

CHAPTER 3

**BIOLOGY
(R645-301-300)**

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INCORPORATED
EFFECTIVE:
SEP 02 1999 99-1
UTAH DIVISION OIL, GAS AND MINING

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CRANDALL CANYON MINE, MINE AND RECLAMATION PLAN
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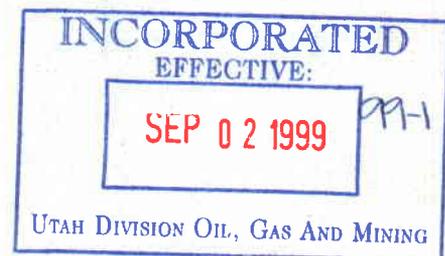


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Note: Bold number plates are included with this submittal.

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Note: Bold number plates and appendices are included with this submittal.

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BIOLOGY

3.10 Introduction

This chapter presents a description of the biological resources found within the life of mine permit area. The sections addressed in this chapter are:

- o the vegetative, fish and wildlife resources;
- o the potential impacts to vegetative, fish and wildlife resulting from the proposed operations,
- o the mitigation plans and measures to minimize the impacts;
- o and the reclamation plan to restore the vegetative, fish and wildlife resources to a condition suitable to the postmining land use.

3.11 Vegetation, Fish and Wildlife Resources

Vegetation, fish and wildlife resources of the permit area and adjacent area are described under 3.20.

The proposed Incidental Boundary Change will not create any surface disturbance or affect any vegetation resources. Regional vegetation information for the Incidental Boundary Change area can be found on Plate 3-2. Regional wildlife information for the IBC area is shown on Plate 3-1. Mining within the South Crandall lease will not create any surface disturbance or affect any vegetation or wildlife resources. Regional wildlife information for the South Crandall lease area is shown on Plate 3-1(A, B,C). Regional vegetation information for the South Crandall lease area is shown on Plate 3-2.

Mining within the U-68082 lease mod area will not create any surface disturbance or affect any vegetation or wildlife resources. Regional wildlife information for the U-68082 lease mod area is shown on Plate 3-1 and Appendix 3-19. Regional vegetation information for the U-68082 lease mod area is shown on Plate 3-2. Photographs of the regional vegetation of the lease mod area can be found in Appendix 7-64. A discussion of the vegetation in the drainages and perennial stream considerations in the lease mod area can be found in Appendix 3-21. Refer to Appendix 3-20 "Final Environmental Assessment, Modification of Federal Coal Lease UTU-68082, U.S. Forest Service" for additional information regarding wildlife and vegetation in the lease mod area.

3.12 Potential Impacts to Vegetation, Fish, and Wildlife Resources

Potential impacts and methods to minimize these impacts are described under 3.30.

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3.20 Environmental Description

3.21 Vegetation Resource

3.21.1 Reference Areas

There are 10 vegetative communities in Crandall Canyon. They are:

- | | |
|---|-------------------------|
| (1) Cottonwood; | (2) Sagebrush; |
| (3) Mountain Shrub/Grassland; | (4) Mountain Grassland; |
| (5) Mixed Mountain Shrub/Conifer/Aspen; | (6) Aspen; |
| (7) Spruce/Fir/Aspen; | (8) Spruce/Fir; |
| (9) Alpine Grassland; | (10) Riparian. |

Of the 10 communities, 6 lie within areas to be disturbed and/or impacted by the development and operation of the proposed GENWAL Mine Site (communities 1, 2, 4, 5, 7, and 10).

Mountain Grassland (3) and Aspen (5) are found on the north-facing south slope and higher up on the north slope, outside of areas to be disturbed. Spruce/Fir (9) is also found on the north slope, and Spruce/Fir (8) and Alpine Grassland (9) are found on the highest summits and ridges.

The previously disturbed areas around the existing mine portals exhibit a vegetation association distinctly different than the existing natural vegetative communities.

Vegetative Communities Within Areas to be Disturbed

Portions of 6 plant communities will be disturbed by mine site construction and road building. They are: Cottonwood; Sagebrush; Mountain Shrub/Grassland; Mixed Mountain Shrub/Conifer/Aspen; Spruce/Fir/Aspen; and Riparian. In addition, portions of the proposed disturbed area have been previously disturbed.

Representative areas of each community, other than Riparian, were sampled by means of three randomly placed 30 meter transects. Ten 1-square meter plots were randomly selected by lot in each of the 3 transects and sampled for cover and productivity. The Riparian community was sampled in two locations by means of 10 transects, 10 meters or more long placed at right angles to the thread of the stream and spaced from 1 to 10 meters apart (spacing randomly selected by lot). Each of the 20 transects was sampled by 2 dm x 1 meter plots spaced at 1 meter intervals for 5 meters or more (as needed to reach limits of Riparian community) on either side of the centerline of the stream. The Riparian transects were likewise sampled for cover and productivity.

The Seven communities sampled (including the previously disturbed area) are summarized in Tables 3-A through 3-H, of Appendix 3-1. A complete species list is provided in Table 1 and a



community/species list is provided in Table 2 (Appendix 3-1). A general description of visual dominants within each of the communities is provided below.

Cottonwood

Along the lower 200 meters of Crandall Creek; and along the bottomlands of Huntington Creek; and one short section of Crandall Creek near the portals; the vegetative community is dominated by Narrowleaf Cottonwood (*Populus augustifolia*) and Rocky Mountain Juniper (*Juniperus Scopulerum*) in the upper story and by Wood's Rose (*Rosa Woodsii*), Big Sage (*Artemisia tridentata*), Squaw Currant (*Ribes cerium*) and Rocky Mountain Juniper (*Juniperus scopolorum*) in the understory.

Sagebrush

The numerous small sagebrush flats occurring within Crandall Canyon are dominated by Big Sage (*Artemisia tridentata*).

Mountain Shrub/Grassland

This association, found on the south-facing slopes above Crandall Creek, is dominated by Curl-leaf Mahogany (*Cercocarpus ledifolius*), Rocky Mountain Juniper (*Juniperus Scopolorum*), and Bluebunch Wheatgrass (*Agropyron spicatum*).

Mixed Mountain Shrub/Conifer/Aspen

This association is primarily found near the toe of the south-facing north slope of the canyon. It is essentially a blend of the Mountain Shrub/grassland and Spruce/Fir Aspen communities. This plant community is dominated in the upper story by the conifers Blue Spruce (*Picea Pungens*), Douglas Fir (*Psuedotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*), by Aspen (*Populus tremuloides*), Curl-leaf Mahogany (*Cercocarpus ledifolius*), and Rocky Mountain Juniper (*Juniperus scopolorum*). The understory is dominated by Mountain Snowberry (*Symphoricarpos oreophilus*), Rubber Rabbitbrush (*chrysothamnus nauseosus*), Needle and Thread Grass (*Stipa Comata*), and Bluebunch Wheatgrass (*Agropyron spicatum*).

Spruce/Fir/Aspen

This community is found in the bottomlands and north-facing south slope of Crandall Canyon. The upper story is dominated by Blue Spruce (*Picea pungens*), Douglas Fir (*Psuedotsuga menziesii*) and Aspen (*Populus tremuloides*). The understory is dominated by Mountain Snowberry (*Symphoricarpos oreophilus*). The Spruce/Fir/Aspen community generally gives way very quickly to the Mountain Shrub/Grassland or Mixed Mountain Shrub/Conifer/Aspen associations at the toe



of the north slope. This transition is dominated by Common Juniper (*Juniperus communis*) in the understory along with Mountain Snowberry (*Symphoricarpos oreophilus*).

A vegetation survey was conducted in July 1996 by Dr. Patrick Collins to assess the vegetation of the proposed disturbed area south of Crandall Creek. The report is included as Appendix 3-11. Productivity data for this area is provided in Appendix 3-15.

Riparian

The Riparian community was sampled in two locations because of differences in the substrata. Riparian #1 is located about 1.0 km below the existing mine portals. Here, Crandall Creek flows over bedrock (Star Point Sandstone). Riparian #2 is located just 200 meters upstream from the existing mine portals. There, the substrata is alluvium and bedrock (regolith). Also, the Riparian community around the Crandall Creek Mine Culvert Expansion was inventoried in 1994. The results are included in the Addendum to Appendix 3-2.

The Riparian communities exhibit more variety than the other communities sampled within the grass, herb, and shrub communities. However, the trees, which border the riparian zone seldom encroach within the zone.

The dominate shrubs of Riparian #1 are Red Osier Dogwood (*Cornus stolonifera*), Willow (*Salix Myrtilifolia*), and Common Juniper (*Juniperus communis*). The dominant herbs are Thistle (*Cirsium pulchellum*), Aster (*Aster glaucodes*), and Richardson's Geranium (*Geranium richardsonii*). The dominant grasses are Redtop (*Agrostis stolonifera*) and Fescue (*Festuca Pratensis*).

The dominant shrubs of Riparian #2 are Wood's Rose (*Rosa Woodsil*), Willow (*Salix myrtilifolia*), and Mountain Snowberry (*Symphoricarpos oreophilus*). The Dominant herbs (are the same three as in Riparian #1): Aster (*Aster Glaucodes*), Richardson's Geranium (*Geranium richardsonii*), Thistle (*Cirsium pulchellum*), and also includes Heartleaf Bittercress (*Cardamine cordifolia*). The dominant grasses are Smooth Brome (*Bromus inermis*), Redtop (*Agostis stolonifera*), and an unidentified grass. Also dominant in the grass and herb layer is horsetail (*Equisetum arvense*).

Woody plant density for the area to be disturbed by the yard expansion was collected in June 1997 and is provided in Appendix 3-14.

Previously Disturbed Areas

The previously disturbed areas around the existing mine portals are located in areas that were probably Spruce/Fir/Aspen and Mixed Mountain Shrub/Conifer/Aspen before 1939 when mining began in Crandall Canyon. After mining stopped around 1955 three shrubs have taken over;



Mountain Snowberry (*Symphoricarpos Oreophilus*), Rubber Rabbitbrush (*Chrysothamnus nauseosus*), and Big Sagebrush (*Artemisia tridentata*).

Trees

Trees in the Cottonwood, Mixed Mountain Shrub/grassland, and Spruce/Fir/Aspen communities were sampled by the Point-centered Quarter Method with tree diameters taken at breast height. Twenty stations were randomly selected in each community. Data are reported in Tables 3-B, 3-D, 3-E, and 3-F (Appendix 3-1).

3.21.2 Productivity of Lands Prior to Mining Activities

The only historic commercial utilization of Crandall Canyon and the adjacent lease area over the last 50 to 100 years appears to be domestic grazing. The disturbed area associated with the past and current mining operations is approximately 14 acres, including mine yard expansion in 1998 and topsoil stockpiles.

Approximately two dozen elk cows and calves were in the canyon during the summer of 1980. Large game animals typically use the canyon for forage. However, the level of use is generally determined by the amount of forage available annually. The balance of productivity estimates are included in Appendix 3-1, along with the corresponding reference areas and tables of species.

3.22 Fish and Wildlife Information

Data associated with fish and wildlife habitat, both baseline conditions and changes to those conditions, have been collected by or obtained from the Utah Division of Wildlife Resources, Utah Division of Water Rights, U.S. Fish and Wildlife, U.S. Army Corps of Engineers, U.S. Forest Service, and outside consulting firms.

3.22.1 Protection and Enhancement of Fish and Wildlife

Numerous state and federal agencies provided current lists of species which are threatened, endangered, sensitive or of high-interest. The Utah Division of Wildlife Resources conducted baseline fisheries and raptor studies associated with the mine pad expansion. Independent consultants were utilized to assess the fish and wildlife resources associated with the original Crandall Canyon mine site. Winget Environmental Consultants were employed to investigate the initial aquatic resources (including the 1980 macroinvertebrate study and 1982 and 1983 stream surveys, see Appendix 3-2). Supplemental studies have been conducted by Environmental Industrial Services (EIS) and the Utah Division of Wildlife Resources (1994 and 1995) and included in Appendix 3-2.



The terrestrial wildlife resources were initially inventoried by Valley Engineering and subsequently studies were conducted by EIS as summarized within Appendix 3-3. A cursory tree nesting raptor inventory was also conducted by personnel from the Utah Division of Wildlife Resources and EIS (Appendix 3-3).

According to these studies, Crandall Creek is being used primarily as a spawning and nursery stream, but it also contains a few mature resident fish. Refer to Appendix 3-10 for a population survey report.

In 1997, the Utah Division of Wildlife Resources (DWR) determined that native Colorado Cutthroat Trout (CRCT) inhabited that segment of Crandall Creek where the stream was to be culverted to allow expansion of the mine yard. The Crandall Creek population is one of only a few populations of endemic Colorado River Cutthroat Trout populations identified on the Wasatch Plateau Manti-LaSal Forest and are therefore of high interest to the Forest Service, Division of Water Rights, Division of Oil, Gas and Mining and Division of Wildlife Resources. GENWAL agreed to comply with the conditions and stipulations of the letters included in Appendix 3-12 for the mitigation plan. Details of the mitigation plan are included in Appendix 3-12. GENWAL provided funding to remove the trout from a segment of Crandall Creek and construct habitat enhancement of the stream above the mine. After the mine yard expansion was completed and the DNA results were received, the Forest Service and DWR replaced only individual fish that demonstrated the highest genetic purity of Colorado River Cutthroat Trout back into Crandall Creek above the mine site.

3.22.2 Site Specific Resource Information Pertaining Wildlife

Mammals

Big game animals use the Crandall Canyon area as a part of their seasonal habitat. The migration of elk and deer on the Manti-La Sal National Forest occurs as a sheet migration with no specific corridors. Plate 3-1 shows elk and deer summer range on the high ridges and ledges of the canyon, and also depicts critical mule deer winter range habitat in the extreme lower portion of Crandall Canyon, contiguous to the confluence with Huntington Creek. Critical elk winter range occurs no closer than approximately 1.5 miles to the proposed surface facilities. Additional habitat information is available in Appendix 3-19.

Birds

Data pertaining to migratory and upland game birds within the permit area are included in Appendix 3-3 and in Table 5 of the November 1980 Valley Engineering Report (Appendix 3-3). Eleven of the twenty-two migratory birds are raptors (Appendix 3-3).

There are no known locations of drumming logs in Crandall Canyon or near the proposed disturbance areas, according to Larry Dalton of the Utah Division of Wildlife Resources. The mine permit and contiguous area inventoried to make this determination begins at the confluence of Horse Canyon with Huntington Canyon to the confluence of Mill Canyon with Huntington Canyon, and thence west to the west side of East Mountain.

No raptor nests were located in the riparian zone. The target species of the riparian inventory was the Goshawk. During the 1992 inventory no Goshawks were observed or located. (For further information, see the Environmental Assessment of Coal Lease UTU-68082, Crandall Canyon Tract by the USFS, Manti-La Sal National Forest.) Raptor nests have been located in Crandall Canyon (Plate 3-1A). One of the nests was occupied by a nesting pair of Golden Eagles in the Spring of 1995. During the raptor survey conducted in 1996 the nests were classified as "old, dilapidated" meaning that they were not active nests and had not been tended (based on communication with Ben Morris in March 1997).

No raptor nests were found within either the existing permit area or Incidental Boundary Change area during the 1998 raptor survey conducted on May 20, 1998 (personal communication with Ben Morris, May 1998). DWR conducted a raptor survey of the South Crandall lease area in May 2003. No nests were found. The results of this survey area shown in Appendix 3-16. DWR raptor surveys in 2003 and 2004 covered the U-68082 lease mod area, and no nest were found (see Appendix 3-16 and 3-16A).

Reptiles and Amphibians

The ranges and habitat preferences obtained from published data for the vertebrate species of southeastern Utah have been compared with the location and available habitats of Crandall and Huntington Canyons. Table 3 in Appendix 3-3 presents a list of the reptiles which may be found in the area and their relative abundance.

Reptiles are found throughout the mine permit area from the riparian areas to the mesic hillslopes and ridgetops. Amphibians are found near water in the habitats associated with Huntington and Crandall Creeks or near springs and seeps located on the hillsides above the creeks. (See Appendices 3-2 & 3-3 and refer to Table 5 included within Appendix 3-3). Baseline studies in the spring and summer of 1994 did not encounter the presence of any threatened or endangered reptile or amphibian.

3.22.21 Listed or Proposed Endangered or Threatened Species of Plants and Animals, and Critical Habitat

FEDERALLY LISTED AND PROPOSED ENDANGERED (E) AND THREATENED (T) SPECIES AND THEIR HABITAT IN EMERY COUNTY

In a 2004 listing the following T and E Species were identified for Emery County. They are:

Bonytail	<i>Gila elegans</i>	E
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	E
Humpback Chub	<i>Gila cypha</i>	E
Razorback Sucker	<i>Xyrauchen texanus</i>	E
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	T
Western Yellow-billed Cuckoo	<i>Coccyzus americanus occidentalis</i>	C
Black-footer Ferret	<i>Mustela nigripes</i>	E
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	E

Listed threatened and endangered species potentially present in the permit area is the Bald Eagle (*Haliaeetus leucocephalus*) (E). (Source: U.S. Fish and Wildlife Service, July, 1994)

None of the species are likely to occur within the mine permit area, (including the South Crandall lease area and the U-68082 lease mod area) because habitats for these species in the permit area are marginal. Areas of potential occurrence include riparian forests along Huntington Canyon for the Bald Eagle.

A revised (2004) list of wildlife and vegetation T & E species within Emery County is provided in the second addendum to Appendix 3-3.

Migratory Birds of High Federal Interest

This group of especially significant species is comprised of 22 bird species identified by FWS as occurring in the Uintah-Southwestern Utah Coal Production Region. Of the 22 species 7 species have the potential of migrating within the region where the mine is permitted.

1. Bald Eagle
2. Golden Eagle
3. Ferruginous Hawk
4. Cooper's Hawk
5. Prairie Falcon
6. Western Bluebird
7. Flammulated Owl
8. Black Swifts
9. Williamson's Sapsuckers

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Data from the U.S. Forest Service indicate that a list of mammals, birds, fish, amphibians and plant species which are sensitive species that are potentially present in the area of influence of the proposed mine permit. They are:

1. Townsend Big-Eared Bat (Mammal)
2. Northern goshawk (Bird)
3. Flammulated owl (Bird)
4. Colorado Cutthroat Trout (Fish)
5. Spotted Bat (Mammal)
6. Three-Toed Woodpecker (Bird)
7. Peregrin Falcon (Bird)

Goshawks and Colorado Cutthroat Trout are the only species on this list that have been observed in the permit area or contiguous to the permit area. According to the Forest Service the Colorado Cutthroats are hybrids, not pure. However, GENWAL has a firm commitment to report the presence of threatened or endangered species to the regulatory authority (irrespective of which list the plants or animals appear on). For example, a monitoring program to determine adaption of any nesting golden eagles was implemented.

Several raptor surveys have been conducted since the original survey in which a golden eagle was reported at a nest site the spring of 1980. The nest site was inactive upon inspection by the DWR in 1987 and no eagles were sited in the vicinity. A 1995 raptor survey conducted in June of 1995 found a nesting pair of Golden Eagles, with fledgling, in a nest on the ridge immediately north of the mine (Appendix 3-3). However, survey work later in 1996 showed the nest sites to be "old and dilapidated". The nests were not active and were in poor condition. No nests were found in the permit area or the Incidental Boundary Change area during the May 1998 raptor survey, (personal communication with Ben Morris, May 1998). DWR conducted a raptor survey of the South Crandall lease area in May 2003. No nests were found. The results of this survey area shown in Appendix 3-16. The U-68082 lease mod area was also surveyed and no nests were found (see Appendix 3-16 and 3-16A).

To further protect this potential valuable resource, an aerial survey for the purpose of identifying cliff-nesting raptors, will be conducted every three years or on request of the U.S. Fish and Wildlife Service (USF&W) or the Utah Division of Wildlife Resources (UDWR).

3.22.220 Habitats of Unusual High Value for Fish and Wildlife

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Plates 3-1 and 3-1A identify wildlife usage areas of high or critical value. The haul road and surface facilities within the permit area will not disturb any winter range for deer or elk. Plate 3-1 shows elk and deer winter range in the valley bottoms.

Crandall Canyon represents only a portion of winter habitat for moose, the winter range encompasses all the Huntington Canyon drainage, with a very large amount of unoccupied adjacent habitat, (reference Larry Dalton). Thus, the projected impacts will be minimal. According to Larry Dalton of the State of Utah Division of Wildlife Resources, there is a sufficient volume of adjacent unoccupied habitat suitable to absorb displaced moose. The southeastern Utah moose herd is

proliferating at a normal pace. There is an abundance of suitable habitat that is not occupied. This is due, in part to a low initial transplant population of moose and some illegal killing.

3.22.230 Other Species or habitat that Require Special Protection Under State or Federal Regulations.

At present, there are no known additional species that require special protection. Although GENWAL will address any future concerns as they may arise.

No endangered or threatened plant species were encountered in the initial vegetation survey. (This conclusion is supported by a review of the field data in a meeting with Mr. Bob Thompson of USFS, Manti-La Sal National Forest). The subsequent vegetation survey conducted in the summer of 1994 did not encounter the presence of any threatened or endangered plant species.

3.22.300 Fish & Wildlife Service Review.

If, following the Fish and Wildlife review of the above section it is determined the information provided is not adequate, GENWAL will take whatever steps are deemed necessary and reasonable to provide additional requested information in a timely manner. Note letter from USF&W Service Appendix 3-4.

3.23 Maps and Aerial Photography.

GENWAL has a complete set of aerial photographs of the permit area and will make the material available upon request to any regulatory agency. All applicable maps are included in each chapter outlining critical areas that are addressed.

3.23.100 Maps Showing Location of Reference Areas.

Plates 2-4 and 3-7 show the location of the vegetation reference areas.

3.23.200 Monitoring Station(s)

For elevations and locations of monitoring stations used to gather data for fish and wildlife and any special habitat features see Appendix 3-2 and 3-3. This information was collected from the UDWR Publication 90-11.

3.23.300 Habitat Protection and Enhancement

GENWAL ensures that all electric power lines and other transmission facilities are constructed to minimize electrocution hazards. All fencing installed at the mine site will be



constructed to DWR standards, for the protection of wildlife. The landscape boulders/riprap stockpile at the topsoil storage site will provide shelter for the smaller animals.

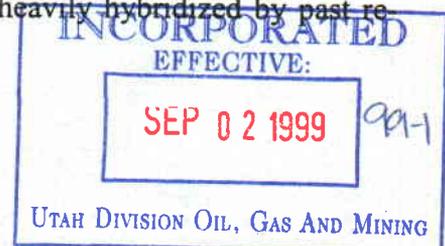
Surface disturbance will be kept to a minimum. The road will be designed as narrow as practically possible. Encroachment on Crandall Creek will be kept to a minimum to protect the creek as a source of potential food for trout downstream in Huntington Creek.

During construction of the proposed expansion at the mine facility GENWAL commits to the following:

1. Crandall Creek will be temporarily diverted into a 18 inch perforated plastic pipe embedded in the drain rock in the creek bottom. Diversion of the flow through the pipe will allow construction activities to take place above the pipe and avoid impacting stream flow. The drain rock filter will also minimize sediment contribution to the stream. Silt fence and strawbale dikes will be used at the downstream portion of the project to aid in controlling erosion and sedimentation in the areas contiguous to the stream (Detailed construction plans are provided in Appendix 7-50).
2. The area not to be disturbed will be designated as a buffer zone and marked as specified in R645-301-521.200.
3. GENWAL commits to the development and implementation of appropriate mitigation plans with the regulatory authority (UDWR, USFS, Water Rights, UDOGM) should stream flow diminish significantly or water quality deteriorate.
4. During and after construction, the water quality and quantity in the perennial stream shall not be adversely affected.
5. Fill material used in the yard expansion will be taken from a borrow area that has been inspected and deemed to be free of noxious weeds by the UDAF.

GENWAL commits to working with the Forest Service, the Division of Wildlife Resources and the Division of Oil, Gas and Mining on suitable mitigation plans. Mitigation will be based on a 3:1 ratio. Enhancement will be performed at a location selected by the agencies to improve wildlife/fishery habitat on an area three times the length to be affected by the culvert placement. Refer to Appendix 3-12 for a discussion of mitigation measures associated with the yard expansion project.

The Utah Division of Wildlife Resources (DWR) has recently determined that native Colorado Cutthroat Trout (CRCT) inhabit the 1,500 feet of Crandall Creek in the immediate area of the proposed culvert installation. Because this fish has been heavily hybridized by past re-



stocking effort of other trout species, this fish is now considered sensitive by the U.S. Forest Service. The Forest Service and DWR have recently signed a CRCT recovery agreement designed to restore the fish to numerous streams throughout the State of Utah.

According to the Recovery Agreement, there are presently 21 pure and 59 potentially pure populations of CRCT which collectively inhabit more than 215 miles of stream in Utah. There are also another 41 populations of pure CRCT which have been identified in neighboring area of Colorado and Wyoming.

The Crandall Creek population is the only population yet identified on the Wasatch Plateau Manti-LaSal Forest and are therefore of high interest to the Forest Service, Division of Water Rights, Division of Oil, Gas and Mining and Division of Wildlife Resources. GENWAL recognizes the sensitive nature of this fish and has worked cooperatively with DWR and the Forest Service to develop an acceptable mitigation plan to provide suitable mitigation for the Crandall Creek population. Details of this mitigation plan are included in Appendix 3-12.

3.23.400 Vegetation Type, Plant Community, and Sample Locations

See Plates 3-2, 3-7, 3-8, and 3-9.

3.30 Operation Plan.

Each application will contain a plan for protection of vegetation, fish, and wildlife resources throughout the life of the mine.

GENWAL has prepared a plan to mitigate any adverse effects on vegetation, fish or wildlife. This plan is addressed in the following Sections 3.31, 3.32, 3.33, 3.41, and 3.40.

3.31 Disturbance and Interim Stabilization

As agreed to by the United States Forest Service and GENWAL, land above and within the 20 degree angle of draw of all second mined workings shall be monitored by infrared aerial photography techniques every five (5) years by the operator. This monitoring will begin in 1995 and continue once every five (5) years thereafter. Comparisons of vegetative cover will be made to determine if any adverse changes to the vegetative cover have occurred.

GENWAL further commits to not disturb any area within their permit boundary due to construction without approval from the Division. When disturbance does occur GENWAL will ensure that the smallest area practicable will be disturbed. GENWAL does reserve the right to change the location of fence posts, power poles, etc. without obtaining a permit modification. When



an area is disturbed, revegetation measures will be implemented to establish and maintain the area and to minimize surface erosion.

Mitigating Measures to Reduce Impacts on Vegetative Resources

The disturbed area within the permit area, including the four topsoil stockpiles, will be reclaimed upon permanent cessation of mining operations. Within the permit disturbed area during the operational phase, water will be applied to the coal, roads, and the adjacent forest development road when needed to reduce fugitive dust emissions. Additionally, magnesium chloride may be applied to the roads to reduce dust emissions.

All surface areas which are disturbed during construction and which will not be needed for mining operations (i.e., cut banks and outcrops of fill and areas near the sedimentation pond) will be revegetated in the fall of the year following completion of construction. This revegetation will be performed as described;

The seed mix listed below has been and will be used as temporary cover to stabilize topsoil stockpiles and disturbed areas:

<u>Temporary Mix</u>	<u>lb/acre PLS</u>
Agropyron smithii (western wheat grass)	4
Agropyron trachycaulum (slender wheat)	4
Bromus marginatus (mountain brome)	3
Elymus cinereus (great basin wild rye)	2
Melilotus officinalis (yellow sweet clover)	2
Total Seed Mix	15

A similar seed mix was used in the past for temporary cover, with the exception of Elymus janceus (Russian wild rye) which was used in place of Great Basin wild rye due to seed availability.

In the future the seed mix which will be used in the final reclamation will also be used for temporary cover to stabilize topsoil stockpiles. Lynn Kunzler of UDOGM conferred with the Forest Service regarding the change in seeding procedure and seed mix. An agreement was made, that GENWAL would use the same mix for temporary reclamation, the changes in seed mix would be approved by the Forest Service. The temporary seeding may be observed by a representative from the UDOGM, Forest Service and GENWAL. If the seed mix should need changes due to over or under growth of a particular plant, an appropriate substitution will be made after consultation with the Division.



3.33.100 Compliance with R645-301-358

The GENWAL will comply with the requirements of R645-301-358 using BTCA to protect fish, wildlife and related environmental values.

3.33.200 Designated Species

GENWAL agrees to (at a minimum) protect and enhance species and habitats identified under R645-301-322.

3.33.300 Project Impact of Mining on Fish and Wildlife

Operation will unavoidably impact small vertebrate species, temporarily eliminate approximately 1,500 feet of fisheries habitat, and increase hunting pressure on big game species. Impact to the fishery in Crandall Creek which is adjacent to the permit area will be kept to a minimum. Approximately 1,500 feet of fisheries habitat will be temporarily lost when the stream is culverted. This area of the stream will be reclaimed and the habitat re-established during reclamation of the site.

GENWAL will protect wildlife habitat on the permit area by careful design and construction of mining facilities and transportation corridors, and by keeping surface disturbance to a minimum. GENWAL has committed to report to the regulatory authority the presence of any threatened or endangered species in the area.

The substation and transformer located within the permit area supplies all the power for the mine site. The power lines from the substation are in underground conduit, providing no threat to raptors.

Water depletion by mining consists of water evaporation caused by the ventilation current and water used in the mining process and removed within the coal shipments. Water evaporation by the ventilation current varies with the volume of air and is estimated to be less than 5 acre feet per year at the maximum air flow of the mines. The amount of water depleted by the mining process varies with the tonnage of coal produced per year. At the maximum annual production the amount of water depleted is estimated to be 40 acre feet. Refer to calculations in Appendix 3-18.

Mitigating Measures to be Employed to Protect Fish and Wildlife

Impacts on the lower 2 km of the canyon will remove approximately 0.5 acre of moose habitat, winter habitat in particular. This represents only a minute portion of the moose winter habitat which encompasses all of the Huntington drainage. Of the 0.5 acre winter range to be disturbed, the riparian habitat portion is of critical value, with only approximately 3000 square feet

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of wooded area being disturbed. According to Larry Dalton of the State of Utah Division of Wildlife Resources, there is a tremendous volume of adjacent unoccupied habitat suitable to absorb displaced moose. The southeastern Utah moose herd is proliferating at a normal pace.

Moose are drawn to Crandall Canyon because of the water and vegetation which grows along the Crandall Creek. The Division of Wildlife Resources provided a map of moose wintering habitat

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in the area, the information from that map is shown on Plate 3-1. Crandall Canyon is of critical grazing value to moose all year long.

As per Larry Dalton, State of Utah, Division of Wildlife Resources, there are no known locations of drumming logs in Crandall Canyon or near the proposed surface or haul road areas to be disturbed.

The loss of 1,500 feet of fisheries habitat will be mitigated with the recommendations from the UDWR and the U.S. Forest Service. GENWAL, the U.S. Forest Service and the Utah Division of Wildlife Resources have agreed to mitigate this loss. Refer to Appendix 3-12 for the specific mitigation measures that have been agreed upon by GENWAL and the agencies.

Also, the previously approved and also the recently updated air pollution control plan, as submitted in the permit, contains itemized mitigation for dust abatement during construction. In 1983 the practice of dumping rock and soil adjacent to the mine site near Crandall Creek was stopped, to reduce impact to fisheries and food production in Crandall Creek. Efforts will continue in the future to limit disturbance of fishery habitat.

GENWAL feels that the initial aquatic study and report provides sufficient baseline data (Appendix 3-2). Additional studies have been performed in 1994. GENWAL agrees to conduct an additional aquatic macroinvertebrate study in the spring and fall of 1997 (as agreed to by the Price Office of the Forest Service). Thereafter, GENWAL will conduct additional monitoring in the spring and fall of 2000 and every three years thereafter for the life of the mine (unless the study data indicate a different schedule).

UDWR has conducted cliff nesting raptor surveys of the entire permit area. These surveys have located one site where Golden Eagles either have historically built eries or areas that have a potential for eries.

Aerial surveys of the eagle nests will be conducted every three years or on request of the USF&W Service or the UDWR. Prior to the implementation of UDWR recommendations, GENWAL will advise UDOGM and request their approval and/or recommendations. An annual survey will only be conducted: (1) in the event that UDWR recommends it, (2) this course of action will not unduly harass or stress nesting eagles, and (3) if prudent to insure their safety and/or habitat.

Wildlife

In addition to cliff nesting raptors, there is a potential for five tree nesting raptors inhabiting the permit area. They are: the (1) Goshawk, (2) Sharp Shinned Hawk, (3) Red Tailed Hawk, (4) Swainson's Hawk and the (5) Ferrugenous Hawk (the Price office of the U.S. Forest Service is of the opinion that the Ferrugenous Hawk is unlikely to occur in the mine permit area). All of these species are condo-nesters and will normally have a number of nest locations and only utilize one



per any one season. Other than surface disturbances the only potential impact to these species would be the loss of an active nest during the egg incubation period or when flightless young were occupying the nest. This could possibly occur as a result of subsidence. A GENWAL representative will contact the UDWR and the U.S. Forest Service as per their recommendations. Appendix 3-8 outlines the course of action GENWAL has agreed to implement.

3.40 Reclamation Plan

3.41 Revegetation

The revised acreage is correct in itemizing 10.53 acres of disturbance within the permit area of 5195.30 acres (total lease acreage, including new leases), refer to Plates 1-1, 2-2 and 5-3. Each application will contain a reclamation plan for final revegetation 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, showing how the GENWAL will comply with the biological protection performance standards of the State Program. The plan will include, at a minimum, as described in the following Sections 3.41.100 through 3.41.300.

3.41.100 Detailed Schedule and Timetable

All reclamation, other than areas handled in interim reclamation, will commence with final grading of disturbed surface areas, which should be completed in approximately one month. Within 30 days following completion of final grading (which should be in late September or early October), topsoil from the stockpile will be redistributed. Nutrients and soil amendments, if shown to be required by soil tests, shall be applied to the redistributed topsoil before the end of October. Seeding, transplanting and mulching will then proceed when moisture conditions are optimal for planting and seeding. Seeding will commence as soon as the seedbed is finished in the late fall. Tree planting will be done in conjunction with seeding or in the following spring, as soon the soil is workable.

As stipulated by the Price office of the U.S. Forest Service the sediment pond will be removed in final reclamation after the mine site has been revegetated and the potential for erosion and sedimentation has been significantly diminished. All associated control devices will be removed after the criteria of R645-301-763.100 has been achieved, according to the approved reclamation plan. The permanent runoff control system will then be completed (see Chapter 7 for further information).



3.41.200 Descriptions

3.41.210 Species and Amounts of Seeds and/or Seedlings

A planting (seed) mix has been developed for the non-riparian and riparian disturbed areas. It is made up of native and naturalized grass, forb, and shrub species (see Appendix 3-6). Trees species will be planted in the wooded areas and riparian zone.

Appendix 3-6 includes a list of grasses, forbs, shrubs and trees to be used after December 1988 for both interim stabilization of topsoil stockpiles and for reclamation. This list was compiled by Lynn Kunzler in conjunction with the USFS. If changes in the seed mixture become necessary due to over or under growth, seed availability, etc., all parties involved will come to an agreement as to the right seed mixture for each area. This list has been amended for the culvert expansion project after consultation with DOGM and USFS.

Refer to Plate 5-16 and 5-17 for the areas to be planted with planting mixture (Appendix 3-6). Two tenths of a pound per acre of Louisiana Sagebrush (*Artemisia ludoviciana*) could be added if needed for erosion control.

The following procedures are designed to revegetate and control erosion. They should, to a large degree, satisfy the commitments made by GENWAL in their desire to restore the disturbed land to its pre-disturbance condition.

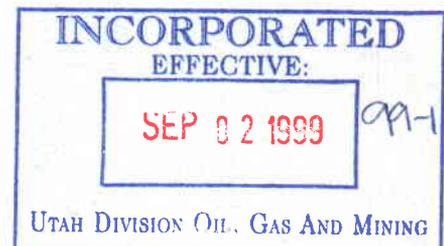
The actual ground involved comprises approximately 10.20 acres of disturbed land, primarily coal facilities and fill areas. The actual procedures involve a three phase program: (1) broadcast seeding, (2) hydromulch the entire area to supplement revegetation and control run-off until stabilization is complete, and (3) to plant seedlings to further stabilize the soil and to provide necessary wildlife, hydrological, and aesthetic commitments as required under R645 regulations.

3.41.220 Methods to be Used in Planting and Seeding

Phase 1 Seeding

The entire area of disturbance will be broadcast seeded during the first fall following the completion of the earth work (October through November). Spring seeding was considered too speculative to be implemented based on the variation in spring moisture regimes. All areas receiving top soil would be seeded. This includes the top soil stockpile area and associated disturbance.

Hydroseeding combines the advantages of applying seed uniformly over all areas, plus, with the addition of a tackifying agent, insures a greater degree of stability and seed-ground contact. "Tac" acts much in the same way as a "permeable matt" it sticks the seed to the ground and to a



degree, helps adhere the new soil to the side hill. It minimizes the potential for erosion and will be residual for up to 2 years, aiding the seedlings to become established.

3.41.230 Mulching Techniques, Type and Rate of Application

Phase 2 Mulching

The entire area of disturbance will be hydro-mulched during September-October. Hydromulching will be carried out in conjunction with the earth work. Recommendations for the hydromulching operation are as follows:

This methodology involves the use of hydroseeder to apply the seed and tac to all disturbed areas and then to overspray the seeding with a bonded fiber mulch in combination with additional tackifying agents.

The following rates of material should be utilized. Rates of tac were developed with respect to velocity and erosive power of water which is proportional to the square root of the slope. An empirical factor was determined from laboratory and field studies to arrive at the minimum tac fiber ratio. Thus, 60 pounds of tac per ton of fiber is determined to be required for a slope of 25% (a 25% slope will require the minimum amount of tac). For additional slopes the ratio of tac to fiber is calculated as:

SUGGESTED RATIOS OF TAC TO FIBER FOR HYDRO-SEEDING AND HYDRO-MULCHING TO SERVE AS MULCH OR SOIL BINDER

<u>Slope Angle</u>	<u>Slope Ratio</u>	<u>Percent Slope</u>	<u>lbs. Tac Per ton Fiber To Fiber</u>	<u>Ratio Tac</u>
14°	1 : 4	25%	60 (Minimum)*	1 : 30
26°	1 : 2	50%	80	1 : 25
33°	1 : 1 1/2	66%	100	1 : 20
45°	1 : 1	100%	120	1 : 16
45°	1 1/2 : 1	150%	140	1 : 14
64°	2 : 1	200%	160 (Minimum)	1 : 12

Sixty pounds of tac is suggested as a minimum to insure excellent stabilization with the seed application. An additional 80 pounds of tac per acre with the mulch application has given excellent results on a 1 : 1 slope.

Following the seeding effort the entire area of disturbance will be hydro-mulched. The rate of application of the mulch is 2000 lbs./acre.



No attempts will be made to establish rabbitbrush as previous experience has shown that it is impossible to stop this shrub from invading the area. If Snowberry does not establish from seed by the end of the second year, seedlings from native plant nurseries will be planted randomly on approximately one rod intervals where they occurred in the original land cover of the disturbed areas.

Tree species and rates, to be planted on the slopes of 30% or less are listed in Appendix 3-6.

If the seeded shrubs do not grow, then replacement seedlings will be planted in clumps. While clumping will not give a uniform seed dispersal over the entire area it would enhance wildlife habitat.

Species diversity standards have been established for revegetated areas. These will insure that a good mix of grasses, forbs, shrubs and trees, where appropriate, will be re-established, and that the reclaimed area will not be dominated by one or two species. GENWAL has committed to protecting revegetated areas and to managing the reference area in a manner compatible with postmining land use.

Interim reclamation will be undertaken following construction. Plates 7-5 and 5-16 show areas of interim reclamation.

The USFS, USF&W Service and UDOGM have requested that the riparian habitat be restored along Crandall Creek. The proposed seed mix and planting mix should accomplish this goal.

3.41.240 Irrigation and Pest and Disease Control Measures

No irrigation is anticipated (see Section 3.31).

GENWAL hereby commits to avoid the use of persistent pesticides and/or chemicals and to prevent personnel caused fires.

Should lack of precipitation cause the vegetation to fail, all areas will be revegetated. No attempts will be made at irrigating the revegetated areas during final reclamation. The species recommended for revegetation are known to survive in this region without the artificial application of water.



3.41.250 Revegetation Success

Revegetation Monitoring

Success of revegetation shall be monitored by techniques approved by the Division after consultation with the appropriate State and Federal agencies. Comparison of ground cover and productivity will be made on the basis of reference area. Ground cover and productivity figures from the reference area will be used as a standard for all revegetated areas. The shrub density standard for south facing slope areas will be 1,336 shrubs/acres (as per baseline data).

GENWAL has used the reference area method to set criteria for determining success. One reference area was established, as shown on the Vegetation Community Study Map, Plate 3-7. The reference area for the north-facing slope spruce/fir/aspen community is shown on Plate 2-4.

The seed mix meets the postmining land use of light livestock grazing and wildlife habitat. Data on cover and tree density have been submitted. Should seeding not be successful, a plan for seedling shrub planting (to enhance the habitat for wildlife) will be developed prior to implementation and submitted to UDOGM for approval.

The original plots were done by ocular estimate of circular plots. The circular plots were done randomly by laying a steel circle of 11 feet circumference upon the ground and recording the vegetation density, the bare ground, surface fragments and litter values as a percent of the enclosed circular area. On the MSG area the following original species density, in percent of composition, were recorded: 92% grass, 2% forbs and 6% shrubs. Upon reseeding, there will be a minimum of 5% shrubs with a maximum of 20%, minimum of 2% forbs with a maximum of 20% and the remainder will be taken up by grass species to meet required standards. For the reference area, the following densities were found on the original survey: 94% grasses, 1% forbs and 5% shrubs. On the SFA area there will be a minimum of 6% grasses with a maximum of 20%, minimum of 14% forbs with a maximum of 30% and the remainder being taken up by shrubs.

On the MSG area including the reference area, there was no sign that any domestic livestock had ever used this area. The slope steepness of 70% and greater making domestic livestock use prohibitive. Elk and mule deer had and were using the area. The 30% and less slopes and the riparian area show that domestic livestock have used the areas.

GENWAL has chosen to follow the diversity standards recommended as a result of consultation between the Forest Service and the Division. In the spruce/fir/aspen areas, grasses are expected to dominate the vegetation for the first several years until the tree and shrub growth becomes more prominent. The diversity standard would be 3-15% relative cover from broadleaf forbs, at least 15% cover from trees and shrubs, and the balance from grasses. This will leave some latitude for variation over time since woody plants are expected to eventually become dominant in the area.

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The riparian and north facing slope areas will also become dominated by woody species as the vegetation matures. A standard of 5-10% relative cover from broadleaf forbs, 40-85% relative cover from trees and shrubs, and 10-50% relative cover from grasses and grasslike plants will be applied to the riparian area.

For both riparian and spruce/fir/aspen areas, no one species will make up more than 60% of the cover in its respective vegetation class, except that individual species of trees and shrubs will make up no more than 80% of the density for this class. The diversity standards for south-facing slopes are based on Natural Resource Conservation Service range site potential plant community data. The diversity standard for the riparian and north facing slope areas was developed by a Forest Service botanist, a NRCS soil scientist and a DOGM biologist .

The Division and Wildlife Resources has established woody plant density success standards of 4,000 woody plants per acre for the spruce/fir/aspen areas and 6,000 woody plants per acre for riparian areas.

A detailed plan for monitoring revegetated areas is presented below. This includes specific methods for collecting data on cover, productivity, and shrub and tree density, as well as a time table for all monitoring activity.

The reference area will be reviewed by the SCS for range conditions every five years, during the field season before permit renewal. If the range condition is found to be in a deteriorating condition because of encroachment of wildlife or livestock the area will be fenced.

The areas that have been revegetated will be monitored during the 2nd, 4th, 7th, 8th, 9th and 10th years during the last half of the growing season, thus corresponding to the time of the original vegetation survey. Ocular estimates will be made in years 2 and 7 with quantitative estimates in years 4, 8, 9, and 10, or one year prior to Phase II Bond Release. Species diversity will be confirmed in years 9 and 10, or one year prior to Phase II Bond Release, and compared to the reference area data collected during the same sample period. If on any year the monitoring shows the vegetation to be below the requirements, steps will be taken to increase the vegetation by additional seeding with the required seed mixture.

Circular plots will be located randomly across the entire revegetated area. A steel hoop of 11 feet circumference, enclosing an area of 9.6 square feet will be used to determine the ocular plot for estimating percent cover by species and total vegetative cover, percent bare ground, percent of surface fragments and percent litter within the hoop boundaries.

The point-centered quarter plots will be used to check tree and shrub densities in years 4, 8, and 10, or prior to Phase II Bond Release, in order to demonstrate that 80% of trees and shrubs have



been in place for at least 60% of the liability period. No trees or shrubs will be counted that have not been established for two years.

For sample adequacy of vegetation data during the 9th and 10th years, the formula suggested in the latest UDOGM guidelines will be used.

Approximately 22 plots in the MSG area and 10 plots in the reference area will be needed to meet the standard of the UDOGM formulas. The double "t" test will be used, the 9th and 10th year, to test similarity of the reference area to its affected vegetational counterpart with respect to cover and shrub density and productivity.

Resulting figures and data from the reclaimed areas will be compared with the data collected the same year from the reference area to determine vegetative compliance. The reclaimed area must meet the success criteria during years 9 and 10 of the liability period. The double "t" test to check revegetation data and reference area data will be collected the same year.

Adequate sampling will be ensured, especially at the time of bond release, years 9 and 10. Reclamation will be considered successful when percent cover density and productivity are within 90% of the reference area or other approved standard (with a confidence interval of 90%).

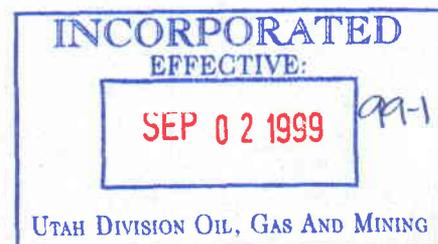
As a final step during the last field check upon the vegetational productivity, an adequate sample, as determined by the above adequacy formula, within the reference area will be clipped and weighed and the weights recorded by individual species for each plot. The average weights of these plots will be compared to the average production of species of similar plots taken in the revegetated areas. The production of plots taken from the reseeded area must fall within the limits of 90% or better of the production of plots taken from the reference area. All weights for comparison will be dry weights.

Monitoring data will be submitted to the Division with the annual report. GENWAL also commits to fencing the revegetated area until plants are well established should grazing pressure on the revegetated area be excessive. Any fencing will be approved by the Division prior to erection.

Regarding erosion control monitoring, GENWAL proposes to utilize "Erosion Condition Classification System" (Humphreys, 1990), the erosion classification system developed by the BLM and modified by Mark Humphreys of OSM. In utilizing this system, SSF values would be kept at less than or equal to the surrounding undisturbed areas.

3.41.300 Greenhouse Studies

Should the Division require greenhouse studies, field trials, or equivalent methods of testing, GENWAL will comply when feasible.



3.42 Fish and Wildlife

Each application will contain a fish and wildlife plan for the reclamation and postmining phase of operation consistent with R645-301-330 (Section 3.30) and the performance standards of R645-301-358 (Section 3.58). Following mining, revegetation will be primarily concerned with replacing the premining habitats. High value habitats will be restored; in many cases, they will be enhanced beyond their premining condition.

3.42.100 Enhancement Measures

Enhancement measures will be used during the reclamation and postmining phase of operation to develop aquatic and terrestrial habitat. Such measures may include restoration of streams and other wetlands, retention of ponds and impoundments, establishment of perches and nest boxes. Where the plan does not include enhancement measures, a statement will be given explaining why enhancement is not practicable.

No additional enhancements are proposed during the reclamation of the GENWAL mine facilities, other than those stated in the reclamation plan.

3.42.200 Criteria for Plant Species Selection

Where fish and wildlife habitat is to be a postmining land use, the plant species to be used on reclaimed areas will be selected on the following basis.

1. Their proven nutritional value for fish or wildlife;
2. Their use as cover for fish or wildlife; and
3. Their ability to support and enhance fish or wildlife habitat.

The selected plants will be grouped and distributed in a manner which optimizes edge effect, cover, and other benefits to fish and wildlife.

GENWAL's goals are to create an enhanced diversified cover and/or habitat that will support a wide range of species while restoring the area to a premining condition.

3.42.300 Croplands

There are no croplands within the permit area. See Appendix 2-1.



3.42.400 Residential, Public Service or Industrial

There are no residential, public service, or industrial postmining land uses planned within the permit area.

3.50 Performance Standards

3.51 General Requirements

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

3.52 Contemporaneous Reclamation

Revegetation on all land that is disturbed by coal mining and reclamation operations, will occur as contemporaneously as practicable with mining operations.

3.53 Revegetation

General Requirements

GENWAL will establish on regraded 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 approved permit and reclamation plan. The seed mix and plant stock detailed in Section 3.41.200 meet all of the reference regulations in R645-301-353.

3.53.100 Vegetative Cover

The vegetative cover will be:

Diverse, effective, and permanent;

Comprised of species native to the area, or introduced species approved by the Division;

At least equal in extent of cover to the natural vegetation of the area; and

Capable of stabilizing the soil surface from erosion.

The erosion condition classification system will be employed on a yearly basis after final reclamation has been accomplished in order to monitor the effectiveness of revegetation in stabilizing the soil surface from erosion.



3.53.200 Plant Species

The established plant species will:

Have similar seasonal characteristics of growth as the original vegetation;

Be capable of self-regeneration and plant succession;

Be compatible with the plant and animal species of the area; and

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

3.53.300 Species Exceptions

The Division has granted exception to GENWAL to include yellow sweet clover in their seed mix to achieve a quick-growing, temporary, and stabilizing cover.

3.53.400 Prime Farm Lands

There are no prime farm lands within the permit area. See Appendix 2-1 (Prime Farm Land Determination).

3.54 Revegetation; Timing

See Section 5.42 of Chapter 5.

3.55 Revegetation; Mulching and Other Soil Stabilizing Practices

Suitable mulch and other soil stabilizing practices will be used on all areas that have been upgraded and covered by topsoil or topsoil substitutes. See Section 3.41.230.

3.56 Revegetation; Standards for Success

3.56.100

GENWAL's success of revegetation will be judged on the effectiveness of the vegetation for the approved postmining land use and the extent of cover compared to the extent of the reference area cover.

The Division's "Vegetation Information Guidelines, Appendix A" will be used for sampling techniques and methods to measure success.



Unmined lands in the area of GENWAL will be used 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.

3.56.200 Postmining Land Use Success Standards

The area of disturbance will be reclaimed with the intent of limited domestic grazing as a side use to wildlife habitat and will adhere to the standards outlined in 356.200.

GENWAL agrees that the minimum stocking and planting arrangements will be specified by the Division. Trees and shrubs 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. Vegetative ground cover will not be less than that required to achieve the approved postmining land use.

Cropland

No prime farmland (cropland) exists within the permit area (see Appendix 2.1).

Residential, Public Service, or Industrial Postmining Land Use

Due to limitations imposed by topography, climate, soil conditions, inadequate water supply and other natural features, use of the land within the area has been limited primarily to livestock grazing, wildlife habitat and outdoor recreational activities.

No development for industrial, commercial or residential use is anticipated.

Previously Disturbed Areas

All previously disturbed land within the permitted area of disturbance will be addressed and reclaimed in the same manner as newly disturbed areas.

As the vegetative ground cover existing before redisturbance was 50.3%, this figure has been established as the vegetative cover standard for success for the areas previously disturbed by mining.



3.56.300 Siltation Structures

GENWAL will leave all siltation structures in place until adequate vegetation cover is achieved to minimize negative impacts and authorization has been given by the Division.

3.56.400 Removal of Siltation Structures

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

3.57 Revegetation: Extended Responsibility Period

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. Based on historic precipitation record GENWAL anticipates a 10-year liability and responsibility period.

GENWAL will take all steps necessary to insure revegetation success during reclamation.

3.58 Protection of Fish, Wildlife, and Related Environmental Values

GENWAL commits to using the best technology currently available to minimize disturbances and adverse impact to the fish, wildlife and related environmental values and the enhancement of these resources when practical.

Construction of the newly expanded surface facilities will allow salt and road traction to be stored in the area of the existing coal loading facility after these facilities have been removed and the area has been cleaned up. Runoff from this new salt/road traction storage area will report directly to the sediment pond thereby minimizing potential impacts to the aquatic environment in Crandall and Huntington Creeks. Installation of the 72" culvert will remove a section of aquatic habitat from Crandall Creek. However, the newly constructed surface facilities will allow greater control of surface runoff from the mine area. This will reduce the potential for accidental contamination of Crandall Creek from sediment, coal fines and other contaminants.

Construction work that may have had an impact on the Crandall Creek fishery is the construction of the haul and access road. This haul and access road was constructed and is maintained under jurisdiction of the USFS. Impacts and required mitigation are addressed in the approved environmental assessment, authorizing the construction of the Crandall Canyon Road and Bridge as proposed by GENWAL, dated May 18, 1981. The approved air pollution control plan, as submitted in the permit, contains itemized mitigation for dust abatement during construction.



In 1983 the practice of dumping rock and soil adjacent to the mine site near Crandall Creek was stopped, to reduce impact to fish spawning and food production in Crandall Creek. Efforts will continue in the future to limit disturbance of fishery habitat.

GENWAL has committed to conducting additional macrobiotic studies in the spring and fall of 1997 and again in the year 2000 and every three years thereafter for the life of the mine (unless study data show a different schedule would be effective). Stream flow and water quality will also be monitored as proposed in previously submitted ground and surface water monitoring plans.

Threatened and Endangered Species

GENWAL will conduct no coal mining or reclamation operation which is likely to jeopardize the continued existence of endangered or threatened species. GENWAL will report to the Division any state-or federally-listed endangered or threatened species within the permit area.

No nests or eries are located within any area that could feasibly be in jeopardy through mining or mine related activities. At no time will GENWAL proceed in any manner which could theoretically jeopardize raptors or threatened and endangered species.

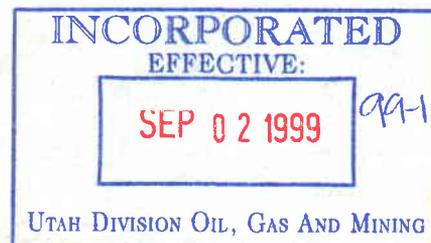
Wetlands and Riparian Vegetation

See Sections 3.23.300, 3.33.300, 3.41.200, and 5.25.16.

An inventory of soil and vegetation resources potentially affected by GENWAL's proposed yard expansion within the riparian zone of Crandall Creek was conducted in July and October of 1994 by employees of Environmental Industrial Services (EIS).

A soil survey, using U.S. Army Corp of Engineer standards, was conducted to determine the presence of hydric soils within the area of proposed disturbance. Six soil pits were located randomly throughout the riparian corridor immediately adjacent to Crandall Creek. Of the six samples sent to Intermountain Laboratories for analysis, two indicted possible hydric soil development. Two other pits were located up on a small bench above the riparian corridor. Of these samples, one indicated the presence of hydric soil, possibly the result of seepage from the hillside above.

The soil resources along the proposed expansion area had been previously mapped by the U.S. Forest Service. Portions of the field work were conducted by Mr. Dan Larson. Written descriptions were obtained from "Soil Survey of Parts of the Price River and Huntington River Watersheds" by John L. Swenson, Wesley Ketch and Laurel Stott, December, 1983. Refinement of the soil boundaries and descriptions were completed by GENWAL Resources, Inc. personnel, David Steed of EIS, and Chris Hansen of EarthFax, through additional field work conducted during the summers of 1995 and 1996.



The soils were mapped and correlated by the U.S. Forest Service as the Bundo-Lucky Star (Map Unit 100) and Lucky Star-Adel (Map Unit 711) complex and the Greyback Bachelor Family (Map Unit 301).

The Bundo-Lucky Star and Lucky Star-Adel are described as Typic Paleoboralfs, loamy-skeletal, fine sandy loam, 40 to 70 percent slopes. The Greyback Bachelor Family is described as a Typic Cryorthent, fine-loamy mixed, (calcareous), 30 to 50% slopes. These soils also contain small inclusions, less than 0.25 acres of alluvial/colluvial soils which have been deposited and formed on the south side of Crandall Creek. In the area of the mine, these soils are shallow to moderate in depth and are underlain by bedrock. Numerous rock outcrops are present.

Field methodology was based on procedures established by the U.S. Army Corp of Engineers (USACE), Corp of Engineers Wetland Delineation Manual, 1987 Edition for the identification of hydric soils. The procedures for the determination of wetland soils in both organic (nonsandy) and sandy soils incorporated into this study were:

- determining the presence of organic soils (histosols)
- determining the presence of organic material in surface horizon, or streaking of organic material in subsurface horizons (sandy soils)
- determination of a saturated A horizon (histic epipedon)
- the indication of a reducing environment (sulfidic material or presence of ferrous iron)
- a completely saturated soil structure (aquic or peraquic)
- use of a Munsell Color test (nonsandy soils only)
- determining the presence of an organic "pan" .

The inventory of possible hydric soils was accomplished with the excavation of six (6) soil pits randomly located along the riparian corridor. Pits were located along the channel banks, so as not to sample recently deposited material or exposed channel substrate. As the material was excavated down to parent material, the composition of the native material was noted. Soil moisture was also noted for each sample as was depth of the organic layer. A composite sample was collected for each of the six samples because no significant soil horizon formation was apparent.

Two representative samples were collected from the adjacent bench area using the same methodology as for those collected along the riparian corridor. Only two samples were collected due to the small, uniform nature of the bench which comprised an area 200' x 50'. Composite samples were collected due to the lack of substantial horizon formation.

On-site field investigation of the riparian corridor and the adjacent bench indicated a potential for hydric soils at locations along the riparian zone at SS 5 and SS 6 and on the bench area at location SS 1. Riparian SS 5 and SS 6, Entisols located above the bankfull mark on the northern embankment of Crandall Creek, were saturated throughout their depth to parent material (preaquic).



The presence of thick organic layers within these two samples were also identified. The bench sample SS 1 was saturated and contained a one inch organic pan layer 11 inches below the surface. The pH levels were higher than expected along the riparian corridor (7.5 to 7.7). Munsell Color tests did not provide satisfactory identification of hydric soils since all of the samples analyzed were sandy.

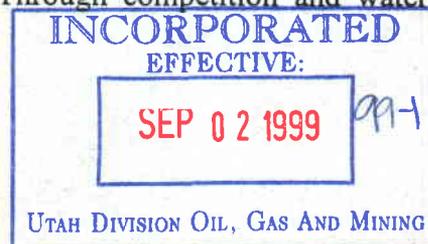
A hydrologic influence to soil resources is inherent to a riparian area. All soil along the greenline; that area where a continuous cover of vegetation has resulted from the presence of a saturated environment, is to some degree hydric in nature. Though Samples 5 and 6 were identified as hydric soils, their presence along the channel within the narrow riparian corridor would assume this. Therefore, the presence of these two samples is not in itself a significant indicator of a wetland.

The presence of the hydric soil on the adjacent bench is questionable. Bench Sample 1 was taken uphill and more than 100 feet away from the true greenline corridor. At this location the influence of the wetted channel is doubtful. It is more likely that runoff from the steep slope above the bench may have resulted in sediment deposition and localized saturated environment. The presence of a seep or spring may also have produced this inclusion

The current vegetation inventory took into account the previous evaluation of the deciduous/coniferous community, past disturbances, and the divers nature of this stretch of Crandall Creek. Vegetation along this particular section is varied throughout the 1,000 feet, due to past disturbances from fire and grazing. A series of beaver ponds, rock outcrops and steep side slopes have also contributed to intermittent vegetation cover along the length of the corridor. The community cover, in general, is a mix of grassy slopes, deciduous and coniferous clusters, and shrubby stretches that border a relatively narrow wetted zone along the creek.

Vegetation cover was relatively high (>70%) over the area of proposed disturbance. Species richness and diversity within the corridor and the bench, however, do not reflect a highly even community. With the exception of forb species, diversity for the corridor and adjacent bench is low, considering the influence of the wetted hydrological regime associated with the creek in the narrow corridor. Species composition decreases as distance from the creek increases. The steep slopes (40-70%) that border the riparian corridor and bench are not as directly affected by the wetted channel, and tend to be covered with abundant xeric shrub species which do not have the water needs of the lush grasses, forbs and trees that border the creek. Diversity of species is thus limited by the availability of water and the resultant competition by hardier species on these slopes.

The influence upon the bench by the adjacent riparian corridor does not seem to be of a benefit to species diversity and richness. Moisture accumulations associated from winter snowpack and spring runoff have resulted in the high density of emergent quaking aspen (*Populus tremuloides*). Past disturbances to the bench be fire has resulted in the high density of transitional aspen "sucker" shoots. The high abundance of transitional shoots (<2 inch diameter) do not correctly reflect the amount of true trees upon the bench. Through competition and water



restrictions, the majority of shoots sampled could in effect die out or be replaced by another cover type.

High shrub abundance is expected. A drier environment (except for a small wetted inclusion at its western end) exist over much of the bench, establishing conditions that enable shrub species to compete more successfully for resources than other cover types. Due to interspecies competition, diversity of species is lower. Forb diversity, however, is high and may be the result of the wetted inclusion where soil moisture conditions allow for more mesic and lush vegetation cover to exist.

A wetland analysis has been done for the 1,500 foot segment of Crandall Creek where the yard expansion will occur and is included in Appendix 3-13. Using the information gathered for the baseline vegetation survey, an evaluation was done for this area based on the Army Corp of Engineers methodology described in "Corp of Engineers Wetland Delineation Manual (1987)". Using the evaluation format set forth in the USACE Wetlands Delineation Manual, this area does not meet the criteria of jurisdictional wetlands because it does not have dominant hydrophytic vegetation.

In conclusion, the stream inventory shows that no jurisdictional wetlands regulated by the Army Corps of Engineers exists in the proposed disturbance area along Crandall Creek. This determination was also confirmed by the Utah Division of Water Resources. GENWAL recognizes the significant value of the broadly defined wetlands that typically exist along steep mountain streams. The reclamation plan included in the Crandall Canyon Mining and Reclamation Plan specifically addresses the protection of the stream during the life of the yard expansion project as well as during final reclamation.

Electric Power Lines and Other Transmission Facilities

All electric transmission lines that could pose a threat to raptors have been safeguarded to minimize hazard.

Potential Barriers and Toxic Forming Materials

No structures at GENWAL create barriers to wildlife and no hazardous or toxic materials are stored which wildlife could gain access.

