculating the extent of area that may be treated by husbandry practices.

357.304. Separate Responsibility Periods

If it is necessary to seed or plant in excess of the limits set forth under R645-301-357.300, DOGM may allow a separate extended responsibility period for these reseeded or replanted areas in accordance with R645-301-820.330.

357.310. Reestablishing Trees and Shrubs

357.311. Planting Within the Responsibility Period

Trees or shrubs may be replanted or reseeded at a rate of up to a cumulative total of 20% of the required stocking rate through 40% of the extended responsibility period.

357.312. Planting Shrubs in Established Vegetation

If shrubs are to be established by seed in areas of established vegetation, small areas will be scalped (see section 341.220, Planting & Seeding Methods). The number of shrubs to be counted toward the tree and shrub density standard for success from each scalped area will be limited to one.

357.320. Weed Control and Associated Revegetation

Weed control through chemical, mechanical, and biological means discussed in R645-301-357.321 through R645-301-357.323 may be conducted through the entire extended responsibility period for noxious weeds and through the first 20% of the responsibility period for other weeds.

Any revegetation necessitated by the following weed control methods will be performed according to the seeding and transplanting parameters set forth in R645-301-357.324.

357.321. Chemical Weed Control

Weed control through chemical means will follow the current Weed Control Handbook (published annually or biannually by the Utah State University Cooperative Extension Service) and herbicide labels.

Weed surveys will also be conducted on the reclaimed areas on a yearly basis or during the revegetation monitoring studies. If undesirable, exotic or "weedy" plant species are present at a density that they could impede revegetation or out-compete desirable plant species, a certified or trained specialist will spray herbicide, kill or remove the weeds mechanically (see below).

357.322. Mechanical Weed Control

Mechanical practices that may be approved include hand roguing, grubbing and mowing.

357.323. Biological Weed Control

Selective grazing by domestic livestock may be used by the Coal Hollow Project. Biological control of weeds through disease, insects, or other biological weed control agents is allowed but will be approved on a case-by-case basis by DOGM, and other appropriate agency or agencies which have the authority to regulate the introduction and/or use of biological control agents.

357.324. Weed Control & Desirable Species Damage

Where weed control practices damage desirable vegetation, areas treated to control weeds may be reseeded or replanted according to the following limitations. Up to a cumulative total of 15% of a reclaimed area may be reseeded or replanted during the first 20% of the extended responsibility period without restarting the responsibility period. After the first 20% of the responsibility period, no more than 3% of the reclaimed area may be reseeded in any single year without restarting the responsibility period, and no continuous reseeded area may be larger than one acre. Furthermore, no seeding will be done after the first 60% of the responsibility period or Phase II bond release, whichever comes first. Any seeding outside these parameters will be considered to be "augmentative seeding," and will restart the extended responsibility period.

357.330. Control of Other Pests

357.331. Big Game

Control of big game (deer, elk, moose, antelope) may be used only during the first 60% of the extended responsibility period or until Phase II bond release, whichever comes first. Any methods used will first be approved by DOGM and, as appropriate, the land management agency and the State of Utah Division of Wildlife Resources (DWR). Methods that may be used include fencing and other barriers, repellents, scaring, shooting, and trapping and relocation. Trapping and special hunts or shooting will be approved by DWR. Other control techniques may be allowed but will be considered on a case-by-case basis by the DOGM and by DWR. Appendix C of the DOGM's "Vegetation Information Guidelines" includes a non-exhaustive list of publications containing big game control methods.

357.332. Small Mammal & Insects

Control of small mammals and insects will be approved on a case-by-case basis by DWR and/or the Utah Department of Agriculture. The recommendations of these agencies will also be approved by the appropriate land management agency or agencies. Small mammal control will be allowed only during the first 60% of the extended responsibility period or until Phase II bond release, whichever comes first. Insect control will be allowed through the entire extended responsibility period if it is determined, through consultation with the Utah Department of Agriculture or Cooperative Extension Service, that a specific practice is being performed on adjacent unmined lands.

357.340. Natural Disasters and Illegal Activities Occurring After Phase II Bond Release

Where necessitated by a natural disaster, excluding climatic variation, or illegal activities, such as vandalism, not caused by any lack of planning, design, or implementation of the mining and reclamation plan on the part of the Coal Hollow Project, the seeding and planting of the entire area which is significantly affected by the disaster or illegal activities will be allowed as an accepted husbandry practice and thus will not restart the extended responsibility period. Appendix C of the Division's "Vegetation Information Guidelines" references publications that show methods used to revegetate damaged land. Examples of natural disasters that may necessitate reseeding which will not restart the extended responsibility period include wildfires, earthquakes, and mass movements originating outside the disturbed area.

357.341. Extent of Area

The extent of the area where seeding and planting will be allowed will be determined by the DOGM in cooperation with the Coal Hollow Project.

357.342. Standards of Success

All applicable revegetation success standards will be achieved on areas reseeded following a disaster, including R645-301-356.232 for areas with a designated postmining land use of forestry or wildlife.

357.343. Seeding & Planting in Phase II Areas

Seeding and planting after natural disasters or illegal activities will only be allowed in areas where Phase II bond release has been granted.

357.350. Irrigation

The irrigation of transplanted trees and shrubs, but not of general areas, is allowed by DOGM through the first 20% of the extended responsibility period. Irrigation may be by such methods as, but not limited to, drip irrigation, hand watering, or sprinkling.

357.360. Highly Erodible Area and Rill and Gully Repair

The repair of highly erodible areas and rills and gullies will not be considered an augmentative practice, and will thus not restart the extended responsibility period, if the affected area as defined in R645-301-357.363 comprises no more than 15% of the disturbed area for the first 20% of the extended responsibility period and if no continuous area to be repaired is larger than one acre.

357.361. Highly Erodible Areas Responsibility Period

After the first 20% of the extended responsibility period but prior to the end of the first 60% of the responsibility period or until Phase II bond release, whichever comes first, highly erodible area and rill and gully repair will be considered augmentative, and will thus restart the responsibility period, if the area to be repaired is greater than 3% of the total disturbed area or if a continuous area is larger than one acre.

357.362. Extent of Area Affected

The extent of the affected area will be determined by the DOGM in cooperation with the Coal Hollow Project.

357.363. Definition of Highly Erodible Areas

The area affected by the repair of highly erodible areas and rills and gullies is defined as any area that is reseeded as a result of the repair. Also included in the affected areas are interspatial areas of thirty feet or less between repaired rills and gullies. Highly erodible areas are those areas which cannot usually be stabilized by ordinary conservation treatments and if left untreated can cause severe erosion or sediment damage.

357.364. Erodible Areas & Sediment Control

The repair and/or treatment of rills and gullies which result from a deficient surface water control or grading plan, as defined by the recurrence of rills and gullies, will be considered an augmentative practice and will thus restart the extended responsibility period.

357.365. Erodible Area Designs & Repairs

The Coal Hollow Project shall demonstrate by specific plans and designs the methods to be used for the treatment of highly erodible areas and rills and gullies. These will be based on a combination of treatments recommended in the Soil Conservation Service Critical Area Planting recommendations, literature recommendations including those found in Appendix C of the Division's "Vegetation Information Guidelines", and other successful practices used at other reclamation sites in the State of Utah. Any treatment practices used will be approved by the Division.

358. PROTECTION OF FISH, WILDLIFE AND RELATED ENVIRONMENTAL VALUES

The Coal Hollow Project will, to the extent possible using the best technology currently available, minimize disturbances and adverse impacts on fish, wildlife, and related environmental values and will achieve enhancement of such resources where practicable.

358.100. Threatened & Endangered Species

A review of the Utah Heritage Program database for sensitive species in the proposed mine site and adjacent areas has been accomplished. Field maps with locations of these species have been prepared and have been used for additional surveys and will continue to be used in future biological studies or when disturbance by mining in specific areas is proposed.

Due to the sensitivity of these species, specific location information is considered confidential and has not been submitted in this application. However, review of this information can be arranged by the regulatory authorities (see section 322.200, Site-Specific Resource Information).

No coal mining and reclamation operation will be conducted which is likely to jeopardize the continued existence of endangered or threatened species listed by the Secretary or which is likely to result in the destruction or adverse modification of designated critical habitats of such species in violation of the Endangered Species Act of 1973. The Coal Hollow Project will promptly report to the DOGM any state- or federally-listed endangered or threatened species within the permit area of which the operator becomes aware. Upon notification, DOGM will consult with appropriate state and federal fish and wildlife agencies and, after consultation, will identify whether, and under what conditions, the operator may proceed.

358.200. Eagles

The coal mining and reclamation operations at the Coal Hollow Project will not be conducted in a manner which would result in the unlawful taking of a bald or golden eagle, its nest, or any of its eggs. The operator of the Coal Hollow Project will promptly report to the DOGM any golden or bald eagle nest within the permit area of which the operator becomes aware. Upon notification, the DOGM will consult with the U.S. Fish and Wildlife Service (USFWS) and DWR and, after consultation, will identify whether, and under what conditions, the mining operations may proceed.

358.300. Removal of a Threatened & Endangered Species

No regulations in the R645 Rules authorizes the taking of an endangered or threatened species or a bald or golden eagle, its nest, or any of its eggs in violation of the Endangered Species Act of 1973 or the Bald Eagle Protection Act, as amended, 16 U.S.C. 668 et seq.

358.400. Riparian & Wetland Areas

There are some riparian and wetland areas associated with springs and seeps in the Coal Hollow permit area (see Chapter 7). At this time, the Coal Hollow Project plans to avoid disturbances to them, enhance them where practicable, and restore, or replace, wetlands and riparian vegetation along rivers and streams if disturbance to them it done.

Additionally, the coal mining and reclamation operations at the Coal Hollow Project will avoid disturbances to, enhance where practicable, or restore, habitats of unusually high value for fish and wildlife (see Section 333, Procedures to Minimize Adverse Impacts to Fish & Wildlife in this document).

358.500. Best Technology Available

The Coal Hollow Project will apply the best technology currently available in all disciplines of the coal mining and reclamation activities.

358.510. Powerline & Transmission Facilities

The Coal Hollow Project will ensure that electric powerlines and other transmission facilities used for, or incidental to, coal mining and reclamation operations on the permit area are designed and constructed to minimize electrocution hazards to raptors, except where DOGM determines that such requirements are unnecessary.

358.520. Fences & Conveyers

The Coal Hollow Project will design fences, overland conveyers, and other potential barriers to permit passage for large mammals, except where the DOGM determines that such requirements are unnecessary.

358.530. Toxic-Forming Areas

The Coal Hollow Project has no plans for ponds that contain hazardous concentrations of toxic-forming materials.

R645-301-321.322, Vegetation information pertaining to the county road realignment should be included in the application as adjacent area. [JH]

A new vegetation map has been prepared that shows the plant communities and wildlife habitats that the new road alignment will impact.

A reference to this map that includes verbiage about the plant communities impacted by the county road alignment has been prepared.

(Instructions to replace the map have already been provided; see new Drawing 3-1)

(Instructions to replace this page has already been provided; see new page 3-38)

R645-302-321.260, Plates 3 and 4 include color infrared aerial imagery taken in July of 2006 and November of 2007. Although the application states that the imagery was used extensively by the researchers in various disciplines, the application needs to include an analysis of the two plates to show late summer and fall differences between upland and valley floor vegetative growth. [JH. PB]

Color and infrared photographs were used extensively by researchers as a tool for formulating some of the conclusions in the AVF report (Appendix 7-7, p. 31) as related to vegetation, soils and hydrologic issues. Results and conclusions of these disciplines have also been included in separate reports and have been based on other environmental factors (e.g. field mapping, soil pits, water data, etc.) as well as the infrared imagery. This was shown and described in the field October 1-2, 2008 when the reports, maps and aerial photographs were reviewed by representatives from ACD and DOGM. As a result, this deficiency was resolved as noted in DOGMs Inspection Report (dated October 6, 2008).

(No changes were necessary. Refer to present MRP, Appendix 7-7, p. 31)

R645-301-321.323, The application needs to include Affected Area Boundary Maps. [JH]

“Affected Areas” are the areas shown on the disturbance map, Drawing 5-2

(No changes were necessary. Refer to present MRP, Drawing 5-2)

R645-301-333, The data obtained from comparing the leks and roost sites indicates that there are sites with enough similarity that could be used for breeding and roosting areas. The applicant needs to include a methodology for relocating the birds to these alternative sites in the Alton Sage-Grouse Habitat Assessment and Mitigation Plan. • Page 20, paragraph 1, The applicant needs to describe how the "Conservation Area will be enhanced for Sage-Grouse especially during the breeding season." • Page 20, paragraph 3, "Intact sagebrush sites will be cleared of all young Juniper trees", these areas need to be identified. • Page 20, paragraph 3, "Juniper woodlands surrounding intact stands can be cut back to increase patch size and the amount of area that has potential for nest site selection by hens," these areas need to be identified on a vegetation map and quantified in terms of acreages. • Page 21, paragraph 3, "Long term mine plans will remove hundreds of acres of juniper woodlands". The applicant needs to perhaps quantify this statement. How many acres per year will be removed for the development of Sage-Grouse habitat? Areas need to be listed in the application and delineated on a vegetation map. [JH]

(The deficiencies above have been addressed separately in the following pages)

ACD Response:

The applicant needs to include a methodology for relocating the birds to these alternative sites in the Alton Sage-Grouse Habitat Assessment and Mitigation Plan.

This deficiency has been addressed in the new Appendix 3.5, p. 12 of this submittal.

Appendix 3-5, "Alton Sage-Grouse Habitat and Mitigation Plan" should be added to the current MRP.

APPENDIX 3-5

ALTON SAGE-GROUSE HABITAT MITIGATION PLAN



December 2008

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INTRODUCTION

Alton, Utah is home to a greater sage-grouse (*Centrocercus urophasianus*) population that resides year-round within the Alton valley region. This population (sometimes called the Alton Sink Valley population) has persisted in this region for many generations in spite of significant habitat alterations and human-related impacts (e.g. farming, livestock, traffic). In addition to the resident bird population, shallow coal beds are present that can only be extracted using surface mining operations. Alton Coal Development, LLC (ACD) has developed a plan to remove these coal reserves while providing habitat conservation efforts and improvements that will enhance habitat conditions both during and post-mining activities.

The sage-grouse populations near Alton have been the subject of research over the past few years by biologists representing the Bureau of Land Management (BLM), Southern Utah University (SUU) and ACD. Frey et al. (2008) provided a local conservation plan for sage-grouse located in the Color County area in Southern Utah, of which the Alton population is part. Petersen (2006) described some of this research as well as provided a summary of some ecological factors, historical considerations, biological requirements and mitigation suggestions related to the sage-grouse population in the Alton area.

A follow-up report was prepared (Petersen 2007) as an update to the on-going research as well as habitat mitigation that has been conducted since 2006. In addition to reporting results of research and mitigation on the Alton sage-grouse population, information was also provided regarding another larger population (Heut's Ranch) located near the town of Hatch, Utah. Moreover, additional mitigation and habitat improvement ideas were proposed in that document.

Since that time, results from the current onsite sage-grouse research has been provided. Proposed mitigation and habitat restoration ideas have also been submitted for review by biologists from the State of Utah, Division of Oil, Gas & Mining (DOGM) and State of Utah, Division of Wildlife Resources (DWR). Finally, ACD's mine plan has been finalized as a permit application for the regulatory agencies, thus providing more details about how the land in the Alton area will be disturbed, mined and later reclaimed.

After consultations with biologists representing the regulatory agencies, land managers, academia and the coal mine operator, the primary goals for the Alton sage-grouse population includes:

- Minimize impacts to the birds from the mining activities.
- Enhance current sage-grouse habitat.
- Create a conservation area for the sage-grouse that will never be mined.
- Provide a corridor between north (Heut's Ranch) and south (Alton) populations to promote gene transfer and increase population numbers.
- Restored land disturbed by mining activities to enhance sage-grouse habitat.

The purpose of this report is to describe the habitat conservation and mitigation efforts that will be implemented to sustain the existing population and provide optimal habitat conditions after mining is complete. This plan includes 1) efforts to reestablish connectivity with a nearby sage-grouse population to facilitate migration and reestablishment, 2) reducing juniper trees in existing key habitats throughout the valley, 3) preserving a sage-grouse habitat "conservation area", 4) restoring sagebrush habitats after topsoil has been replaced using a suite of shrub, forb and grass species, 5) establishing forbs that provide critical forage for hens and chicks

during brood-rearing phases of their life cycle, and 6) to aid birds in shifting mating efforts from the original lek to alternative sites with comparable biotic and abiotic conditions.

PROPOSED MITIGATION AND MANAGEMENT PLAN

Reestablishing Connectivity Between Alton and Heut's Ranch

The Alton or Sink Valley sage-grouse population occurs at the southernmost extent of the range of the species. Historically, additional populations occurred further south toward the town of Kanab, Utah. However, these populations no longer exist in these areas, likely due to habitat loss and fragmentation (Connelly et al. 2004). In the Alton area, adequate sage-grouse nesting, brood rearing, and winter habitat are at low levels, limited by habitat alteration and fragmentation by juniper encroachment and juniper stand development. Other potential impacts include agricultural practices, urban development, and predation. Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*) invasion confines intact sagebrush stands throughout the valley limiting nest site and brood rearing habitat availability.

Habitat fragmentation between Heut's Ranch and Alton has likely disrupted migration and gene flow between these two populations. Greater connectivity can facilitate more rapid recovery of the bird population after the disturbance and increase resistance with greater genetic diversity in the population. Restoring connectivity can be accomplished by removing juniper trees between these two populations on both private and public land. An area that is approximately 1,700 acres has been delineated that, with treatment, could provide connectivity between the two populations (Figure 1). Funds will be provided to hire crews to cut and remove trees. It is anticipated that this habitat improvement will create access for birds to migrate between the two populations.

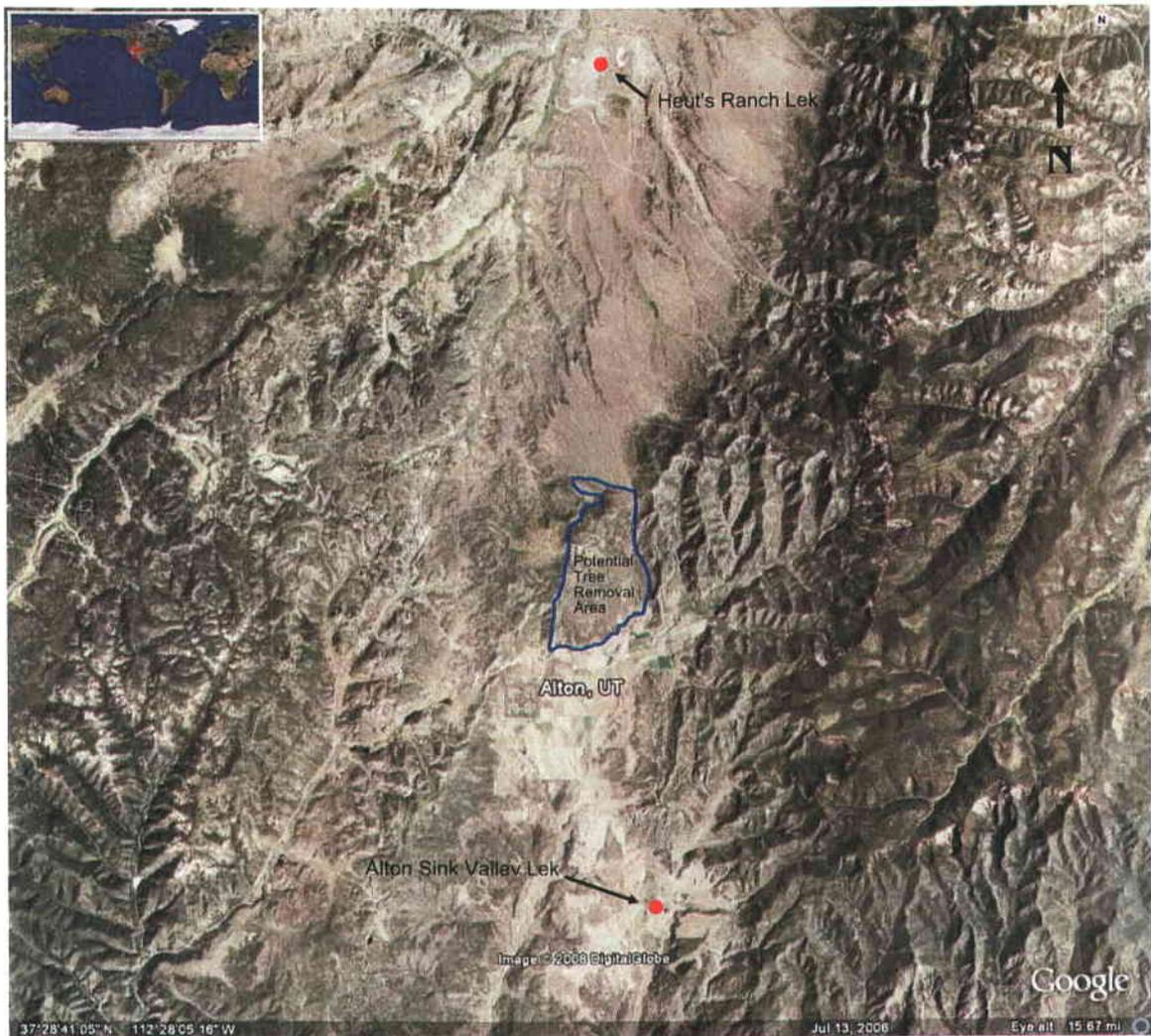


Figure 1. Potential Corridor Development Area

Reduction of Juniper Trees Within Key Habitat in the Alton Area

Research continues to emphasize the importance of intact sagebrush habitats in providing the resources sage-grouse require throughout their life cycle. This

includes the necessity of sagebrush (*Artemisia spp.*) as the primary source of cover, food, and breeding (Crawford et al. 2004, Connelly et al. 2004, Gregg et al. 1994). Connelly et al. (2004) suggest that productive sage-grouse nesting habitat includes sagebrush that has both horizontal and structural diversity with an understory dominated by native grasses and forbs which provide a food source of insects and forbs as well as concealment from predation (Connelly et al. 2000, Connelly et al. 2004). With an increase in juniper, sagebrush steppe communities rapidly decline (Miller et al. 2000, Connelly 2004). For example, in sites dominated by western juniper (*Juniperus occidentalis*), big sagebrush (*Artemisia tridentata*) cover can decline to less than 1% and the seasons of available succulent forbs is reduced with soil moisture depletion. Bates et al. (2000) found that 2 years following juniper removal, understory plant biomass was nearly nine times greater and perennial plant cover was three times greater than uncut juniper understory vegetation. These data suggest that juniper woodlands suppress and fragment understory and intercanopy plant communities, including sites dominated by big sagebrush.

In the Alton area, evidence of widespread juniper impacts on the sagebrush – grassland ecosystem can be observed. cursory assessments of sage-grouse habitat conditions within the valley indicated that the cover, density and biomass of living sagebrush and herbaceous plants occurring in the intercanopy of these juniper woodlands is lower than in open sagebrush stands (Figure 2). Data collected from radio-collared birds confirms that these birds do not rely on juniper encroached sites for nesting and brood rearing (Frey 2008).



Figure 2. Juniper and pinyon dominated plant communities located 50m west of the country road between Alton and Sink Valley.

Follow up quantitative sampling was conducted in the pinyon-juniper and sagebrush communities of the Alton area (Collins, 2007a; Collins, 2007b). When comparing reference areas of these two communities (reference areas are those areas chosen to represent future revegetation success standards), the total living understory cover of the sagebrush area was 60.50% compared to 27.50% for the pinyon-juniper community. Additionally, the sagebrush understory cover was comprised of 38.51% forbs and grasses as opposed to only 10.44% in the pinyon-juniper community. Finally, woody species density in the sagebrush community consisted of 8,331 individuals per acre, of which over 90% were sagebrush plants. In the pinyon-juniper community the woody species density was estimated at 4,215 individuals per acre, many of which were pinyon pine and Utah juniper trees.

Within the past few years, an attempt was made to improve sage-grouse habitat within the Alton region by removing juniper and pinyon pine trees using bullhogging technology. Following tree removal, radio collared birds were observed the following year utilizing these stands where they had not been found before. This primary benefit of this work was a reduction in trees that compete with sagebrush and herbaceous plant species while maintaining trees that could be used for

roosting (primarily during hot summer months). Over time, shrub and herbaceous biomass production and plant cover will likely increase compared to pretreatment levels, even though recovery of perennial plants is slow. To improve nesting habitat, however, complete tree removal is recommended. Juniper provides perching sites for predatorial birds, obstructs the ability to observe predators from a distance, and impairs intercanopy and understory plant community structure. Furthermore, remaining trees provide a seed source for more rapid reinvasion in the intercanopy space which can lead to a more rapid exclusion of sage-grouse habitat in that area.

In southeast Oregon and northwest Nevada, over 1,200 nest sites were located from 1995 to 2003. The majority of sage-grouse nest sites occur in intact sagebrush and bitterbrush/sagebrush stands which lacked juniper trees. Western juniper occurs throughout the region and within 10 km of both leks, however, birds have never been observed nesting within juniper woodlands. In Canada, 90% of all identified nest sites occurred under sagebrush plants (Aldridge and Bingham 2002). In Colorado, birds nested 94% of the time under sagebrush (Petersen 1980). Other plant species that provided nest sites included greasewood, bitterbrush, rabbitbrush, horsebrush, snowberry, shadscale, mountain-mahogany, and basin wildrye. While sage-grouse nesting under juniper limbs or near juniper has been reported (i.e. Colorado), it is generally agreed that sage-grouse nest away from juniper stands, in particular closed or nearly closed canopy woodlands (Miller 2005). At a recent sage-grouse conference held in Mammoth Lakes, California (July 2008), a group of 4-5 sage-grouse biologists were questioned on their attitude about nesting habitat and juniper. The group unanimously stated that optimal nest site habitat is void of juniper trees. Complete juniper removal from sage-grouse habitat was identified as a primary objective for improving sage-grouse nesting habitat throughout the range of the species. Holloran (2008) also agreed that optimal habitat would include large-scale removal of juniper. In addition to nesting habitat, brood rearing habitat is also impacted as plant structure and

forage availability are reduced and the potential for predation is increased with juniper encroachment.

According to Crawford et al. (2004), sage-grouse managers should understand that without purposeful habitat management such as juniper removal, sage-grouse habitat quality may decline. To improve habitat conditions in the Alton area, and to increase connectivity with the neighboring Heut's Ranch population, large-scale juniper removal is recommended. With aggressive revegetation of native shrub species (e.g. *Artemisia spp.*, *Purshia tridentata*), including the use of transplants to increase more rapid sagebrush establishment and establishment of herbaceous species (in particular sage-grouse forage species), habitat conditions can be improved to ensure greater habitat availability for nesting and brood rearing. Tree removal increases resources available for shrub and herbaceous plant establishment and growth. In the Alton area, it is likely that birds will identify adequate sites for roosting following tree removal, using sagebrush plants or juniper trees at the juniper woodland fringe. More significant is the long-term benefit from having greater area to nest and raise brood. While research is needed to provide further evidence of the impacts of juniper on sage-grouse habitat, an assessment from sage-grouse biologists and wildlife habitat biologists have concluded that juniper impacts are detrimental to sage-grouse nesting and brood rearing habitat.

Juniper encroachment threatens sagebrush stands within the Alton area (Figure 3). In these areas, trees will be cut to prevent further encroachment and increase the likelihood of birds to use these sites for nesting and brood rearing. The extent of juniper removal will be determined with consultation from the Division of Wildlife Resources. This could result in the removal of a significant number of trees. Rather than removing intermittent trees, the objective will be to remove all trees and open a traveling corridor to link the two areas.



Figure 3. Intact sagebrush community being encroached by juniper.

Establishment of a Core Sage-Grouse Conservation Area

The east end of the valley maintains one of the few remaining intact sagebrush stands in the valley. This area is located northeast of the lek and provides sites for roosting during the mating season (see Coal Hollow Project, Mining & Reclamation Plan, Vegetation Map, Drawing 3-1). This area will not be mined, rather, it will be preserved to create a harbor area for bird breeding, nesting, and brood rearing. Within this "Conservation Area", habitat will be protected and enhanced for sheltering displaced sage-grouse, especially during the breeding and brood-rearing seasons.

All juniper trees that encroach into sagebrush communities within the permit area will be removed. This will be accomplished by felling and removing individual juniper trees while minimizing the impacts to the sagebrush community. One

method for accomplishing this is the use of a tract excavator. In 2007, an excavator was used to remove over 8,000 invading juniper trees from the conservation area ranging in size from 6-15' (Figure 4). Using this method, trees can be rapidly extracted from the soil and immediately loaded into dump trucks and removed away from the site. In addition to juniper, Gambel oak (*Quercus gambelii*) will also be removed (in particular along the eastern foothills) to expand the sagebrush community and provide greater suitable habitat for sage-grouse.



Figure 4. Mechanical removal of juniper within the proposed conservation area.

In addition to juniper and oak removal, sagebrush treatments (mechanical) can be applied to reduce shrub density in small areas (patches). Within these areas, forb species that are known to be important sage-grouse food will be seeded and established to provide an additional food source for hens and chicks, primarily during the brood rearing period. Grasses will also be seeded to provide additional hiding cover and a potential source of insects for chick foraging. These treatments will initially be done in a few, relatively small areas to determine whether forb and grass densities actually do increase and if birds are observed using these areas for

foraging. If successful, these treatments can then be used in other areas where benefits are expected. Maintaining optimal shrub cover for nesting, brood rearing, predator avoidance, roosting, and as a source of shelter will remain the highest priority for these sites.

In addition to the Conservation Area, much of these grasslands and upper sagebrush stands are located along an upper terrace that provides a partial visual barrier from mining activities that will occur in the valley bottom. To create a more distinct visual barrier, spoils from mining can be stockpiled at the ridgeline (up to 20' higher) further decreasing motion and sound within the Conservation Area created during mining activities.

Restoration of Sagebrush Habitat

After mining has been completed, reclamation specialists will return the original grade and valley form to pre-disturbance conditions, or in some cases, better than pre-existing conditions with respect to sage-grouse habitat. Reclamation will include seeding similar plant species with comparable plant composition, structure and function as those of the original plant community. In sites used by sage-grouse for breeding and roosting that had previous livestock grazing, livestock will be used post-reclamation to maintain similar vegetation characteristics as pre-mining conditions. Final reclamation seed mixtures have been formulated to include forb species critical for survival of hens and their chicks.

Seed mixes that will be used for reclamation consist of native shrub, grass and forb species that will provide cover and food for sage-grouse. Bareroot or containerized sagebrush and bitterbrush transplants will also be planted (see Coal Hollow Project, Mining & Reclamation Plan, Chapter 3, Revegetation Seed Mixtures).

Aiding in Shifting Mating Activities Away from the Historic Lek During Mining

Lekking occurs in the lowlands of Sink Valley (Figure 5). This area will be disturbed during mining potentially displacing birds from typical mating activities. To encourage mating behavior during the breeding season, decoys and mating calls will be used to lure birds to nearby alternative sites positioned away from the disturbed area. Research has shown that birds will shift mating activities toward decoys and recorded bird calls (Eng et al. 1979). Both silhouette and 3-dimensional decoys (with bright white coloration) will be used to encourage sage-grouse mating activity.



Figure 5. Sage-grouse males displaying on the Alton Sink Valley lek on March 30, 2006.

CONCLUSIONS & SUMMARY

Surface coal mining activities have been proposed south of the town of Alton, Utah. The southern-most sage-grouse lek is known to occur within the boundaries of the proposed mining. As a result of recent and on-going research on the known Alton sage-grouse populations, it is believed that if current land management practices and habitat fragmentation trends continue, this population will likely be extirpated from the area.

There are several activities that could be accomplished to preserve and even enhance the sage-grouse habitat in the Alton area. First, measures to minimize impacts to the birds from the mining activities must be implemented. Next, enhancement of sage-grouse habitat is currently being accomplished by removing juniper trees that have encroached sagebrush communities. Moreover, plans have been formulated to remove encroaching juniper trees to provide a connectivity corridor between the sage-grouse located in the Alton area and the Heutt's Ranch area that should promote mixing and breeding, resulting in larger populations and increased genetic diversity through gene transfer between populations. A Conservation Area will be established that will not be mined within the Coal Hollow permit area. Finally, restoration of lands disturbed by mining will be conducted that improves and increases the amount of sage-grouse habitat in the Alton area. All habitat enhancement and reclamation activities will be closely monitored throughout the life of the proposed mine.

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Page 20, paragraph 1, The applicant needs to describe how the "Conservation Area" will be enhanced for Sage-Grouse especially during the breeding season.

Creation of the "Conservation Area" has been described in the MRP, Chapter 3, Section 333, page 3-47, 12/15/08 *and* in new Appendix 3.5, "Establishment of a Core Sage-Grouse Conservation Area".

(Insertion instructions for appropriate MRP pages *and* Appendix 3-5 have been described previously in this document)

Page 20, paragraph 3, "Intact sagebrush sites will be cleared of all young juniper trees", these areas need to be identified.

This area has been identified on a revised map called "Sage-Grouse Brood Habitat and Conservation Area Map" (Drawing 3-5).

Drawing 3-5 of this submittal replaces
Drawing 3-5 of the current MRP.

Page 20, paragraph 3, "Juniper woodlands surrounding intact stands can be cut back to increase patch size and the amount of area that has potential for nest site selection by hens," the areas need to be identified on a vegetation map and quantified in terms of acreages.

The Drawing 3-5 "Alton Sage-Grouse Habitat and Mitigation Plan" identifies these areas on a map (see "Conservation and Juniper Removal Area Boundary" in the Legend of this map).

(Instructions for replacement of Drawing 3-5 have been described previously in this document).

Page 21, paragraph 3, "Long term mine plans will remove hundreds of acres of juniper woodlands". The applicant needs to perhaps quantify this statement. How many acres per year will be removed for the development of Sage-Grouse habitat? Areas need to be listed in the application and delineated on a vegetation map.

This was a statement that referred to the LBA area administered by the BLM. The permit application depends on the results of an EIS and subsequent lease purchases. Therefore, comments regarding this area and sage-grouse habitat development would be premature.

(No insertions to the MRP are possible at this time for this deficiency).

DOGM Deficiency:

R645-301-342, Page 23, paragraph 3. the applicant needs to describe the mechanical treatment for controlling invasive species. • Page 10, Habitat connectivity. the applicant needs to provide an update on the status of juniper removal perhaps in terms of acres of restored habitat and a map delineating the restored areas. • What is the projected time frame for providing a corridor that would connect the two populations. Endangered and Threatened Species • Page 9, Predator control paragraph 3, the applicant needs to provide an update on the status of predator control arrangements. [JH]

(The deficiencies above have been addressed separately in the following pages)

Page 23, paragraph 3 [Appendix 3-1], the applicant needs to describe the mechanical treatment for controlling invasive species.

The weed control program has been described for the MRP, Section 333, "Monitoring Plan".

(No additional instructions are needed here. Instructions to insert a new Section 333 have already been provided above with the insertions of new MRP pp. 3-34 thru 3-80).

Page 10, Habitat connectivity [Appendix 3-3], the applicant needs to provide an update on the status of juniper removal perhaps in terms of acres of restored habitat and a map delineating the restored areas.

Additional information regarding habitat connectivity between the Alton and Heut's Ranch populations have been provided in the new Appendix 3-5.

(No additional instructions are needed here. Instructions for the addition of Appendix 3-5 have already been described in this document).

What is the projected time frame for providing a corridor that would connect the two populations?

ACD has had many meetings conversations regarding establishment of a corridor to connect the Alton and Heut's Ranch sage-grouse populations. ACD has ear-marked funds for these activities which will be conducted in conjunction with the State of Utah, Division of Wildlife Resources (DWR). It has also been established in meetings with DWR that the task of obtaining permission from landowners will be the responsibility of DWR. Consequently, until permission has been granted, determination of a time frame for these activities cannot be established.

(No insertions to the MRP are possible at this time for this deficiency)

Page 9, Predator control paragraph 3, the applicant needs to provide an update on the status of predator control arrangements. [JH]

Predator control has been discussed further in meetings with the State of Utah, Division of Wildlife Resources (DWR). Requests to DWR for more information have been made. Comments back from them are pending. As such, no final plans or applications have been filed to date.

(No insertions to the MRP are possible at this time for this deficiency)

R645-301-358, Page 22. paragraph 3, "The Alton Sage-Grouse population will be enhanced by importing birds from nearby populations that are relatively large and stable, the applicant needs to include a time table. number of birds and appropriate clearances from DWR, USFWS, BLM. • Page 22 paragraph 3 and page 22 paragraph 1, The applicant needs to support this proposed population enhancement by differentiating the populations and providing a time table for capturing and relocating the birds as noted in the previous comment. • Page 9, Brood Rearing habitat improvement. the Division is requesting the applicant to provide an update on the status of the development of the alfalfa field in the Sage Grouse Distribution and habitat improvement Alton, Utah. • Page 9, Brood Rearing habitat improvement paragraph 2, has the research on plant insect relationships been completed? • Page 9, Predator control paragraph 3, the applicant needs to provide an update on the status of predator control arrangements. • Page 10, Habitat connectivity, the applicant needs to provide an update on the status of juniper removal perhaps in terms of acres of restored habitat and a map delineating the restored areas. • What is the projected time frame for providing a corridor that would connect the two populations. The application needs to include mine water consumption calculations in acre feet per year for the four endangered fish species included in the recovery program. • The applicant needs to provide information on Bald and Golden Eagles. i.e. narrative about each species including their status within ½ mile of the proposed disturbed area. • The information on page 3-40 needs to include protection and enhancement measures for the wetland areas. •The applicant needs to include a narrative that describes how impacts to the habitat for the high value wildlife species, black bear, rocky mountain elk, and mule deer will be mitigated or enhanced during the active phase of mining operations. The applicant could describe the beneficial uses to the referenced species that have been achieved to date by the removal of the Pinyon Juniper. A comparison of acreages should be included, disturbed area footprint versus habitat enhancement, in the application. • The application needs to include vegetation and fish and wildlife information pertaining to the road realignment for the permit and adjacent areas.

[JH]

(The deficiencies above have been addressed separately in the following pages)

Page 22. paragraph 3, "The Alton Sage-Grouse population will be enhanced by importing birds from nearby populations that are relatively large and stable"; the applicant needs to include a time table, number of birds and appropriate clearances from DWR. USFWS, BLM.

Meetings with private and agency biologists have concluded that importation of sage-grouse from larger populations to the Alton populations (including transplanting birds from Alton to other larger populations as a conservation method) would not be a prudent mitigation strategy at this time.

(No insertions to the MRP are possible at this time for this deficiency)

Page 22 paragraph 3 and page 22 paragraph 1, The applicant needs to support this proposed population enhancement by differentiating the populations and providing a time table for capturing and relocating the birds as noted in the previous comment.

As stated above, meetings with private and agency biologists have concluded that importation of sage-grouse from larger populations to the Alton populations (including transplanting birds from Alton to other larger populations as a conservation method) would not be a prudent mitigation strategy at this time. Additionally, future permits for capturing the sage-grouse in the area are subject to be discontinued.

(No insertions to the MRP are possible at this time for this deficiency)

Page 9, Brood Rearing habitat improvement. The Division is requesting the applicant to provide an update on the status of the development of the alfalfa field in the Sage-Grouse Distribution and habitat improvement Alton, Utah.

This idea was mentioned in Appendix 3-3 as a possible mitigation technique. Since that time it has been found that an adequate water supply is not available for the alfalfa field. However, other mitigation techniques have been described in the new Appendix 3-5.

(No insertions to the MRP are possible at this time for this deficiency. Appendix 3-5 will provide more insight; instructions to add this have already been provided in this document)

Page 9, Brood Rearing habitat improvement paragraph 2; has the research on plant insect relationships been completed?

This research has not been completed, however, plant seed mixtures for revegetation of the sagebrush habitat have provided species known for their nutritional value for sage-grouse and their young.

(No insertions to the MRP are possible at this time for this deficiency)

Page 9, Predator control paragraph 3, the applicant needs to provide an update on the status of predator control arrangements.

Predator control has been discussed further in meetings with the State of Utah, Division of Wildlife Resources (DWR). Requests to DWR for more information have been made. Comments back from them are pending. As such, no final plans or applications have been filed to date.

(No insertions to the MRP are possible at this time for this deficiency)

12/18/08

Page 10, Habitat connectivity, the applicant needs to provide an update on the status of juniper removal perhaps in terms of acres of restored habitat and a map delineating the restored areas.

This has been discussed in deficiency section **R645-301-342** above. Additional information regarding habitat connectivity between the Alton and Heut's Ranch populations have been provided in the new Appendix 3-5.

(No additional insertions to the MRP are necessary at this time for this deficiency. Instructions for the addition of Appendix 3-5 have been described previously in this document).

What is the projected time frame for providing a corridor that would connect the two populations?

This has been discussed in deficiency section **R645-301-342** above.

(No additional insertions to the MRP are necessary at this time for this deficiency. Instructions for the addition of Appendix 3-5 have already been described above).

The application needs to include mine water consumption calculations in acrefeet per year for the four endangered fish species included in the recovery program.

It was determined in a meeting with DOGM that the Alton project area is not within the Upper Colorado River Basin, a specific area delineated and directed to comply to the Recovery Program for this species. See the new Chapter 3, Table 3-35.

(No additional insertions to the MRP are necessary at this time for this deficiency. Instructions to replace Table 3-35 have already been provided with the insertions of pp. 3-34 thru 3-80).

The applicant needs to provide information on Bald and Golden Eagles. i.e. narrative about each species including their status within ½ mile of the proposed disturbed area.

Results from the recent raptor survey has been included with this document. A map showing the exact flight pattern and locations of all nests within and adjacent to the adjacent area. This map (Drawing 3-6) has been included in this document to be place in the Division's confidential files for the Coal Hollow Project.

Drawing 3-6 should be added to the Confidential File at the State of Utah, Division of Oil, Gas & Mining (DOGM).

The information on page 3-40 needs to include protection and enhancement measures for the wetland areas.

Information about protection and reclamation has been included for insertion into Section Chapter 3, Section 333, PROCEDURES TO MINIMIZE ADVERSE IMPACTS TO FISH & WILDLIFE.

(No insertions to the MRP are necessary at this time for this deficiency. Instructions to add this information in Section 333 have already been provided with the insertions of pp. 3-34 thru 3-80).

The applicant needs to include a narrative that describes how impacts to the habitat for the high value wildlife species, black bear, rocky mountain elk, and mule deer will be mitigated or enhanced during the active phase of mining operations. The applicant could describe the beneficial uses to the referenced species that have been achieved to date by the removal of the Pinyon Juniper. A comparison of acreages should be included, disturbed area footprint versus habitat enhancement, in the application.

Information about protection and reclamation has been included for insertion into Section Chapter 3, Section 333, PROCEDURES TO MINIMIZE ADVERSE IMPACTS TO FISH & WILDLIFE.

(No additional insertions to the MRP are necessary at this time for this deficiency. Instructions to add this information in Section 333 have already been provided with the insertions of pp. 3-34 thru 3-80).

The application needs to include vegetation and fish and wildlife information pertaining to the road realignment for the permit and adjacent areas.

A new vegetation map has been prepared that shows the plant communities and wildlife habitats to be impacted by the new county road alignment crosses.

A reference to this map that includes verbiage about the plant communities impacted by the county road alignment has been prepared.

(No additional insertions to the MRP are necessary at this time for this deficiency. See the new Drawing 3-1. Instructions to replace the map have already been provided in this document).

(Instructions to replace this page has already been provided; see new page 3-38)

R645-301-333, Section, 358.530, page 3-74, states that "The Coal Hollow Project will fence, cover, or use other appropriate methods to exclude wildlife from ponds which contain hazardous concentrations of toxic forming materials". In the event other appropriate methods are deemed necessary the application needs to include a commitment to consult with DOGM, biologists from the DWR and other appropriate entities to determine the scope of other appropriate methods to exclude wildlife. [JH]

No toxic ponds are planned for the mine site.

(No additional insertions to the MRP are necessary at this time for this deficiency. Instructions to add this information have already been provided with the insertions of pp. 3-34 thru 3-80).

R645-301-323, The application needs to include Reclamation Monitoring And Sampling Location Maps and Reclamation Treatments Maps. [JH]

Sample locations are shown on the new vegetation map, Drawing 3-1.

Reclamation treatments for Robinson Creek are shown on Drawing 5-20A and Drawing 5-21A.

The remaining "Reclamation Treatments" are all the same and are have been described in the verbiage of the new pages of Chapter 2 and Chapter 3 (no maps showing treatments were created).

[Instructions to replace the above maps have already been provided in Chapter 3 (Drawing 3-1) and Chapter 5 (Drawing 5-20A and Drawing 5-21A) information].