CHAPTER IV

MITIGATING MEASURES

Air Quality

All activities affecting air quality must comply with State and federal air quality laws as listed in Chapter VI, Part I.

The primary mitigating measures will be revegetation to control dust and emission control devices. Dust from denuded areas and roads will be minimized by reclaiming spoil piles as soon as possible after mining, treating roads to reduce dust, irrigating areas to hold dust on the ground and hasten revegetation, and placing chemical or physical covers over exposed areas to prevent dust from lifting into the air.

Coal piles should be minimized by shipping coal as soon as possible and limiting storage on site. This will reduce the chance of high winds blowing coal dust and reduce the opportunity for coal to burn on site.

Emission control devices will be used to reduce gaseous and particulate matter from vehicles, processing plants, and heating plants.

State, federal, and industrial fire prevention campaigns will reduce the number of fires. The construction of firebreaks along roads and railroads and around mining activities will limit the extent of fires. Firefighting equipment will be required on the site.

The use of spark arrestors on equipment will cut down on accidental range fires. On turbo-charged equipment and locomotives which cannot use spark arrestors, using a high quality diesel fuel will minimize sparks.

Topography

The mining and reclamation plan filed with the Federal Government, in conjunction with federal regulations, state laws, and the coal lease terms, requires actions to mitigate the adverse topographic effects of surface mining. Spoils will be graded to a rolling topography; the highwalls will be reduced. The final pits will be filled with material from adjacent spoil banks and highwalls. The spoil banks, highwalls, and final cuts will then be covered with a layer of soil material to facilitate revegetation. All exposed coalbeds will also be covered by at least three feet of soil material.

The Atlantic Richfield Company, in its revised mining and reclamation plan dated May 20, 1974, proposes to continously shape the surface disturbed by mining after a lag period of 10 to 12 months from the start of mining; reconstruct this surface by replacing spoils, using 50-foot increments, in the same stratigraphic sequence of the original overburden. Final slopes including the reclaimed highwall will have gradients no greater than 4:1 and will blend into the surrounding landscape to achieve a natural-appearing configuration. Lateral drainage will be maintained to control run-off and erosion during mining.

The restored landform shall be determined by consultations among the lessee, the appropriate land management agency, the State Department of Environmental Quality and the U.S. Geological Survey to assure that company plans conform to operating stipulations. Such consultations will be frequent enough so as not to impede the progress of the mining or reclamation. Prime consideration in grading and shaping shall be catching and holding of any waters falling on the area to improve the water table and catch and hold sediment in such a manner as to protect downstream areas from excessive sedimentation. During the shaping of the spoil into the final landform no closed interior ponds, such as upland playas, should be permitted to form.

Soils

The land will be reformed following mining and construction activity to assure proper vegetation as one of the major criterion. Topsoil will be stockpiled during the mining operation and replaced on the reformed land prior to revegetation.

Mechanized equipment, such as scrapers, which will minimize soil mixing will be used for both stockpiling and replacing topsoil. Productive soil will not be buried or mixed with unproductive or toxic material. Toxic or other undesirable material will be buried below the top 60 inches.

Soil erosion will be minimized by structures such as waterbars, terraces, contour furrows, etc. Soil compaction will be mitigated by restricting off-road vehicle use, ripping, and tilling. Soil protection will be insured by revegetating the disturbed areas or by insuring proper protective measures if other higher uses are made of the lands.

The leasee will provide the Forest Service detailed soils information on the mining area as follows to supplement the information now available and to insure that the above measures will be accomplished:

1. Detailed soils map of the lease area to standards designated by the Forest Service.
2. Take samples of soil from soil horizons and overburden formations down to coal seam for chemical tests to determine presence or absence of toxic or undesirable material and its depth and thickness.
   (a) Sample each individual soil horizon and the underlying geologic layers of the formations and record depth at which sample was taken.

(b) Chemical analysis to include organic matter, pH, exchangeable percentage, copper, manganese, iron, aluminum, magnesium, boron, sodium, chlorine, calcium, selenium, nitrogen, sulfur, phosphorus, arsenic, potassium, base saturation, cation exchange capacity, percent lime, conductivity.

(c) Determine at what level certain chemicals are toxic to plants used in rehabilitation work.

(d) Determine which ions or compounds become insoluble or more soluble when exposed to air, water, and other chemicals.

(e) Describe the character of the overburden material--stony, clayey, etc.

(f) Conduct soil mechanical analysis (particle size and distribution).

(g) Determine soil mineralogy.

3. Determine soil moisture relationships.

(a) Measure precipitation.

(b) Determine potential soil moisture holding capacity.

(c) Determine the amount of soil moisture which is actually available during growing season.

4. After soil has been replaced following mining and before planting, the following detailed information will be obtained:

(a) Soils map characterizing the upper 60 inches.

(b) Chemicals analysis of the top 60 inches.

(c) Conduct mechanical analysis of the upper 60 inches.

(d) Determine soil mineralogy of the upper 60 inches.

Availability of water from deeper aquifers

Water-well supplies affected by lowered water levels in the radius influenced by dewatering for mining could be replaced by deeper wells. The chemical quality of water in the Fort Union Formation is similar or of better quality than water in the overlying Wasatch Formation.

Monitoring programs

Monitoring programs are being established by companies planning to mine coal. A number of the monitoring programs are being planned in consultation with the Water Resources Division of the U.S. Geological Survey. The programs consist of establishing observation wells to determine water-level fluctuations in the coal and the overlying overburden. Water samples will be collected to determine the chemical quality of the water for detecting changes in water quality after mining begins. As mining progresses, observation wells will be established in backfill areas to monitor for leaching and movement of toxic materials.

Vegetation

The loss of vegetation on land disturbed by mining, and the construction of related facilities, will be mitigated by satisfactory revegetation. Initial measures will be started within one year following the reshaping of the land and the replacing of the topsoil. Revegetation efforts will continue until a satisfactory stand of grasses, shrubs, or trees of acceptable species is established and free to grow without irrigation.

Plans to revegetate disturbed land will be approved by the administering agencies. On the National Grasslands, one of the following five options, or combinations thereof, will be used:

1. Plant the reclaimed area with native species only.
2. Plant a mixture of native and introduced species of grasses and shrubs.
3. Plant native grasses, shrubs, and shelterbelts using mining water, treated as required, to maintain shelterbelts.
4. Plant only introduced species.
5. Plant species adaptable to new landforms, natural lakes, and reservoirs.

Following are examples of vegetative species which will be used (the ers to the above options as indicated by the numbers shown):

Reference Number	Species
1, 2, and 3	Blue Grama (*Boutelous gracilis*)
1, 2, 3, and 5	Needleandthread (*Stipa comata*)
1, 2, 3, and 5	Western Wheatgrass (*Agropyron smithii*)
1 and 2	Sandberg Bluegrass (*Poa sandbergii*)
1 and 2	Green Needlegrass (*Stipa viridula*)

Reference Number	Species
2, 3, 4, and 5	Slender Wheatgrass (Agropyron trachycaulum)
2, 3, and 5	Rabbitbrush (Chrysothamnus viscidiflorus)
2, 3, 4, and 5	Winterfat (Eurotia lanata)
2, 3, and 5	Big Sagebrush (Artemisia tridentata)
2, 3, 4, and 5	Yellow Sweet Clover
2, 3, and 4	Crested Wheatgrass (Agropyron cristatum)
2, 3, 4, and 5	Sodar Streambank Wheatgrass
2, 3, and 4	Fall Rye, Oats, Barley Wheat
3, 4, and 5	Russian Olive
1, 3, and 5	Plains Cottonwood
3 and 4	Caragana
3	Yellow Pine
3	Juniper
3 and 4	Hackberry
5	Willow (peach leaf)
5	Hard Stem Bullrush
5	Cattails
5	Deep Water Duck Potato
3 and 5	Wild Duck Millet
3 and 5	Reed Canary Grass
5	Sago Pondweed

Specific revegetation measures will be recommended by the lessee in the mining and reclamation plan for approval by the Forest Service. When

planning and approving revegetation, the lessee and the Forest Service will consider and use supplemental measures to aid revegetation when needed such as:

1. Irrigation, including treating water as necessary
2. Fertilization
3. Soil amendments
   (a) Manure
   (b) Gypsum
   (c) Lime
   (d) Treated sewage
   (e) Sulfur
4. Tillage
5. Mulching
6. Correct time of year to seed or plant

Research studies will be planned and implemented to determine the effect of industrial emissions and dust on plants and animals. Reclamation plans will recognize the effects of landform, vegetation, soil color, and soil texture on the microclimate. Reclamation will be designed to create a microclimate favorable to revegetation.

Not enough is known about the macro- and microclimate on the lease area. These climates will be monitored to gather data such as air temperature, wind speed and direction, precipitation, solar radiation (total incoming and net), humidity, and evaporation. This data will be collected before mining as base line information, and during mining. A variety of situations will be sampled to depict the climatic character of the area.

The mining and reclamation plan will consider modifying the landform to provide a microclimate favorable to revegetation. Such landform

modifications may include terraces, contours, minimizing the area in south-facing slopes, or other ideas which evolve during the course of the reclamation job.

The lessee will be responsible for the continued management of rehabilitated areas, including fencing which may be necessary to control use by livestock and wildlife, until the vegetation is satisfactorily reestablished.

The use of herbicides and soil sterilants in maintenance of rights-of-way will be controlled by applicable federal and state laws, and requirements of the surface owner.

Archeological Preservation

Legislative authorities and obligations which guide issuance of federal license to develop the Powder River coal resources are the statute commonly referred to as Antiquities Act of 1906 (34 Stat. 225, 16 U.S.C. 431-433); Wyoming statutes relating to archeological and paleontological sites (sections 36-11 to 56-13 and 18-330.7 W.S. 1957); Wyoming Environmental Quality Act of 1973 (Section 35-502.12(a)(v)); an act for salvage at reservoir sites (74 Stat. 220; 16 U.S.C. 469-469c); an act for historic preservation (80 Stat. 915, 16 U.S.C. 470-470m); National Environmental Policy Act of 1969 (83 Stat. 852, 42 U.S.C. 4321 et seq); and Executive Order 11593, May 13, 1971 (36 F.R.-8921).

Both federal and state antiquities acts regulate antiquities excavation and collections, and both protect historical values on public lands. They provide for fine and/or imprisonment for violators of their provisions. The Wyoming Environmental Quality Act protects areas of the state designated unique, irreplacable, historical, archeological, scenic or natural. The reservoir salvage act provides for recovery of historical and archeological data from areas to be inundated by certain water impoundment as a result of federal action. The Historic Preservation Act established a system of historic preservation in the nation and requires that certain federal undertakings be submitted for review by the National Advisory Council on Historic Preservation. NEPA states in Section 101(b)(4) that one objective of national environmental policy is to "preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment which supports diversity and variety of individual choice." Finally, Executive Order 11593 affects federal agencies most intimately in that they are instructed to cooperate with the nonfederal agencies, groups, and individuals and to insure that federal plans and programs contribute to the preservation and enhancement of nonfederally owned historic and cultural

values. Agencies are directed to inventory, evaluate and nominate properties in their jurisdiction to the National Register of Historic Places.

Under the mandate of the Executive Order, federal agencies must insure that until inventories and evaluations are completed, the agencies will use caution to assure that federally owned properties which might qualify for nomination to the National Register of Historic Places are not inadvertently transferred, sold, demolished, or substantially altered and that federal plans and programs contribute to the preservation and enhancement of nonfederally owned sites.

The Antiquities Act of 1906 prohibits damage or excavation of plant and animal antiquities on federal lands without a permit (see 43 CFR Part 3). The Wyoming statutes require that permits be obtained before excavation of any archeological or paleontological deposits on either state or federal public lands (sec. 36-11 W.S. 1957).

Archeological and paleontological values on federal lands will be protected by surveys and salvage excavations. The Wyoming Antiquities Act similarly requires a permit for excavation of antiquities on public lands, permission to be granted by the State Board of Land Commissioners.

The Wyoming Environmental Quality Act requires approval of any application for a mining permit under the provisions of Section 35-502.24 (g)(iv) of this Act to assure that "...the proposed operation will not irreparably harm, destroy, or materially impair any area that has been designated by the Council to be of a unique or irreplaceable, historical, archaeological, scenic or natural value."

Surface surveys for evidence of archeological values in the alluvium are fundamental to establishing responsible stipulations for their protection. Therefore those stipulations in the mining plan and/or permit that require surveys will be followed to insure archeological and paleontological protection.

No mining plans, permits or rights-of-way will be approved until the company has coordinated its archeological surveys with the Wyoming State Historic Preservation Officer. Company survey reports will be submitted to the State Historic Preservation Officer with a copy to agencies approving plans and permits. The report will be certified by the Preservation Officer and forwarded to the approving agencies with a statement that surveys have been conducted by competent, professional archeologists and a recommendation for additional surveys to be required before plans and permits are approved. These additional surveys may be necessary if surface evidence indicates further evaluation is necessary. In addition, approvals will be conditioned to require notification to the Area Mining Supervisor of all archeological and paleontological sites discovered during mining prior to disturbance and notification to the appropriate officer of the surface administrating agency of sites discovered during right-of-way construction prior to disturbance. The Antiquities Act of 1906 and Wyoming statutes make it unlawful to excavate sites which are discovered without a permit.

Furthermore, it will be required that the alluvium to be displaced during the mining operation be surveyed and that all surveys be coordinated with the Wyoming State Historic Preservation Officer to insure competent, professional inventories, salvage, and preservation of archeological and paleontological data.

It is recommended that all present and future applicants share in the cost of establishing a full-time resident basin paleo-archeologist under the supervision of the Wyoming State Historic Preservation Officer. The basin archeologist will aid in reducing lead time and development delays by performing advance surveys for support facilities, educating construction employees, sampling soils, responding to company discoveries, and conducting salvage work.

Historical Values

A systematic evaluation of homestead sites and other locatable history shall be completed before the mining begins. If a significant site is located on the lease area, action as specified in Part I shall be taken by the agency having jurisdiction.

Aesthetics

The objectives for aesthetics are to create the least impact possible on the existing landscape character. This means that colors, form, lines, and textures on the rehabilitated land and of intrusions should correspond and blend with those of the natural, characteristic landscape. An exception to this is water features. Water features add interest and motion to a landscape, giving it added character in variety.

The annual operating plan of the A.R.Co. mine will be approved by the Forest Service. The following mitigatiing measures will be required for aesthetic considerations. The proposed mining plan now states that the topsoil will be stripped off and replaced on the reshaped landform. This will reduce or eliminate the color contrast that would otherwise be present.

The landform cannot be restored to the original contour and configuration, but reshaped land can be blended to the undisturbed land to reduce or eliminate the contrast in form, line, and textures at these locations around the lease area. In other words, smooth terrain will join smooth terrain and rough terrain will join rough terrain so that a gradual blending with the adjacent natural areas will take place.

Color, line, and texture contrast in vegetative changes will be reduced or eliminated by using a mixture of native species, including sagebrush, on the rehabilitated areas. On pipeline rights-of-way where long tangents usually occur, the line dominance will be reduced by planting sagebrush, on the right-of-way. Additional clearing in irregular patterns planted to grass will also be used to reduce the line dominance of pipeline rights-of-way.

Structures will be kept as low as possible on the skyline. To do this, they can be placed in natural depressions. Telephone lines and low voltage powerlines can be buried.

The earthy tones of muted grays, greens, browns, and reds will be used as colors for structures to blend with the natural colors in the landscape. Nonreflective materials for roofs and other parts of the structures at the plant site will reduce the visual disharmony.

The effects of the generally lowered profile of the mined area will be reduced by blending the contours at the edge of the mined area with the undisturbed land. The depressions that will be left from this measure will be planned where they can be filled with natural runoff water for an added landscape and recreation attraction.

The added structures, roads, utilities, and railroads cannot be completely blended into the landscape, so for the duration of mining operations, a certain amount of discordant intrusions will have to be accepted.

The mining operation itself will have up to 400 acres disturbed at any given time during its lifetime. This will be an ever-present visual discordant site that cannot be avoided.

Wildlife and Fish

The primary impact of habitat loss will be mitigated by increasing wildlife carrying capacity ahead of mining on areas adjacent to the lease. This will be accomplished by measures such as providing wildlife cover, improving vegetative species' composition, and providing water developments.

Industry will provide detailed ecological information on present populations of macrofauna and associated microfauna as to composition, movements, habitat, and food chains to support rehabilitation plans and the selection of alternate habitat areas.

Wildlife habitat will be considered in reclamation measures following mining and will be coordinated by the surface owner or agency administering surface values with the Wyoming Game and Fish Department.

Following are some examples of measures that should be taken to restore wildlife habitat. Include sagebrush, rabbitbrush, winterfat, and early season grasses in restoration plantings planned for the benefit of antelope and sage grouse. Include additional shrubs suited to the area for cover when deer habitat is involved. Plant and protect aquatic and emergent vegetation in reestablished water developments.

A reservoir with comparable fish and waterfowl habitat as Reno Reservoir will be constructed and established before the 57-acre Reno Reservoir is destroyed. This will be done in the general area of this existing reservoir.

Recreation

The primary mitigating measures for recreation will be prompt reclamation to retain aesthetic and wildlife values and the replacement of Reno Reservoir. Reclamation is discussed under the soil and vegetation sections of this chapter.

Reno Reservoir will be replaced with another reservoir before it is destroyed. This will be done at least five years before the destruction of Reno Reservoir so that the quality of the new fishery and waterfowl habitat will be similar to the present habitat.

Agriculture

Grazing

Existing fences, water wells, and reservoirs will be replaced after reclamation to the extent possible and in locations which will assure optimum grazing use of the reclaimed land. Industry will reimburse individuals and public agencies for any facilities which cannot be replaced due to mining and related development.

Impact of lost grazing, both temporary and permanent, will be mitigated. For example, more intensive grazing on or adjacent to the lease area could occur by improving species' composition, increasing water developments, fencing, and sagebrush eradication. Portions of the lease area will be grazed until mining actually occurs. Prompt reclamation will bring mined land back into production as quickly as possible.

Utilities and transportation facilities serving the area will be placed in corridors on National Grasslands to localize and minimize the grazing area they remove from production. Processing plants and buildings should also be designed to use a minimum surface area.

Where future developments are foreseeable, fill will be compacted during reclamation to provide a stable foundation and protect future developments from subsiding.

Transportation Networks

Powerline, telephone lines, pipelines, roads, railroad spurs, etc., on National Grassland will be authorized by issuance of a special use permit or easement by Forest Service. The authority and laws are covered under Institutional Arrangements.

A long-range transportation plan, including road design and location, needs to be developed by industry, county, state, and federal agencies to meet the needs now and for future uses.

Corridors will be designated for construction of facilities (roads, powerlines, etc.) on National Grasslands to reduce the impacts on other uses. The corridors have not been located and evaluated.