

**CHAPTER III
OPERATION AND RECLAMATION PLAN**

*For On-site Coal Piers &
Trench Workout facility plans,
approved June 27, 1988 - see
ch 3, notes 3.2.3 & 3.2.4
of the new 1988 5-year IAP
submitted. JH/epk*

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*- see App
3-XXX of
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for applicability
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PART 3.1 SCOPE

This Chapter will present the surface facilities, operation plan, underground operation, environmental protection, and reclamation plan.

PART 3.2 SURFACE FACILITIES/CONSTRUCTION PLANS

3.2.1 Site /Selection and Preparation

The site selection was limited to the only area where the coal outcropped in the lease area. This site is extremely small at this point and very few options are available at this time. See the proposed surface facilities layout Plate 3-1 and pre-mining land configuration on Plates 9-1, 9-2 and 9-3.

A Forest Service road use permit was obtained from the U.S. Forest Service, Manti LaSal National Forest, Price, Utah, in order to build, use and maintain the road to the mine permit area. This Forest Development Road does not lie within the permit area and is not included as part of this permit application. The permit area begins at 67+00 on the Forest Road. The Forest Road that passes by the mine site will be included in the permit area for the purpose of drainage control.

The topsoil will be stripped according to the plan located in Chapter 8. These topsoil stockpiles will be seeded with the topsoil stockpile seed mix found in Chapter 9. The topsoil stockpiles will be protected from encroachment by placing earthen berms where needed. If straw berms are to be installed to prevent erosion and contamination, approval will be requested from DOGM prior to their installation.

*straw berms
should be
done
now.*

3.2.2 Portals

Four portals have been placed on the Starpoint Sandstone in the Hiawatha coal seam. Three of the four portals will be used, while one of the portals will be sealed. The three portals will be used for intake ventilation, beltline, and a return ventilation fan.

During the early part of 1985 a drilling program was conducted to determine the extent of the upper, or Blind Canyon Seam. The drilling results indicated that the upper seam was not economically mineable at the present time, therefore portals to access the upper seam will not be necessary. The location of the drilling stations are included on Plate 3-2.

3.2.3 Surface Buildings and Structures

At the present time no buildings are anticipated, however 3 trailers are to be placed on site to act as a temporary warehouse office building and rockdust supply.

A generator set with two power centers will be located on the surface to provide power underground. Fuel tanks needed to run this generator set will be placed on the surface as well. The fuel tanks and all oil containers will be stored inside a containment area with a 3' high concrete block wall placed on the perimeter (See Plate 3-1) in order to prevent a spill from leaving the containment area and contaminating the surrounding area. The containment area will be of sufficient volume to hold all the fuel and oil that will be stored within the area, this being approximately 5000 gallons. The containment area will have valves placed in the outer wall in order to drain any spill or water in the containment area, and to facilitate draining oil from the generator. Oil used underground will be stored in this fuel containment area as well. The generator set will be placed on the main pad at a temporary location pending construction of a permanent substation location on the upper pad, refer to Plate 3-1.

No utility poles are proposed for the area at this time, however in the event poles are installed they will be installed in order to protect raptors and other wildlife from possible danger. All structures will be designed and constructed to minimize damage to fish, wildlife and related environmental values as outlined in UMC 817-181.

3.2.4 Coal Handling, Processing, Preparation, and Storage

Coal will exit the mine on a 36-48" conveyor belt. This mainline conveyor will extend approximately 60' outside of the portal where it will dump the coal onto a grizzly. The coal on the mainline conveyor contains sufficient water to control the coal dust, therefore with the short length of the conveyor and the water used to control the dust it will not be necessary to cover the conveyor. The division of air quality has issued a permit allowing for the conveyors to remain uncovered (See Item XI-1). The belt conveyor will be of very simple construction using 2 wire ropes, bottom stands, rollers and a head pulley installed over the grizzly. Refer to Plate 3-1.

The grizzly used at the end of the mainline belt will direct the lump coal into a chute and to a separate lump coal pile. The undersized product will then go through the grizzly and onto a chute to be deposited into the coal stockpile. These two piles will be located next to each other on the same pad. The coal

stockpile will be equipped with water sprays to suppress dust when needed.

The coal will then be loaded out of the two stockpiles with a front-end loader and dumped into trucks.

3.2.5 Power System, Transmission Lines, Substations, Feeders

Power for the mine, both underground and surface use, will be provided by a diesel generator located on the surface. The generator will provide a 480 VAC power supply to a power center located next to the generator. Powerlines will be run on the ground or overhead to the mine portals where they will go underground. All the electrical installations will meet the appropriate 30 CFR Part 75 and 77 MSHA regulations.

3.2.6 Water Supply System

The culinary water used at the mine will be purchased from a vendor or supplied from the Huntington City water supply. The culinary water will be placed in containers designed for this purpose.

The water used underground will be placed in the mine sumps located underground. The location of the sumps will change as mining progresses across the reserve and will not remain in any one area. These sumps will be filled with water produced underground, or from a pump located in Crandall Creek.

3.2.7 Sewage System

At the present time, with only one regularly scheduled employee on the surface per shift, a portable chemical toilet will be used in lieu of a sewage system. This toilet will be maintained in accordance with Forest Service and State Health regulations. In the future with the addition of permanent surface facilities, a sewage system will be designed and approved prior to construction. The sanitary facilities underground will comply with all MSHA regulations.

3.2.8 Water Diversion Structures

See Chapter 3 Appendix

3.2.9 Sedimentation Control Structures and Water Treatment Fac.

The existing sedimentation pond will be reconstructed during the 1986 construction season in accordance with UMC 817.46, as detailed in the Runoff and Sediment Control Plan located in Chapter 7.

Underground sumps will be built in order to effectively treat underground water before discharging into Crandall Creek, refer to Plate 3-2 for the sump locations. These sumps will be designed and submitted to the EPA for approval

before discharge begins. All discharge into the creek will meet effluent limitations of the NPDES permit and monitored in accordance with same, refer to Item 3-8.

The sediment pond and the underground sumps are the only water treatment facilities proposed at the mine site.

A NPDES permit has been issued for the sediment pond and is included as Item 3-8.

During the construction of the surface facilities straw bale dikes will be erected and maintained during construction as shown on plate 3-1. These three areas will have straw bale dikes erected prior to construction in that area. All water from the pad area construction will be treated in the newly renovated sediment pond.

During the renovation of the sediment pond, if necessary, water entering the pond will be pumped into the mine sump and discharged to Crandall Creek after treatment.

3.2.10 Transportation, Roads, Parking Areas

The coal from the mine will be transported to the rail load out or final destination by truck. The trucks are typical 40 Ton tandem trailer coal haulers used in the Utah coal fields. Genwal does not own a rail loadout at this time, however a loadout in Price, Utah will be contracted to load coal into trains when necessary.

The Forest Development Road from Huntington Creek to the truck turn around area will be designated as a Class 1 road and will be maintained in compliance with the road use permit issued by the U.S. Forest Service, Manti-LaSal National Forest. The forest access road will remain as part of the post mining land use in accordance with the Forest Service permit. The Class 2 Forest Service Access road to the main pad area from the truck turn around area will be designed, maintained and restored in accordance with the Forest Service road use permit. The Class 2 road from the main pad area to the portal area will be designed, maintained and restored in accordance with UMC 817.160-170. The Class 3 road to the substation pad will be designed, maintained and restored in accordance with UMC 817.170-176.

All roads in the permit area will have weekly inspections performed in order to determine the maintenance required to minimize and correct erosion problems before they become extensive. Maintenance will be performed as required to control erosion. This maintenance will include maintaining the ditches, resurfacing when needed and maintaining proper

drainage.

The Class 1 Forest Service road will be utilized by coal haul trucks, mining equipment on a limited basis, support vehicles, employees and recreational users. The Class 2 roads located on the permit area, the portal pad road and the access road to the main pad from the truck turn around area, will be utilized by both surface and underground mining equipment, support vehicles and employee vehicles. The Class 3 road to the transformer pad area will be utilized by service vehicles on a very limited basis.

The Class 3 road to the transformer pad road will be reseeded after construction and a gate will be placed at the bottom end of the road to restrict access to the road. See Figure 3-1.

Two parking areas will be maintained at the mine site. These parking areas, the upper main parking area and the stockpile area will be utilized by Genwal for equipment and employee parking. A forest parking area will be developed past the mine site for primarily recreational/forest service parking. This parking area will not be used by Genwal Coal Company. The parking areas on the main pad and stockpile areas will be used exclusively by Genwal Coal and its employees.

The plan view for the above roads may be found on Plate 3-1, the typical cross section for each road and their corresponding profile may be found on Plate 3-6.

3.2.11 Total Area for Surface Disturbance During Permit Term

The total disturbed area for the life of the mine will be 5.75 acres as described in Section 1.1. See Plates 3-1 and 2-1.

3.2.12 Additional Areas for Surface Disturbance for the Life of

the Mine

No additional surface disturbance is anticipated for the life of the mine.

3.2.13 Detailed Construction Schedule

Construction will begin as soon as weather and snow conditions permit in 1986. Construction of the main pad area, upper pad area, portal road, parking areas, forest access road and sediment pond will be completed by July 31, 1986. The following table represents construction beginning on June 1, 1986, however construction will begin when the climate allows and all dates will then become relative:

Start Date	Event	Completion Date
June 1	Sediment Pond Enlargement	June 20
June 1	Construct Cut Off Ditches	June 15
June 20	Topsoil Removal Main Pad	June 25
June 20	Reconstruct Upper Pad	June 30
June 26	Construct Cut Off Ditches	July 3
June 26	Construct Access Road, Main Pad, Portal Road and Parking areas	July 20
July 20	Move Existing Trailer, Generator, and Fuel	July 31

3.3 OPERATION PLAN

3.3.1 Mining Plans

3.3.1.1 Multiple Seam Considerations

The lower Blackhawk Formation of the Wasatch Plateau is known to contain two mineable seams in this general area. These two seams are locally referred to as the Hiawatha and the Blind Canyon (lower and upper seam respectively). Originally two seams were thought to exist in the mine plan area, however a drilling program that began in March 1985, and since concluded, has revealed that the upper seam is not of mineable thickness in the Tract 1 area. Future drilling will be done to determine the feasibility of mining the upper seam, if the horizontal extent and mining conditions make mining the upper seam economical the upper seam will be mined. If the economics of mining the upper seam are present, plans will be developed and submitted to the proper



agencies for approval.

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3.3.1.2 Portals, Shafts and Slopes

The Hiawatha seam is the only mineable seam in this area. Four portals are located on top of the Star Point Sandstone, however only three of these portals will be used. The three portals will provide for intake ventilation, beltline, and a return air way. These portals existed during previous mining attempts and will be utilized during current mining operations. The highwall above the portals has been secured and canopies have been installed to bring the portals up to MSHA standards.

The Blind Canyon seam is not of mineable thickness in the mine permit area and no portals, shafts or slopes are anticipated. The BLM has determined the upper seam is not mineable and during 1985 approval was given by both the BLM and the Division to commence pillaring of the lower seam.

3.3.1.3 Mining Methods, Room and Pillar, Longwall

3.3.1.4 Projected Mine Development

See Plates 3-2 and 3-3.

3.3.1.5 Retreat Mining

Retreat mining will be done in accordance with the approved MSHA roof control plan. All pillars in the mine, with the exception of the pillars designated in Chapter 12 as barrier pillars or other pillars needed to protect the outcrop, will be fully extracted, however safety or economic reasons may dictate some pillars or partial pillars may remain in place. Pillars used to protect mains, submains, and fire breaks will be left until final retreat or when they serve no useful purpose.

3.3.1.6 Roof Control, Ventilation, Water Systems, Dust Suppression, Dewatering, and Electrical

The following plans can be found in the Chapter 3 Appendix:

Roof Control Plan	Item 3-3.
Ventilation Plan	Item 3-5.
Sumps	Plate 3-2.
Air Quality Approval	Chapter 11

The existing sumps underground as shown on plate 3-2 has a capacity of approximately 96,500 gallons. The water presently stored in this sump is approximately 2.5 feet deep at the deepest point and does not have any impoundment structure installed, the

dip of the seam is used to trap the water in this particular area.

The new proposed sump area, as shown on plate 3-7 , will have a capacity of approximately 3.0 acre feet of water. The impoundment walls will be constructed of concrete block with mortared joints and sealed on both sides. All the contact areas around the walls will be sealed with concrete to prevent seepage. These sumps will be constructed so as to allow the sediment to settle out and have an oil skimmer installed, as shown on Plate 3-7 , to allow the water to be pumped directly to Crandall Creek under a modified NPDES permit. The applicant has contacted the EPA for the necessary permit modification and pumping will not be done until the permit has been received and the sumps constructed to the approved design. All water pumped to Crandall Creek will meet all effluent limitations and will be sampled in accordance with the NPDES permit requirements.

There are no plans to install utility poles located on the surface, however if utility poles are used they will be constructed to protect raptors. The power line from the generator will be insulated and layed on the ground to the portal pad. The location, either above or below the portal pad road, will be made upon completion of the construction. All electrical installations will be done in accordance with MSHA regulations.

The generator will be located on the main pad area and placed in a concrete block open top enclosure as shown on plate 3-1. The enclosure will be constucted to contain all fuel and oil stored on the site.

3.3.2 Barrier Pillars

Barrier pillar design and sizing is included in Chapter 12 and are shown on Plates 3-2 and 3-3.

3.3.2.1 Protection of Oil and Gas Wells

There are no oil and gas wells located on the property or within potential areas of coal mining. The topography in the area of coal mining activities does not lend itself to this type of development. Wells that have been drilled in the recent past have been located in the canyon bottoms and not on the surrounding ridges. With this in mind no provisions have been made to protect oil and gas wells, however if such activities do take place Genwal, will work towards a mutual agreement between the interested parties.

*Adjacent
seam*

3.3.2.2 Protection of Surface Structures Streams

No surface structures or streams exist under the coal seam, therefore no protection will be afforded. There exists a concern for the Crandall Creek in the southwest area of the property, this has been addressed in Chapter 12.

3.3.2.3 Property Boundaries

All property boundaries will be protected with barrier pillars designed in accordance with Utah State Industrial Commission's and BLM's regulations. These barriers have been tentatively calculated and located on the mining Sequence map, however these will be finalized when the coal height and overburden are more accurately known. The formula used to calculate these pillars can be found in the Utah State Industrial Commissions Underground Mining Code. More information may be found in Chapter 12.

3.3.2.4 Outcrop Protection

Barrier pillars will be left for outcrop protection where outlined in Chapter 12.

3.3.3 Conservation of Coal Resource

3.3.3.1 Projected Maximum Recovery

Mining recovery of the coal in Tract 1 is projected to be greater than 50% of the total in place coal. Tract 1 contains approximately 65,000 tons of recoverable coal (101,400 tons in place), however 30,000 tons of this coal will be left in place as barrier pillars until final retreat. Tract

2, within the same lease area, contains approximately 811,000 tons in place, of which 406,000 tons are estimated to be recoverable. The recoverable coal in the Tract 2 permit includes an area that is to be left as a barrier pillar for the north mains which will provide for access to future reserves. The resulting mineable coal, on the advance, in Tract 2 is approximately 327,000 tons.

Genwal Coal Company will mine coal from rock to rock in areas where coal is less than 9' thick, however in order to protect the environment from unsightly waste rock piles, all attempts will be made to leave the rock in place. In areas greater than 9', a coal top or bottom will be left for safety reasons and attempted to be mined on the retreat. (Note: No coal is thicker than 7' within this permit area.)

3.3.3.2 Justification For Non recovery

All coal above 5 feet thick that can be safely and economically mined will be mined. Coal below 5 feet of thickness may be mined if it is economically feasible and the equipment is available to operate safely and efficiently. State and federal regulations require certain barrier pillars to be left in place and these will remain in place as required.

3.3.3.3 Access to Future Reserves

Access to future reserves will be maintained by the North Mains entries on the eastern most end of the property. This set of entries will maintain access to coal both to the north and east. Coal to the west will be accessed by entries driven north and west. Barrier pillars will be left on both the east and west side of the north mains to protect future access, refer to Plate 3-3.

3.3.4 Equipment Selection

3.3.4.1 Surface Equipment

Underground supply equipment will be used on the surface as needed. The following is a list of equipment used exclusively on the surface:

- 1 - Front End Loader
- 1 - Dozer
- 1 - 2 ton Water Truck
- 1 - 1000 KVA Generator with 1200 HP Pickup trucks

3.3.4.2 Underground Equipment

Typical mining equipment used in this area will be employed to mine coal in this permit area. Two continuous miners will be employed to mine coal in this lease area, however a conventional section of equipment is available if it becomes necessary. The following is a list of equipment, or equivalent, that will be utilized underground and on the surface as required:

- Joy 12 CM Miners
- Joy 10 and 21 SC Shuttle Cars
- Lee Norse Top Dog Roof Bolters
- Feeder Breakers
- Battery Powered Scoops and face haulage
- Various Electrical Equipment

3.3.5 Mine Safety, Fire Protection, and Security

3.3.5.1 Signs

All signs required at the mine site will be designed, constructed and installed in accordance with UMC 817.11. The following is a list of signs to be utilized at the mine site.

Sign	Location
Identification Sign	Permit Bound. on Road
Perimeter Markers	Perimeter of Dist. Area
Explosives (when required) Buffer Zone Signs	Blasting Zones Within 100' of Creek
Topsoil Markers	Topsoil Stockpiles

3.3.5.2 Fences and Gates

No fences or gates are proposed at this time except for the fence separating the topsoil stockpile from the public parking area as described in Chapter 8. If security or safety become a problem, a fence or gate will be erected at the entrances to the main pad and coal stockpile areas. These gates or fences will be constructed to prevent unauthorized access to the mine property.

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3.3.5.3 Fire Protection

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Fire protection will be maintained in accordance with all Federal and State regulations pertaining to coal mining operations. Additionally the fire prevention plan can be found in the Chapter 3 Appendix.

3.3.5.4 Explosives

There are no structures or dwellings within one mile of the mine permit area. All blasting will be done under the direction of a person trained, examined and certified as provided by 30 CFR 850 and applicable regulations of the State Industrial Commission.

Explosives will be stored on the surface in accordance with 30 CFR Part 75 and 77 and all state and local regulations. These magazines are located on the Plate titled Proposed Surface Facilities, refer to Plate 3-1.

The use of explosives will be done in accordance with UMC 817.62-68 and all records as outline in UMC 817.68 will be kept at the mine site or at the mine office in Huntington, Utah for a period of at least three years.

The applicant will post blasting signs, in accordance with UMC 817.11, in the vicinity of the surface blasting operations indicating that blasting is being done in the area and the audible signals and meanings. The applicant will limit access to people from the area immediately prior to and after the blast until the applicants representative determines all is clear. Signals, audible within a half mile, will be given prior to and after the blast as outlined in UMC 817.65.

The amount of explosives used within any 8 millisecond period will be determined with the following equation as outlined in UMC 817.65 $k(1)(1)$, $W=(D/60)^2$, where W is the max. weight of the explosive, and D is the distance in feet to the nearest dwelling etc.

Blasting will be done between sunrise and sunset, unless other criteria is met in UMC 817.65.

Blasting will be done so as no fly rock will leave the permit area, where practical. Netting will be used to achieve this where there exists a possibility of this occurrence.

3.3.6 Operations Schedule

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3.3.6.1 Annual Production Per Year for Permit Term

The mine capacity will be 360,000 tons per year.

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3.3.6.2 Operating Schedule Days/Shifts

The mine will operate (3) 8 hr. shifts per day, 5 days per week, 52 weeks per year. When market or mining conditions dictate, production will be expanded to 7 days per week, 52 weeks per year.

3.3.6.3 Operation Employment

The mine will employ approximately 30 people at the present capacity, however if market or mining conditions dictate as many as 50 people may be employed at the mine.

3.3.7 Mine Permit Area

3.3.7.1 Projected Mining per Year

See Plate 3-3.

3.3.7.2 Acreage and Delineation of Mine Permit Area

Refer to Section 1.1 and Plate 2-1.



3.3.8 Mine Plan Area

The mine plan area is shown on Plate 2-1.

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3.3.8.1 Projected Mining by Future Permit for the Planned Life of the Mine

All coal around the permit area has the potential for future mining by the Crandall Canyon Mine. Provisions have been made to access future reserves, however we can not formulate a logical mining plan at this time without knowing the sequence of the Federal Coal Leasing Program, refer to Plate 2-1.

3.3.9 WASTE DISPOSAL PLANS

3.3.9.1 Underground Development Waste

The Crandall Canyon mine produces a run of mine product for final sale, this product does not contain any mine related rock or development waste. The method of mining used at the Crandall Canyon mine produces no development waste, however small amounts of rock wastes are generated in unexpected roof falls and overcasts. This rock waste is not brought to the surface, it is disposed of on pillar lines or stored in areas that have been mined and no second mining is to be done. The material disposed of on the pillar lines will be of the same nature that naturally caves in the pillaring process, therefore no leachate will be formed other than that associated with normal pillaring. In no event will the disposal of this material interfere with future recovery of the coal resource without consent of the BLM or the managing agency of the coal resource. All disposal of the development waste will be done in accordance with MSHA regulations.

Underground development waste, coal processing waste or sediment pond sludge will not be returned to the underground workings. The underground development waste that is brought to the surface will be temporarily stored at the west end of the coal stockpile prior to disposal at the permitted site.

Genwal Coal Company is in the process of permitting a location for the permanent disposal of underground development waste, sediment pond waste, and coal processing waste. This area will be located at the Sinbad landfill adjacent to the county landfill

in Emery County, six miles north of Orangeville, Utah. A small area will be permitted and bonded for the disposal of the above mentioned items. This permitting process will be done in accordance with all regulations pertaining to the permitting of such facilities as outlined under UMC 782,783, and 784. All necessary environmental considerations will be accounted for in the operation of this site.

3.3.9.2 Solid Waste

The waste generated by the normal activities which include, but are not limited to, the following: wood, oil cans, oil contaminated material, paper, scrap metal and belting etc., will be disposed of underground on pillar lines where possible. Any solid waste brought to the surface will be disposed of in a trash container until the container becomes full, at which time the container will be transported to a State approved landfill for the final disposal. The container will be emptied at intervals no longer than 2 months when the mine is not idle. At the present time the landfill to be used will be the state approved Sinbad Landfill, which is located next to the county landfill, approximately 6 miles north of Orangeville, Utah, however if another State approved landfill becomes available and more cost effective this landfill will be utilized. The operator will notify the Division prior to any waste disposal in any landfill other than the Sinbad landfill. The location of this landfill and a statement from DOH indicating the landfill permit number, the permit term and any conditions that the DOH has concerning the disposal of noncoal waste will be submitted to the Division. In no event will liquids be disposed of in landfills that are not approved to handle such material.

Scrap metal and used equipment will be stored underground or on the surface next to the solid waste container until the material is sold to a scrap metal or used equipment dealer.

Oil contaminated soil from the gas and oil storage area will be disposed of at the Sinbad landfill prior to reclamation, moving of the facility or when contamination is uncontrollable within the berm area. Areas outside the berm area will be cleaned and disposed of when more than 2 gallons have been spilled or more than 10 cubic feet of soil have been saturated.

No toxic or hazardous waste will be disposed of in the Sinbad landfill. In the unlikely event that hazardous or toxic material is encountered, Genwal will notify the Division of Oil, Gas and Mining and the State Health Department for disposal plans.

3.3.9.3 Sediment Pond Waste

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Sludge removed from the pond, which is removed during the cleaning process, will be temporarily stored on the surface west of the coal stockpile. All moisture and runoff from the sludge pile during temporary storage will be directed back to the sediment pond for treatment. During the temporary storage period the sludge will be allowed to dry and tested for any toxic contaminants. When it is determined that the material is sufficiently dry and contains no contaminants it will be transported to a landfill that will be developed and permitted, as part of the Crandall Canyon Mine, by Genwal Coal Co. and used to accommodate these materials. These materials will not be transported off-site until a landfill can be made available and permitted for such activities, until such time this material will remain in the temporary storage location as described above. If hazardous contaminants are present, the Department of Health and the Division of Oil, Gas and Mining will be consulted as to the proper method of disposal of this material.

Refer to Item 3-9 for correspondence and approval.

3.3.9.4 Sanitary Waste

At the present time there are no plans for the construction of temporary or permanent bath house facilities. There will only be one regularly assigned employee on the surface per shift. To handle the sanitary waste needs on the surface, a portable construction type toilet will be located on the surface and maintained in accordance with approved State Health standards.

The sanitary waste needs for the miners underground will be handled in the accordance will MSHA regulations.

Should temporary or permanent bath house facilities be built, the sewage handling will be designed in accordance with State Health and Forest Service regulations. These agencies will be contacted prior to design and implementation for their input and approval as necessary.

Genwal Coal Company will use the surface area located adjacent to the Emery County Landfill and Sinbad Construction Landfill, described in the lease in Item 2-12 and on Plate 3-11, as a final disposal area for sediment pond waste, underground development waste and other waste rock material generated at the Crandall Canyon Mine. This area has been zoned as landfill, and is presently being used in such a capacity.

Genwal Coal Company has obtained a lease from Sinbad Construction for the use of the land as a landfill. Genwal Coal Company will operate the landfill in accordance with Sinbad's permit from the State Department of Health. Sinbad's landfill is contiguous on three sides to this lease area.

Before each pit is excavated the top foot of soil will be stripped and stockpile on the western edge of the pit for future use in reclamation. Only one pit will be constructed for use at a time. Upon completion and reclamation of the pit a new pit adjacent to the reclaimed pit will be constructed in the same manner. Cut off ditches will be constructed to divert undisturbed drainage away from the pits. All surface water that comes in contact with any reclaimed pit or disturbance will be conveyed to the current pit, upon completion of the final pit a sediment basin will be constructed to allow water to settle prior to discharge. All water courses will be made by ditching or berming as necessary to obtain the typical cross section. No defined water course exists on the lease area. See Plates 3-12,13.

After each use of the pit the material placed in the pit will be covered with at least 3' feet of dirt, upon final use of the pit the remaining dirt will be placed on top of the pit to the necessary height and the "top soil", a minimum of 8" deep, will be placed over the entire pit area. See Plate 3-13.

In consideration of the poor quality of topsoil and the other landfills in the area that exhibit natural revegetation, no contemporaneous reclamation will be attempted. Upon final completion of the landfill the Division of Oil, Gas and Mining will be contacted if natural vegetation fails to exhibit growth in accordance with the surrounding landfills. This area does not support wildlife due to the poor vegetation and constant activity surrounding the area.

The Lessor, Sinbad Construction, may at its discretion use the material excavated from each pit for it's purposes, however enough material will remain in order to perform the proper reclamation and no "topsoil" will be hauled away.

INSERT AS AN ADDITION THE END OF SECTION 3.3.9.3 PAGE III-16B

No dwellings or water intakes exist within 1 mile of this landfill. No structures exist on the lease area.

The access to the landfill lease will be maintained via the county road system to the NW corner, SE 1/4, NE 1/4, Sec. 16, T.18 S., R.8 E., S.L.B.M., from this point a Right of Way has been obtained from Sinbad Construction to use their existing road. With the limited use of these roads and no new construction of roads, no road improvements will be done.

Should temporary or permanent bath house facilities be built, the sewage handling will be designed in accordance with State Health and Forest Service regulations. These agencies will be contacted prior to design and implementation for their input and approval as necessary.

PART 3.4 Environmental Protection

3.4.1 Preservation of Land-Use

3.4.1.1 Projected Impacts of Mining on Current and Future Land-Use

Acreage delineated as surface disturbed areas will be withdrawn from current land-use status. This impact will be negligible and roads have been designed to allow passage through our disturbed area so as to reduce impact and make other areas available for the same current land use. With regrading and revegetating, our surface disturbed area should again be capable of supporting the same land use as it was capable of supporting prior to mining. Refer to Chapter 4 Part 4.4.

3.4.1.2 Control Measures to Mitigate Impacts

See 3.4.1.1 above.

3.4.2 Protection of Human Values

3.4.2. Projected Impacts of Mining on Human Values - Historical and Cultural

Applicant determines there will be no effects of mining on historical resources. Applicant proposes there will be no impacts of mining on human values, cultural or historical. See Chapter V, Parts 5.3 and 5.4 and also Chapter I, Part 1.2.

The archaeological site at the mouth of Crandall Creek is not threatened by road improvements and the area will be fenced as stated in the plan. The initial road development has progressed along Crandall Canyon past site (42EM722) and the applicant has fenced off the designated site accordingly. A detailed report on the Sherman Shelter was completed by the USFS and is included within this chapter as Item 5-4.

Although the archaeological report mentions a scattering of

historic mining remains, they are remains of habitation and human use rather than mining. The remains consist of a rusty automobile body, either a 1939-1940 Ford or Mercury, numerous tin cans and bottles, and piles of wood from old cabins which have been destroyed by vandals, and bedsprings. These habitation remains (1939-1955) are of absolutely no historic value and no study will be undertaken to document the worthless remains. A clear map of areas surveyed in relation to areas of potential surface disturbance is included, refer to Item 5-1.

Applicant has provided a clear map of the areas surveyed in relation to areas of potential surface disturbance, and it is included with this document as Item 5-1.

3.4.2.1 Control Measures to Mitigate Impacts

See 3.4.2 above.

3.4.3 Protection of Hydrologic Balance

3.4.3.1 Projected Impacts of Mining on Hydrologic Balance

Applicant proposes there will be no impacts of mining on the hydrologic balance. See Chapter 7 Parts 7.1.4 and 7.2.4.

Genwal has purchased 20 shares of Huntington-Cleveland Irrigation Company water from Mr. Joseph Harvey of Huntington, Utah. A copy of the paperwork indicating Genwal ownership has been forwarded to DOGM and is included in Chapter 7. The change in diversion point and a change in water useage with the State Engineer's office has been completed and filed, refer to Chapter 7. This documentation has previously been submitted to DOGM.

3.4.3.2 Control Measures to Mitigate Impacts

See Chapter VII, Parts 7.1.5 and 7.2.5.

3.4.3.3 Monitoring Procedures to Measure Projected Impacts and Control

See Chapter VII, Parts 7.1.5 and 7.2.5.

3.4.4 Preservation of Soil Resources

3.4.4.1 Projected Impacts of Mining On Soil Resources

Topsoil will have to be removed from disturbed surface area prior to grading and leveling - loss of soil vegetation that it will support and creation of source of dust emission.

3.4.4.2 Control Measures to Mitigate Impacts

See Chapter VIII, Part 8.11.

3.4.5 Protection of Vegetative Resources

3.4.5.1 Projected Impacts of Mining on Vegetative Resources

Loss of all vegetative resources in surface disturbed areas, no impacts on adjacent vegetation.

3.4.5.2 Mitigating Measures to be Employed to Reduce Impacts on Vegetative Resources

The disturbed area within the permit area, including the 3 topsoil stockpiles, will be reclaimed upon permanent cessation of mining operations. During the operational phase of the property water will be applied to the coal and roads within the permit area and adjacent forest development road, when needed, to reduce fugitive dust emissions. Additionally magnesium chloride may be applied to the roads to reduce dust emissions. Prior to the use of this product on the forest access road, the forest service will be contacted and arrangements made for the application under their direction.

3.4.5.3 Monitoring Procedures-Reference Areas, and Revegetation

See Chapter III, Part 3.5.5.5.

3.4.6 Protection of Fish and Wildlife

3.4.6.1 Projected Impacts of Mining on Fish and Wildlife

Operation will unavoidably impact small vertebrate species and increase hunting pressure on big game species. No fishery exists within the permit area or the immediately adjacent area.

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

minesite so no power lines will be constructed.

3.4.6.2 Mitigating Measures to be Employed to Protect Fish and Wildlife

See Chapter X, Part 10.5.

Migration of elk and mule deer of the Manti-LaSal occurs as a sheet migration with no specific corridors as such.

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 as the moose habitat encompasses all the Huntington drainages. Of the 0.5 acre winter range to be disturbed, of which the riparian habitats are ranked as being of critical value, only approximately 3000 square feet of wooded area will be 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 substantial pace due to the abundance of suitable unoccupied habitat.

No information can be obtained on moose wintering habitat. Utah Division of Wildlife Resources could not provide a map of moose wintering habitat in the area. As soon as information and a definitive map of moose wintering habitat becomes available, we will forward the information as being pertinent to the mine plan application.

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 only construction work that may have an impact on the stream is the construction of the haul and access road. This haul and access road will be constructed and 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 Coal Company, dated May 18, 1981. Also, the approved air pollution control plan, as submitted in the permit, contains itemized mitigation for dust abatement during our construction phase.

Information and commitments to show how UMC 817.97(d)(1) will be met--applicant again refers the regulatory authority to the USFS, which is the agency having jurisdiction over the haul and access road.

Section 10.5 on page 10 of the Aquatic Resources Report indicates further monitoring to establish baseline data. Applicant feels that the initial aquatic study and report provides sufficient baseline data. Applicant therefore does not propose any further monitoring of habitat value and biotic community, but only for stream flow and water quality as proposed in previously submitted ground and surface water monitoring plans.

If during the monitoring of the springs it is proven that mining activities have dried up a significant spring in the area, Genwal Coal Co. will notify the Division of Wildlife Resources and the Division of Oil, Gas and Mining and begin working on an acceptable mitigation plan involving the use of guzzlers. These guzzlers will be designed in cooperation with the Division of Wildlife Resources and the Division of Oil, Gas and Mining and placed in the area of the effected spring. No other sources of water, other than the springs located by the seep and spring survey are known to exist in the mine plan area, therefore no other replacement will be necessary.

Genwal Coal Company will attempt to educate the employees of Crandall Canyon Mine on the protection of wildlife resources. The employees will be shown, on an annual basis, the film prepared by the Utah Division of Wildlife Resources relating to wildlife protection and awareness.

3.4.6.3 Monitoring Procedures

Applicant proposes none.

Applicant will monitor golden eagle nest in Spring 1982 and report to Division the presence of any golden eagles in the area.

Applicant will also develop and carry out appropriate reasonable mitigation plans in cooperation with the regulatory authority should coal mining activities significantly diminish stream flow or water quality deteriorate.

3.4.7 Protection of Air Quality

3.4.7.1 Projected Impacts of Mining Operation on Air Quality

Creation of airborne dust as a nuisance pollutant.

3.4.7.2 Mitigating Measures to be Employed to Control Air Pollutants

See "Air Pollution Control Plan", included with Chapter XI as Item XI-2.

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3.4.7.3 Air Quality Monitoring Plans

Applicant proposes no air quality monitoring plan, no monitoring plan recommended by Division of Environmental Health, see letter included in Chapter XI as Item XI-1.

3.4.8 Subsidence Control Plan

Applicant's survey, as stated in the mine plan, indicates that no structures exist above the areas where there is potential subsidence on the surface. Renewable resource protection is addressed in Chapter 12.

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3.4.8.1 Projected Impacts of Subsidence

For a more complete discussion refer to Chapters 7 and 12.

3.4.8.2 Control Measures to Mitigate Impacts

Not applicable.

3.4.8.3 Monitoring Procedures to Measure Projected Impacts and Controls

Applicant commits to implementing the proposed USFS subsidence monitoring plan, and applicant hereby incorporates same into applicant's mining and reclamation plan as found as Item XII-5.

The applicant commits to notifying the Division of Oil, Gas and Mining upon obtaining the knowledge of a landslide or other damage that may have potential adverse effects as specified under UMC 817.99.

3.4.9 Waste Disposal Plans

SEE SECTION 3.3.9

3.4.9.1 Projected Impacts of Disposal Areas and Methods on Environment

Applicant proposes no disposal areas.

3.4.9.2 Control Measures to Mitigate Impacts

See 3.4.9.1 above.

PART 3.5 Reclamation Plan

The revised acreage in Table 4 is correct in itemizing 6.65 acres of proposed disturbance within the permit area of 87.46 acres, refer to Plates 2-1 and 3-1.

3.5.1 Contemporaneous Reclamation

All surface areas which are disturbed during our construction phase and which will not be needed for mining operations, (i.e. cut banks and out slopes of fill and areas near the sedimentation pond) will be revegetated in the fall of the year following completion of our construction phase. This revegetation will be performed as described in Part 3.5.5 of this chapter.

A reclamation map showing post construction contemporaneous reclamation areas and final reclamation accompanies this

chapter as Plate 7-5. The correct number of acres to be revegetated in final reclamation is 5.15 acres.

Plants used to stabilize the topsoil stockpile are listed in Section 3.5.5.

3.5.2 Soil Removal and Storage

The topsoil will be removed from the areas indicated on the soil survey map as TCE and JDE, which includes the Datino Variant, Jodero Variant and Twin Creek soils, after vegetative cover that would interfere with the use of the topsoil is cleared from these areas. The topsoil will be removed in a single lift. A small front end loader on cat tracks and a D-6 dozer or equivalent will be used to remove and load topsoil into tandem or off-road haul trucks. A qualified person of supervisory capacity will monitor on site the topsoil removal and stockpiling operation to insure the protection and preservation of the topsoil resources. Refer to Chapter 8 for additional information.

Additional yardage of subsoil will be used to make up the topsoil shortage. Subsoil will be taken from the area indicated JDE on the soil survey map Plate 8-1.

Topsoil will be removed in a separate layer from areas to be affected by surface operations after vegetation cover has been cleared and before any actual surface disturbance of the land commences. The topsoil removed shall be stockpiled on a stable surface area within the permit area, protected from erosion, compaction and contamination by an effective cover of non-noxious, quick grazing annual and perennial plants (see Part 3.5.5 of this chapter for plant types and seeding procedures) (see Plate 3-8 of this chapter for stockpile location).

3.5.3 Abandonment

If operations are to be temporarily suspended for 30 days or longer, the applicant will submit a notice of intention to the Division. This notice will include a description of the extent and nature of existing surface and underground disturbance prior to temporary cessation. The statement will also cover the type of reclamation which will have been accomplished to date and also include the type of on going monitoring, number of opening closures, water treatment activities and other topographic rehabilitative efforts which have been or will be undertaken during this period. The applicant will maintain and secure the surface facilities and mine openings.

Applicant will implement the temporary cessation regulations as follows:

(a) Each person who conducts underground coal mining activities shall effectively support and maintain all surface access openings to underground operations, and secure surface facilities in areas in which there are no current operations, but operations are to be resumed under an approved permit. Temporary abandonment shall not relieve a person of his or her obligation to comply with any provisions of the approved permit.

(b) Before temporary cessation of mining and reclamation operations for a period of thirty days or more, or as soon as it is known that a temporary cessation will extend beyond thirty days, each person who conducts underground mining activities shall submit to the Division a notice of intention to cease or abandon operations. This notice shall include a statement of the exact number of surface acres and the horizontal and vertical extent of subsurface strata which have been in the permit area prior to cessation or abandonment, the extent and kind of reclamation of surface area which will have been accomplished, and identification of the backfilling, regrading, revegetation, environmental monitoring, underground opening closures and water treatment activities that will continue during the temporary cessation.

(c) Each mine entry which is temporarily inactive but has a further projected useful service under the approved permit application, shall be protected by barricades or other covering devices, fenced and posted with signs to prevent access into the entry and to identify the hazardous nature of the opening. These devices shall be periodically inspected and maintained in good operating condition by the person who conducts the underground coal mining activities.

Each exploration hole, other drill hole, borehole, shaft, well or other exposed underground opening which has been identified in the approved permit application for use to return underground development waste, coal processing waste or water to underground workings, or to be used to monitor ground water conditions, shall be temporarily sealed until required for actual use.

Backfilling and regrading of disturbed lands has been committed to in order to restore all areas affected by surface operations as near as possible to the contour of the land prior to disturbance. Reclamation of affected areas including revegetation is outlined in Section 817.111-.117. All openings will be sealed as per the request of the MMS

letter dated September 24, 1981, from Jackson Moffitt).

All surface equipment, as well as structures, including all concrete foundations, will be removed by the applicant after the permanent cessation of operations. At the time that the mine closure plan is submitted to the MMS, a copy will be forwarded to the Division for concurrence and approval and for addition to the mine plan on file. A copy will also be placed at the Emery County Recorder's Office.

During permanent cessation of operations, all surface equipment and structures, including all concrete foundations will be removed by the applicant after the permanent cessation of operations. At the time that the mine closure plan is submitted to the USGS, a copy will be forwarded to the Division for concurrence and approval and for addition to the mine plan on file. A copy will also be placed at the Emery County Recorder's Office. A formal plan will be submitted to the USGS for approval prior to final sealing of any openings. As per their on site inspection and plan approval, the openings will be sealed.

Cross sections that show the final configuration of the permit area have been completed, refer to Plates 3-5 and 3-4.

Included as Item 3-11 is a cost estimate for monitoring the revegetation success rate.

3.5.3.1 Sealing of Mine Openings

The applicant has drilled from the Hiawatha seam upwards to the Blind Canyon seam as described in Chapter 6. The drilling occurred in areas that pillar extraction will occur and no provisions were made to seal the borehole.

Temporary sealing of the portals, if needed, will be accomplished by the construction of protective barricades or other covering devices, fenced and posted with signs indicating the hazardous nature of the opening. Permanent closure plans will include sealing the portals as per the request of the Mineral Management Service (See UMC 817.132).

Upon cessation of mining operations all drift openings to the surface from underground will be backfilled, regraded and reseeded as per Section 3.5.5 of this chapter. Prior to final sealing of any openings, the MMS will require an on site inspection and a submission of formal sealing methods for approval of the MMS. The formal sealing methods will be presented as a plan including cross sections demonstrating the measures taken to seal or manage mine openings will

comply with UMC 817.13-.15.

Permanent sealing of the portals will be done as shown on page 3-27b,c. A drain will be placed in the western most portal, this drain will be 18" deep 10' wide and extend under the backfill to the highwall. This drain will be redesigned if the mine produces greater quantities of water than anticipated.

3.5.3.2 Removal of Surface Structures

All waste material generated from the removal of the structures will be removed from the property and sold as scrap or disposed of in the appropriate approved state disposal areas, which at the present time will be the Sinbad landfill. The only structures to remain after the mining operation will be the sedimentation system and all necessary diversions required to insure routing of all disturbed area drainage to the pond and diversions to maintain the integrity of the pond until the requirements of UMC 817.46 are met, these diversions can be found on Plate 3-4 and 7-5.

3.5.3.3 Disposition of Dams, Ponds and Diversions

Upon final cessation of mining the area will be reclaimed. Upon completion of the reclamation earthwork the sediment pond will be cleaned out and the material disposed of in the approved method. Once it is determined that the pond is no longer required for sediment control of the reclaimed area the pond will be cleaned out again, the material in the pond should only be topsoil that has eroded from the reclaimed site, (care will be taken not to mix the pond liner with this topsoil) this topsoil will be stockpiled and allowed to dry at the edge of the pond. Once the topsoil has been dried the sediment pond will be reclaimed and the topsoil spread on top of the pond area.

3.5.4 Backfilling and Grading Plans

3.5.4.1 Recontouring

All areas affected by surface operations will be graded and restored to a contour that is compatible with natural surroundings and post mining land use as near as possible to the contour of the land prior to disturbance by our mining operation. See map included with Vegetation and Terrestrial Wildlife Report included as Item IX-1 in Chapter IX. For approximate contours prior to our surface disturbance refer to the maps presented as Plates 9-1, 9-2 and 9-3. The final regraded contours can be found on Plate 3-5.

3.5.4.2 Removal or Reduction of Highwall

Backfilling and grading will proceed so as to eliminate or reduce the highwall. This can be by recontouring as per Part 3.5.4.1 of this chapter. The portals will be backfilled with soil and two rows of solid concrete blocks placed across each entry and then backfilled to the surface and recontoured as shown on Plate 3-5. The block stoppings will be placed as far from the surface as is necessary to obtain a competent top and bottom, see the figure on page III-27b. The highwall above the coal stockpile will be backfilled with as much material as is available, however a substantial highwall will exist and a small flat spot will be left as a potential campsite.

3.5.4.3 Terracing and Erosion Control

No terracing will be done. All final grading, preparation of overburden before replacement of topsoil will be done

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BACKFILL

LIMIT OF BACKFILL

20'

SIDE VIEW

PORTAL BENCH

DRAIN ROCK 18"x 10' to highwall edge

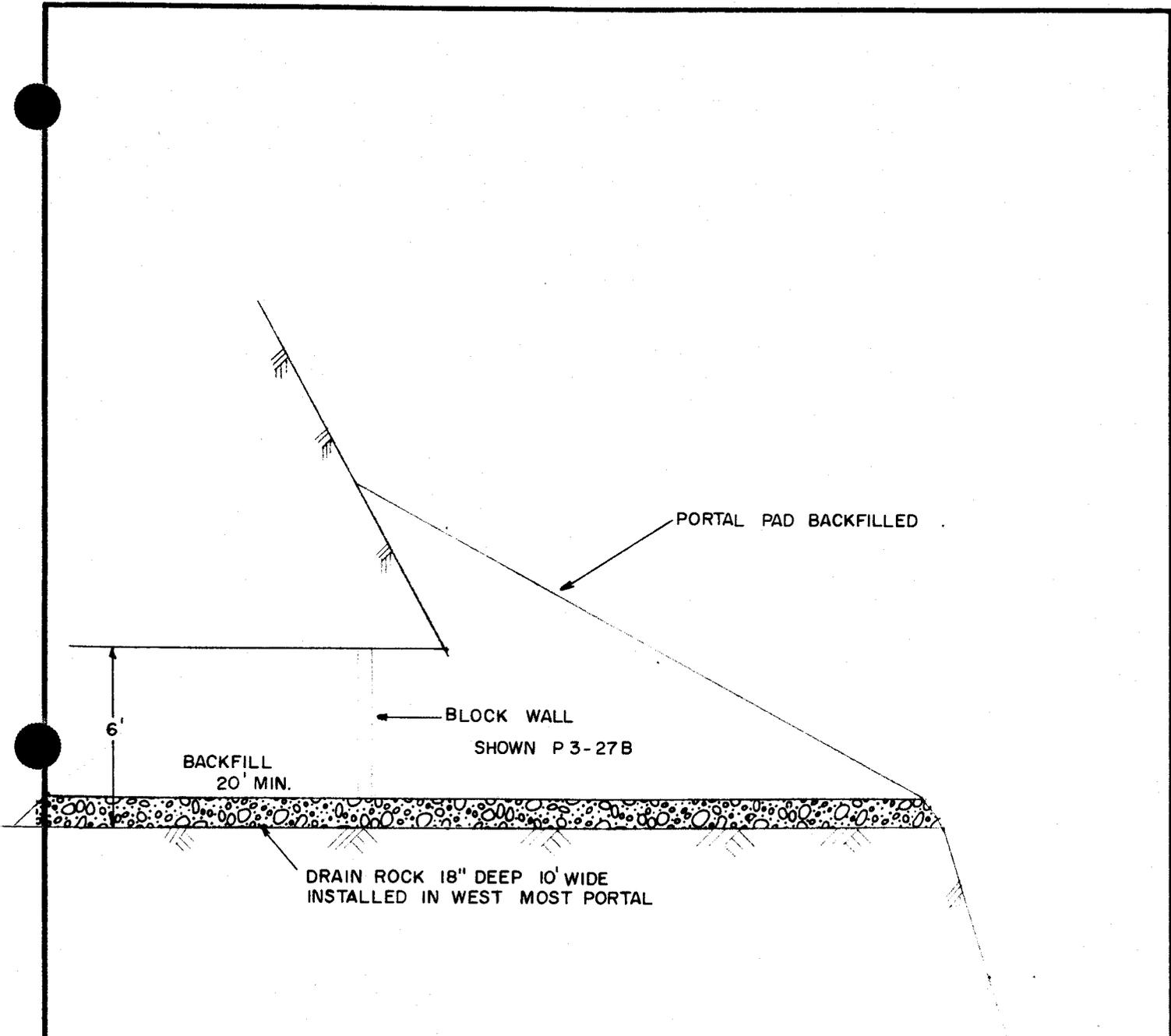
2 ROWS OF CONCRETE BLOCKS

DRAIN ROCK INSTALLED IN WESTERN MOST
PORTAL ONLY

PLAN VIEW

SCALE 1"=5'

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PORTAL SEALING

NOT TO SCALE

along the contour to minimize erosion and instability unless this operation becomes hazardous to equipment operators in which case the grading, preparation and placement in a direction other than generally parallel to the contour will be used.

3.5.4.4 Soil Redistribution and Stabilization

Regraded land will be treated as required by the Division to eliminate slippage surfaces and promote root penetration. Before topsoil replacement, the subsoil will be disced in areas having average slopes of less than 30% and ripped in other areas until the grade becomes impractical. Topsoil will be redistributed in a manner that achieves an approximate, uniform stable thickness and that will prevent excess compaction of the topsoil and also protect the topsoil from wind and water erosion before and after it is reseeded and planted.

Topsoil will be redistributed with a small front end loader on cat tracks and a D-6 dozer or equivalent. A qualified person, of supervisory capacity, will monitor on site the topsoil redistribution operation. This monitoring will ensure even distribution of the 1.0 feet of soil. To minimize compaction of the topsoil, after redistribution, the topsoil will be disced and/or harrowed on the contour.

As previously indicated, the topsoil stockpile will be sampled and analyzed prior to redistribution. Six auger sample locations, at evenly spaced intervals, will be taken from the stockpile. Two of the auger samples will be in the top 1/3 volume of the stockpile; two will be in the middle 1/3 volume of the stockpile; and two will be in the lower 1/3 volume of the stockpile. Substitute topsoil will be stored separately as described in Chapter 8.

3.5.5 Revegetation

3.5.5.1 Soil Preparation

An engineering sketch of the topsoil stockpile will be done prior to the sampling, so that the 1/3 volume determinations can be calculated and marked on the pile. Each auger sample will be taken on the correct angle to the approximate center of the pile. Angle and center of the pile are to be determined from the engineering sketch. Each sample will then be mixed and quartered to the size necessary for lab determination of necessary amendments. Results of the six samples, along with consultation from the regulatory authority, will determine the necessary amendments to the topsoil.

Nutrients and soil amendments, if shown to be required by soil tests, shall be applied to the redistributed topsoil layer so that it supports the required vegetation. All soil

tests shall be performed by a qualified laboratory using methods approved by the Division and shall be conducted prior to the redistribution of the topsoil. If possible, the topsoil will be redistributed in the late fall (late September or early October) just prior to the seeding time so as to have a seedbed free of weeds and annual grasses. If the seedbed is prepared early and weeds and annual grasses become established on it before seeding, they will be killed before seeding is attempted. A clean seedbed is essential at time of seeding. Pesticides will not be used to clear the seedbed. Farming or road building equipment will be used to remove weeds if it is needed. If spraying of the weeds is found to be necessary, a plan will be submitted to DOGM for approval.

Soil test data along with recommended amendments in the case of soil deficiencies will be submitted to the USFS prior to soil redistribution.

3.5.5.2 Seeding and Transplanting

The position of the leases will leave no north facing slopes to revegetate.

The correct number of acres to be revegetated in the final reclamation is 5.15 acres, 4.53 acres within the surface facilities area and 0.62 acres in the topsoil stockpile areas. Plants for temporary cover used to stabilize topsoil stockpile will be:

Temporary Mix	Lbs./acre PLS
Aqropyron smithii	4
Aqropyron trachycaulum	4
Bromus marginatus	3
Elymus junceus	2
Melilotus officinalis	2
Total Seed Mix	15

The contemporaneous reclamation plan for steep slope areas (areas having a slope greater than 30%) will be modified to provide a greater and faster growth rate as follows:

1). Medicago sativa will be added at a rate of 2 lbs PLS/acre to the above seed mix.

2). Hydromulch will be substituted by curlex during application.

3). The slopes will be irrigated weekly to promote plant growth during the life of the mine. The irrigation system will consist of pipe laid across the ground fitted with an ample amount of spray heads to irrigate the area.

All areas affected by surface operations will be graded and restored to a contour that is compatible with natural surroundings. All final grading will be done along the contour to minimize erosion and instability unless this operation becomes hazardous to the equipment operators. Backfilling and grading will proceed so as to eliminate or reduce the highwall. Refer to Plates 3-5 and 3-4 .

The temporary seed mix shown is for drill seeding, when broadcast seeding the rate will be doubled.

The outslope between the road and Crandall Creek will be seeded with the wooded area seeded mix. Where possible this seed will be broadcast on to the soil.

Note: Irrigation will begin approximately in the middle of May and continue through the middle of September depending upon climatic and moisture conditions. If a cover of 80% can be obtained without irrigation, irrigation will be stopped.

Backfilling and grading will be done according to the reclamation timetable as originally submitted.

If possible, the topsoil will be redistributed in the late fall (late September or early October) just prior to the seeding time so as to have a seedbed free of weeds and annual grasses. If the seedbed is prepared early and weeds and annual grasses become established on it before seeding, they will be removed before seeding is attempted, refer to Chapters 8 and 9. Seeding will be done as soon as possible after the seedbed is prepared. If this can not be done within 30 days, the Division will be notified.

Hydro-mulch using a chemical tacifier will be used to anchor the mulch to the seed bed. The grade of slope dictates the seed mix as presented below and shown on Plate 3-4 and 3-5. The use of native and naturalized species recommended in the following tables is based on personal observations of other reclamation projects in the Wasatch Plateau area and at the Great Basin Experiment Station of the USFS in Ephraim Canyon.

On slopes of 30% or less a straw mulch of 1.5 tons per acre will be used to retain enough moisture for seed germination. The slopes greater than 30% will require a hydro-mulch of 1 ton of wood fiber mulch per acre. The wood fiber mulch shall be suspended in water to form a slurry type material and shall be sprayed evenly over the area where it is to be applied after seeding is accomplished. The straw mulch will be applied to slopes less than 30% and anchored into the soil by pulling a notched disc over the straw cover which results in pushing the straw ends into the soil. On slopes of 30% or greater, the ground will be hydroseeded, then mulched with 1 ton of wood fiber hydro-mulch with tacifier added to the mulching process. Any woody plant seedlings will be planted in small depressions on the slopes. No attempts at irrigation will be made.

Typical cross sections and topographic maps which adequately represent the existing land configuration of the area affected by surface operators are shown on Plates 9-1, 9-2 and 9-3. Postmining reclamation cross sections and surface topography will be as near to premining as is possible and practical as noted on Plate 3-5.

A reclamation map showing post construction contemporaneous reclamation areas and final reclamation accompanies this document as Plate 7-5 and 3-5 respectively. Slope rounding on Plate 3-1 has been revised to meet the required slope of 1.5:1 at the specified reclaimed cross sections. Two distinct areas showing post construction contemporaneous reclamation and final reclamation can be found on Plates 7-5.

The applicant has submitted a complete revegetation plan, includ-

ing soil preparation, species lists and seeding rates, methods of planting and mulching techniques. The species lists contain species that are native to the area, with three introduced species included that have proven value to prevent erosion, and which are not overly competitive with the native species. Seeding will be done in the fall, and will be done as soon as possible after seed bed preparation to minimize erosion and enhance revegetation potential. The time of seeding will automatically limit the length of lapse time from seed bed preparation to seeding, and will have to be less than thirty days because of climate. As a result, there will be little chance of excess weed establishment.

A seed mix has been developed for this area, made up of native and naturalized grass, forb and shrub species. A standard of 1336 shrubs per acre, as determined by sampling, has been established. Ground cover in the reference area was found to be 24 percent. A separate seed mix has been proposed for slopes of 30 percent or less. Trees will be planted in this area as well. Disturbance in this area will affect the forested communities: riparian; spruce/fir/aspens; and the previously disturbed community, which was most likely forested prior to disturbance. An area suitable for a reference area for a forested type could not be found within the permit area. Accordingly, revegetation standards for this area have been set as follows: ground cover, productivity figures and shrub density figures and shrub density standards from the reference area will be used; tree density standards will be 550 trees per acre, as recommended by the USFS.

South facing slopes of 30 percent or less and flat areas will be revegetated by seeding with 23 pounds per acre of the following mixture, and will be seeded with a rangeland drill equipped with depth control flanges on the discs. Row spacing will be 12 inches.

Mix No.1 Aspen spruce fur Area of 30% slopes or less

	Lbs./ Acre PLS
Agropyron trachycaulum (slender wheatgrass)	3
Bromus marginatus (mountain brome)	4
Stipa columbiana (columbia needle grass)	2
*Agropyron smithii	4
*Aster glaucoides (aster)	1
Astragalus cicer (lutana milkvetch)	2
Vicia americana	2

(american vetch)	
Symphoricarpos oreophilus	2
(snowberry)	
*Rosa woodsii	1
*Ribes aureum	1
*Ribes cereum	1
TOTAL SEED PER ACRE	23

South facing slopes of 31% or greater will be vegetated by seeding with 30 pounds per acre of the following seed mixture. This mixture will be sown by hand with a cyclone feeder or will be broadcast by hand prior to mulching. Wherever possible, the seed will be harrowed in before mulching is applied. The seed must be high quality seed (high % of germination, with weed seed content at a minimum and without any noxious weed seeds).

Mix No.2 M.S.G. Area 31% slopes and greater

	Lbs./ Acre PLS
*Stipa comata	2
Oryzopsis hymenoides	4
(indian ricegrass)	
Agropyron spicatum	5
(bluebunch wheatgrass)	
*Agropyron smithii	4
*Elymus junceus	5
(russian wildrye)	
*Penstemon watsonii	1
(blue foxglove)	
*Aster glaucoides	1
(aster)	
Vicia americana	2
(american vetch)	
*Linum lewisii	1
(wild flax)	
*Sanguisorbi minor	1
(small burnet)	
Symphoricarpos oreophilus	1
(snowberry)	
*Sambucus coerulea	1
(blue elderberry)	
*Cercocarpus ledifolius	1
(curly leaf mt. mahogany)	
*Juniperus scopulorum	1
(rocky mountain red cedar)	
TOTAL SEED PER ACRE	30

Refer to map showing the areas to be seeded with each mixture, Plate 3-4 and 3-5.

The introduced species used in the above mixes have been used successfully under similar elevation and climatic conditions on the USFS seedings on the Mt. Pleasant Watershed, the Ephraim Watershed, the Great Basin Experiment Station and on all the road cut seedings in Huntington Canyon which have been personally observed. These species do not show enough vigor to compete with native species as the native species become reestablished.

Concerning the revegetation of slopes 31% or greater, these slopes will be hydroseeded, then mulched with one ton of wood fiber hydromulch per acre. On slopes greater than 31%, the seed and mulch will not be applied in one step during hydromulching.

No further data will be submitted supporting the feasibility of successful revegetation using the proposed reclamation procedures due to the fact that the proposed procedures are standard within the industry and the USFS and have been used elsewhere under similar conditions quite successfully. These are standard accepted procedures commonly used throughout the Western United States intermountain region, on USFS and private ground.

No attempt will be made to establish rabbitbrush or sagebrush as previous experience has shown that it is impossible to stop these shrubs from invading the area on their own. If plants of snowberry do not establish from the seeding at the end of the second year, hand plantings of tubular started plants from native plant nurseries will be planted randomly on approximately one rod intervals where they occurred in the original land cover of disturbed areas.

Trees to be planted on the slopes of 30% or less (in conjunction with Mix No. 1) will include Aspen, Englemann Spruce, Douglas Fir and Ponderosa Pine as shown on Plate 3-5. *Populus angustifolia* and *Salix myrtifolia* will also be planted in the wooded area as shown on Plate 3-5. No less than 100 trees of any one species will be planted.

Trees will be established on the wooded area that occurs within the permit area due to the road sedimentation pond building activity, refer to Plate 3-5. The following seed mix No. 4 will be used:

Mix No.4 Wooded Area of 30% slopes or less

	Lbs./ Acre PLS
Agropyron trachycaulum (slender wheatgrass)	3
Bromus marginatus (mountain brome)	4
Stipa columbiana (columbia needle grass)	2
*Agropyron smithii	4
*Aster glaucoides (aster)	1
Astragalus cicer (lutana milkvetch)	2
Vicia americana (american vetch)	2
Symphoricarpos oreophilus (snowberry)	2
*Rosa woodsii	1
*Ribes aureum	1
*Ribes cereum	1
TOTAL SEED PER ACRE	23

	# Plants/acre
Aspen	75
Englemann Spruce	150
Douglas Fir	150
Ponderosa Pine	50
Populus angustifolia	75
Salix myrtifolia	110
TOTAL PLANTS PER ACRE	610

The Salix myrtifolia will be planted within 20 feet of the drainage to assure sufficient moisture for growth. The standard for the tree seedlings will be planted at the rate of 610 seedlings per acre. When considering a normal mortality rate, this would establish the required 90% of the USFS recommended density standard of 550 trees per acre.

The seeding rates used are average for the seeding method used. It is hoped that the shrub seeds in the seeding mix

tures will take hold and give a random spacing of plants over the area. If the seeded shrubs do not take, then the tublings will be planted in clumps. While clumping will not give a uniform seed dispersal over the entire area it would enhance wildlife habitat at little cost.

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. The applicant has committed to protecting revegetated areas and to managing the reference area in a manner compatible with postmining land use.

Contemporaneous reclamation will be undertaken following construction. Plates 7-5 and 3-5 have been submitted showing areas of contemporaneous and final reclamation. All out slopes of 1:1 or flatter and fill slopes of 1 1/2:1 or flatter will be revegetated contemporaneously with the same seed mix as used for topsoil stockpile stabilization. A seed mix for stabilizing the topsoil stockpile has been submitted. Areas not actively needed for operations will be seeded with the same seed mix as that used for topsoil stockpile areas.

The US Forest Service, US Fish and Wildlife Service and DOGM have requested that the riparian habitat be restored along Crandall Creek and Genwal Coal Company has agreed to this request and submitted an appropriate revegetation seed mix. Shrubs will be reseeded over the whole area to enhance the postmining land use of wildlife habitat.

Applicant hereby commits to avoid the use of persistent pesticides and chemicals to prevent 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. The species recommended for revegetation are known to survive in this region without artificial application of additional water.

3.5.5.3 Mulching

Refer to Section 3.5.5.2.

3.5.5.4 Management

Refer to Section 3.5.5.2.

3.5.5.5 Revegetation Monitoring

Success of revegetation shall be monitored by techniques approved by the Division after consultation with appropriate State and Federal agencies. Comparison of ground cover and productivity will be made on the basis of reference areas. Ground cover and productivity figures from the reference area will be used as a standard for all revegetated areas. The shrub density standard for both areas will be 1336 shrubs/acre (as per baseline data). The standard for trees will be 550 per acre (as per Forest Service recommendations). Stocking rates will be higher to account for mortality.

Applicant 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 referred to as Plate 9-1. This mix will meet the post mining land use of light livestock grazing and wildlife use. Data on cover and tree density have been submitted. Shrub planting to enhance the habitat for wildlife use will be determined based upon the density figures obtained. A plan for planting shrubs will be developed prior to implementation and submitted to DOGM for approval if the seeding is not successful as previously described in Section 3.5.5.2.

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 densities in percent of composition are recorded: 92% grass, 2% forbs and 6% shrubs. On the 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 the grass species so to meet required standards. On the reference area, the following densities were found on the original survey: grasses 94%, forbs 1% and shrubs 5%. 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.

A standard for the riparian area could be set up as 10% minimum and 25% maximum grasses, 16% minimum and 30% maximum forbs and shrubs taking up the balance.

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 prohibits nearly all domestic livestock use. There was considerable signs that 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. However, the mine operations on the 30% and less slopes and on the riparian area will exclude all grazing because of the mining operations. Proper use of the area will be no problem.

Ground cover and productivity figures from the reference area will be used as a standard for all revegetated areas. The shrub density standard for both areas will be 1336 shrubs/acre (as per baseline data). The standard for trees will be 550/acre (as per USFS recommendations). Stocking rates will be higher to account for mortality.

In addition to the diversity figures already committed to, it will also be insured that no one species makes up more than 60% of the cover in its respective vegetation class; individual species of shrubs and trees will make up no more than 80% of the density figure for the class.

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 and the MSG area will be reviewed by the SCS for range conditions every 5 years, the fifth year being the year 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 are to be revegetated will be monitored during the 1st, 2nd, 3rd, 5th, 9th and 10th years during the last half of the month of June, thus corresponding to the time of the original vegetation survey. 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 of the required seed mixture. The 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 in percent cover by species and total vegetative cover, the percent of bare ground, the percent of surface fragments and the percent litter within the hoop boundaries. To record these properties, it is suggested

that a USDA Range Condition Record or UT Range 2 form be used. For tree and shrub densities, the point centered quarter plats will be used to check their densities. For sample adequacy of vegetational data during the 9th and 10th year, the formula suggested in the latest DOGM guidelines will be used. It is $n_{min} = (ts)^2 / (dx)^2$.

Approximately 22 plots in the MSG area and 10 plots in the reference area will be needed to meet the standard of the DOGM formulas. The following formula will be used, the 9th and 10th years, to test similarity of the reference area to its affected vegetational counterpart with respect to cover and shrub density and productivity:

$$t = (x_1 - x_2) / (s_1^2/n_1 + s_2^2/n_2)^{1/2}$$
$$df = n_1 + n_2 - 2$$

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 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. Successful reclamation must accomplish 70% of the standards for cover for wildlife habitat, production and density with 80% confidence for shrub lands, or 90% for grasslands. The mountain shrub/grassland vegetation type qualifies as a grassland.

A diversity standard for the riparian area could be set up as 10% minimum with a maximum of 25% grasses, 16% minimum with a maximum of 30% forbs with shrubs taking up the remainder. Additionally, no one species will make up more than 60 percent of the cover in its respective vegetation class and individual species of trees and shrubs will make up no more than 80 percent of the density figure for their class.

As a final step during the last field check up on 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 used for comparison will be dry weights.

The applicant has given a schedule for monitoring the

reference area to ensure that it stays in good range condition. The applicant commits to using standard SCS range inventory techniques for this sampling or to obtaining SCS personnel to do the monitoring. All such monitoring data will be submitted to the Division. The applicant 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.

3.5.6 Schedule of Reclamation

3.5.6.1 Detailed Timetable for Completion of Each Major Step in Reclamation

All reclamation, other than areas handled in contemporaneous reclamation, (see Part 3.5.1 in this Chapter) 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 amended as necessary and then redistributed. 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 early spring as soon as one can work the soil.

The sediment pond and associated control devices will be removed after the criteria of UMC 817.46 (u) have been achieved. The sediment pond will then be reclaimed and revegetated according to the approved reclamation plan and the permanent runoff control system will be completed.

3.5.6.2 Reclamation Monitoring

See Part 3.5.5.5 of this Chapter. All procedures described in this plan (final grading and topsoil placement) will be monitored by supervisory personnel knowledgeable in this proposed plan and all pertinent aspects of the Division's permanent program. Post reclamation water monitoring is described in Chapter 7.

3.5.7 Cost Estimate for Reclamation

3.5.7.1 Cost Estimate of Each Step of Reclamation

The Crandall Canyon Mine bond estimate will be determined as soon as the proposed permit changes are approved.

yds. and the fill is 77434 cu. yds. The difference between cross sections is approximately 35000 cu. yds.

Topsoil must be distributed on the 4.55 acres disturbed during the mining operation.

Seeding is assumed to be required on the 4.55 acres which can be completed for \$270 per acre.

Transplanting of 40 trees, 24 to 30 inches in height, is assumed to cost \$1200 which includes the costs for the tree, transportation and labor.

3.5.7.2 Forecast of Performance Bond Liability During Permit Term

Permit term and life of mine are the same. The liability cost for both the forecast and cost estimate are the same at \$135375.

Applicant proposes the type of bonding to be instituted for the mine life and reclamation monitoring period to be the entire performance bond for the entire permit term (5 year life of mine plus a 10 year liability period) dependent upon reclamation success beginning at the time of the last augmented seeding, pursuant to UMC 805.13(b).

The form of the performance bond that will be submitted to the Division pursuant to UMC 806.11(a) will be a surety bond (MR Form 5) as received from DOGM.

Part 3.6 Bibliography

Revegetation Guidelines for Surface Mined Areas
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Colorado State University
Ft. Collins, Colorado

User Guide to Vegetation, Mining and Reclamation in the West
USDA Report INT-64
Intermountain Forest & Range Experiment Station
507 25th Street
Ogden, Utah 84401

Characteristics of Plants Used in Western Reclamation
Ecology Research Consultants, Inc.
1716 Heath Parkway, PO Box 2105
Ft. Collins, Colorado 80522

Selection, Propagation and Field Establishment of Native Plant Species on Disturbed Arid Lands

Bulletin 500
Institute for Land Rehabilitation
Utah State University
Logan, Utah 84321